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THE BADGE OF THE COLUMBUS MEETING.

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PROCEEDINGS

OF THE

SEVENTH ANNUAL MEETING

OF THE

ASSOCIATION

OF

Military Surgeons

OF

THE UNITED STATES.

HELD AT

COLUMBUS, OHIO,

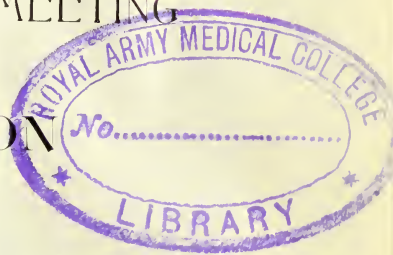
MAY 25, 26, AND 27,

1897.

EDITED BY

JAMES E. PILCHER, M. D.,

CAPTAIN IN THE MEDICAL DEPARTMENT OF THE UNITED STATES ARMY; SECRETARY AND EDITOR OF THE ASSOCIATION.



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Table of Contents.

CHAPTER I. The Minutes of the Meeting.

List of members present, 1. *The Opening session*, 3. Announcements for the meeting, 4. Letters of regret, 5. *Second session*, 7. Reports of officers and committees, 7. Proposed combination of offices of secretary and editor, 7. Status of Marine Hospital Service, 8. Official recognition of insignia, 11. Propriety of official delegation, 12. Nominating Committee, 15. *Third session*, 18. Status of Marine Hospital Service, 18. Vote of thanks to Gen. Oliver and the Treasurer, 19. Vote of thanks to Maj. Carr and Lieut. Col Chancellor, 23. *Fourth session*, 23. Vote of thanks to Central Traffic Association, 24. Lieut. Col. Almy's emergency case, 25. Presentation of badge to Gen. Oliver, 25. Delegates to other bodies, 26. Location of next meeting referred to Nominating Committee, 26. Invitation from Detroit, 26. Question of accepting entertainment from places of meeting, 26. *Fifth session*, 29. Remarks by Dr. Loving, 29. Report of Nominating Committee, 30. Restoration of Colonel McCandless, 30. Vote of thanks to Prof. Pilcher, 31. *Sixth session*, 31. Votes of thanks: the President, 33; Committee of Arrangements, 34; the Governor, 35; the Adjutant General, Dr. Millikin, the Clubs, and Starling Medical College, 35; Officers and Ladies of Columbus Barracks, 35; Colonels Poland and Waters, 35; Ladies' Committee, 35; Academy of Medicine, 35; citizens of Columbus, 35; the railroads, the press and the Columbus Medical Journal, 35; the city of Detroit, 35. Installation of president-elect, 36. Farewell of retiring president, 37.

CHAPTER II. Reports of Officers and Committees.

I. The Treasurer, 39. II. The Auditing Committee, 49. III. The Editor, 49. IV. The Executive Committee, 50. V. The Publication Committee, 52. VI. The Literary Committee, 53. VII. The Committee on Official Recognition of Badge, 53. VIII. The Committee in Credentials, 57. IX. The Committee on Necrology, 61. X. The Committee on Ways and Means, 69. XI. The Committee on Transportation, 70. XII. The Committee of Arrangements, 72. XIII. The Committee on Recommendations in President's Address, 79. XIV. The Nominating Committee, 80.

CHAPTER III. The Opening Session.

I. Invocation—By the Rev. Washington Gladden, D. D.....	81
II. Introduction—By Captain James E. Pilcher, U. S. A.....	82
III. The City of Columbus—By Mayor Samuel L. Black.....	86
IV. The State of Ohio—By Governor Asa S. Bushnell.....	87
V. The Medical Profession of Ohio—By Dr. Dan Millikin, Ex-President State Medical Society.....	91
VI. The Ohio National Guard—By Adjutant General Henry A. Axline	94
VII. The British Army—By Deputy Surgeon General W. S. Oliver, British Army	98
VIII. The Association of Military Surgeons of the United States—By Surgeon General Nicholas Senn.....	100

CHAPTER IV. The Address of the President.

I. On the Status of the Military and Naval Medical Officer—By Medical Director (Commodore) Albert Leary Gihon, U. S. Navy.....	102
--	-----

CHAPTER V. Naval Medicine, Surgery and Hygiene.

I. A Plea for the More Efficient Organization of the Medical Department on our Ships of War—By Medical Inspector (Commander) John C. Wise, U. S. Navy.....	115
II. The Work of the Medical Department on Naval Vessels—By Surgeon (Lieutenant) C. A. Siegfried, U. S. Navy.....	124

III. The Practical Disinfection of Ships of War—By Surgeon (Lieutenant) T. C. Craig, U. S. Navy.....	147
IV. Some Practical Points on Antisepsis in the Navy, embracing Hygiene and Disinfection of Ships, Barracks and Yards, with a View to Preventing the Implantation of Germs of Disease and the Spread of Contagious Affections—By Medical Director (Captain) G. W. Woods, U. S. Navy.....	169
V. Venereal Disease in the Navy and its Prevention—By Passed Assistant Surgeon (Lieutenant) R. Percy Crandall, U. S. Navy	194
VI. A Portable Folding General Operating Table for Use on Naval Vessels—By Surgeon (Lieutenant) C. A. Siegfried, U. S. Navy.	205

CHAPTER VI. Military Personal Identification.

I. The Identification of the Soldier—By Assistant Surgeon General Charles H. Alden, U. S. Army.....	209
II. Identification—By Major George W. Adair, Surgeon, U. S. Army.....	227
III. Objections to the System of Identification in Use in the United States Army—By Major Paul R. Brown, Surgeon, U. S. Army.	243

CHAPTER VII. Clothing and Accoutrements.

I. Accoutrements for the Infantry Soldier—By Deputy Surgeon General W. S. Oliver, British Army Medical Department.....	250
II. The Infantry National Guard Foot Dress—By Major George Halley, N. G. Mo.....	261

CHAPTER VIII. Military Physical Training.

I. Military Physical Training—By Surgeon (Lieutenant) Henry G. Beyer, U. S. Navy.....	265
II. What to Avoid in Army Athletics—By Lieutenant John S. Kulp, Assistant Surgeon, U. S. Army.....	311
III. Physical Training in the National Guard—By Captain Wm. Alfred Westervelt, Assistant Surgeon, O. N. G.....	321
IV. The Physical Proportions of the American Soldier—By Major Henry S. Kilbourne, Surgeon, U. S. Army.....	328

CHAPTER IX. The Military Medical Officer.

- I. The Better Type of Medical Officer—By Lieutenant Colonel Alfred A. Woodhull, Medical Department U. S. Army..... 340
- II. The Medical Officer of the National Guard—By Lieutenant Colonel Leonard B. Almy, Medical Director (Ret.), Conn. N. G. 347

CHAPTER X. Sanitary Work in the National Guard.

- I. History of the Hospital Corps in Connecticut—By Major Julian La Pierre, Surgeon, Conn. N. G..... 352
- II. The Hospital Corps of the National Guard of Pennsylvania—By Major J. K. Weaver, Surgeon First Brigade, N. G. Pa..... 358
- III. The Hospital Corps of Rhode Island—By Lieut. Col. Charles H. French, Medical Director, R. I. M..... 364
- IV. Some Suggestions as to the Medical Department of the National Guard—By Captain Gilbert I. Cullen, Assistant Surgeon, O. N. G..... 372
- V. Camp Sanitation of the National Guard—By Captain James J. Erwin, Assistant Surgeon, O. N. G..... 376
- VI. The Leadville Campaign—By Colonel Clayton Parkhill, Surgeon General, N. G. C., and Major L. H. Kemble, Surgeon, N. G. C..... 393

CHAPTER XI. Transportation of the Disabled.

- I. Hospital Corps Drill—By a Detachment of the U. S. Army Hospital Corps and the Company Bearers of the Seventeenth U. S. Infantry..... 402
- II. A New Method of Lifting and Carrying a Patient by a Single Bearer—By Major Henry McL. W. Moore, Surgeon, O. N. G... 404

CHAPTER XII. Medical Service in the Field.

- I. A United States Army Field Hospital..... 407
- II. A Field Appliance for the Extempore Preparation of Hypodermatic Solutions—By Major Henry McL. W. Moore, Surgeon, O. N. G..... 411
- III. A Medical Chest, suitable for a Battery, Troop, or Independent Company—By Lieutenant Herbert A. Arnold, Assistant Surgeon, Battery A., N. G. Pa..... 414

IV. Personal Equipment for Field Service—By Lieut. Col. Henry R. Tilton, Deputy Surgeon General, U. S. Army.....	419
V. Some Remarks on Mountain Campaigning from a Medical Standpoint—By Captain Henry P. Birmingham, Assistant Surgeon, U. S. Army.....	430
CHAPTER XIII. The Service of Aid to the Disabled.	
I. Scheme of Military Sanitary Organization—By Major John Van Rensselaer Hoff, Surgeon, U. S. Army.....	437
II. The Influence of Certain Modern Military Conditions in Modifying the Lines of Surgical Aid on the Battlefield—By Captain James E. Pilcher, Assistant Surgeon, U. S. Army.....	448
III. First Aid on the Firing Line—By Captain James J. Erwin, Assistant Surgeon, O. N. G.....	454
IV. Military Sanitary Organization on the Lines of Communication and at the Base—By Major John Van Rensselaer Hoff, Surgeon, U. S. Army.....	464
CHAPTER XIV. Military Surgery.	
I The Radical Cure of Inguinal Hernia from the Standpoint of the Military Surgeon—By Major John M. Banister, Surgeon, U. S. Army.....	478
II. Slowly Absorbable Catgut by a Modification of the Boeckmann Method—By Captain W. C. Borden, Assistant Surgeon, U. S. Army.....	497
III. Some Effects of Bullets—By Lieut. Col. Jefferson D. Griffith, Medical Director, N. G. Mo.....	505
IV. The Ambulant Treatment of Fractures—By Major Edward Martin, Surgeon, N. G. Pa.....	521
V. On Fracture of the Lower Extremity of the Radius in its General and Military Aspects—By Dr. Lewis Stephen Pilcher, formerly Passed Assistant Surgeon, U. S. Navy.....	523
CHAPTER XV. Instruction in Military Medicine and Surgery.	
I. On Military Medical Problems—By Lieut. Col. Alfred A. Woodhull, Medical Department U. S. Army.....	537
II. Regimental Instruction in First Aid—By Surgeon Captain Rory Fletcher, Eighth V. B., King's Royal Rifles.....	577

- III. The Place of Military Medicine and Surgery in the Medical College Curriculum—By Dr. George M. Kober, Professor of Military Surgery in the Georgetown University Medical School..... 610

CHAPTER XVI. Military Medicine.

- I. The Use of Kola in Military Practice—By Colonel George H. Penrose, Surgeon General, Utah N. G..... 616
- II. On the Management of Acute or Sudden Recurrent Appendicitis in Camp and in the Field—By Brig. Gen. M. O. Terry, Surgeon General, N. G. S. N. Y..... 620

CHAPTER XVII. Foreign Military Sanitary Matters.

- I. The Medical Department of the Mexican National Army—By Major Louis M. Maus, Surgeon, U. S. Army..... 624
- II. A Military Delegate to the Second Pan-American Congress, Mexico, November, 1896—By Colonel Charles H. Alden, Assistant Surgeon General, U. S. Army..... 641

APPENDIX.

Constitution and By-Laws of the Association of Military Surgeons of the United States.....	650
Officers of the Association from its Organization.....	655
Register of Members, Life Members.....	657
Active Members	658
Associate Members	672
Corresponding Members	673
Honorary Members	675
Deceased Members	676
List by States and Services.....	677

PROCEEDINGS
OF THE
SEVENTH ANNUAL MEETING
OF THE
Association of Military Surgeons
OF THE UNITED STATES,
HELD AT
Columbus, Ohio, May 25, 26 and 27, 1897.

CHAPTER I.

The Minutes of the Meeting.

THE Seventh Annual Meeting of the Association of Military Surgeons of the United States convened in Columbus, Ohio, May 25, 26 and 27, with Medical Director (Commodore) ALBERT LEARY GIBON, U. S. N., President, in the Chair.

The following members were present during the meeting:

Maj. G. W. Adair, U. S. A.	Lt. Col. L. B. Almy, C. N. G.
Capt. Chas. Adams, Ill. N. G.	Lt. H. A. Arnold, N. G. P.
Col. C. H. Alden, U. S. A.	
Lieut. W. F. Barry, R. I. M.	Maj. A. H. Briggs, N.G.S.N.Y.
Gen. R. A. Blood, M. V. M.	Maj. O. J. Brown, M. V. M.
Lt. Col. C. B. Blubaugh, W. V.	Capt. F. E. Bunts, O. N. G.
N. G.	
Lieut. W. Boardman, N. G. P.	Maj. H. Burgin, N. G. P.
Lt. Col. E. Boeckman, N.G.M.	Gen. F. W. Byers, W. N. G.

- Maj. L. C. Carr, O. N. G. Maj. T. C. Clark, N. G. M.
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 Capt. R. J. Gibson, U. S. A. Lt. Col. J. D. Griffith, N. G. M.
 Med. Dir. A. L. Gihon, U. S. N. Maj. L. T. Guerin, O. N. G.
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 Maj. F. W. Hendley, O. N. G. Prest. W. H. Humiston, Ohio
 State Med. Soc.
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 Docent Dr. O. Kukula.
 Maj. J. La Pierre, C. N. G. Maj. H. Lippincott, U. S. A.
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 Col. C. Parkhill, N. G. Col. Gen. A. W. Phillips, C. N. G.
 Lt. C. F. Peckham, N.B.R.I.M. Capt. J. E. Pilcher, U. S. A.
 Gen. J. T. Priestley, N. G. Ia. P. A. Surg. L. S. Pilcher, (Late)
 U. S. N.
 Capt. D. A. Rannells, O. N. G. Maj. G. H. Rohé, M. N. G.
 Maj. J. H. Rodgers, O. V. I.
 Col. N. Senn, Ill. N. G. Capt. W. T. Stark, N. G. Mo.
 Capt. A. V. Smith, O. N. G.
 Gen. M. O. Terry, N. G. S. N. Y. Mr. C. Truax.
 Maj. J. K. T. Van Pelt, U.S.V.
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Capt. F. C. Weaver, O. N. G.	Med. Ins. J. C. Wise, U. S. N.
Maj. J. K. Weaver, N. G. P.	Maj. F. J. J. Wood, N. G. S.
Capt. W. A. Westervelt, O.N.G.	N. Y.
Lt. J. L. Wheaton, R. I. M.	Capt. T. B. Wright, O. N. G.
	Capt. G. A. Wuchter, O. N. G.

OPENING SESSION, TUESDAY MORNING, MAY 25, 1897.

SUMMARY:—Music by the Seventeenth Infantry Band. Invocation by Dr. Washington Gladden. Addresses by Captain Pilcher, Mayor Black, Governor Bushnell, Dr. Millikin, General Axline, General Oliver and Colonel Senn. President's Annual Address by Medical Director Gihon. Announcements for the meeting by Major Moore. Letters of regret.

The seventh annual meeting was opened at 10 o'clock, Tuesday morning, at the High Street Theater, the President, Medical Director (Commodore) ALBERT LEARY GIHON, in the Chair, in the presence of His Excellency the Governor of Ohio, the members of his staff and a considerable audience of the citizens of Columbus and others, at which time a special introductory program was carried out under the direction of Captain James E. Pilcher, Chairman of the Local Committee on Program.

An invocation was pronounced by the Rev. WASHINGTON GLADDEN, D. D. (See page 81.)

The following addresses were then delivered:

"Introduction," by Captain JAMES E. PILCHER, Assistant Surgeon, U. S. Army. (See page 82.)

"The City of Columbus," by the Honorable SAMUEL L. BLACK, Mayor of Columbus. (See page 86.)

"The State of Ohio," by His Excellency, the Honorable ASA S. BUSHNELL, Governor of Ohio. (See page 87.)

"The Medical Profession of Ohio," by Professor DAN MILLIKIN, M. D., ex-President of the Ohio State Medical Society. (See page 91.)

"The Ohio National Guard," by Major General HENRY A. AXLINE, Adjutant General of Ohio. (See page 94.)

"The British Army," by Deputy Surgeon General W. S. OLIVER, A. M. D., Delegate from the British Army Medical Department. (See page 98.)

"The Association of Military Surgeons of the United States," by Surgeon General NICHOLAS SENN, Founder of the Association. (See page 100.)

The President's Annual Address—On the Status of the Military and Naval Medical Officer, by Medical Director (Commodore) ALBERT LEARY GIBON, of the United States Navy. (See page 102.)

At suitable points between these addresses the Seventeenth Infantry Orchestra rendered the following pieces: (1) Sousa's March, Washington Post; (2) Blegar's Overture, Oriental; (3) Selected Two-Step; (4) Eilenberg's Gavotte, Cuirassier Attaque; (5) Conradi's Musical Smiles, and (6) Sousa's March, El Capitan.

After the addresses of the morning, the following announcements for the meeting were made by Major HENRY M. W. MOORE, Chairman of the Committee of Arrangements. "I have neither the desire nor the time to speak of the hospitality of Columbus. The time has come now for you to try us and see. In the beautiful souvenir book, a copy of which has been presented to every person present, it is designed to effect, as has been said, a mutual introduction between our city and the Association. In addition to this it has been the plan of the Committee of Arrangements to get into the hands of every member the finally revised program and into the hands of every lady the list of the entertainments to be given by the Ladies' Committee.

"This evening the Governor and Mrs. Bushnell extend an invitation to every member of the Association, to the ladies accompanying them, to the friends in the city with whom they are visiting, and to the members of the local committee and their ladies, to a reception from eight to nine o'clock at their residence. To-morrow, Wednesday evening, the officers and ladies of Columbus Barracks will give a military reception at the Garrison, cards to which are being issued by the reception committee, and on Thursday evening a reception by the Columbus Academy of Medicine at the Columbus Club will be tendered to the Association. The Columbus Club and the Arlington Country Club have opened their doors to us and special cards to the former are being issued to the members.

"The program of the Ladies' Committee for the entertainment of ladies accompanying the members is as follows: Tuesday: In the morning the opening exercises, High Street Theatre; in the afternoon, the visiting ladies will receive calls from the

ladies of the committee; in the evening, the reception by Governor and Mrs. Bushnell. Wednesday: The morning will be taken up by walks and drives about the city; the afternoon will be occupied by a drive to the Country Club, starting at two o'clock; and in the evening, the military reception at Columbus Barracks. Thursday: The morning will be given up to visits to studios and the Art School Exhibition; in the afternoon, the ladies will be driven to Columbus Barracks to witness the Hospital Corps and Company Bearer Drill, and after that to hear a complimentary concert by the Seventeenth Infantry Band; in the evening, there will be a reception by Mrs. Francis Carter.

"Carriages will be in attendance to convey visiting ladies to all entertainments, except the opening exercises and the Art Exhibit."

The session was then closed with the reading of the following letters of regret:

FROM THE COMMANDING GENERAL OF THE ARMY.

General Miles regrets that, owing to his absence, he is unable to accept the kind invitation of the Association of Military Surgeons of the United States to attend the opening exercises of the seventh annual convention, May 25th.

FROM THE SURGEON GENERAL OF THE NAVY.

I beg to thank you for the kind invitation extended in your note of the 7th instant to attend the meeting of Military Surgeons of the United States to be held in Columbus, Ohio, on the 27th instant, and regret to say that official duties require my presence in Washington at the date specified.

FROM THE SECRETARY OF THE NAVY.

I have the honor to acknowledge the receipt of your letter of the 7th instant, extending to me a cordial invitation to attend the meeting of the Association of Military Surgeons of the United

States, which is to be held in Columbus on May 25th. I regret very much that other engagements prevent my acceptance.

FROM THE SECRETARY OF WAR.

I am very sorry indeed to be compelled to reply to your letter of the 7th inst. that it will be impossible for me to accept your invitation to be present at the meeting of the Association of Military Surgeons on the 25th of this month. My official duties here are so pressing that it will be impossible for me to go.

FROM THE PRESIDENT OF THE UNITED STATES.

The President has requested me to acknowledge the receipt of your letter of recent date and to express his regret that his engagements are such that it will be impossible for him to accept the kind invitation of the Association of Military Surgeons of the United States for the meeting in Columbus on May 25th.

FROM THE SURGEON GENERAL OF THE ARMY.

I have the honor to acknowledge the receipt of your letter of May 7th, inviting me to be present at the meeting of the Association of Military Surgeons of the United States, to be held in Columbus on the 25th of May.

I regret exceedingly that I will not be able to attend this meeting, but I will be represented by my principal assistant, Colonel Charles H. Alden, Assistant Surgeon General, U. S. Army. We cannot both very well be absent from the office at the same time. I take deep interest in the Association and am sure that the meeting about to be held in the city of Columbus will be a most successful one. As an ex-President of the Association I take the liberty of thanking you¹ for your kind interest in the success of the meeting to be held in the Capital City of your State.

¹ Governor Bushnell, Honorary Chairman of the Committee of Arrangements.

SECOND SESSION, TUESDAY AFTERNOON, MAY 25, 1897.

SUMMARY:—Reports of the Secretary, Treasurer and Editor. Auditing Committee. Report of the Executive Committee. Remarks by Medical Director Gihon and Surgeon Murray. Committee on Recommendations in the President's Address. Report of Committee on Official Recognition of Badge. Discussion. Report of Committee on Credentials. Discussion on question of official delegates. Reports of Committees on Necrology, and on Transportation. Report of Committee of Arrangements. Vote of thanks. Nominating Committee. Papers by Medical Inspector Wise and Surgeon Siegfried. Discussion on number of papers. Papers by Colonel Almy, Major Weaver, Major La Pierre, Colonel French, Captain Cullen and Colonel Parkhill.

The Association met Tuesday afternoon at two o'clock in the Senate Chamber, the President, Medical Director ALBERT L. GIHON, U. S. N., in the Chair.

MAJOR HERMAN BURGIN, Secretary, read his annual report, which was accepted with a vote of thanks for the economy with which the office had been administered.

CAPTAIN JAMES J. ERWIN, Treasurer, presented his annual report (See page 39). On motion the report was referred to the auditing committee, the membership of which the Chair announced as follows:

Auditing Committee:

General James Taggart Priestley.

Major Charles Adams.

Surgeon Philip Leach.

The Editor, MAJOR CHARLES C. FOSTER, was not present at the meeting, but his report was afterward received. (See page 49.)

The report of the Executive Committee (See page 50) was read by the Secretary.

THE PRESIDENT remarked concerning the amendments (See page 51) which he proposed:

Our present system of publication of our Transactions is a very cumbersome one. According to the existing method, the papers are first given to the Secretary, who forwards them to the Chairman of the Publication Committee. The Publication Committee may be scattered all over the United States, and the papers

theoretically are submitted to each of its members. They are then gathered together and sent to the Editor, who revises them and transmits them to the Treasurer who contracts for their printing. This method is clumsy and an altogether impracticable arrangement. The suggestion I would offer is that we abolish the office of Editor, and make the Secretary, *ex officio*, the Chairman of the Publication Committee, his associates on that committee being members residing near him and readily accessible, and that this committee, through him, shall contract and provide for the speedy publication of the proceedings. This is the procedure which, after long experience, was found to be the most expeditious and satisfactory by the American Public Health Association. I only make these statements that you may understand the amendment when it comes before you. This will enable us to get the volume out in six months or sooner. The amendment must lie over one year, according to the Constitution. I would suggest to the Nominating Committee, when it is appointed, that in order to carry out the effect of this amendment, which I believe will be passed—I judge so after communicating with a good many of the members—that this year we confer the duties of editor and secretary upon the same individual. You have no idea what an amount of correspondence and loss of time this will save. The amendment still provides that the contract for printing shall be subject to the approval of the President and Treasurer, so there will not be too great a financial responsibility thrown upon one individual, and the interests of the Association still be carefully guarded.

SURGEON MURRAY, U. S. M. H. S., submitted in writing the following remarks concerning the amendments (See page 51) proposed by him:

For myself, personally, and for my service, incidentally, I beg permission to submit some thoughts in favor of the introduction of the proposed amendment, hoping they will lead to fair and just action in 1898, when the Marine Hospital Service will have passed a hundred years of existence. Being the oldest officer in that service gives me no extra claim for a hearing, but it does increase my interest in the service and presses on me the duty of saying a word in its behalf. When I joined the Association I had a faint doubt of recognition, but I joined in good faith. I had

treated naval officers and seamen on board of vessels and in hospital and had done the same for army officers and soldiers in camp and hospital, as many of your members know. I had commanded small armies and camps and played admiral-doctor or surgeon-admiral on the sea and, I think, always to the safety of my country and to the comfort of the afflicted. The hospital I now command cared for sick and wounded Mexican soldiers before many of your members were born. I have now under care seven wounded seamen; two of them suffering with dirk wounds. I lately discharged a case of gunshot of the chest and lung.

During the late war the Marine Hospitals cared for army and navy sick and shot of both belligerents as a matter of course; in case of another war the same will be done. A mutiny on a vessel is only a little naval war and the physician who looks after the injured is thus far a naval doctor; a physician who carefully cares for a camp is thus far a military doctor whether he has a high-sounding string of title or not.

I do not *plead* for full recognition, but I think I am entitled to it, and that the amendment passed at Buffalo was not fairly considered; certainly I did not know it was to be voted on; could not have been present had I known, for I was at the time at sea in command of a fleet and a hospital for seamen's diseases. It is very probable that I would not now be a member and that some others—worthy, too—would not be members if I had known that I was not wanted.

For 28 years I have been a medical society man and but for my military or naval character might have been better known; but a soldier cannot fight and attend salons and leveés at the same time.

I do not ask for the admission of police surgeons, railway surgeons, contract doctors, passenger-ship surgeons, hospital internes or non-graduate volunteer surgeons, but it is fair to insist on full courtesy to the medical officers of the Marine Hospital Service as they are *military* to a degree that would make many a National Guard or State Troop Surgeon dizzy and *doctors* to awe the Medical Corps of both the Army and Navy. The Marine Hospital Service is commissioned; it is uniformed; in parade or martinetism some of its officers can give long points to any corps and in number and variety of patients and diseases treated no service

in the world exceeds it. I think there is no Medical Corps in the world that can excel the Marine Hospital Service in a hurry with a variety of epidemic, blockade, camp, hospital, guard line, local relief and at a minimum cost in money and lives. I think what has been done by me can be done by a majority of the present membership of the corps.

If it is considered, as it should be, that the Marine Hospital Service is the Medical Corps of the U. S. Treasury Department and that department has a navy known as the Revenue Cutter Service and a squad-army known as the Life Saving Service and that the Marine Hospital Service constitutes the medical agent of said army and navy, the relation of my service to the General Government will be more clear to many Americans. I have not mentioned the duties of quarantine except by implication, but in those duties the Marine Hospital Service officer gets full experience in army and navy methods, privations, overwork, emergencies and makeshifts.

These thoughts are set down at random. I might *say* more if ill health and public duty did not prevent me from visiting my native State after 21 years' absence.

The founder of your Association seemed pleased that I was a member and your President can vouch for me.

I trust that in another year the members who can be present will, not by a three-fourths, but by a unanimous vote, place the Marine Hospital Service where it should be in your Association.

On motion the report of the Executive Committee was accepted, the candidates recommended for honorary and corresponding membership were elected and the amendments proposed were ordered to take the usual course.

CAPTAIN PILCHER moved (seconded and carried) that a committee be appointed to consider the recommendations made in the Annual Address of the President, and upon request of the Chair, suggested the following members for the committee:

Committee upon Recommendations in the President's Annual Address:

Colonel Nicholas Senn.
General Frederick W. Byers.
General James T. Priestley.
Colonel J. D. Griffith.

The reports of the Publication Committee (See page 52) and the Literary Committee (See page 53) were then read by the Secretary.

The report of the Committee on Official Recognition of the Badge (See page 53) was read by Captain ARTHUR R. JARRETT., who remarked:

I may say that I have a communication from the Surgeon General of my own State, New York, and he said he would use all his influence in this matter. There is an order in New York that no badges shall be worn upon the dress uniform coat except those specially designated. But at the same time I find many of our members wearing old badges that have been discarded for years, for instance, those long step-ladders, without any criticism from our officers, and I think it is considerable of an anomaly that a badge of so much importance as we claim our badge is, should be ignored while badges of much less value are permitted to be worn. I should think if some member who lives in Washington were to notify us when a favorable paper is to be introduced, we could get the congressmen from our various districts to help push the measure through. I am satisfied, if I had known of the bill that was proposed, I know of enough congressmen who would have helped to pass it. So far I can only report progress, with the sincere hope that next year the officers of the Army will be permitted to wear the badge.

MEDICAL INSPECTOR JOHN C. WISE: I want to say the only way, in my opinion, for that committee to do is, as the Captain suggested, to get one member in Washington to attend to it. I would suggest that some member be put on the Committee who will attend to it. As far as expecting the members through the States to get that through, they will not do it. If the Surgeon General of New York or somebody else will use sufficient influence with the Naval Committee, it will be put through. I will guarantee that if some active man familiar with legislative matters in Washington will take it in hand, it will be put through. I suggest you add to that committee the name of Medical Inspector Marmion, of Washington. In all due deference to the gentleman, if that matter is left as has been suggested, I believe it will be neglected entirely. It must be the business of some one individual and not of a large number. Not long since I had some business in Washington, and I know what I say is true. I soon received a card saying it would be promptly attended to, and it was promptly attended to.

THE PRESIDENT. I regret that Dr. Wise cannot be the gentleman, but he is now on his way to sail the ocean blue.

It was moved, seconded and carried that the Special Committee on Recognition of the Badge be continued.

The report of the Committee on Credentials (See page 57) was read by the Chairman, Captain JAMES E. PILCHER. Moved and seconded to accept.

CAPTAIN A. R. JARRETT: Is it really a good thing for this Association to have any State send a delegate as an official representative of the State? Isn't it a detriment to the Association in keeping other members away, who do not like to come unless they can come as delegates? I think if we would do away with this we would have a larger number present. When the State pays for one to come as a delegate, the 20 or 30 who are not sent by the State may feel slighted, and a larger number may stay away from the meeting of the Association.

LIEUT. COL. C. H. FRENCH: While Rhode Island has not sent a special delegate, Rhode Island has granted transportation to as many as desired to come. Rhode Island has brought five. (Applause.)

MAJOR T. C. CLARK: The manner of getting at this matter is not right, in my mind. Minnesota appointed three official delegates to this Association and gave them credentials.

A MEMBER: Isn't the appointment of delegates desirable in order to bring the Association before the different governors?

THE PRESIDENT: That is one advantage in it, it brings the Association officially before the Governors of the various States. If we existed only as an individual association, we would not have official recognition. For myself, I cannot see how the presence of official delegates will deter the presence of others. I think it would be well to hesitate before doing away with official representation. It has been the custom for the Army and Navy to be represented in the American Medical Association and the American Public Health Association, as well as in this body, and that has not interfered with the presence of others.

CAPTAIN A. R. JARRETT: There are only two or three official delegates present.

THE PRESIDENT: The fact that there are official delegates from the Army does not operate to prevent other men coming.

GENERAL MAYER: In my honest opinion, the only success we will secure in this Association is by having the aid and assistance of the Governors of the different States. It brings this society before the State Governors and the different legislatures; it makes them open their eyes to the fact that this institution is for the betterment of the States and the United States. What can you do? You want hospital supplies, and you want your military department. But who is going to provide for them, unless your legislatures do so? The legislatures provide at the request of the Governors. When my Governor received the letter from Captain Pilcher, why, it didn't take him a moment to decide whether or not this was a great scheme. He called the Adjutant General and said, "Order every one of our surgeons to this meeting." Otherwise I do not think you would have had one here, because they did not know there was such a society. I have been practicing medicine for forty years and I did not know there was such a society until I got the Captain's letter. I cannot see any damage you are doing by having delegates here. I do not understand the Doctor's idea. I understand the United States Government sends its officers here, and the Navy has done the same. Why should not the governments of the States do the same with the officers of the National Guard? I think it is the only way we can succeed, unless we want only the Army and Navy officers to come once a year, and God knows they can't all come. Our meeting is small enough as it is. I understand we have some 400 members, but there are not 75 members here. Let the Governors send all the military doctors they want to send, it can't hurt us any. I hope the Doctor will refrain from offering his resolution. (Applause.)

COLONEL NICHOLAS SENN: I certainly endorse what the previous speaker said with reference to keeping in touch with the Governors. I am certain if Captain Pilcher had not corresponded so largely with the Governors, our delegation would not be so large. I think we should hereafter tax the delegates with a duty.

Each delegate should report to his Adjutant General what he sees and hears here. I hope hereafter delegates will not only come as members but as official delegates and report.

MAJOR T. C. CLARK: I forgot to add that the Minnesota delegates are required to hand in a report to the Adjutant General. We have done so heretofore and it has been published.

GENERAL COOK: It seems to me that the Association has lost sight of Captain Jarrett's remarks. I do not wish to seem contrary, but I wish to disagree with the gentleman who preceded General Senn. I have attended every meeting until the last two meetings, and we have hardly known such things as official delegates, but our attendance has been about as large as it is now. The Governor has ordered out all the medical officers of the National Guard of Ohio, I understand. But there are many States who have ordered only four or five as delegates when there are many others who could come but would feel hurt at the preference shown and would stay at home. I feel like keeping in touch with the Governors, but there are many who have retired, as I have, and they would be crowded out. That is the spirit of Captain Jarrett's remarks. He would keep from wounding the feelings of those who would not be sent as delegates.

CAPTAIN PILCHER: The Committee on Credentials has included in its report every delegate whose credentials have come into its possession, and it will be glad to render its report still more complete by the addition of any whose names have not been announced. While our report is as complete as we could make it, one or two points brought out in this discussion would seem to deserve attention at our hands. The statement, for example, that there are only two or three official delegates present is very far from correct for *there are no less than forty-eight*.

The statement also that official delegates are a recent innovation is equally incorrect. The Army has been represented by official delegates almost from the beginning, and delegations from states were almost coeval with those of the Army. There was an official delegation of sixty at the last meeting in Philadelphia, and at the previous meeting in Buffalo twenty-eight delegates were reported, the entire list not being included.

It is believed that a moment's reflection will cause any member to rise above a feeling of jealousy because another officer has been selected as an official delegate from the organization of which he may be an officer. Few states are willing and a still smaller number are able to send their entire medical corps to our meetings. Yet, as a most important reason of our being is the obtaining of official recognition for the Association and its badge, we should leave no honorable means unemployed to secure this end. The official delegate has no special privileges in this Association; he pays his fees and is expected to do his duty like other members. He is simply a tangible tie between this Association and the governmental body, whose favorable disposition toward our work we desire to secure. I hope that this important feature of the Association will be permanently retained.

Motion to accept the report and continue the Committee carried.

The report of the Committee on Necrology was presented by the Chairman, Colonel PARKHILL. (See page 61.) On motion this report was adopted and the Committee continued.

The Committee on Ways and Means reported by letter. (See page 69.) On motion the Committee was discontinued.

The report of the Committee on Transportation, Major ALBERT H. BRIGGS, was read, and on motion accepted. (See page 70.)

The report of the Committee of Arrangements was read by Major H. M. W. Moore. (See page 72.) On motion the thanks of the Association were extended to the Committee for their very effective services in the organization of the meeting, and the report of the Committee was accepted:

Under the provisions of the Constitution the Chair called for members of the Nominating Committee to be designated by the states and services. The following members were so designated:

Nominating Committee:

Colorado (1), Col. Parkhill.

Connecticut (2), Gen. Phillips, Col. Almy.

Illinois (2), Gen. Senn, Maj. Adams.

Iowa (1), Gen. Priestley.
 Massachusetts (2), Gen. Blood, Maj. Brown.
 Minnesota (2), Col. Boeckman, Maj. Clark.
 Maryland (1), Gen. Warfield.
 New Hampshire (1), Gen. Cook.
 New Jersey (2), Col. Myers.
 New York (4), Gen. Terry, Col. Henry, Majs. Briggs and Wood.
 Ohio (3), Majs. Hendley and Moore, Capt. Smith.
 Pennsylvania (5), Majs. Weaver, Egle and Johnson; Lieuts. Halberstadt and Arnold.
 Rhode Island (2), Col. French, Maj. Wilson.
 West Virginia (1), Gen. Mayer.
 Wisconsin (2), Gen. Byers, Maj. Evans.
 Army (7), Cols. Alden and Waters, Majs. Lippincott and Adair, Cpts. Gibson and Pilcher.
 Navy (5), Med. Insp. Wise, Surgeon Leach.

The scientific work of the meeting was opened by Medical Inspector (Commander) John C. Wise, U. S. N., who read a paper on "A Plea for the More Efficient Organization of the Medical Department on Our Ships of War." (See page 115.)

Medical Inspector Wise also presented a paper by Surgeon (Lieutenant) C. A. Siegfried, U. S. N., upon "The Work of the Medical Department on Naval Vessels." (See page 124.)

COLONEL SENN: In view of the number of papers before us, would it not be well hereafter to give the preference to gentlemen who are present?

MEDICAL INSPECTOR WISE: Mr. President, I hope that as many papers as is possible will be read in justice to the writers, but hereafter I think it would be well not to have too many. Discussions upon the papers are really the most valuable and desirable features of our meetings.

THE PRESIDENT: At one time we were apprehensive of a dearth of material; but through the energetic efforts of Dr. Wise and his associates, as well as those of the local committee, we have not only the twenty-five papers we proposed as the limit, but

twenty more in excess of it. I agree with Dr. Wise as to the value and desirability of the discussing of papers, and suggest in future the restriction to the number that can be read and discussed.

The paper of Surgeon Siegfried was then referred for publication.

The following papers upon correlative subjects were then read in succession:

"The Medical Officer of the National Guard," by Lieut. Colonel Leonard B. Almy, Medical Director (retired), Connecticut N. G. (See page 347.)

"The Hospital Corps in Connecticut," by Major Julian La Pierre, Surgeon N. G. Ct. (See page 352.)

"The Hospital Corps of the National Guard of Pennsylvania," by Major J. K. Weaver, Surgeon First Brigade N. G. Pa. (See page 358.)

"The Hospital Corps of Rhode Island," by Lieut. Col. Charles Henry French, Medical Director R. I. M. (See page 364.)

"Some Suggestions as to the Medical Department of the National Guard," by Capt. Gilbert I. Cullen, Assistant Surgeon O. N. G., read by title. (See page 372.)

MAJOR T. C. CLARK: Minnesota two years ago passed a bill creating a medical department in the National Guard. This result was the outcome of the suggestions of Colonel Senn, as President, at the St. Louis meeting. There was passed also an appropriation, providing for the erection of a permanent hospital and a thoroughly equipped hospital department. We are following along the lines of progress laid down by this Association. I simply mention this to show some of the good work being accomplished through the influence of this Association.

The papers upon the National Guard were then further discussed by Gen. Oliver, Col. Senn, Gen. Byers and Gen. Priestley (See page 381) after which a paper upon "The Leadville Campaign," by Colonel Clayton Parkhill, Surgeon General N. G. C., and Major L. H. Kemble, Surgeon N. G. C., was read by Col. Parkhill. (See page 393.)

THIRD SESSION, WEDNESDAY MORNING, MAY 26.

SUMMARY:—Discussion on representation of Marine Hospital Corps. Papers by Colonel Alden, Major Maus, Passed Assistant Surgeon Crandall, Major Ashmun, Colonel Woodhull and General Oliver. Report of Auditing Committee. Vote of thanks to the Treasurer. Report of Committee on Recommendations of the Address of the President. Papers by Surgeon Craig, Medical Director Woods, Captain Birmingham, Major Sullivan, Major Halley, and Captain Erwin. Association Photograph.

The Association met Wednesday morning at ten o'clock in the Senate Chamber, the President, Medical Director Albert L. Gihon, in the Chair.

THE PRESIDENT: There is one matter in connection with the report of the Executive Committee yesterday, which is accentuated now by some further communications, which I have had on the subject. Surgeon General Senn also has received some to the same effect. They are from members of the Marine Hospital Service. The Marine Hospital Service claims the right to come into this Association on terms of absolute equality with the Army and Navy. I will read for your information a letter which I wrote to my old and esteemed friend, Surgeon Robert D. Murray, a very able and distinguished member of the Marine Hospital Service, in reply to his request that I should personally present the amendment to the Constitution, which I beg to lay before the Association in his own name. I may state that the position taken in this letter was indorsed by the Executive Committee:

“COLUMBUS BARRACKS, COLUMBUS, OHIO, 24 MAY, 1897.

Surgeon Robert D. Murray, U. S. Marine Hospital Service, Port of Mobile, Alabama:

MY DEAR DOCTOR MURRAY—I have yours of the 18th inst., with proposed amendment, which shall be presented to the Executive Committee in your name, and I have no doubt will be referred to the Association for action next year. Dr. Wyman has already spoken to me on this subject, and I told him that in view of the recent revision of the Constitution by the Committee, of which the lately deceased First-Vice President, Brigadier General Edward Forster, Surgeon General of Massachusetts, was Chairman, I thought it improbable that any change would be favorably considered, but that in any event, it would be necessary to produce an

official declaration by competent authority, recognizing the U. S. Marine Hospital Service as a distinctively *military establishment*. Had that been done at the outset there never would have been any question as to the recognition of your corps as a *military organization*. If the Secretaries of War, Navy and the Treasury shall unite in declaring this to be so, I am sure the Association will spontaneously amend its Constitution as you desire.

* * * * *

(Signed) ALBERT L. GHON,

President Association Military Surgeons of U. S."

I suggest that the amendments proposed by Dr. Murray be published in the transactions, and that next year they be acted upon. He has the right to ask that, but my own personal views and the views of the Executive Committee are those mentioned in my letter, that the only objection to the recognition of this body is that it is not a military organization. As one of the members said, "If we are not military, in God's name what are we?" Well, they are simply employes of the Treasury Department.

COL. ALDEN: Mr. President—I was not at the meeting when the action was taken in regard to the change of status of these men from active to associate members, and I do not know how it came about. I would like to know whether the Constitution was regularly amended.

THE PRESIDENT: A Committee on Revision of the Constitution was appointed at Washington in 1894, of which Surgeon General Forster was Chairman. To it were referred all pending amendments of the Constitution for condensation, improved diction and arrangement. That Committee revised the Constitution and the revision was reported to the Association at Buffalo in 1895 and regularly acted upon. The Constitution now governing the Association is that revised Constitution.

QUESTION: It was all done at one meeting, then?

THE PRESIDENT: No, it was laid over from the previous year. The proceeding was regular and legal, and the revised Constitution was *unanimously* adopted.

MEDICAL INSPECTOR WISE: I wish to express myself as favorable to the entrance of these Marine Hospital people to this Association. They stand, I think, in a very important relation to the country, and I do not think the dignity of this Association would be lowered in any instance. Primarily and properly we are here to advance the professional interest, and I think the interests of the Marine Hospital Service are cognate to those of this Association. They are men experienced in climatology and they perform an important government function, and I want to put myself on record as favoring their admission into this Association.

THE PRESIDENT: Are they *Military Officers*?

MEDICAL INSPECTOR WISE: No, they are not, but we can certainly associate them with us, I think.

THE PRESIDENT: Nevertheless, we are the Association of Military Surgeons, and the Constitution says: "The Military Surgeons of the United States, in order to promote and improve the science of military surgery, have associated themselves together and adopted the following Constitution and By-Laws."

MEDICAL INSPECTOR WISE: I would like to ask if we have not men in this Association who are not military or naval men.

THE PRESIDENT: They were admitted when the Association was composed only of members from the National Guard, and before the revision of the Constitution.

MEDICAL INSPECTOR WISE: They are medical men.

THE PRESIDENT: Yes; that is not contested. So are railway surgeons and pension examiners medical men. The provision has been made for the Marine Hospital officers as associate members, precisely as it has been provided that (Art. II, Sec. 3 of the Constitution), "Ex-medical officers and other officers of the above mentioned services, (United States Army, Navy, National Guard and Volunteer Militia of the several States) and of the Marine Hospital Service, and ex-medical officers of the United States Volunteer Service are eligible for associate membership." They are given everything that can possibly be expected from this Association; they are admitted to all rights and privileges, except that of holding office and voting.

COLONEL ALDEN: The Chair is so positively right that he must allow me to make the suggestion that he is a little misinformed. The officers in the Marine Hospital Service can hardly be called in the Treasury Department, because they are nominated and commissioned just as the officers of the Navy. These gentlemen are very anxious about this matter and feel very sore about the action taken. I for one am in favor of returning to our former standing and admitting them. They are in every way worthy of it. I can see no adequate reason for excluding them.

GENERAL COOK: Is there any question before the meeting?

THE PRESIDENT: No; this simply comes in connection with the report from the Executive Committee. I desire further to make the explanation that those members admitted in the Association under the old Constitution from the Marine Hospital Service retain their status, and only those afterward admitted come in as associate members. There are several still on the active list. But if we are to continue to admit them as active members, then I hope some one will offer an amendment to change the name of the Association, since it would be without meaning. But this amendment has to lie over until next year.

A paper entitled "A Military Delegate to the Second Pan-American Congress, Mexico, November, 1896," was then read by Colonel Charles H. Alden, Assistant Surgeon General, U. S. Army. (See page 64L.)

The following papers were read by title:

"The Medical Department of the Mexican National Army," read by Major Louis M. Maus, Surgeon, U. S. Army. (See page 624.)

"Venereal Disease in the Navy and Its Prevention," by Passed Assistant Surgeon (Lieutenant) R. Percy Crandall, U. S. Navy. (See page 194.)

"The Hygiene of Enlisted Men." by Major G. C. Ashmun, Surgeon O. N. G.

Selections from a paper "On Military Medical Problems," by Lieut. Colonel Alfred A. Woodhull, Medical Department U. S. Army, were read for the author by Captain Pilcher. (See page 537.)

A brief address upon "Accoutrements for the Infantry Soldier," was made by Deputy Surgeon General W. S. Oliver, British Army Medical Department. (See page 250.)

On motion a vote of thanks was extended to General Oliver for his very instructive and valuable remarks. The motion prevailed without a dissenting voice.

The report of the Auditing Committee was read by General PRIESTLEY. (See page 49.) On motion the report was adopted, and a unanimous vote of thanks was tendered the Treasurer for the admirable manner in which he performed his duties and advanced the interests of the Association.

The Committee on the Recommendations in the address of the President reported through General PRIESTLEY. (See page 79.) A motion to adopt was put by Major Clark and carried unanimously.

The following papers were then read by title:

"The Practical Disinfection of Ships of War," by Surgeon (Lieutenant) T. C. Craig, U. S. Navy. (See page 147.)

"Some Practical Points on Antisepsis in the Navy, embracing Hygiene and Disinfection of Ships, Barracks and Yards, with a View to Preventing the Implantation of Germs of Disease and the Spread of Contagious Affections," by Medical Director (Captain) G. W. Woods, U. S. Navy. (See page 169.)

"Some Remarks on Mountain Campaigning from a Medical Standpoint," by Captain Henry P. Birmingham, Assistant Surgeon, U. S. Army. (See page 430.)

"The Adoption of an Emergency Ration for the National Guard," by Major Thomas J. Sullivan, Surgeon, Ill. N. G.

"The Infantry National Guard Foot Dress," by Major George Halley, Surgeon, N. G. Mo. (See page 263.)

A paper was then read on "Camp Sanitation in the National Guard," by Captain James J. Erwin, Assistant Surgeon O. N. G., (See page 376) and discussed (See page 383) by Col. Almy, Gen. Byers, Major Egle, Col. Myers, Capt. Jarrett, Maj. Clark, Maj.

Weaver, Maj. Rohé, Col. French, Maj. Moore, Col. Griffith, Gen. Blood, Maj. Burgin, Gen. Priestley, Capt. Bunts, Col. Henry, Med. Insp. Wise and Maj. La Pierre.

Major Carr rose to a question of personal privilege and made a full statement concerning his relations with the finances of the Association. (See page 46.)

On motion a vote of confidence was cordially and unani- mously extended to the late Treasurer, Major Carr, of Ohio. On motion a similar vote was unanimously extended to the former Secretary, Lieut. Col. Chancellor, of Missouri.

Immediately after adjournment the Association assembled on the east portico of the State House, where was taken the photo- graph, a reduced copy of which forms the frontispiece to this vol- ume.

FOURTH SESSION, WEDNESDAY AFTERNOON, MAY 26.

SUMMARY:—Papers by Major Adair and Major Brown; discussion by Colonel Alden and Med. Insp. Wise. Papers by Colonel Woodhull, Col- onel Penrose, Captain Woodruff, Surgeon-Captain Fletcher, Colonel Tilton, Major Moore, General Terry. Vote of thanks to the Central Traffic Association. Emergency Case shown by Colonel Almy. Presentation of badge to General Oliver. Delegates to International Medical Congress and to the British Medical Association. Invitation from Detroit. Dis- cussion upon who shall pay expenses of Association meetings.

The Association met Wednesday afternoon at two o'clock in the Senate Chamber, the President, Medical Director ALBERT L. GIBSON, in the Chair.

A paper upon "Identification," by Major George W. Adair Surgeon, U. S. Army, (See page 227) was read by the author.

This was followed by a paper upon "Objections to the System of Identification in Use in the United States Army," by Major Paul R. Brown, Surgeon, U. S. Army, (See page 243) which was read for the author by Capt. Pilcher.

These papers were discussed by Col. Alden and Med. Insp. Wise. (See page 248.)

On motion Colonel Alden was requested to incorporate in the Transactions a monograph upon the "Identification of the Sol- dier," in the line of the present discussion. (See page 209.)

The following papers were read by title:

"Disability Discharge in the United States Army," by Colonel Dallas Bache, Assistant Surgeon General, U. S. Army.

"The Better Type of Medical Officer," by Lieutenant Colonel Alfred A. Woodhull, Medical Department, U. S. Army. (See page 340.)

"The Use of Kola in Military Practice," by Colonel George H. Penrose, Surgeon General, Utah N. G. (See page 616.)

"Degeneration in Military Life," by Captain Charles E. Woodruff, Assistant Surgeon, U. S. Army.

"Regimental Instruction in First Aid," by Surgeon Captain Rory Fletcher, Eighth V. B., King's Royal Rifles. (See page 577.)

"Personal Equipment for Field Service," by Lieut. Colonel Henry R. Tilton, Deputy Surgeon General, U. S. Army. (See page 419.)

A paper was then read on "A Field Appliance for the Extempore Preparation of Hypodermatic Solutions," by Major Henry M. W. Moore, Surgeon O. N. G. (See page 411.)

Brig. General M. O. Terry, Surgeon General N. G. S. N. Y., read a paper "On the Management of Acute or Sudden Recurrent Appendicitis in Camp and in the Field." (See page 620.)

MAJOR BRIGGS: The agreement we made with the railway companies in order to secure concession of fare is that we shall have one hundred certificates. So far we have received but forty-five. A dispatch was received from the President of the Central Traffic Association this morning stating that they will allow the certificates to be signed and used, notwithstanding the deficiency in number. Therefore, the members will be able to secure their certificates any time within an hour. It is a matter that I hope the Association will appreciate, because they never under any circumstances grant a concession of fare where there are less than one hundred certificates.

GENERAL COOK moved that the thanks of the Association be extended to the President of the Traffic Association for his



courtesy in the matter of certificates, and that the Secretary be requested to notify him of this action. The motion was unanimously carried.

LIEUT. COL. ALMY: I hoped at the time of the reading of the papers on field equipments, to show a little equipment which has proven of value to me and is very simple and easily procured. We frequently have trouble in carrying our medicines. Some years ago I saw a little pistol cartridge box which I have found of very great value in this way. It contains a bottle of morphia, a bottle of diarrhoea tablets, a bottle of cocaine, a bottle of heart stimulant for hypodermatic use, a bottle of cathartic pills, and a hypodermic syringe. It is extremely simple. It cost me the enormous sum of sixty cents for the outside of it; I got the bottles for nothing, and the hypodermic syringe is my own. It is very convenient. It is not intended for the hospital but for going around the field when you have nothing else with you—just simply for emergency work.

THE TREASURER announced that he was prepared to supply the insignia and button to any of the new members who had not already secured them.

THE PRESIDENT: It must be understood, gentlemen, that the very pretty device which the Columbus Committee of Arrangements has prepared, is not the regular insignia of the Association. The badge of the Association is the one I now show you, and the Columbus device I am almost afraid may cause some of the members to think it is a sufficient substitute for the other. It is not.

MAJOR EGLE: Yesterday our distinguished visitor from across the border, Deputy Surgeon General W. S. Oliver, expressed himself as greatly delighted upon being the recipient of the souvenir from the Committee of Arrangements. Knowing full well how he appreciates the Association and the work we are doing, I now take the pleasure and privilege of presenting him, on behalf of this Association, with the badge of the Association. (Applause.)

SURGEON GENERAL OLIVER: I can scarcely express how I feel on this occasion. As I have mentioned before, we desire to

establish a society similar to the one you have organized here, and I have also suggested at the same time the advisability of bringing our province in as auxiliary members in every sense of the word, because we need your inventive faculties and your help. I trust our government will carry out the suggestion I shall offer in my report. Again thanking you for the honor you have placed upon me, I can only express to you how gratified I am to receive it.

On motion of Colonel Senn the President and Secretary were authorized to issue certificates as delegates to the Twelfth International Medical Congress at Moscow, to as many as desired to attend that meeting under the auspices of the Association.

The Secretary read a letter from the Committee of Arrangements of the British Medical Association, requesting the appointment of a delegate to their sixty-seventh annual meeting in Montreal this summer.

On motion this invitation was unanimously accepted and, after some discussion, the selection of the delegate was referred to the Nominating Committee.

On motion the Nominating Committee was delegated to select the next place of meeting for the Association.

The Secretary read three letters from Detroit inviting the Association to hold its next meeting in that city, and the invitation was referred to the Nominating Committee.

COL. ALMY: I would like to speak of a matter that I know has attracted the attention of many of the members of the Association. It has been the custom of the Association for the expenses incurred at our meetings in any one city to be largely met by soliciting subscriptions from merchants, hotel keepers, apothecaries, etc., where the Association meets, and I know it has occurred to the members that this is an undignified way to raise funds. Now, I would not cast any reflections on the Columbus Committee for I do not know how they have done. But I wish to make a motion that it is the sense of this Association that hereafter the local Committee of Arrangements should not solicit any subscriptions for the purpose of defraying the expenses of the

meeting; that they may receive any voluntary contributions, but that a small registration fee should be levied at the time of registration in order to meet the expenses. I do not think I need to enlarge upon this subject. The subject must appeal to the sense of propriety of every one. We must pay our own way and not be a burden on the community where we may meet. This process of paying one's own way has been adopted, for instance, by the American Congress of Physicians and Surgeons. I think if the local committee of arrangements would keep down their expenses in meeting and use of halls that may be placed at their disposal, for instance in the medical colleges, we might meet the expenses by a moderate registration fee which no one would feel.

MEDICAL INSPECTOR WISE: I second what Colonel Almy has said. The American Health Association has adopted the same rule. The result is that it has courtesies thrust upon it and wherever that Association goes it has, as at Buffalo, all sorts of things insisted upon, and I suppose that would be practically the result here. But I am doubtful whether we have the right to pass a resolution levying a registration fee, and for that reason I would suggest that it go to the Executive Committee for consideration.

GENERAL COOK: I am heartily in favor of the suggestion by Colonel Almy. We cannot help, perhaps, having some board of health or some individual now and then tender us some courtesy, as a steamboat ride or something of that kind, and it would be discourteous on our part not to receive it. But the Colonel's idea, to pay our own way, I think, is right. This matter of it being referred to the Executive Committee to make a change in the Constitution would be proper unless it is voted here without dissent. I suppose any corporate body can do as it pleases by common consent.

THE PRESIDENT: This meeting can do what it pleases, but it will be binding only on this meeting. To make a change in the Constitution, the matter must be referred to the Executive Committee.

COL. ALMY: I will modify my resolution, that the expense be met by those registering, the amount estimated to be made known by the Chairman of the Registration Committee.

MAJOR ROHÉ: I would like to know what some of the members consider a fair registration fee.

MAJOR BURGIX: In Philadelphia it would have been about \$15 for each person present.

MAJOR ROHÉ: I am informed that the expenses of our meetings is between \$1,500 and \$2,000, and it is rather imposing on the members to ask them to pay a registration fee sufficient to cover that amount. It would probably result in the reduction of the number who will attend next year and an increase in the proportion of the registration fee. If anything, the dues should be increased.

MAJOR BRIGGS: There is another side to this question. I think the debate is a very proper one. The subject is one for the Society to consider in all its bearings. But the other side of the matter is this: Many of the cities of this Union consider it an honor to receive and entertain this distinguished body. I know the city of which I am a citizen did consider it an honor to entertain this Society. The experience I had in obtaining funds to entertain this Association was trivial. I will not say what the expenses were; it is immaterial; but I will say this: I never asked the citizens of Buffalo to contribute one dollar, but when it was known that this Association was coming and funds were needed, they came voluntarily. We paid every bill and we had more than \$300 left to contribute to the poor of the city of Buffalo, which we gave to the Mayor and I believe he planted potatoes with it on the Pingree plan. So you see it left a mark which is a benefit to the city. I think the cities should have the privilege of entertaining in a free-handed and hospitable manner this Association or any other. But of course we can see how it is undignified to go about and beg of this hotel or this corporation which may be benefited, and I would be heartily in favor of a motion to forbid anything like that. If the funds are not given voluntarily, it is better not to have any entertainment whatever. Now, I know the temper of the city of Detroit. As you see, representative busi-

ness men there, that represent the capital of that great and wealthy city, are soliciting this Association to come, and you can depend upon it, gentlemen, if you accept the invitation, you will be hospitably entertained and there will be no beggerly methods used to secure it. It is a delicate matter to discuss at the best, and it is better to accept what comes before us and say nothing.

COL. SENX: I move the resolution be laid on the table. Carried.

FIFTH SESSION, THURSDAY MORNING, MAY 27.

SUMMARY:—Paper, illustrated by stereopticon, by Colonel Griffith. Remarks by Dr. Loving. Report of Nominating Committee and election of officers. Paper by Major Banister. Discussion by Prof. Pilcher, Col. Boeckman, Dr. Kukula, and Col. Alden. Papers by Captain Borden and Prof. Kober. Reinstatement of Col. McCandless. Paper by Prof. Pilcher. Vote of thanks.

The Association met Thursday morning at ten o'clock in the Senate Chamber, the President, Medical Director ALBERT L. GHON, in the Chair.

A paper on "Some Effects of Bullets," was then read, with stereopticon illustrations, by Lieut. Colonel Jefferson D. Griffith, Medical Director N. G. Mo. (See page 505.)

The Association then adjourned to meet immediately in the lecture room of Starling Medical College.

The PRESIDENT: Gentlemen, I have the pleasure of introducing to you the Dean of the Starling Medical College, Dr. Starling Loving, whom, on the authority of a lady in this city, I introduce to you as the foremost man in the profession in Columbus.

DR. STARLING LOVING: As a member of your Reception Committee, gentlemen, and as Dean of the College, I think it is no more than polite to bid you welcome here. A great many surgeons have been educated in these rooms; a great many military surgeons, and a great many who served in the War of the Rebellion were educated here. Also, a great many surgeons of the National Guard of this state and of other states, have been educated here, and I do not think they will disgrace you. The room is very well accustomed to talking and I am sure you need

not be afraid to talk here just as much as you please. It will not hurt the room. I hope you will use it as long as you like, and that next year you will come back and make this your headquarters.

THE PRESIDENT declared the next order of business to be the report of the Nominating Committee, which was read by General Cook. (See page 80.) On motion the report was received, and the Secretary cast the vote of the Association for the election of the nominees presented by the Nominating Committee. The Chair declared the officers elected for the ensuing year as follows:

President.—Lieutenant Colonel J. D. GRIFFITH, N. G. Mo.

First Vice President.—Major JOHN VAN R. HOFF, U. S. A.

Second Vice President.—Medical Inspector J. C. WISE, U. S. N.

Secretary and Editor.—Captain JAMES E. PILCHER, U. S. A.

Treasurer.—Captain JAMES J. ERWIN, O. N. G.

A paper on "The Radical Cure of Inguinal Hernia from the Standpoint of the Military Surgeon," by Major John M. Banister, Surgeon U. S. Army, with presentation of three patients, was then read by Colonel Alden. (See page 478) and discussed by Prof. Lewis S. Pilcher, Col. Boeckman, Dr. Kukula, Capt. Bunts and Colonel Alden. (See page 494.)

The following papers were read by title:

"Slowly Absorbable Catgut by a Modification of the Boeckmann Method," by Captain W. C. Borden, Assistant Surgeon, U. S. Army. (See page 497.)

"The Place of Military Medicine and Surgery in the Medical College Curriculum," by Dr. George M. Kober, Professor of Military Surgery in the Georgetown University Medical College. (See page 610.)

The Secretary submitted to the Association the question of the membership of Col. McCandless, Division Surgeon of Pennsylvania, who had been dropped for non-payment of dues, but

who claimed to have paid them although he had no receipt. On motion Colonel McCandless was duly restored to membership and credited with payment of the dues in question.

Dr. Lewis Stephen Pilcher, formerly Passed Assistant Surgeon, U. S. Navy, read a paper "On fracture of the Lower Extremity of the Radius in its General and Military Aspects." (See page 523.)

CAPT. BUNTS: I do not like to let Professor Pilcher's paper pass by without expressing my thanks to him for bringing such a valuable paper on Fracture of the Lower End of the Radius before this Association. It is a fracture the frequency of which we all recognize, and anything which will enlighten us on the nature and treatment of it surely must be very well received. Therefore, I move that the thanks of this Association be extended to Dr. Pilcher for his able address.

The motion was seconded and prevailed unanimously.

SIXTH SESSION, THURSDAY AFTERNOON, MAY 27.

SUMMARY:—Field Hospital. Bearer Drill. Papers by Major Martin, and Captain Erwin. Discussion by General Byers, Med. Ins. Wise, Captain Bunts, Major Hendley, Major Adams and General Oliver. Papers by Major Moore, Captain Pilcher, Major Hoff, Surgeon Siegfried, Lieutenant Arnold, Major Kilbourne, Lieutenant Kulp, Lieutenant Godfrey, Surgeon Beyer and Captain Westervelt. Vote of thanks to the President, Secretary, Committee of Arrangements, the Governor, the Mayor, Dr. Millikin, the Columbus Club, the Arlington Country Club, Starling Medical College, the officers and ladies of Columbus Barracks, Colonels Poland and Waters, the Ladies' Committee, the Academy of Medicine, the press, the railroads, the Columbus Medical Journal, the citizens of Columbus in general and the city of Detroit. Announcement of committees. Introduction of the newly-elected President. President's closing remarks.

The afternoon session was held at Columbus Barracks. During the hour from one to two in the afternoon a field hospital camp established by Lieut. Col. William E. Waters, Deputy Surgeon General, U. S. Army, was on exhibition. (See page 407.)

A demonstration of the Drill Regulations for the Hospital Corps of the United States Army was given in the hour from two

to three o'clock, by the Company Bearers of the Seventeenth U. S. Infantry and a Detachment of the Army Hospital Corps under the command of Captain James E. Pilcher, Assistant Surgeon, U. S. Army. (See page 402.)

At 3:10 o'clock, the reading of papers was resumed in the Columbus Barracks Hospital, the President, Medical Director ALBERT L. GIBON, in the Chair.

A paper on "The Ambulant Treatment of Fractures," by Major Edward Martin, Surgeon N. G. Pa., (See page 521) was read by Lieut. H. A. Arnold.

A paper on "First Aid on the Firing Line," (See page 454) with a demonstration of a new first aid packet, was read by Captain James Jay Erwin, Assistant Surgeon O. N. G., and discussed by Gen. Byers, Medical Inspector Wise, Captain Bunts, Major Hendley, Major Adams and General Oliver. (See page 461.)

A demonstration of "A New Method of Lifting and Carrying a Patient by a Single Bearer," was given by Major Henry M. W. Moore, Surgeon O. N. G. (See page 404.)

The following papers were read by title:

"The Influence of Certain Modern Military Conditions in Modifying the Lines of Surgical Aid on the Battlefield," by Captain James E. Pilcher, Assistant Surgeon U. S. Army. (See page 448.)

"Military Sanitary Organization on the Lines of Communication and at the Base," by Major John Van Rensselaer Hoff, Surgeon, U. S. Army. (See page 404.)

"A Portable Folding General Operating Table for Use on Naval Vessels," by Surgeon (Lieut. Commander) C. A. Siegfried, U. S. Navy (See page 205.)

"A Medical Chest, Suitable for a Battery, Troop, or Independent Company," was demonstrated and described by Lieutenant Herbert A. Arnold, Assistant Surgeon, Battery A., N. G. Pa. (See page 414.)

MAJOR CLARK: I wish to congratulate Lieutenant Arnold on the very compact, practical chest which he has presented, for the purpose for which it was intended. The supplying of a single troop

or a battery with sufficient medical stores for a summer encampment or a short trip, is one of considerable moment when we take into account the transportation and the cost of the same. With some slight improvements, which the native ability of this body will suggest, I think it about meets the requirements for which it is intended. I certainly think the Committee on Supply and Equipment of the United States will want a very complete description of the same. The question of sepsis and the handling of bandages would have, of course, to be taken into consideration, and that could be provided for by having the bandages properly protected. I commend it as a very sensible and practical case.

THE PRESIDENT: In connection with the chest, Colonel Waters desires me to announce that Messrs. Truax, Green & Co. have a supply of chests on the grounds, which they will be pleased to have you examine after we adjourn. The Senn chest is among them. General Terry desires me to announce that the Remington Company has sent a new bicycle ambulance here. It is outside and after the adjournment he would like you to inspect it. (See page 410.)

A paper on "Military Physical Training," by Surgeon (Lieutenant) Henry G. Beyer, U. S. Navy, (See page 265) was presented by Medical Inspector Wise.

"Physical Training in the National Guard," was considered by Captain William Alfred Westervelt, Assistant Surgeon, O. N. G. (See page 321.) These papers were discussed by Generals Priestley and Oliver. (See page 327.)

The following papers were read by title:

"What to Avoid in Army Athletics," by Lieutenant John S. Kulp, Assistant Surgeon, U. S. Army. (See page 311.)

"The Physique of the American Soldier," by Major Henry S. Kilbourne, Surgeon, U. S. Army. (See page 328.)

"The Soldier as an Athlete," by Lieutenant Guy C. M. Godfrey, Assistant Surgeon, U. S. Army.

MAJOR CLARK: In recognition of the courtesy which has characterized our President in conducting the exercises of this

Association and of his active ability which has enabled us to complete the large program even ahead of time, I wish to offer him a vote of thanks. Seconded and carried unanimously.

THE PRESIDENT: I thank you, gentlemen. I came here feeling that I would hardly be able to conduct you through the meeting and I can only assure you how glad and grateful I am that I can stay to adjourn you *sine die*.

MAJOR CLARK: All of us ought to know the duties of the Secretary and how arduous they are. In recognition of the arduous services of our retiring Secretary, Major Burgin, I move a vote of thanks to him. Seconded and carried unanimously.

MAJOR BURGIN: I thank you, comrades and gentlemen, very heartily indeed. All I can say is that I have tried to do my duty. I thank you very much.

MAJOR CLARK: This, our Seventh Annual Meeting, I am sure, has been characterized by the utmost harmony and resulted in great benefit. We have experienced every comfort during our stay in this city. This we owe much to the Committee of Arrangements, and I wish to offer a vote of thanks to the Committee of Arrangements, especially mentioning Major Moore and Captain Pilcher.

THE PRESIDENT: It has been moved and seconded that the thanks of the Association be tendered to the Committee of Arrangements, mentioning especially the Chairman and Secretary, and before the motion is put I wish to say how much I owe to their exertions and how fully I can appreciate the work done by the Chairman and Secretary of the Committee of Arrangements. We have had almost daily correspondence. I know the amount of official paper has been nearly used up. How much did you send me, Major Burgin?

MAJOR BURGIN: 750 sheets.

THE PRESIDENT: I have just 13 sheets left.

The motion was then put and carried unanimously.

MAJOR CLARK: I move the adoption of the following resolutions:

Resolved, That this Association tenders a cordial vote of thanks:

(1) To the Chief Executive of this State for the personal and official courtesies and for the generous and thoughtful hospitality extended to us;

(2) To the Chief Executive of this city, to the Adjutant General of this State, to the ex-President of the Ohio State Medical Society, to the Columbus Club, Arlington Country Club, and to the Starling Medical College for their courtesy to us;

(3) To the officers and ladies of Columbus Barracks for the brilliant and cordial reception tendered to us as an Association and for the numerous courtesies shown us as individuals;

(4) To Colonel J. S. Poland and Lieutenant Colonel W. E. Waters, the former, for extending to us the freedom of Columbus Barracks and affording us numerous facilities for observing the methods employed in his splendid regiment, and the latter, for the hospitality displayed both in his field and permanent hospitals and for the instructive lessons taught in them:

(5) To the Ladies' Committee for their charming contributions to the pleasures of our meeting;

(6) To the Columbus Academy of Medicine for the reception tendered to us by that body, and

(7) To the citizens of Columbus in general for the cordial hospitality shown us on every side.

Resolutions unanimously adopted.

MAJOR CLARK: I now move a vote of thanks be extended to the press for the very full reports of the proceedings of this Association, and to the railroads for their courtesies, and especially to the publishers of the Columbus Medical Journal for the beautiful souvenir number. Carried.

MEDICAL INSPECTOR WISE: I move a vote of thanks to the authorities of the city of Detroit for the invitation extended to us, and that the Secretary convey to them our regrets, stating that we cannot visit them this year. Carried.

THE PRESIDENT: Now, gentlemen, the Secretary will read the names of those placed upon committees by the President elect and myself in conference. We have done this as carefully as possible and we hope the positions will be accepted with the understanding that each individual will discharge the duties imposed upon him to the fullest degree. If any member does not desire to serve on a committee and wishes to have his name taken off, he will kindly communicate with the President elect.

The names were read by the Secretary. (See page vi.)

THE PRESIDENT: Gentlemen, there is now one very pleasant duty I have to perform. I regret there is no ex-President to conduct the President elect to the Chair, but in the absence of an ex-President I will ask General Cook, who will some day be one, to do that duty. (Applause.)

LIEUTENANT COLONEL JEFFERSON D. GRIFFITH, the President-elect: Had I Dr. Gihon's tongue or his apt way of putting things, I could tell you, gentlemen, how grateful I am to you for having been elected your President for the ensuing year. It is to me the highest compliment that I ever expect to receive. I think more of this Association than of any other one to which I have ever belonged. I was down on its roll as a charter member, and since Dr. Senn five years ago appointed me on a committee to investigate the action of the new bullet, I have worked for this Association in that line right straight along. Two years ago at Buffalo I asked General Sternberg if he would not relieve me. He said, "No, Griffith; you have to go right along with it." Now I am going to stay at it. (Applause.)

Just a few words in outlining what I hope some day may come to the National Guard, which now belongs to our tutors, the United States Army and the Navy. That is, our hospital departments in the several states of the Union are not what they should be, are not what they are in the Army and Navy. If we should ever be called on suddenly in an emergency of any kind, our National Guard should certainly be a strong arm or a help at least, to the Regular Army, and we should be as well equipped in our line as they are. A surgeon in the Army belongs to the Army in its entirety. He belongs to the hospital department. A surgeon of

my brigade at home is an appointee of the Colonel; he is not under the Surgeon General of the State. It matters not, indeed, although the Surgeon General of the State may be changed from time to time by a new administration coming in, the medical department should stay as it is. Let it be made of good men, as is the case with the Regular Army; although General Sternberg or Commodore Gihon or some other man might be changed, that would not change the entire department. If we could have it so in the different States of the Union, it would be better for us, it seems to me. As it is our Surgeon Generals are usually figure-heads. (Laughter.) We cannot order a single man in the whole Department to do anything. Whereas, if General Sternberg says, "Captain Pilcher, I move you to Fort Riley," Captain Pilcher will go to Fort Riley, but he will be just as much Captain Pilcher there as here. If a man is put in charge of a camp or told to inspect a camp, he should do it. But as it is the Major or Surgeon of a regiment, if he is called on to do something by the Surgeon General—he may do it, but if his Colonel don't like it he won't. He is under the direction of the Colonel then, is he not?

MAJOR EGLE, N. G. Pa.: Not with us.

LIEUT. COL. GRIFFITH: You are an exception, then. But where the general rule prevails the change must come through this Association. This Association is already a power, but it can be made a much stronger one.

Mr. President, if I can get together as good a meeting as you have had, if I can get as good a program, and my Committee of Arrangements can do as well as Columbus has done, I shall certainly be thankful.

THE PRESIDENT: You know what to expect at Kansas City, and you have the assurance that you will not be disappointed.

Gentlemen, I do not care to detain you. You have been very faithful. Everybody has been thanked but yourselves. I take it upon myself to thank you cordially for having been absolutely the best conducted body over which I have ever had the honor to preside. (Applause.) There has been no trouble of any kind at any time. The sessions have gone along swimmingly. Look

at the number in attendance here at this last meeting! It is superb. General Griffith said well that the distinction of being President of this Association is the highest any military medical man can attain. I certainly entertain this belief. I was retired from active duty in the Navy nearly two years ago, but I have never realized that I was actually retired while I was in this position. But now when I leave you I shall feel that my active work is really done. I beg in this, my last official duty, to tender you my thanks for the privilege of having it said in my biography that I was once your President. (Applause.)

I now declare the Association of Military Surgeons of the United States adjourned *sine die*, to meet in Kansas City in the year 1898.

CHAPTER II.

Reports of Officers and Committees.

I. REPORT OF THE TREASURER.

ON the 14th day of May, 1896, I became Treasurer of the Association of Military Surgeons of the United States. When in the event of time the new Treasurer had gathered together the assets and liabilities of the Association, he found that at that time he was to be made the custodian of five large boxes weighing 1,300 pounds, said to contain books, valuation not estimated; \$170, which had come into his possession from the Chairman of the Committee of Arrangements for 1896, Major J. Wilks O'Neill, of Philadelphia, Pa.; and \$3.93 from the late Treasurer, Major Lawrence C. Carr, of Cincinnati, O.

In contrast with this he was confronted with claims for liquidation as follows: Lieut. Colonel E. Chancellor, late Secretary of the Association, balance due \$255.80; Colonel N. Senn, ex-President of the Association, \$150; Earhart & Richardson, publishers, \$155.35; and P. F. Harvey, late Editor, \$4.85. Total amount of indebtedness \$566; total amount of cash \$173.93—deficit \$392.07. Added to this amount of liability there was to be anticipated for the near future such liabilities, requiring ready cash, as freightage, cartage, expressage, etc., necessary to the changing of custody of properties; the securing and distributing of the published proceedings, Vol. V, 1895; the publication and distribution of proceedings, Vol. VI, 1896; and the usual incidental expenses, such as postage, stationary, etc., necessary in the transaction of business of the Association.

When it was considered that the reliable dues of the members had been closely collected for 1896; that the field for new members had been thoroughly canvassed; and that there were no other authorized sources from which to expect an influx of funds

until after a time when it would be expected that the proceedings for 1896 would have been published and distributed, the task of accomplishing this end and the satisfying of members who would feel themselves entitled to certain rights without knowledge of the existing difficulties which would make such a realization at least uncertain, appeared to be a situation which could be best appreciated after the undertaking.

The solution of this problem was begun by the new official becoming personally responsible to the out-going Treasurer for a prompt liquidation of whatever claim the publishing house might present for completing and delivering to his address the volumes of the proceedings for 1895. This being done, he secured permission to solicit advertisements to be inserted in the forthcoming volume; also for the offering for sale, at a nominal price, back numbers of the proceedings for which storage had heretofore been paid (there is a charge in the Treasurer's report, 1895, of rent, \$70), and for the soliciting of 25 cents from each member to pay transportation on the proceedings for 1895 that were soon to be distributed. The new Treasurer also found room on his own premises where all books, property of the Association, could be stored free from cost.

After a voluminous and persistent correspondence with business firms of the United States, which was conducted about two months, there was secured for the 1895 publication, advertisements aggregating \$205. The project to unload back volumes of proceedings, and add what revenue it would bring to the treasury, resulted in a net gain of \$32.05.

To give an idea of the expense of receiving and distributing an issue of the proceedings of this Association, the following, which is a statement covering the expenditure attending the distribution of the issue of 1895 (which it will be observed bears no charge for help or personal labor), is respectfully submitted:

For shipment of books from Cincinnati and depositing	
them in place of storage.....	\$9 60
Cases and labels; postage and express charges.....	83 14
	<hr/>
Total	\$92 74

The amount claimed by Earhart & Richardson as balance due on publication of the 1895 proceedings was \$155.35. This

was thought to be in excess of the amount due under a contract claimed to have been entered into between this firm and the Publication Committee. A number of letters had passed between the Treasurer and parties conversant with the terms of the negotiation, which was communicated to the President, who decided to take council before authorizing payment of the same. While awaiting the decision of the President and his legal adviser, the Treasurer undertook negotiations with the publishers looking to an amicable settlement, and had ventured an offer to the firm that was a compromise which provided for concessions on the part of both. This was accepted. When the Executive Officer informed the Treasurer that the best advice he could secure informed him that "the extortion would have to be paid," that officer was ready to meet the former with the result of his negotiation, which readily received his approval, and the debt was liquidated for \$103.75, a saving of \$51.78 to the treasury.

The balance said to have been due Lieut. Colonel E. Chancellor, proved by investigation to have been a contested one, and required a long and careful investigation to inform the Treasurer as to his correct official duty concerning its settlement.

Major Carr, the late Treasurer, had reported to his successor, that the Association, at the close of his term of office, owed Lieut. Colonel E. Chancellor, late Secretary of the Association, \$195.20. Lieut. Colonel E. Chancellor claimed an indefinite sum, but assured the Treasurer that the amount was much in excess of that reported by the other ex-official. To fix a basis on which to work, the Treasurer requested of each an itemized copy of the accounts on which their claims were based; which request was courteously granted. When the figures had been gone over, they revealed the fact that, according to the statement of the late Secretary, the Association owed him \$225.80, and that the account furnished by the late Treasurer had reduced his former statement of \$195.20 to \$55.80. Considerable correspondence was conducted with a view to arriving at a clearer understanding which it was hoped might result in a settlement that would be agreeable to both ex-officers, and just to the Association. When circumstantial and corroborating evidence had been gathered from both sides, the Treasurer was satisfied that, *according to the evidence secured*, the

Association owed Lieut. Colonel E. Chancellor \$55.80, and made him a proposition to settle in full for that amount, which was accepted by him, and a check for that amount was thereupon drawn.

Sec. 4, Art. V of the By-Laws, provides for the executing of a bond by the Treasurer of \$2,000, which shall be acceptable to the Executive Committee.

One of the first official acts of the Treasurer incumbent, was to apply to the National Trust Co. for the required bond. The company requested and was furnished a copy of the Constitution and By-Laws of the Association. After due time their agent favored the Treasurer with a very courteous letter in which he regretted very much that the company whom he represented had considered that the provisions of the By-Laws allowed so much latitude to the Treasurer in handling the funds of the Association, that they did not think they would be justified in assuming his responsibility.

A letter was then addressed to Wm. B. Wilson, No. 110 Wall street, New York, a person known to the Treasurer, and the official head of an organization whose business it is to insure associations and societies against losses from official mismanagement, making request for a bond of the required amount, and including a copy of the By-Law governing the duties of the Treasurer. Subsequent correspondence revealed the fact that this letter was not delivered.

Time had now passed, and the business had become so exacting that the Treasurer did not then find time to pursue this subject further; and the year has slipped through, and your Treasurer has not complied with the requirements of our law. While \$12 or \$15 have thus been saved to the treasury, it is a bad precedent to establish, and one which should not be emulated.

To be able to publish Vol. VI of the proceedings, year 1896, and to have the issue ready to distribute on the first of January, 1897, to all who should then have paid their dues for that year, it was readily seen, would require an extra effort. As far as was within power, the name of every firm in the United States, whose business would admit, and who it was thought might be induced to advertise the same in the proceedings of our Association, was secured, and a letter adressed to each soliciting their advertise-

ment to be inserted in this coming volume. Many of these firms conducted a correspondence with the Treasurer, and a few complied with his request. The number of letters written is not known. The Treasurer has a record of 418 letters and 88 postal cards on which he personally paid the postage, and for which he paid to have written and addressed (no mention of this is made in the accounts, or in the financial report), and he probably wrote as many more. The profits to the Association, the result of this effort, was \$340. To secure one advertisement of \$30, it was agreed by the Treasurer that he would personally accept that amount in merchandise, a part of which he has already received. But he has not yet paid the amount into the treasury—that department is therefore \$30 short.

The delay of the publishers carried the time for this work sufficiently far beyond the first of January, 1897, to allow the collection of annual dues to meet the expense, and have all receipts from advertisements to be used to pay back debts, which have so long been an unwholesome burden to the Association.

There has accumulated, and are now in the custody of the Treasurer, 1,135 volumes of annual proceedings of the Association, apportioned as follows:

Proceedings for 1891, Vol. I.....	297
Proceedings for 1892, Vol. II.....	135
Proceedings for 1893, Vol. III.....	34
Proceedings for 1894, Vol. IV.....	216
Proceedings for 1895, Vol. V.....	323
Proceedings for 1896, Vol. VI.....	132

These are valuable books in the hands of those who appreciate them, and some time they may be sought after, as are other volumes of similar kind. To show that they are in this way appreciated, I have only to refer to the fact that the Treasurer has, during his time of office, frequently received from medical and library associations requests for sets of these books to be deposited in their libraries. Also from the War Department of the United States for the same purpose.

As we have this number of copies which are of little use to the Association, and which might be of benefit to others, and pos-

sibly in an indirect way to this body if thus distributed, he has complied with these requests, allowing the recipients of same the privilege of paying transportation. This he would advise to be continued by his successor.

Through knowledge obtained by connections with certain patriotic organizations, the Treasurer had become aware that it was a part of the financial plans of these societies to add to their treasuries through profits from sales of badges, or insignia of their associations. In comparing the prices for which the insignia and button of the Association of Military Surgeons of the United States was sold, with the amounts paid by others for a similar article, it occurred to him that the profits usually secured to the institution authorizing it, were in this case going to the parties who sold the goods. Acting on this suggestion, negotiations were opened with a firm in Cleveland, O., to ascertain what the expense of these articles would be to the Association. The prices named were a reduction of \$2 on each insignia, and 50 cents on each button, from the prices then paid to the authorized manufacturers. The result of this investigation having been communicated to the latter, ready consent was secured for a conformity in prices to agree with the new offer, and a contract was procured for an advertisement in the published proceedings for 1896. The prices of these emblems to the members having been established by custom, the Treasurer arbitrarily announced that the insignia and button could be obtained only from the Treasurer; which, if approved by the Association, will hereafter result in the profits from these sales being converted into the treasury.

It is the wish of the Treasurer to call the attention of the members, and more especially of the officers of the Army and Navy, to a greater appreciation of the necessity for informing the Treasurer of their changes of address. The published proceedings for 1895 and 1896 have been sent to each member to the latest address known to the Treasurer, and in many cases have been returned at the expense of the Association, or have been sold by express companies as unclaimed matter. Many members have been displeased because of their not having received their volumes, who would have pleased themselves and the Association's officers better had they taken this precaution.

When I consented to accept the Treasurership of this Association I did so with the ambition that I might at this meeting be able to report the Association out of debt. As time wore away, my ambition grew with age, and I came to entertain the idea that I might have the pleasure of concluding my term with as much cash in the treasury as there appeared to be a deficit when I assumed this responsibility. The accounts as they came into my possession showed the latter to be \$392.07. I will submit this certified check as an evidence which will show to you how nearly my ambition has been accomplished (\$646.86).

Of the roll of active members, 129 are delinquent in dues for 1897, a deficit due the Association amounting to \$645; 34 others owe for 1896 and 1897, making an addition of \$340; together they form a total aggregate for dues unpaid of \$985. (This refers to none of the many who are more than two years in arrears.) It is not to be supposed that these men will all of them make their deficiencies good. We have only to look for corroborative evidence to the names in each annually published roster, and note the numbers dropped from the preceding roll. While this is true, there is another feature more wholesome in its aspect which speaks for a brighter future. Three have paid dues one year in advance, and a few of these old delinquents have been writing inquiries concerning their financial standings, and some have settled their accounts and thus had their names replaced upon the roll. Some of these may have been stimulated in their acts by the depleted condition of the treasury. There are different ways by which the masses may be reached in matters pertaining to this kind. One class who really have the interest of an institution at heart, will respond with ready cash to help in times of need. Another and larger set are heard from when the treasury is plethoric and does not actually need their assistance. The institution is popular then, and they wish to be "known within the gates." But by far the greatest number do the best they can and fully appreciate the value of all good things which come their way. To the former and to the latter, our Association owes a debt of gratitude, and the condition of the treasury now invites the attention of the others; if any such there be among us.

REPORT OF TREASURER, MAY 15, 1897.

Amount received from Chairman Com. of Arrangements, 1896, \$	170.00	
“ “ for Dues.....	1069.60	
“ “ for Membership fees.....	170.00	
“ “ from Advertisements	515.00	
“ “ from Sale of Proceedings	52.75	
“ “ from Late Treasurer.....	3.95	
“ “ from Time Deposits, %.....	4.64	
“ “ from other sources	15.02	
		\$2000.94
Paid P. F. Harvey, Editor, 1895.....	\$ 4.60	
“ E. Chancellor, late Secretary.....	55.80	
“ N. Senn, Ex-President.....	150.00	
“ Earhart and Richardson	103.57	
“ Medical Gazette Publishing Co.....	657.90	
“ For cases for shipping books.....	31.00	
“ For printing and stationery.....	23.00	
“ Secretary.....	115.00	
“ Shipments of Proceedings.....	135.94	
“ For Postage.....	37.85	
“ For transporting property.....	21.57	
“ Sundry Items.....	17.85	
Cash in Bank	646.86	
		\$2000.94

(Signed) J. J. ERWIN, Treasurer.

DISCUSSION.

MAJOR CARR: You have heard so much from Ohio to-day that I am almost afraid to get up, but I cannot resist the temptation to explain to the Society the cause of the seeming discrepancy of the account as it previously existed and how it now appears.

Colonel Chancellor was a very sick man, as you all know, and when he left our meeting in Buffalo, he went home and started directly for Europe. He telegraphed me from St. Louis to send him some money, if I could spare it. I sent him a check of \$200, which reached him in New York, and it was only after finding the stub of that check that the misunderstanding was cleared up.

If yesterday was Ohio's day, to-day surely is not. This morning three gentlemen conversing together saw me as I passed. One of them called to me: "Say, Major, I understand you had a balance of 300 and odd dollars at the Philadelphia meeting, and if I heard the Treasurer's report aright, he says he received but \$3.70 from you. What is wrong?"

¹ Major Carr's statement was made upon two successive days but for unity, both portions are presented together.

It struck me then that he was correct and such had been the report. This morning I heard the report of the Committee on Ways and Means—it also charges extravagance against the outgoing officers, and all of this it seems to me, will appear in the minutes without a word of explanation. I crave five minutes of your time to show to old members the conditions that prevailed, and to tell to the new members some things they should understand.

I went to Chicago, at the call of General Senn. I was a stranger, but on account of the button I wear, Major Byers, now General Byers, and Captain Mann, took me in and cared for me. There the Association was born. The second year took us to St. Louis. In the meantime the angel of death had not passed us by, and our Secretary, Colonel Matthews, was taken from us; Colonel Chancellor was elected to this place.

The third meeting found us at Chicago once more. This Association honored me by electing me Treasurer. One hundred and twenty-two dollars was turned over to me (sum now depends entirely upon my memory, having no books or data). By persistent communication I succeeded in locating 105 members in good standing. The dues were then \$2 per year, but as 105 would not divide 122 with any satisfactory result, I left the matter for the Washington meeting to settle. When I received the \$122 above referred to the Association was about \$1,000 in debt, \$800 of which was due to General Senn and Colonel Chancellor for moneys advanced. By the time of the fourth meeting at Washington I was able to reduce our liability by \$300.

I will say here, gentlemen, that to these two, Senn and Chancellor, our Society owes not only its present condition, but its very life. As a loving mother carries her new-born through its first illness, so they took us up in their arms and bore us beyond the rough places. You will always remember the name of Senn. You should never forget the name of Chancellor. Colonel Chancellor is an unique character. He is extravagant in his personal tastes and habits—he was born so. He was an extravagant Secretary for this Association. When we told him to reduce his expenses, he said: "I will run the office of Secretary my way, or I won't run it at all." The report of the Committee on Ways and Means admits that the extravagance did the Association an immense amount of good, but the report contains no word to the credit of Colonel Chancellor or any other officer.

In Washington I promised the Association that we would go to the Buffalo meeting with \$1,200 or \$1,500 in the treasury. I based my calculation on the following: Our dues were now \$5; our membership was rapidly increasing; our last published proceedings had cost but \$441, and advertisements to the amount of \$1,000 or more could be obtained.

It was settled by resolution that no contract should be made without the agreement of the President, Secretary and Treasurer. Shortly after the Washington meeting I received word from Chancellor that, with the consent of General Sternberg, he had contracted with Buxton & Skinner, of St. Louis, for the publication of proceedings to cost in the neighbor-

hood of \$2,000 (it afterward proved to be more). I telegraphed to him and wrote to General Senn in an endeavor to stop this, but it was too late. With this contract I had naught to do. Chancellor, however, put his shoulder to the wheel and secured about \$1,100 of advertisements. The firm of Buxton & Skinner made my life miserable for the next few months, drawing on me, and threatening suit, but I had no money to pay them with. They also began to dun Chancellor until he appealed to a few of us for \$100 donations. He had already received a check for \$100 from General Senn. I insisted on its return, and stopped the movement, maintaining that Buxton & Skinner knew we did not have the money when they took the contract, and that they should wait. I also made Buxton & Skinner understand that the Association was not responsible, as I had not agreed to the contract, and so we went to our Buffalo meeting about \$700 in debt.

After my vacation last year I found on reaching home a letter from my successor stating that with all available assets he could not count on more than \$250. I answered there must be a mistake somewhere, as he could draw on me for \$300. He told me to pay it to the publishing firm who had contracted for our last proceedings. I did so. I boxed books, sent them to him, paid some small bills, and sent him the balance, and also a supplemental report, showing what had become of the 300 and odd dollars. Then arose the trouble with the publishers in regard to the remaining copies of the proceedings. My successor wrote me that Earhart & Richardson would not let him have them unless the bill was paid. I went to the firm, became personally responsible, and the copies were shipped to him. Immediately following, arose the question of extortion. As I had nothing to do with this contract, I knew nothing of the facts. The matter was finally settled, not without considerable trouble to myself.

My annual report was in charge of the Auditing Committee at Philadelphia. It was in the hands of the Chairman, General Forster. We all know how suddenly he was called from among us. The report was lost. I made out another as best I could, but it does not appear in the proceedings. I mention these things in a spirit of fairness because the younger members do not know of them. I would wish them to remember that, although now grown and waxed strong, there were many obstacles in the way of our growth, and while we stand here to-day as a mighty tree rooted deep in friendly soil, with wide-spreading branches reaching far and wide throughout this broad land, aye and beyond it, do not forget that you were a little sapling with shy and delicate tendrils reaching out over stony places, and you should not forget the men that led those tendrils to cool, moist and nourishing places, and gave our Association a chance to become what is to-day.

MEDICAL INSPECTOR WISE: This Association will never forget Senn or Chancellor, but I, for one, will never forget the late Treasurer.

II. REPORT OF THE AUDITING COMMITTEE.

YOUR committee appointed to audit the accounts of the Treasurer beg to report as follows. The vouchers have been examined and found correct and certified check to balance account to date of report.. We find vouchers for express charges to the amount of one and 26-100 dollars (\$1.26) not included in the report, and would recommend that the Treasurer be reimbursed to that amount, and further that a vote of thanks of the Association be tendered him for the highly creditable and efficient manner in which he has discharged his duties.

(Signed) JAMES TAGGART PRIESTLEY,
CHARLES ADAMS,
PHILIP LEACH.

III. REPORT OF THE EDITOR.

A REPORT from the Editor seems hardly necessary, as that from the Publication Committee will doubtless cover the same ground; yet I should like to once more remind members that if they want the transactions to appear promptly they *must* obey the by-law requiring them to hand their papers to the Secretary as soon as read. Many members carry them away for "revision," forget about them, and do not finally get them into the hands of the Publication Committee until much time has been wasted in correspondence. It was not until into December that I received the last papers; but all material was corrected and put into the printer's hands, of course, excepting the index, which could not be made out until the paged proofs were ready, before Christmas. As to the appearance of our volume, I think that, considering our lack of funds, and the low price at which the publishers took the contract, the result is as good as we could expect. I have enjoyed the work, and hope my successor will find it equally pleasant.

(Signed) CHARLES C. FOSTER, Editor.

IV. REPORT OF THE EXECUTIVE COMMITTEE.

THE Executive Committee has the honor to report:

First—The following list of Active and Associate Members elected during the year:

Active Members.—Maurice C. Ashley, George C. Ashmun, William Francis Barry, Charles B. Blubaugh, Robert Burns, William Francis Campbell, Dudley Newcomb Carpenter, Edward Champe Carter, George Hazard Crookes, John H. Dickerson, Samuel Henry Dickson, Earl Hamilton Fish, Robert Jackson Gibson, David King Gotwald, Middleton Semmes Guest, Lovett T. Guerin, Frederick Gunsaulus, Wilbert A. Hobbs, John Henry Huddleston, Charles Simonton Jordan, Lewis Hasbrouck Kemble, William P. Kendall, Robert Morris Kennedy, James Jesse Lemon, Joseph E. Lowes, Daniel Mayer, George Westgate Mills, Arthur Leland Osborn, Charles F. Peckham, Albert William Phillips, Willard Curtis Rank, David A. Rannels, Philip S. Rieg, George Henry Rohé, William H. Skene, Charles A. Siegried, J. Lewis Srodes, William T. Stark, Franklin Bache Stephenson, William Stephenson, Harrison Edward Stroud, Allen H. Vance, Luther L. von Wedekind, Ridgely Brown Warfield, William Alfred Westervelt, James Lucas Wheaton, Jr., John Hey Williams, William G. Willard, Thompson Barrett Wright.

Associate Members.—Morris J. Asch, Stephen Cooper Ayres, Phineas S. Conner, Charles S. Hamilton, Hugh A. Hart, James Nevins Hyde, Starling Loving, John H. Rodgers, Hervey Williams Whitaker, J. William White.

Second—The following names recommended for Corresponding Membership:

General Epifanio Cacho, Mexico; Sanitary Captain Hans Daal, Norway; Surgeon Captain Rory Fletcher, England; Assistant Surgeon Otokar Kukula, Austria; Colonel Fernando Lopez, Mexico; General W. S. Oliver, England.

Third—The following candidates recommended for Honorary Membership:

Dr. William H. Humiston, Cleveland, O.; Professor George M. Kober, Washington, D. C.

Fourth—The fact that the committee has adopted the following resolution:

Resolved, That the authors of all papers read at this meeting are hereby authorized to publish them in such journals as they may desire,

Provided, That the manuscript be handed to the Secretary for the use of the Association immediately after it is read by title, or otherwise and

Provided, That, when so published each paper shall have attached a clause stating that it was read at the Seventh Annual Meeting of the Association of Military Surgeons at Columbus, Ohio, May —, 1897.

Fifth—The following amendments to the Constitution and By-Laws, proposed by Medical Director Albert L. Gihon, U. S. Navy, for action at the next Annual Meeting:

(1) Amend Art. III of Constitution by omitting the *Editor* from list of officers, so that Sec. 1 shall read: "The officers shall be a President, two Vice-Presidents, a Secretary and a Treasurer, who shall hold, etc."

(2) And Art. III, Sec. 2 of Constitution to read: "A Publication Committee to consist of three members, one of whom shall be the Secretary as *ex officio* Chairman."

(3) Amend Art. III, By-Laws, to read: "At the annual meeting the President, Vice-Presidents, Secretary and Treasurer," omitting the words "and Editor."

(4) Omit entirely Art. V, Sec. 5.

(5) Amend Art. VI, Sec. 2, to read: "It shall also decide on the advisability of publishing the various papers presented at the annual meeting, and shall prepare for publication, contract for printing and see through the press all such papers in a volume of Annual Transactions; but all contracts for printing must first have the approval of the President and Treasurer."

Sixth—The following amendments to the Constitution and By-Laws, proposed by Surgeon Robert D. Murray, U. S. Marine Hospital Service, and others, for action at the next Annual Meeting:

(1) Amend Section 2 of Article II by inserting the words "of the Marine Hospital Service" just after the word "Navy."

(2) Amend Section 2 of Article III by striking out the third section and inserting the following: A Literary Committee, to consist of seven members, four members from the National Guard, State Troops or Militia and one each from the Army, Navy and Marine Hospital Service.

Also amend same section by inserting "and Marine Hospital Service" (three times) just after the word "Navy" wherever it appears.

(3) Amend Section 4 of Article VI of the By-Laws by substituting the words "the Navy and the Marine Hospital Service" for the words "and the Navy."

(Signed) ALBERT L. GIHON,
Chairman, *ex officio*.
HERMAN BURGIN,
Secretary, *ex officio*.

V. REPORT OF THE PUBLICATION COMMITTEE.

THE Publication Committee has the honor to report that it examined the stenographic reports of the proceedings of the Convention of 1896, and also all the papers presented at the Convention and delivered to this Committee by the Secretary. The Committee determined which portions of the proceedings seemed of sufficient interest to be printed, and decided that all papers received were worthy of publication.

The Chairman of the Committee was greatly assisted by the Editor, Major Charles C. Foster, Surgeon Massachusetts Volunteer Militia, and received valuable suggestions from our President Medical Director Albert L. Gihon, U. S. N. (retired).

All material for publication was duly forwarded to the Editor, thus ending the duties assigned this Committee.

Respectfully submitted,

(Signed) H. LINCOLN CHASE,
First Lieut. and Asst. Surgeon, M. V. M.,
NELSON H. HENRY,
Colonel and Asst. Surgeon General, N. G. S. N. Y.,
CHAS. H. FRENCH,
Lieut. Col. and Medical Director, R. I. M.,
Publication Committee.

VI. REPORT OF THE LITERARY COMMITTEE.

AS Chairman of the Literary Committee of the Association of Military Surgeons, I have the honor to make the following report. On February 21, 1897, I was appointed Chairman of the Literary Committee by the President on account of the illness of Lieutenant Colonel Myers, who was unable to perform the duties of the position. On account of the lateness of my appointment, I have been unable to accomplish as much as I should have desired, and therefore crave the indulgence of my fellow members on this account. The titles of forty-three papers have been reported to the Secretary of the Committee of Arrangements, many of these papers being of great interest.

It has been found impossible to have any meetings of the committee, and I have consequently to a great extent been compelled to act independently, although I have consulted more or less by letter with the President and with Medical Inspector John C. Wise, U. S. Navy, a member of the committee. I have a record of one hundred and one letters written, seventy-five requests for papers, and of sixty-three received.

(Signed) PAUL R. BROWN,

Major and Surgeon, U. S. A., Chairman of Literary Committee.

VII. REPORT OF THE COMMITTEE "ON THE OFFICIAL RECOGNITION OF THE BADGE."

YOUR Committee upon the Official Recognition of the Badge of our Association have the honor to submit the following report:

In accordance with the plan and scope outlined in the report for 1896, your committee addressed a communication to the Adjutant General of each of the twenty-two States from which orders permitting our badge to be worn had not yet issued, of which the following is a copy:

"The Association of Military Surgeons of the United States.

"Committee on Official Recognition of Badge.

"Major John Van R. Hoff, Surgeon U. S. Army, Chairman:

"VANCOUVER BARRACKS, WASH., —, 189—.

"GENERAL.—The Association of Military Surgeons of the United States deem it particularly desirable that a specific order be obtained from the Commander-in-Chief of your State forces authorizing medical officers thereof, who are members of the Association, to wear its badge on occasions of military ceremony. Such orders are already in force in a large number of the States, as for example:

'Commonwealth of Massachusetts,

'Adjutant General's Office,

'Special Orders

'BOSTON, May 10, 1894.

No. 54

'The Association of Military Surgeons of the United States, having requested that the Medical Officers, M. V. M., members thereof, may be permitted to wear the insignia of said Association on occasions of ceremony, permission is hereby granted the Medical Officers of the Massachusetts Volunteer Militia entitled thereto by membership therein, to wear the insignia of the Association on the uniform dress coat, as requested.

'By order of the Commander-in-Chief:

(Signed) 'SAMUEL DALTON,

'Adjutant General.'

"The objects of the Association must be well known to you as being both patriotic and professional. The work already done has been of immense value in disseminating a knowledge of military sanitation and unifying our sanitary organization. To promote these objects it is most desirable that the Association be officially recognized in every State, and particularly in those States in the military forces of which there is a considerable membership.

"May I ask for an early acknowledgment of this circular, and that you will believe me,

"Very respectfully,

(Signed) "JOHN VAN R. HOFF,

"Major, Surgeon, U. S. Army, Chairman.

"To the Adjutant General, State of—————."

In reply thereto six of the States addressed issued and transmitted the requested orders, viz.:

Florida, S. O. No. 7, A. G. O., Tallahassee, February 26, 1897.

Kansas, S. O. No. 6, A. G. O., Topeka, February 23, 1897.

Louisiana, S. O. No. 20, A. G. O., Baton Rouge, May 21, 1897.

¹*Maine*, S. O. No. 40, A. G. O., Augusta, November 14, 1895.

¹*New Hampshire*, General Regulations, National Guard N. H., 1896.

Tennessee, S. O. No. 6, A. G. O., Nashville, February 25, 1897.

Utah, S. O. No. 3, A. G. O., Salt Lake City, March 3, 1897.

Copies of which are filed herewith and made a part of this report. Making in all thirty States from which orders have been received.

In the following named States our badge cannot be legally worn on occasions of military ceremony: *Vermont, North Carolina, Mississippi, Montana, New York, South Carolina, Missouri, Maryland, Georgia, Texas, Arkansas, Virginia, West Virginia, Kentucky, Wyoming.*

In spite of all that has been said and written upon this subject your Committee regrets that there is yet considerable ignorance as to what decorations can and cannot be worn upon the military uniforms of our members.

A glance at our report for 1896 will make it clear that any officer of the regular establishments can wear nothing upon his uniform that is not permitted by a specific act of Congress—while so far as known to your Committee this matter is regulated in the respective States by the Governors thereof,—in the former case it is a legislative act, and in the latter an executive matter. That this vast difference is not fully appreciated is brought out in an interesting correspondence with the Adjutant General of the State of New York (by the way, about the only large State in which our organization is not recognized), which closed with the following remarks: "The present Commander-in-Chief deems it time

¹By some extraordinary combination of circumstances, in the report of this Committee for last year—1896—the name of New Hampshire was inserted in the list instead of Maine. Accordingly, although not properly pertaining to this year's work, the latter as well as the former is included in the table, with the authorities correctly quoted.

enough to consider the matter when the War Department issues an order allowing medical officers of the Army to wear the badge."

During the year no active measures were taken by your Committee in the direction of recognition by the general government for the reason it was not believed that during the last (short) session of Congress anything could be accomplished; moreover, it is hoped that by the time of the next regular session the Association can go to Congress backed by the official recognition of every State in the Union. Whether or not we will have this backing, your Committee believes depends largely upon the individual efforts or rather collective efforts of members in their respective States which have not yet recognized the Association. Certainly such efforts must prove quite as effective as the best your Committee can accomplish, and would leave the Association, no matter what the result, in a more dignified position.

In the matter of our recognition by the General Government, your Committee respectfully refers to its report for 1896 and ventures to reiterate the recommendation therein made.

As was the case this year, there should be on this, or on the Executive Committee, if the last named will undertake the duty, a member who lives in Washington and who is familiar with the routine of legislative procedure. A man sufficiently interested in accomplishing the end sought to devote both time and talent thereto, in a word a worker. It will be observed that the Surgeon Generals of the Army and the Navy are both favorable to our recognition by Congress so that nothing seems to be needed but some one to put it before that august body and conduct it safely through.

Your Committee has had no occasion to change the views heretofore expressed that the recognition and promotion of our Association by the military authorities, both general and local, will prove of inestimable benefit to the country when the time shall come, as it soon must, when we will really need soldiers. The Association asks very little now—then it will return a thousand fold through the many military sanitarians it is helping to train.

Respectfully submitted,

(Signed) JOHN VAN R. HOFF,

Major and Surgeon, U. S. Army, Chairman.

ARTHUR R. JARRETT,

Captain and Assistant Surgeon, N. G. S. N. Y.

VIII. REPORT OF THE COMMITTEE ON
CREDENTIALS.

YOUR Committee on Credentials has the honor to submit the following report. Understanding the duties of the Committee to relate to the delegates from National and State services, the Chairman, on the 2d of April, addressed 98 letters respectively to the Governor and Surgeon General of each State and Territory, as follows:

His Excellency, the Governor of—————, ———:

SIR—I have the honor to call your attention to the fact that the Association of Military Surgeons of the United States, composed of delegates from the Medical Officers of the Army, Navy and National Guard and others, will convene in this city on the 25th, 26th and 27th of May, and to request that, in accordance with the usual custom, a delegation be detailed from the medical officers of your State forces to attend the meeting.

(Signed) JAMES E. PILCHER,

Captain Medical Department, U. S. Army, Chairman Committee on Credentials.

The Surgeon General of the State of—————,

Care of the Adjutant General,—————, ———.

DEAR DOCTOR—I have sent by this mail a request to your Governor to detail delegates to our next meeting. I hope you will be able to come yourself, and that we may have a large representation from your State. Will you not actively follow up our request to the Governor and assist us in our efforts to make this meeting the most important contribution to military medicine and surgery we have yet had?

Trusting to receive your co-operation, I remain, dear doctor, very faithfully yours,

(Signed) JAMES E. PILCHER,

Captain Medical Department, U. S. Army, Chairman Committee on Credentials.

Letters were also addressed to the Secretary of the Navy and to the Director General of the British Army Medical Department. In connection with the one hundred letters thus written, much accessory correspondence was involved, largely increasing the num-

ber of communications sent by the Committee. The replies to these letters are appended hereto.

The following officers have been delegated to attend the meeting, either in response to these letters or according to the usual routine. Those of the number who are actually present are marked by a star (*).

Army, British—

*Deputy Surgeon General W. S. Oliver, A. M. D.

Army, United States—

*Lieutenant Colonel William E. Waters, Deputy Surgeon General.

*Major Henry Lippincott, Surgeon.

*Captain Robert J. Gibson, Assistant Surgeon.

Arkansas—

Representation impossible on account of the refusal of the State Legislature to appropriate funds for the maintenance of the National Guard.

Connecticut—

*Brigadier General Albert E. Phillips, Surgeon General.

*Lieutenant Colonel Wilbur S. Watson, Medical Director.

*Major Julian La Pierre, Surgeon.

Florida—

No delegation possible on account of the simultaneous existence of the annual encampment.

Georgia—

Colonel Napoleon G. Gewinner, Surgeon General.

Captain Howard J. Williams, Surgeon.

Captain Julius A. Childs, Surgeon.

Captain W. W. Owens, Surgeon.

Idaho—

No detail made, but all officers desirous of attending, granted leave of absence for the purpose.

Illinois—

Major J. G. Carter.

Iowa—

*General James T. Priestley.

Maryland—

- *Brigadier General Ridgely B. Warfield, Surgeon General.
- *Major George H. Rohé, Surgeon.
- Lieutenant Sidney O. Heiskell, Surgeon Naval Battalion.

Massachusetts—

- *Brigadier General Robert A. Blood.
- *Major Orland J. Brown.

Minnesota—

- General John F. Fulton, Surgeon General.
- *Major T. C. Clark, Surgeon.
- Lieutenant William Jacoby, Assistant Surgeon.

Navy, U. S.—

- *Medical Inspector (Commander) John C. Wise.
- *Surgeon (Lieutenant) Philip Leach.

Nebraska—

- Colonel R. Emmett Giffen, Surgeon General.

New York—

- *Brigadier General M. O. Terry, Surgeon General.

North Dakota—

- Leave of absence granted those officers who desire to attend.

Ohio—

- Brigadier General J. E. Lowes, Surgeon General.
- *Major L. T. Guerin, Surgeon 14th Infantry.
- *Major A. L. Osborn, Surgeon 16th Infantry.
- Major G. C. Ashmun, Surgeon 5th Infantry.
- *Major E. C. Farquhar, Surgeon 8th Infantry.
- Major F. D. Bain, Surgeon 2d Infantry.
- *Major F. W. Hendley, Surgeon 1st Infantry.
- *Major H. M. W. Moore, Surgeon 1st Light Artillery.
- Major A. H. Vance, Surgeon 3d Infantry.
- *Captain Fred. Gunsaulus, Assistant Surgeon 14th Infantry.
- Captain Park L. Myers, Assistant Surgeon 16th Infantry.
- *Captain G. H. Wuchter, Assistant Surgeon 8th Infantry.
- Captain D. W. Steiner, Assistant Surgeon 2d Infantry.
- Captain J. D. Howe, Assistant Surgeon 16th Infantry.

- Captain A. M. Dent, Assistant Surgeon 17th Infantry.
 Captain E. M. Semans, Assistant Surgeon 14th Infantry.
 Captain G. I. Cullen, Assistant Surgeon 1st Infantry.
 *Captain F. C. Weaver, Assistant Surgeon 3d Infantry.
 Captain Z. T. Housman, Assistant Surgeon 2d Infantry.
 *Captain A. V. Smith, Assistant Surgeon 8th Infantry.
 *Captain J. J. Erwin, Assistant Surgeon 1st Light Artillery.
 Captain H. E. Twitchell, Assistant Surgeon 1st Infantry.
 Captain M. H. McIlrath, Assistant Surgeon 5th Infantry.
 *Captain F. E. Bunts, Assistant Surgeon Troop "A."
 Captain W. H. Buechner, Assistant Surgeon 5th Infantry.
 *Captain W. A. Westervelt, Assistant Surgeon 1st Lt. Arty.
 Captain W. A. Hobbs, Assistant Surgeon 8th Infantry.
 Captain Otto C. Stutz, Assistant Surgeon 2d Infantry.
 *Captain D. A. Rannels, Assistant Surgeon 17th Infantry.
 *Captain T. B. Wright, Assistant Surgeon 14th Infantry.
 Captain C. H. Castle, Assistant Surgeon 1st Infantry.
 Captain W. C. Rank, Assistant Surgeon 17th Infantry.
 Captain F. H. Honecker, Assistant Surgeon 5th Infantry.
 *Captain D. K. Gotwald, Assistant Surgeon 3d Infantry.
 *Captain J. H. Dickerson, Assistant Surgeon 9th Infantry.
 Lieutenant C. W. Newton, Assistant Surgeon 1st Battalion,

Naval Brigade.

Ensign Philip Rieg, Assistant Surgeon 1st Battalion, Naval Brigade.

Pennsylvania—

- *Lieutenant Colonel Alex. A. E. McCandless, Surgeon-in-Chief of Division.
 *Major Joseph K. Weaver, Brigade Surgeon.
 *Major Herman Burgin, Surgeon.
 *Lieutenant Herbert A. Arnold, Assistant Surgeon.
 *Major W. McC. Johnston, Surgeon.
 *Major William H. Egle, Brigade Surgeon.
 *Lieutenant G. H. Halberstadt, Assistant Surgeon.
 *Lieutenant Walter Boardman, Assistant Surgeon.

Rhode Island—

- *Lieutenant Colonel C. H. French, Medical Director.
 *Major W. E. Wilson, Surgeon.

- *Lieutenant William Barry, Assistant Surgeon.
- *Lieutenant J. L. Wheaton, Jr., Hospital Corps.
- *Lieutenant C. F. Peckham, Naval Reserve.

Utah—

Colonel George H. Penrose, Surgeon General.
 Lieutenant Colonel Charles F. Wilcox, Assistant Surgeon.
 (To report by letter.)

Vermont—

Brigadier General James N. Jenne, Surgeon General.

Washington—

The Adjutant General reports no Surgeon General and no Medical Department to be in existence, owing to an incomplete condition of a reorganization of the National Guard.

West Virginia—

- *Brigadier General Daniel Mayer, Surgeon General.
- *Lieutenant Colonel C. B. Blubaugh, Medical Director.

Wisconsin—

- *Brigadier General Fred. J. Byers, Surgeon General.
- *Major T. W. Evans, Surgeon.

In closing, it is desired to call especial attention to the value to the Association and to military surgery of delegated representation of the States. From recognition of the Association by delegates, on the part of State authorities, it is but a step to recognition of the principles advocated by this body, and but a few steps farther to a practical realization of them.

(Signed) JAMES E. PILCHER,
 Captain Medical Department, U. S. Army, Chairman.

IX. REPORT OF THE COMMITTEE ON NECROLOGY.

IT is fitting that we should pay some tribute of respect to our departed friends. Since last we met the grim harvester of death, with his remorseless scythe, cut down seven of those whom we most loved and honored. Their memory we will cherish and the example of their noble lives will be a constant incentive to those who mourn their loss. The record of all is one of duty

manfully performed; of responsibility nobly upborne; of work done with the self-sacrifice and courage of the soldier. Their lives were one continuous process of noble deeds. The suffering relieved, the lives prolonged, has erected for them a monument in grateful hearts.

The societies whose meetings they enriched and the profession whose cause they advanced will hold them in well-earned remembrance.

They have passed behind that veil which marks the boundary and limitation of this life. Their fellowship we will miss; their absence we deplore; and at the mystery they have solved we wonder still. "The moving finger writes; and having writ moves on."

Respectfully submitted,

(Signed) CLAYTON PARKHILL, Chairman.

BRIG. GEN. EDWARD JACOB FORSTER, FIRST VICE PRESIDENT.

If it be true that death loves a shining mark, he could have sought no brighter target for his shafts than Surgeon General Edward J. Forster, of Massachusetts, the First Vice President of the Association, who died suddenly in New York, May 15, 1896, of cerebral hemorrhage. While in attendance upon the meeting of the Association of Military Surgeons, from which he was returning when the fatal vascular rupture occurred, General Forster was apparently in the perfect health of a vigorous prime and his genial spirit and ripe experience not only deepened the affection and respect with which he was regarded by the Association, but materially contributed to the development of the Association work. While there may be others to whom his death is a deeper bereavement, there can be none who mourn his loss with more sincere regret than the Association in which his work was of so much value and in which he had attained so honorable a position.

Dr. Forster was born in Charlestown, Mass., July 9, 1846, and received the doctorate in medicine from Harvard in 1868, after which he continued his studies in Paris and Dublin, before his return to the home of his childhood to enter upon his professional labors. While yet a student he had become a member of the Massachusetts Volunteer Militia, and had not been long in practice before he was promoted to the surgeoncy of the Fifth Regiment of that organization, an office which, for many years, he ad-

ministered with notable efficiency. In 1894, he was again promoted to Medical Director of the First Brigade, and in 1895 he succeeded to the highest medico-military office in the State upon his appointment as Surgeon General of the Commonwealth of Massachusetts. This office General Forster filled with the rare



SURGEON-GENERAL EDWARD J. FORSTER (DECEASED),
FIRST VICE PRESIDENT.

efficiency born of long experience, careful study, and ripe judgment and during his incumbency he set a pace progressive and aggressive enough to be a worthy example to his successors for all time.

In his medical work, he was from the beginning conscientious, painstaking, tireless and sympathetic. For many years he was visiting physician to the Boston City Hospital, in connection with which he was also for some years Secretary of the medical staff. He was active in the promotion of the movement to secure a State medical registration law, and when the movement finally culminated in the law of 1894, he was appointed a member of the Board of Registration and became its Secretary.

He was a power in medical society work and both the Massachusetts Medical Society and the Obstetrical Society of Boston will permanently bear the impress of the judicious and zealous administration of the various offices to which he was elected by them. In 1891 he was made Treasurer of the former and immediately set himself not only to simplifying and improving the system of accounts, but he devoted an enormous amount of time and labor to the preparation of a complete catalogue of the society from its foundation in 1781, which will ever remain an enduring memorial of Dr. Forster's zeal and efficiency in office.

He was in the habit of seeking recreation in natural history, and was an interested student of the habits and ways of the bee, while in botany his interest was manifested by the production of a valuable work on the identification of edible mushrooms.

General Forster's social, patriotic, charitable and scientific inclinations found vent in numerous societies of which he was a member and in which his sterling qualities always made his presence felt. He became a member of the Association of Military Surgeons March 30, 1894, and was appointed a member of the Committee on Legislation; in 1895 he became a member of the Executive Committee, and in 1896 he was unanimously elected First Vice President of the Association. The higher honor of the Presidency would undoubtedly have been conferred upon him had it not been for his untimely death.

LIEUT. COL. CHARLES MEREDYTH WOODWARD.

Charles Meredyth Woodward was born at Hector, Tompkins county, New York, February 10, 1843. His father was of English birth, having come to America in 1824. The ancestry of the family for many generations embraced many men eminent in the medical profession and it may, perhaps, truthfully be said

that Dr. Woodward's love of his profession and his ardor and skill in the practice of it were, to some degree at least, inherited.

His early life was spent on the farm, where he learned habits of industry and imbibed sentiments of honor which characterized his entire life. Graduating from the local academy in 1851 he at once entered the army, enlisting as a private in I Company, 23d Regiment, New York Volunteers. He was at once made corporal and served with that rank until the spring of 1862.

On April 18, 1862, while on the march from Catlett's Station to Fredericksburgh, he received a sunstroke which disabled him for a time and resulted in his transfer to the Commissary Department, where he served with the rank of Sergeant until the beginning of 1863 when he began the study of medicine and surgery in the medical department of the army, serving as acting assistant surgeon until the close of the war. He was with his regiment in seventeen engagements.

On his return home he resumed his medical studies and graduated from the Albany Medical College in 1867. In 1869 he located at Waterloo, New York, where he continued in the practice of his profession until his removal to Michigan. In 1872 he was elected Medical Director of the Department of New York G. A. R., which position he held until he removed to Michigan. In the fall of 1872 he went to Europe, visiting the hospitals of London, Edinburgh, Dublin and Paris. In 1875 Dr. Woodward located at Tecumseh, Michigan. In 1879 he was appointed Assistant Surgeon of the First Regiment, M. N. G., and acted as Assistant Surgeon to the Michigan Battalion during the Centennial celebration at Yorktown. On May 29, 1883, he was appointed Surgeon General of the Michigan National Guard with the rank of Lieutenant Colonel, which position he held until 1894.

His early military experience and great interest in surgery admirably fitted him for his duties in the Medical Department of the National Guard, and that department attained a high degree of efficiency during his administration.

Lieutenant Colonel Clark, who was his successor, pays an eloquent tribute to his abilities. In part he says:

"To Dr. Woodward's push and perseverance is due in a large measure the improved position occupied by the medical officer of the Michigan National Guard, and it seems to me, had his wishes

and aims been given more consideration by our military boards, the Medical Department would be in even better condition than it is at present. My association with him was such as to gain for him my admiration for his talents and ability as an organizer and professional man. He leaves an honorable record in the military,—one of which any man might be proud.”

He contributed many valuable articles to contemporary medical literature and was a member of many medical societies. The one, perhaps, of which he was most proud, and whose membership he most highly prized, was this Association. His gentle and unassuming manner and his military bearing will be long remembered by us all. His enthusiastic work and his wise counsel will be greatly missed. He was a charter member of this Association and in honoring him with the chairmanship of important committees the Association did more to honor itself. He is now but a memory with us, but one which we shall long cherish and emulate.

MAJOR JAMES CHESTON WORTHINGTON.

James Cheston Worthington was born in Maryland, January 19, 1853, and commissioned Assistant Surgeon in the United States Army June 26, 1875, thus becoming a commissioned medical officer of the Army at the early age of twenty-two, and singularly enough he had before him twenty-two years of service. During this time he served in various military departments, on both the Atlantic and Pacific coasts, and on the Indian frontier between them. Always faithful to duty, he left no part of his work without attention. An enthusiast in the study of first aid, he was particularly an advocate of the use by the troops of the Esmarch elastic suspenders. He was a marksman for five successive years and in 1885 he was a sharpshooter. An excellent surgeon and a successful physician he readily held the confidence of his colleagues, his patients and his superiors. His military history was as follows: Lieutenant, June 26, 1875; Captain, June 26, 1880; Major, August 12, 1893. He became a member of the Association of Military Surgeons, April 12, 1894, and died in Louisville, Ky., August 11, 1896.

CAPTAIN WALTER WILLIAM ROSCOE FISHER.

Walter William Roscoe Fisher was born in Strasburg, Va., July 29, 1856, and was commissioned Assistant Surgeon in the Army, December 3, 1883. At that time, instead of appointing medical officers at once subject to subsequent confirmation by the Senate, it was customary to offer them the option of waiting for confirmation or of accepting a contract as "Acting Assistant Surgeon" during the interval. Dr. Fisher accepted such a contract and went to the Pacific coast in that capacity, with the consequence that although his commission was dated December 3, 1883, he did not receive it nor act under it until February 18, 1884. During his contract service and for a considerable time afterward, he was stationed at the Presidio of San Francisco, California, where his work gave great satisfaction. His service was considerably diversified during the ensuing thirteen years, occurring at numerous posts in the Departments of Arizona, California, Dakota and the East. For more than a year of this time, in 1885 and 1886, he was in the field against hostile Apaches. He became a member of the Association of Military Surgeons, April 7, 1896, while on duty at his last station, Fort Meade, South Dakota, where on the 6th of June, two months later, he passed away deeply mourned by a wide circle of sorrowing friends.

PASSED ASSISTANT SURGEON JAMES SHIRLEY HOPE,¹

James Shirley Hope was born at Portsmouth, Va., on the 24th of May, 1868, and received his academic education at the schools of his native town. He entered the Medical Department of the University of Virginia in 1886, graduating therefrom in 1888. Subsequently he was Resident Physician at St. Luke's Hospital, Richmond, Va., for one year, receiving a most commendatory letter from Dr. Hunter McGuire upon the close of his service at that institution.

After engaging in private practice at his home for a little more than a year, he decided to take the examination for admission into the Medical Corps of the Navy, and after pursuing special courses in various professional branches at New York, he underwent a

¹ For the information contained in this sketch, we are indebted to the courtesy of Surgeon-General Tryon, U. S. Navy.

successful examination, being commissioned an Assistant Surgeon in the Navy, July 10, 1891.

After his appointment he served successively on the "*Franklin*," "*Fern*" and "*Charleston*," being attached to the latter ship at the time of the recent Brazilian troubles, when, although hundreds were dying on board neighboring vessels, not a case of yellow fever developed among the *personnel* of his ship, then lying in the harbor of Rio.

After successfully passing his examination for promotion to the grade of Passed Assistant Surgeon, he was ordered to the Navy Yard, Pensacola, Florida, upon which duty he remained until the time of his death. While on this duty he not only had the respect and esteem of those of the medical profession at Pensacola, but the confidence and love of the inhabitants of the two little villages attached to the Navy Yard, to whom he invariably, cheerfully and willingly extended professional aid.

During the spring of 1896 he became aware of the existence of some serious affection, which, upon examination, was considered to be an osteoma within the pelvis, and after consulting several of the leading surgeons of New York City, he decided that an operation was imperative. There seemed every reason for believing the tumor to be benign in character, so perfectly developed was he in physique, and such was the glow of health of his complexion; there was nothing cachectic, no evidence of dyscrasia. The operation was performed at Roosevelt Hospital, June 30, 1896, and proved so formidable by reason of the size and vascularity of the tumor removed (osteosarcoma), that notwithstanding transfusion and the employment of every means of resuscitation, it was impossible to rally the vital forces, and two hours after his removal from the table he died.

Dr. Hope married a daughter of the late Captain Coston of the Marine Corps, who, with her two children, is now living at Portsmouth, Va. He had been a member of the Association of Military Surgeons since May 7, 1895.

CAPTAIN PERLEY PUTNAM SANBORN.

Perley Putnam Sanborn was born in Hiram, Maine, March 1, 1861. He graduated from the High School of Detroit, Mich., at the age of nineteen. A year later he entered the Medical De-

partment of the University of Michigan in Ann Arbor. During vacations he was employed in a corps of U. S. Engineers, engaged in Government surveys at Sault de Ste. Marie. Later, he was employed as Assistant Engineer on the Mississippi, with headquarters in St. Louis, his work being principally at points in the miasmatic regions of the lower Mississippi. He remained there about two years, when failing health obliged him to quit Government employ. Shortly afterward he resumed his studies in Ann Arbor, and graduated from the medical department June 25, 1885. In August of the same year, he located in Fremont, Steuben county, Indiana, for the practice of his profession, remaining there about three years. During the winter of 1888-9, he spent three months in the Medical Department of Harvard University, retiring with a diploma from that institution; and he spent three months of the winter of 1893-4 in the Medical Department of Columbia University in New York City, and received a diploma therefrom. On the 2d of February, 1888, he was united in marriage with Bertha B. Burdick, of Fremont, and shortly afterward he removed to Angola, Indiana, where he remained until his untimely demise, January 29, 1897.

About three years ago he was commissioned Assistant Surgeon of the Third Regiment of the Indiana National Guard, which grade he occupied at the time of his death. He became a member of the Association of Military Surgeons of the United States in 1895. His attractive personality and strength of character won him a large practice in Angola, and he was regarded by many as a physician of pre-eminent ability. He was very unassuming, his modesty amounting almost to diffidence; but acquaintance soon disclosed the fact that he was unusually well informed in matters which require close study and research.

X. REPORT OF THE COMMITTEE ON WAYS AND MEANS.

AT the time I offered the Resolution, suggesting the appointment of a Committee on Ways and Means, for the betterment of the financial condition of the Association, I had been serving on the Auditing Committee with our late lamented friend, General Forster. At that time we were both

impressed with the fact that there had been marked extravagance in the conduct of our administrative departments. At the same time, we felt that while we were financially embarrassed, the money had not been spent altogether aimlessly. In other words, the large expenditures had thoroughly advertised the Association throughout the country, and the success which our Association has attained has placed us on a plane where we are recognized as an important National Association. I coincide with one of my colleagues in the opinion that what we need most is an increased membership (See exhibit A) and I would suggest that a committee be appointed in each State, and in the Army and Navy, to make a thorough canvas of the medical officers, with a view of enrolling them as members of the Association of Military Surgeons. It seems to me that is the very best method of improving our finances. I am informed that the officers of our Association for the last year have conducted our affairs most economically, and the fruits of this able management will be recognized at the coming convention. I would suggest the discharge of this committee and should the Association require the services of a new committee during the coming year, that the Treasurer should be made a member of this committee, and that the other members of the committee be appointed from his locality, so that they will have the financial history of the Association at hand for easy reference.

Begging the indulgence of the Association for this letter, which I send in lieu of a report.

(Signed) J. WILKS O'NEILL,

Chairman.

XI. REPORT OF COMMITTEE ON TRANSPORTATION.

THE Committee on Transportation will take but a few minutes in making a short report. The duties of the Transportation Committee are routine from year to year. They consist in securing a concession in rates and fare for the members of this Association who attend the meeting. I will briefly outline the work of this Committee. We are obliged to make an application to the passenger authorities that have control of the district in which the meeting place is located. This

year it was in the territory of the Central Passenger Committee, whose headquarters is in Chicago. Through the influence of that passenger association concessions in fare are received from the other associations that control the United States and Canada. Application was made in due time, the first of March, for concessions, to that body. Also, your Transportation Committee made application to the Trunk Line Association of New York, that has headquarters in New York, to the Western Passenger Association, the Southwestern Passenger Committee, of St. Louis, the New England Passenger Association, Boston, and the Southern Passenger Association, of Georgia. These control the entire United States and Canada. Very promptly the concession was granted by the Central Passenger Committee, but in granting this concession we had to guarantee an attendance of one hundred. They require that when the tickets are purchased a certificate shall be secured, properly signed. They also require the Committee to furnish a certain amount of money to pay the expenses of an authorized agent to examine the certificates. The certificates have to be examined and approved by this agent, and if all these requirements are fulfilled, then the agent signs the certificates and they are returned to the delegates, who then may return at one-third fare over the same route by which they came. You can readily see it is not the province of this Committee to secure rates of fare by any one route, nor would it be wise nor judicious for this Committee to undertake to recommend any one route of travel by any special line or lines of travel in the United States, because we would thereby at once antagonize certain lines. You will observe that in none of our notices have we recommended the delegates to come by any particular route. The agent that has been sent to us, will report to-morrow morning. He will be here to-morrow and then he will go away. Any certificate that is not signed by this agent to-morrow will be valueless. Any certificate which is in the pocket of a delegate will be perfectly useless unless it is turned in in time to receive the signature of this agent. We must have one hundred before he will sign one, and so it is quite important that every member of the Association present who has a certificate, should turn it in to the Secretary or the place of registration before to-morrow morning. As I said, the work is routine work, but it necessitates a great deal of cor-

respondence and a great deal of red tape. It is important, though, that the delegates fully understand the requirements of the delegate; that he secure his certificate, that he turn it in, and that it be signed. Unless those formalities be complied with, the certificates will be valueless. We pay \$11 for the agent for the first day and \$6 for every additional day. I believe one day will be sufficient, if the delegates will hand the certificates in promptly. It is necessary that we have one hundred people here. Any member who comes here and pays full fare, or even those who come here on a pass, or the wives and other relatives count.

(Signed) ALBERT H. BRIGGS,
Committee on Transportation.

XII. REPORT OF THE COMMITTEE OF ARRANGEMENTS.

THE Committee of Arrangements has the honor to report that arrangements for the Seventh Annual Meeting in Columbus, Ohio, have been completed.

The Chairman, immediately upon his election, associated with himself Captain James E. Pilcher, of the Army, as Secretary, and up to March 13, 1897, the Committee consisted of but two members, the Secretary and the Chairman. At that time, however, it was enlarged by the appointment of Governor Asa S. Bushnell as Honorary Chairman and Hon. Robert M. Rownd as Treasurer. On May 3, the Committee was further enlarged by the addition of the following members:

Gen. H. A. Axline,
J. Y. Bassell, Esq.,
Hon. S. L. Black,
Frank F. Bonnet, Esq.,
W. D. Brickell, Esq.,
Hon. G. W. Bright,
Col. A. B. Coit,
Dr. J. M. Dunham,
Hon. Tod B. Galloway,
W. E. Guerin, Esq.,
Hon. L. D. Hagerty,

J. A. Jeffrey, Esq.,
Hon. James Kilbourne,
S. A. Kinnear, Esq.,
W. R. Kinnear, Esq.,
Dr. D. N. Kinsman,
Fred Lazarus, Esq.,
Hon. J. J. Lentz, M. C.,
Philip Lindenberg, Esq.,
T. Longstreth, Esq.,
Dr. Starling Loving,
N. Monsarrat, Esq.,

Hon. G. K. Nash,	Col. W. E. Reppert,
Hon. J. B. Neil,	Hon. A. D. Rogers,
Hon. J. H. Outhwaite,	E. R. Sharp, Esq.,
S. Pentland, Esq.,	E. K. Stewart, Esq.,
Col. J. S. Poland, U. S. A.,	Hon. G. H. Stewart,
F. W. Prentiss, Esq.,	Hon. Emmet Tompkins,
Dr. R. H. Reed,	Hon. D. K. Watson,
Col. D. S. Wilder.	

Beginning with the first of February, the Committee held regular weekly meetings, at which a large amount of work was accomplished. During the whole year, however, the Chairman and the Secretary were in frequent communication and latterly, daily, and often still more frequent conferences have been held.

As an important contribution to the success of the meeting, the Committee secured the organization of the Association of Military Surgeons of Ohio on the 17th of December, 1896. This Association has become firmly fixed and its organization is believed to be a most important result of the selection of Columbus as a location for the Seventh Annual Meeting. The State Association appointed, as an auxiliary to the Committee of Arrangements, the following Committee:

Surgeon General J. E. Lowes,	Capt. F. Gunsaulus,
Major L. T. Guerin,	Capt. W. A. Westervelt.

These gentlemen have since their appointment acted with the Committee of Arrangements and have been of material assistance in the working out of our plans.

On the 15th of February, the Secretary by invitation appeared before the Columbus Academy of Medicine and addressed that body upon the coming meeting. In a number of responsive speeches the members of the Academy expressed great interest in the meeting and a motion was adopted to appoint a committee to act with the Committee of Arrangements. On consultation with the Chairman, the following members were so appointed:

Dr. Dickson L. Moore, President,	
Dr. J. F. Baldwin,	Dr. C. F. Clark,
Dr. J. U. Barnhill,	Dr. D. T. Gilliam.

In further prosecution of the plan of informing the medical profession of the State regarding the Association and its work, the Secretary prepared and through the courtesy of its editorial staff, published from time to time in the *Columbus Medical Journal* the following articles:

1. The Association of Military Surgeons of the United States and Its Next Meeting in Columbus, May 26, 1896.
2. The Revival of Military Surgery, July 21, 1896.
3. The Meeting of the National Association of Military Surgeons, March 2, 1897.
4. The Military Surgeon and the Medical Profession, March 16, 1897.
5. The Association of Military Surgeons of the United States—Its Character, Its Personnel, Its Officers, and Its Purposes, April 27, 1897—printed in the Special Number of the *Columbus Medical Journal* and reprinted in the Souvenir Book.
6. The Status of the Medical Officer, May 25, 1897.

The following publications were also issued in connection with the work of the Committee:

1. The Revival of Military Surgery and the Association of Military Surgeons of the United States. 4 pp. Reprint, 200 copies.
2. Special Military Surgeons Number of the *Columbus Medical Journal*—written by Captain Pilcher and issued under the direction of the Committee—96 pp., 2,500 copies.
3. The Columbus Book of the Military Surgeons. 104 pp. Reprint, 1,000 copies.
4. Program of the Seventh Annual Meeting, duodecimo, 20 pp. Reprint. 1,000 copies.
5. Program of the Opening Session of the Seventh Annual Meeting. 4 pp., 1,000 copies.
6. Daily Program of the Seventh Annual Meeting. 8 pp. Reprint, 500 copies.
7. Program of the Entertainments of the Ladies' Committee. 4 pp., duodecimo, 200 copies.
8. Invitations to the Opening Session. Copper plate engraving with special embossed design illuminated in colors. 1,500 copies.

9. Special Application-for-Membership Blank. 300 copies.

Realizing the important bearing upon a meeting of an enthusiastic and successful beginning, the influence of numbers in creating enthusiasm and success, and the inspiring effect of a large and interested audience, upon the speakers and upon one another, the Committee early set in motion the influences which resulted in the representative audience of the Opening Session this morning. To rehearse the many devices adopted would be impossible. Through social influences, the society element of the city was actively and favorably disposed. The powerful help of an unusually influential Committee of Arrangements was invoked, and all the assistance to be derived from official influence was brought to bear. Over eight hundred engraved invitations were issued—all of which co-operated to produce the audience of this morning, notwithstanding the great disadvantage of the early morning hour and the inclement weather.

The Committee has also endeavored to take advantage of every factor which might attract a large attendance of the members to the meeting. The elaboration of the scientific program, the issue of the Souvenir Book to the entire personnel of the Association, as a special number of the *Columbus Medical Journal*, and especial efforts looking toward recruitment of the membership, have all been directed toward this end. Advantage has also been taken of the facilities afforded by the railway companies for calling the attention of members to the accessibility of Columbus. The courtesy of the Buckeye and Royal Blue Lines in providing special cars for the meeting, has been of particular service, while the lavish use of personal solicitation and postal information by the railroads has been of much assistance.

The efforts at recruitment of the membership have been especially directed toward the State of Ohio and have consisted of personal communication with every National Guard Surgeon and every Ex-Surgeon of the War of the Rebellion, furnishing each one with a circular describing the Association and a blank application for membership. The organization of the State Association was expected to be an important factor in the work. The result of our labors consists of the addition from the State of twenty-three new members, of whom sixteen were active and

seven associate. The membership from this State is thus increased from eleven to thirty-three.

In view of the great advantage to the members of an attractive presentation of the points of interest in a place of meeting, and the equally great advantage of having the history, aims and personnel of the Association well represented to the citizens of the city, the Secretary of the Committee prepared the beautifully illustrated and charmingly written souvenir book, which was distributed at the opening session. This book, containing an accurate and graphic account of the Association and the most picturesque and complete sketch of Columbus ever written, together with the program of the meeting, will be a memorial of the meeting that will not soon be forgotten either by the members of the Association or the citizens of Columbus.

Learning that the illness of the Chairman of the Literary Committee had seriously impeded the work of obtaining scientific material for the meeting, the Committee of Arrangements volunteered to assist in the preparation of the program. This largely increased the Committee's labor, but it was successful in obtaining twenty or more papers, which occupy places upon the program.

An analogous duty was the arrangement for the social entertainment of the members during the continuance of the meeting. From the beginning, the Committee set its face against any social events during the day and determined to confine the entertainments to the evenings. Numerous plans for these evenings were considered and finally those announced in the program were selected.

As, however, the officers attending our meetings are often accompanied by ladies, who are apt to be left alone during the scientific sessions, the Committee secured the formation of a ladies auxiliary committee of arrangements, who have rendered splendid service in providing for the visiting ladies. The appended program shows that an entertainment of some kind has been provided for every morning, afternoon and evening. (See page 4.)

In selecting the places for the meeting, the Senate Chamber of the State was evidently the most desirable place for the ordinary sessions, and the State authorities very courteously acceded to the

request of the Committee for its use. Numerous other rooms were offered to the Association, but it was finally determined to hold the public opening session in the High Street Theater, the fifth session in the amphitheatre of Starling Medical College, and the sixth in the Hospital at Columbus Barracks—the first because of its proximity to the Association headquarters, which it was determined would be at the Chittenden Hotel, and its accessibility from all parts of the city; the second, because of the necessity for an amphitheatre for the proper display of specimens to be presented; and the third in order to give the Association the opportunity to observe a regular army field hospital, post hospital, litter drill and a regimental military post.

In course of its work the Committee has used 2,000 letter heads and 1,600 letter envelopes. It has also expended \$43.88 in postage, of which fully forty dollars was used for the purchase of two-cent stamps. About eight hundred of these were used upon invitations to the meeting, addressed to persons outside of Columbus, or not readily reached by personal delivery, leaving not less than twelve hundred letters actually mailed by the Committee. Most of these were actually written by members of the Committee themselves, although the services of a stenographer were utilized on some occasions.

Perhaps the most unwelcome part of the Committee's work was the collection of funds. While this has been made very easy by the responsive courtesy of our Columbus friends, it is no less a fact that this is the part of the work, the completion of which most profoundly gratifies us. The Souvenir Book was paid for entirely by advertisements, which left a handsome margin of profit to the Association. The contributions to the entertainment of the Association, including this, have amounted to \$647.35, in addition to which the Columbus Medical Publishing Co. contributed the May 27 number of the *Columbus Medical Journal* at a cost of \$103, and the Berlin Printing Co. contributed their profit upon the various invitations, amounting to \$76, making a total of \$826.35 which has been received and expended, as shown in the Treasurer's statement herewith appended.

STATEMENT OF THE TREASURER OF THE COMMITTEE OF
ARRANGEMENTS.

<i>Receipts.</i>	<i>Expenditures.</i>
Subscriptions..... \$355 35	Drayage\$ 6 67
Contribution of Hotel As- sociation (Advt.)..... 150 00	Office Sundries 9 35
Advertisements in Colum- bus Book 142 00	Stationery..... 23 25
	Badges 33 80
	Entertainment of Ladies, 39 00
	Clerical Work 39 05
	Programs 42 00
	Postage 43 88
	Opening Session..... 81 80
	Invitations 92 30
	Columbus Book.. 185 60
	Balance 50 65
Total Receipts..... 647 35	Total expenditures..\$647 35

In closing, the Chairman wishes to express his thanks to the following friends who have been of material help in the Committee's work:

1. To Governor Asa A. Bushnell, for his cordial endorsement, counsel, and encouragement, particularly in the capacity of Honorary Chairman.

2. To the Hon. Robert M. Rownd, for his zeal, energy and ability in handling the funds of the Committee and for the many other helpful acts, which have contributed so much to the success of the meeting.

3. To Captain James E. Pilcher, U. S. A., who has been associated with the work from the beginning, for his tireless labor in so many lines of work, bringing to the Committee ripe editorial experience, wide knowledge of the personnel of the Association, and previous experience as a member of such a Committee of Arrangements, coupled with an entire unity of purpose which has made the year's relationship one of pleasure to the Chairman, as well as profit to all.

4. To the local members of the Committee, for their practical and cordial support in a pecuniary and personal way.

5. To Major Guerin and Captains Gunsaulus and Westervelt, resident medical officers of the Ohio National Guard, for much assistance.

6. To Colonel J. S. Poland, Commandant, and Lieut. Col. W. E. Waters, Surgeon at Columbus Barracks, for many facilities offered at that post.

7. To Mr. J. Y. Bassell and his staff of the Chittenden for the uniform courtesy and assistance extended to the Committee.

8. To Dr. R. Harvey Reed and the Columbus Medical Publishing Co. for donating an entire issue of the *Columbus Medical Journal* to the Committee as a means of furnishing the Association with information concerning the meeting and the city; and

9. To the people of Columbus, the press, the medical profession, and the officers of the regular service and National Guard, whose support and encouragement has meant so much to the Committee in its arduous labor.

In conclusion, speaking for my colleagues as well as myself, the work of the Committee is before you. We have done the best we could. If there has been any omission or failure it has been unintentional. And with the most kindly feelings toward all with whom its duties have brought it into contact, with earnest hopes that its labors may conduce to the good of the Association, and with great relief at being able to lay down its arduous work, the Committee of Arrangements for the Seventh Annual Meeting retires to private life.

(Signed) HENRY M. W. MOORE,
Chairman.

XIII. REPORT OF THE COMMITTEE ON THE RECOMMENDATIONS IN THE ADDRESS OF THE PRESIDENT.

WE, your Committee appointed to report upon the President's Address, recognize the scholarly manner in which a clear line of distinction has been drawn between *grade and rank* and recommend its wide distribution among field, staff and line officers. We further heartily indorse all of his suggestions, except number four, which reads as follows: "On the institution of post exchanges (canteen) at all permanent posts and stations of the Army, Navy, Marine Corps

and National Guard." We would suggest that the words "and National Guard" be stricken out.

(Signed) F. W. BYERS,
N. SENN,
JAMES TAGGART PRIESTLEY,
J. D. GRIFFITH.

XIV. REPORT OF THE NOMINATING COMMITTEE.

THE Nominating Committee of the Association of Military Surgeons for 1897 has the honor to report the following for officers for the ensuing year:

President, Lieutenant Colonel J. D. Griffith, of Missouri.

First Vice President, Major John Van R. Hoff, of the U. S. Army.

Second Vice President, Medical Inspector J. C. Wise, of the U. S. Navy.

Secretary and Editor, Captain James E. Pilcher, of the U. S. Army.

Treasurer, Captain James J. Erwin, of Ohio.

Delegate to the British Medical Association, Major W. H. Egle, of Pennsylvania.

Alternate, General D. Mayer, of West Virginia.

Place of meeting, Kansas City, Missouri, at a date to be determined by the Executive Committee.

(Signed) GEORGE COOK, Chairman.

(Signed) G. H. HALBERSTADT, Secretary.

CHAPTER III.
The Opening Session.

INVOCATION.

BY THE REV. WASHINGTON GLADDEN, D. D., LL.D.,
COLUMBUS, OHIO.

Let us invoke God's blessing.

O THOU eternal God, Lord of life, Source of light, who hath revealed thyself unto us as our Father: We draw near unto Thee, lifting up our hearts in thanksgiving and adoration, beseeching Thee that Thou wilt look down upon us now in mercy, forgiving all our sins, imparting unto us the truth, which we need to know, the wisdom which is profitable to direct, that we may be guided by Thy counsel in the ways of life and sanctified by Thy truth for all the service to which Thou hast called us. We bless Thee that Thou hast revealed unto us so much of Thy truth, that Thou hast made it possible for us to discern the meaning of Thy work in the world and to read the record Thou hast written there and follow Thee in the work thou art doing. We bless Thee that we are made co-workers with Thee, that we may understand Thy purposes more perfectly, that we may know and obey Thy will. We beseech Thee that Thy blessing may rest upon these surgeons, whom Thou hast gathered here to-day. We thank Thee for the beneficent work to which Thou hast called them, the work of ministering to the suffering, of healing the hearts of those who are afflicted, and of comforting those who are in need of life. We praise Thee that He who came to reveal God to men, was one who delighted in healing the sick, in giving sight to the blind, in giving help to the needy and we beseech Thee that Thou wilt help these, Thy servants, to know Him that their hearts may be full of the divine compassion, that they may know how to help and minister to all those who are in suffering. We

pray Thee, our Father, that Thou wilt bless them in all the work to which Thou hast called them. May their meeting here be full of profit to them. Give them understanding of Thy ways, lead them in Thy paths, strengthen them in Thy service, and grant, O, Lord, that the time may soon come when there will be no more wounds to heal, no more of the marred and maimed in battle appearing in our streets, when the swords shall be beaten into plowshares and the spears into pruning hooks, and when the peace and good will that angels promise, shall come to earth to abide.

Now, let Thy spirit rest upon all who shall take part in these exercises; give wisdom and grace and expedience to all who may speak, and so in this meeting grant that Thy Kingdom may come and Thy will be done in earth. We ask it for Jesus' sake. Amen.

INTRODUCTION.

BY CAPTAIN JAMES E. PILCHER,

COLUMBUS BARRACKS, OHIO.

ASSISTANT SURGEON IN THE UNITED STATES ARMY; CHAIRMAN OF
THE LOCAL COMMITTEE ON PROGRAM.

THE Association of Military Surgeons is this morning somewhat in the position of a newly-arrived guest in a strange household. In the little book¹ which so many of you have in your hands I have attempted to effect something of a mutual introduction between the guest—the Association—and the host, our very kind friends, the people of Columbus.

Without being ungenerously particular as to historic accuracy, we may admit that the beginning of Columbus is enshrouded in tradition and buried in fable. Perhaps the most unreliable tradition is the story of that beautiful morning in the month of flowers when Christopher Columbus came sailing up the raging Scioto, the noble prow of the Santa Maria breasting the billows like a thing of very life. Seeing signs of humanity on the bank, Columbus, as my naval friends would say, "boxed the compass," "spliced the main brace," "shivered his timbers," and "drove in the Captain's gig" to the shore.

¹"The Columbus Book of the Military Surgeons." 8 vo., 100 pages, the illustrated Souvenir of the meeting.

Lucas Sullivant and Lyne Starling¹ were standing on the bank in awe and apprehension—and also in brand new buggies of home construction.

“Are you, oh, are you,” said the trembling Starling, “are you Christopher Columbus?”

“Yes,” replied the great Admiral of the Indies.

“Then, Lucas,” said he, “we might as well give up—we are discovered at last!” (Laughter.)

I may be a little weak on my history in general, but I know that no person can tell the tale of Columbus' doings on that night. I am afraid that, like many another guest of later days, he became involved in the delights of Columbus hospitality and returned to his fleet—again to quote the words of my naval colleagues—hardly able to navigate, and with his mind in a confused condition quite characteristic of the after-dinner stage of Columbus hospitality. So that, in his absent-mindedness, he left behind him his most valued possession—his name. And that name has remained ever since, a cynosure of glory to the entire republic, an example of greatness to the marvelling nations! (Applause.)

Of the beautiful city which has come into full bloom among the mystic structures of the mound builders and along the grassy meadows of the Olentangy, little need be said. In the words of a neighboring State,

“*Si quaeris urbem amoenam circumspice!*”

or in the classic pronunciation of the schools,

“See kwyrees oorbaym amoenam, keerkoomspeekay!”—
If you seek a beautiful city, look about you!

Ohio has been the scene of many a warlike picture. Not a few spots upon her territory deserve the title of “Dark and Bloody Ground,” given to an adjoining State, and the military instinct is strong within her. Many of her Governors have been soldiers, from Harrison of Tippecanoe to the gallant gentleman who now adorns the gubernatorial chair. (Applause.)

The participation of the surgeon in war has been too little appreciated. Unlike many others of the staff, he is present with troops everywhere, sharing alike hardship, danger and death. In the single battle of Abba Carina recently fought in Abyssinia, no

¹It is hardly necessary to remark that these worthies were the first settlers in and founders of Columbus.

less than nineteen surgeons were killed. But the other day in the British expedition in Benin, the only officer killed was Surgeon Fyfe, of the Navy, who was shot while helping a wounded comrade. No less an authority than Archibald Forbes goes so far as to claim that, under the changed conditions of modern warfare, the medical officers present with any body of troops are likely to be annihilated at the first general engagement.

The gallantry of Sir Philip Sydney, who in his dying moments declined a cup of water in favor of a wounded soldier lying near by, has been the theme of poets' song and writers' eulogy three hundred years. But how much more should the laurel wreath of fame crown the memory of Arthur Landon, a young English surgeon of a few years ago. Mortally wounded, with the agony of death fast closing in upon his enfeebled frame—in the midst of his own suffering and prostration, the cry of an injured soldier shrieking aloud with pain fell upon his almost palsied ears, and roused the sense of pity ever near the surface in his heart. Forgetful of self, he threw off the grasp of Death fast bearing down upon him, crept to the suffering man, injected into the arm an anodyne to relieve his agony, and fell across him—dead!

This is no isolated case! The annals of war and the archives of medicine alike are full of them. From Baron Percy, of Napoleon's army, who bore a wounded comrade across a ponton bridge over the Rhine in the face of a galling fire from a battery of Austrian guns, down to one of the younger members of this Association, who in the last Apache campaign led a battalion of infantry against a band of howling savages, the medical officer has been as ready to sacrifice his own life as to save that of others.

But, brave and generous as are these acts, they really fall short of that higher and truer courage which animates the surgeon when he coolly and unconcernedly proceeds with his mission of healing upon the battlefield amid the thunder of artillery, the rattle of small arms and the roar of contending armies. Brave as is the hero, who, with all his arms about him, leads a dashing charge upon a fighting enemy, equally brave is the quiet surgeon who follows in his wake with soothing touch and helping hand, saving life where his predecessor destroyed it. (Applause.)

And this higher, holier mission of relieving pain, of saving life and rendering obsolete the trite old saying,—“the horrors of war”—it is the work of the Association of Military Surgeons to advance. It is an actual incarnation of the principle—“in time of peace prepare for war.”

To the want of compliance with this bit of wisdom was due the hideous mortality which decimated great armies in the military operations of former times. Inadequate preparation slew thirty-three per cent. of the allied armies in the Crimea. In our own War of the Rebellion, two hundred and fifty thousand brave men laid down their lives for the principles which they advocated. At least a third of these fatalities are said to have been directly chargeable to the mismanagement and ignorance which was manifested toward the medical department early in the war. All honor to the splendid courage and magnificent humanity of the medical corps which in the end triumphed over the obstacles thrown in the way by ignorance, malice and stupidity! All honor to the professional enthusiasm, the scientific accuracy and the contagious humanity which, during that war, produced results so tremendous as to create an era in military medicine, unexampled in the splendor of its achievements and the immensity of its accomplishments.

Upon the American military surgeon of to-day falls the duty of maintaining this brilliant legacy of progress and growth in undiminished lustre. For that purpose this Association was organized. With that object this meeting has been appointed. And to that end the labor of every member is unflinchingly directed. (Applause.)

THE CHAIRMAN (continuing): This part of my theme has so grown upon me that I am afraid I have said more, in my introduction, about the guest than the host. But it is easy to understand my hesitation in speaking of Columbus, when it is understood that I am to be followed by one so much more capable of speaking upon this attractive theme than I. For we have with us this morning the Honorable Samuel L. Black, Mayor of Columbus, who will address us in behalf of the city of Columbus—a subject in which he is entirely at home.

THE CITY OF COLUMBUS.

BY THE HONORABLE SAMUEL L. BLACK,

COLUMBUS, OHIO.

MAYOR OF THE CITY.

IT is my pleasant duty this morning to thank you most sincerely for your presence among us; to greet you most cordially and extend to you a most hearty welcome among us, in our hearts and in our homes. The greed of nations, man's inhumanity to man, has raised the hideous form of war in two quarters of the globe. Christian humanity is watching its course with fear, lest it may be encompassed in its bloody path. We are impressed by this that this relic of the dark ages is yet a possibility among enlightened people, that men are yet devoting their time and energy to increase of the destructiveness of the engines of war, and increasing its horrors a hundred fold year after year. It is, therefore, indeed an honor to meet with a body of distinguished men, representatives, as we believe, of the greatest nation on earth, who, anticipating such a possibility, are devoting their time, their energy and their skill to devising ways and means to mitigate its horror. I beg to assure you, Members of the Association of Military Surgeons, that you have, among the people of our city, friends who will watch your progress with the keenest interest and kindly feeling, who will recognize in your advancement a ray of the sweetest hope that may penetrate the darkest cloud of the bloodiest strife.

No pen can picture, no language describe and no imagination conceive of the pain and suffering that would have been spared the horrors of our late war had your modern methods of surgery, your modern methods of caring for the sick and wounded then been applicable and in vogue. Indeed, recognizing this, we may well follow you, in every step forward you may make, with hearts laden with prayer.

It is with pardonable pride that we claim for our city, so beautifully described by Captain Pilcher, a share of the well-deserved honor. Our gallant Fourteenth Regiment created and instituted a hospital corps, the first in Ohio and among the first in the United States. With the assistance of the surgeons of the local post, they created and formulated a code of regulations for

the ambulance corps, which were finally adopted and are in vogue to-day. All praise be to the humanity of men, that these people have marched in the progress of humanity and are to-day recognized as non-combatants throughout the world. We congratulate you, gentlemen, most heartily upon your work in the past. You have our sincerest hopes for your work in the future. May it continue to grow until that divinity that shapes our ends, rough hew them as we may, shall assure us liberty without conflict, peace without war.

Again, members of the Association of Military Surgeons, I welcome you for the people of this city, and we bid you Godspeed in your errand of mercy. (Applause.)

THE CHAIRMAN: A distinguished orator, who recently spoke in this city, enlarged extensively on what he called "The Ohio idea." The Ohio idea is to have a suitable man ready for every office in the gift of the country, state or city. In Ohio we have certainly carried this idea out to its logical conclusion. We have not only men who are willing to fill every office, but we have men who are able to fill every office. (Applause.) We have with us this morning a gentleman with a splendid military record, a gentleman well known as a statesman, a gentleman who fills the highest office in the State with the greatest dignity and ability, and who is worthy to fill not only the highest office in this State or any other State, but the highest office in the country. I take pleasure in introducing to you His Excellency, the Honorable Asa S. Bushnell, Governor of Ohio. (Applause.)

THE STATE OF OHIO.

BY THE HONORABLE ASA S. BUSHNELL,
OF SPRINGFIELD, OHIO.
GOVERNOR OF OHIO.

THE Chairman has made a good many promises for me. I doubt very much whether I shall be able to carry out all that he has said. But, according to "the Ohio idea," I must be willing to do so.

Ohio is a great State. All her citizens admit that. She was the first State carved out of the great Northwest Territory. Her first colony of citizens came from the commonwealths of Connecticut and Massachusetts. They came not here fleeing from

justice, but they came as citizens of a great country, determined to establish a government devoted to morality, religion and education. From the day of the landing of the 48 colonists at Marietta that idea has been carried out and has become also "the Ohio idea." Ohio has never hesitated in furnishing her quota in every cause, whether it was for military or civic duty. Her quota of soldiers for the Mexican war was 3,000, but she furnished of rank and file before the war was over 5,536, nearly double the number that had been assigned as her quota. When the Governor of this State, one of the great war Governors of Ohio, promised President Lincoln 30,000 men in thirty days, fully equipped and ready for the battle field, 36,000 responded. And so throughout the whole war, she never hesitated to furnish more than was asked or more than she promised. It is with pride that we say that during the War of the Rebellion Ohio furnished in soldiers for the defense of the Union 318,000 of her citizens. (Applause.) Nearly one-eighth of the entire army went from Ohio. And among that number, as you know, were the greatest military chieftains. Ohio furnished to the country the greatest General of modern times, (Applause.) the man whose ashes we deposited in their final resting place in that magnificent tomb on the Hudson in the city of his choice, but a few days ago. His last words, which were characteristic of the man, were that he hoped no one would be distressed on his account. Ohio furnished other great chieftains. What other State gave to the army such Generals as Sherman, (Applause.) Sheridan, (Applause.) and many others that I might name, whom you will recall without my mentioning them. So, too, Ohio furnished her full quota of Military Surgeons, and among them as good as were furnished by any of the States of the Union.

We are glad to have this Association with us to-day. Some of us do not look with as much dread into your faces as we did when we saw you among our regiments and in the regimental hospitals. Then we thought you were very severe toward us at times, and the boys who were so unfortunate as to be obliged to go to the hospital sometimes felt that the surgeon had but little heart or sympathy for them. I remember an instance in the hospital at Beverly, when we were going through one morning. We had a surgeon, a splendid man, tender hearted as a woman, but

prompt as a business man. No time to waste words. One of the boys had lain in the hospital for some time and was convalescent; he had commenced getting a little better, had a good appetite and was feeling as if he would like to have something good to eat. As the surgeon passed along in the morning, he said,

"You are getting better."

"Doctor," said the young man, calling him back, "would mince pie hurt me?"

"It wouldn't hurt you if you didn't eat it," was the answer.

The soldier thought the surgeon was too severe with him. But no one, either in the army or in private life, ministered so much to the comfort and relief of suffering as the Surgeon and the Doctor.

Ohio is proud of a great many things. We have here, as many of you know, all kinds of climate. (Laughter.) We regret that your visit here should have been made when we were having just the kind of climate we have had yesterday and to-day; but if you stay long enough we assure you we will have bright sunshine, instead of weeping clouds, and as beautiful days as you will find under an Italian sun. We have all kinds of soil. We have, I may say, all kinds of production. In fact, I believe that we have so much in Ohio that if you were to build a wall around the State, the four million and a half people could live inside of it without getting anything from outside. (Applause.) She could sustain herself. But that we would not do; that we should be very sorry to be obliged to do, because it would deprive us of the pleasure of having the Surgeon-General of the Queen's Dominion with us, (Heavy applause) and having the Surgeon-Generals and distinguished Surgeons from the sister States of the Union. (Applause.) Ohio is hospitable as is the city of Columbus hospitable, and we want them all to come within our borders. We extend to them a welcome always, and, while it might be that we could live among ourselves without the outside world, we should not want to deprive ourselves of the pleasure of the company of these distinguished persons.

Ohio has followed the determination of the early settlers in the education of the young. It was one of Ohio's favorite sons, President Garfield, who said he never passed a ragged boy upon the street without thinking it were possible he might owe him a salute, for he did not know what possibilities might be buttoned

up under his ragged coat. High or low, rich or poor, we love the boys. Men are but boys grown up, and so long as any State or Nation cares for its youth, so long that State or that Nation will prosper. Wordsworth, in his little poem *To the Child*, has given expression to something for older minds to contemplate. He says:

"Small service is true service, while it lasts.
Of friends, however humble, scorn not one;
The daisy, by the shadow it casts,
Protects the lingering dew drop from the sun."

Our good people of the State, many of them, are devoting their time to protecting these lingering dew drops from the sun. Ohio expends more money in education in the public schools than any other State in the Union. She has, as you know, abundant seminaries and colleges devoted to the education of the younger generation. So, as I said at the outset, Ohio is a great State. Even Charles Dickens, fifty years ago, when he wrote up his recollections of his trip through America—which many of us thought very severe—paid us the compliment to say that the State of Ohio in its public institutions was an example for the world. (Applause.) Ohio has institutions for the deaf and dumb, for the blind, and for the unfortunate insane.

I thank you very much for your courteous attention, and I welcome you to the State of Ohio, those of you who are from other States and from our neighboring country on the north, and you of our own State, I welcome here to your own capitol. I hope the deliberations of this session will be pleasant and profitable to you. I wish good health to one and all of you, long life to your Association, and God-speed to the Country we all love so well. (Applause.)

THE CHAIRMAN: The medical profession is a working one. The quiet watcher by the bedside is more in our line than the leading of great multitudes by the sound of eloquent phrases. Still we have orators among us. There is one gentleman, well known to the people of Columbus and the entire State, whose silver tongue is the delight of post-prandial medical exercises. We esteem it, then, a very great bit of good fortune that we are this morning honored with the presence of Dr. Dan. Millikin, Professor of Medical Jurisprudence in the Miami Medical College, and ex-President of the Ohio State Medical Society, who is to a high degree a representative of the best element of the medical profession of Ohio.

THE MEDICAL PROFESSION OF OHIO.

BY DAN MILLIKIN, M. D.,

HAMILTON, OHIO.

EX-PRESIDENT OF THE OHIO STATE MEDICAL SOCIETY.

I HAVE been wondering, as I sat upon the stage, what could compensate me for having no uniform and for not having the band play for me. I have it now—it is the introduction with which I have been so pleasantly presented to you, and which flatters me, I do protest, for there is no silver in my tongue and precious little in my pocket. But I am just as proud of my introduction as I can be, and I am proud of what brings me here, for I have been invited as a medical man of Ohio to speak to you as an Association. So I am proud, in spite of or notwithstanding the circumstances which have brought me to the front. It is enough to speak for the profession of the State which in wealth and population is no less than fourth in that noble galaxy which forms our Union; that State which measured in war and peace, that State which measured by her orators, her statesmen, her plodding men of science, her physicians and surgeons, is not fourth, but first of all. (Applause.) It is no joke, although it has been said here with something of humor, that she is first of all because she is ever full of presidential candidates and they get to the front. (Laughter.) I have been told since I came upon this stage that Ohio sent to the front 800 of her good doctors some years ago to care for the health and heal the wounds of her soldiers in the War of the Rebellion. There are practicing now in the State of Ohio only 125, and I doubt if there are many more practicing anywhere. Not one of those men is as young as I. They practiced surgery under infinite difficulties at a time when war on such a scale was new, for, wipe out the monstrous lies which blot the page of ancient history, and you will find never was there before arrayed such a host as was arrayed in that struggle. These doctors went to the front under infinite difficulties. The commissary was new, the transportation of stores was imperfect at first; and, O! the pity that Lister had only for one year been spelling out the primer of aseptic and antiseptic surgery! Those men fought the pestilence, they fought sepsis, they fought hospital gangrene, without the marvelous power which we have now. I

honor them, and I salute the few here present in the name of the Profession of the State of Ohio. (Applause.) I salute you and honor also the representatives of the Medical Service of our Regular Army. We have a little army—God grant that there may never come a day when we will need a bigger one. Yet the men in our little army are as well cared for as those who stand arrayed in the immense armies across the Atlantic, and I know that the medical officers of our army have done as much and are doing as much for the comfort and well-being, not only of their enlisted men, but for humanity and science at large, and I salute you and welcome you also in the name of the Profession of the State of Ohio. (Applause.) The officers of the Marine Hospital Service should not be forgotten and are not forgotten by scientific men who watch the progress of the world. They stand at the portals of our noble country, not only ministering to the wounds of the mariner, but they stand there, guarding with admirable courage and sagacity—a fine mixture is that, courage and sagacity—guarding the country against pestilence, which threatens you and me every hour in these times of rapid transit. Don't let me forget to extend our welcome to the National Guard, that splendid body of men, who could even in twenty-four hours muster a hundred thousand men, and a million troops in thirty days. To the medical officers of this National Guard I also extend a welcome on the part of the Profession of my State, for that State is honored by their visit among us.

And, now, ladies and gentlemen, a thought has come to me to-day, prompted, indeed, by remarks I have heard upon this stage, that war is, itself, an unspeakable curse and a brutal crime against our modern civilization. The waste is tremendous. Cut down to the lowest level and find what a citizen is worth to his country and you will find that statisticians put it at thousands of dollars for each man. Multiply that by the thousands lost in battle, and multiply it also by the thousands lost by disease and privations of war and see what a tremendous money loss there is, to say nothing of the bleeding hearts at home. Add to that the tremendous loss of food and stores wasted, including, if you please, animals, some of the noblest animals God ever made. Besides think of the time wasted, the lives spoiled, and tell me if war is not an unspeakable crime in our modern civilization. Can there

be any excuse for our preparing or thinking of war? Only one, that it may be possible for us to invoke the aid of brute force to repel brute force brought against us by a lower civilization, or it may be necessary for us to assert ourselves against a civilization—that of Spain, perhaps—that is so low and decrepit it cannot appreciate anything but brute force. (Applause.) But when war comes there will be only one good thing in it, save honor, and that will be the work that will be done by the medical corps and by all these men of the red cross. I will not belittle the courage which animates the soldier when he imposes himself front to front and life to life against an enemy. It is something that many of us have not; it is a virtue, but a virtue that does not belong pre-eminently to a higher civilization. But that spirit which animates the surgeon in battle belongs to the highest, and there is no religion, not even the highest religion that has been evolved out of the highest condition of man, not even Christianity, that is not put into active play and practice when the medical man of the army goes to the front and faces the peril of the field hospital, the fatigue marches and the bivouac, the thirst and the lack of repose when other men are sleeping, and lays down his life, as often he does, not from bullets alone, but from sepsis and from fatigue, and all in the service of fallen man, (Applause), cheerfully yielding of his strength and of his good body to save some poor torso; standing perhaps at the door of his hospital to see his friends march away, glancing back to see a sullen and perhaps savage foe come to visit him while he stands faithful. Is there any sublimer sight in history?

I was thinking a little bit ago of the great surgeon, Larrey, who accompanied Napoleon to Moscow, in that campaign that no one has found an excuse for, a campaign planned by a madman, a campaign planned by a little Cæsar and perhaps the worst of all, a campaign the result of the ambition of the people. You know the story. Snowflakes did what Russian men could not do. You know how the selfish monster who planned it broke down, horrified by the magnitude of his crime. But where was Larrey, the French surgeon, supreme master of himself and greater than all? It is recorded that in twenty-four hours he made two hundred capital operations. So swift was his knife that he had to leave to his assistants the ligation of arteries and the suturing and bandaging.

On that campaign Larrey exsected the head of the humerus, and that means something to you medical men; he amputated both thighs and got his man through to France alive. He made a pharyngotomy to remove a portion of a bayonet that was pressing on the pharyngeal nerve. All this he did in such biting cold and under such circumstances of panic and hunger as you and I can hardly conceive. If there is any example of man's ability rising high above all circumstances of fate, there is one for you, and that was set forth by a military surgeon. (Applause.)

And, so, gentlemen, while I welcome you here I would stir your pride perhaps by these poor words. By putting on your uniform and taking care of these troops, you line yourself up with men whose ability far transcends that of the militia. I could say perhaps much more, but time flies and I will not. The State of Ohio, speaking through a feeble instrument like myself, for her Medical Profession, welcomes you to this capital of this glorious State in this glorious galaxy of States, and welcomes you most heartily. (Applause.)

THE CHAIRMAN: It is difficult for me to speak without prejudice of the Ohio National Guard. So many courtesies have been showered upon me by its members, so much kindly feeling has been shown to me, that I can say nothing but praise. There is, however, with us this morning a gentleman who can speak of the Ohio National Guard without prejudice and thoroughly impartially. We are now to have the pleasure of listening,—concerning the Ohio National Guard and its attitude toward the military surgeon in general and in particular,—to Major General Henry A. Axline, Adjutant General of Ohio.

THE OHIO NATIONAL GUARD.

BY MAJOR GENERAL HENRY A. AXLINE,
OF COLUMBUS, OHIO.

ADJUTANT GENERAL OF OHIO.

THE unusual modesty, as you have observed, of the Ohio man precludes him from praising anything that pertains to the Ohio institution, and for that reason I fear it would not be proper for me to give my attention to the Ohio National Guard exclusively. Our good friend from across the lakes, who comes down to mingle with the surgeons of the United States, might think about all there was of this country was Ohio,

and should there any difficulties arise between our nations, which is not probable in the least, all the efforts of the opposition might be directed towards our State, while the other States would dwell in peace and tranquility. (Laughter.) Now, the Ohio National Guard is but a type of that of all the progressive States in the American Union. It is made up of the same class of material, with the same aspirations, the same motives, and the same patriotism that moves all of them. The National Guard is a modern institution, the like of which is unknown in the history of the past. It is peculiar to itself. No nation in the world, except the States of the American Union, has anything like it. You remember thirty years or more ago, at the close of the War of the Rebellion, the military establishment of this country, both North and South, was wonderful in its magnitude. The armies of the United States mustered more than a million of armed soldiers trained in the arts of war as soldiers are seldom trained. And as if by magic this army melted away and that gallant establishment known as the Regular Army was reduced in its numbers, so that we went from a military nation into a nation without soldiers almost at one step.

The army at this time was engaged principally in the frontier work, so they had very little time to devote to the interior or the eastern part of the United States. They were engaged in Indian wars, etc., and we were left so that we could scarcely see a soldier. The States seem to have awakened up to a realization of the condition and as a military force seemed to be necessary, one by one they dropped into line and organized what is known as the National Guard of this republic. The affair was crude in the beginning, but it has progressed and marched onward until it has become one of the recognized institutions of our country. It is made up of a peculiar class of material; many of the men are the descendants of the old volunteer soldiers of the war, and all of them have taken up that spirit as much as it can be taken up in time of peace and are preparing themselves as soldiers of like character in time of war. We have in this country at this time 115,000 National Guards, scattered all over the country, sustained by the various States. The National Government appropriates \$400,000 for this purpose. The States in an aggregate appropriate and expend \$3,000,000 to sustain this force, an amount en-

tirely out of proportion to the results, seven and a half times more being appropriated by the States than by the National Government.

I believe the time has come—we have indications of it on all hands, it has been coming for a number of years—that our services are recognized as they have never been recognized before. The people come in contact with the National Guard, who have their friends and relations and supporters all around them, and thus the people come to learn what they are. The army has not sufficient magnitude, and it is concentrated in garrisons, so very few of our people come in contact with them. But by this system of civil soldiery the whole people know who our volunteer defenders are. This has extended until we have every species of organization coming up—the Boys' Brigade, the Sons of Veterans, etc.—so that the military spirit to-day is greater than it has been in any other period of our history, unless it was during the War of the Rebellion. You can scarcely find a boy now who does not know something about drill. We have, to-day, 115,000 men ready for an emergency. The strength of the establishment, if it were filled to its maximum limit under its present organization, would be more than 150,000 men, and these are backed by the veteran association of the G. A. R., so that we are to-day better prepared for a military emergency than this nation has ever before been in times of peace.

It has been said to-day that Ohio is a great State. The Governor has said that we can produce here men, soldiers, anything. Why, up here in one township six miles square, in Harding County, that was a marsh when Columbus came up here, we can raise enough onions and potatoes to sustain an army of one million of men. (Laughter.) We have 6,000 men equal to any in the Union; we have organized eight regiments of infantry, the First, Second, Third, Fifth, Eighth and Ninth Battalion, the Fourteenth, Sixteenth, the Seventeenth, a regiment of Light Artillery, one troop of cavalry, and a naval reserve that will join with the Navy of the United States to save this nation. We are backed by a reserve, back even of the National Guard, of which Governor Bushnell is Commander-in-Chief of 600,000 able-bodied men who are ready for any emergency. All this is in addition to the grand aggregate of 10,000,000 reported in the latest reports from the

military establishment of this country as the reserve forces of the United States of America.

Now one word in behalf of the Ohio National Guard. We have in the National Guard, nine Surgeons with a rank of Major, twenty-five Surgeons with the rank of Captain, eight Hospital Stewards, ten Acting Stewards, and 173 enlisted men, an aggregate of 225 officers and enlisted men in the Medical Department of the National Guard of Ohio. When I speak of them I will say, and without fear of contradiction, that in that department the Ohio National Guard has no superior in the Union. I want to say for the medical profession, as it exists in the National Guard, we have among our members some of the best; they are the leading surgeons of the localities they represent; they are young and active and vigorous, and they are progressive. Even those who are getting a little old in years are so young in appearance that you would take them for boys. My good brother on the right has scarcely told the whole truth; he has scarcely given the medical profession credit for all it deserves, although he has done it eloquently. I believe there is no department of the military science that excels the branch represented by the Medical Department. Simply take the records of war—while we thought at that time surgery was so far advanced that it was the marvel of the world, yet if one of those old surgeons were to have occasion to apply his methods to-day, he would be driven out of camp for malpractice. The advance has been wonderful in the character of armies, but the present system of surgery is as far ahead of that practiced during the war of the rebellion as is the new magazine rifle superior to the old flint-lock smooth bore, so that there is no comparison. This Association with its small membership represents all the departments of military surgery in this country. We have the Army, the Navy, and the National Guard combined in this Association. You are the men who will take the lead in case of an emergency. If the Army must be expanded, you must help. You fabricate the rules that will govern surgery in the time of war. If we come to be plunged into a general war, which we hope will not occur, your little band of surgeons will expand and be such as has never before been known. Your surgical and other appliances will give you an advantage no other body of men ever had. Instead of having thousands of men dying from lack of treatment, the loss of death

from wounds and disease will be so much lessened that you will be recognized. As has been said, those who serve in war may come out with honor, but you will come out as the benefactors of mankind, who have saved in numbers more than any other class of men.

Now, gentlemen, I suppose our surgeons of the Ohio National Guard will be here; they have their ideas and the disposition to impress their ideas upon others. I think, too, all they have to say will be good, but they may try to impress the Ohio idea too strongly. Still, I know they are willing to listen and learn, and they together with you will help to fabricate and build up a system. Now, in conclusion let me ask of you, as members of this Association, to put your heads together and see if you cannot work out some uniform system of supplies to be issued by the Department at Washington, that will fit all the work in this country. We need that, and all that is necessary is to gather together the elements and I know the Department at Washington will help carry out anything you offer in that direction. (Applause.)

THE CHAIRMAN: It may be inferred from some things said here this morning, that we believe the United States to be the greatest nation on earth. But if such is the case, the next greatest nation is that mighty empire, the people of which not only speak the same tongue, but, although under a different title, sing its national hymn to the same air—we call it "America," they call it "God Save the Queen." We are favored this morning by Her Majesty's Government with a representative of the Queen of the United Kingdom of Great Britain and Ireland. I have the pleasure of introducing to you Deputy Surgeon General W. S. Oliver of the British Army. (Great applause.)

THE BRITISH ARMY.

By GENERAL WILLIAM SILVER OLIVER,

HALIFAX, N. S.

DEPUTY SURGEON GENERAL BRITISH ARMY MEDICAL
DEPARTMENT.

I COME before you somewhat like Columbus of old. I came as a stranger, but already to-day, I feel to be one of yourselves and perfectly at home. I thank you for the reception and the kindness I have received, but especially for this

decoration,¹ to which I can assure you I attach the greatest importance. Of course, people who are not thoroughly acquainted with the exigencies of the time of war cannot thoroughly appreciate the advantages of this grand society, which our friend here (Gen. Senn) had the honor of founding, and which I trust will be extended to my own country. When we realize that there are no less than 22,000,000 soldiers in Europe, amongst the Russians, French, Germans and Austrians, not including England, all ready to turn out on short notice, and that there are extensive preparations there made for war and large stores of materials ready for emergency, trains specially constructed, railroads built not on commercial grounds but for strategic purposes; when we consider these vast strides that have been made and vast expenses incurred for the purpose of establishing these preparations, we can realize the great importance of this Association. Your worthy Governor just mentioned the number of grand institutions you have in this country, but, speaking as a medical officer, I do not believe they can compare at all with the benefit that will accrue from the extension of this Association. This Association is only in its infancy—I believe it has been established only seven years—but I can assure you it is a giant in the relief of suffering. I trust I can impress upon my people at home the importance of establishing a similar society, not only in Great Britain but in our Provinces. We have a St. John Ambulance Association extending over our country with a numerous staff of ladies and others, but it is not the same at all as this created in the United States. Here you have officers vying with each other in inventing materials for the transportation of the sick and wounded and for the alleviation of sickness. As I have said before, I hope to see the institution extended. I will not now occupy more of your time, but thank you for the grand reception and the honor you have conferred upon me. (Applause.)

THE CHAIRMAN: If, as we are led to believe, the Association of Military Surgeons is the most valuable factor in existence in developing and elaborating military medicine and surgery, and if its organization will contribute enormously to the mitigation of the horrors of future wars, we cannot be too grateful to the distinguished surgeon, the

¹ The Badge of the meeting.

famous investigator, the celebrated teacher, the charming gentleman and faithful friend, who evolved the idea and developed the plan of the Association. To know him is a privilege worthy ever to be remembered with grateful pleasure, and to hear his teachings is a privilege ever to be cherished. No person could speak of military surgery in general better, and no one could speak of the Association of Military Surgeons one-half so well as Surgeon General Nicholas Senn, of Chicago, Illinois.

THE ASSOCIATION OF MILITARY SURGEONS OF THE UNITED STATES.

BY COLONEL NICHOLAS SENN,

CHICAGO, ILL.

SURGEON GENERAL OF ILLINOIS; FOUNDER OF
THE ASSOCIATION.

I DESIRE to thank, in behalf of the members of the Association of Military Surgeons, the gentlemen for their eloquent addresses this morning. I am sure we have always had the greatest pride in the State of Ohio. We have come here with great expectation. Our brief experience, however, makes us feel that Ohio is a greater State than we had anticipated. We are willing to concede now that we have come to the greatest capital city in the United States, that we have come to the greatest State, and that we have come here to the greatest branch of the National Guard of the United States. This State is represented at the national government by two of the greatest statesmen of the present century. (Applause.)

It is a source of pride to me to represent the small but select body of men you have before you to-day. They are men who represent three distinct medical departments, all with common interests, the National Guard, the Regular Army, and the Navy, all working in harmony for one purpose—to improve the medical service. The history of this Association is a very short one. It is only six years old, a young but vigorous babe that soon will reach its manhood and the height of utility. It was formed six years ago, first exclusively of National Guard Surgeons. We had little hope then that it would interest the Regular Army sufficiently for them to join our ranks. Great blessings have followed the changes in medicine and surgery. The medical departments we

felt, in this and other countries, were exceedingly slow in availing themselves of the great advances made in our practice. That was the one motive that impressed the founders of this Association. The next controlling idea was to bring the members of the National Guard together to exchange ideas and to obtain more harmony in practice; in other words, to build up the Medical Department of the National Guard. We were honored from the very beginning with official representatives of the Army and Navy who visited our meetings year after year, and we were agreeably surprised when after the second year they asked admission. We appreciate their fellowship. We are always willing to learn from them. We, of the National Guard, perhaps, have better opportunities to keep apace with the wonderful strides and improvements of the practice of medicine and surgery, and the honorable representatives of the Army and Navy are anxious to benefit by contact with us. We are here war-like in appearance but with the most peaceful intentions. We feel that the hearty welcome extended to us has been sincere, and we feel that the State of Ohio is honored by being visited by these gentlemen, who represent the entire defensive force of the United States.

THE CHAIRMAN: It is perhaps unfortuate that we of the inland have rather infrequent opportunities to come in contact with the Navy. We are, then, particularly to be congratulated upon the happy circumstance which has given us a most distinguished Naval medical officer as our President. But we are still more fortunate in having the presidential chair filled by a man who is not only a Naval medical officer of rare distinction, but who is possessed personally of exceptional executive power, wide experience of life in all parts of the world, remarkable personal magnetism, and unusual professional ability. The Association is then to be congratulated that in introducing the President, I may, at the same time, introduce Medical Director (Commodore) Albert Leary Gihon, the fourth Executive of this body.

(For the Address of the President, see the following chapter.)

CHAPTER IV.

The Annual Address of the President.

ON THE STATUS OF THE MEDICAL OFFICER IN THE MILITARY AND NAVAL ESTABLISHMENT.

BY ALBERT L. GIHON, A. M., M. D.,

MEDICAL DIRECTOR (COMMODORE) U. S. NAVY (RETIRED);
PRESIDENT OF THE ASSOCIATION.

A BODY of military men, clothed in uniform bearing military designations, wearing upon their breasts the insignia of military service afield and afloat, yet who are all doctors as well as generals, colonels, majors, commanders, lieutenants and the like, would seem to a civilian ignorant of the matter, to be a strange anomaly, and as there may be more than one civilian and as there are actually many non-medical military and naval men no less ignorant or wilfully blind to facts, I can perhaps occupy my time as presidential exhortator in no better way than by explaining the precise status and relations of the military and naval medical officer.

And first, it must be distinctly understood that the military surgeon is not a mere make-believe soldier, an imitation officer, parading in borrowed plumes, seeking to hide his professional identity under distinctively military titles, nor that he is accorded by courtesy a quasi-status in military life to which in strict justice he has no legitimate claim.

At the very start, I desire to denounce that assumption as unwarranted by fact and in the most positive and emphatic terms declare that a military surgeon is a soldier officer, as unmistakably as if he had never borne a medical degree, and when I use the term military, I wish to be understood as including naval officers as well, as has been the very proper intention in designating this body the Association of Military Surgeons of the United

States, with the administration of which, for the nonce,—myself—a naval medical officer has been honored.

If the claim be that a military organization is exclusively the physical fighting, so-called "combatant" element, then a military force would simply be a brawling armed mob and a navy, a collection of blood-thirsty Jack tars. The theory that soldiers and sailors are only so many gladiators hired to kill or maim each other¹ and that warfare is but a matter of the relative endurance of the material for slaughter, is the legitimate corollary of the assumption that a medical department is not an absolutely indispensable, essential constituent part of an army and navy. The fact is that there cannot be, as there is not, any army or navy in existence in any country, without its organized medical department, the thoroughness of organization, however, not being everywhere, commensurate with its importance.

The aggregation of men in masses for whatever purpose establishes the necessity for their intelligent sanitary supervision—a necessity that is as urgent in civil as in military life, but is the greater and more necessary as the disciplinary restraints governing these masses increase. This supervision is of a character requiring special information and training, and that the State shall have the ablest possible service of the kind, it establishes a high order of acquirements, and in time a body of men possessing these qualifications and identified with the service, in which their peculiar and responsible duties are exerted, comes to be constituted. The coincident creation, inseparability and indispensability of the medical department, which is nothing more than the department of sanitary supervision, therefore entitle it to be coequal with every other in dignity, distinction, precedence and position.

The denial of this coequality, the assertion that a medical corps is only a civil excrescence, that its services are of a temporary character and only occasionally required, are the causes of the disputes which have, at various times, agitated the national services. Medical officers are determined in their insistence that their duties are never inoperative and that, consequently, they are a necessary part of the complex organization constituting an army and navy. It has been repeatedly declared that doctors, like hostlers, can be

¹ "The soldiers's trade, verily and essentially, is not slaying but being slain."—JOHN RUSKIN.

hired for the special occasions when required, and if the functions of the medical officer were limited to the treatment of casualties or the relief of sporadic cases of sickness, undoubtedly there are charlatans and cheap Johns in the profession of medicine as in other callings to be had at very moderate rates, but it is hardly possible that the twentieth century of the world's progress shall witness such a catastrophe of intelligence and common sense.

A medical department, therefore, being an indispensable ingredient of a military organization, co-ordinate and coincident with the inception of that organization, I shall briefly indicate its place in the military system, showing how unfounded the fear that it must needs clash with any other department.

The *officiel*, as the entire body of officers of every corps is collectively understood, is the controlling, directing, thinking element, as distinguished from the subordinate, responsive but irresponsible human agents who mechanically operate the engines of war. This *officiel*, this collective body of officers, irrespective of their particular or special duties, is divided into grades, bearing distinctive designations—as in the army, generals, colonels, lieutenant-colonels, majors, etc., and in the navy, admirals, commodores, captains, commanders, etc., the latter corresponding and equivalent to the former. The practice has grown of classifying the *officiel* into “combatants,” meaning thereby the line or executive department, and “non-combatants” or the staff, comprising the medical, engineer, quartermaster, commissary, pay and other corps, and the implied non-militant character of the latter has been the pretext for the arrogation by the former of a superior consideration and the exclusive claim to the recognized titles of what are actually only military grades, irrespective of special duties. The result has been an unnecessary and regrettable contest based on misunderstandings and misrepresentations of what on the one side are called “staff assumptions” and on the other “line persecution.” A few words in explanation of the proper significance of the terms *grade*, *rank* and *title* may, I hope, make clear the relations the various corps of the army and navy bear towards each other without conflict or detriment to any. As already suggested, the entire *officiel* is divided into certain grades—steps—as the word *gradi* indicates—or platforms, one higher than another, on which the officers of the several depart-

ments collectively are grouped, by virtue of longer service, higher attainments, or greater responsibilities, so that some departments are limited in the number of their grades, the very highest in fact being reached only by the line or executive branch, but this without detriment, disparagement or invidious distinctions between those members of the several departments, who stand side by side on the same platform. I may be permitted to quote substantially what I have written on this subject on a former occasion, in language that I sought to make so explicit that the mere change of terms of expression cannot give it greater precision.

Grade is that something the law has conferred upon all commissioned officers, which serves to show each officer's place, position or status in a military organization. *Rank* means simply seniority or precedence in the several grades and depends solely upon the date of the officer's commission; thus one officer ranks another in his own grade. While custom has sanctioned using grade and rank as synonymous, this is not correct, since the word rank is not employed in the statutes to give any officer his official place or position either in the military or naval organizations. Grades in the military establishments of all civilized nations are practically the same, corresponding names in the several languages being given to those grades. In European services, the ascensional grades surpass those known to us—such as Marechal de France, Captain General, and Field-Marshal in the army, and Lieutenant Admiral, General Admiral, etc., in the navy. To show the equivalent correspondence of naval with military grades, the law in the United States defines that a rear admiral shall have the *relative rank* of major general, a commodore that of brigadier general, a captain that of colonel, it being distinctly understood and unquestioned that the expression "relative rank" implies absolute equality. Unfortunately, this same term, relative rank, has been used in defining the correspondence of the grades, into which the staff corps of the navy have been divided, with those of the line, for while the manifest intent of the law is precisely the same in the one case as in the other, "sea-lawyers" have quibbled to make it appear that relative rank as applied to staff officers is not real rank, actual rank, positive rank, although the same reasoning invalidates their own precedence with the army. Happily in the army the matter has been settled by law and with good

or bad grace the medical officer's military grade is recognized without resort to mischievous qualifying words. In the navy, this mischief has gone to the extent of assailing the bona-fide official character of the staff, for though the relationship implied by the words "relative rank" is undeniably one of unqualified equality, as in the instance defining the relative rank of a rear admiral to be that of a major general, a distorted significance entirely inconsistent with the plain meaning of the words has been given to them. In the case of the medical corps of the navy, the grades are specified to be medical director, medical inspector, surgeon, passed assistant surgeon, and assistant surgeon—these being, in fact, not grades at all but only titles, since a medical director may be of the grade (or as the law states may have the relative rank) of commodore or captain; a surgeon that of lieutenant commander or lieutenant; a passed assistant surgeon that of lieutenant or lieutenant of the junior grade; while in the engineer corps the confusion is still greater, for the title (or as it is erroneously called the grade) of chief engineer is bestowed upon five separate grades of officers, ranging from commodore to lieutenant. Out of this careless misuse of the word grade has arisen the lamentable dissensions, now limited to the navy, which have gone so far as to lead to the assumption by the line of a vested right to be considered *the Navy*, all other officers, according to them, not being officers at all, because not specifically stated to be of the same grades as themselves, and they oppose legislation rectifying this misuse of terms, affecting to believe that it would lead to conflict of authority, therein having the mistaken idea that authority is inherent in any grade, and in the face of the army precedent where no such conflict occurs, and here it may be well to proclaim, in reply to a malicious insinuation to the contrary, that no military or naval medical officer aspires to lose his professional identity by being confounded with any line officer, nor wishes to exercise his functions, nor desires anything more than to have the actual grade to which his commission entitles him so clearly defined that his perfect equality with all others of that same grade may be unhesitatingly recognized, nor does he object to or desire the omission of the distinctive medical title indicating his specific duty.

I trust the significance of the terms *grade*, *rank* and *title* has been made apparent. *Grades* are generic distinctions, the out-

growth of military creations, and are practically the same all over the world. *Rank* is the relation of the individual officer to others of the same grade and naturally as well to those of other grades, so that in fact no two officers of the same service can have absolutely the same rank. Properly, there is no name for rank, but custom has led to the identification of the name of the grade as rank, so that in speaking of the grade of brigadier general or the grade of commodore it is customary to say the rank of brigadier general or the rank of commodore. *Title*, the third of the terms employed in the designation of officers, is the specific definition of their particular duties. It is the name of the grade generally and also of the several classes of officers in each grade. Thus, surgeon general in the army is the distinctive title by which an officer of the grade of brigadier general, who belongs to the medical departments, is distinguished from brigadier generals of other departments. In the line, the title of the grade is frequently used to the exclusion of the corps title, but most officers affix to their names the specific title, infantry, cavalry, artillery, as others do, engineer corps, medical department, pay corps, etc. In the broad scope, which has been given to the word grade, there has been no suggestion that specific corps titles should be abolished. Major Smith of the medical department does not wish to be confounded with Major Smith of the artillery, while he does wish it distinctly understood and admitted that he is as much a major in dignity, privilege and precedence as any other major. He aspires to become a colonel or brigadier general in the medical department, but he knows that he can never be a major general, at least in this country. In Europe he might rise even higher. At Berlin, in 1890, on the occasion of the official dinner to the Section on Military Surgery at the Tenth International Medical Congress, nearly four hundred military officers from almost every nation on earth were assembled, clothed in their various national uniforms, many covered with decorations of high order, all of them doctors and some of them major generals. Here in the very heart of militarism was witnessed the recognition of the fact that a physician can be both soldier and officer—a fact that democratic-republican America learns so reluctantly. The naval medical officer only asks to stand on the same platform with his army colleague, and neither seeks to jostle with any other officer of the grade to which

he of right belongs, nor is he willing to have the other stand in front of him nor tread on his toes.

I may be pardoned this tedious argument, but as the first naval President of this Association I felt it obligatory upon me to clearly define the status of the corps to which I belong, and to place on record where all may read, our claim that without being one whit less doctors, we are not one whit less military officers, and that the language of our commissions, which severally read "all officers, seamen and marines under his command are strictly charged and required to be obedient—" is intelligible English. I trust, too, that my army and national guard colleagues may not find the discussion as to grades wholly irrelative or useless in their own cases, justifying as it does their own status, which has not escaped carping criticism.

Military records are full of instances of great personal bravery exhibited by medical officers, and the list would be a lengthy one were their names collated, but it is claimed that these were accidental and exceptional individual displays of heroism in no way associated with the proper professional functions of these officers. Granting this, it remains a fact that the mortality of medical officers in the legitimate performance of their duty is significant of their exposure to danger, which has been assumed to be the special risk and boast of the so-called "combatants." Lord Roberts, commander-in-chief of the forces in Ireland, at a recent dinner, said with a liberality of spirit that characterizes, if we may judge from current medical publications, few British officers of his position: "The heroism and courage, which he himself had seen displayed by army medical officers had deeply impressed him and he had greatly admired their devotion to duty." It is true, the commander-in-Chief of the British Army, Lord Wolseley, at the commencement of the Army Medical School at Netley, gave a graphic and interesting account of the brave conduct of Surgeon-Captain Langdon at Majuba Hill, but he refrained from mentioning his name, and the *Boston Medical and Surgical Journal* quotes the *British Medical Journal* as deploring the lamentable condition of the British army medical service through the policy of neglect and contempt practiced by commanding officers of the line towards their fellows of the medical staff, and saying: "The allusion to a

medical officer, who had shown distinguished gallantry in action, as *that brave civilian* by the commander-in-chief of Her Majesty's Army, is a fair example of the regard felt for medical officers by the line officers of the army, who would exclude the medical officers from service clubs and regard them as social inferiors. It is not to be wondered that it is difficult to induce men of good position and education to enter the medical service." The "brave civilian" referred to was Surgeon-Captain Whitechurch, who was present at the siege of Chitral, and who besides winning the Victoria Cross was awarded a gold medal for gallantry when Lieutenant Baird was fatally wounded. "As a consequence, competition for the British Army Medical service is dead. At a late examination only thirteen were passed and for them twenty-five vacancies existed. Since then a further need has occurred from subsequent resignations and forty places await qualified candidates, but none of these are coming forward. The 'combatant' officers have killed competition and will yet feel the want of skilled surgeons," a condition of things paralleled in our own naval medical service, where at a time of financial stringency, not even the attraction of a fixed salary can induce qualified medical men to apply for a position not consistent with their standing as graduates in a learned profession. The lesson may be well borne in mind, at this time, that the disasters of the Greek armies have been chiefly due to the lack of efficient "non-combatant" departments, among these a wholly inadequate medical establishment being prominent.

It would be ungenerous and unjust not to give credit to the different spirit that has prevailed in our own army, and to no one more than to General Sherman should be accorded the grateful recognition by medical officers of the liberal policy which has resulted in the existing harmonious relations between them and the other corps. Faithfully adhered to, a few years will give the medical corps the opportunity to demonstrate its right to its military pretensions. In the navy, we ask for this, all this which is enjoyed in the army, and nothing more.

As it is now, it cannot fail to be evident in mixed associations of officers, that the medical officer is not the least loyal and patriotic, nor least worthy of wearing a uniform, of all those who are in the service of the government. It should not be forgotten that two

of the three founders of the *Military Order of the Loyal Legion of the United States* were medical officers—Dr. Samuel B. Wylie Mitchell and Dr. Peter Dirck Keyser, both of Philadelphia, and both deceased, the latter only a few weeks ago; and the fact that under their military titles their professional identity was not lost, is sufficient rejoinder to those who assert that medical officers only seek to parade themselves as colonels and majors. All honor to these two physicians, officers and soldiers, who on the memorable 15th of April, 1865, with Colonel T. Elwood Zell, originated this popular military organization, on whose rolls are borne the names of the leaders in the civil war, and at whose meetings is exhibited that spirit of confraternity which is doubtless largely due to the fact that two medical officers were the first to suggest and inspire the Order. Nor is this all: The second of the great military associations of this country, in whose ranks generals and privates march side by side, the *Grand Army of the Republic*, was founded solely by another doctor—B. F. Stephenson, of Wayne county, Illinois, now deceased. How many members of this Grand Army know the fact that but for a brave, loyal medical officer the great patriotic institution, in which they take such pride, would never have been? And here I may digress to ask how many medical officers, themselves, cherish the memories or preserve the recollections of the deeds of the brethren of their own cloth? and perhaps I may be permitted to mention a notable instance, in which I have a personal interest, of a very great medical military officer—the first surgeon-general and physician-general of the Middle Department of the Continental Army of the Revolution—a brave and courtly officer and “the greatest physician this country has ever produced”—a man famous as practitioner, professor, writer and lecturer—the originator of enterprises far ahead of his day—the public-spirited citizen and fearless patriot, elected to the Continental Congress when timid men fell out that he might sign the Declaration of Independence—and one of the authors of the Constitution of the United States—Doctor Benjamin Rush, of Philadelphia. For thirteen years as chairman of the committee to erect a monument to this illustrious medical officer, I have vainly solicited contributions for the purpose from the 110,000 members of the profession in the United States and to-day have the added mortification of knowing that a superb monumental structure

will soon be erected in the city of Washington by a little body of homœopaths to their foreign progenitor—Hahnemann—and later still, that funds are being collected for the erection of a monument in the city of Paris to another foreigner—Pasteur. The Navy Department has assigned a conspicuous site on a knoll in the beautiful park facing the splendid U. S. Naval Museum of Hygiene in Washington for this monument to Rush, the great medical figure of the Revolution, and I trust I do not appeal in vain to those members of this Association, who have not already contributed to it, that they may do their share towards commemorating this great man, who first wore the uniform of an American Surgeon General. If as physicians, the characteristic professional indifference be felt, at least as military officers render justice to the memory and take pride in the achievements of a brother in arms. Are not physicians rather disposed to ignore those of their profession, who rise to eminence in national affairs? The roll is a long one of members of European cabinets, who have borne the degree of Doctor in Medicine, recent instances being Dr. Baccelli, Minister of the Interior of Italy, and Dr. Miquel, the great Finance Minister of the German Empire; and in our day, Dr. Schultz has been Governor of Manitoba, and twice have medical men been Prime Ministers of Canada, Sir E. Tache in 1856 and Sir Charles Tupper in 1896; and "incredible as it may seem to some officers of the army," says the *London Lancet*, "a Surgeon-Lieutenant-Colonel, Dr. Borden, has been made Minister of Militia and Defence, a corresponding position to that of Secretary of State for War." One important arm of our own military establishment, the Signal Corps, was the creation by a doctor, Assistant Surgeon Albert J. Myer, of the United States Army.

The distinctive military character of the members of this Association having been demonstrated, it is evident that the Association itself cannot be regarded as a mere medical society in the ordinary sense, for if it were, there would be no occasion for it, as the numerous existing medical organizations cover every possible department of the profession and to add another would be an unreasonable demand upon the time, as well as upon the pockets of members. It is, of course, a medical association, but with the specific limitation, as stated in the Constitution, that it has been organized "in order to promote and improve the science of mili-

tary surgery." In this respect, it is a body of medical specialists, since military surgery may justly be accounted a specialty, and in conjunction with my honored predecessor, Surgeon General Senn, we sought to have the Association so recognized in the Congress of Physicians and Surgeons, when we were met by an objection, the weight of which we could not gainsay—that we were in fact an inchoate organization, in which membership was no guarantee of individual acquirements and proficiency in that specialty, that is that the several State organizations of the National Guard had no established standard of qualifications and a man might be appointed assistant surgeon, medical director, or surgeon-general at the whim of a Governor, who did not make competency a condition of appointment. This Association will justify its institution if it accomplish the better organization of the medical department of the National Guard, Volunteer Militia and State Troops of the several States, and I commend the work to you as worthy your earnest effort, until you succeed in creating in the military establishment of every State an organized medical department, into which admission shall be gained only after the same rigorous examination as is required in the national services, and in which promotion shall take place from the lowest to the highest grades as in these services. When this shall have come about, the Association of Military Surgeons of the United States may take unquestioned rank as a body of specialists, since Military Medicine, Surgery and Hygiene can justly claim a special character in requirements and practical application. Naturally, therefore, the line of inquiry and work of this Association is limited to questions relating solely to Military Medicine, Military Surgery and Military Hygiene. The discussion of the etiology, pathological history or therapeutic treatment of disease, independently of military conditions or relations, is out of place with us. However interesting the researches of the members as physicians, their recountal belongs to other societies, except so far as they pertain to the incidents of military life. While thus apparently narrowing the field of medical work, opportunity is, in fact, offered for that concentration of energy upon special subjects, which ends in results of the greatest utility.

In the prosecution of this work, I beg to recommend from an experience of many years in Association work, the assignment of

special subjects of inquiry to selected committees, and I suggest as such special committees, submitting their adoption to your later consideration, the following:

(1) On securing uniformity of organization of the medical department in the military establishments of the several States;

(2) On securing uniformity of outfit and supply for field service in the medical departments of the several States;

(3) On the rationing of bodies of men in peace and during hostile operations, on shore and afloat;

(4) On the institution of post exchanges (canteens) at all permanent posts and stations of the army, navy, marine corps and national guard;

(5) On the thorough disinfection of men-of-war, transports, and other government vessels;

(6) On the best means of identification of enlisted men.

I need not add that to accomplish results, work must be done, and that it ought to be a matter of pride with every officer accepting the position of chairman or member of a committee to perform zealously, thoroughly and faithfully the duty he accepts, and I beg that no member shall leave this session having been notified of his appointment to a committee without advising the President whether the appointment is acceptable and whether he intends to assume the responsibility therein implied.

This Association has the promise of a distinguished future and if zealously supported by its members, is destined to exercise a powerful influence in military questions. It has successfully tided over a threatened financial crisis and, thanks to the exertions of the indefatigable Treasurer, it is now so well grounded that nothing but carelessness, gross mismanagement and negligence can ever again menace its successful career. But, no Association, however well organized and conducted, can continue prosperous without the earnest support of its members. A lukewarm participation in its affairs, the mere payment of annual dues, and inactive attendance at its meetings, are not enough. Every member must recognize his responsibility to be seen, heard and felt, and here I may pay tribute to the memories of two of our lately deceased associates—Brigadier General Edward J. Forster, late Surgeon General of the Massachusetts Volunteer Militia, our lamented

First Vice President, and Lieutenant Colonel Charles M. Woodward, Surgeon General of the Michigan National Guard (retired) of the Executive Committee, both of whom were conspicuous for their active interest in this Association. Only a few hours before his tragic death, General Forster was discussing with me how we might best promote the growth and development of this body. The published transactions show the part he had already taken to this end. My last letter to Colonel Woodward, in relation to the work of this session, was received and replied to by his daughter announcing that he was dead when it had arrived. What these men did is an earnest of what we all ought to do, and while cherishing their memories let us imitate them in their lively interest in the prosperity of our Association.

Entertaining the opinion I do of the commanding importance of this body, I need not assure you of my pride at having been placed at its head. Following upon the close of my official career in the navy, my election to the position of chief of all the associated military medical services of the United States, had peculiar significance to me as setting the seal of approval upon my past career, and feeling that it is the last, as it is the greatest distinction of my life, I shall most gratefully and with earnest interest to the end, watch the development of this Association into one of the great national institutions of this country. (Applause.)

CHAPTER V.

Naval Medicine, Surgery, and Hygiene.

I. A PLEA FOR THE MORE EFFICIENT ORGANIZATION OF THE MEDICAL DEPARTMENT ON OUR SHIPS OF WAR.

By JOHN C. WISE, M. D.,

WASHINGTON, D. C.,

MEDICAL INSPECTOR (COMMANDER) IN THE
UNITED STATES NAVY.

I DESIRE to ask the attention of this Association to the very complex conditions, which will obtain in future naval actions, as they relate to relief of the wounded, to the unusually high rate of casualties which may be expected, and to show how inadequate the present organization of the Medical Department is, to efficiently discharge its duties, or to fulfill the reasonable requirements of humanity.

Of late we have heard much of the "humane" element in the modern missile; as this idea is erroneous and misleading it should be controverted, else it may materially influence the preparation for the care of the wounded. It is certainly true that the lesion inflicted by the modern missile in many cases is very light.

An English Consul in Egypt, reporting to his government, on the operations there, states that the small calibre, modern missile, failed to stop an enemy when hit, and recently from the garrison of Olmutz, a case is reported of a soldier who was shot through the abdomen, liver, and diaphragm, the patient making a speedy recovery—(*Militar-Wochenblatt*). Yet these cases represent conditions, which will not prevail in the future. Dr. Demosthen, in his letter to the Paris Academy, distinctly states that humanity will gain nothing from the modern missile in warfare.

There is a grim humor in the quotation made by Sir William McCormac in a recent address, in London, from a letter of Surgeon Lieutenant Evans serving in the Chitral expedition, as follows, "All uncomplicated wounds healed readily, but that there were no severe bone injuries under treatment was due to the fact, that all men who suffered from fracture of the long bones were dead." In the Bombay riots the long bones were so comminuted, and shattered by the new missile, that amputation was required in nearly all cases.

Surgeon Captain Melville (*Journal of the United Service of India*), is one of the few authorities who claim that there is no proof of the predicted increase in the casualties of future wars, and that the duties of the Medical Department will be enlarged. He classifies wounds of the future into, first, slight and demanding little attention, or second, severe and probably fatal. He contends further that the proportion of killed to wounded, will be greater, and thus materially lessen the labors of the surgeon.

Despite the statement of the German Commission, that the large vessels were rarely hit, in its experiments, and the small ones torn, most students of the subject, assert that the wound of the vessels by the modern missile is clean cut, punched out as it were, that hemorrhage is to be the important factor in the mortality tables of the future, and coupled with the results of shock, be their greatest components.

Stitt states that in the Chilean war, the mortality was greatly increased by immediate hemorrhage.

Fischer (*Oesterreichische Militarische Zeitschrift*), estimates that the total casualties for future actions will be from 22 to 30 per cent. of the total force engaged. Kries, a lieutenant in the German Army (*Jarbuch fur der Deutsche Armee und Marine*), agrees to this higher percentage. It is evident that these figures must vary greatly in accordance with the courage and endurance of the troops engaged. What military writers call the "breaking-strain" occurs in the best regular troops (according to Valentine Baker), when 30 per cent. of their number are placed "*hors de combat*."

Now the conditions of a naval engagement are such that fighting is carried to the most sanguinary extremes.

Given a ship that will float, and a gun that will fire, the action may continue indefinitely, and a possibly well delivered shot may disable, and cause an enemy otherwise intact, to strike. Perry in the action on Lake Erie, came repeatedly to the hatch, and asked the Surgeon to spare him "another hand" at the guns, and this was repeated until the Medical Officer was left alone with the wounded.

It is believed that the naval action of the future will be short, sharp, and decisive. At the battle of the Minn river, between the French and Chinese, the first shot of the flag-ship *Triomphante*, as she rounded a bend, struck, exploded, and sank the most formidable of the Chinese ships, and at once decided the action.

It is impossible to conceive in the future such an engagement as that between the *Serapis*, and *Richard*. Lashed together, these antagonists fought for four and a half hours, plying all the means of destruction known to the times, and yet there was a mortality of but 50 per cent. on both sides, terrible enough, it is true, but to-day such a situation would mean the utter annihilation of one of the combatants.

This engagement well exemplifies some of the conditions which swell the mortality in naval actions. The explosion of a bucket of hand-grenades on the *Serapis* killed and wounded 60 men, and the explosion of a gun on the *Richard* killed 16 on the deck above. Many times both ships were on fire, and hostilities ceased between the ships' companies, in order to fight the common enemy.

The estimate of casualties in late naval engagements, as stated by Surgeon Siegfried, U. S. N. (Report of the Surgeon General of the Navy, 1894), is as follows, viz.: At Riachuelo, in 1865, the Brazilians had 20 per cent. of the force disabled; on one ship the *Paranhyba*, it was 25 per cent.

The Paraguayan loss is stated to have been 45 per cent. of the effective force. In the *Huascar-Esmeralda* action, the latter (of wood) lost 80 per cent. In the *Covadonga-Independenzia* action, the latter lost 12 per cent.

In the *Huascar-Cochrane*, and *Blanco Encalado* engagement, the *Huascar* had 34 per cent. of her company disabled.

At Yalu, the Chinese, *Chen-Yuen*, lost 350 killed and wounded, in a crew of 460, or a little over 76 per cent. If such a percent-

age occur in the engagement of nations unskilled in naval warfare, what will it be when first-class powers are combatants?

Surgeon Siegfried, before quoted, concludes that a "battle-ship with a complement of 500, in action, if she is not sunk, will have within a few minutes 150 dead, and disabled strewn about her decks, of whom 30 will be killed and 120 wounded."

This officer, judging from all available statistics, estimates the percentage of casualties at one-third, or 33 per cent. In view of the figures cited, the authority of Fischer and others, this estimate would seem too low. For many reasons we must expect a higher percentage in naval actions, and if we consider the experiments made in France of firing at silhouette figures, we must conclude the estimate of the German Commission 20 per cent. as much below the mark. If doubt remain on this score, in view of the meagre statistics available, a consideration of the dynamics of the question should remove it.

The Hebler tubular bullet of .30 calibre has a velocity of 3,000 feet per second, and a pressure of something over three atmospheres (46,000 pounds per square inch), with a range of 4,000 yards. The penetration of the service bullet (U. S. A.), as determined by the Bureau of Ordnance, is $16\frac{1}{2}$ inches—fired at three feet into seasoned oak. Is it a matter of wonder that all fractures of the long bones, in the Chitral expedition, caused death? or those at Bombay required amputation?

Major Girard, Surgeon U. S. A. (address before the Salt Lake County Medical Society), states: "The ammunition expended by rapid fire guns will be so perfected, those troops within the firing distance will have to meet a perfect hail of bullets," and further, "with the modern repeating rifle 40 shots can be delivered in a minute and up to a range of 6,000 yards, with a remaining velocity sufficient to penetrate the abdominal cavity."

Herr Prinz, a German Naval Surgeon, writing of the civil war in Chili (*Admiralty and Horse-Guards' Gazette*), states as follows, concerning the fire of the Mannlicher magazine rifle: "The Balmacedists, who were no cowards, declared that their astonishment, caused by the terrible storm of projectiles, left them unable to use their own weapons."

The loss on the *Serapis*, and *Richard* was for each 50 per cent. in killed and wounded. Let us reflect on the difference

in weight of metal thrown, then, and now. The broadside of the *Richard* was 472 pounds; that of the *Indiana* is 5,664 pounds, or twelve times greater. The missile from a modern 13-inch rifle, firing every four minutes, is more than double the weight of the full broadside of the older ship.

The battery of the battleship *Indiana* in rapidity of fire and weight of projectile is as follows:

4	13 inch.	every	4'	(1100)	4400 lbs.
4	8 "	"	1' 30''	(250)	1000 lbs.
2	6 "	"	1'	(100)	200 lbs.
10	6 lbs.	"	0.6''	(6)	60 lbs.
4	1 lb.	"	0.2''	(1)	4 lbs.
					5664

In view of all the facts, and our present state of knowledge, 50 per cent. will be a conservative estimate of the casualties in future sustained by naval actions. Recapitulating, we can conclude:

First—That casualties in war of the future will be decidedly increased.

Second—That this increase in casualties will be greater in naval engagements, from causes peculiar to this mode of warfare.

Third—That the number of lesions characterized by hemorrhage and shock will be unusually large.

Fourth—That, owing to the greater per cent. of casualties and the nature of naval actions, large numbers of wounded will demand urgent and immediate attention.

Coming now more definitely to the purpose of this paper, let us see if the present organization of the Medical Department is equal to its duty—the efficient succor of the wounded in action.

While we have seen the war-ship increased in magnitude, and power, to its present formidable proportions, while the development of arms and missiles have been brought to such perfection, what advance has been made in the facilities of the Medical Department, since our revolutionary period, in relation to the question under consideration?

I can claim to be well within the bounds of conservatism when stating that the organization differs little, if at all, from that with which Lawrence Brooke ministered to the wounded of the *Bon Homme Richard*. I mention the name of this Medical Officer,

from Virginia, here, and consign it reverently to the historian of this Association, so that while the names of Jones and Dale are immortalized, that of this old-fashioned Surgeon, who stood as the only Angel of Mercy in that scene of carnage and wreck, may not be forgotten.

Article 685, Par. 1, U. S. N. Regulations, provides that "The Surgeon's division shall consist of all junior medical officers, the Apothecary and Baymen."

Article 651 provides that "When attendants to the sick, in addition to the regularly established complement, are necessary, he (the Senior Medical Officer) shall report the fact to the Captain, representing the degree of necessity existing, and the extent of additional service required."

Article 652 provides that "He (the Senior Medical Officer) shall have everything necessary for the relief of the wounded."

Article 653 provides that "He (the Senior Medical Officer) shall at general and special exercises, when directed, distribute a sufficient number of tourniquets for all requirements, and instruct officers and men how to use them."

Article 683 provides "In battle he (the Senior Medical Officer) shall have charge of the sick and wounded and shall be stationed, as designated by the Captain."

Article 827, Par. 1, provides that baymen shall be given a course of instruction on board a receiving ship or at a naval hospital before being drafted for service in a sea-going ship.

Article 741 provides that "The Chaplain's duty in battle shall be with the wounded."

The "Instructions for Medical Officers," par. 2, page 29, under duties of Surgeon of the fleet, direct that "He shall suggest to the Commander-in-Chief, or Senior Officer, measures which he may consider necessary for the preservation of the health of the fleet, or to arrest the progress of disease, and for promotion of the comfort of the sick and wounded."

Such is the written law, in so far as it relates to the formation and functions of the Medical Department in battle.

While many zealous officers with the hearty co-operation of their commanders, will with the authority hereby granted, accomplish much for the amelioration of the wounded, it is evident that under existing provisions, all methods will differ, and lack that

unanimity of organization, and detail of discipline, which are so essential to the best results.

The basis of complement for our naval service is approximately as follows:

Rate.	Complement.	Medical Officers.	Apothecary.	Baymen.
First.....	400 to 500	3	1	2
Second.....	300 to 350	2	1	2
Third.....	250 to 300	1 or 2	1	1

Torpedo boats, tugs and tenders are usually dependent for their medical service, unless on detached duty.

Baymen as a rule (despite the regulations) have no previous service, and are detailed when the ship goes in commission. On the completion of a cruise they are discharged or re-enlisted, but it is rare to find continuous service men in these billets.

After a reasonable period of instruction many acquire fair proficiency, but soon thereafter their term expires and their services are lost, just as they become useful.

The formation of the Medical Department for battalion drill or for landing parties is not a matter of regulation. It consists usually of the Junior Medical Officer or Apothecary, or both, with from two to four bearers.

I am indebted to the Medical Officers of the *Columbia*, *Maine* and *Indiana* for details of the organization on these ships.

The armored cruiser *Columbia* has a complement of 470. Aids to wounded number 80 per cent. of the crew, these being permanently told off, but serving in guns' crew and divisions. Instruction is given systematically by the Medical Officer at least twice a week, and again when the crew is at general quarters. About 25 per cent. of the crew have been so far drilled, and it is the intention to teach this number to fair proficiency, and the whole crew to a less extent. Each man gets three occasions at drills. They come in classes of 12 or 15 at a time, and receive lecture, and practice drill, on first aid, transport, and handling. Operating or Surgeons' stations at quarters are two, one in sick-bay, one aft in ward-room, latter on gun-deck, former on lower deck, or two decks below the greatest guns.

On the battleship *Maine*, with a complement of 380 men, at battalion drill, the medical formation is one Surgeon, one Apothecary, two Baymen, and four aids from the crew. At general quar-

fers, in addition to above force, two men are detailed at each gun. These men are especially drilled in the care of the wounded, and the entire crew has received instruction in compliance with the Regulations.

Concerning the handling of the wounded in action, Surgeon Neilson of the Maine states that "in ordinary distant action, with comparatively few casualties, but one large hatch has to be traversed, and the wounded may be sheltered behind the turrets; on the other hand, at close quarters, with one or more ships, and an extraordinary number of casualties, the battle plates being on, no wounded can be passed below: furthermore at close quarters, all the structures, above the armored belt, would be riddled by the fire, the number of casualties would be enormous, and no operating possible."

Surgeon Bradley, U. S. N., concerning the condition on the Indiana, states: "Apparatus (*i. e.* for transportation) would be of little or no use in action; all the handling would be man-handling, no operating except to save life, while even for this, if the light guns are used (and they will be), three or four surgeons would not be too many." It is, however, beyond the purpose of this paper to enter into the question of handling the wounded on shipboard—this subject having been ably presented to the Association by Surgeons Russell and Stitt of the Navy.

While many ingenious devices are suggested for handling the wounded, and which will be useful in transport after action, it is generally conceded in our own, and foreign services, that they will have no place in action. "To anyone witnessing in time of drill the perilous descent through three decks of a volunteer patient, in even the most scientifically constructed stretchers, the danger of such a method in action is vividly apparent. A chance shot disabling the men at the falls, or cutting the ropes, the unfortunate patient falls to his death, probably wounding others in his descent," (Medical Inspector Du Bois, Report of the Surgeon General of the Navy).

Where the operating stations will be, and how the wounded will reach them, can be answered only by the Medical Officer, who has decided, after careful study of the problem as presented in his ship, and after consultation with his commander.

Mr. President, when first-class battleships of the great naval powers shall engage in action, it will transcend in its terrible ferocity and fatality anything known in the history of past warfare. Each deck will be a distinct battlefield, and there will be practically no succor from one to the other. Can there be any question, then, that each deck shall have its sanitary units compact and disciplined, or that a hospital corps is a necessity for the Navy?

England, France and other naval powers have long since moved in this matter, and the Surgeon General of the Navy has repeatedly asked its consideration. In the report for 1894 he says, in connection with a bill prepared for organization of a hospital corps, "it is believed that the provisions contained in this bill are necessary, and afford the only means by which the present defective system, so harmful to the interests of the service, and so unjust to the sick and wounded officers and men of the Navy, can be remedied. The number of apothecaries and nurses employed at present in the Medical Department of the Navy is about 200, and by enactment of the present bill, these men will be immediately available for service in an organized hospital corps."

There can be no question, but that the task of those to whose lot it will come, to succor the wounded in future naval actions, will, under the most favorable condition, be one full of difficulty and perplexity, and should it occur without the Nation's having done those things which are acknowledged the best, it can but ever remain as a source of deepest regret.

II. THE WORK OF THE MEDICAL DEPARTMENT ON BOARD UNITED STATES NAVAL VESSELS.

BY C. A. SIEGFRIED, M. D.,

NEWPORT, R. I.,

SURGEON IN THE UNITED STATES NAVY.

THE work of the Medical Department, or, in other words, the duties of surgeons on board ship, naturally fall under three heads; first, the medical and surgical work; second, the military part; and third, the sanitary duties. Over the whole of the work there is the presiding and vastly important subject of hygiene, in all its manifold ramifications and sequence of events, whether applied with knowledge, or if affairs generally are left without guidance and prescience. In fact we have in modern times, in navies, as well as in armies, become more or less pretty well practised in hygiene, this relating to everything pertaining to the successful modern man-of-war. That no ship can be successful in the full and economic sense without constant and watchful hygienic control, governing the daily life of her personnel, I think can be abundantly proved. The quality of a man's brain marks the physical well being of a man, and it is a duty to get all we can, mentally and physically, out of the human material supplied by the country to man the Navy.

THE MEDICAL AND SURGICAL WORK.

The diseases most common and incident to ship life are those induced by the environment, the usual excesses in food and drink, from dissipation whilst ashore on liberty from the ship; from the long confinement oftentimes, the monotony of labor and occupation; from diet, either its insufficiency in certain elements, excess of salt meats and absence of green vegetables; or the diet lacks variety, and is more or less unsuitable either in its selection or preparation. It is rarely insufficient in quantity, but this does occur, though less frequently than formerly.

There are at times long periods where men afloat do not have pure air to breathe. It seems strange that at sea and free from the usual land pollutions that the air of sailors should not be pure. This will not be wondered at when it is reflected upon that within the ship's bulk there is congregated in the minimum amount of space all the multifarious activities of the modern war vessel. After all, the real cubic capacity of the average naval vessel containing 470 men is about the same as the well-to-do house of 25 inmates on shore. A ship 350 feet long, 70 feet wide, and 35 feet deep, tapering to fine points at both ends and to a rounded hull, and keel, carries, besides its battery (of four 13-inch, eight 8-inch, six 6-inch guns, and twenty-four light guns of the secondary battery), half a dozen torpedos, two great engines for driving purposes, over 90 separate auxiliary engines, three dynamos and all their appurtenances and electric stores, 1,800 tons of coal, provision for 60 days for all hands, cabins, officers' quarters, offices, mess halls, pantries, storerooms of all descriptions and for all purposes, machine shops, ice machine and refrigerators, a hospital, dispensary, and a great number of other necessary accessories, water closets, baths, lavatories, etc., etc. Consequently the air of many of these compartments, a ship being a cellular construction, is often impure and unwholesome, not alone lacking oxygen and with an excess of carbon dioxide, but always and without any exception dust laden. Hence there always occurs a pretty constant proportion of respiratory diseases and phthisis, and various disorders or debility.

Moral influences are, of course, nearly wholly lacking on board ship, and these undoubtedly have an influence in inviting disorder, mentally and physically. In fact the prevalence of immoral and degrading practices is admitted, to an extent more or less depending upon several factors and conditions, such as the work, occupations and recreations of the men. A crew is also much influenced by its leaven, whether good or bad. In my experience all the crews contain, for the first eight months or year of the cruise, as high as five per cent. of confirmed criminals! And until these men are found out and eliminated there is trouble, confusion, and vile practices of the criminal arts and tendencies.

A great amount of the real disease met with is due to, I may say, the auto-intoxications, or auto-infectious fevers of the

"ephemeral" simple continued type, as a rule. These are non-infective, of course, but they will be found to occur in groups at times, when the same conditions meet men much alike in their ages, habits and daily customs. But simple continued fever is rarely absent from most of our naval vessels, and because as a rule these ships are perforce overcrowded. Nevertheless I have long held that, beyond a certain number of cases, or where they seem to persist in cases from a certain part of the ship, the hygiene of the men or of the ship is at fault, and the time has come for close investigation and study with certainty of relief or abatement. When the fevers persist longer than five to six days, the necessity for such study and investigation becomes urgent. And now there is imminent the occurrence of typhoid, under the conditions that incubate simple ephemeræ; it is now that the Eberth-Gaffky germ finds encouragement and gets lodgment. In the number of continued fevers, now probably met with, the proportion of those not possible to diagnosticate as typhoid will be nearly 60 per cent. This has been my experience on two occasions. So, one can say that fevers of serious and continued type, even verging to the fairly well marked typhus forms, including typhoid, are preceded and followed by the innocuous swarms of the ephemeral or simple auto-intoxicant forms, and these originating from neglects or mistakes in hygiene, in a general way.

There is another thermic disorder common to the members of ship's companies when the ship remains for lengthened periods in maximum warm climates, even though no other infective influence seems apparent, beyond possibly a heightening of the ever-present auto-infective agencies and influences through the enforced idleness and confinement to the narrow confines of the ship. I say enforced, for the power of the sun's rays and the indirect effects of the continuous heat, and moisture of the air, to a great extent prevent much labor, or even exercise, for many hours of the day. Under such circumstances the probability is that, without great care in the management of the men, in their diet, work, exercise, recreation, and "cool comforts," there will be many cases of continued fever, "heat fevers" (?) of which a proportion may terminate fatally. Antiperiodics do not influence these nondescript continued fevers, and they, in some respects, bear resemblances to the "Mediterranean fevers" so well elucidated by the

British Army surgeons, Bruce and Hughes. But they are not the same in their etiology, for the latter are due to a specific germ, are as a rule longer continued, and are even less amenable to treatment. The heat physiology and regulation is disordered, and whether by toxins from the commoner saprophytes, or from a specific germ, or series of germs related to each other, remains to be seen.

The purely infective diseases or fevers, the exanthems, and swiftly contagious fevers are happily becoming rare. These invariably are brought to us from the shore, and are easily traced. In such cases isolation, disinfection and transfer to hospital ashore is the rule. At sea extemporized hospitals, tents on deck, or portion of the deck below, near large ports, is secured for the purpose. Canvas screens and care in management with strict segregation serves the usual desired purpose. I have so treated malignant erysipelas, but one additional case occurring from the first two, and this third case in the person of the nurse in attendance.

Vaccination and revaccination being our practice in the naval service we now pass years without having a case of smallpox. In a service of twenty-five years I have not had a case on ship-board.

Parasitic diseases, though infrequent, yet occur sufficiently often to give one the opportunity for study, and forming quite a wide acquaintance. Both internal and external forms, and including the worms of various classes, flukes, filaria, distomæ, and the smaller microscopic parasites less common. In their regions of endemic prevalence I have met the Guinea worm (six months after exposure on West African coast), *Bilharzia hæmatobia* plasmodia of malaria, filariæ (the three classes made by Manson), Chigoe, two varieties of tapes, *Anchylostomum duodenale*, and a few forms not yet sufficiently studied and elucidated to further mention here. In the tropics and islands included, and among the darker races, much parasitology remains to be uncovered, and I have no doubt these forms mentioned will infect the crews of ships when a vessel's stay is prolonged. Blacks, and these socially degraded darker races, nearly universally seem to be affected with some one of more forms of parasites, internal and external, animal and vegetable.

Within a few days' sail of our southern ports there is a wide inviting field for the study of parasites, and as yet obscure bacterial disorder and fevers. I would refer here specially to the subject of continued fevers not typhoid. From my own short glimpses I am convinced that these fevers are a species or series of their own, much alike probably in their etiology, inasmuch as the bacterial cause seems to be the several varieties of cocci, connected with saprophytic tropic conditions, very elusive when searched for in the hot regions, yet not unknown in other climes where such studies are less enervating. Sixty hours from the port of Tampa, Florida, lies the island of Jamaica, and on the lower levels of that land and among its people, black, brown, and mixed, can be found examples of all that I have above suggested, and especially the tropical, continued, and thermic fevers, the exciting cause of which still remains concealed. In examining a number of patients in one of the civil service hospitals in one of the northern ports of Jamaica in March, 1895, I came upon a black man who with his protruding belly and cachexia suggested hydatid disease. This was not so, however, and examining further I found in his blood a small distomum, whose length was twice the diameter of the red corpuscles, the width half the length. The form was perfect, pronounced so by Alex. Agassiz, to whom it was shown. In my desire to have the specimen further studied and recorded, as no such form is known, and upon the advice of Prof. Welch of Baltimore, I sent it to Dr. Stiles, Chief of the Bureau of Animal Industry at Washington, D. C., the well known parasitologist. He did not agree that the specimen was clearly shown as described, and put it in the mails to return it to me. I am sorry to say I have never received it. Not being registered it was apparently lost in the mails. Among the Windward Islands I would recommend Trinidad for a still larger and more varied field for the study of tropical diseases due to bacteria and parasites. This island is not over four days from New York. Here is also located the lepra hospital, distinguished by the labors and management of the late Dr. Beavan Rake. Internal animal parasites of palpable size very generally infest the natives of this island, while one can meet with large groups of yaws, leprosy, filarial disease with pendulous limbs and scrotum, and intestinal blood worms. Seamen in being ashore either on duty or for recreation, may mix

with such people, concealing their diseases, and living together promiscuously, yet they suffer rarely from such contact. It is, however, different in regions where bilharzia, dracunculus, anchylostoma, the amoeba of dysentary, the bacteria of cholera, yellow fever, and the plasmodia of malaria prevail. No state of health or vigor will surely safeguard them here. And again their dissipations temporarily lower resisting power.

We have much to do with the class of disorders excited or induced by the necessary exposure of the sailor. These exposures may be seasonal and climatic, temporary or prolonged. And according to the time and degree of the work, deprivation, and character of the exposure so may follow rheumatic inflammation, disorder of muscle and nerve, the various algias, respiratory or circulatory disease, or such lowering shock to the body as to threaten existence. The most frequent effects from seamen's exposures result in serous membrane inflammation, with next pneumonia, bronchitis, and myalgias. Rheumatism, disorder of the heart and arteries, pleurisy, bronchitis, pneumonia, and intestinal disease. Chilblain, and lowering of the energy of the body from cold are quite common. On the other hand heat disorders are also common, for excessive heat is our principal enemy on board these floating forts with their innumerable engines, confined, illy-ventilated spaces, miles of piping for steam, and the firemen's tasks in crowded firerooms. The common form of heat affection seen is a gradually occurring one, the man complaining of nervelessness, headache, nausea, and finally collapse. We find him with little or no pulse, probably a lowered temperature of his body, though often a few degrees excess, sighing difficult respiration, and imminence of death. There seems to be inhibition of the respiratory and heart centre. By stimulation, the use hypodermically of strychnia, atropia, cognac, ice to the head, if there is excessive heat, a pure air, and frictions with dryness to the surface, the outcome is usually good. Sun heat direct or indirect may act quite differently, and general ice bathing and frictions with cautious use of stimulants, usually suffices. There are among these however a small percentage of cases, the replete bursting head and brain and excessive maximum temperature, which must be bled at once if the integrity of the brain cells is to be preserved. Each case of heat stroke must be individualized, to be properly

and successfully treated. The same must be said, however, in the whole practice of our art.

There is a large body of diseased men in the naval service, which it is difficult to properly classify. They are cases of disordered membranes—mucous, serous and epithelial change and disease with consequent symptoms and results. These in time fill our lists, are always in need of assistance, and eventually require invaliding and pensioning. It may be said to be the price of the seaman's occupation. The disorders are cumulative, so that in the course of time, the man's heart is excitable, his cough is chronic, his bowels are always loose, he has hemorrhoids, his conjunctivæ are intractably thickened and bleared, his ducts and channels are clogged. His "water works" function badly, and finally before his fiftieth year he is a wreck, and at forty may already be useless as an active man-of-wars-man. With the newer modern ships, diminished amount of weather exposures and better hygiene, we may confidently expect a falling off in this class of cases. Yet, on the other hand, there is springing up a tendency to unnecessary luxury and coddling, in the steam heating, electric lighting, and minimum amount of open air work now required in the modern battleship. I have seen, on going to sea from a quiet harbor, where the men from their heated confined quarters, were kept in the open air for their full watches on deck instead of the warm housing, a quadrupling of the sick list from sudden congestive disorders of the respiratory and air passages with in many cases serious systemic disturbance. The men had become "soft" and tender, and could not stand even a moderate degree of the usual exposures at sea.

There occurs with us a pretty constant though small proportion of cases of tubercle of the lungs. In my experience from one to one and a half per cent. annually. Typhoid fever is rare, and in the period of a three year's cruise, recently completed, I have met with but five pronounced cases, all occurring within a period of six weeks in the waters of the naval stations at League Island, Philadelphia, and contracted from that environment (a common experience of our ships at that place).

Venereal diseases are commonly our greatest charge, and prevail much as we choose to govern the liberty ashore of our crews. I have no doubt that much of the seaman's ulterior health and life

is unfortunate from the evils of venery and its consequences. Arteritis, nerve disease, bone and skin lesions, and vesical, urethral and perineal disease are only the most prominent marks and symptoms of this history. The sailor must not be condemned hastily; he has well founded excuses if any human beings have. His life is monotonous, his diet and recreations confined to dull routine often, he periodically gets a sum of money and reaches the land flushed with a craving for liquor, excitement and "pleasures." For sailors there is no great provision made anywhere in the world for their rational amusement, but rum mills, dance halls, and "boweries" are held out to him as his legitimate portion, and this to the shame of the civil communities of sea ports. The sailor is the same kind of a human being as the rest of us, and just what we make him.

Skin diseases and suppurating sinuses (sepsis) are frequently seen. They spring from the many small abrasions by contact with irritating substances, with neglect. It is remarkable how rapidly a tract travels up the hand from the finger tip.

General accidents are rare, though they do occur, and more frequently than formerly. Small amputations, trimming operations, sewing up cuts and lacerations, and scalp wounds happen oftenest. Burns are also common to the men of the engineer's department. As has been said the modern battleship contains from eighty to ninety separate steam cylinders, and some miles of steam piping, with innumerable joints, valves, etc. When a general serious accident occurs involving the lives of from one to a dozen men, the resource of the ship's medical officer or officers is tested to the utmost. A bursting steam pipe in the close fire or engine rooms below, where egress is by means of a small narrow iron ladder only, means, at rare intervals happily, a swift awful calamity. A bursting great gun, a sudden discharge of a rifle in careless hands, the breaking of a tackle in transporting heavy weights such as the enormous shells (some weighing upwards of 800 pounds) over the decks and to the magazines, lowering boats and swinging them twenty feet overhead, handling the heavy anchors and chains, and the rapid work of the steam winches with wire and manilla hawsers, all these things do now and then fail at critical moments, and mangle, scald or in some manner use up the man or men. From the going out of sail power, we now rarely

have the old time accidents aloft, but it has been my sad experience to see and hear the crashing and thud of human beings falling from the yards aloft to the deck.

There is an increasing number of cases of blood disorder from the workers in the dark compartments below. After from four to eight months men must be alternated in their work, brought to the upper air oftener, or kept on deck for an equal period. The sallow, pallid skin, failing strength and weight, all tell plainly the loss of hæmoglobin and diminishing relative proportion of red cells.

As a rule, in compartments below, the air is abnormally moist as well as overheated, and the electric light is ever present, and these conditions cannot, in my knowledge and experience, be as yet entirely obviated. It must always be remembered that our living conditions and opportunities are all most unnatural and opposed to good health, and this (so far as yet known) is unavoidable when one considers the most complicated and intricate structure of the modern war ship. I will even assert that the world does not contain another equal example of such extraordinary close complexity and scientific practical skill as is shut in small confines in the hull of the armored potentially powerful and self sustaining—for long periods—modern ship of war. The three elements, though of equal importance, offensive power, motor power, and personnel, probably come in this order when the naval vessel is designed. As medical men we hold that the personnel should have more consideration, and though this is not a matter pertinent for discussion here, yet I can believe from my own experience that the personnel is gradually having almost if not quite, now, an equal consideration with the first two elements. This is, however, due to the forceful effect of cost, and the temper of the average American. With enlightenment it is easily seen that the Navy needs "better and smarter" men; and the later ship's guns and machinery—for they are but floating machine shops now—need bright active men, and fewer in proportion to the older ships, and this kind of man will not submit to hard conditions of existence. Once made he must be kept, for the experienced product is costly to form, and any other kind is little short of criminal waste of material. Hence hygiene and the medical officer's

functions, are vastly forwarded and improved, and the position of the personnel advanced philosophically if not legally.

With the present materials of construction of ships of war, the cellular nature of the design, and disposition of the space within the ship's outer skin, the matter of infection does not offer any serious difficulties to contend with. Compartments are water tight and not large, and the metals cannot be injured by any one of the several methods I have used in disinfection. Steam can be led to and confined in compartments, chlorine can be liberated, spraying and washing of surfaces is easily done with bulb hand syringes, using various solutions, and more lately formaldehyde can be liberated in the utmost crevices and spaces of a modern all metal ship. What wood we still use is chemically fireproofed, becoming very hard and brittle, and may be for disinfection purposes treated as so much metal.

There is a very considerable amount of urethral work done by us, probably twenty-five per cent. of our work, as may be supposed when the sailor's life is considered, but even this is in later years diminishing. Having our men quite under our control, we do not as a rule find great difficulty in curing and managing our patients successfully. As a rule the more serious cutting operations are by choice transferred to our hospitals if circumstances permit. Hemorrhoids are common, and by myself an operation in which a ligature figures largely is preferred, followed by excision and searing. Hernias as might be expected constantly crop up, but the subject will not here be entered upon, the matter being far too important to be treated in a general or superficial manner at this time, space not permitting a proper presentation of the subject.

Malingering is peculiarly attractive to many of the men who go down to the sea in ships, and I will say that most of the naval surgeon's usefulness will come from his knowledge of human nature, the motives of men around him, and his just firmness in dealing with men and officers. He must be just and fair, always give the man the benefit of the doubt, yet must be sufficiently knowledgeable and professionally quick to constantly throw back the loafers, the idlers, and the criminal. For all these beset him, particularly of stormy days, on coaling ship times, on heavy drills and similar occasions taking them out of their moods or other

schemes. Such cases promptly recover upon reaching the pleasant pastures of a port for liberty ashore. I have in my time overheard both officers and men threaten to "go on sick list" if certain work or duties were required of them. Have also known of ships where the kindly disposed medical officer's "easy gullibility" was a subject of mirth. I have an instance in mind where a seaman was invalided over 3,000 miles home, with a large sum of money as a gift in his pocket, yet gave up his crutches promptly upon gaining his freedom in New York City. I have seen cured a case of rheumatism by a month's confinement in the damp prison cells of an old wooden ship, the result of a court-martial for malingering. A change of medical officers in a ship is always followed by a trial of the new man's patience and skill, until he has in turn learned the prevailing characters of many of the crew. The rascals, the liars, the stupid and ignorant will all in time come to him and he will as certainly find them out. But what waste!

THE MILITARY PART.

Within quite recent years the part allotted to, and claimed by, the medical officer in military formations universally, has vastly increased in importance. It is now beginning to be seen that the man must be physically trained, conserved, and, if injured must be succored, and if possible saved. Since the Crimea this economic and humane principle has become established, until now it is obligatory upon all governments to improve, increase the efficiency, and to further the aims and efforts of the medical departments of national forces. The difficulties in the way of bringing governments to a realization of the vital importance of an able, systematized and well drilled medical organization, as parts of national forces are unhappily only slowly removed.

In the navy much depends upon the surgeons and the lack of uniformity in ambulance drills, methods of teaching the removal of and aid to the wounded and so on, would suggest some further specific additions to the rules in our service, such as for instance, a well-organized hospital corps. However, in forming the ambulance corps or surgeon's division, on board ship, we take control of a small body, usually about two per cent. of the ship's crew, and equip them, in the battalion for landing parties for in-

stance, although with virtually the same outfit familiar to you all in the hospital corps ashore. That is, each man has his kit of living gear, blanket, haversack, canteen, is without arms, and must carry a share of the medical and surgical outfits, stretchers, etc. The weights are equally distributed; the body is in command of the medical officer, and for a battalion of say 250 men, would consist of one surgeon, one apothecary, one navy bayman (nurse), and four men detailed regularly and drilled as carriers and bearers, and in first aids. The medical officer receives his orders from the regular adjutant and officer commanding. Upon landing he, the medical officer, selects his position in the field according to circumstances, on the march always bringing up the rear. Tents are available and to be used if needed, but dependence is left to what may be found, for shelter and construction of sick and rest stations. Rubber blankets being in the equipment of all the men, shelter tents can be improvised. Larger operations necessitate regular hospital tents, a greater quantity of dressing and surgical appliances, the use of the portable general operating table, and in fact more generally complete preparations, establishment of base hospital, and a larger medical personnel.

For smaller expeditions by one or more boats, and not to land in regimental or battalion formation, surgeon's corps does not accompany. Each boat, carrying one or more line officers, and on an average sixteen to twenty men, carries its own emergency medical and surgical boat box. This box is simply gotten up, and the officers are instructed in the use of its contents, besides each package and the under side of the lid, contain plain directions. Dressings for fractures and wounds, first aid packets, and a few tourniquets and bandages complete its outfit. The drugs comprise tablets of opium, quinine, calomel, an astringent, a vomitive, an antiseptic grease, and an antiseptic powder. There is also a flask of pure whiskey or brandy.

We use the simple and very efficient "Well's stretcher" for landing purposes (side bars sliding through a slatted canvas couch). It is compact, light and can be made into the best slinging stretcher for hoisting men up or down hatches in or out of ship, that I know of. By means of lines from four points on each side (side bars being removed) and leading to one stout ring in the centre over the patient, any position can be given, except the

straight one. The tackle takes hold of the ring to which all the lines from the side run, and by lengthening or shortening these side lines the desired position of inclination can be secured.

I have not yet seen any contrivance, stretcher, or cot that is practically successful in handling men wounded in ships in battle. And these are as numerous as other fancies are apt to be, their inventors existing by dozens in all navies.

At the International Medical Congress, at Rome, in 1894, military and naval section, I saw many of these unique contrivances, and the products of men grown grey in many services, and without exception, they met with only cold comfort, and usually tolerant interest only. Hickory, copper, canvas, inclines, double inclines, straps and bands, suspensions, and wonderful "tyings up and in" of a supposed wounded man; all these entered into some of the products of many long incubations. And I do not hesitate to state that it was the opinion of ninety per cent. of the surgeons present that the show of stretchers for use in battle on shipboard was a waste of time. The naval conflicts of the Chino-Japanese war entirely bear out this point, that, in battle on a modern war ship, carriage of the wounded by hand is the only possible method. Within a period of ten minutes the modern cruiser of ten guns, six in play at a time, fires over 200 shots or shells, rapid fire, of from 4 in. to 6 in. calibre. These pierce armor up to eight inches in thickness. Now, in the confusion, carnage, fire, and terror perhaps, and in the few moments of time of the engagement, in all probability, is it not a waste of time to prepare complicated apparatus requiring the whole force of the surgeon's division to manipulate? The "aids to wounded" in a gun division may tarry to stop a comrade's bleeding to death or to tie up a wound but not to wander about at the surgeon's call to lower by tackle a man below, nor would his officer let him leave his gun or battery. The naval battle in these times, between somewhat equal forces, must be a shambles. By one shot, fired by a large Chinese ship, striking a Japanese cruiser fairly and amidst the men and guns of the after battery, there were killed and wounded 102 men. The late Commander McGiffen, who was present, told me this.

After a battle, with time, and the survivors to help, the difficulties of transport can easily be overcome. Hatches, doors and passages in modern ships are small, irregular, and difficult. Ships

are not constructed with the view of handling the wounded; and as yet the medical department must group its way in all that relates to transport and handling of the wounded.

In the absence of specific regulations, and the non-existence of a naval hospital organization with its well trained, well compensated body of men, it is my practice to teach as many men as possible of the ship's company, including officers, the principles of first aid to the wounded, with practical ambulance drills at stated periods. In this way I have reached as many as 35 per cent. of the ship's personnel. It is plain practical instruction with rubber tourniquet, bandages, the Esmarch triangle and first aid packet, posture and position of a wounded man, hand carriage by one man, by two or more men, and how to touch or take hold of a mutilated man, or to restore or revive him by simple means. Some men are taught further, the methods of artificial respiration, to rescue from live electric wires, and something of shock, fainting, and the physiology of the circulation, and respiration. The interest taken in this instruction by the men themselves is our chief reward. The thought of being able to save a life or of being saved themselves by this means, in an emergency, is always held up to them. The danger to the men in the engineer's division and in the magazines is described and dwelt upon; the effect of fire, steam, and irrespirable gases and vapors, methods of combating these, and rescue and assistance, form much of the instruction.

In naval conflicts in the future, not much can be done, at the best, by the ship's medical department; and, following a battle, the vessel must at once seek the aid of civil or military and naval hospitals within easy reach. By the experience in all naval battles, since 1863, the statistics of the killed and wounded of which I compiled in 1894, the proportion of those immediately placed *hors de combat* has been thirty-three per cent. This, with the older methods. To-day, with rapid fire guns, explosive shells, smokeless powders, and more effective methods for killing generally, we may reasonably expect a higher proportion, possibly a doubling of the figures. Hence, in a ship of 450 men, the average good-sized man-of-war with a medical department of two surgeons, and possibly six nurses and hospital men, the wounded would, within a few minutes, number 150, calculating at the old and proved rate of thirty-three per cent.; but, as already proved in a few instances,

if the killed and wounded reach the proportion of two-thirds of the personnel, the number would be 300. I leave to the imagination the state of affairs in such a case, and the plight of the ship and her hapless surgeons, if any of these latter are left alive. Armor protection only existing in the few battleships, and at a few points, the surgeons share equally in all the chances. In fact a compartment in one of the Japanese ships at the Yalu fight was cleaned out by a single explosive shell, and it was the surgeon's battle station, himself and all his wounded being utterly destroyed.

In all drills on board, the surgeon musters his division, and the patients (temporarily to be accounted for by him), and occupies for the time his station, that is the sick-quarters or ship's hospital. He reports to the first lieutenant, who is the commanding officer's aid, at assembly, and at the conclusion of all drills. At fire and collision drills additional aids are detailed for helping in the sick's removal. In going to battle quarters the senior surgeon, who is the responsible one for everything in the medical department, upon the completion of all his preparations, and having arranged his station for reception of wounded for probable operation (this battle station being now located if possible under protection), reports by one of the speaking tubes his readiness for action. The station or stations in battle cannot now be below the water line, the modern armored protection deck being closed at such time, hence all protection is of a limited character. The iron portable operating table is set up, the chests of dressings, the instruments, stretchers, the electric lights, stimulants, restoratives, the bags (to sling over the shoulders) of artery forceps and first aid packets, bandages and the other multitudinous articles, all gotten ready. Porcelain-lined basins and buckets, oakum, cotton, and the water supply must be looked after, and the special aseptic dressings, ligatures and materials must all be carefully overhauled. The stretchers rigged and the men in order, we report "ready," and at our stations, or in visiting the batteries, not far removed, we await events and the conclusion of the exercise and drill. Then as carefully put up our armamentarium and supplies and report "secure."

In abandoning ship the personnel of medical department is distributed as far as it will go. Of the fourteen boats, in ships of 400 people, now having left the lost ship, from four to six will contain some one member of the surgeon's division. Each boat has

also its own medical boat box, besides its full equipment of water and provisions. The medical officers themselves carry the larger cases of a very complete outfit, in small compass, of medical and surgical supplies, and a few instruments.

The medical and surgical original outfit of a U. S. ship of war, with a crew of 450 people, costs upward of \$3,500, and is surpassed by no other naval medical equipment in variety extent and completeness. It is furnished entirely by the Government. In some foreign services, the instruments and professional apparatus, of the medical officers on board ship, must be supplied by themselves. As a rule every facility is granted and allowed our naval medical officers, and the earnest serious minded worker is at times particularly favored, as an incentive, in his work and duties, both ashore and afloat, special accessory apparatus, microscopes, and appliances for special study in science even, are not withheld. The captious and discontented fare no better in their, we may say difficult environment on board ship, than similar natures elsewhere. In fact the navy professional man, line or staff, must be in many respects happily endowed or his bed will never be of roses. Close community of physical and mental lives strains the average human machine. We can only lament paucity of results and original work from the existing antagonistic circumstances of life on shipboard, the lack of space, the confused crowded life and activities necessarily entailed by the modern ship of war, and the irregular, interrupted character of all the daily routine duties.

THE SANITARY DUTIES, AND HYGIENE.

In order that the surgeon in charge of a ship may efficiently and safely be her sanitarian he must carefully study and comprehend every detail of her design, construction, materials used, divisions, subdivisions, drainage, holds, storerooms, compartments for living quarters, offices, mess rooms, hatches and openings in all decks, ladders, lavatories, water closets, the artificial and natural ventilation, the heating, rate of conduction of heat and cold and condensation of moisture on surfaces, the refrigerators and food receptacles in daily use, the cooking facilities, and the housekeeping economics of the various messes. He must be the expert, whose opinion is daily required, on the quality of the water constantly being condensed by the distilling apparatus

from sea water. He must know all about the water, the apparatus and its working capacity. He may be able to tell from what section of pipe or tank a water may come that is spoiling a great quantity of pure water stored in the tanks. He can in a moment give the quantitative amount of chlorine from any given sample provided his apparatus is properly set up in his dispensary, and he uses the well-known volumetric method of silver nitrate with neutral potassium chromate indicator. He must know by a glance the quality of fruits, meats and vegetables that are constantly coming aboard for sale and use. He may be confronted suddenly with from ten to a hundred men with urticaria or an irritative congestive erythema of the skin, and thus get his first knowledge of underdone pork and its effects; or a series of poisonings from other unusual ingesta, taken without caution in strange waters. His crew may, during a single night, be effected by dozens with nausea and vomiting, and yet no cause be assignable until the ship be moved from the too close proximity of the foul shores of a Chinese city, when all the symptoms cease. "Rot-ten air" may do this at from a few yards to the distance of half a mile, as I have experienced, both in China, and in ports like Valparaiso, Chile, where the winds sweep the foul gullies of the amphitheatre-like city out on the ships in the harbor. The medical officer is the sentinel watching disease causes and morbid agencies wherever the ship may be; he is always on duty, and standing as he does between the evil, never absent anywhere (and danger) and the healthy crew, he is distinctly a true combatant in the fullest sense of that word. He guides in many instances the commanding authority and is virtually and by regulation responsible for the well-being of the ship's company. An anchorage taken without thought or knowledge on a tropical coast, or in a foul harbor may cost a life or lives, and in so much impair efficiency as a naval force. And in all these untoward encounters the medical officer is among the first to fall, giving up his life if need be as he has often done heretofore. Or, in season of epidemic malignant disease, his counsel may save all infection, as happened with our fleet at Brazil when threatened with yellow fever, in 1893, the other fleets being more or less attacked.

The chief cause for congratulation in our naval service within modern times is the general introduction and use of distilled water from sea water. Formerly all ships constantly suffered from the

effects of bad drinking water, this manifesting itself mainly in forms of low fevers, ill nutrition, and dysenteries. With the introduction of this rational and beneficent rule of pure water, made on board by an apparatus for condensing the vapor of steam of sea water, aerating and filtering it, many obscure and inveterate forms of disease affecting seamen have quite disappeared from our lists. Digestion and nutrition are improved, ulcers and dysentery are less frequent or absent; and, there being also a greater amount allowed individually than formerly, the general sanitation of the ship and the personal hygiene of every individual in her has been improved and ameliorated. I may say that in ships, more than in shore habitations, a pure water, following sunlight, is of vast importance, but its use must be judicious and well timed, for moisture is among our chief dangers. With light, insanitation becomes abundantly palpable, and with water freely supplied there is no excuse for it.

After the distilled water finds its way to the receiving and storage tanks, it may and often does get its fouling. And here the medical officer may be puzzled. But by a little investigation he will always come to the fault. It lies oftenest, in these cases, at the hands of the caretakers of the tanks. Dirty methods, man hole plates fouled, lack of frequent cleansing of inside linings of tanks, and a general carelessness, may soon spoil and render almost unfit for use from organic matter a water that a few days previously came from the distilling apparatus beautifully pure. In some cases, in removing a man hole plate in the upper wall of a tank, through a deck, used as a thoroughfare, and left open for hours, clouds of foot dust and the retained debris from the crevices around the plate, drop down into the water; and bacterial and fermentive action and the growth of fungi do the rest. Man hole plates are more recently placed on the side walls and bolted in, and improved piping joints and valves constructed, but for the bulk of ships the former method prevails. I have found, upon inspection, tanks so foul that it required days of careful work to cleanse them, their sides slimy with fungi, and the water yellow tinted and filled with debris, yet they were constantly filled and re-filled with distilled water, and the caretakers quite as constantly reported them clean. (The organic matter was reaching the danger content before my attention was drawn to the tanks.)

This fouling originated from dust and dirt dropping in or frequent careless handling of the man hole plates, dirty hands, etc.

Storerooms of all kinds, and in all departments of a ship need watching. I may say that without frequent inspection no ship will be clean and sanitary. And these inspections must be done by the medical officer himself, as he is authorized to do by law. No one else knows true cleanliness and what moisture in confined spaces mean, and no one else can be relied upon regarding this point of thoroughness in sanitation and hygiene. Even the subordinates of the responsible medical officer are not to be trusted, for in these things it is only the one officially amenable who realizes the use of thoroughness and certainty.

Equally important with quality of water is the air we breathe within ships, and with elaboration and growing complexity of war ships has grown the difficulty of ventilating them. We now have floating habitations, from four-fifths to one-half quite submerged, and at sea with bad weather little better than submerged iron cylinders with perhaps a few tube openings, high in the air, for the ingress and egress of the required air to maintain existence. The means of forcing air in and out of ships, by the vast ramifying ducts and tubes reaching literally every detail of her cubic space, excepting only the double bottom spaces, depends upon a series of fan blowers operated by steam or electricity, located at various situations in the structure, and of various sizes and capacities. Usually the general and main system of ventilation in a good-sized ship radiates from one to four blowers of about sixty inches diameter, with a capacity of 10,000 cubic feet of air per minute. This will, in a single tube system, supply or exhaust the required amount of air in a ship of from 7,000 to 10,000 tons displacement, if operated properly and continuously at a regular speed of not less than 400 revolutions per minute. The ingress for air from the outside to the blowers is by large ducts, with expanded extremities, reaching high in the upper air. The size and capacity of the ducts and well finished pipes, with inner linings smooth, and turns rounded, are calculated to a nicety, so that the ultimate and final louvres, or openings of the ramifications in the compartments farthest removed, may supply or extract the same amount of air as those placed nearer the blowers. This in practice is very difficult to obtain. I have found in practice that though the usual single tube system of war ships is designed and constructed for the

extraction of air chiefly, the best hygienic results are obtained by the plenum or supply method used solely and continuously. By the supply method we always put in a pure air directly where needed, and the clogging of the pipes with a gradually increasing diminution of calibre, is avoided. No one without practical knowledge of this subject can comprehend these few salient and important features so necessary to the successful operation of a ship's system of ventilation. I will even assert, that in my experience of perhaps a dozen of our modern ships, that the proper anticipated results easily attainable, is not obtained from their ventilation plants. Now, without ventilation of these modern ships, they are uninhabitable, and they are wholesome or not according to the degree of their ventilation, cleanliness, or hygienic condition, and the first is the more important. Some air stirring, in parts of the system only, is what is usually found. The causes of this are not pertinent here, but they spring from several sources, and mainly from ignorance and inattention. In other places, for those particularly interested I have gone into this fully (Surgeon-General's Report, Navy, for 1896.)

In some of our low freeboard ships, like the monitors, the ventilation system is more complicated and consists of double systems, and in sections. There are blowers for extracting and for supplying air; and in sections of the ship, more capacity than in general is given, as in the hotter compartments and steam engine department. The fire rooms of all ships have separate blowers with more power and capacity. Also the dynamo rooms, engine rooms, and magazines. Separate tubes with blowers, usually electric, serve these purposes in exhausting and supplying vast quantities of air, in these overheated spaces. Where ducts and tubes pierce decks and bulkheads, appropriate automatic valves are placed to, in case of collision or sinking, prevent the inrush of water. Dampers and valves control the force and direction of currents. The method of supply in the usual system of ventilation I hold to be of first importance—that is, air forced in. It is the only way to give pure air to the far down and distant spaces, and preserves the tubes from diminishing calibre by reason of dirt and dust deposit—should the exhaust system be used. No conception of the amount of dust and debris in the air of a busy ship of war can be formed without seeing the actual facts of experience. The simple experiment of running a small electric fan

blower for a few hours in a compartment apparently clean and then wiping the edge of one of the blades, will show an astonishing collection of a dark carbonaceous sticky mass, eminently fitted to clog up and disorder tubes of ventilation systems or the human breathing apparatus. And further, if the exhaust system is used the air necessarily existing in the ultimate compartments is already polluted by passing over the surfaces of decks, walls, greasy machinery, and the bodies and possessions of many of the men; it has lost a good per cent. of its oxygen, and accumulated heat and obnoxious odors.

Natural ventilation is adapted to assist in every possible manner, and the upward currents in the funnels from the firerooms are utilized for extraction. Gun ports and deadlights, hatches, and innumerable other openings are all of use in fair weather. There is no particular difficulty in the upper decks in good weather, but we must be fitted for weather at sea, and for the conditions of actual hostilities, and here the ventilation problem is always vexatious. For water closets the combined systems, forced and natural, are often insufficient for perfect results in anything else than fair weather, and this mainly because of depth of ship or deep submergence.

In rationing, the sailor of the U. S. Navy, does not get as much food as he usually prefers to consume, and I have frequently dwelt on this subject. Briefly the U. S. Naval Ration (daily average), comprises:

The mean of all food supplies:

Protein	157.34 grammes.
Fats	75.59 grammes.
Carbohydrates	549.77 grammes.
Mineral matter	30.10 grammes.
Potential energy,	3,615 calories.

An additional allowance is desirable to the nitrogenous and fat elements.

I think I am safe in estimating the amount of food as very commonly consumed by them in home ports as of

Protein	200 grammes.
Fats	125 grammes.
Carbohydrates	599 grammes.
Potential energy in calories	about 4,400.

They usually add to their allowances by purchase, individually contributing to the mess fund about three dollars monthly.

The Government also commutes about twenty-five per cent. of the ration in a mess, at thirty cents per ration, with which the men vary their food still more.

It must be said that the ration, in theory, is good and wholesome; sufficiently varied, and ample, excepting in the lack of fat and albumen. The trouble comes from waste, bad selection, preparation and kitchen economy. But this being a national failing, the sailor is not so much to blame.

Carefully selected kinds and amounts of food are made up for expeditionary and ship abandoning purposes. As a man can live three minutes without air, three days without water, and three weeks without food, the calculations are made on these lines, having due regard to weights and spaces. Air is always in plenty so long as we are above the water; water is of the first place, and I allow three pints per diem per man. Of food proper, hard bread in cans, and a minimum of fat pork. Tobacco is important. *Opium*, in pill form, I always supply; it will obviate hunger, pain, and conserve waste. As a rule we equip boats for abandoning ship, for an eight days supply, with enough water and food to keep the humanity they carry on the surface of the sea in condition for some exertion, and in normal physical condition.

Spirits are not allowed, since 1863. In lieu, the cost value, five cents a day, was given us all. Beer is pretty generally given at meal time, when ship is in port and supplies are readily obtained. Boys are not given it.

A system of Canteen supplies, run by the men and officers themselves, is becoming common, furnishing beer, tobacco, small stores, pies, cakes, and groceries. By buying at wholesale rates they use the profits in their messes and avoid the exactions of small dealers, alongside at meal times in all ports.

There is considerable to be done in this matter of rationing, provisioning and canteening (officially) the men of the navy. In any system, however likely to be pursued, and as now in existence, the known obstructions springing from lack of space, peculiar types of humanity to be dealt with, national characteristics, the lack of cooking talent, and tendency to waste, must be dealt with, and I do not see how they are to be easily overcome.

The lavatories and water closets now found in recent war ships are worthy of this era of improved hygiene. The washout types, with air pumps if below surface, and simple gravitation flow

if above, are usually found supplied for the officers. For the men, the constant flow in large volume, with separate seats in continuous rows, usually partitioned off, are supplied. Of course sea water is used and without stint. The great difficulty is in supplying seats sufficient for the men, but very recently I have seen an improvement made, in the "Massachusetts," at my suggestion, where, from thirty-three men to one seat, the number is now a little over seventeen to one seat, thus greatly adding to the comfort, decency, and health of the crew.

Inspections of clothing in detail are made by the divisional line officers, but upon occasions the medical officer inspects and makes suggestions accordingly. Uncleanliness and parasitism are usually the cause however of these.

All systematic weekly inspections must be officially reported upon to the commanding officer, and all discovered nuisances, insanitary areas or materials, practices and conditions, must be specially reported, and method and manner of relief or amelioration recommended. All reports are copied before sent and kept on file in medical department. Once annually a general review and "Sanitary Report" is, by regulation, forwarded to the Surgeon-General of the Navy. This comprises in epitome every matter and detail of noteworthy importance concerning the surgeon's work and experience of the year, the hygiene and sanitation of the ship, cases of disease and injury, scientific notes and all points relating to progress and improvement.

Other matters: Of renewal of supplies from time to time, invaliding of the sick for hospital treatment ashore, surveys of the chronically ill, the securing of pratique in ports and a watchful regard of health of proximal communities ashore, and various boards for the examination of men and materials from time to time, all these are within the scope of the medical officer's duties. There also occur, rarely however, invasions of infectious malignant disease, and it is here that the well equipped naval surgeon has his best opportunity for distinction and his rewards come freely. But, on the whole, we of the naval service have not the swing or opportunities of our confreres ashore in the purely military services, nor are our lives as comfortable and final rewards as great. From other papers you will learn our relative positions and emoluments; and, having already taken up a great part of your time I must, in thanking you for your indulgence, here close.

III. THE PRACTICAL DISINFECTION OF SHIPS OF WAR.

BY THOMAS C. CRAIG, M. D.,

BROOKLYN, N. Y.

SURGEON (LIEUTENANT) RETIRED, IN THE UNITED STATES NAVY.

THE practical disinfection of ships of war is one of the most important duties that the Medical Officer may be called on to perform, for on its thoroughness may largely depend the checking of epidemic disease. The number of different epidemic and infectious diseases that may be carried in ships is few. Small-pox, cholera, yellow fever, typhus fever, scarlet fever, typhoid fever, diphtheria, erysipelas, measles, tuberculosis, and bubonic plague, are among the more important and more common of these. The specific causes of about one half of these diseases, named, are now known to be due to certain microorganisms, and although the specific causes of the remaining ones have not as yet been ascertained, nevertheless it is an undisputed fact that they are highly infectious, and that this infection clings to and is often transported by means of ships. It is to the destruction of these infecting agencies that I would ask your attention for a brief time.

Disinfection may be defined to be the means taken to destroy the living organisms or contagium, which would propagate the disease it is the object to eradicate. The power of a germicide is either complete or incomplete. If incomplete then the disinfection is inefficient, untrustworthy, and dangerous. The practical disinfection of ships naturally divides itself into four heads, viz.:

1. The value or efficiency of the means to be employed.
2. Its ease of application.
3. Its economy.
4. Its least possible damage to the infected articles.

A well known and recognized fact, in regard to practical disinfection ashore, is, that an occupied apartment cannot be prop-

erly disinfected. This same rule holds good in regard to the practical disinfection of ships; therefore, to thoroughly disinfect a ship, it will be necessary to disembark the crew. But before this is done, it will be necessary to have each one of the crew free from any contagion. The only way to do this is to disinfect each person just as he leaves the ship, supplying him with clean, uninfected clothing. Any sick are to be transferred to suitable quarters in quarantine, and proper precautions carried out to afterwards disinfect them, and their bedding and clothing. In disinfecting a ship it will make a great difference in the manner and extent of the operation, to know certain facts, viz.: the nature and natural history of the disease; how many of the crew were or are sick; what places in the ship they have occupied; who came in contact with them; where their soiled clothes and bedding were kept; and, if possible, to ascertain from where the first case of sickness originated. Then again, it should be known how the discharges, from the sick persons, were disposed of. For example, if one single case of an infectious disease had been confined to one certain compartment; and the proper precautions taken in visiting him; and thorough disinfection carried out in regard to his clothing, bedding, and discharges, and no other case of similar sickness had originated within a reasonable length of time; it would be sufficient to disinfect only that compartment which he occupied.

If on the other hand, the disease originated aboard ship, from some locally infected area or thing, it would be necessary to find this out, and disinfect every person, place, and thing which could have been instrumental in carrying the contagion. The point being this: to disinfect as far as may be necessary.

In searching for a cause of sickness, of an infectious nature, aboard ship, it will be well to remember that most cases are brought about through the medium of food, drink, or air.

It is not the foul smelling air or bad tasting food which originate diseases of an infectious nature; but each individual disease is due to a certain specific contagion. As has already been said, the cause of about one half of the infectious diseases is known to be due to certain microorganisms; further than this, their manner of infection is known; hence one is aided in arriving at a knowledge of the means of infection. In the case of cholera and typhoid fever the food or water supply would be the first things to

be investigated; on the other hand, in the cases of tuberculosis or erysipelas, we could exclude the food and water supply, and look for a cause in the local surroundings. Having arrived then at the conclusion that the infection is due to certain factors and surroundings, our efforts should be directed to these things. It will perhaps be more to the purpose of this paper to take up each infectious disease separately or as a class, and treat of it in section; but first it will be necessary to give a list of the reliable disinfectants, which time, experience, and experiment, have proven to be trustworthy.

DISINFECTANTS.

I shall quote from the report on disinfection, made to the American Public Health Association, in 1887, by its committee. This committee arrived at the following conclusions:

“The most useful agents for the destruction of spore-containing infectious material are,

1. Fire. Complete destruction by burning.
2. Steam under pressure 110 degrees C (230 Fahr.), for ten minutes.
3. Boiling in water for one hour.
4. Chloride of lime. A 4 per cent. solution.
5. Mercuric chloride. A solution of 1 to 500.

For the destruction of infectious material which owes its infecting power to the presence of micro-organisms not containing spores, the committee recommends,

1. Fire. Complete destruction by burning.
2. Boiling in water half an hour.
3. Dry heat, 110 degrees C (230 Fahr.) for two hours.
4. Chloride of lime, 1 to 4 per cent. solution.
5. Solution of chlorinated soda, 5 to 20 per cent. solution.
6. Mercuric chloride. A solution of 1 to 1000 to 1 to 4000.
7. Sulphur dioxide. Exposure for twelve hours to an atmosphere containing at least 4 volumes per cent. of this gas, preferably in presence of moisture.
8. Carbolic acid, 2 to 5 per cent. solution.
9. Sulphate of copper, 2 to 5 per cent. solution.
10. Chloride of zinc, 4 to 10 per cent. solution.

The agents named in this list are all comparatively cheap, and leave scarcely anything to be desired from a practical point of view."

I might add that two of the cheapest and most efficient germicidal disinfectants, are crude carbolic acid, and creolin. They can be used either of full strength or in a diluted form.

THERMAL DEATH POINT.

All known microorganisms are killed when the temperature surrounding them is raised to a certain degree, in the presence of moisture, and it has also been proven that infected clothing and apartments, rendered so by diseases, the causes of which are not yet known, may be made non-infectious by subjecting them to a certain degree of heat for a certain length of time. This then has come to be known as the thermal death point of bacteria. In the infectious diseases, the causes of which are known, it ranges from 52 degrees C in the case of the cholera spirillum, to 100 degrees C in the case of the tubercle bacillus. Exposure to cold, or freezing, is not reliable for the destruction of some of the infecting bacteria. In 1887 Prof. T. M. Prudden, of New York City, demonstrated that the bacillus of typhoid fever survived a freezing temperature after 103 days.

To these means may be added sunlight, cleanliness, and desiccation. These aids will be more fully discussed under the head of disinfection in cases of cholera. A very cleanly, cheap, and practical means of disinfecting the walls of rooms, or in fact any smooth surface that would be injured by the application of heat, moisture, or chemicals, is one used by the Brooklyn Board of Health, viz.: by means of bread. A loaf of bread is cut into several pieces, and the soft spongy surface is used to rub down the walls, ceilings, pictures, etc. This rubbing crumbles away the bread, and the bacteria are thus entangled in these crumbs, which fall to the floor, where they are afterwards swept up and burned. Of course this mechanical mode of disinfection would be supplemented by the use of chemical disinfectants applied to the wood work, chandeliers, floors, etc. The carpets, bedding, curtains, etc., being subjected to the action of dry heat. Lately the gas of formaldehyde has been brought forward as an efficient germicide. Several means of applying this agent have been devised; as for

example, spraying by an atomizer the 40 per cent. aqueous solution, or by burning methyl alcohol in a specially constructed lamp, or by evaporating the aqueous solution of this gas.

The volume, per cent. per cubic space, of this gas required to act as a germicide has not yet been accurately determined. In the *Annals of the Pasteur Institute* for September, 1896, Vaillard and Lemoine give the results of their experience as follows: The test organisms were exposed to the action of the gas in different sized rooms, and were placed at different heights, and different distances from the source of this gas. The bacteria and other test materials employed were, in part, as follows: dried diphtheritic membrane, alvine dejections, blood from an animal infected with the pneumococcus, staphylococcus pyogenes aureus, cholera spirillum, streptococcus, typhoid bacillus, sporulating anthrax, tetanus bacillus, etc. Nearly all the test organisms and materials were freely exposed to the action of the gas, except the few which were covered over with a fold of cloth. Several series of experiments were conducted, and inoculations of the tested organisms and materials were made into culture media. Dust from various parts of the room was also inoculated into culture media. The different experiments were conducted for various lengths of time, varying from six hours to twenty-four hours. The volume, per cent. per cubic contents, of the gas, is not given, but is stated to have been in abundance.

The conclusions reached by these experimenters were: that the gas of formaldehyde is efficient as a germicide for bacteria other than the sporulating forms; that it makes no great difference from what source or in what way the gas is supplied, provided there is a sufficient amount of moisture present, and the gas is in abundance, and an exposure of twenty-four hours is allowed; that it does not penetrate materials, except possibly those of an albuminose nature, but merely acts on the surfaces; that the gas should be disengaged rapidly and in large quantities. To give some idea of the volume of this gas present, in the most successful of these experiments, and the one in which all of the non-sporulating organisms were killed after an exposure of twenty-four hours, I might mention, that the volume of gas contained in a 35 per cent. solution of 15 litres, was used in a room of 660 cubic meters. (Practically a room about 13 feet square.)

A series of experiments were made some few years ago by the New York Board of Health, in order to determine the actual value of certain disinfectants, and I have made use of their report (1892) in order to show the relative value of some of these disinfectants. Of course no one will deny that fire and live steam are the most potent of all the disinfecting agencies, but it is often impossible to use them, hence it becomes necessary to resort to other means. Those the New York Board of Health tried were the following: Electrolized sea water, sulphurous acid gas, and heat, both dry and moist. Electrolized sea water is a patented germicide, made from sea water. It is readily prepared by passing an electrical current of a certain intensity through sea water. The current strength is 10 amperes, and electro-motor force 4 volts. This current is passed through the water for some hours; and by its action sets free the chlorine, which in turn is taken up by the water.

The cost of its production is very small, amounting only to a couple of cents a barrel. The conclusions reached by the experimenters were, that it is a fairly good germicide when freshly prepared and when a certain amount of chlorine gas is present; that it is particularly useful for the destruction of the Cholera Spirillum; but that it is not a good germicide for spores or for the more resisting micro-organisms.

Sulphurous acid gas is a reliable disinfectant when in sufficient quantity and the atmosphere of the apartment is saturated with the vapor of water. The general rule given for the percentage of this gas is as follows: First the cubic air space, of the place to be disinfected, is obtained. Then the amount of sulphur to be burned is calculated, allowing five pounds of sulphur for each 1000 cubic feet of space to produce four per cent. of gas. All outlets should be closed, such as air ports, doors, hatches, and made as nearly air tight as possible, before the gas is generated. I think that the error has too frequently been made of not having sufficient watery vapor present to insure the prompt action of the gas. A small amount will not answer. The quantity should be such that the air is fully saturated; the condensed vapor being very easily seen to form on the furniture, walls, etc. Of course when these conditions are carried out the textile fabrics, such as rugs, curtains, clothing, etc., will have the color bleached out of

them; but in disinfection under certain conditions this destructive action will not be of such great moment. It is efficiency and ease and thoroughness of application which are sought. Applied in the above manner, sulphurous acid gas is safe, reliable and quickly efficient for such diseases as small-pox, measles, and scarlet fever.

Now as to the way of generating this gas. The ordinary mode of procedure is the following: Having broken up the sulphur into small pieces and weighed out the necessary quantity to produce the requisite amount of gas, place it in a good sized iron vessel having high sides; and saturate it with alcohol; then place this vessel on several bricks, in a larger vessel, generally a wooden tub, in which there is sufficient water to cover the bottom to the depth of four or five inches. The arrangement is now ready to use; but before doing this it is essential to provide for the watery vapor before spoken of. A small hose led from a boiler, or steam radiator; or any vessel containing water, and in contact with a fire, will supply the steam vapor. When all these arrangements are ready, and the cracks and crevices and all means of exit are closed tightly, the steam should be turned on and as soon as the apartment is well filled with the steam vapor, the alcohol on the sulphur should be lighted, and the gas will then be disengaged. The place should be kept tightly closed for twenty-four hours, when it may be opened, washed down, well aired, and dried and is then ready for occupancy. Liquefied sulphurous acid gas in cylinders may also be used, but for all practical purposes the above outline can be followed, provided enough sulphur is burned to produce the requisite per cent. per volume of gas.

Now in regard to the efficiency of sulphurous acid gas as a germicide. Through the kindness of Dr. Alfred L. Beebe, of the New York Board of Health, I am permitted to make use of a series of experiments, conducted by him, to determine the germicidal value of sulphurous acid gas, under a variety of conditions.

These experiments have never been published, hence the more interest and value attached to them. The experiments were in twenty series, and amounted in all to 582 observations. The receivers were rooms of known capacity, the test organisms were the bacillus diphtheria, and the staphylococcus pyogenes aureus. The rooms were capable of being made air tight or otherwise, so

that in some of the experiments they were sealed, while in others they were not. Various amounts of sulphur were burned, and various quantities of aqueous vapor were allowed to be present. The time of exposure of the test organisms was varied, as was also the distance from the burning sulphur and the distance from the floor. The test organisms were exposed in different ways, such as on pieces of sterilized linen, on dried sterilized pieces of carpet, on clean walls by smears, etc. "The principal varying factors were the condition of the receiver, the amount of sulphur burned, the duration of exposure of the cultures to the gas, the amount of moisture present, and the method of exposure in the room. No positive effect on both test organisms was noted with a less amount than 1 pound per 1,000 cubic feet, and the cultures were not killed with less than 2 pounds. With $2\frac{3}{4}$ pounds and with 3 pounds as good results were obtained in some cases as with 4 or 5 pounds."

The time of exposure varied from one to twenty-six hours. The amount of watery vapor present ranged from the usual amount of moisture present in the atmosphere of a dwelling room, to the complete saturation of the air to the dew point. This moisture was supplied by evaporating water by means of heat. The walls and ceilings in one of these rooms were covered with ordinary plaster, while in the other this plaster was painted over, so as to give a smooth surface. "All experiments were made in duplicate, so far as the test organisms were concerned, and control tests were made with every series." Cultures of the tested organisms were kept under observation for times varying from twenty-four hours to two and a half weeks. From these extended series of experiments and observations the following conclusions were arrived at:

"The germicidal value of sulphurous acid gas, as indicated by its effect on the micro-organisms employed for test, depends on several factors, all of which must be taken into consideration. Absolute certainty of germicidal action was not obtained under the conditions of experiment, even when these were probably equivalent to the best to be had in routine fumigation of infected premises. It may, however, be safely asserted that the probability of efficient action approaches a point very near certainty, under the following general conditions, viz.: a room in a well

built house, with painted walls and ceilings, made tight by pasting paper over all cracks and openings; sufficient sulphur, moisture, and time of exposure, and finally free exposure of the germs to be destroyed. Mention should also be made of the tendency manifested by the test organisms to lose their vitality through age, becoming thus easily and quickly affected, or even killed by the gas. Various experiments were rendered inconclusive because the test organisms exposed were old. The probability that all germs in a room have been killed by sulphurous acid gas is increased, therefore, if it is known that these are old. The importance of this lies in the recognition of the greater difficulty of killing the germs in a room very recently occupied by a case of diphtheria. From what has been said, it follows that the principal factors to be considered are the following five:

1. The amount of sulphur burned per cubic foot of air space.
2. The duration of exposure of the test organisms to the gas.
3. The tightness of the room.
4. The percentage of moisture present.
5. The freedom with which the gas can come in contact with the test organisms.

1. While under favorable circumstances, the amount of gas obtained by burning 2 pounds of sulphur per 1,000 cubic feet of air space may prove sufficient as a germicide, that obtained from 3 pounds, gives much more uniformly good results in killing the test organisms; but it is to be noted that even 5 pounds will not prove efficient unless the test organisms are exposed for a considerable time, and other conditions are favorable.

2. When the sulphurous acid gas is present in sufficient amount for germicidal action, and other conditions are favorable, its efficiency is probably directly proportionate to the time it has to act. In rooms with unpainted walls and ceilings, however, gas, sufficient for germicidal action, will probably stay in the room not more than 8 hours, and under the best conditions, an exposure of less than three hours cannot at all be relied upon.

3. Unless sulphurous acid gas can be confined so that it is in contact with the test organisms, in sufficient amount, for a considerable time, it is inefficient. The ordinary room cannot be made a good receiver for the gas without painting, or otherwise making walls and ceilings impervious to it; but in a room in a well built

house with painted walls and ceilings, and made as air tight as practicable by pasting paper over all the cracks and apertures, the gas, if considerable in amount, will be delayed in its passage out long enough to give time for germicidal effect. In a room in which the gas is not so held, no reliance can be placed on its germicidal action.

4. While under otherwise favoring circumstances, the percentage of moisture usually present, in air not artificially dried, may be sufficient to allow the destruction of the test organisms, an increased supply of moisture does aid materially in such destruction, and is usually a necessary factor for decided germicidal action. It is to be noted that an important amount of moisture may be added to the air of a room by means of the water evaporated from an outer dish by the heat of sulphur burned in an inner dish.

5. The more freely germs are exposed to sulphurous acid gas, the more rapid and certain will be the germicidal action.

It is probable that no reliance can be placed on the destruction of germs not on the surface, or protected in any way from ready access to the gas. It may be added that in a room of ordinary size it is probable that the place of the germs in the room, and their distance from the burning sulphur, is unimportant.

RECOMMENDATIONS.

Upon the assumption that the apartment to be disinfected is of a character to admit of its being made practically air tight, the following recommendations are offered as to the method of using, as a germicide, sulphurous acid gas produced by burning sulphur.

1. Remove from the room for disinfection by steam, boiling water, or disinfecting solutions, all articles of clothing and bedding, carpets, etc., which will admit of such treatment. Open all closet doors, drawers in bureau, etc.

2. Sprinkle water on the floor, the woodwork and such of the contents of the room as would not be thereby injured.

3. Close tightly the doors, windows and all other openings, and then paste strips of paper over all cracks.

4. Burn at least three pounds of sulphur for every thousand cubic feet of air space in the room. Put not over five pounds of

sulphur in any one vessel, and immerse these to a depth of at least one inch in water (preferably heated) contained in outer vessels.

5. After lighting the sulphur, close exit door tightly and seal it on the outside by pasting strips of paper over all cracks. Keep the room closed for at least eight hours.

Upon the supposition that the above recommendations have been carefully followed, if, when the room is opened, the sulphurous acid gas is found to be so abundant as to make it impossible to enter the room at once, efficient disinfection of exposed surfaces may be regarded as almost a certainty. If, on the contrary, the sulphurous acid gas is found to have largely escaped, reliance cannot be placed on its germicidal action."

Carbolic Acid and Creolin.

Carbolic acid is one of the most reliable and powerful germicides known. Various experiments have been conducted to determine its value as a disinfectant. As a rule a one per cent. solution is efficient for nearly all organisms, but in practice a five per cent. solution is used. With this stronger solution (1 to 20) all of the non spore bearing infecting bacteria are certainly destroyed after an exposure in it of two hours.

Crude carbolic acid and creolin are also safe and sure in their germicidal action. They may be used of full strength or diluted. Creolin is particularly efficient as a germicide, even in dilution as low as two per cent. (1 to 50), but on account of its cheapness we are enabled to use it in much stronger solution.

A safe rule would be to use it in the strength of 1 to 20, which makes a five per cent. solution. On account of its small cost and of its harmless action on metals, it is par excellence the germicidal agent to use in the disinfection of bilges and under water compartments which are only accessible to disinfection by flooding. Several barrels of this creolin could be pumped into a compartment, and after remaining there a few hours, could be pumped into other compartments, and then into the bilge before being pumped over-board, and thus utilized in continuous disinfection.

Mercuric Chloride.

In mercuric chloride we have one of the most powerful germicides that has yet been discovered. Various experimental data

have shown that this salt is efficient for the destruction of the most resistant spore bearing bacteria, in the proportion of 1 to 1,000 in a few minutes; and for the destruction of the non spore bearing bacteria 1 to 10,000 for two hours. The great drawback to the use of this salt, in general, is the fact of its ability to coagulate albumin, and thus envelop bacteria in an impermeable covering. In practical disinfection it has come to be the general rule to use this salt in solution in the proportion of 1 to 500 or 1 to 1,000. Used in these strengths it is capable of destroying all known bacteria, including the spore bearing ones. There is one essential to bear in mind in using this agent, and that is its chemical action on metals. For this reason it is inadmissible for use in the bilges and places where the metal is exposed to its action.

For apartments and places in which the metal work is well covered with paint; for wood work, curtains, bedding, clothing, carpets, furniture, rugs, etc., it is a safe, reliable, and efficient germicide.

Chloride of Lime.

The value of chloride of lime as a disinfectant depends on the available chlorine held in combination as hypochlorite. When this amount is twenty-five per cent., then is this salt reliable and efficient as a germicidal agent. It has been found that a solution of chloride of lime in the proportion of .25 of 1 per cent. is an effective germicide. A safe rule would be to use a 5 per cent. solution of this salt for the purposes of general germicidal action. One ounce of chloride of lime, of the standard strength, mixed with twenty ounces of water, makes an efficient disinfectant to use for the destruction of all bacteria in typhoid fever and cholera dejecta.

Freshly Slaked Lime.

Freshly slaked lime, used, as an adjuvant, for the purification of an infected bilge, is useful; but in order to be efficient it must be *recently slaked*, and used in the form of milk of lime.

This milk of lime can be deposited in a ship's bilge, and allowed to remain there several hours. The bilge can be flushed with clean water, and pumped out. Metal exposed to contact with lime is not injured. One great advantage of freshly slaked lime, used to disinfect a bilge, is its power to saponify the oils

generally found mixed with the bilge water, and adhering to the surfaces and sides of the bilge. This cleaning away of the oleaginous materials, from these surfaces, renders subsequent procedures more certain of success. A strong solution of caustic soda or caustic potash, would, of course, answer the same purpose.

THE DOUBLE BOTTOM COMPARTMENTS AND THE BILGES.

In disinfecting the double bottom compartments and the bilges, due regard must be had to using those agents which will not have a deleterious chemical action on the metal. For this reason substances such as mercuric chloride, chlorinated lime, electrolized sea water, etc., cannot be used. Recourse must then be had to using such things as do not act destructively on the metal; these would be, steam, hot water, caustic alkalies, lime, crude carboic acid, creolin, sulphurous acid gas, etc.

The compartments in the double bottom, and the bilges should be disinfected in the following way: The man-hole, leading into each compartment, should have fitted into it a wooden cover, which is capable of being securely fastened down and made air tight. In the centre of this wooden cover should be a hole, into which the nozzle of a hose can be tightly fitted. This having been done, live steam is then turned on and allowed to flow in until a thermometer, previously inserted through this same wooden cover, shows the temperature to be maintained at 100 degrees C. for ten minutes. The cover is then taken off, and the condensed water is pumped out. Each compartment is thus treated. Where it is impracticable to use steam, sulphurous acid gas may be substituted, burning the same amount of sulphur per 1000 cubic feet capacity, and furnishing the requisite moisture, as indicated, under the remarks concerning sulphurous acid gas. In addition to these means the compartments can be washed down with crude carboic acid solution (1 to 20), or creolin solution (1 to 20), and finally milk of lime can be placed in the lowest part of these compartments, where drainage collects by gravitation.

THE BILGES.

The drainage system of the inner bottom is called the bilge. Drains pass from the sides to the centre, and it is this central longitudinal drain which carries the liquids to a central well, where the material is finally pumped overboard.

The only possible way to disinfect a bilge would be, first to disinfect the material in the bilge well before it is pumped overboard. Then the different drains leading into the central one can be flushed out with the germicidal agents, and these after finding their way along the drains to the well, can then be pumped overboard. Hardened, inspissated grease, adhering to the sides and bottoms of these drains, is one of the most troublesome materials to get rid of. The decomposition of this substance gives rise to foul odors, which often penetrate the whole of the inner drainage system, and from thence to the upper decks of a ship. It has occurred to me, that to flush these drains with a strong solution of caustic potash or soda, or the milk of lime, would saponify this greasy material, while at the same time they would act as disinfectants. After they remain in contact with these drains and in the well, they are pumped overboard. Then to make the disinfection yet more complete, crude carbolic acid or creolin in the proportion of 1 to 20 or 1 to 40 may be used to again flush out these drains and the well, and then pumped overboard. If it is decided that the disinfection is yet incomplete, then the engine room, and all openings leading into it, can then be made air tight, and live steam turned in and kept flowing, until the temperature in all parts is raised to 100 degrees C. and maintained thus for one hour.

In practice I believe that it will be very rare to carry any disinfection to the extent of applying it to the compartments of the double bottom.

DISINFECTION APPLIED TO SPECIAL DISEASES.

Cholera.

In regard to the disinfection of a ship infected with cholera, it will be necessary to proceed in three ways:

- 1st. To remove the sick to some quarantine.
- 2nd. To disinfect all the remaining persons and their effects, and then remove them from the ship.
- 3rd. To disinfect the ship.

The sick should be removed under a strict quarantine, and continued under such until the final termination of the case. The means for disinfecting their persons, clothing, discharges, and the

disinfection of the remaining persons on board ship, and their belongings, prior to removal from the vessel, will be dealt with under one general head, viz.: hygiene and disinfection of cholera infected persons and effects.

There are certain natural agents which are deadly to the growth of the cholera spirillum; and supplemental to these are the empirical means used to destroy this organism. These two means combined are the most potent agencies with which to combat the cause of cholera. The natural agents are sunlight and desiccation; the empirical agents are heat, chemicals, and cleanliness. The action of sunlight is in itself quite potent in destroying the cholera germ. It is not the direct heat contained in the rays of the sunlight, but there seems to be some inherent chemical action in the rays of sunlight by which the growth of the cholera spirillum is inhibited, and if long enough continued, to destroy the life of this bacterium. It might be asked then, why is it that the intense sunlight which we generally find in tropical countries, does not completely destroy all the spirilla of this disease. In answer to this it may be suggested that the spirilla are not all subjected to the action of sunlight; that sunlight does not penetrate very far into water, and that shade is abundant in the tropics. Recent experiments by a German investigator have shown that the influence of sunlight on bacteria extends in muddy water to about twenty inches below the surface. Water is the sole vehicle of contagion in cholera. With poor sewage and drainage it is easy to imagine the contamination of the drinking supply. The other natural agent, which is deadly to the growth of the cholera, is desiccation. This agent is more potent for the destruction of the cholera spirillum than the first mentioned, viz.: sunlight. The cholera germ cannot live without moisture. In this particular it differs widely from most other of the pathogenic bacteria. It is well known that the vitality of many of the pathogenic organisms remains almost indefinitely in the dried condition. In witness of this I would instance anthrax, tubercle, diphtheria and the tetanus bacillus.

Not so with the cholera spirillum. Desiccation means death to it. It requires moisture in order to live. A drying for twenty-four or forty-eight hours destroys it. If all of our contaminated water supply could be thoroughly dried for a certain length

of time, it would become free from the contagium, and the further spread of the disease checked. When these two natural agencies are combined, we get a very high and potent factor for the destruction of the cholera spirillum. Now as to the empirical means. The chief of these is heat. The thermal death point of the cholera spirillum is 52 degrees Cent., hence how easy it is to destroy this spirillum by simply boiling our drinking water, and by subjecting to a sufficient temperature all infected articles. The next means that empiricism has taught us to use is acids and chemicals. Long before the cause of cholera was known, it was found that acid lemonade was useful during cholera epidemics, to guard against the disease. All acids exert an inhibitory action on the growth of the cholera spirillum, and if sufficiently concentrated will destroy its vitality; hence how easy it is to destroy this organism by means of acid solutions; they are almost prophylactic against this germ. Chemicals, such as carbolic acid, mercuric chloride, calx chlorinata, liquor sodii chlorinata, milk of lime, etc., also destroy the cholera spirillum, and thus become useful agents to use as disinfectants against this germ.

Employing sunlight, desiccation, acids, chemicals and heat will serve as the means to use in case of disinfection for infection by the cholera germ. All contaminated clothes, bed clothes, syringes, basins, etc., and in fact all articles which have been soiled by the discharges from cholera patients, should be subjected to the action of a strong solution of carbolic acid (1 to 20), for six or eight hours; or should be exposed to dry heat at 100 degrees C. for an hour. If this is not possible, then the articles should be boiled in water for an hour or two; in either case making sure that the heat penetrates to all parts of the mass alike. Under other circumstances soaking them in a 1 to 500 solution of mercuric chloride would answer just as well. Soiled bedding should be burned in a furnace, while soiled furniture, soiled decks, soiled bunks and hammocks, should be washed with a 1 to 500 solution of mercuric chloride and afterwards exposed to the direct rays of the sun and to heat. The patient himself should be well bathed in a strong solution of acetic or citric acid, and afterwards put on clean clothing, and be removed to a clean apartment. The disinfection of the discharges of cholera patients is probably the most important matter in this connection. Before they are finally

disposed of, they should be subjected to the action of a strong solution of carbolic acid or mercuric chloride, these quantities should be twice the volume of the fæces, and should be thoroughly mixed and allowed to stand for an hour or two before being thrown away.

Typhoid Fever.

Drinking water and milk are almost the sole means by which typhoid fever is communicated from one person to another.

It is now definitely known that this disease is due to the bacillus typhosus, and that it only infects when introduced into the alimentary canal: hence it can only be conveyed by this organism gaining access to either the food or drink supply. As the great bulk of our food is prepared by subjecting it to the action of heat, and as the thermal death point of the bacillus typhosus is 56 degrees C., which is far below the temperature used in the cooking of food, it is certain that this organism is never introduced into the alimentary canal, in a living state, by recently cooked food. It is for this same reason that the vitality of this organism cannot resist the temperature of boiling water, hence, with recently cooked food, and recently boiled drinking water, the entrance of the living germ of this disease, into the alimentary canal, is impossible.

Heat then, either dry or moist, is the most ready means to use in order to destroy any infection from typhoid fever. In addition to this, chemicals, and the routine disinfection may be used.

A (1 to 20) carbolic acid solution, or a (1 to 500) mercuric chloride solution, may be used to immerse all the contaminated clothing and bed clothing in. All furniture and utensils used about the sick can be washed with these solutions, and then in fresh water. A ready and effective means would be, to boil in water all contaminated garments and bed linen, and to wash down the walls and ceilings with the carbolic acid or mercuric chloride solution. Attention should be had to the drinking water supply. All the water tanks should be emptied, after having first destroyed all the bacteria in them. This now brings up the question as to how this can be readily and effectively done. There is no better way than the following: a hose is led from the boiler, and its nozzle being immersed in the water, the steam should be allowed

to flow in until the water is all heated beyond the thermal death point of this organism. These tanks should then be thoroughly cleaned by the means of scouring and scrubbing them out with milk of lime, then with fresh water, and finally allowing them to dry completely. As the means for the destruction of both the cholera spirillum and the typhoid bacillus are almost identical, the same disinfection agents that would apply to one, will in like manner apply to the other. All dejecta and vomited matters are to be disinfected by subjecting them to an equal quantity of the carbolic acid or mercuric chloride solution, or to milk of lime or chlorinated lime. Having purified the drinking water supply, and disinfected all the bedding, clothes, furniture, rugs, curtains and apartments, attention is then directed to the purification or disinfection of the compartments in the double bottom, and the bilges.

Diphtheria, Tuberculosis and Erysipelas.

The specific cause of diphtheria is the bacillus diphtheria; that of tuberculosis is the bacillus tuberculosis, and that of erysipelas is the streptococcus pyogenes.

The means used to destroy these organisms are identical. It is well to remember that the diphtheria germ and the tubercle bacillus are always contained in the materials which are expectorated.

These things may be deposited on clothing, bed linen, handkerchiefs, eating and drinking utensils, or they may be accidentally deposited on carpets, rugs, etc., and then drying, they are, in the form of dust, deposited on the walls, ceilings, furniture, curtains, etc. The germ of erysipelas, in like manner, may be accidentally deposited in the form of dust on the ceilings, walls, furniture, curtains, etc. It is then the disinfection of these things and places to which we must give our efforts. All curtains, clothing, bed clothing, carpets, rugs, etc., should be immersed in a 1 to 20 solution of carbolic acid, or a 1 to 500 solution of mercuric chloride and remain there for twelve hours; or when this is not possible they may be subjected to the action of dry heat at 150 Cent., or moist heat at 100 degrees Cent. for an hour. After these things have been removed from the rooms, compartments, and decks, where cases of sickness of this nature have been, it then becomes

necessary to disinfect the floors, walls, ceilings, beds, furniture and utensils which these sick persons used. The means found to be most effective are to wash all these places, things and utensils thoroughly, first with the carbolic acid or the mercuric chloride solutions, and then after twenty-four hours, with fresh water; and allow them to dry. It will not be necessary to disinfect the bilges, or any part of the ship in which these cases of sickness did not go.

Typhus Fever, Measles, Small Pox, Scarlet Fever, Yellow Fever.

We now come to a group of infectious diseases the cause of not one of which is known, but from experience in disinfection after them, we know that the contagium can be destroyed by certain means. In what manner these diseases are conveyed from one individual to another is not definitely known; but it is a well known fact that, with possibly one exception, viz.: yellow fever, they can all be conveyed by means of any infected material or thing which has been in contact with them; it is moreover very certain that the contagium gains entrance to the system through the medium of the respired air. Desiccation is not fatal to the contagium of these diseases. Infected clothing and apartments retain the contagium for a very long time, and it is often through the medium of these things that these diseases are conveyed from person to person.

The food and drinking water can be excluded as possible sources of infection in all of these diseases, with the possible exception of yellow fever. As these diseases are very infectious, it is quite important that ships infected with them should be thoroughly disinfected, and to do this it will be necessary to use those means only, which are known to be effective. The means that have been found to be reliable, are, fire, dry and moist heat, carbolic acid solution, mercuric chloride solution, and sulphurous acid gas. Infected clothing and utensils should be immersed in the carbolic acid solution or the mercuric chloride solution. All carpets, rugs, curtains and mattresses should be subjected to the action of dry heat at 150 degrees C. for two hours, or moist heat at 100 degrees C. for one hour. Should this be impossible, they should then be immersed in either the carbolic acid or mercuric chloride solutions.

All furniture, walls, floors, and ceilings should be washed down with either the carbolic acid or mercuric chloride solution first, and after twenty-four hours with fresh water. All compartments should then be made as air tight as possible, by closing air ports, sky lights, etc., and then thoroughly wetted down with water, or the air thoroughly saturated with moisture; and after this the requisite amount of sulphur burned in them, according to the directions given under the head of sulphurous acid gas. After this gas has been allowed to remain in contact with these places for twenty-four hours, they may be opened up, again washed down with fresh water and allowed to dry and air thoroughly. It will be unnecessary, except in the case of yellow fever, to disinfect the compartments in the double bottoms and the bilges. In the case of yellow fever the purification of these places and of the drinking water supply should be carried out, according to the directions given under the head of cholera and typhoid fever. While it may be possible for coal from an infected locality, to be the means of carrying the contagium of yellow fever on board ship, yet the chances are slight. Should the opinion be arrived at, that the coal might possibly be infected, then it would be necessary to disinfect the coal in the bunkers. To do this thoroughly is a very difficult matter, and the only way that it can be done successfully is the following:

Begin with the most accessible bunker, by first spraying all the surface of the coal, that can be reached, with a solution of crude carbolic acid or creolin (1 to 20), then while this is still wet, subject it to the action of sulphurous acid gas, in as large amount as can be generated by burning sulphur, and closing up the bunkers for twenty-four hours; but of course in doing this due regard must be given to guard against igniting the coal.

At the end of this time the coal can be removed. Each bunker should be treated successively in the same way, until they are all finished. After the coal is all removed the bunkers should be well washed down with the carbolic acid solution and then allowed to thoroughly dry and air. Where it is impossible or impracticable to use the sulphurous acid gas, then after the spraying with the carbolic acid or creolin solution, live steam may be introduced into the bunker, until the temperature is ascertained to be 100 degrees C., and this should be maintained for an hour.

Bubonic Plague.

The infectious nature of this disease is now definitely established, and the cause of it has been found to be due to a certain micro-organism, which has been named the bacillus pestis bubonicæ. It is one of the most fatal infectious diseases known, and ships infected with this disease will require the most thorough disinfection. It has not yet been definitely ascertained whether or not this disease is introduced into the human system by means of the respiratory or the digestive tracts; but it is certainly known that it can be introduced by a wound in the skin, as happened in the case of the Japanese investigator, who while holding an autopsy on a case dead of the plague, accidentally cut his finger; and in due course of time the disease manifested itself, but was not fatal in his case. In a series of experiments, made in January of this year, I found that the thermal death point of the plague bacillus was 60 degrees C., and that when a bouillon culture of this bacillus was dried on sterile strips of woolen blanket, it resisted desiccation for more than ninety days*. The means to be used to disinfect a ship infected with this disease should be as follows: All infected clothing, bed clothing, mattresses, carpets, rugs, curtains, etc., should be immersed in the carbolic acid solution (1 to 20) or the mercuric chloride solution (1 to 500) for six or eight hours, then subjected to a prolonged boiling in water for several hours. If this is not possible, then these things should be exposed to the action of steam at 100 degrees C. for an hour or two in an air tight compartment. The place occupied by the sick person should be made air tight, wetted down with water, and the requisite amount of moisture introduced, and the proper quantity of sulphur burned, allowing the sulphurous acid gas to remain in contact for twenty-four hours. The compartment should then be opened up, and the floor, ceiling, walls, bunks, and furniture thoroughly washed down with mercuric chloride solution 1 to 500, and after this has remained in contact for five or six hours, then washed down with fresh water, dried and allowed to thoroughly air. Each compartment, room, cabin, or store room, in which any case of this disease was, should be treated in the same manner.

* These experiments are not yet concluded, May 3d, 1897.

The drinking water, in the tanks, should then be purified and pumped overboard, as was described under the head of cholera, the tanks being subsequently cleaned as was also noted under that head. Where the bedding and clothing are not of sufficient value to save, they should be burned in the furnace. The utensils used in treating these cases, should also be subjected to the same disinfection as the compartments.

It should be the aim in disinfection of all infected ships, to thoroughly and effectively destroy all means of contagion, relying for this on the faithful and the conscientious carrying out of the directions given under the head of each disease or class. The thermal death point of these infecting organisms should be borne in mind, and also the chemicals which are fatal to them. The ingenuity of the disinfector will often be taxed to its utmost to devise ways and means by which the disinfecting agents can be best and most efficiently applied. It will be his intelligent and ready understanding of these things, on which will often depend the thoroughness of his work. A careless or insufficient disinfection is more dangerous than none at all, for it only leads to a false security.

IV. SOME PRACTICAL POINTS ON ASEPSIS AND ANTISEPSIS AND THE METHODS OF CARRYING OUT THE SAME ON BOARD VESSELS OF WAR; EMBRACING QUARANTINE HYGIENE AND DISINFECTATION OF SHIPS, "BARRACKS" AND STRUCTURES ON SHORE, WITH A VIEW TO PREVENTING THE IMPLANTATION OF GERMS OF DISEASE AND THE SPREAD OF CONTAGIOUS AFFECTIONS; TOGETHER WITH THE OFFICIALLY APPROVED METHODS FOR THE CARE AND TRANSPORTATION OF THE WOUNDED ON BOARD SHIP DURING BATTLE.

BY GEORGE W. WOODS, M. D.,

BROOKLYN, N. Y.

MEDICAL DIRECTOR (CAPTAIN) IN THE
UNITED STATES NAVY.

ASEPSIS and antiseptic in the navy should not present many peculiarities differing in any great degree from the requirements in civil life, but it may be desirable to review the status of conditions afloat and consider the surgical and medical armamentarium, the hospital department, the medical service, the modus operandi in surgical cases on our modern men-of-war, as well as the special hygienic and prophylactic means of avoiding the implantation of disease germs, and the spread of contagions.

In our modern ships it is a source of regret that no radical change has been permanently effected in the location and design of the so-called "Sick-Bay," which is the hospital department of the vessel. It is conceded by medical officers generally that its common location in the forward part of the ship, the very focus of noise, is objectionable; and at times, in the old as well as the new constructions, it has been placed aft of this location, in the waist

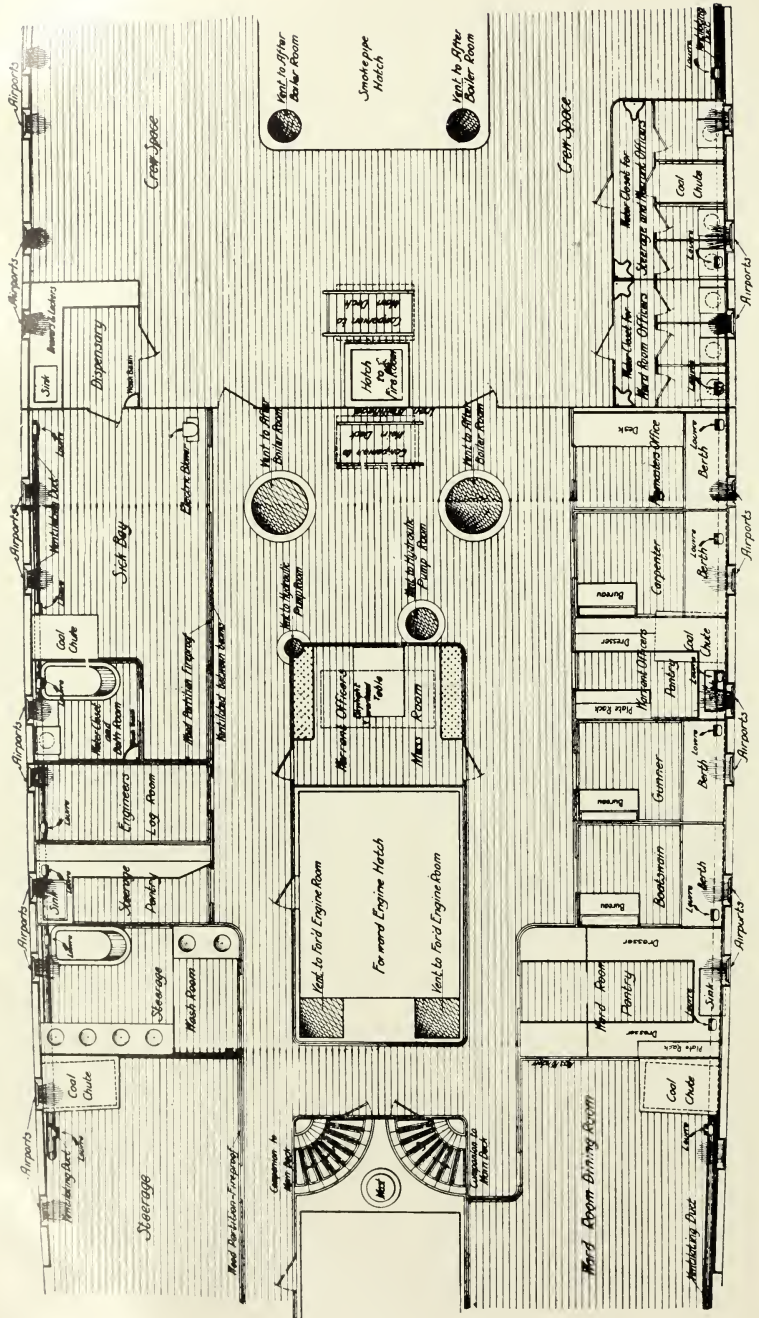


Fig. 1.—Sick Bay and Vicinity in the United States Steamer Charleston.

of the ship, where greater space, less noise, more light and better ventilation could be secured, near the main hatch; but as often under reconstruction, the old position has been reverted to again, it being argued by "Line Officers" that this location interfered seriously with the berthing or swinging of the crew. A better spirit now prevails, however, and save where the location in the "Eyes" of the ship is conceded absolutely necessary, our constructors have been amenable to the arguments of medical officers, and in recent reconstruction have invariably acted on their opinions, as in the case of the "Charleston."

The consideration of the medical department of the navy afloat from a sanitary stand-point should embrace:

1st. The sick-bay and its belongings, including the furniture, distribution of water closets, baths, heating, ventilation, etc.

2nd. The armamentarium.

3rd. The adaptation of the teachings of antiseptis and asepsis to surgical work on board ship.

4th. The receipt, and transportation of wounded.

5th. Ventilation of ship.

6th. Water supply, and its purification.

7th. The preventing of the implanting of germs of disease on board ship. (Quarantine.)

8th. The establishment, and preservation of hygienic conditions on board ship—

and for this purpose, I shall take the "Charleston"—on which vessel I made an extended cruise in her first commission—now under process of re-construction, and the "Oregon" at present in commission, as types of the "cruiser" and "battle-ship," and representing what we have obtained thus far in the attainment of our sanitary desires, drawing freely from many naval sources, foreign and American, for suggestions applicable to these considerations.

The "Charleston" was the first modern war-ship built on the Pacific coast, and went into commission on the 26th of December, 1889, at Mare Island, Cal., and her "Sick-Bay" arrangements were similar to most of the vessels of that and previous periods, being located on the berth deck forward in the "eyes"—so termed—of the ship. It was sufficiently commodious, accommodating easily six men in swinging cots; was fairly well lighted and ventilated, had bath and other facilities, but was noisy through the rattling of

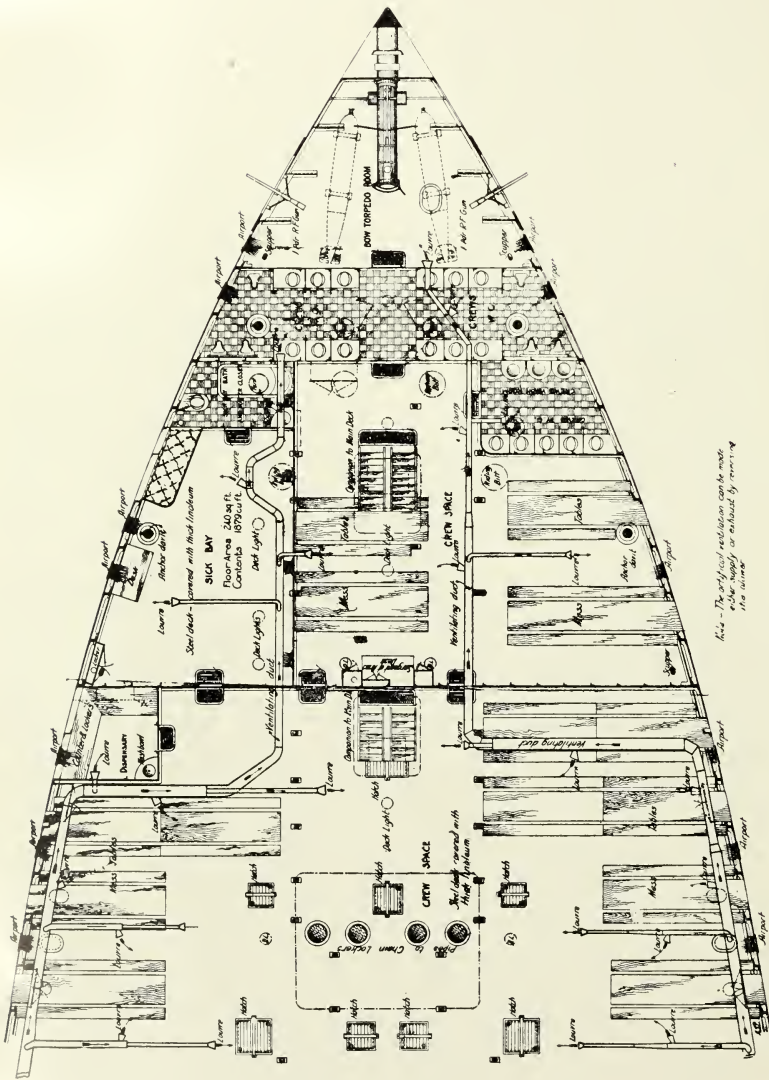


Fig. 2. - Sick Bay and Vicinity, United States Steamer Oregon.

chains, working of the steam windlasses, and the constant tramping of men on the deck above. Like the rest of the deck, the iron ceiling, carlins, and beams were painted with "Cork paint," which acted, however, as no perfect preventive of the condensation of moisture, for which purpose it is applied on all iron ships, and, being the coldest place between decks, a shower descended nightly in the "Sick-Bay" during the moderately cold winter weather of California, upon the occupants of the cots, which was only in a degree obviated by covering the iron surfaces with a ceiling of wood. This resulted in much rheumatism, and pulmonary trouble, including many cases of pneumonia.

Under re-construction, the "Sick-Bay" and dispensary are located in the "Charleston" in the waist of the ship on the berth deck, with large officers' mess-room adjacent, and is both well lighted and dry. The floor area is 240 feet, and cubic space 1,879. The "Sick-Bay" of the "Oregon" is forward on the berth deck, but not completely in the "eyes" of the ship; has about the same area, and ample space in the vicinity for the deposit of the wounded at a "first station," when sent below.

The plans of both ships, appended, demonstrate the location and arrangements of the "Sick-Bay" and belongings, and the system of heating and ventilation, which may be considered as well-nigh perfect.

The *Armamentarium* of the medical department of the Navy is unique, and in every way equal to that of any civil hospital in the United States, covering instruments, antiseptic outfits, and surgical appliances, and an elaborate supply of medicines, while provision is made for the supply of additional instruments, or necessities, which, in the opinion of the medical officers, may be necessary. Every ship is amply supplied, but of course the larger ships have a more extensive array of instruments, and for the smaller ships all that could be desired is a larger number of hæmostatic forceps, as the demand for their use is as likely to occur on a small, as on a large vessel, and all surgical appliances should be in greater quantity than usually supplied, for the same reason.

Additionally, to *all* ships there should be furnished:

Instrument trays, (6)	Absolute alcohol.
Sterilizers, (2)	Carbolic soap.
Hot-water bags, (12)	Icthyol soap.
Agate buckets, (6)	Etherial soap.
Agate bowls, (12)	Green soap.
Coir brushes, hand and nail, (24)	Wood Charcoal, in cans.*
Towels, (60)	
Gauze caps, (24)	
Operating gowns, (2)	
Rubber blankets, (6)	
Rubber gloves, (12)	

The sterilizers may be used by breaking the connections of the steam heater, and by appropriate devices introducing the steam from this source, and through this break, the "Sick-Bay" may be flooded with steam, before the thorough cleansing preceding an operation.

*The charcoal dressing is strongly advocated by Dr. Kikusi, of the Japanese Army, and S. Sherwell, M. D., (*Medical Record*, November 14, 1896, and January 30, 1897.) Carbonized rice straw was made use of in the Japanese service, which is rich in silicates. Carbonized corn stalks would probably be of the same character.

Dr. Sherwell speaks of it to prevent septic complications due to direct infection, and further says: After operations there should be instant envelopment of wounds, particularly those of lower limbs, in sack or bag—small pillow-slip will do—containing the finely pulverized charcoal in excess; either in this way or directly laid on the wound or on a piece of some dressing, as gauze or book muslin, over surface not to be removed for days, except as a pressing necessity, and then preferably by a jet of water to clean surface, and same dressing, if fitting, to be re-applied. This dressing may prevent a large amount of septic infection. Perhaps charcoal had better be slightly dampened with antiseptic fluid before being applied.

Under its use a clean healthy wound is observed under daily examination, and when renewal is necessary, it can be removed with antiseptic irrigation. It has been used from time immemorial as an adjunct to other dressings and an ingredient of poultices to foul, suppurating or necrotic surfaces, but has never before been recommended for general use in military surgery.

The adaptation of the technique of antiseptics and asepsis to surgical work on board ship comprises thorough cleanliness first—which *is* asepsis—and the employment of all those means usually conceded to be necessary for operation outside the navy, as well as the preparation of the "Sick-Bay" as an operating room, according to accepted hospital methods.

The preparation of the room should be made by washing ceilings, floors, necessary furniture, and tables with hot soda solution, and then with hot water; all cots removed and furniture which can be dispensed with; and other patients transferred to swinging billets on berth deck. Before this work is done, flooding the Bay with steam is desirable, and when all this is accomplished, all surfaces and furniture should be washed off with a solution of hydrarg. bichlorid, 1-500, and sheets and towels saturated with this same solution should be hung at the door-ways, in ports and gratings. The operating table should be similarly treated, covered with a sterilized blanket, and a rubber sheet, which has been cleansed with corrosive sublimate solution 1-500. Abundant blankets, sheets and towels, all rendered antiseptic, and sterilized as far as practicable, must be provided. All operations should be performed under electric illumination, and for this purpose, a cone reflector containing four 32-candle power lamps should be supplied, and adjusted over each operating table with a smaller reflector containing one lamp for exploring cavities and special regions.

PREPARATION OF PATIENT.

A hot bath with antiseptic soap should first be given in a thorough manner. The area to be operated upon should be shaved, thoroughly cleansed by scrubbing with green soap and hot water, then washed with ether, and further cleansed, and rendered antiseptic, with a douche of Hydrarg. bichlorid. 1-2000, and then covered, the whole body, as well as field of operation, with sterilized towels, previously treated with a solution of Hydrarg. bichlorid.

PREPARATION OF OPERATOR AND ASSISTANTS.

No person should be allowed in the "Sick-Bay" save the operator and assistants, being restricted to absolutely necessary attendants; no friends, no outsiders who might be the carriers of

infection. One attendant should be stationed outside, at the principal door of the bulk-head, as a guard, and as a carrier of necessary messages, who must on no account be allowed ingress; nor are the attendants to be permitted egress until the operation is concluded, and parts have received their permanent dressing.

All participating in the operation should wear thoroughly sterilized gowns, previously treated with solution of Hydrarg. bichlorid. or a sheet draped so as to fulfill the same purpose, and clean, light slippers, preferably of rubber, should be worn, and rubber gloves, if hand-toilet is under suspicion.

The skin toilet, including face, neck, fore-arms, and hands, should be by prolonged application of green soap, and hot water, a coir brush being used for the scrubbing, absolute alcohol being subsequently applied, and finally a solution of Hydrarg. bichlorid., 1-3000; or the final application may be a saturated solution of potassium permanganate, and immediate immersion in saturated solution of oxalic acid.

PREPARATION OF INSTRUMENTS, ETC.

All the dressing material should be prepared by being placed in the sterilizer at least an hour before the operation, and when removed to the tables, conveniently located near the operating table, should be covered with sterilized gauze or towels, and all the instruments having been selected with great care, so that nothing shall be wanting, are immersed in a hot soda solution, when anæsthesia is commenced, and when patient is on the table, removed to sterilized agate or porcelain dishes. The cat-gut and silk sutures, drainage material, etc., should be placed near the instruments, and all covered with sterilized, and antiseptized cloth or towels.

For operations there should be an abundance of every form of dressing and appliance that can possibly be demanded, including hot-water bags, whiskey, anæsthetics, alcohol, and ammonia, strychnia tablets, and hypodermic syringe, that there may be no necessity for communication outside of the "Sick-Bay."

On board ship, operating and instrument tables cannot be constructed of glass, but being of wood, with brass fittings, and chairs of iron, should be painted with a hard metallic, or enamel paint, so as to be capable of easy antiseptic cleansing, and have no exposed pores, joints or crevices, to receive disease germs.

TRANSPORTATION OF WOUNDED ON BOARD SHIP.

The accompanying circular is authoritative and commandatory, and with its illustrations is sufficiently explanatory; but it is not forbidden to employ other means which may have been found efficacious in our own, and other services.

The method, and appliances indicated in the circular—practically based on the suggestions of P. A. Surgeon E. R. Stitt, U. S. Navy—may also be adapted to bringing men from below, but P. A. Surgeon Russel recommends a combination of the stretcher, and Lowmoor jacket for all purposes (report of Surgeon-General of the Navy, 1895), the latter device permitting of men being brought up, or lowered through the ash-hoists and ventilators, and the combination is thus described by him:

“The stretcher consists of two poles of seasoned hickory, 6 feet 8 inches long, with ends turned into rounded knobs. These are joined by bars of steel, 6 feet apart. Over the poles and bars canvas is tightly stretched and sewed. From the upper corners, the canvas is cut away sufficiently to allow the suspension straps of the jacket to be passed over the bar, which is to be covered with leather to prevent chafing. At the junction of the poles and the bars, at the upper end, a rope, strong enough to suspend 270 pounds is spliced. A loop of rope is thus made and in a turn in its centre a thimble is spliced. In this thimble, the double hook of the lowering or the hoisting rope, is caught. A Lowmoor jacket is laid on this stretcher and secured to it by two canvas cleats at the sides. These hold it in place, and allow it to slip up and down to adapt itself to men of different heights; fixed to the lower part of the stretcher is a strap to buckle across the legs below the knees.

“This jacket stretcher is to be allowed to slip down from one deck to another on a skid or slide with raised sides of sufficient height to prevent the stretcher from slipping out of it.”

GENERAL ORDER

No. 452.

NAVY DEPARTMENT.

Washington, D. C., July 13, '95.

The following method (illustrated by drawings A, B, C and D) of transporting to sick quarters those disabled in action, is pub-

lished for the information and guidance of all concerned, and shall be employed under the direction of a medical officer as a drill in exercising at general quarters on board ship, when practicable.

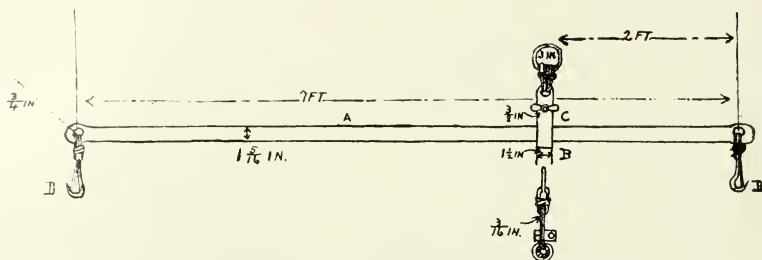


Fig. 3.—("A")—Stretcher Bar for Lowering Wounded.

1. *A stretcher bar*, supplied by the Bureau of Construction and Repair, will be properly rigged for lowering through the hatchway to be used. This bar, 7 feet long and made of 1-inch wrought

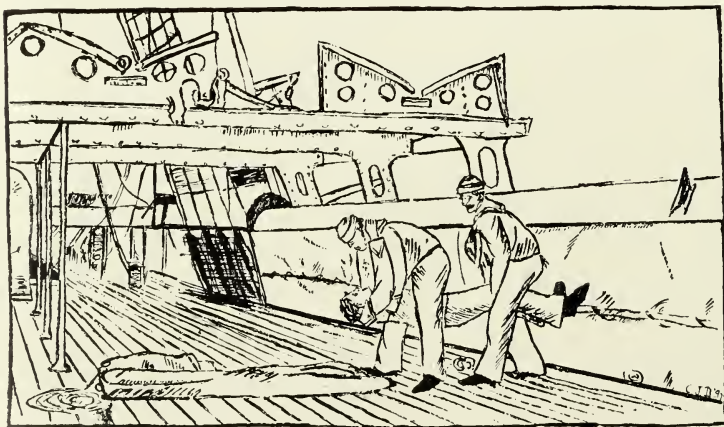


Fig. 4.—("B")—Lifting and Carrying.

iron piping, with each end forged flat and fitted with snap hook having play in a $\frac{3}{4}$ -inch opening, is given the necessary obliquity by means of a suitable sliding binding strap held together by a bolt, which can be tightened by a thumb-screw, and attached to a

ring into which the hook of the tackle is inserted. A guiding line should be made fast to one end of the bar when required.

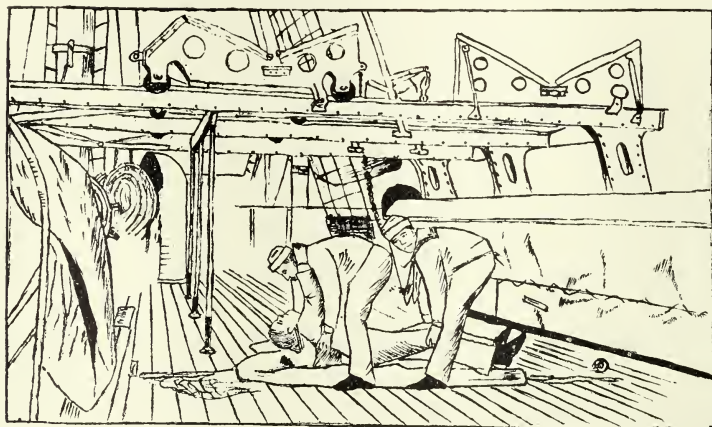


Fig. 5.—("C")—Lowering on to Hammock.

2. *Hammocks* shall be utilized for transportation along decks from which the sick or wounded are to be lowered. The hammock, as stowed, shall be unlashd and, containing the mattress,



Fig. 6.—("D")—Lowering through the Hatchway.

spread out on the deck in line with the body. The injured person is then placed on the mattress, the blanket spread over him, and

secured by three or four lashings, the first turn being under the armpits.

3. To place the sick or wounded in the hammock, two stretcher bearers take positions 1 and 2 respectively; No. 1 standing astride the patient's chest with toes close to the armpits, stoops and locks his hands under the shoulder blades, and the patient, should his arms be uninjured, clasps No. 1 around the neck. No. 2, with his right foot between the knees and his left alongside the hips of the man, bends his right knee and takes hold of the legs at the bend of the knees. At the signals, *Ready, Lift*, from No. 1, they raise the body in unison and keeping step, No. 1 counting 1-2, 1-2, etc., they move forward and deposit the wounded person on the hammock.

4. After the lashing is complete, the man is temporarily put aside until some person or persons detailed for the purpose, such as the two *Divisional Aids to Wounded*, can transport him by dragging the hammock along the deck to the hatch where one of the *stretcher bars* is rigged. This is effected most readily by one person at each end, the hammock being moved longitudinally.

5. Arriving at the hatch, the bearers snap the safety hooks at the ends of the bar into the hammock rings, and lower. The angle at which this is done, depending on the size of the hatchway, should have been previously fixed by loosening the thumbscrew and shifting the point of attachment to the tackle nearer the head end of the bar. When the hammock is released the *stretcher bar* is hoisted.

(Signed) H. A. HERBERT,
Secretary.

Lowering from the tops may be accomplished by a modification of the Lowmoor jacket, or an ordinary stretcher with side poles specially adapted to the ends in view, and placed in the top before action; and I would suggest that a "T"-shaped canvas be securely sewed to the inside of the ordinary stretcher, the patient being placed in it, the horizontal piece of the "T" being brought around under the axilla and the vertical portion up under the crotch and secured, the poles being brought up in front of the patient, several turns of a hammock lashing passed around, and made fast, and the whole being lowered to the deck below by means either of a rope or canvas sling.

The problem of transporting a wounded man from a top, even under the most favorable circumstances, will be extremely difficult, and in the heat of action, may be considered well-nigh impossible, according to any pre-arranged mode.

Placing the wounded in the hammock may be accomplished in the following manner: Two men are required. No. 1 crumples the hammock up to half its length and places it at the patient's head in line with the body. No. 2 standing astride of the patient's head, lifts him while No. 1 pulls the crumpled portion of the hammock down to the patient's buttock, the smooth portion being under the head and shoulders. No. 2 then lays the patient down and advances to the hips and again lifting the patient, No. 1 straightens out the hammock. The poles are then inserted.

It is recommended that all the nurses detailed to aid the stretcher-bearers should wear shoes with corrugated rubber soles attached, to prevent slipping on deck.

AIDS TO WOUNDED.

Prominent French authority recommends about two stretcher-bearers for each 100 men or important part thereof.

FIRST AID DRESSINGS.

These should be hung on the bulk-heads at the aid stations and in many other parts of the ship in bags. The top should also be supplied with such dressings, and as the occupants thereof will be more or less isolated during the action, they should be especially well instructed in the matter of first aid. Great stress should be laid on teaching all who render these services, to finger the wounds as little as possible.

Protected "Sick-Bays," such as those found alone on the French ships "Magenta" and "Frehouart," seem not to have received approval, since there has been no repetition of the plan in other ships. These ships are also furnished with an elevator for transporting the wounded, which cannot be relied on for maintaining its action in time of battle. All modes of transportation are more or less theoretical, and in addition to the devices described, we have the stretcher devised by Dr. P. W. Mowll, which is a frame-work so arranged that it can be employed as an invalid chair, when it very closely resembles the ordinary steamer chair.

By adjusting handles attached to either end of the apparatus, it can be converted into an admirable stretcher, and finally, by means of straps centering in a ring, it can be converted into a serviceable cot for lowering the wounded, but is rather a complicated arrangement.

The "Gouttiere Metalique de Bonnet," herewith figured, is much praised by surgeons of the French navy. It is made of woven wire, bound at the edges, but might be constructed of bamboo or rattan, and with wheels and poles and hoisting apparatus, may serve in transporting men from top, in carrying them, or wheeling them along decks, or sending them below through



Fig. 7.—"Gouttiere Metalique de Bonnet."

chutes and hatches. They might be furnished in *nests*, and so occupy but little space in store-room.

The admirable cots of Medical Director Gihon, and Medical Director Gorgas, are well known, and that of Dr. Pohl, which folds upon itself in the middle, occupies but little space on board ship, and its only objection is the great length of the legs. The methods recommended by Dr. Stitt, are fully embodied, and illustrated in accompanying circular.

The conclusions of Surgeon C. U. Gravatt, U. S. Navy, are that in actual practice aboard ship, in time of action, tackle, chairs,

cots and the like are of little, or no use. That the Japanese very wisely dispensed with them during the recent war with China, and resorted to the very simple and safe method of carrying the wounded "Pick-a-Pack." The four-handed method is also recommended as very good when there is room for three men to pass abreast through an opening door-way or hatchway.

WHO SHALL AID THE WOUNDED?

A careful detail must be made of aids to wounded, and of medical officers and nurses adapted to each vessel, and training of such detail is absolutely essential.

According to Dr. Russell, during action there should be three medical officers and a hospital corps of at least three to each 100 men. One surgeon should have charge of the spar deck and of the superstructure decks, and two should be stationed on the berth deck—one forward and one aft.

The object should be kept in view to put on such primary simple appliances or dressings as may be necessary that men may not suffer in transportation, and as rapidly as possible get them below in the vicinity of the "Sick-Bay," the adjacent mess rooms being utilized as resting points, and adjuncts to the hospital department as a first station. These are admirably located for this purpose, on the "Oregon" and "Charleston," but in a fierce battle the wounded would have to be carried below the protective deck, to which location, the whole medical department would have to be transferred.

Surgeon D. O. Lewis, U. S. Navy, thus writes, emphasizing the importance of a thoroughly trained set of nurses and aids, such as are now found in the Japanese service, a need becoming more apparent in our navy every day. He says men selected for their intelligence and aptitude for this duty should be submitted to a course of training either on the receiving ships, or at some shore station adapted to the purpose. It might be advisable to establish a sort of preparatory school at Mare Island, and at one or two of the eastern receiving ships, where the medical officer might instruct a class in:

- (a) Minor surgery, and first aid to the wounded.
- (b) Transportation of the wounded with especial reference to the new conditions.

(c) Application of first dressings, with some of the fundamental principles of asepsis.

(d) Various kinds and means of checking hemorrhage.

(e) Application of extemporized dressings to fractures.

(f) Resuscitation of the apparently drowned—

and the same instructions should be given to all apprentices.

This plan is quite in line with Surgeon-General Tryon's long-continued and earnest efforts for a regular corps of trained apothecaries, and nurses, after the character of the hospital corps of the army, under the title of "Naval Hospital Corps."

In reiterating this recommendation in his report for 1895, the Surgeon-General says: "At the present time no naval hospital should be without its corps of well-trained nurses, and no ships should be allowed to go to sea without the requisite number of trained nurses on board. The system of limiting and picking up nurses from service at naval hospitals, and on board ship, antecedates war times, is detrimental to both patient and medical officer, is obsolete, and should be discontinued as soon as possible. All civil hospitals years ago found the necessity of educating and training their own nurses, established their training schools, and to-day there is no responsible public institution of the kind in any city of the land but is supplied with a trained corps of assistants.

"The same system can be applied in the medical department of the navy by the organization of a Naval Hospital Corps, which has been strongly advocated in the previous reports, and is becoming more and more necessary to meet the increasing wants and growth of the navy."

Under the heading, Handling Sick and Wounded, and Ambulance Ships, the Surgeon-General says: "Interest continues in the study of this important subject, and the views advanced in the last annual report are still entertained, believing that in the event of battle some efficient and practical provision must be made to care for the wounded, wholly different from what now exists in the navy. Aside from the many ways at present employed on board different ships, by reason of difference in construction, an asylum for their immediate reception should be at hand in every fleet in the event of an engagement. Ambulance, or hospital ships specially fitted can only answer this purpose, and until they are allowed, the naval medical service will be incom-

plete. Considerable attention is now being given to the construction of such vessels abroad, and it is universally conceded that they should be designed and built for this particular duty, and considered an essential part of the fleet of war.

"It is interesting to notice from reports received, the complete organization for field service that exists in the medical department of the British army:

"1. The regimental surgeon with the regimental stretcher-bearers.

"2. The bearer companies.

"3. The field hospitals.

"4. The stationary hospitals on the line of communication, the base hospital, and the hospital ship, or ships.

"By this means, continuous medical assistance is afforded the British soldier, from the moment he falls in action until his restoration to health at a temporary hospital, or discharge from service on account of disability, from the permanent government hospital at home, where he has been transferred by ambulance ship. If this is considered essential in an army organization, how much greater appears the necessity in a navy organization.

"These relief ships are fast steamers, fitted with comfortable beds, and are equipped and conducted by the officers of the medical staff and men of the hospital corps, who have been thoroughly trained in time of peace in the duties of nursing and caring for the wounded.

"On board fighting vessels, in case of war, there cannot be sufficient room with proper security, to attend to the sick and wounded, nor would there be a sufficient complement of surgeons and trained nurses to supply the fleet, so the best professional assistance at hand might prove a failure in action.

"This whole question of rendering proper assistance in naval warfare is of such interest that public attention has been called to the necessity of establishing a naval ambulance associated for the treatment of sick and wounded at sea, corresponding with 'St. John Ambulance Association,' the aim being to 'succor all during and after the battle without regard to nationality, and to proceed with their rafts to the assistance of the crew' in case of loss of vessel.

It is stated that in the last naval battle, between the Austrian and Italian fleets, now thirty years ago, 'more than 400 men were drowned uselessly in battle, while they might have been saved had an ambulance ship been in attendance.'

"The plans suggested for vessels provide large wards for officers and men on spar deck for treatment of serious cases, and additional wards, affording ample space, on main deck and lower deck. Natural ventilation is assisted: 'by a steam-spray extracting apparatus, as well as by a steam-fan blast that pumps in an abundant supply of fresh air.'"

In the same annual report, the Surgeon-General further says: "No method recommended in foreign, and American reports for transportation of wounded, equals that for our navy, embodied in General Order No. 452."

In the report read in the Section of Military Hygiene, at the 10th Medical Congress at Berlin, in 1890, by Dr. Wenzel, Surgeon-General of Marine, the subject of hospital ships was fully considered. He recommends vessels to be selected from the merchant marine; large, spacious, sea-going passenger vessels with light, high decks, with every device for ventilation and lighting, and all modern hospital conveniences; and in this selection care should be taken that the vessel has not been engaged in the transportation of emigrants, or passengers affected with contagious diseases; animals, hides, wool or rags.

Such ships should undergo a complete and radical disinfection, and thereafter to be used, if they be retained in the service, for no other purpose that might render them un-hygienic, and should be painted white, for tropical service, or in the hot season, on any station; fifteen cubic metres of air-space must be allowed to each patient, and the patients should be classified, infectious cases being isolated completely and placed forward.

Only two decks should be used—the larger and lighter upper decks—the upper one for serious cases and major injuries, the lower one for less serious cases.

In fine weather, the lower deck patients may be accommodated on the upper deck protected by tents and awnings. Of the utmost importance is the separation of the ship's company from the patients.

The patients must be berthed in swinging cots, provided with mosquito nettings when season or climate demands them, and punkahs for the more seriously wounded.

Arrangements for cooking, dining room, wash room (laundry), disinfecting room, ice and distilling apparatus, cold storage, clothing and linen rooms, and room for soiled clothing, a *morgue*, bath rooms, water closets, and bath room facilities, and distributors of salt and fresh water, as well as distilling apparatus, must receive the strictest attention; likewise arrangement of business office, dining rooms, nurses' rooms, dispensary and operating room, and facility of access to instruments, surgical appliances, and hospital stores. An electric light plant should be always installed in hospital ships.

There should be large hatches for hoisting in and out, and barges for transportation of the sick and wounded, and rendering aid to the ship-wrecked.

WATER SUPPLY.

In these modern days, no ship is without a still, or evaporator, and no water should be used save distilled water for any purpose whatsoever—save for washing spar deck—must be ample in quantity and perfect in character, which should be determined always by an examination to be made by a medical officer. It should be sufficient for drinking and cooking purposes, cleansing of utensils and mess furniture, and for "Sick-Bay" use, where it should be furnished both cold and hot, for cleaning, and operative purposes, and the necessary bathing of the sick.

In distillation from sea water, the principal difficulty to contend with is the presence of organic matter in the form of pelagic infusoria, or the sewage disseminated through the water of harbors, which demands perfect filtration through animal charcoal.

An old difficulty was the presence of chloride of magnesium, which, under conditions of heat, and concentration, formed muriatic acid, and this, acting on the metal pipes and joint solders, frequently caused lead, or metal poisoning. This danger no longer exists, I believe, the construction and material being quite different from the old types, in our modern evaporators. To avoid this danger, all poisonous metals are now excluded in their construc-

tion; the pipes are covered with a coating of tin, and care is taken that the water distilled should not reach too high a point of saturation, often the result of an effort to secure the greatest amount of water with a minimum of expenditure of coal.

In foul harbors the ship should be sent out a distance of at least a league for the purpose of washing the spar deck, and at necessary intervals for securing clean sea water for distilling purposes. All tanks should be thoroughly cleaned before receiving a new supply of distilled water, and the filter be examined frequently to see that it has not retained organic, animal or saline impurities.

PREVENTING THE IMPLANTATION OF GERMS OF DISEASE
ON BOARD SHIP.

This is but another form of expressing quarantine as against infected persons, and infected districts on shore, and practically applies in the matter of naval exposure to yellow fever, cholera, small-pox, typhus, and typhoid and the various forms of malarial fevers, to which may be added as exceptional exposures, scarlet fever, diphtheria and measles, and finally, dengue, leprosy and bubonic plague.

If epidemic disease exists on shore, as nearly as possible, non-intercourse should be maintained, and the bum-boats should be rigidly inspected for any food that might be deleterious; decayed fruit, and locally purchased beverages being absolutely interdicted, and vegetables must be cooked on board before being served.

No sending of clothes to laundries, or launderers on shore should be permitted.

If liberty is given, or men take it without permission, on their return to the ship they must be compelled to take a disinfecting bath, have their clothes sterilized or disinfected, and in case of exposure to small-pox, they should be vaccinated at once. In any districts subject to endemic disease, even if it is not declared to exist in an epidemic form, and in tropical countries, generally, these matters should always receive the greatest consideration, and coffee, or other hot beverages, with bread, should invariably be served out when "all hands" are called in the morning watch, and before "turning to."

ESTABLISHMENT AND PRESERVATION OF HYGIENIC CONDITIONS,
AND PREVENTION OF THE SPREAD OF CONTAGIOUS
DISEASE ON BOARD SHIP.

It being assumed that a perfect quarantine against infectious disease has been established, there may still be infractions of the regulations, and through this cause, and the atmosphere as a carrier, disease may be introduced; therefore, vigilant observations must be maintained, and the ship made so perfectly hygienic, that disease germs may have no facility for germinating, and their speedy obliteration ensured, or, at least, have such sanitary surroundings that they may be capable of doing the least harm.

To attain this end, there should be no general holy-stoning of decks, for it is maintained by unerring statistics that "A wet ship is always an unhealthy ship." The spar deck must be cleaned with wet swabs, and the berth deck and other decks below water line, being shellacked, always cleaned with cloths, or light swabs wrung out of hot water, and the moisture thoroughly and speedily absorbed by dry swabs or cloth.

The rest of the ship, including living quarters, being painted—preferably with hard oil, or enamel paint—should be cleaned in a similar manner—carbolic acid being added to the water, if disinfection is demanded—and the lower holds and store-rooms, should be painted or coated with white-wash in which chloride of lime has been incorporated. In our modern or iron ships, the bilges are much cleaner and the cleanliness more easily maintained, than in the old wooden ships, there being less material for decomposition, the hulls made water-tight and easy to empty, ventilate and clean, with the addition of water and frequent pumping. If disinfection is necessary, the McDougal solution is recommended, which consists of a mixture of sulphite of lime and sulphite of magnesia with impure carbolic acid. It is perfection for the disinfection of bilges, and may be used for general atmospheric disinfection by hanging of several thicknesses of blankets saturated with the solution, wherever its use is indicated. In the compound there occurs a union of the carbolic acid with the lime and magnesia, whereby natural sulphurous acid is formed and liberated, the most powerful of disinfecting substances, which neutralizes all foul odors, and drives flies, roaches, and insects gener-

ally away. This solution must invariably be used for bilges, heads and water-closets, unless hydrarg. bichlorid. be held in higher esteem. Sulphur, ignited by means of alcohol, may be burned in large metallic vessels, for setting free sulphurous acid, 500 grammes to 30 cubic metres of ships' space; but this is scarcely to be considered, save in localized disinfection, unless the crew is on shore, or ship out of commission, and hatches and ports closed, as part of a process of complete disinfection, when flooding the ship with steam may also be employed.

Personal cleanliness must be insisted upon; dry woolen clothing, the wearing of the Cumberbund in tropical countries—moderate, and not excessive exercise and drills—good, well-cooked food—which is generally a noticeable feature of the American navy—and a breakfast of bread and coffee before “turning to” in the morning.

The *ventilation* of the ship should be perfect, based on the calculation that a healthy adult requires about 3,000 cubic feet of pure air per hour, which is undoubtedly supplied on most of our recent naval structures of the American navy, with the improved system of ventilation, and 100 cubic feet of space should be allowed to each person.

Electric lighting should be the rule, and as full an admission of daylight as is practicable, for its drying and sanitary effect, and to prevent the concealment of dirt, for as the Italian proverb says, “Where the sun shines, the doctor cannot live.”

Daily bathing should be demanded, and if necessary, disinfectants may be added to the water in the lavatory. Closets, galleys, wash rooms, store rooms, fire rooms and living quarters should be inspected daily and scrupulous cleanliness maintained, and all accumulated garbage, or refuse food, waste and rags, disposed of in a proper manner, preferably by burning.

If small-pox is to be feared, immediate general vaccination should be ordered; and it is hoped we may soon thus be enabled by inoculation of various serums to exercise prophylaxis against cholera, yellow fever, diphtheria and plague and, in the near future, against the other enumerated contagions and epidemic diseases.

In cases of contagious disease established on board ship, patient or patients, should be isolated by screening off a portion of the deck and preventing all intercourse with the crew; preferably a portion of the spar deck forward. This space must be continuously disinfected, and clothing, bedding and dressings, in case of virulent contagion, should be burned, and non-intercourse maintained.

The present system of *ventilation* on board ships of the "cruiser" and "battle-ship" class, as exemplified in the "Charleston" under re-construction, and the "Oregon," is well nigh perfect, and is based on the report of a board organized to make decisive recommendations to this end. The natural ventilation through hatches and deck ventilators, with cowls and wind-sails is adapted to all ships, and is the only system in the smaller and older vessels. In the larger and modern ships, there is a combination of steam and electric blowers, two main steam blowers forward and aft. They are so arranged as to be reversible, either forcing air, or withdrawing it by suction, and reach the various portions of the ship by large ducts; as for the fire room, air is always *forced* in, as it is for all parts of the ship in the tropics.

The electrical blowers are for local service, and are made multiple, according to the needs of the ship. Many electrical fans are now employed for cabins, state rooms, and mess rooms, and for the "Sick-Bay."

The heating of the ships is by steam, distributed through pipes and radiators. All ducts for steam and air are provided with globe floats of metal or rubber—similar to those employed in water-closet tanks—which, being ruptured during an engagement, by the penetration of shot, shell, or by collision, are immediately closed automatically.

DISINFECTION PLANT AT NAVY YARDS AND HOSPITALS.

In the report of the Surgeon-General for 1896, he announces that all naval hospitals have been equipped with aseptic operating room and furniture, and that *disinfecting plants* will be installed at all naval hospitals, in connection with laundry. The oven to be used is thus described: "It will rest in circular openings in the

laundry wall, and be so fitted as to totally exclude communication. The disinfectors will include metallic retaining straps for mattresses, and two galvanized wire cages for holding clothing and other articles undergoing disinfection. The room in connection with the laundry to receive disinfecting chambers will be made of smooth brick, resting upon suitable foundations, covering a ground space of sufficient size, and constructed so as to completely cut off and isolate the two apartments. These are to be finished throughout with Portland cement, so that they can be easily washed by water or antiseptic solutions. The disinfecter when fixed in the wall, completely isolates the door of entrance to the chamber for contaminated articles from the door of exit after disinfection—the manipulation of valves to take place from the purified end.”

The disinfection service in the capital city of Mexico, which I recently inspected, is based on the French system established in 1889. This comprises a collection service, with disinfection by means of super-heated steam, in a Geneste-Herscher stove, of all clothing and bedding associated with each case and a return of the same to the domicile, with also, a thorough disinfection of the dwelling where the disease exists or has existed. In the apartment of reception, all clothing and bedding is cleansed in an antiseptic solution, introduced into a cylinder with tightly closed doors at either end, where it is submitted to the action of super-heated steam, or air, and, after a definite period, the apparatus is slid into another apartment and the contents of the cylinder removed. Closed wagons painted yellow transport the clothing to the disinfecting plant, and others painted maroon carry it back when disinfected, and roughly laundered, or dried.

The disinfecter, it will be seen, is similar to that recommended by Surgeon-General Tryon.

Portable disinfectors, delivering a disinfectant spray, are used in the disinfection of dwellings and barracks. These consist of an atomizer or spray producer connected by a rubber hose, the liquid to be atomized contained in a metallic tank of 40 litres capacity, and transported on wheels. The staff consists of one chief, one machinist, one man in charge of disinfected clothing, one in charge of inspected clothing, a coachman and assistant.

This may be used on walls and wood work with any chosen disinfectant; the McDougal solution, various solutions of bichloride of mercury, carbolic acid, and creoline, and may be preceded or followed, by the generation of sulphurous acid by means of burning sulphur, for a more perfect disinfection, all furniture and bedding being accumulated in centre of room.

Wall paper and hangings may be cleaned with bread crumbs associated with some disinfectant, afterwards to be burned, and such things as are of no value, or are condemned for their close association with the disease germs should be incinerated. The oven and the portable disinfecting apparatus should be at the disposal of the entire station for purposes of disinfection, or a general plant should be established, if that at hospital be not of sufficient capacity.

V. VENEREAL DISEASE IN THE NAVY AND ITS PREVENTION.

BY R. PERCY CRANDALL, M. D.,

NORFOLK, VA.

PASSED ASSISTANT SURGEON (LIEUTENANT) IN THE
UNITED STATES NAVY.

THE loss to the United States Government from venereal diseases in the Naval service for the year 1895, as shown in the report of the Surgeon General of the Navy for that year, was equivalent to the total loss of the crew of such a vessel as the *Castine* or *Machias*, for a period of six months.

Incredible as this may seem, it is nevertheless true, and may be readily demonstrated in the above mentioned report.

Owing to the admirable method of gathering statistics now followed by the Bureau of Medicine and Surgery, accurate results and data are readily obtainable. Previous to the report for 1895, it was impossible to estimate the exact number of cases of any one disease, as a case might appear first on the returns of a ship or station, and afterwards on the returns of one or more hospitals, thus appearing as two or three distinct cases. Now, however, a case appears but once as an admission, and if sent to a hospital, as a re-admission, making the total admissions for the year represent the actual number of cases.

The "Report of the Surgeon-General of the Navy" for 1895, shows the total admissions for disease and injury to have been 10,625,—721 of which were venereal. Allowing 30 days for each case of venereal (which is very small), we have 22,351 sick days, or the loss of 61 men for one year or 122 men for six months, about the strength of the *Castine's* crew.

At several of the home stations the percentage of venereal is very large. During the first four months of the present year, from 1st January to 30th April, there were under treatment at the U. S. Naval Hospital, Norfolk, Va., 150 cases of disease and injury, 50 cases, or 1 in 3, being venereal. In addition some 12 or 15 cases developed while patients were under treatment for other affections

which do not show on the returns. Many of the cases were acquired at one brothel in the city of Norfolk from one woman and yet, I found upon inquiry, that the police were powerless to interfere, and the woman still continues to infect the admirers who seek her favors. What better argument is needed than this in favor of police supervision and medical inspection of prostitutes. If such a system were in force in Norfolk, the government would save many hundreds of dollars annually, and increase the efficiency of the Naval force of the station.

It is impossible to ascertain the actual amount of venereal disease in the Navy owing to the tendency of concealment, and again many cases are not entered on the returns when they are not incapacitated from duty.

The question now suggests itself—cannot some means be adopted by which these affections may to some extent be prevented?

We can never hope to stamp out prostitution, as long as the demand exists the supply will always be adequate, and prostitution is the chief source of all venereal diseases.

Sanger says (*History of Prostitution*,) "it is a mere absurdity to assert that prostitution can ever be eradicated. Strenuous and well directed efforts for this purpose have been made at different times. The whole power of the Church where it possessed not merely a spiritual, but an actual secular arm, has been in vain directed against it. Nature defied the mandates of the clergy, and the threatened punishments of an after life were futile to deter men from seeking, and women from granting sinful pleasures in this world. Monarchs victorious in the field and unsurpassed in the council chamber have bent all their energies of will, brought all the aids of power to crush it out, but before these vice has not quailed. The guilty women have been banished, scourged, branded, executed, held up to public opinion as immoral; their partners have been subjected to the same punishment; denuded of their civil rights; have seen their offenses visited upon their families; have been led to the stake, the gibbet and the block, and still prostitution exists. The teachings of morality and virtue have been powerless here. In some cases they restrain individuals; upon the aggregate they are inoperative. The researches of science have been unheeded. They have traced

the physical results of vice, and have foreshadowed its course. They have demonstrated that the suffering parents of this generation will bequeath to their posterity a heritage of ruined powers; that the malady which illicit pleasure communicates is destructive to the hopes of man; that the human frame is perceptibly and regularly depreciating by the operation of this poison, and have shown that even the desire for health and long life, one of the most powerful motives that ever influenced a human being, has been of no avail to stem the torrent."

But while history has shown that prostitution cannot be crushed out, it has also shown that by a proper system of regulation and supervision, its evils may be materially lessened and the spread of venereal disease be reduced to a minimum.

Before considering further the regulation of prostitution as a means of prevention, I wish first to take up a few points that are particularly applicable to prevention in the Naval service.

First then regarding enlistments.

Physical examinations for entry into the service should be more strict. Men frequently are passed who have had the initial lesion of syphilis but at time of examination have not yet developed secondary symptoms, and frequently present no signs whatever by which the disease may be detected. If all men after examination were kept under observation for 6 or 8 weeks before final enlistment—much loss of service would be saved the government.

An elongated foreskin should be a positive bar to enlistment unless circumcision is at once performed by the examining surgeon, thus decreasing the danger of acquiring venereal lesion. It is a well known fact, that freedom from syphilis and chancroid among the Jews is due to the practice of circumcision.

I have met with many cases both in service and private practice, where men with elongated foreskins have contracted disease and others again with retracted foreskins have cohabited with the same woman and passed unscathed. Treatment is rendered much more difficult, and the tendency to phimosis and phagedena is much increased where the foreskin constantly covers the glans.

Another important point which seems to have received but little attention is the periodical inspection of a ships crew. This should be done at least once a fortnight, and in addition, liberty

parties should be thoroughly examined both before going on liberty and after returning. It is a firmly fixed belief among sailors, that to get rid of a chronic discharge, it must be given to some one else, and this they invariably do whenever the opportunity offers. By such an examination the detection of concealed venereal would be very easy and disease quarantined and prevented from infecting others on shore.

Dr. Kidder (Venereal diseases in Japan) relates that venereal disease became so prevalent in the Atlantic Squadron that a general order was issued in 1869 requiring the Surgeon of each vessel to examine all liberty men both on leaving and after returning to the ship. Unfortunately the order exempted from examination all over 35 years of age, married men and petty officers, and as the majority of the cases occurred among these classes, as shown by an examination of the Medical Journals, the order proved ineffectual. The Russian Government took a more effectual means about the same time. They obtained semi-official possession of a deserted village called Hinassa, across the harbor from Nagasaki. "When any Russian ships arrived at the port they were accustomed to allow a certain number of women to migrate to this villiage where they were placed under the charge of a surgeon. The crew were then turned loose ashore only at this villiage, one watch at a time, during the stay of the ship. This characteristically direct proceeding proved eminently effectual, the amount of venereal disease on Russian ships being very small." (Kidder.)

In addition to the periodical inspection, the men should be instructed in sexual hygiene and the importance of ablution. When syphilized they should use individual mess gear, towels, etc., and be fully informed of the contagious nature of their disease. These seem to be small points, yet I have seen syphilis communicated aboard ship from neglect of these very details.

Returning again to the most important preventive factor of all, the regulation of prostitution, it seems almost incredible that while thousands and thousands of dollars are spent annually to quarantine against yellow fever, cholera, small pox and other contagious diseases, which occasionally occur, not a dollar is expended to control or prevent syphilis, which we have always with us. Nearly every civilized nation but our own has some form

of regulation and supervision, by which the spread of venereal diseases is in a great measure checked and controlled.

Lecky says in his *History of European Morals*—"In the eyes of most continental writers who have adverted to this subject, no other feature of English life appears so infamous as the fact that an epidemic which is one of the most dreadful now existing among mankind, which communicates itself from the guilty husband to the innocent wife, and even transmits its taint to the offspring, and which the experience of other nations conclusively proves may be vastly diminished, should be suffered to rage unchecked, because the legislature refuses to take official cognizance of its existence, or proper sanitary measures for its repression."

In the United States the experiment of regulation has been twice tried with the happiest results, but owing to misplaced sentiment and religious fanaticism it was abandoned in both instances after a short trial.

The first experiment was made in Nashville and is described in the report of the Committee on the Prevention of Venereal Diseases presented at the eighth annual meeting of the American Public Health Association, of which Medical Director Gihon of the Navy was Chairman. Dr. Gihon says: "Colonel Fletcher of the Surgeon General's Office of the U. S. Army, writes to your committee: "In 1863, while I was on duty in Nashville, the question of the periodical examination of prostitutes, as a protection to the troops stationed at or passing through the city, was referred to another medical officer and myself. We drew up regulations for the purpose, and for nearly three years the women were examined, at first every two weeks, but subsequently every ten days.

"I believe this was the first occasion of any systematic inspection of prostitutes attempted in the United States. Its results may be briefly stated thus:

"1. The amount of venereal disease was markedly lessened; so much so that its occurrence came to be looked upon (absurdly, of course,) as an imputation on the care of the examining surgeon. I have more than once known a company officer complain that a man was off duty for disease caught of such a girl at such a time, and demand that she be sent to the hospital.

"2. The women, who were first rebellious, became quite reconciled to the system. I have known them to come to the hospital voluntarily, desiring to be examined for suspected disease.

"3. It was self-supporting, the fee paying the expenses of the hospital."

It may be mentioned here that the committee embodied their conclusions in the following resolutions:

"Resolved, That the American Public Health Association earnestly recommend the Municipal and State Boards of Health to urge upon the legislative bodies of this country the enactment of a law constituting it a criminal offense to knowingly communicate by any direct or indirect means a contagious disease, such as small-pox, scarlet fever or venereal disease, and giving to said State Boards of Health, and the State and Municipal officials under their control, the same power in the prevention, detection, suppression and gratuitous treatment of venereal affections which they now possess in the case of small-pox and other contagious diseases."

The next attempt at legislation was made in St. Louis in 1872. The Missouri Legislature enacted a law based on the system followed in Paris. Prostitutes were registered and subjected to medical examination at regular intervals, and when diseased sent to a hospital and retained until cured. Many of the evils of prostitution were abated, disease diminished, and the number of brothels and prostitutes decreased. Yet in spite of all these beneficial results, a year had scarcely passed ere the clamor of the clergy and the devotees of the innumerable religious organizations made itself heard and demanded the repeal of the law, which was eventually brought about and in a most dramatic way as described in Sanger (*History of Prostitution*), as follows: "A petition praying for the repeal of the obnoxious law, signed by more than 100,000 good people, was presented. The document was cumbersome. A wheelbarrow decorated with white ribbons and accompanied by a group of innocent young girls attired in spotless white gowns, was brought into service and on it the gigantic and emphatic protest against licensing of vice was wheeled up to the clerk's desk to be read. Courageous indeed would have been the country member who would have voted otherwise than he did." Counter petitions from the cities and the medical profession were

in vain, the doctors of medicine were ignored and the doctors of divinity won. And all this because the public at large and the clergy persist in regarding the regulation of prostitution as a moral problem, whereas it is a strictly scientific one in sanitary science.

The great cry of the many associations for the prevention of licensed prostitution is that vice is made more attractive, that many timid ones who are now held back from gratifying their desires through fear of contracting disease, would rush headlong to embrace the golden opportunity offered by the regulation system. How puerile this argument is, it is unnecessary to state. We know only too well, both as men and physicians, that the sexual instinct is so strongly implanted in man, that he will risk heaven itself for its accomplishment.

This is especially true of our sailors, the majority of whom not only do not care about the risks they run, but in some instances are rather proud of their battle-scarred organs, and are ever ready to enter the lists for another tilt with Venus.

The following will serve to illustrate this point. During my last cruise an old boatswain's mate who had grown grey in the service presented himself at sick call one morning with the announcement that he had it again, and he had, making according to his own statement, which I had no reason to doubt, his eighteenth case of acute gonorrhœa. In addition, I found that he had had nearly every other form of venereal disease, including syphilis. The undoubted pride which he took in his record, as he termed it, was a matter of much astonishment to me, although recent experience has shown me many such cases, even in private practice, where the risk of contracting disease was no check whatever to the gratification of the sexual appetite.

The enlisted men seek, as a rule, the lowest resorts, where disease always abounds more or less, not being admitted into the better class of houses, owing to their tendency to make trouble and leave behind some venereal memento. It is then doubly important that these houses of the lower class should be under police supervision and subject to medical inspection.

In February, 1876, a committee appointed by the New York Legislature to investigate the cause of the increase of crime made the following report among others:

"In the interest of the well-being, the decorum, the decency of society; in the interest of the peace and happiness of by far the greater number of people; in the interest of the preservation of the purity of the guardians of the public peace; in the interest of public health and for the sake of thousands yet unborn, the committee earnestly urge upon the Legislature, as the only means of grappling with the social evil, the granting to the police the power of regulation, of localization, and medical visitation."

It is needless to say that the carrying out of the resolution was violently opposed by that class of narrow-minded people who insist upon remaining blind to the presence of syphilis and the evils of unrestrained vice. "The crass ignorance of that class which busies itself about a speculative future rather than an actual present is an important cause of the non-recognition of the presence of syphilis. For this class the idea of syphilis is inseparably connected with that of sexual commerce with an infected individual, and is considered as clear proof of chronic debauchery. Of a non-venereal origin persons of this class have no suspicion. The initial lesion occurring elsewhere than upon the genitals, is attributed to some other cause, and the disease is allowed to run its terrible course" (Fournier, *Gazette des Hôpitaux*, '78).

"Suppress prostitution, and capricious lusts will overthrow society," said Saint Augustine (Tr. Ord. lib. ii, c 12), in the early Christian era, and the world's history has fully justified this opinion.

The state of New York City to-day is lamentable. The streets are overrun with prostitutes, owing to the recent breaking up of the regular houses, and the smaller flats in the upper part of the city are thronged with them. This is especially dangerous, as they come in contact with the innocent and virtuous, the working girls and the lower middle classes. Thus young girls are apt to be led aside from the paths of virtue by the glint and glitter of a fast life and this apparently easy and delightful mode of gaining a living. This condition of affairs is not found in Paris or Berlin where prostitution is under police supervision. One is not jostled at every turn in Paris by eager-eyed harlots as in London and New York.

No better time than the present should be chosen to try the regulation system in New York City. The police force since its

reconstruction would carry out strictly and honestly the provisions of such a system, prostitutes would cease to throng the thoroughfares, servants would no longer carry disease and sin into private families and young girls would be less liable to be corrupted.

Wherever suppression has been tried it has failed utterly.

In Berlin in 1845 a royal edict was promulgated, under pressure, closing the brothels and discontinuing the registration of prostitutes. The result was disastrous, prostitutes filled the streets, theatre and dance halls. Under the toleration system this had never happened, the girls being forbidden to appear in public places of amusement. Venereal disease multiplied so fast that the ordinary wards at the Charite were soon filled to overflowing and new wards had to be added to accommodate them, and finally syphilitics had to be sent to the Lazareth. Prostitution, which under police supervision had been confined to one quarter of the city now spread over the whole town and to the surrounding village and even invaded private families through servants. Things reached such a frightful state eventually, that in 1851 the edict was repealed and police supervision restored and still exists. After a six years' trial of the "crushing out" system, it was admitted by the ministry to have been a complete failure. Nearly every civilized and semi-civilized nation has some form of supervision and regulation. In Belgium the system is very complete. In 1855 in an army of 30,000 men there were but 200 cases of syphilis. The Royal Academy of Belgium adopted the following resolutions in 1867:

1. The Belgium Royal Academy considers that the regulation of prostitution is necessary to restrain the development of venereal diseases and of syphilis.
2. Prostitution that advertises itself in the streets and public places, being the most patent cause in the propagation of venereal diseases and syphilis should be interdicted.
3. Persons convicted of living by habitual prostitution should be inscribed and subjected to sanitary visits.
4. Registration and medical visits should only be authorized under safeguards that would, under each and every circumstance, protect the honor and dignity of the person.

5. From the exclusive standpoint of public health the Academy declares that frequent and conveniently administered sanitary visits constitute the most efficacious means of arresting the propagation of venereal diseases and syphilis.

The contagious diseases acts of '64, '66 and '69 in England were productive of the most beneficial results in the Army and Navy. Before the acts went into effect, there were 108 cases of syphilis to the 1,000 in the army. After the acts had been in force, the proportion of syphilis fell to 54 cases in the 1,000 in 1874.

Much has been written both for and against these acts, but statistics show that syphilis decreased, brothels and prostitutes lessened in numbers, many of the evils of prostitution disappeared and many young girls warned by the police that they were under observation, gave up the life rather than be inscribed on the police register. Many reformed, owing to the facility with which they could be approached while in hospital by philanthropists and the clergy, others again married, settled down and became respectable members of society.

The *Lancet* of January 30th describes the startling condition of affairs of the army in India since the passage of the "Cantonments' act" abandoning the medical inspection of prostitutes visited by the soldiers. The increase in venereal diseases among the troops has been very great, 24,000 out of 73,000 suffering from special disease. One-half of the entire army are unfit for prolonged marching service. Medical inspection had proved invaluable in India, but the narrow-minded meddlers who are trying to lay additional treasures in heaven, thought otherwise and, under pressure, the "Cantonments' act" was passed. In spite of the fact that the Viceroy's council has urgently recommended the repeal of this mischievous act, it is still violently opposed in England.

At most of the foreign ports visited by our ships of war regulation and supervision exist in some form. It is true that in some places the system is not strict enough, as in Spezzia, as shown in Surgeon Green's report of the recent cruise of the *Marblehead* in Mediterranean waters. While the ship was in Spezzia, during a stay of 15 days, 50 per cent. of the crew contracted venereal disease. Dr. Green remarks, "That being a large garrison town, and the principal rendezvous of the Italian Navy, one would think

that a rigid inspection of prostitutes would be held, but judging from the results as affecting our crew, hygienic laws in that direction must be very lax."

It is unnecessary to further multiply instances where the suppression of prostitution has failed and the regulation and supervision succeeded.

The majority of medical men the world over are in favor of it and even clergymen of the advanced type have recognized its advantages. The very able papers of Medical Director Gihon and J. William White should be consulted in this connection.

In conclusion then, venereal diseases in the Naval service would be reduced by:

1. Circumcision before or immediately after enlistment.
2. Applicants for the service being placed on probation after physical examination before final enlistment.
3. A periodical examination of the ship's crew at least once a fortnight.
4. The examination of all liberty parties both before and after returning from liberty.
5. The use of individual mess gear, washing utensils, etc., by syphilitics on board ships and in hospitals.
6. The regulation of prostitution by a system of registration, police supervision and medical inspection.

VI. A NEW UNITED STATES NAVY PORTABLE GENERAL-OPERATING TABLE; AND A NEW PORTABLE FOLDING, DRESSING AND INSTRUMENT TABLE.

By C. A. SIEGFRIED, M. D.,

NEWPORT, R. I.

SURGEON (LIEUTENANT COMMANDER) IN THE UNITED STATES NAVY.

IN the modern battleships, when clearing ship for action and preparing for battle, the surgeon's station or stations are selected at locations offering some protection, if possible,

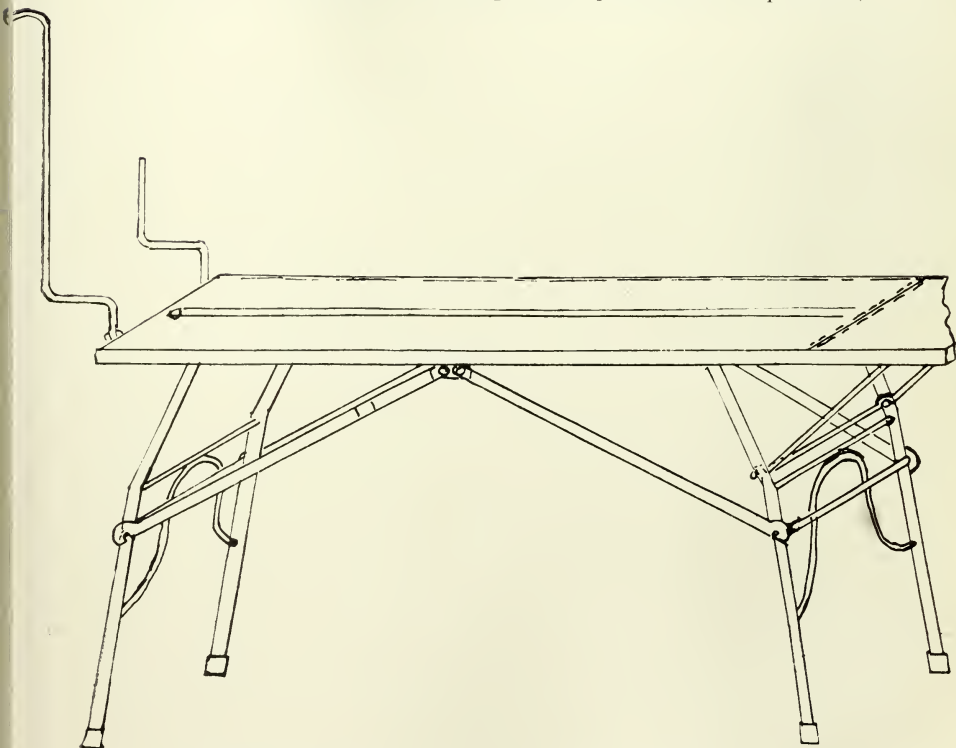


Fig. 1.—The Siegfried Portable Operating Table, for use in the United States Navy.
Table Standing.

NOTE.—The upper portion of the right hand stirrup socket is not shown in this illustration

and are invariably far removed from the usual hospital, in use at ordinary times. In the "Massachusetts" class of battleships only the central heavily armored and turreted parts are occupied in battle, the ends of the ship above the protection deck being abandoned. Hence it was found necessary to improvise tables and furniture for the purpose of equipping the surgeon's station, the narrow doors and passages general throughout the ship not allowing the transport of the broad old-fashioned wooden navy tables, always in use in sick bay or hospital. Under these circumstances I have designed a useful metal table, suitable for general surgery, easily folded, set up, or transported; and, in it the requirements of strength, rigidity, simplicity, and safety, are fully met. The

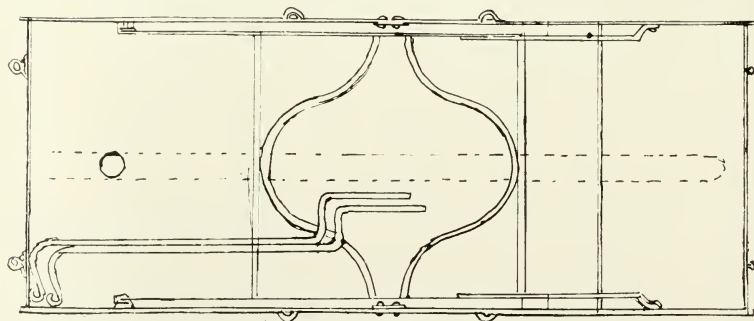


Fig. 2.—The Siegfried Portable Operating Table, folded.

top is slightly concave, 24 in. by 60 in., with a longitudinal groove in centre, $1\frac{1}{2}$ in. wide, to facilitate drainage, terminating at one end and by a short pipe discharges below. A detachable head-piece, 12 in. by 24 in., fastens to either end, and lengthens the table to 72 in. when set up for use; it is attached by means of a $\frac{5}{8}$ in. slot fitting over a $\frac{3}{4}$ in. round head bolt on the vertical steel band forming the rim of the table top 8 in. from the end; they have a spread of 7 in., and are braced by hinged angular braces, $28\frac{1}{2}$ in. long from pin to pin, to the side of table. The braces are secured to the legs by means of grooved stout catchings over heavy pins. At the foot are cast bronze sockets to secure the adjustable stirrups (for the lithotomy position) 28 in. long from sockets to foot-holders.

The legs fold under, and the supports or braces fold up against the top, making a complete package for transport 60 in. long, 24 in. wide, and $3\frac{1}{2}$ in. thick, complete in canvas bag. Finished in white enamel. Special rubber sockets to the ends of legs. Weight 90 pounds.

The special features, heretofore not seen nor embodied in any surgical table, are the longitudinal groove in centre of top for drainage purposes, the slight concavity of top for more secure retention of patient should there be any motion of ship at sea, and

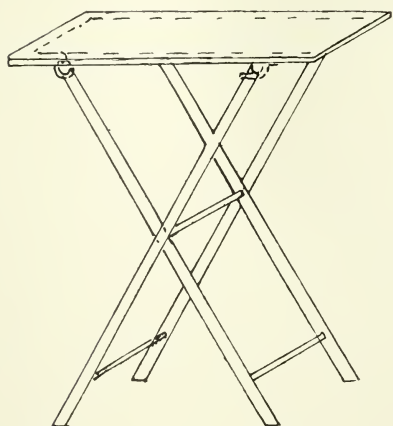


Fig. 3.—The Siegfried Portable Dressing and Instrument Table, standing.

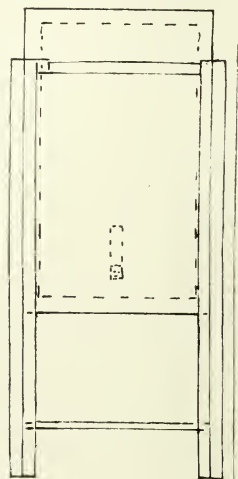


Fig. 4.—Dressing and Instrument Table, folded.

the construction of the braces and supports. Height of table at low end $31\frac{1}{2}$ in., at high end 32 in. Cost, with canvas case, about \$50, as made by the Kny Co., N. Y.

A board of Naval medical officers, appointed by the Surgeon General of the Navy, found this table fulfilled the requirements commonly met with on our ships, and the table is now furnished on requisition and has thus far been supplied to the "Massachusetts" and to several other of our large Naval vessels. It can be taken ashore with expeditionary forces for use in base hospital, as well as carried to any compartment or location in ship for any required surgical uses following an engagement or accident on any large scale.

A NEW, FOLDING, PORTABLE, DRESSING AND INSTRUMENT TABLE.

With the foregoing operating table the following smaller iron table has been designed and found to be extremely useful. It consists of an iron frame $\frac{1}{4}$ in. by 1 in., on the flat of which is securely riveted a sheet of metal top 16 in. by 26 in. It is supported on four legs of $\frac{1}{2}$ in. pipe and stands 30 in. high. The top is secured to the $\frac{1}{8}$ in. supports by two hinges on the one end, and is held secure by a hook of 8 in. from 1 in. wide at the other end. The legs have a spread of $19\frac{1}{2}$ in. on floor. Folded for transport the table is 36 in. long by 18 in. wide and 3 1-3 in. thick. Finished in white enamel. Stout rubber sockets at bottom of legs.

CHAPTER VI.

Military Personal Identification.

I. THE IDENTIFICATION OF THE SOLDIER.

BY ASSISTANT SURGEON GENERAL C. H. ALDEN, U. S. ARMY,
WASHINGTON, D. C.

NOTE—This paper is substantially the same as one read before the Anthropological Society, of Washington, May 5, 1896, and is here incorporated in the Proceedings of the Association of Military Surgeons by a vote of that body, Columbus, Ohio, May 26, 1897; the object being to place on record an account of the method of identification of the U. S. Soldier used in the Office of the Surgeon General of the Army. An appendix brings the results up to May, 1897.

THE purpose of this paper is not to enter into a general discussion of identification nor of the various methods proposed for its accomplishment. Time would not permit, for the bibliography alone of this subject would occupy many pages, as an examination of the Catalogue of the Army Medical Library will show. I will confine myself to a sketch of the system of identification of the individual soldier now in use in the Surgeon General's Office, indicating the necessity for it, the principles upon which it is based, giving an account of its practical workings and of the results obtained, and incidentally of the Bertillon system of anthropometry, with which the army system is to some extent allied.

The re-enlistment of deserters, bounty-jumpers, and other undesirable characters in the army became a serious embarrassment to the Government in the later stages of the civil war. Stimulated by the enormous bounties paid by towns and county governments and the large prices paid for substitutes, men would enlist and desert, repeating the process many times. As noted by Dr. Robert Fletcher, in his interesting paper on "Tattooing," read before the Anthropological Society in 1882, an effort was made during the civil war, by marking men on discharge with nitrate of

Silver, to secure their detection at subsequent attempts at enlistment, but it had to be abandoned. Probably at that time, in view of the vast army then in service, the frequent changes, the hurry and confusion of actual warfare, no effective plan could have been carried out.

Familiar as we were with the existence of the evil during war times, one would hardly think that it could exist to any serious extent in peace and in our present army, yet this re-enlistment of deserters and dishonorably discharged men became so frequent that in 1888 it was evident that something must be done to prevent it. The efforts that were being made and have continued to be made to procure men of better character for the army and to elevate the tone of the enlisted men added to the importance of keeping out of the ranks deserters and men who have been dishonorably discharged.

One instance of "repeating" is quoted which has occurred since the identification system has been in use, else it would not have been known. It illustrates the persistence of these repeaters and at the same time the value of the method which has detected them.

Patrick Timlin enlisted February 28, 1891; was dishonorably discharged in the same year. He enlisted as *William Swift*, January 14, 1892; was identified by outline card and discharged promptly for fraudulent enlistment; again enlisted as *James T. Casey*, May 2, 1892; was again identified and again discharged for fraudulent enlistment; again enlisted as *Thomas J. Casey*, September 15, 1892; was identified and discharged for fraudulent enlistment. Lastly, he enlisted as *James Pearson*, May 25, 1894; was identified and dishonorably discharged, with confinement for one year.

The system of M. Alphonse Bertillon had already become known and undoubtedly suggested the army system now in use to Dr. Charles R. Greenleaf and Dr. Charles Smart, of the United States Army, who were then on duty in the Surgeon General's Office, and to whom the credit of devising and putting it into successful operation is due. Messrs. B. B. Thompson and Walter S. Kaye, clerks in the identification division of the Surgeon General's Office, are also entitled to much credit for their highly intelligent and efficient services in connection with the successful work-

ing of the system. The identification division of the Surgeon General's Office is now in charge of Lieutenant Colonel Smart.

Colonel Greenleaf and Lieutenant Colonel Smart have already published brief articles on the subject in the medical journals in 1891 and 1892, but the subject has not, I believe, yet been presented to this Society, nor have the later modifications of this method or its results up to a recent date been given.

A brief reference to the Bertillon system is necessary to an understanding of that with which my paper is specially concerned.

"The anthropometric system," as he calls it, of M. Bertillon had been in successful use in Paris since 1882, but it was probably not until 1885 that the author made it known to the world, which he then did by an address before the International Prison Congress in Rome, in November of that year. It was so obviously superior to the imperfect methods in use, that depended only on photographs or personal descriptions, that it was rapidly adopted throughout Europe. In September, 1887, it was adopted by the Warden's Association of the United States and Canada, which had been organized earlier in that year. A school of instruction in the method was held in Joliet, Illinois, in 1888, and the system was soon adopted by the principal penitentiaries, houses of correction, and police departments. Central bureaus have been established for the filing and examination of measurements made at different stations. The object is, as is apparent, to ascertain the previous history of the arrested men, to identify old offenders and to separate them from the new and less hardened ones, and thus provide for more intelligent efforts at reformation.

The Bertillon system depends essentially on the accurate measurements of certain osseous structures, most of which it is fairly assumed do not change materially during adult life. They are:

1. The length of the figure.
2. Measurement of the outstretched arms.
3. Measurement of the sitting figure from the bench to top of head.
4. Length of the head.
5. Width of the head.
6. Length of right ear.
7. Width of right ear.

8. Length of left foot.
9. Length of left middle finger.
10. Length of left little finger.
11. Length of left forearm.

Appropriate instruments, such as calipers, sliding scales of various styles, etc., are employed to obtain accurately the desired measurements.

These measurements are entered on a card which contains photographs, full face and right side of head and profile, with a notation of peculiarities of feature, such as the nose and color of eyes, form of ear, etc., according to a definite system, and last a description of scars, birthmarks, and other peculiar marks. These three—the measurements of the body, the photographs and description of the person, and the distinctive marks—form the basis of the system.

The cards containing the data already referred to are put into file boxes and classified according, first, to the length of the head, then by the width, by the length of the left middle finger, and so on, each subdivision being again divided into the small, medium, and large, each one having, of course, definite limits. By comparing the measurement of the head of the suspected recidivist with those of the cards on file and then successively eliminating those who have different measures of other parts, it is easy, of course, to find the card, if one exists in the cabinet, in which all the measurements will practically coincide, the final detection being made by the photograph and personal description and distinctive marks. The measurements, therefore, serve not only as a means of identification, but as an index to find the other data upon which the final decision is made.

M. Bertillon has published a recent (1895) edition of his work describing his system, in two volumes, text and album of plates. The principles remain unchanged, but the work is much expanded by very minute and exact directions for the required procedures. The difficulties in securing exactness in taking these measurements have led to the most detailed instructions, even to instituting a sort of drill, the motions of the person examined being made in three movements or times and each measure made from two positions of the examiner. A special chair is devised in which the subject sits to be photographed, and the instructions as to de-

Name, *John Smith.*

Age, *23.* Height, *67 $\frac{3}{4}$ inches.*

Organization, *M. S. (mounted service).*

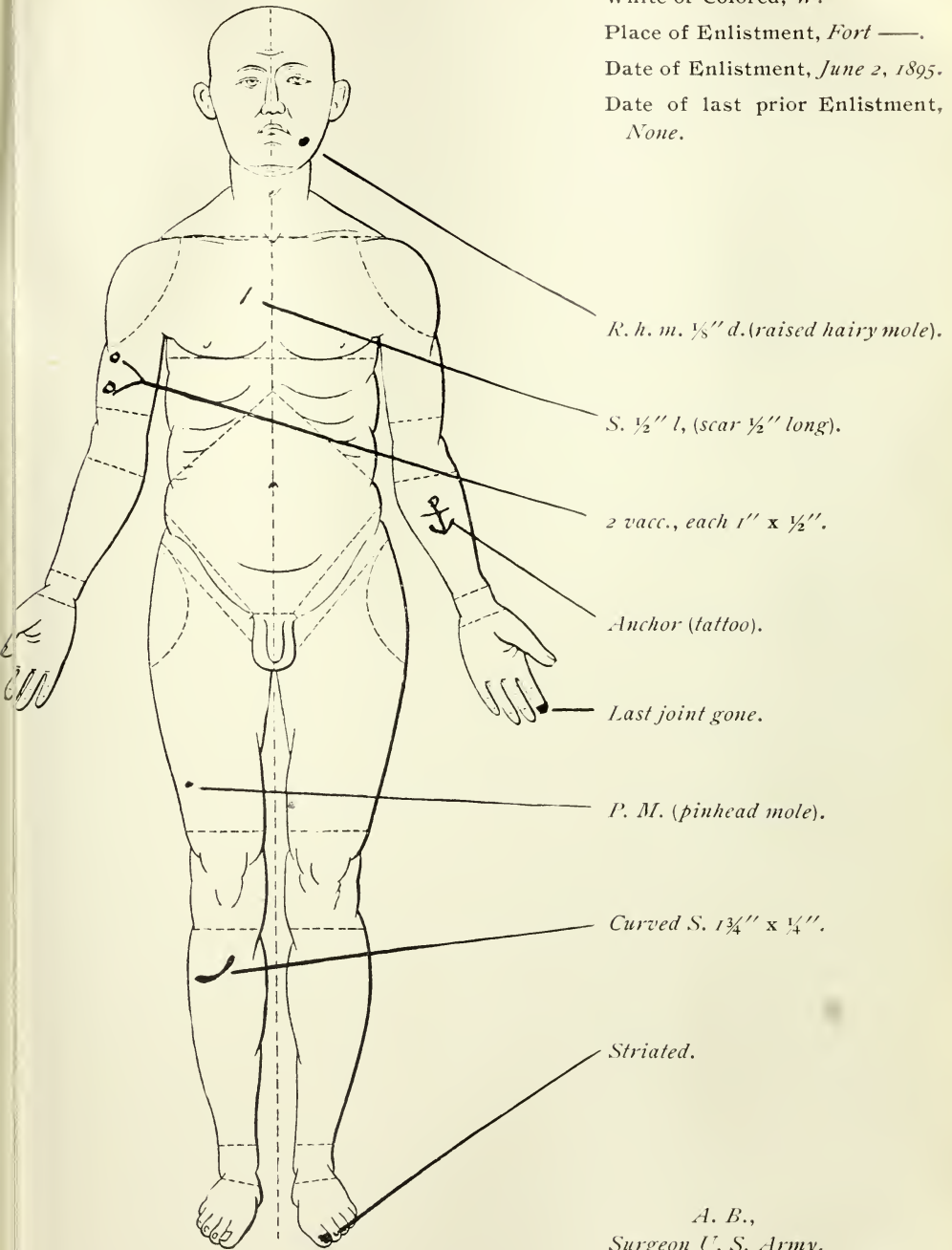
Hair, *L. Br.* Eyes, *Blue 7.*

White or Colored, *W.*

Place of Enlistment, *Fort —.*

Date of Enlistment, *June 2, 1895.*

Date of last prior Enlistment,
None.



*A. B.,
Surgeon U. S. Army.*

Station, *Fort —.*

Date, *June 2, 1895.*

Fig. 1.—Front of Outline Card

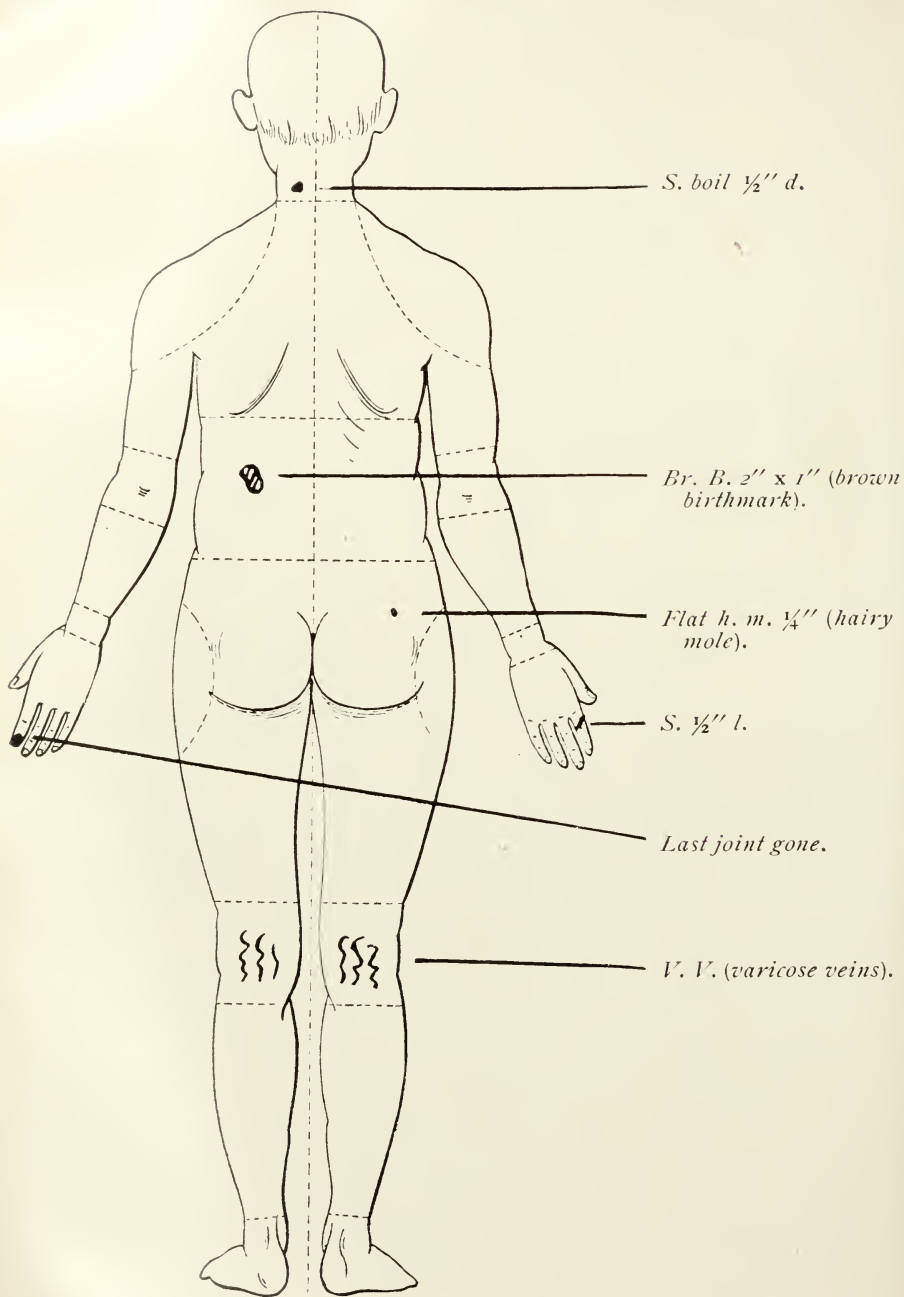


Fig. 2.—Back of Outline Card.

scribing the personal peculiarities are most thorough and painstaking and are illustrated, as are all parts of the work, with cuts and photogravures. The scars and marks come last and take a subordinate though important place. Only the marks found on the head, upper extremities, and trunk above the waist would seem from the instructions to be ordinarily recorded.

The United States Army system was, as has been said, suggested by that of Bertillon. The first scheme that suggested itself was the possibility of causing all soldiers to be vaccinated at some exact and unusual spot, and thus become marked as having been in service. Accordingly, a circular was issued by the Surgeon General in December, 1888, requiring that all vaccinations on soldiers should thereafter be made on the outer aspect of the left leg at a point four inches below the head of the fibula, and that every man be so vaccinated when enlisted or re-enlisted. It was an ingenious plan, but unfortunately so many soldiers became disabled temporarily by the inflammation resulting from the vaccination on the leg that in December, 1891, the circular had to be revoked. The scars then made are of value even now as evidence of former service.

The failure of this scheme led to effort to see if the scars, birthmarks, moles, and other natural or acquired marks could be utilized as means of identification. In carrying out this plan, the third division of the Bertillon system, already described, that of distinctive marks, is amplified and extended and becomes the sole means of identification, and when classified by the regions of the body in which they are found furnishes its own index. No measurements are taken except of the height of the person and of the size of the marks, and no photographs made.

The Bertillon system is without question a thoroughly scientific one, most complete and comprehensive, and has demonstrated its thorough efficiency and adaptation to its purpose by the success with which it has been practiced for the detection of criminals and its extension to almost all civilized countries, including even Japan.

The United States Army system cannot be compared directly with it, for it was devised for the special needs of the army service. It is a sort of "short cut," to use a popular phrase; it is simpler, avoids the use of special instruments and of the camera, and will

<i>Scars.</i> L. B. head, under 67.	<i>Scars.</i> R. B. head, under 67.	<i>Scars.</i> L. neck.	<i>Scars.</i> R. neck.	<i>Scars.</i> L. buttock, under 67.	<i>Scars.</i> R. buttock, under 67.	<i>Scars.</i> L. leg, under 66.	<i>Scars.</i> R. leg, under 66.	<i>Scars.</i> L. shoulder, L. U. arm.	<i>Scars.</i> R. shoulder, R. U. arm.
<i>Scars.</i> L. B. head, 67 and over.	<i>Scars.</i> R. B. head, 67 and over.	<i>Scars.</i> L. breast, L. chest.	<i>Scars.</i> R. breast, R. chest.	<i>Scars.</i> L. buttock, 67 and over.	<i>Scars.</i> R. buttock, 67 and over.	<i>Scars.</i> L. leg, 66-67.	<i>Scars.</i> R. leg, 66-67.	<i>Scars.</i> L. F. arm, under 67.	<i>Scars.</i> R. F. arm, under 67.
<i>Scars.</i> L. F. head, under 67.	<i>Scars.</i> R. F. head, under 67.	<i>Scars.</i> L. abdomen	<i>Scars.</i> R. abdomen	<i>Scars.</i> L. thigh, under 67.	<i>Scars.</i> R. thigh, under 67.	<i>Scars.</i> L. leg, 68 and over.	<i>Scars.</i> R. leg, 68 and over.	<i>Scars.</i> L. F. arm, 67 and over.	<i>Scars.</i> R. F. arm, 67 and over.
<i>Scars.</i> L. F. head, 67 and over.	<i>Scars.</i> R. F. head, 67 and over.	<i>Scars.</i> L. groin.	<i>Scars.</i> R. groin, Penis.	<i>Scars.</i> L. thigh, 67 and over.	<i>Scars.</i> R. thigh, 67 and over.	<i>Scars.</i> L. foot, under 67.	<i>Scars.</i> R. foot, under 67.	<i>Scars.</i> L. B. hand, under 67.	<i>Scars.</i> R. B. hand.
<i>Scars.</i> L. cheek, L. ear.	<i>Scars.</i> R. cheek, R. ear.	<i>Scars.</i> L. scap., L. I. scap.	<i>Scars.</i> R. scap., R. I. scap.	<i>Scars.</i> L. knee, under 67.	<i>Scars.</i> R. knee, under 67.	<i>Scars.</i> L. foot, 67 and over.	<i>Scars.</i> R. foot, 67 and over.	<i>Scars.</i> L. B. hand, 67 and over.	<i>Scars.</i> R. palm, R. fingers.
<i>Scars.</i> Chin.	<i>Scars.</i> Nose, Lip.	<i>Scars.</i> L. lumbar.	<i>Scars.</i> R. lumbar.	<i>Scars.</i> L. knee 67 and over.	<i>Scars.</i> R. knee, 67 and over.	<i>Scars.</i> L. heel, L. toes.	<i>Scars.</i> R. heel, R. toes.	<i>Scars.</i> L. palm.	<i>Scars.</i> R. thumb.

Fig. 3.—Plan of Transcript File-case No. 1, showing Labels on Drawers and Classification.

be shown to have demonstrated its value and sufficiency by the results it has accomplished. Let us see how it is carried out.

In accordance with orders issued in April, 1889, for every man who enlists or re-enlists the medical officer makes out an outline-figure card such as is here illustrated (Figs. 1 and 2). This card shows name and organization, age, height, and color of hair and eyes, the latter according to the scale on a colored chart, and on it are also entered, graphically, the scars, tattoos, amputations, moles, including birthmarks, the location, nature, and size of the marks being accurately indicated, as shown in the above figures. Both front and back of the body, it will be seen, are represented.

On their receipt at the Surgeon General's Office, where they must be sent at once, these cards are filed alphabetically. Immediately on the desertion or dishonorable discharge of an enlisted man, a report of the fact is made to the Surgeon General. On receipt of this report the original enlistment outline-figure card is taken out of the alphabetical file case and transcribed on office outline cards, like the original card, except that the outlines are on the same side. This is done in order that a separate card (one to four are made) may be filed for each of the prominent regions in which important marks are found and because both sides, front and back, of the original card are utilized to save space, while this arrangement would be inconvenient for the office cards used for identification. The original outline card of the deserter is then returned to the alphabetical file. Transcripts are also made of the outline cards required to be sent in for every convict discharged from the military prisons or dishonorably discharged at a post. These office transcripts, one to four for each man, are placed in one of two file cases which are called the "transcript files," the arrangement of which is given in Figs. 3 and 4. It will be noted that the classification, corresponding to regions, is marked off by dotted lines on the figures on the outline cards. Scars form the most important group, and are arranged, first, as to location, L. B. head (left back head); R. B. head, etc.; then according to height of subject, those upon individuals under 67 inches being placed together, etc. The scar-files, it will be seen, take up not only one entire case but a small part of the second. Then come the tattoos, which are similarly classified according to

Scars. L. fingers.	Tattoo. L. shoulder, L. U. arm.	Tattoo. R. shoulder, R. U. arm.	Tattoo. Head, Trunk.	Amputations.	Moles. L. chest.	Moles. R. chest.	Moles. L. buttock.	Moles. R. buttock.	Colored. Scars, head.
Scars. L. thumb, under 67.	Tattoo. L. F. arm, under 66.	Tattoo. R. F. arm, under 66.	Tattoo. Thighs, Knees, legs, Feet, &c.	Moles. Nose, lip, Chin, ears, F. & B. head.	Moles. L. abdomen.	Moles. R. abdomen	Moles. L. thigh, L. knee.	Moles. R. thigh, R. knee.	Colored. Scars, arms.
Scars. L. thumb, 67 and over.	Tattoo. L. F. arm, 66-67.	Tattoo. R. F. arm, 66-67.	Moles. L. cheek.	Moles. R. cheek.	Moles. R. & L. I. scaps.	Moles. R. & L. groins, Penis.	Moles. L. leg, L. foot.	Moles. R. leg, R. foot.	Colored. Scars, trunk.
Tattoo. B. F. arms, under 66.	Tattoo. L. F. arm, 68 and over.	Tattoo. R. F. arm, 68 and over.	Moles. L. neck, under 67.	Moles. R. neck, under 67.	Moles. L. scap, under 67.	Moles. R. scap, under 67.	Moles. L. shoulder.	Moles. R. shoulder.	Colored. Scars, legs.
Tattoo. B. F. arms, 66-67.	Tattoo. L. hand, under 67.	Tattoo. R. hand, under 67.	Moles. L. neck, 67 and over.	Moles. R. neck, 67 and over.	Moles. L. scap, 67 and over.	Moles. R. scap, 67 and over.	Moles. L. U. arm.	Moles. R. U. arm.	Colored. Moles.
Tattoo. B. F. arms, 68 and over.	Tattoo. L. hand, 67 and over.	Tattoo. R. hand, 67 and over.	Moles. L. breast.	Moles. R. breast.	Moles. L. lumbar.	Moles. R. lumbar.	Moles. L. F. arm, L. hand.	Moles. R. F. arm, R. hand.	Colored. Tattoos, amputations, blue eyes.

Fig. 4. Plan of Transcript File-case No. 2, showing Labels on Drawers and Classification.

regions and subdivided by heights. Then amputations, which include, of course, only such minor losses as would not interfere with a soldier's duty, as portions of fingers and toes, yet forming, as will be readily seen, a very valuable means of identification. Then moles, including birthmarks, also classified as to regions, and finally, a separate but small division in red (indicated by italics in the figure), for the colored soldiers. It should be added that a special file of peculiar and unusual tattoos, such as are not likely to appear but once, is kept, which sometimes leads to prompt identification without search in the regular way.

You will see, therefore, that the classification runs as follows: First, as to race, white or colored; second, as to nature of prominent scars, tattoos, amputations, moles, etc.; third, as to regions in which these marks are found, and fourth, as to the height of the individual. There are 120 drawers in the file case, each one having a capacity of about 400 cards. The number of transcript cards to date (April, 1896.) is 36,700 for 12,150 deserters and discharged soldiers. The cards of recruits and re-enlisted men now number about 58,900.

Of course, time had to be given for the accumulation of cards from recruits before the plan could go into effect, but it became operative in July, 1890, and has been in successful operation since, but slight changes in the system having been required. Originally the data on the cards for whites were transcribed into two books—one for men with blue eyes and one for men with brown eyes. The leaves of the book were tagged so as to show divisions as to height in quarter-inches, and the pages ruled in perpendicular columns, in which were entered the more important scars and other marks. This arrangement was found defective, owing to the uncertainty as to the color of the eyes, which was liable to be given differently by different observers, and a like uncertainty as to the measurements of height, and was abandoned for the one now in use, which has been found to work satisfactorily.

Let us see, briefly, its practical operation. The outline figure card of the recruit is, when it comes in, inspected to see if he states he has had previous service. If he does, it is placed in the alphabetic file with his prior card, with which it is compared, as he might, though a deserter, have re-enlisted under his own proper name or have personated some other man. If he denies prior ser-

vice, his card is then compared with the cards of the deserters and other undesirable men in the transcript file referred to. The examining clerk first observes the race of the recruit and his most conspicuous marks, noting from three to six of the latter. For instance, a white recruit 68 inches tall has, besides numerous smaller marks, a scar on his left forearm one inch by one inch, two scars on his left knee one-half inch in diameter, a scar on the calf of his right leg three-fourths inch in diameter, a raised mole on his left calf one-eighth inch in diameter, and a raised mole between right scapula and right shoulder one-eighth inch in diameter. In making the comparison the clerk will take the most conspicuous mark, the scar on forearm, first. He will withdraw from the transcript cabinet the drawer containing the cards of white deserters with scars on left forearm who are 67 inches tall and over, and beginning his comparison at 67 inches height will continue it to 68½ inches, allowing an inch for growth and a half inch for shrinkage. Should the examination on this mark be fruitless, he will make a similar examination for each of the other marks noted, after which, if the man is not identified, his outline card will take its place in the regular alphabetical file. If, however, the man is identified in the progress of search, copies of the outline cards of his current and former enlistments, together with copies of the examination forms pertaining thereto, are transmitted to the Adjutant General by letter reporting the identification. If the man is a deserter the Adjutant General will by telegraph order his arrest, sending the papers in the case by mail. If not a deserter, the telegram will be omitted. When the papers reach the post where the recruit is stationed the case will be investigated under the direction of the commanding officer, who usually requires the surgeon there to examine the recruit with special reference to the description of the former soldier and express his opinion on the question of identity. If the investigation made by the direction of the post commander satisfies him that the recruit is identical with the former soldier, he will cause appropriate charges to be preferred against him, which, when approved by the department commander, will be tried before a general court martial. In many cases the recidivist is simply ordered to be dishonorably discharged, by order of the War Department, without the delay of a court martial.

The following notes of cases of identification will be of interest:

Wade L. Shields enlisted June 9, 1892; discharged without honor, Co. A, Fourth Artillery, early in 1893; presented himself for enlistment at Cincinnati, August 9, 1894, with the discharge paper of Walter B. Dent, formerly a sergeant in his battery, who had been discharged October 1, 1893; pretended to be Dent and was so enlisted. On receipt of his description in the Surgeon General's office it was ascertained that he was not Dent but Shields, and the matter having been brought before the Adjutant General, he was accordingly discharged without honor early in 1895. The genuine Walter B. Dent re-enlisted within a few weeks thereafter. Shields next appeared at Fort Warren, Mass., where he was enlisted February 20, 1896, as Lee W. Shields, having concealed his former enlistment. He was in due course identified, tried, convicted of fraudulent enlistment, and is now (April 14, 1896) serving out his sentence at Fort Columbus, New York.

John H. Anderson, a colored man, enlisted January 22, 1891, and deserted July 11, 1891, from Co. H, Twenty-fifth Infantry; was soon apprehended and discharged, and served a term at Fort Snelling, where he was set at liberty October 1, 1892. Soon after, it appears from his story, he began to drink heavily, was arrested and confined in the St. Paul reformatory, where he was released in August, 1893. Failing to get work and desperate from hunger and privation, he surrendered himself as Felix Newsome, who had deserted from the Twenty-fifth Infantry in August, 1891. He was brought to trial as Newsome, pleaded guilty (no witnesses to identify being brought forward, in view of his plea), and sent to Leavenworth for a year and a half. Soon after his incarceration there, in January, 1894, he applied for release, setting forth the above facts. An outline card forwarded from the prison established beyond a doubt that the prisoner was Anderson and not Newsome, and he was accordingly set at liberty May 26, 1894.

Michael Jones, a military convict, was released from confinement at Alcatraz Island, May 15, 1890. He enlisted again at Fort Douglas, Utah, July 26, 1890, as William Brady; was identified by outline card, and acknowledged his identity. Pending receipt of order directing his discharge, he deserted, and the order was revoked. He next appeared at Fort Monroe, Virginia,

where he was enlisted December 22, 1890, as Michael A. Jones, concealing former service. He was identified by the cards as William Brady, alias Michael Jones, and admitted that he was ex-convict Jones, but denied that he had enlisted and deserted as Brady at Fort Douglas. This denial he persisted in until upon trial he was confronted by witnesses from Fort Douglas who recognized him, and he was thereupon sentenced to dishonorable discharge with three years confinement at Leavenworth.

The results of the work have been as follows: From July, 1890, to April 28, 1896, 537 men have been identified, 209 as deserters, 180 as soldiers whose previous service was terminated by dishonorable discharge (with or without imprisonment), and 148 as frauds of a minor grade. Of these 49 deserted before final disposition was made of their cases, and 13 others are at present awaiting final action; 402 were discharged from the service by sentence of court martial or by orders from the Adjutant General's office, and 73 were retained in service, of whom 9 were subsequently discharged by sentence of court martial, 4 were discharged without honor by orders from the Adjutant General's office, and 20 deserted.

During the calendar year 1890, 18 identifications were made; in 1891, 88; in 1892, 123; in 1893, 88; in 1894, 80; in 1895, 101; and in 1896, up to April 28, 39.

In addition to the 537 cases noted, 184 identifications were made of men who had left the service—deserters, 113; military convicts, 34; others, 37. Three applications for enlistment were identified at the instance of the recruiting officer making in all 724 identifications made.

During the calendar year 1895 the whole number of identifications was 121 (including 19 cases of men who had left the service and 1 applicant for enlistment identified at the instance of the recruiting officer). This number represented the "repeating" element of 4,929 recruits whose outline cards have been examined—i. e., of every thousand recruits enlisted from civil life 24.55 were identified through the outline-card records as deserters, military convicts, or otherwise bad characters.

It may be asked if no failures have occurred; if no men have been identified by the cards who did not prove to be the same. It cannot be said that any distinct failures have occurred. The rec-

ords show that in fifteen cases the Surgeon General has reported that men were probably (not positively) identical, in which the commanding officers have stated that, after investigation, they did not believe the men to be the same. Undoubtedly some of these were cases of true identity; also there have been five cases in which the evidence was considered sufficient to justify trial by court martial, but in which the court acquitted the prisoners. One of these men was dishonorably discharged by order of the War Department immediately after and one acquitted man at once deserted. The failure to convict in these cases probably arose from other causes than failure of the evidence of identity.

It will be noted that the number of identifications was greater in 1892, soon after the system went into effect, showing evidently that the knowledge of the existence of this system has deterred the class it seeks to exclude from re-enlistment—a result as satisfactory as an increased number of detections would be.

It has been objected that the reception of a scar or a tattoo mark after the enlistment card is made out might lead to the non-detection of the repeater, these marks not being on the original card. This objection might have some force if only one scar or mark or the scars and marks in one region only of the body were considered, whereas the scars and marks on an average of three regions are examined, and all have value in determining the question of identity.

Again, it may be said that in process of time these cards will accumulate so as to render identification very tedious. This difficulty is in a measure met by taking out of the files those of men shown by their cards to have reached the age of forty. Thirty years is the limit of age for enlistment, and it is presumed that no recruit would be taken who was ten years older than that age. If the number of cards in any drawer becomes unmanageable, the difficulty can be met, if necessary, by still further subdividing the regions of the body represented.

The system I have just been describing is especially adapted for army use from its simplicity and facility of application. No apparatus and no camera or elaborate personal description is required. Army recruiting parties sometimes move about from town to town and could hardly carry apparatus with them. To comply with the instructions of Bertillon in taking the eleven

measurements of his system (each twice), take two photographs, record a careful description of facial peculiarities, and then of distinctive scars and marks would require more time than can ordinarily be given to each recruit at his examination.

Again, as has been pointed out by Colonel Greenleaf, it is well to avoid for recruits the use of a system such as that of Bertillon, which is associated with the detection of criminals. Even the present system has been objected to on the score of its similarity to that used for the identification of criminals, and still greater would be the objection if exactly the same system was used. There would be a certain advantage if a common system of identification could be used for all classes, private individuals, soldiers, sailors, and criminals, but in the present state of feeling in our community it cannot be. Some such system as that now in use in the army must for the present at least be relied on.

Lastly, the success which has attended the use of the army system, covering a period of nearly six years, is perhaps the best proof of its value. Failures to identify have been made, no doubt, but the large number of undesirable men excluded from the ranks amply justifies its inception and continuance. It met with little favor with the military authorities at first, but it is now relied on as an indispensable agency in maintaining discipline and in improving the standard of character in the ranks of the army.

APPENDIX, MAY, 1897.

During the calendar year 1897 there were 108 identifications, and during the first four months of 1897, 25. This 108 in 1896 represents the repeating element of 4,658 recruits, or 23.19 per thousand. From July 19, 1890, to April 30, 1897, the whole number of identifications by means of outline figure cards was 812, deserters 361, dishonorably discharged men 244, others 207. In 610 cases, the men were in service and amenable to punishment when identified, 238 as deserters, 207 as dishonorably discharged soldiers and 165 as otherwise undesirable men. Of these 53 deserted before final disposition was made of their cases, 469 men were dishonorably discharged by sentence of court martial or by War Department orders, 84 were held to service and 4 cases are awaiting action.

Up to May 10, 1897, 67,844 outline figure cards for recruits and soldiers re-enlisting have been received at the Surgeon General's office. In addition there have been received 4,134 cards for released military convicts or soldiers discharged dishonorably, making a total of 71,978. This number does not, however, represent that number of different men, as there are sometimes two or more cards for the same individual, in the cases of re-enlisted men, of convicts, or of men dishonorably discharged, their original or previous enlistment cards being already on file. These double records furnish the best of evidence of the permanency of the marks and of the substantial uniformity of cards made by successive officers. It should be noted, therefore, that by no means all outline cards coming in require comparison with the transcript cards of delinquent soldiers. A large part being for men who have seen previous service, take their places at once in the alphabetical file with the original or former enlistment cards.

To May, 1897, 45,799 transcript cards for 15,179 delinquent soldiers have been made, from an average 3.03 per man in 1893 to 2.35 in the last year, the diminishing average being due to increasing excellence in the outline cards and to experience in the Surgeon General's office in estimating the relative value of marks. Meanwhile, 11,747 transcript cards of 2,739 men have been withdrawn from the files, being chiefly of men who, in the lapse of time, have grown too old to pass themselves off as under 30, the maximum age at first enlistment. It is now possible to estimate the probable maximum number of outline figure cards, assuming that the army will continue at its present strength. Taking 35 years as the age limit for cards (5 years over the limit for enlistment) the system will reach its maximum growth in 1904, when there should be 54,814 cards for 23,325 delinquents.

In addition to the cancellation of superfluous transcript cards, a further improvement has recently been made. Hereafter there will be 105 subdivisions of the surface of the body, instead of 58 as heretofore. This change reduces very much the handling of transcript cards and lessens correspondingly the time and labor required for a search. This increase in the number of regions does not increase the number of drawers in the transcript file cases. The labels on the drawers show the grosser classification, the

lesser regions are indicated on the partition cards subdividing the contents of each drawer.

Some of the objections made to the army system of identification have already been referred to or incidentally answered. They are largely theoretical. The practical success of the army method is in many cases the best answer. It is claimed that it would be impracticable to carry it out in time of war when larger numbers of men are to be dealt with. Is there any proof that the Bertillon or any other system would be practicable under such circumstances? Certainly the preparation of the army outline figure card requires less time than that of the Bertillon system with its numerous measurements and descriptive record, though the search for repeaters in the central office possibly requires more.

It has been objected that the army system must necessarily require a large force of clerks for comparison of cards as they come into the Surgeon General's office. As a matter of fact, two clerks only are ordinarily assigned to this duty.

It has been said that $2\frac{1}{2}$ per cent., which is about the proportions of recruits now identified as repeaters, falls far short of the whole number of this class. This criticism is necessarily based on individual opinion and not on any data, and does not coincide with the opinion of others. It is not claimed that the army system is infallible. A few instances of failure to identify men otherwise discovered to be repeaters are known, but they are very few. It is believed that the exclusion of $2\frac{1}{2}$ per cent. of undesirable men is a great gain, and a most gratifying success for the plan adopted.

There is no desire to set up the army system as generally superior to the Bertillon method, as some of the advocates of the introduction of the latter into the army seem to think. It is believed that its facility of application from the use of the graphic method in lieu of description in recording marks, from the absence of special apparatus, with its avoidance of association with criminal detective work make it better adapted for army use, and that its success has proved its efficiency.

II. IDENTIFICATION.

BY MAJOR GEORGE W. ADAIR,

WASHINGTON BARRACKS, D. C.

SURGEON IN THE UNITED STATES ARMY.

“And warrior, I could say to thee
The words that cleft Eildon hill in three,
And bridled the Tweed with a curb of stone.”

OF course this is all nonsense. Words have no mystic, magical power. The intelligence of the world has long since outgrown its belief in charms, and spells, and incantations. The use of these old traditions merely as an aid to the flight of the poet's fancy is old-fashioned. Science has long since freed herself from such superstitions. Science has learned to make words her most humble servants. She no longer bows and cringes and trembles before a word—as in the presence of a master. Are we so sure of that? I am going to cite you an example that tends to unsettle one's belief.

After years of diligent research, a scientist felt that the world would be the better should he publish the results of his labor; and in the very first report that he made, he allowed to slip in a single word, a word that had only an incidental connection with his subject—and, at once, that word deprived his work of more than half its usefulness; at once confined that work in a very narrow groove and put a brand and a seal upon it that it will take a century of patient, persistent, thoughtful argument to remove. Such was the power of the word. And I come here to-day to raise a feeble voice—to hurl an untrained spear—in an almost endless, almost hopeless crusade against the uncanny power of that word.

Recidiviste is from a Latin verb, signifying to slide back. Meaning originally, “One who does a thing more than once,”—then a repeater,—from long use in prisons it has grown into the meaning, an habitual criminal. *Recidiviste* was the word that Bertillon used in his first report upon human identification which came so near to nullifying his whole life's work.

The Bertillon system of identification was very thoroughly presented to this Association last year by Major Brown. The present writer was greatly interested in that paper,—he was greatly interested in the discussion;—but most of all was he interested in a little anecdote that was thrown into that discussion by Captain Miles Standish, of Massachusetts. He told us how they had tried to apply the system in a workhouse of his State—and had raised a riot among the prisoners. Here was that foreign word that had crossed the ocean,—had gone down into the lowest social strata,—among people who probably had never heard a French word,—and had incited them to acts that must cause them great personal inconvenience in the way of punishments;—and why?

Was the system irksome? Less so than to be measured for a suit of clothes. Send a tailor among those people and not only would they submit,—they would assist; they would insist that those measurements be accurately taken. Folks like to have their clothes fit properly—even if there are stripes upon them.

Did those people shrink from future recognition? Send a photographer among them and they will at once assume an attitude, put on their most smiling expression,—and be terribly disgusted if the artist fail to do them justice—fail to produce a portrait that all the world can recognize as their image. For one moment, put yourself in the place of one of these prisoners and tell me which would you prefer,—to have your photograph displayed in the Rogues' Gallery, where all the world can compare it with your features,—or to have certain measurements set down in an obscure cipher in a prison register where no one can associate you with that record but an expert and even he, before he can do it, must have you measured again for comparison.

Send another artist among those people with his needles and his ink. A large number of them will undergo a painful operation to have pricked into the skin various devices that can serve no useful purpose except for identification. That is not so strange a whim. The sailor on the unstable ocean tattoos his skin,—not that he may present his card when he arrives in Davy Jones's locker,—but he has a feeling that when his body is washed ashore, he wants the world to know that those are the mortal remains of Jack Tar of the good ship So-and-So. We all of us have that feeling. No matter how much we may shrink from passing

forward into the great unknown, we shrink still more from passing out suddenly and completely from the world's knowledge and memory.

In Arlington, with its sixteen thousand graves, there is one monument erected over the remains of two thousand one hundred and eleven unknown dead. Other slabs are marked unknown; and Arlington is but one of many national cemeteries. How many women have declined advantageous offers of marriage—have put aside proffered provision of home and comfort for their old age and in the end have become public burdens because of a feeling that, perhaps, after all, their loved ones were not included in that heap of unknown dead? Think for a moment of the protracted anguish in a single instance of that persistent feeling, "Sometime my loved one will come back." What one of the million American soldiers would have refused to submit to the measurements that should go to make up a record to assuage the sorrow in the hearts of so many mourners scattered over the whole land? Would it not be well for the government to make provision so that in any given instance it can declare: "This is the grave of Private Thomas Atkins, of Company A of such a Regiment of Volunteers—and there can be no mistake about it"? The Bertillon system of identification would enable this to be done. In the future there need be no unknown dead.

Many fatherless children have grown up in penury, deprived of the pension provided by law because of inability to prove the death of the parent. Many deserving claimants have had trouble in establishing their identity. Again, chance acquaintance with a sound survivor of the war may enable a maimed impostor to secure an undeserved pension by impersonating the veteran. Among our nomadic people, residence for a year under the given name will secure testimony as to identity. All this can be obviated by a more perfect description.

Many land titles have a cloud upon them because the death of a missing heir cannot be proven. Think of the celebrated Tichborne case in which an impostor impersonated the long-lost heir and subjected the rightful owner to an expensive law suit and the danger of losing a great estate. Would it not have been better to compel the prospective heir, before his departure from home, to leave behind him in the family archives a personal description by

which—let him come when he would—he could always claim his own without dispute, and, at the same time, an impostor would be forever debarred from impersonating him?

Persons with insurance upon their lives are frequently drowned, or die among strangers, far from home, and the beneficiaries have difficulty in identifying the remains—in proving the death. Then the insurance companies are frequently defrauded by the substitution of bodies. They expend thousands of dollars in salaries and the transportation of detectives to guard against this loss. This expense is forseen and provided for—it appears as loading upon your premiums and upon mine. Would it not be better to have a proper description on the face of every policy and in the archives of the company?

In many countries it is still necessary, and in many others it is of advantage to carry a passport. An objection to the system is that it is a trouble to honest people and no impediment to rogues who readily transfer their passports. The advantages of a more accurate description are apparent. Then railway accidents, floods, storms, and conflagrations are among the unpleasant possibilities of travel. When you go abroad next summer, you may spare your friends days and weeks of anxiety if you leave with them a description so that they can learn by telegraph if they are indeed interested in that delirious patient in a foreign hospital, or in those charred remains in a far-away morgue. Will you leave behind you such a record? or do you shrink and tremble before that word *recidiviste*?

It is not believed that the unmodified Bertillon system of identification will ever be used in its entirety for the various purposes enumerated above. It must be remembered that by the power of a baneful word the method has been screened from the scrutiny of the world; that up to the present it has remained the work of a single human brain, has been devoted to a single purpose. Remove the taboo; let the X-ray of science shine through that mystic veil;—and the genius of a thousand minds will take up the subject, prune it, perfect it, and adapt it to the various uses of mankind.

The present elaborate system is not well adapted to military use. It cannot be supposed that all burial parties on the battle-fields of our next war will be provided with the necessary imple-

ments or be instructed sufficiently to apply those implements with careful accuracy. The descriptive card made under such circumstances and by the flickering light of a lantern will never bring comfort to a mourner. So far as known, our own War Department has made the first attempt to extract from the Bertillon system a modified method for military use. The outline-figure cards collected in a central bureau have given satisfactory results in our small regular army in time of peace for the identification of deserters; but the method must prove too slow and cumbersome for use with large volunteer forces in actual war. Should they be properly prepared, the classification is such as to cause congestion in the central bureau. Then that classification is by scars which we go on accumulating all our lives. This uncertainty in the plan is recognized in orders which require, in the case of a particularly bad man, that a new outline-card be prepared at the latest date before his discharge. If he had scars upon his head at the time of enlistment and has received a slash across the face since, upon re-enlisting his new card would go to an entirely different class and, without this precaution, all trace of the culprit would be lost. Then scars have a proneness to occur in special regions. Upon prominent parts, as knees, eyebrows and shins, scars are too frequent to be significant. Scars from boils upon the back of the neck can only indicate that the man has worn a collar. Although given a subordinate place, moles and birthmarks, when accurately located, are more distinctive and, upon them, it is believed the stability of the system rests. Then the mystic spell upon the Bertillon system remains unbroken by the outline-figure cards—the method is only useful for the identification of criminals. No one can expect that such careful inspection of bodies will be made and cards prepared by burial parties on the battlefield. But, however unfitted the system of outline-figure cards may be for adoption in large volunteer armies, it is worthy of all praise as an example pointing the way to better things. The Bertillon system of identification is a great mine—and the Surgeon General's Office has been the pioneer prospector who has uncovered the vein and given us courage to go deeper in search for the richer mineral that is surely below.

In time of peace prepare for war. Whatever advance is made in our methods of identification must be made in time of peace,

and the subject is worthy of consideration by this Association. When war comes, to be useful, whatever method is adopted must be uniform and permanent. Then, our deficiencies can only be supplied,—our errors only corrected by some future generation. Hence the incentive to weigh our methods carefully and be prepared to act promptly and in unison. But the writer did not come here simply to tell what others ought to do. He has carefully considered the conditions of the problem and has exercised what little ingenuity he possesses in devising a scheme for identification which he herewith submits to this Association.

It is no part of a doctor's province to do good to people against their will and take abuse for his reward. If he does as much good as the public will cheerfully accept—and be prepared to do more when that public demands it—he will have done his whole duty. A short time ago the railway authorities removed from the floor of the Pennsylvania depot in Washington the star that marked the spot where Garfield fell, and took away the memorial tablet from the wall of the waiting-room. The roads had been losing business for years because the public did not like to have so melancholy a reminiscence recalled at the very beginning of a journey. Bodily measurements have been made for the identification of criminals and budding patriotism will object to the unpleasing association. Then people are measured for their coffins,—and the aspirant for military honors will naturally shrink from having his bones measured on the very threshold of his career. To the cold eye of science these things are silly, but to us, as practical medical men, they are stubborn realities with which we have to deal;—we must manage what we cannot cure. Hence the first step in the problem was to eliminate those objectionable measurements which form the groundwork of the Bertillon system. This the writer did the more readily because he believed that those measurements were not an essential part of the system. Bertillon began with a study of those measurements and based his classification upon them; but finding them inadequate for certain identification, he gradually added a very thorough study of the features, moles, scars, etc., and then he brought accurate photography to his aid. By the time that his work was perfected, descriptive cards of all the rogues in Europe had been classified by

the measurements and it was too late to change had he desired to do so. We are beginning and can adopt any plan we choose.

The next step, equally important and more difficult, was to reduce to a minimum the coefficient of personal error, necessarily large at best in a matter that must depend upon several observers. Men will differ upon shades of color and all questions of degree. The writer's aim was to select such questions that all were likely to be answered with a reasonable degree of unanimity.

Then it was desirable to reduce clerical labor to a minimum; and lastly to devise a system of indexing so that when a new card is received the presence or absence of any duplicate description in the collection can be readily determined; or when the name is given, the description can be furnished.

With these aims the Key to Identification has been prepared in four tables, A and B for the nose, C and D for the right ear. When the proper terminal numbers have been found, those from A and C can be written as numerators and those for B and D as denominators; and the entry of two common fractions on enlistment papers, descriptive lists, discharges, and the like will give a full description to anyone who has a Key and will read it backward from the terminal numbers.

TABLE A.

The general line of the crest or bridge of the nose when viewed from the side is either straight, concave, or convex. There are so-called S-shaped noses with the bridge very low at its upper part and very convex at the tip. To avoid confusion these noses will be classed as concave and the letter S placed after the terminal number in the record. In each of these three classes, the line of the bridge is either uniform or sinuous. There are straight noses with the line uniform except at the tip, which is raised; these will be classed as straight and uniform and the letters t. r. placed after the terminal number. A straight nose may be uniform except for a notch at the root which will be noted by a letter n. after the terminal number. With the head erect, each of these six classes of nose may have the base line, the line from the attachment of the ala to the tip, either elevated, depressed or horizontal. So the answering of three questions gives eighteen classes of nose and the terminal numbers from one to eighteen for the numerator of the first fraction in the record.

KEY TO IDENTIFICATION.

For use of examining surgeons, officers in charge of internments, etc.)

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TABLE A.—OUTLINE OF NOSE.

COLUMN I. BRIDGE OR CREST.	COLUMN II. LINE OF BRIDGE.	COLUMN III. LINE OF BASE.
Straight.....	{ <i>Uniform (a and b)</i>	{ Depressed 1
		{ Horizontal..... 2
		{ Elevated..... 3
	{ <i>Sinuous</i>	{ Depressed 4
		{ Horizontal..... 5
		{ Elevated..... 6
Concave (c).....	{ <i>Uniform</i>	{ Depressed 7
		{ Horizontal..... 8
		{ Elevated..... 9
	{ <i>Sinuous</i>	{ Depressed 10
		{ Horizontal..... 11
		{ Elevated..... 12
Convex.....	{ <i>Uniform</i>	{ Depressed 13
		{ Horizontal..... 14
		{ Elevated..... 15
	{ <i>Sinuous</i>	{ Depressed 16
		{ Horizontal..... 17
		{ Elevated..... 18

a. Straight noses of uniform line, except at the tip, which is raised, will be classed as straight and uniform and the letters *tr* placed after the terminal numbers in the record.

b. Straight noses of uniform line, except for a notch at the root, will be classed as straight and uniform and the letter *n* placed after the terminal number.

c. So-called S-shaped noses, with the bridge low above and very convex below, will be classed as concave and the letter *S* be placed after the terminal number.

TABLE B.—OTHER NASAL PECULIARITIES.

COLUMN I. BRIDGE OR CREST (excluding the tip).	COLUMN II. TIP (compared with rest of bridge).	COLUMN III. SEPTUM.
Width uniform.....	{ <i>Of equal width</i>	{ Covered 1
		{ Exposed 2
	{ <i>Wider</i>	{ Covered 3
		{ Exposed 4
	{ <i>Narrower</i>	{ Covered 5
		{ Exposed 6
Wider at root.....	{ <i>Of equal width</i>	{ Covered 7
		{ Exposed 8
	{ <i>Wider</i>	{ Covered 9
		{ Exposed 10
	{ <i>Narrower</i>	{ Covered 11
		{ Exposed 12
Wider below.....	{ <i>Of equal width</i>	{ Covered 13
		{ Exposed 14
	{ <i>Wider</i>	{ Covered 15
		{ Exposed 16
	{ <i>Narrower</i>	{ Covered 17
		{ Exposed 18

TABLE C.—RIM OF RIGHT EAR.

COLUMN I.	COLUMN II.	COLUMN III.
PENCIL LAID HORIZONTALLY ACROSS EAR FROM TRAGUS TOUCHES:	RIM.	OUTLINE OF RIM.
Helix or rim and anti-helix	<i>Of uniform thickness</i>	A uniform curve.... 1
		Angular 2
		Notched or scalloped 3
	<i>Thicker in superior border.</i>	A uniform curve.... 4
		Angular 5
		Notched or scalloped 6
<i>Thicker in posterior border.</i>	A uniform curve.... 7	
	Angular 8	
	Notched or scalloped 9	
Touches helix only	<i>Of uniform thickness</i>	A uniform curve.... 10
		Angular 11
		Notched or scalloped 12
	<i>Thicker in superior border.</i>	A uniform curve ... 13
		Angular 14
		Notched or scalloped 15
<i>Thicker in posterior border.</i>	A uniform curve.... 16	
	Angular 17	
	Notched or scalloped 18	
Touches anti-helix only....	<i>Of uniform thickness</i>	A uniform curve.... 19
		Angular 20
		Notched or scalloped 21
	<i>Thicker in superior border.</i>	A uniform curve.... 22
		Angular 23
		Notched or scalloped 24
<i>Thicker in posterior border.</i>	A uniform curve.... 25	
	Angular 26	
	Notched or scalloped 27	

TABLE D.—OTHER PECULIARITIES OF RIGHT EAR.

COLUMN I.	COLUMN II.	COLUMN III.	COLUMN IV.
ANTI-TRAGUS.	INSERTION OF ANTI-TRAGUS.	LOBE.	DARWINIAN NODULE.
Erect	Oblique....	<i>Adherent to the cheek.</i>	Plainly visible 1
			Obscure..... 2
		<i>Separated from cheek by a notch.</i>	Plainly visible 3
	Obscure..... 4		
	Horizontal.	<i>Adherent to the cheek.</i>	Plainly visible 5
			Obscure..... 6
<i>Separated from cheek by a notch.</i>		Plainly visible 7	
	Obscure..... 8		
Turned Outward	Oblique....	<i>Adherent to the cheek.</i>	Plainly visible 9
			Obscure..... 10
		<i>Separated from cheek by a notch.</i>	Plainly visible 11
	Obscure..... 12		
	Horizontal.	<i>Adherent to the cheek.</i>	Plainly visible 13
			Obscure..... 14
<i>Separated from cheek by a notch.</i>		Plainly visible 15	
	Obscure..... 16		

DESCRIPTIVE CARD.

Serial Number..... }
Filing Number } (To be filled at Central Bureau.)

Name

Age.....; Height.....inches; Hair.....

Eyes—Light Blue, Deep Blue, Pigmented Blue, Light Brown, Dark Brown, Black. (Draw lines around most nearly descriptive term.)

Weight.....pounds.

Organization

Date of Enlistment

Place of Enlistment.....

Date of Last Prior Enlistment.....

Descriptive Fractions....A C
B D (Terminal Numbers obtained from the Key to identification.)

Possible Doubts. Table.....; Column.....; Resulting Terminal No.

Moles, Birth-marks, and Scars upon head, face, and neck. (Describe in given order, giving size, color, anatomical location, and distances from at least two fixed points, as outer canthus, commissure of lips, nasal septum, tragus, etc. Write centimeters and millimeters in three decimal places, like cents and mills in United States money.)

.....
.....
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.....

		RIGHT.										LEFT.							
Missing Teeth.	}	Upper.....	8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8	
		Lower	8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8	

(Count from center and draw line through the number of each missing tooth.)

Burial Parties will fill out the above, using *X* for unknown and *app.* for approximate, and add:

Place of Burial

Date of Burial.....

Number of Grave.....(or other description of exact location.)

Proper Names of Persons or Places mentioned in letters found on the body

.....

Number and Make of Watch.....

Number and Make of Gun

Marks on clothing:

Name.....; Initials.....; Number.....

Missing Members

Apparent Cause of Death.....

[SIGN HERE].....

TABLE B.

Leaving the tip out of consideration, each of the eighteen classes of nose determined by Table A will present a bridge that is either of uniform width, wider at the root or wider below. The tip of each nose compared with the rest of the bridge will be of equal width, or wider, or narrower. Then, when viewed from the side, each nose will have the septum covered by the ala, showing only the skin upon the pillar, or the septum will be exposed showing the covering mucous membrane. Again the answering of three questions gives eighteen terminal numbers to be used as the denominator of the first fraction. Each of the eighteen classes in Table A are so divided into eighteen classes; and the answering of six questions gives three hundred and twenty-four classes of nose to be recorded by a common fraction whose terms do not exceed two figures.

TABLE C.

With the subject's head erect, a pencil held horizontally across the right ear with a half inch of the extremity resting lightly upon the tragus will touch both the outer rim or helix and the anti-helix, or the helix only, or the anti-helix only. This gives three classes of ear in each of which the rim is either of uniform thickness, or is thicker in the superior border, or is thicker in the posterior border. In each of these nine classes, the rim may present a uniform curve, or be angular, or be notched or scalloped. The answering of three questions about the ear gives twenty-seven terminal numbers to be used as the numerator of the second fraction.

TABLE D.

Each of our three hundred and twenty-four classes of nose is so divided into twenty-seven classes. The answering of nine questions gives eight thousand seven hundred and forty-eight subdivisions, in each of which the anti-tragus is either erect or turned outward; and in either case its insertion is either oblique or horizontal. This gives four classes of ear in each of which the lobe will be adherent to the cheek, or will be separated from the cheek by a notch. This gives eight classes of ear, in each of which the Darwinian nodule will be plainly visible, or it will be obscure. This gives sixteen terminal numbers to be used for the

denominator of the second fraction in the record. The answering of seven questions gives four hundred and thirty-two varieties of ear; and the answering of thirteen comparatively simple questions about the nose and ear subdivides the human race into one hundred and thirty-nine thousand nine hundred and sixty-eight classes whose description can be recorded by two common fractions, using never more than eight figures.

This is thought to be sufficient for all practical purposes. By considering the forehead and eyebrows, the chin and the lips, it would be easy to provide more classes than there are surviving members of the human race. But by the addition of plainly visible personal peculiarities, moles, birthmarks and scars, upon the head and neck, the central bureau will be enabled to subdivide the cards in any class should such subdivision ever become desirable. For example: moles absent, moles present on right side, on left side, on both sides; and the same for birthmarks and scars; teeth all present, or certain teeth absent—lost teeth never grow in; then the color of the hair and eyes. For the benefit of courts, who may not recognize the perfection of the system, the exact location of any permanent mark giving distances from two or three fixed points, as the commissure of the lips, the nasal septum, the outer canthus, the tragus, etc., ought to establish identity beyond cavil. When circumstances permit, these things should be given, but it is believed that the two fractions will ordinarily give a sufficiently complete description. The central bureau will certainly find the subdivision of classes much less laborious than the elaborate indexing of all cards which would become complicated with any increase of the number of tables in the key.

INDEXING.

The index of the central bureau will consist of eighteen registers of eighteen pages each. The number of the register will be the numerator of the first fraction and the number of its page the denominator. Each page will have twenty-seven lines numbered at right and left and be divided into sixteen columns numbered both at top and bottom. The number of the line will be the numerator of the second fraction and the number of the column its denominator.

When a card is received it will be given a serial number. Then taking the register whose number corresponds to the numerator of the first fraction on the card and turning to the page that corresponds with the denominator, the line will be found that corresponds in number with the numerator of the second fraction and followed to its intersection with the column whose number corresponds to the denominator of the second fraction. In the square so found will be entered the serial number of the card. Should the square be found occupied by the number of a card previously received, that number will be entered on the new card as a filing number—for all like cards must be filed together;—and a dummy card prepared showing the name, descriptive fractions, the serial and filing number of the new card. This will be filed in the place the new card would have occupied had no duplicate been found in the collection. Except in case of duplication, the cards will be filed in cabinets by tens, by hundreds and by thousands in accordance with the serial numbers so that it will be easy to go directly to any card when the number is given. Should a dummy card be found in the place, it will show where the desired card can be found.

THE DESCRIPTIVE CARD.

The Descriptive Card will give the name, organization, place and date of enlistment, the age, height, weight, and an approximation to the color of the eye. Observers will always differ upon the shade of an eye,—which also varies with the light to which it is exposed and with the emotions; and “the dull, cold eye of death” will baffle burial parties. Light blue and deep blue will be understood by all; and pigmented blue is intended to include all the mottled shades up to the unmistakable light brown or hazel. The dark brown will include nearly all that are commonly called black; but, occasionally, there is a jet black eye which is a marked characteristic when present. To note to which of six classes an eye belongs and draw a line around the word on the card will require but a moment;—and the time expended upon a more elaborate classification would be of little use.

For many purposes the descriptive fractions will suffice. With these four numbers on an insurance policy, to obtain a corpse for substitution would be practically impossible. With them on pen-

sion papers, the certificate could never be transferred or handed down as an heirloom, and the Board would be assured that the invalid examined is the true applicant. No more would be required on a passport. The effect of error may be noted here. Although the wrong terminal number is obtained, still in reading the description backward from it all correctly observed features will be found as from the proper terminal.

Experience can alone determine how much of the other data on the card is necessary. The writer believes, however, that future changes will be in the direction of simplicity and curtailment. The study of features associated in groups gives an infinite variety not obtained by their study individually and separately. It would be wonderful if an inbred race should be found in which the association of the same thirteen features should be so common as to cause embarrassment and require a second key based on other features.

Observers may be in doubt: for example, whether a given nose is straight or very slightly convex or concave,—or whether some future observer might not so classify it. If he notes the table, column and resulting terminal number the central bureau can provide for the contingency on the index.

Missing teeth are easily observed and as easily recorded by crossing the number on the card. Of course, teeth are constantly lost; but the presence of a tooth reported lost on a previous card is unanswerable negative evidence.

Describe in given order moles, birthmarks and scars upon the head and neck—giving size, color, anatomical location, and distances from two or more fixed points, as outer canthus, commissure of lips, nasal septum, tragus, etc. Write centimeters and millimeters in three decimal places, like cents and mills in United States money. The measurement from several fixed points fixes the location and renders it probable that different observers will hit upon the same line at least once. The metric system is to be preferred as fractions of an inch are difficult to record and more apt to be illegible.

Burial parties will fill out the same card, using X for unknown, and ap. for approximate as to height, weight and other

points that can only be estimated. They will add the place and date of burial, number or location of grave; the names of persons or places mentioned in letters found on the body; number and make of watch or gun; names, initials and numbers on the clothing; missing members and the apparent cause of death.

In closing the writer must note that his work has been purely one of the cabinet; actual use may disclose many defects. Other questions may be found simpler and better. Since the first man, it is probable that no two faces have ever been exactly alike. From this infinite diversity, it is difficult to determine what points to select—how much or how little is required. To borrow a key from the botanists for the identification of men seems a rational procedure. Others may do this better, may assemble groups of features upon a better plan; but throughout his work the writer has been cheered by one certainty,—until somebody began, nothing would be accomplished.

III. OBJECTIONS TO THE SYSTEM OF IDENTIFICATION IN USE IN THE UNITED STATES ARMY.

BY MAJOR PAUL R. BROWN, U. S. ARMY,

ITHACA, NEW YORK.

THE essential basis of the method of identification now employed in the United States Army is a description and localization of the various scars and marks present upon the body of a recruit at the time of his enlistment and the notation of these scars, etc., on the so-called Outline Card. One of the most serious objections to the Outline Card method of Identification is its utter lack of scientific classification.

At its inception, the originators of this method primarily classified the Outline Cards by separating them into two grand divisions, according as the color of the eyes noted upon each card was blue or brown. The height was also taken into consideration after the color of the recruit's eyes had determined whether his scars and marks should be recorded in the register for blue or brown-eyed individuals.

As should have been foreseen, if the subject had been carefully considered, this method of classification has had to be abandoned as one observer might note the color of a recruit's eyes as some shade of brown and another as some shade of blue. Bertillon, the world's greatest authority in matters of identification, says that it is impossible to classify a large number of individuals by the color of their eyes.

What may be termed a *regional scar* classification has been substituted for the original one. In my opinion, this method of classification, if possible, is even more defective than the abandoned one and less capable of accomplishing the desired result, which is the discovery of a descriptive card in a collection and its identification with a human original.

There is no question that permanent scars and marks upon an individual are fully as convincing proofs of identity as the data furnished by an anthropometry, but unfortunately it is absolutely impossible to satisfactorily classify the subjects presenting such

scars and marks. Even Colonel Greenleaf himself, one of the originators of the Outline Card method of Identification, quotes (Ref. Hand Book Medical Sciences, Supplement, page 721) Bertillon as saying "that permanent bodily marks offer a greater guarantee for identification than measurements, and that they would take their place altogether, *if it were possible to use them as a basis of classification.*" It should be borne in mind, however, that when Colonel Greenleaf's article was published (1893), the color of the eyes was principally used as a basis of classification and that the classification by scars, which Bertillon condemns, was not then in use.

Under the present method, the Surgeon General's Office being informed of the desertion or of the dishonorable discharge of a soldier, his Outline Card is taken from the alphabetical files and transcripts made from it, one to four in number. These transcript cards are then classified in the file cases according to the principal scar regions of the body of the deserter, etc., as indicated on the original Outline Card.

Already there are in the office of the Surgeon General one hundred and twenty file cases for Outline Transcript Cards bearing labels upon which the names of various regions of the body are inscribed and also some heights: sixty-three of them for scars, thirty-three for moles, seventeen for tattoo marks, six for the scars and marks of negro soldiers and one for amputations of white soldiers.

The Transcript Cards in these file cases now number about 36,700 and cover the cases of about 12,150 deserters, etc., showing that, on an average, the file cases contain three cards for each individual. The full capacity of each file case is four hundred cards and, on an average, according to this calculation, they now contain three hundred cards each.

Supposing, for instance, that a recruit, when first enlisting, has several scars or marks upon *three* principal regions of his body and that during his first two years of service he acquires scars upon two other regions: if this man then deserts and re-enlists and a new Outline Card is made out, it may be necessary to compare the scars and marks on this new Outline Card with those of the Transcript Cards of *five* different file cases, that is if the cases were full, with about *two thousand* cards.

At the present time, the number would be somewhat less, about fifteen hundred cards. This is not a case purely hypothetical and problematical, one not likely to be encountered in actual practice. Colonel Alden, in his monograph on "The Identification of the Individual," published in the *American Anthropologist*, September, 1896, says: "The scars and marks on an average of three regions are examined."

Let us suppose, for instance, that this country should be involved in war and our army be recruited at the rate of a thousand men daily; is it within the bounds of probability or even possibility that it would be practicable to compare the Outline Cards of these thousand men with the cards in three different file cases? In the present condition of these cases, that is each containing three hundred cards on an average, if *three* scar regions were examined, as is now the case, this examination might involve the comparison of nine hundred cards for each man or a total of 900,000 cards daily.

Assuming the file cases to be filled, that is each containing four hundred cards on an average, the requisite examination might necessitate the comparison of 1,200,000 cards each day. The Transcript Cards are accumulating in the file cases at the rate of about six thousand yearly and in ten years' time, at the present rate of increase, this collection will contain very nearly 100,000 cards.

If no cards are removed from the file cases, during this ten years it will be necessary to add one hundred additional cases of a capacity of four hundred cards each to the original one hundred and twenty, making two hundred and seventy in all. Supposing at the end of this period war should be declared and our army recruited at the rate of a thousand men a day, an examination of three scar regions for each man, or the Transcript Cards representing these regions in the file cases, would involve the examination of 2,400,000 cards daily.

Eliminating certain cards when the individual whom they concern may be assumed to have reached a certain age will not solve the problem, even supposing no increase in the size of our army. How are we to be at all certain as to the age of the recruit? For instance, it is probable that quite a number of minors enlist who state that they are over twenty-one, and there are many individuals between twenty-five and thirty-five whose age it is exceed-

ingly difficult to determine. A recruit is also occasionally encountered whose body is virtually devoid of scars and marks. In such a case, if this soldier acquires prominent scars *after* his enlistment and then deserts and re-enlists, what possible chance is there of detecting this fraudulent enlistment by means of the regional scar classification?

When his card is taken from the alphabetical files, as there are practically no scars or marks noted upon it, how can transcripts be made of what has no existence? In what possible way, except by the height, one of the most deceptive of measurements as ordinarily taken, can this man be identified by the Outline Card system of identification? Undue importance is also attached to the regional classification of tattoo marks, seventeen file cases being allotted to them.

At first sight, it would seem that nothing could be a more convincing proof of identity than a tattoo mark properly localized. In practice, they are exceedingly treacherous and much inferior as a means of identification to the ordinary scar. When an individual wishes to disguise his personality, if he has any tattoo marks, his first thought is to alter them, either changing the original mark by "*surcharging*," that is by tattooing a fresh design directly upon the old mark, or surrounding the old mark with other designs, sometimes copies of those upon a comrade.

While writing this article, I have seen a marked instance of surcharging in a man presenting himself for enlistment. In addition, tattoo marks are usually of certain conventional patterns and are apt to be located upon nearly the same spots in different individuals. Another serious defect of the Outline Card method is that, in the original registration of the scars and marks upon the card, entirely too much is left to the personal equation of the examining officer; there is no uniform method pursued in the description and localization of these scars and marks, in fact, there is no *precise localization* made of them.

During the year 1895, the identifications made by means of the Outline Card system were one hundred and twenty-one, this number representing the "repeating element" of 4,929 recruits or a little less than two and a half per cent. Is there any officer who has been associated with troops for any length of time who does not believe that the percentage of deserters and dishonorably dis-

charged men who re-enlist is much greater than two and a half per cent?

Colonel Alden, in his monograph, states (p. 309): "That the number of identifications was greater in 1892, soon after the system went into effect, showing evidently that the knowledge of the existence of this system has deterred the class it seeks to exclude from re-enlistment." If this inference is correct, how is the fact to be explained that the number of identifications *increased* from *eighty* in 1894 to *one hundred and twenty-one* in 1895, *four years after* the Outline Card method came into practical operation?

An exceedingly serious objection to the Outline Card method of identification is the great amount of time which must necessarily be consumed in the comparison of the Outline Cards of recruits with the Transcript Cards already in the file cases. Under the most favorable circumstances (when the recruit has only *one* scar region) it may be necessary to compare the scars and marks noted on his card with those registered on three hundred cards in the file cases.

Allowing only *five* seconds for the comparison of each, it will take *twenty-five* minutes to examine the cards in one case and if the contents of three cases (the average) should have to be examined, the search may require an hour longer. Assuming that each takes half an hour and that our army should be recruited at the rate of a thousand men daily, an examination of the Outline Cards of these recruits would necessitate the services of *sixty-two* clerks working eight hours daily.

It would be utterly impossible to make the requisite comparisons without a very large clerical force which would have to be constantly increased as the cards accumulated in the file cases. By means of the classification employed in the Bertillon system of Anthropometric Identification, 150,000 descriptive cards can be so classified that it does not take more than *three* minutes to make a search through the collection and, supposing this system to be in use in our army and recruiting going on at the rate of a thousand men daily, *six* clerks could readily make the searches which, under the present system, would require *sixty-two*, and it would not be at all probable that the file cases containing the descriptive cards of deserters and dishonorably discharged men would ever contain 150,000 cards as, with the Bertillon system, *one* card rep-

resents an individual in the file cases, whilst, with the Outline Card method, there is an average of *three* Transcript Cards for each person.

If, as I think, it has been conclusively demonstrated that the Outline Card method of identification is practically worthless where large numbers of individuals are concerned on account of its defective classification, and as it is especially under just such circumstances that an efficient means of identification is essential in our army for the purpose of preventing desertion and the re-enlistment of deserters and dishonorably discharged men, in my opinion it is advisable that the present system be replaced by the Bertillon system of Anthropometric Identification, a system which is practical and efficient under any and all circumstances.

DISCUSSION.

COLONEL ALDEN: I am sorry Dr. Brown is not here himself, because I make my remarks with some hesitancy when the author of the paper is not here to answer me back. Dr. Brown places considerable stress on the idea that the system in use in the Surgeon General's office takes account of the color of the eyes, which we all recognize is very variable from time to time, and it is difficult to fix a standard. The color of the eyes is no longer used and has not been for some time. In regard to the plethora of cards I shall only take up one or two of the important points touched upon by Dr. Brown. In reference to the plethora of cards, the records in the Army are only accepted up to the age of 30, and therefore it is not necessary for us to keep on the card representing the physical description, the outline cards of men indefinitely. Now, already, if my memory serves me—I have not studied this subject up specially for the purpose of speaking—some 8,000 cards have been taken away, so we have about reached a time when the number of cards will remain stationary at the present strength of our Army, the number of enlistments and discharges about equaling each other, so there will probably be no unmanageable plethora of cards in these drawers.

As to the impossibility of using one of these systems of measurements in case of war, we cannot tell until war comes. I do not doubt that the Bertillon system is useful, especially for the purpose for which it was originally designed, the identification of criminals. It is doubtful whether any description would be practicable in the event of war when we have thousands of men being enlisted every day. Indeed, it is probable that no system that can be devised would be practicable in war times.

Dr. Brown doubts the possibility of recording tattoo marks. As a matter of fact experience has shown that tattoo marks, where they are characteristic or peculiar, are extremely valuable. Sometimes men, not

supposing they will have any outline card made, put the most peculiar, irregular, grotesque tattoo marks upon various parts of their bodies, and these are very valuable because they at once lead to the identification of the man. When a man comes in with a peculiar tattoo mark and we compare his card with the cards of tattoo cases which have been accumulated, which are not many, his identity can be secured at once. As to removing tattoo marks, that cannot be done without leaving a trace of the mark, and that very fact would lead to suspicion and the further looking up of the case. As a matter of fact but two clerks are necessary in the office of the Surgeon General in preparing outline cards. It seems to me that is sufficient answer to the criticism that the service is so cumbersome as to require twelve clerks; it don't, it takes only two. There is no desire to belittle the Bertillon system. It has been a great advance in the identification of criminals. When some system of identification for the military was found necessary in 1889-90 the whole subject was gone over very carefully by Colonel Greenleaf and Major Smart in the office. Every detail was studied and this modification of it, the use of the scars and marks, was adopted because the Bertillon system was so identified with the identification of criminals it was thought it would be opposed and against the sentiments of the people who offered themselves for the defense of the flag and from patriotic motives, that they should submit to a system which had been used before for the identification of criminals. This was an objection that it was found impossible to get over. Some year or so ago I wrote a paper on this subject, giving an account of the system of identification in the Surgeon General's office, and it has occurred to me since this matter has come up with us and many objections have been offered, it might be of value if I were allowed to give the Secretary an abstract or some part of this paper to incorporate in the transactions, so that for convenience the members of the Association might have it to refer to, and it might have value as making the papers and the objections advanced more intelligible.

MEDICAL INSPECTOR WISE: While this question can be said to be *sub judice*, we have on all hands, as even Colonel Alden admits, defects of the method. I think it would be well to make a study of the various systems and get something more satisfactory than we have now. So far as the marks and scars are concerned, in the Naval service these are very trying. You can identify a man to-day by his tattoo marks and a week afterward he will be beautifully illustrated, so no one could identify him. It is a matter of sentiment on one side, it seems to me, and science on the other. The Bertillon system is a scientific method and I believe it will be the method of the future. But the criminal aspect of the case seems to be one hard to get over.

CHAPTER VII.

Clothing and Accoutrements.

I. ACCOUTREMENTS FOR THE INFANTRY SOLDIER.

BY DEPUTY SURGEON GENERAL WILLIAM SILVER OLIVER,
HALIFAX, NOVA SCOTIA.
BRITISH ARMY MEDICAL DEPARTMENT.

I HAVE arranged my accoutrements upon my own person in order to give you an actual example of their method of application. As you see me, I am fully equipped for carrying all the tools, 160 rounds of ammunition and a daily amount of necessaries for the soldier.

The Accoutrements consist of:—

- I Magazine or Service Bag. Weight 32 oz.
- I Magazine Brace, complete.
- I Spade Sling.
- I Coat Strap.
- I Reserve Pouch.
- I Canteen and Cover.
- I Bottle Holder.
- I Waist Belt and Frog.
- I Ammunition Carrier's Bags (A.C.B.).
(I Kit Bag.)

Total weight
(excluding Kit
Bag) 118 oz.

The following are some of the chief advantages attained by this form of Equipment:—

The same BRACE will fit men of all sizes. The point of carriage is the strongest part of the body, and all the articles carried are located as near its centre of gravity as it is possible to place them. The front of chest is free from all constriction of cross straps, there being no haversack or bottle strap, and the weight of the water bottle being supported by the "magazine" brace and

waist belt. This latter, too, is *always* worn *loose*, and can be unfastened on all occasions on the march, etc., unless when the soldier is in the act of "doubling" or jumping. His waist and sides, also, are relieved from the incumbrance of haversack and two ball bags; and all rations, and much of the ammunition, like the kit, are carried out of his way behind the back, where at the same time, they can be immediately reached without assistance, or the necessity of taking off accoutrements. He is similarly circumstanced as regards his great coat.

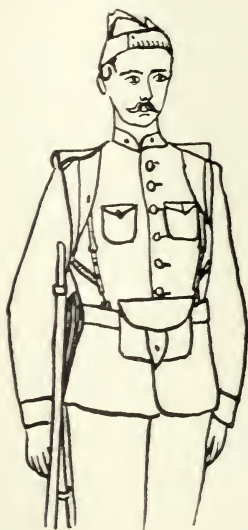


Fig. 1.—"Field Day Order." Magazine bag containing canteen and ration bag, water-proof sheet or coat cape carried on brace behind shoulders. Water bottle on waist-belt.



Fig. 2.—Great coat carried in magazine bag. Back view of brace.

In addition to this, it systematizes a means by which the carriage of the kit can be dispensed with in peace and war, and a large amount of ammunition, rations, intrenching tools, or blanket, etc., substituted for articles not actually needed for the special service on which the soldier may be engaged. And this can be accomplished with a *diminution* of the weight now carried by the individual soldier in "service marching order," without any material increase in the present "Regimental Transport," *four* 2-horsed wagons merely being substituted for the present *four* 2-horsed "Ammunition Carts."

In war, in fact, it enables each soldier to be his own "MAGAZINE," self-supporting, and independent of his "Base of Supply;" and during peace it renders him capable of performing all his various duties with ease, and freedom from all useless weight and body impediments.

1. The Government Spade is carried in its own sling, on the right side of waist. Can also carry A. C. Bag, or Water Bottle.

2. THE COAT STRAP is for carriage of coat behind shoulders, on loop of magazine brace (See Figs. 2 and 3) or coat cape, or waterproof sheet rolled. Also to strap coat when carried *en bandolier*. It is placed in coat pocket when coat is worn.

3. THE GREAT COAT is, as a rule, carried in the coat strap behind shoulders, and folded about 9 in. by 14 in. ; but it may also be carried in magazine bag behind buttocks, supported there by magazine brace (See Fig. 2.) or outside of bag on bag straps under bag flap. It is then folded 10 by 13 inches; or it can be carried rolled *en bandolier* across left shoulder, and secured at the ends by its own strap.

4. THE CANTEEN is furnished with an inner tin for the reception of meat ration. The cover of this tin acts as a plate, and that of the outer one for a frying pan. Both can also be used separately as occasion requires, for drinking, cooking, or the reception of extra rations.

5. THE BOTTLE HOLDER enables the ordinary soda-water bottle to be carried in a fixed position on the waist belt behind the right or left hip, out of the soldier's way, and within easy access for use. The bottle, if broken, can be easily replaced, and saves storage, transport, etc.; or the New Government iron-felt or aluminum bottle can be carried there on loop or strap, as modified by me.

6. THE KIT BAG is a common waterproof bag, capable of holding "spare kit" and "necessaries," and is composed of strong sail canvas, and secured at open end by a flap, and two straps and buckles. In it is a small "boot bag" for holding cleaning utensils, etc. Boot brushes and blacking should not be carried by soldier. Boots should be greased.

7. A strong inside breast pocket in tunic or frock, capable of holding 20 rounds of broken ammunition, (Lee-Metford) and

placed low down on left side, with mouth of pocket corresponding to fourth button, acts as an "Expense Pouch."

8. THE RESERVE POUCH, for carriage of 80 rounds, is furnished with a guard to prevent ammunition falling out, and two brass loops for its direct suspension on front hooks of main brace, when necessary.

9. THE MAGAZINE OR SERVICE BAG is composed of strong waterproof canvas, and acts the part of ration bag and valise; and is intended for carriage of a few indispensable articles of kit, rations, and extra ammunition; also coat, cape, or waterproof sheet, or a blanket when necessary.

10. THE A. C. B.'s are ordinary haversacks converted into "carrier's bags" for the carriage of bread ration, or the supply of ammunition from casualties in the field. For this latter purpose each is furnished with two strong loops and brass D's at back for carriage on front of waist-belt, supported there by the front straps and hooks of main brace, and is capable of holding 350 rounds of Lee-Metford ammunition. The "carriers" will advance with those bags in the "fighting line," and transfer to them all ammunition they collect from the dead and wounded, for redistribution as required.¹

ORDERS OF ACCOUTRING SOLDIER.

There are four Orders—Service, Field Day, Drill and Review Order.

I. SERVICE ORDER.

SERVICE ORDER consists of the following articles:—1 main brace, 1 magazine bag, 1 great coat in coat strap, 1 canteen in cover, 1 A. C. bag, 1 reserve pouch, 1 water bottle, 1 waist belt and frog modified to carry, also axe, or pick handle. In this order the soldier is ready for all duties at home—guards, field days, or flying columns—and for active service in the field.

¹ *During peace*, on occasions when the rest of the accoutrements are not required for use, rations can be carried in those bags slung on waist-belt, or spade sling, or both. *In the field*, two extra ones per company would be issued by each regiment to the "ammunition carriers."

Each bag is furnished with two inside pockets for the carriage of 40 rounds of ammunition in addition to bread ration, when the bag is used in lieu of the Service Bag in hot climates.

The Magazine Bag in Service Order contains the following articles:—1 shirt, 1 towel, 1 pair socks, 1 clasp knife (or¹ holdall complete), 1 coat cape, or water proof sheet, 1 hard brush, a piece of soap, 1 pair of canvas shoes, a pocket ledger, 1 tin of dubbing, 1 fork, spoon and clasp knife.

The shirt should be *flannellette*, and carried by soldier only for temporary wear while his flannel one in use is being aired or dried.



Fig. 3.—“Service Order.” Coat cape or water-proof sheet beneath bag on bag straps; canteen inside of bag.



Fig. 4.—“Service Order.” Showing how canteen is carried on top of bag when occasion requires.

The Canteen, in cover, is carried in magazine bag, containing 1 lb. meat.

The A. C. Bag is carried in magazine bag, containing 1 lb. bread.

²*Ammunition* is distributed as follows:—80 rounds, in packages in Reserve Pouch; 10 in each outside pocket of Magazine Bag; 20 in inside pocket; 20 loose, in “Expense pocket” of coat;

¹ The holdall is carried in this bag only during peace, and in the “Kit Bag” on service.

² The 40 rounds carried by Magazine Bag are omitted in the case of men using axe, pick, or spade.

10 in each breast pocket, these last to be first for transfer to the "Expense" pocket when loose rounds there have been used. Should more be required at Siege operations, etc., they can be carried in Magazine Bag.

Entrenching Spade is also carried by 10 per cent. men.

This removes the necessity for the 4 small arm ammunition carts at present required for the supply of "Regimental Reserve" ammunition in the field; and the horses of those carts can be utilized to great advantage bringing up the spare articles of kit in the "Kit carts," out of range of fire, in the First line of Transport," "Kit Bag" (paragraph 6) is provided for this purpose.

Or, the services of those carts may be retained, and thus increase the total "Regimental" ammunition to 225 rounds. They would then advance in the "First Line of Regimental Transport," and be held in readiness to furnish the Battalion (by carriers and mules) with surplus ammunition (65 rounds per man) before drawing on the "Divisional Reserve" Column.

The above articles are packed in Magazine, or Service Bag, as follows:—Shirt rolled 13 inches at bottom of bag; Shoes, (containing socks, soap, spare boot laces, and dubbing tin,) are placed upper to upper, behind shirt; over them, meat in mess tin, and bread in A. C. bag; towel folded in front of canteen; clothes brush behind A. C. bag; fork and clasp knife in their holders in right end of wall of Service bag, spoon in left:—inside pocket of bag left free for carriage of Extra Ammunition. Coat cape or sheet can be carried either folded under bag flap, or, rolled beneath, or on top of bag on bag straps. (See Fig. 3.)

II. FIELD DAY ORDER.

On Field Days, soldier is accoutred as in "Service Order," and carries Canteen with A. C. Bag *inside* Service Bag. Coat cape, or waterproof sheet, rolled, in coat strap behind shoulders. Blank ammunition in either Expense Pocket of coat, or in Reserve Pouch on front of waist-belt; or he can be equipped without Service Bag.

The mode of accoutring in both these orders is the same.

Fasten great coat in coat strap, having first attached latter to brass and leather loops of main brace, care being taken that the top of coat is not higher than upper edge of brace. Spade sling is then passed over left shoulder by the men (10 per cent.) carrying it.

The waist-belt is now passed through the leather loops on back of service bag and spade sling, and buckled, with bag attached, around waist. The brace, with coat attached, is then taken in left hand, and put on shoulders like an ordinary coat, and is secured by its hooks to the waist-belt in front, and the magazine bag on buttocks. This latter is easily effected by *grasping the bottom of bag firmly behind, and supporting it in one hand while the other attaches the hook on opposite side to D on bag.*

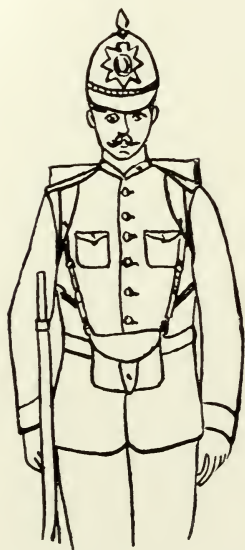


Fig. 5.—"Service Order." Front view.



Fig. 6.—"Service Order." Front view showing how soldier can march with waist belt open or loose, on all occasions.

By now *opening the waist-belt, and drawing on the brace in front of shoulders*, the accoutrements will assume their proper position, and rest extremely easy on the body. The bottle is now passed around on waist-belt to behind the right hip, and the reserve pouch is moved to its front, and the soldier is fully equipped. (See Figs. 3, 4, and 5.)

The spade is placed in sling after accoutrements are adjusted.

Except in the case of the men carrying spade, the soldier can now get at his coat cape, rations, extra ammunition, or any portion of his kit, by simply unhooking left hook of brace, and bringing

the bag around on waist-belt to his right front. (See Figs. 7 and 8.) This bag, in fact, acts as a "Magazine" for all necessities the soldier may require, and places them within easy access, while, at the same time, it retains them out of his way behind his back, and frees his front and sides from all encumbrances. The soldier can, also, at all times, march with his waist-belt open, without displacing his accoutrements (See Fig. 6); and divest himself of them at once by moving reserve pouch to the right or left, unhooking right hook from bag, and opening waist-belt, and removing all like a coat.

III. IV. DRILL AND REVIEW ORDER.

In this "Order" and "Review," the waist-belt and frog and "reserve pouch" only are required, and the pouch is worn in both instances on the front or back of belt.

Forage cap, when not in use, is carried behind coat on coat strap, or in magazine bag.

When it is desired to change a regiment of infantry into "mounted riflemen,"—every two men's magazine bags can be converted into saddle bags, by withdrawing the bag straps from the strap holes, and attaching them to corresponding buckles of the other bag.

This disposal of the straps of those bags also facilitates their conveyance by other means, on bullocks, pack horses, etc.

The ordinary bayonet frog is so modified as to carry the handle of Pick, or the 2 lbs. axe. Head of Pick in its receptacle in bag flap.

I have also modified the Italian water bottle so that it can be carried by brass stay on waist-belt in a fixed position, easy of access behind right hip. (See Fig. 3.) The Government Japanned iron or Aluminum bottle, carried by loop on belt, may be substituted for this or my Bottle Holder.

When blanket, great coat, rations, and 100 rounds of ammunition are required, the blanket is folded 14 in., and rolled tight, and carried in bag on buttocks, canteen outside bag, bread ration in A. C. bag on waist-belt, on the right side, water bottle on waist-belt on the left side, great coat on shoulders in strap. Or coat may be carried rolled over left shoulder, waterproof sheet under bag on bag straps; 100 rounds in pouch and expense pocket.

The weight in a soldier's magazine bag should not, I consider, as a rule, exceed 10 lbs., except at siege operations, or cases of similar emergency, when 200 rounds may be carried on the soldier to the trenches, *i. e.*, 100 in front in the following manner; 20 in expense pocket of coat in broken rounds, 80 in reserve pouch; remaining 100 in body of bag with one day's rations.

If two day's rations and ammunition are required, the inner mess tin is taken out of outer one for the reception of meat in both,



Fig. 7.—Private in "Service Order" in act of unhooking bag.



Fig. 8.—Private in "Service Order" in act of removing extra ammunition from "service" bag.

and the bread or biscuits are placed in A. C. Bag, or in magazine bag itself.

I would also suggest that my *Waterproof Sheet* should be used and carried on ALL OCCASIONS instead of Coat Cape. It is so much more useful, protecting the man from rain or dew at night, either as a cape or sheet, or (two joined) as a *tente d'abri*; or he can rest on it on damp ground on the halt, or at night; or he can carry and use it instead of the GREAT COAT itself in time of peace, to protect him during wet but warm weather on field-days, guard,

or, while performing any of the duties of a soldier. As an extemporary stretcher, or splint-cloth, it will also be found most useful for its wounded possessor in time of war.

METHOD OF CLEANING AND PRESERVING LEATHER PART OF
ACCOUTREMENTS.

The leather part of the equipment is easily kept neat in appearance by occasionally treating it like ordinary saddlery with saddle paste, which preserves the leather, and renders it pliant and waterproof. If desired, before using the paste, when the braces, etc., are first issued, a solution of Orange Diamond Dye, (one paper to a quart of hot water) will impart to them a pleasing and uniform appearance. Paste to be applied after solution has thoroughly dried, and then polish with a cloth or brush.

It will be observed that I do away with the necessity for cross-straps over the chest. The trenching tools of necessity have to be carried, but I only allow 10 per cent. of the men for this, which is ten pounds in weight. And then I allow 10 per cent. of men to carry the axe, which is carried here with the bayonet. Where the spade is not carried, there is no strap across the chest at all. The chest is free from any cross-strap and at the same time all constriction is free from the soldier's front and he can march with his waist front open. The movements are perfectly free for marching, and it leaves the abdominal and chest muscles free for respiration. In addition to that, it removes all impediments from the front of the soldier. As you see, it leaves the entire chest free to assume any position he chooses to assume, but at the same time it places the soldier in possession of everything he needs. He is in instant possession of all he requires to reach, without any difficulty. This, of course, would be the natural position of the belt. If he wants to get at his coat, he merely unfastens this buckle. If he wants to get anything out of the bag, he merely brings it around in front, so he is in immediate reach of every requirement. From a medical standpoint, of course, you see it leaves the entire chest free for respiration and does away with all necessity for having the coat forward, or water-bottle strap or any other strap con-

strapping the chest, which is very important in the active duties the soldier has to undergo.

As you see, by this equipment I carry 160 rounds of ammunition, rations for the soldier for two or three days, and a change of shoes, socks, and everything he actually needs, and in this way I render the soldier independent of his base of supplies for a number of hours. All necessary medical equipment can be carried by the accoutrements, and even a stretcher can be carried by this brace by merely having straps and brass attachments to it.

II. THE INFANTRY NATIONAL GUARD FOOT DRESS.

BY MAJOR GEORGE HALLEY,

KANSAS CITY, MO.

SURGEON IN THE MISSOURI NATIONAL GUARD.

WE are in the habit of regarding the modern soldier as better than any warrior that history presents to us. That he is better dressed, better fed, better trained, better armed, and in these United States, that he is better qualified by education to take care of himself, either in camp or field, than any soldier of modern times, is true. And man for man, this, in most respects is true. In every country, common sense has obtained in dress to a greater extent than has generally been the case heretofore.

The antiquated head dress that was thought to add so much to the terrorizing aspect of the soldier, has long since given place to the close fitting cap, and the stuffed and padded coat that was intended to make all the men, no matter how faulty in form or lacking in development, appear to be physically perfect, has been supplanted by a more comfortable garment.

The stiff stock about the neck, which was such a serious source of discomfort, has given place to the low collar; fitting closely about the neck without in the least obstructing the free movements of the head. All the coverings of the body have been made with the purpose of allowing the freest movements, with the least possible restrictions from the dress.

All the burden borne by the soldier of whatever grade is arranged with a view to the most perfect distribution of the burden, and to be carried with the greatest comfort and ease.

All these questions have been again and again experimented with and the very best results attained by repeated trials. One portion of the body, however, has been almost entirely overlooked. Not perhaps because it was regarded as of less importance, for on it depends entirely the usefulness of the soldier as a fighting machine, but from the fact of its being less visible and less obtruded

on the notice of inspectors and drill masters, or perhaps, being a less part of show in reviews and field displays.

A soldier may make something of a fight with sore or defective hands, arms, or head, with wounds on his body deep and dire, but ingrowing toe-nails, corns, bunions, blisters, or feet-defects of any painful kind, will at times put him hors de combat.

This is not entirely due to the location of these organs, for then indeed would this well-made organism be, in a marked degree, a failure, owing to faulty dress. Both during childhood and early adult life, have we looked for this error in growth and development. When a man becomes a soldier, he finds himself heir to a long list of feet ailments that he will have to combat with (or have some one combat for him) during most of his life.

I will not burden my hearers with a long recital of statistics, suffice it that more men are disqualified for active service in the National Guard from disease, injuries, or deformities in the feet, than from injuries to any other part of the body. In the regular army, this has, to some extent, been remedied by the shoes which are furnished, being made more like the shape of the foot and less after the fancy of the shoemaker.

But in the National Guard—at least in Missouri—while the dress is in every respect made to conform to the regulation requirements of the army, the feet of the men are dressed as each man pleases. Some of the men wearing patent leather with spike toe, some low shoes, some lace shoes, some congress gaiters, etc., etc., anything and every kind, so long as it is a shoe. Out of a total of 311 men examined, 226 men were found with imperfect feet in some respects. The imperfections were hallux valgus, hammer toes, corns, bunions, ingrowing nails and flat feet.

Some of these imperfections, it is true, are not the result of faulty shoes in the first place, but all are aggravated by wearing badly fitting footwear and most would be very materially benefited by the constant use of footwear that suited the deformity and had a tendency to overcome it.

In a hard day's marching, other things being equal, the men with perfect fit would at night be found in very much the best condition, and if all were put in suitable shoes, I am sure all will agree that many more men would be found fit for service, than if made

to march in the miserable footwear most of our National Guard men are equipped with.

The shoe, to be comfortable and of real benefit to the wearer, should, as nearly as possible, simply protect the foot from injury, without in any way hampering or impeding the performance of its every function. To be thoroughly strong, none of its muscular or osseous movements should be hampered in any way, and the joints should be entirely unhampered.

The weight of the body should be borne by the heel, while the front part of the foot should serve only the purpose of springing the body forward and temporarily sustaining its weight. All the shock of alighting should be sustained by the heel. The heel should not be higher than the front of the foot when the body is in an erect position and the foot is at rest. The shoe should grasp the tarsal portion of the foot tightly in order to hold the shoe on. In front of this it should be loose enough to allow free movements of the toes and metatarsal bones, never cramping or pressing on the interossei muscles, or forcing the bones adjunct to each other for in so doing the usefulness of the foot will be impaired and in time destroyed.

How different is that from the position they really occupy when dressed in the modern, fashionable footwear. If the foot was dressed so that the heel would be no higher than the ball of the foot we might have to put short spikes or some means of making the sole less smooth and more steady, but we would soon gain in the strength of the foot and consequently in the serviceability of the men. I think that in view of these facts, the regulation dress should extend to shoes as well as other articles of wear, and that a shoe be made having the following qualities:

First, the shoe to be as wide inside at the metatarso-phalangeal articulation and in front of that to the tips of the toes, as the foot will measure when the body is at rest and the man is standing on both feet.

Second, that the shoe be as long as the foot is under the same conditions.

Third, that the sole of the shoe conform to the inequalities of the sole of foot. A cast of the sole of the foot being taken when the shoes are to be made.

Fourth, that all soldiers of the National Guard be required to wear this foot covering constantly in order that the feet become strengthened and fitted for the service to be put on them when there is a demand made on them. A proper charge for the same being made, so the government should not be at a loss by the wear when the soldier was not on duty.

Fifth, that all men when applying for admission into the ranks of the National Guard be required to pass a physical examination, and if found diseased or seriously imperfect in their feet, to be rejected.

If this defect in our National Guard dress is not remedied we will find, when a demand is made on us, that we are weak at a most vital point, and that our *foot soldiers* will be men without feet, and therefore, cannot stand the fatigue of a soldier's life.

CHAPTER VIII.

Military Physical Training.

I. MILITARY PHYSICAL TRAINING.

BY HENRY G. BEYER, PH. D.,

SURGEON (LIEUTENANT) IN THE UNITED STATES NAVY.

THE training of the soldier, though in actual practice not a part of the duty of the medical officer, must, nevertheless, be considered a problem in practical physiology and hygiene and, as such, it justly excites both our interest and sympathy.

The same training exactly that applies to the soldier may, with but little modification, be applied to the man-of-war's man for, say what we will, since masts and sails on board a man-of-war have been altogether displaced by engines and steam, since the sailor can no longer go over the mast head for his morning and evening constitutional and work on the sails, he has become more of a soldier than he was and, consequently, needs more of a soldier's training than he did in former times.

By military training, therefore, I would have you understand not only the application of certain gymnastic exercises, intended to develop the physique of the soldier in certain spots, but the term, as here used, implies a study of the influences which a soldier's occupation with all its many accomplishments, has on the man as well.

From such a study we will find that the ideal, properly brought up and finished soldier is an athlete in the modern sense and one who has no superior in the field or out of it.

We will, I hope, come to the further conclusion that the soldier has not only but little to learn from a sport like foot-ball, but that, unless indeed every man in the ranks as well as every officer be taught to play it, it would even prove a direct disadvantage when considered seriously.

The most senseless statements have been made in the most rambling sort of fashion as regards the wonderful influence of football and other athletic sports on the soldier, as if it was the universal panacea and sine qua non for all military purposes. I am, on the contrary, of the opinion, that the soldier per se has nothing whatever to learn from, for instance, foot-ball discipline, but should rather say, if there must be discipline in foot-ball training, it is simply military discipline applied to an athletic sport and whoever advocates foot-ball training as being an aid to *military* discipline, puts the cart before the horse and can have very little idea of what discipline really is and where it originated.

As regards the amount and kind of strength and endurance to be derived from foot-ball training, though very great and most satisfactory for a sportsman, these do not come up to the amount and kind of strength and endurance now-a-days required of the finished soldier.

If we could ascertain and express in foot-pounds the amount of work done in a given time by the soldier in the field during, say autumn-maneuver, as easily as we can count the number of bacteria in a given quantity of water, and compare this to the amount of work done by any other athlete or strong man for the same length of time, we would find the soldier far ahead and in better condition at the end of it than are either the sportsman, athlete or the strong man.

Foot-ball is, after all, mere play and should never be regarded as anything else. A soldier's calling is, and must be, of a more serious nature, having a more serious object, and kindergarten methods do not apply to such training, at such an age and for such a purpose. It is merely a fine pastime and recreation.

My ideal soldier would be the one whom we find represented by the infantry men of the best European armies and, the conditions and requirements peculiar to and unavoidable in the United States, when compared to those of Europe, no matter how different they may be, can have no essential modifying influence upon our conception of what the soldier ought to be and what our aim should be with regard to his training.

In writing this paper and before proceeding with the subject with which I have been charged by your literary committee, I must acknowledge my indebtedness to Dr. Leitenstorfer, to whose valu-

able monograph (Das Militarische Training, etc., von Dr. Leitenstorfer, Oberstabsarzt 1. Klasse u. Regimentsarzt im K. B. Infanterie-Regiment, Koenig Wilhelm, von Wurtemberg, Stuttgart, 1897), I owe much of what I have to say on Military Training in the pages that follow.

One of the fundamental conditions for the successful training of the soldier being the harmonious co-operation of the training officer and the military surgeon, we must begin by studying the nature of this bond which so closely unites both their interest and responsibility in this work.

The human body has been spoken of as a work-shop in which every organ and cell performs its special duty assigned to it, in its proper time and place, and for the common good of the whole. But work, in the mechanical sense, is done by muscle and muscular organs alone. Since all training, as applied to the human subject, has for its object and purpose the increase of man's capacity for work, it is with muscle more especially that the physical trainer has to deal. A knowledge on the part of the trainer, of the physiology of muscle must, therefore, be considered the *conditio sine qua non* of all successful training.

Let us, therefore, briefly review the most essential points in the physiology of muscle and of those other organs and tissues upon the functions of which muscular work most directly depends.

Muscle.—By far the most distinctive and important property possessed by muscle is its contractility. All the tissues, even bone, possess a certain amount of elasticity, but muscle alone is contractile. The biceps muscle, in contracting or shortening, flexes the forearm upon the arm. In so doing, that muscle performs a certain definite and measurable quantity of work. When a long muscle is made to contract as much as it can, it loses about half its length but gains in circumference and hardness what it has lost in length. A muscle never contracts without a stimulus. Of the various stimuli to which muscle answers by a contraction, the only one that can interest us here is the stimulus transmitted to the muscle through its motor-nerve and coming directly from the brain.

Voluntary or skeletal muscles are under the direct control of our will and can be made to contract, therefore, by an effort of that

will as much and as often as we desire, while involuntary muscles, not being under the control of the will, contract in spite of our will.

The trainer, therefore, addresses his efforts to the voluntary or skeletal group of muscles only, or those that are attached to and move the skeleton.

As soon as the stimulus, conveyed to the muscle from the brain, ceases, the contracted muscle returns to its normal resting length. In case it is desirable to keep a muscle in a state of contraction for some time, a series of very quick impulses become necessary. Stimuli are then sent into the muscle in quick succession, but none is as strong as the first and, by and by, they become weaker until they cease entirely.

The trembling which we notice about the entire limb, during this tonic contraction of the muscles, is simply due to the various stimuli running in quick succession through the nerves into the muscles attached to it and does not necessarily mean the fatigue of the limb.

Muscle possesses a certain property known as tonus or tension. This tonus denotes a condition of constant readiness for making a contraction. The tonus of a muscle is not yet work, but is rather a preparatory stage of it and passes into actual work imperceptibly.

Co-ordination is the harmonious working together of all or certain groups of muscles, while muscle sense is that property which has been acquired by experience and developed by practice, and by means of which the muscle estimates, as it were, the amount of pressure of any weight or resistance that rests upon it; this sense is more particularly developed in balancing exercises. Persons with locomotor ataxia have no muscle sense and, consequently, are unable to balance themselves with their eyes shut.

The chemical process which accompanies muscular contraction consists in the oxidation of certain definite quantities of carbohydrates and fats into carbon-dioxide, accompanied by the production of heat. Under ordinary circumstances, the muscular substance remains intact and only loses part of what it has stored up in fats and carbo-hydrates and which it had taken from the blood during its resting stage. "*The muscle cannot nourish itself during contraction.*" If we were capable of replacing these substances as fast as they are used up, no fatigue would be possible:

since, however, such substances can only be appropriated by the muscle during the periods of rest, they are exhaustible through continued work.

It is the same with the products of wear and waste; these also require a condition of rest to be thoroughly removed and their presence alone in the muscle would be sufficient to put a stop to its work.

The circulation of the blood is charged with the two-fold office of supplying new material as well as with that of removing the old and used up substances. Hence, the increased circulation in every working muscle and the reflex dilatation of its blood vessels. For the reason that, in a strongly contracted muscle, the blood-flow through it is impeded on account of its blood vessels being compressed, it follows that a continuous contraction is much more quickly fatiguing to a muscle than are contractions alternating with periods of rest no matter how short. When in a state of fatigue, the muscle possesses less tone and elasticity and is, therefore, much more easily overstretched than normally. This condition is particularly to be dreaded on account of its serious and, most likely, permanent consequences, when affecting the muscular substance of the heart.

For the reason that muscle can be nourished only during rest, the oftener a muscle is fatigued by work and allowed to rest for the sake of recuperation, the more often also recur these periods of nourishment, and muscle grows in consequence. Over-doing, however, produces swelling, heat, pain, inability to contract and delay in normal recovery, on account of the normal conditions being seriously interfered with. As the muscle grows in extent, its capacity for storing up energy also becomes enlarged. Hypertrophy of muscle can only be applied to that condition in which the normal bilateral symmetry is destroyed, by one side of the body showing much more muscular development than the other. This condition may prove a source of weakness rather than of strength and should, therefore, be guarded against. A steady and uniform increase in the size and strength of all the muscles at the expense of useless fatty tissue, is the ideal which we wish to attain.

Lungs.—It cannot be doubted that, of all the organs that are concerned, outside of muscle itself, by far the greatest and heaviest requirements are put on heart and lungs. It is these two organs,

Therefore, that also require to be watched with the greatest care in individual cases, since no previous physical examination can be considered an absolute guarantee in all cases, that they will stand the pressure of training. Extreme pallor with an abnormal pulse, during muscular efforts, should meet with early and careful attention.

When we consider that the function of the lung consists, on the one hand, in removing carbon-dioxide from the blood and, on the other, in supplying oxygen to it, it ought to be perfectly clear that breathing must become more rapid in mounting a flight of stairs than it is while lying down. The explanation is a, comparatively speaking, simple one: The muscles of the legs have performed a large amount of work in raising the weight of the body to a height of from 15-25 feet in a short space of time. In overcoming so large an amount of resistance, the muscles concerned in the task had to use up a certain quantity of fats and carbohydrates, producing carbon-dioxide and needing for this purpose an increased amount of oxygen. This increased exchange of oxygen for carbon-dioxide must be effected through the lungs and hence their greater activity during exercise.

The retention of carbon-dioxide in the blood would result in the quick suffocation of the muscle and end its work.

In a person while at rest, the number of respirations is sixteen in a minute; during sleep it may be still less; during work it may be from twenty to thirty; under hard work, as mountain climbing, running, dancing, it may be increased to 40-60 p. m.; while during racing it may be increased to the extraordinary number of 100-140. But such frequency in the number of respirations would indicate respiratory insufficiency; frequency increased at the expense of thoroughness.

The following table taken from Leitenstorfer, shows the approximate amounts of CO₂ exhaled:

	CO ₂ P. M.	NO. RESP.	PULSE.
Sleeping.....	0.38	10-12	60-70
Lying down.....	0.57	16	75
Walking	1.42	20	80
" fast.....	2.03	26	100
Climbing.....	3.38	30-60	120-160
Maximal work	100-140	200-240

While in climbing, the amount of CO₂ exhaled is ten times that while sleeping, we ought also to breathe ten times more rapidly than we do while sleeping which would make 10 x 12 equal 120 times. But breathing while sleeping is very superficial, which is of course, not the case during a steep climb, when our whole lung area is engaged in the exchange of gases. We experience as the effects of training, especially of running, an enlargement of our lung capacity, which normally varies from three to six liters.

Heart.—The relation of the heart to muscular work is similar to that which the lung has; it also must answer to an increased demand for work by more numerous and more voluminous contractions, than it makes during rest, for much more blood flows through the muscles in a given time. To this must be added the increased resistance which the contracted muscles oppose to the flow of blood through them, resulting in an increased general blood pressure which the heart must sustain. The greater the muscles and the larger their number engaged, the greater also must be the resistance opposed to the blood-flow and the greater, consequently, the increase in blood-pressure to be overcome.

While respiration is aided by the muscles of respiration which are skeletal muscles and under the control of the will, the muscular action of the heart is perfectly independent of our will. In the main, however, both the heart and the lungs in their action are governed primarily by the want and the necessity for the exchange of gases in the blood. Want of oxygen and overaccumulation of carbon-dioxide in the blood and the tissues generally, stimulate the automatic nerve centres of the heart to greater activity and the number of contractions may, thereby, be enormously increased until, in some cases, the heart-beats are three times their normal number.

Just as was the case with the lungs, abnormal rapidity of contraction on the part of the heart must sacrifice the thoroughness of its work. When the heart beats at the rate of one hundred and sixty times per minute, the ventricles contract before they are half full with the blood; the pulse, though rapid, is small and feeble, for the arteries are incompletely distended. The contractions of the heart itself are incomplete, being inadequate to the demands put upon it and, consequently, we have as a result a momentary insufficiency of the heart, which, however, given a certain period of

rest, returns to the normal, providing the heart was originally sound and not altogether unprepared for an occasional demand upon the endurance of its muscular tissue, for an extra amount of work.

A muscle, the functional activity of which, as in the case of the heart, is so intimately related to the action of all the other muscles of the body, also shares in the main the fate of the latter. It is exercised and strengthened the same as—if not more—than the other muscles, by carefully systematized work and becomes soft and degenerates through lack of exercise, the same as they do. A certain amount of hypertrophy of the heart, as long as this is in proportion to the increased growth of the rest of the muscles, is not a disadvantage, but rather an expected and quite necessary gain. While no two hearts are exactly alike, the greatest possible difference is found between the heart of an athlete and that of an office clerk, yet both may be normal in their relations to the whole body. A strong heart is one of the essential conditions which determines beforehand the amount of work which a man is capable of performing. General weakness of the heart muscle, distinct lesions, or valvular troubles, limit the amount of work a man is capable of doing, from the beginning. The muscles of the heart must be trained through graded, systematic efforts just the same as other muscles, if a higher degree of working efficiency is expected. Since, however, the two cannot be very well trained separately no special gymnastics for the heart are necessary, at least not under normal conditions, with which alone we are here concerned.

An untrained and unprepared cardiac muscle must surely give out on any sudden demand being made on it for an unusual amount of work and permanent injury is liable to be the result. Any muscle in a state of fatigue can easily be stretched beyond its normal resting limit and thereby lose much of its tone and elasticity.

It must, of course, be quite apparent that the muscles of the heart when weakened by hunger, starvation or fever, must become prematurely fatigued, consequently this organ is much more liable to be overdistedended in this condition, when an unusually large quantity of blood is poured into its cavities as is done during hard work. An overdistedended heart will not admit of perfect closure of its valves and to the inefficiency of the heart muscle, there is

added the insufficiency of its valves. This sort of inefficiency is, as a rule, very serious and leaves permanent after-effects, without producing heart failure. Cases of rupture of the heart and of its valves have been observed everywhere, especially in connection with athletics. In a post-mortem, which I had the opportunity of making on a young cadet, aged 18 years, who was a very determined and enthusiastic high and broad jumper, a pole vaulter and hurdle jumper, the aortic valves were all gone except a few narrow thickened shreds near the ring where they were attached; the mitral valves, also, had nearly disappeared; this was the result of going into competition without previous training for the event.

Overdistension of the muscular walls of the heart with all its disastrous consequences may also be produced by heavy lifting. Heavy lifting results, as a rule, in overdistension of the right ventricle on account of the action of the lungs being suspended and their capillaries being compressed, thus preventing the flow of blood through them and thus from the right to the left side of the heart, consequently, the right must be distended with blood. The same condition exists during forced diving and for the same reasons.

There are certain conditions of the heart that would exclude its owner from the start from any course of training whatsoever. If, for instance, it should be found, that a slight amount of exercise would cause the heart to beat out of all proportion to such exercise, the chances are that, in spite of the appearances of perfect symmetry and health, there exists some malproportion as regards the size of the heart when compared to the blood vessels to be supplied. At last there is the irritable heart which reacts abnormally not only upon exercise, but also upon physical emotions. All such cases are to be excluded from both the military and naval services.

Motor Nerves.—The seat of the will, in obedience to which, all voluntary muscles may be caused to contract, is in the gray matter of the brain. From the cells composing this gray matter fibres originate and travel through the brain and spinal cord into peripheral nerve-cords and finally terminate in muscular fibre. An act of the will, whatever that may be, means a certain amount of work done by these brain-cells and, therefore, presupposes the loss of a corresponding amount of stored-up energy in the brain, in-

creased combustion and metamorphosis accompanying brain work, just the same as they do muscular work. The nerve fibres, simply conducting the various impulses from the brain to the muscles, seem to play a merely passive role in the process.

The strength of the ensuing muscular contraction is directly dependent upon the strength of the stimulus, generated in brain cells. It does but *seem* as if the muscle of its own accord produced the required strength for its contraction to overcome resistance. Sometimes we rather underestimate the amount of stimulus required for lifting a certain weight. The first contraction of the muscles is, then, not equal to the task and now a stronger stimulus is sent to the muscles and so on until the contraction produced is equal to the resistance to be overcome. An act of the will producing muscular contraction, in other words, a motor impulse, is a product of work done by brain-cells and directly determines the strength of the muscular contraction that follows. The greater and the more intense the process of combustion going on in brain-cells is and the longer in duration, the stronger and longer also will be the muscular contractions that follow it. Both the energy stored up in muscle as well as that stored up in brain cells is supplied from the blood; the blood also removes the products of wear and waste in rushing through the tissues. Inasmuch as it takes time to restore the lost nerve energy, it is not difficult to imagine certain conditions and circumstances which would tend to completely exhaust it and, then, muscular work would cease purely and simply on account of the absence of motor-impulses. Thus, we see, that fatigue of the brain and spinal cord may occur independently from fatigue of the muscles.

We know that during muscular contraction, the blood vessels in the muscle become dilated and, thus, more blood flows through them than during a state of rest. The same increased circulation is met with in the brain during its activity. Energy is used up very rapidly and the waste products are quickly removed. Like muscle, the brain cannot appropriate new materials from the blood to take the place of those that had been expended during a state of activity. Now, while a fatigued muscle will recover after a certain amount of rest, a fatigued brain needs sleep for its recovery. The increased blood flow through the brain, when in a state of intense activity, as well as through the muscle

during its work, is chiefly intended to aid in the processes of combustion, but repair of brain energy can only take place during a state of rest, just the same as we have found to be the case with muscle energy. "During sleep, we find the brain plentifully supplied with rich arterial blood; the better this supply, the profounder also will be the sleep and the more thorough, consequently, will be the repair of the lost energy." (L) "Indeed, the drowsiness, temporarily produced by overindulgence in alcoholic liquors, finds its explanation in the arterial congestion of the brain which it produces." (L) Overwork, forced marches, hard mountain climbing produce the contrary conditions. The overworked muscles with their dilated blood vessels require and hold within their meshes a greater quantity of blood than usual and the likewise fatigued brain, consequently, cannot get its proper share and, for this reason, sleep is either impossible, or superficial, or comes on later, that is, after the muscles have already returned to their normal condition, and we wake up feeling perfectly rested so far as our muscles are concerned, but such sleep has not proved as refreshing as normal sleep usually does. In fact, the influence of a sleepless night upon our feelings is well within the experience of everyone of us and would go far in showing the great importance and necessity for a thorough and complete restoration of our lost energies and the direct dependence of their restoration on sound sleep.

If this condition recurs frequently, or if other conditions are combined to still more disturb and impair the normal process of nutrition of the brain substance, maximal muscular contractions and feats of endurance become absolutely impossible; forced marches are things of the past and a condition known as neurasthenia, the natural result. Neurasthenia, then, is the direct consequence of a disturbance of the proper balance to be maintained between supply of nutriment to the brain and demand of work done by its cells. The organ which produces the will has lost its very source of strength. The motor, or voluntary impulses, which are able to force into activity even fatigued muscles, are themselves devoid of those substances upon the presence of which depend their own productive and creative energies. The condition, known as endurance, depends not so much on muscular power as it does upon a strong will and this again finds its fons et origo in

a well-nourished brain. A lack of endurance, also, constitutes one of the cardinal symptoms of all neurasthenics. Among the more general causes which are productive of neurasthenia, besides actual hunger and starvation diet, the principal ones are alcoholic and sexual excesses. These may be the causes that destroy the endurance needed just at the most decisive moment; through over-indulgence in such excesses, the benefits of a long process of careful training may be lost in a single night. If this happens among a number of soldiers, just proceeding on an arduous campaign, these will be found unequal to their comrades and the dangers of hot forced marches will make as heavy inroads among them, as they do among those entirely untrained and unprepared. It is not muscular strength that was lost in such a short time, but it is nervous energy or brain energy; the motor power has been destroyed and wasted. The muscles become prematurely exhausted, the heart muscles included, because that which gives them their endurance has been taken away. It is for this reason that athletes, while preparing for a decisive game or race, in both of which success depends upon every man's doing his duty to the very best of his ability, give their word of honor not to use either alcohol or tobacco, nor indulge in sexual excesses during the period of training.

The training of a whole army corps is, however, not as easily protected against dangers such as these and, since a few may, nevertheless, endanger the success of a large body of troops, since the rapidity of their united advance is not that of the favored few, but that of the slowest among them, means to that end must be taken and attempts at corruption from that quarter guarded against with special vigilance.

As has already been mentioned, besides want of sleep, alcoholic and sexual excesses, hunger, of course, is the most direct cause of a want of nerve energy and endurance.

Any cause preventing the proper and timely supply of those substances in which our energies are stored up, after they had been exhausted, must tend to make further work impossible, without the very structure and vitality of the organs themselves becoming seriously attacked. At first this attack will be felt in those organs that are directly engaged in the work but, afterwards, the entire organism will be drawn upon and a general loss in weight will be the result.

To what extent and how profoundly hunger influences the activity of the brain, may be seen in the expressions of impatience and irritability with regard to more or less all things, shown by some people before meals, as compared to the more benevolent placidity which characterizes the same individuals after they have had their meals. This feature, undoubtedly, shows part of the animal nature of man. We know that every wild animal is particularly wild when attacked or in danger on an empty stomach and it may be considered good and sound advice, if one man has an important favor to ask of another, that such request had better be made of him after meals than before, even under ordinary circumstances of life.

While this condition of temporary neurasthenia is quickly gotten over, continued starvation finally leads to real neurasthenia which is of longer duration. The will power is gone simply because the fuel has been used up. In this respect the human body may safely be compared to a machine that is insufficiently supplied with fuel and, consequently, stops. Every well-informed husbandman knows from experience that the amount of work to be gotten out of his farm-hands depends, among other things, largely on the quantity and quality of the food which they are supplied with, and every commander of troops should know and realize that the success of those troops, the endurance of long and fatiguing marches, the rapidity of his advance, will be in direct proportion to the quantity and quality of the rations that are supplied to his men.

Those of us who have had opportunities of watching men in training for either foot-ball, or a boat race, know from experience that there comes a time when a few of their number begin to complain of lack of sleep at night, of drowsiness and general apathy during the day and a general lack of endurance both mental and physical. This is the condition known as "overtraining" and the result of a disturbance of the normal balance between supply and demand. It may be that the normal limits of their capacity for training have been reached, if not surpassed, or the condition may also have been produced from lack of sleep, insufficient food, an intercurrent attack of indigestion, etc. In many cases it is due to neither of these causes, but rather an indication that the maximum limit of the weight and strength capacity of the particular number of individuals concerned has been reached and their condition

simply stands as the outward expression of this fact. Their nervous and muscular organizations refuse being developed to any higher degree of functional ability or efficiency. It is well known that there exists a natural limit in both directions for every individual and every attempt to develop him beyond that limit leads and must lead to neurasthenia. This natural limit differs with every individual; it also differs at different periods of life for the same individual. As a general rule it may be said that, after middle life, the normal period of repair of used-up energy begins to be lengthened or takes a longer time for its accomplishment and, on the other hand, the energy itself, both muscular and nervous, is more quickly expended and used up than was the case during previous years and, consequently, neurasthenia becomes more frequent in later life. The important bearing which these facts must have on training is self-evident. Consider for a moment the variegated composition of our army, navy and militia, as to the ages represented by the different men, not talking of the difference of their nationality. In the armies and navies of Europe, we find that the age limit of the rank and file is limited to from 20-23 years and forms a tolerably uniform factor in the problem. Much greater care and circumspection are necessary in the training of such a composite body of men as compose our military establishments than in Europe. Individualization is much more often called into requisition in the United States Army than in the armies of Europe; classification according to age previous to a course of training is almost as necessary as the required physical examination before enlistment.

It is a fact, admitted and accepted by the most experienced trainers that a period of six weeks of training, provided such training has been graded and systematic, will result in developing the men to the utmost limit of their capacity. Every attempt to maintain this maximum condition of training for a longer period has invariably failed. Instead of obtaining a further increase in weight and endurance after the period of six weeks, the very contrary occurs, namely: loss of weight and especially loss of endurance, showing the nervous factor in the equation. In other words, after the period of six weeks, we must expect the condition of overtraining to become general, if a short period of rest does not follow the training.

Whenever the state of overtraining comes on prematurely in certain individuals, it may generally be known by the particular individual not having gained the usual and customary amount of weight during the training period, so far as it has advanced. It has been found in the beginning of training, generally during the first week, that a slight loss in weight occurs. This loss is followed, normally, by a steady and continued gain until the fourth week from which time on, the weight becomes steady and the maximum strength capacity of the individual is reached. Many a game of foot-ball, many a boat race has been lost owing to the fact that the team or crew was overtrained, and not because their work was inferior; it is one of the most difficult tasks to convince an enthusiastic trainer that his men are in a condition of overtraining and need rest. Mere argument and advice will rarely suffice and, unless the medical officer has the necessary authority to enforce his suggestions, the resulting disaster becomes inevitable and may be foretold. Dr. Leitenstorfer speaks of having seen whole battalions in this condition of overtraining. Those who show earlier symptoms of overtraining do not possess the capacity necessary for the event, whatever that may be, and should be promptly excluded, if their health is to be respected and the success of the remainder to be assured. The usual and most common signs of neurasthenia are well shown in the overtrained and are easily recognized; their character seems entirely changed; they have become extremely irritable and explosive in their expressions and demeanor; they are disheartened themselves because they realize their state of health, though unwilling to admit it; they have lost their former endurance and are quickly fatigued; continued training in such cases is not only useless, but generally results in permanent and serious injury.

Now, in this condition of overtraining, the anatomical or histological integrity of brain and spinal cord is not necessarily impaired, the trouble being merely functional and temporary. The machine does not work properly on account of the inadequate supply of fuel. Still, a still further abuse of these structures, through continued and impossible demands on the muscles for work, may also finally lead to real structural changes and cause permanent disease of these organs. It sometimes happens that temporary paralysis is caused by excessive work of certain groups of muscles,

even during the period of training. A case of this kind occurred at the Naval Academy during training for foot-ball, in which one whole arm was paralyzed twice within five weeks. The arm was paralyzed for three days the first time it occurred, but the second time it occurred, it remained in this state for two weeks. It is well known that the persistent and more or less systematic abuse of the muscles, especially by professional strong men and athletes, is bound to be followed by disease of the spinal cord. Besides the usual neurasthenic symptoms, the final outcome is the disease known as "progressive spinal muscular atrophy," which is followed by general marasmus and degeneration of the cord.

Leitenstorfer cites the case of a professional strong man who exhibited himself for some time and was able to swing a pair of dumb-bells, weighing 120 pounds each, while his body was supported by his head and heels resting on the edges of two chairs. After a period of two years of such exhibitions, progressive spinal muscular atrophy declared itself.

Fatigue.—A study of the physiology of exercise shows clearly that muscular work is dependent on the simultaneous co-operation of at least four different organs or tissues, namely: Nervous tissue, heart, lungs and muscles, and that muscular work must come to an end as soon as either one of these four factors gives out. Heart and lungs influence muscular work, of course, but indirectly; breathlessness and palpitation of the heart prove by no means that the working organs proper, muscle and brain, are exhausted or even fatigued, for these are able to continue their work just as soon as heart and lungs have recovered. Fatigue proper, we call that condition of things in which muscle and nerve tissue cease to function normally. A very concise separation of muscular and nervous fatigue is not always easy and often impossible. It is nevertheless interesting to know which of the two gives out the quickest in certain exercises, the muscle or the nerve, the will or the flesh, and the exhaustion of which of these two is the most essential.

It is a physiological fact that no electrical current, no matter how strong it may be, is able to produce so powerful a contraction of a muscle as is the motor impulse generated in the brain and conveyed to the muscle through the agency of its motor nerve. It is, furthermore, well known that, after these voluntary impulses for a

muscle have ceased to prove effective, the same muscle may still be caused to give strong contractions by the application to it of electrical stimulation. It is clear, therefore, that the muscle was not exhausted, but was still in possession of a certain amount of energy available for producing work; the muscle would have continued to contract, had the nervous impulse been strong enough to effect such contraction.

We see, then, that at least one of the causes of muscular fatigue seems to lie deeper and far beyond the mere muscular organ apparently concerned; its own strength is of no avail, when the impulses it receives from the brain are not sufficiently strong to excite it to action. No doubt, muscle can be fatigued, but its fatigue occurs long after fatigue has become manifest in nerve tissues. It is the brain that limits muscular work and fatigue finds its last cause in the exhaustion of those of the cells of the cortex, from which motor impulses originate and are sent out. Some of us also may have witnessed the feats of strength that are done under the influence of an over-excited brain. The dementia and paralysis which follow certain maniacal excitements are examples which show the power and the sway which the brain holds over the muscles.

A classification of the different forms of fatigue, although perhaps difficult in some cases, seems nevertheless desirable and we, therefore, welcome the attempt made by Leitenstorfer, who makes five different groups of fatigue:

1. Muscle fatigue.
2. Lung fatigue.
3. Heart fatigue.
4. Nerve fatigue, or true fatigue.
5. Neurasthenia, or the condition of overstraining being a more or less abnormal condition and of some duration.

The term exhaustion, according to the same author, ought to apply only to the "highest degree of nerve fatigue, affecting the central nervous system and involving the subsequent giving out of all the factors involved in the production of muscular work including the heart's action." In a medical sense and, according to this definition of exhaustion, it would be "wrong to report a battalion having arrived completely exhausted, say after storming a height and arriving on top covered with dust and perspiration and somewhat out of breath;" nor would that term apply to a boat's

crew after a long and fatiguing pull against wind and current, when, in a very short time, both the battalion and the boat's crew, after some rest and without taking any nourishment, each in turn is able to continue on their respective duties. The condition in which the soldiers arrived was simply one of an acute temporary fatigue of heart and lungs; the same is true of the boat's crew. In either, the muscular and nervous factors, though functioning badly, were by no means exhausted to such an extent as to require nourishment and sleep.

In further illustration of the above classification of fatigue, we will quote some of the examples given by Leitenstorfer in his work:—

I. *Muscle fatigue.* "This occurs in its purest form in heavy lifting, knee-bending, pulling up on the horizontal bar, whenever these are continued until the muscles engaged in the work give out entirely. Here the muscles are quickly used up, while pulse and respiration, though increased in number, would still support further muscular work. A short period of rest for the muscles involved, removes this form of fatigue. In case such exercise is pushed to extremes, however, the muscles will swell up and become painful and then the sensations of fatigue in the muscles continue for days."

"During the tetanic contractions of muscles, or whenever certain groups of muscles are expected to keep rigid for some time, muscle-fatigue comes on so much more rapidly for the reason that, in the contracted muscles, the circulation is, for the time being, almost entirely interrupted, the blood vessels being contracted or compressed and carbon-dioxide and the other products of wear and waste cannot be washed away nor fresh oxygen be carried to the muscles. This is also well shown in the act of holding a heavy weight out at arm's length and at right angles to the long axis of the body. In spite of the best efforts of the will, the weight, held in the hand, will sink until the arm is alongside of the body. Will power in this case was not exhausted, for, a short period of rest of the arm muscles suffices to enable the same muscles to do the same work over again. The act, often repeated, would, however, finally involve the nerve centres in the brain and spinal cord which, after a while, must share the fatigue in common with the muscular structures involved in the exercise."

2. *Heart fatigue.* "Acute cardiac insufficiency puts a stop to muscular work in the case of a sprinter or a dancer, not because the particular group of muscles engaged in the work is exhausted, but because, with a superficial pulse of 180-200 p. m., the heart contracting imperfectly and the blood vessels being incompletely distended, the muscles do not receive a sufficient blood-supply and, consequently, of the necessary oxygen. A short period of rest will also suffice to remove this form of fatigue."

3. *Lung fatigue,* "in its purest form, is rare and can occur only in a person whose heart is in the best possible state of training, thus permitting the lung alone to put a stop to the muscular work. As a more general thing, we will find that heart and lung give out together and this occurs when the trained soldier rapidly storms a height, over rising ground, fully equipped for war, during the hot season of the year. This form of fatigue, also, will be overcome by a short period of rest."

4. *Nerve fatigue, or true fatigue.* "This form of fatigue is not the result of short maximal muscular efforts, but rather of long-continued average work, or a large sum of often-repeated maximal muscular exertions, for instance, long marches, mountain climbing, prolonged gymnastic exercises, heavy labor. The fatigue thus incurred cannot be removed simply by a short period of rest; rest, under such circumstances, must be supplemented by food and drink and sleep."

"Complete general exhaustion differs only in degree from this form of fatigue. A single day or night is often not sufficient for its removal, especially when sleep is not prompt in coming on and not profound while it lasts. Perhaps several days and nights are necessary to completely overcome the state of general exhaustion but, finally, recovery will take place, providing the men were well trained and under otherwise normal conditions and the proper amounts of nourishment and rest were secured."

5. *Overtraining,* or "the neurasthenia following fatigue from overwork. This condition is often the result of injudicious training. Inasmuch as it is neurasthenic in character, it belongs to the form known as true fatigue, depending, as it does, upon the exhaustion of certain nerves supplying definite groups of muscles. In its relation to other forms of fatigue, which it resembles in some respects, it is of longer duration, though not incurable. This form

of fatigue is caused not by short maximal muscular efforts, but by work that is continued and constantly increased for weeks in succession, far beyond the natural limit set by a given amount of nourishment and a given period of rest for recuperation."

6. *Overexertion* "resembles more nearly an actual injury done to one or more of the organs engaged in doing or assisting in doing certain work. It may be produced by sudden maximal efforts as well as by continued efforts at work. Heavy lifting or forced diving, giving rise, as they do, to an undue overdistension of the cardiac walls, especially of the right side, may produce it at once. In this category, also, belongs the partial or total paralysis of certain nerves supplying definite groups of muscles. Pain in the joints and along tendons caused by their swelling from continued marching, is also often due to overexertion. Raw recruits often experience a painfulness in the joints, tendons, even bones of feet and legs while in training. While the significance of such an occurrence is not very great, these accidents should be avoided for the reason that they are apt to cause an interruption in the training. Cramps are due to overexertion of single muscles."

Practical Problems.—Having briefly summed up, in the preceding pages, the most important points with regard to the physiology of exercises, we are now prepared to approach the more practical problems involved in the training of the soldier.

We can scarcely make the simplest movement without calling into requisition the action of several muscles at the same time. Even in trying to exercise, for example, a single flexor muscle of one of the fingers, we must exercise at least its natural antagonist, the corresponding extensor muscle also. This double influence must be kept in mind and is peculiar to every muscular exertion. Just as in tacking a ship and, hauling on the yards, both braces are held taut, so also have we, in every muscular performance, two kinds of muscles coming into play, namely, those that do the actual work and those that would naturally antagonize their action. This sort of muscular action is well illustrated in all balancing exercises.

It is, therefore, difficult, if not impossible, to develop one single muscle by a certain exercise; on the contrary, the most insignificant movement involves the concerted action of an entire group. It is also sheer nonsense to try and enumerate the names

of all the muscles involved in a certain muscular act, for most every act of any account, would require the enumeration of all the muscles of the skeleton and a perfect rest of all the muscles can be found only in the "horizontal position of the body, semiflexed extremities, the body resting on a soft elastic couch."

We will now pass in review of the principle muscles engaged during the more natural movements required of the soldier and man-of-war's man.

1. *Position of attention.* Standing in due military form is not a position of equilibrium of the bones of the skeleton. The position, on the contrary, is only maintained through the action of the extensor muscles of the back and those of the hip and knee-joint, together with their antagonistic flexors. The action of these muscles is required for the purpose of balancing the body in its upright position and, consequently, they must perform a certain amount of work to maintain this position. It is of some importance to know that, the knees, though straight, are not necessarily to be pressed back ad maximum. In such a position as this, the soldier is enabled by practice, to assume an attitude at least approaching that of equilibrium from his hip-joint up. Notwithstanding this, however, even under these circumstances, the point of gravity falling somewhat in front of the line connecting the two hip-joints, on account of the chest being pressed forward, work is done by the muscles of the back, of the buttocks and those of the back of the thighs and legs, the mere tonus of the muscles would not be sufficient in keeping the man from falling in a forward direction. Sideward motions are controlled by the tone of the muscles alone. In cases of sudden fainting fits, when men are utterly overcome by fatigue, during which all the skeletal muscles are as if suddenly paralyzed, consequently, unable to act so as to maintain the skeleton in the upright posture, the body falls forward. This I have seen illustrated in men who underwent punishment and were obliged to stand on the deck of a ship, keeping their hammocks on their shoulders during an entire watch of four hours; they would fall straight forward, like a rod, in an unconscious state.

In adjusting a fine chemical balance, there comes a time when both scales will be at rest and the tongue in the centre and on top of the horizontal bar points straight upwards and is perfectly im-

movable, so that its tip would produce nothing more than a fine point on a piece of smoked paper held in suspension over it. Leitenstorfer, applying the method of Vierordt, studied the capacity for balancing on the part of a number of soldiers in different positions, by suspending a piece of smoked paper over the points of their helmets. In this manner he produced a large number of cephalograms, very interesting indeed, and showing that such a perfect balance as may be produced with a scale, cannot be approached even by the best trained soldier. A study of these cephalograms would show above all, that the excursions which the swaying of the body produces on the smoked paper are more extensive in their antero-posterior, or sagittal, directions than in a lateral one, these being in a proportion of 3-1; they show, next that these excursions increase in extent from minute to minute, or the longer a soldier is kept in a definite position and, furthermore, that the excursions are smaller or least extensive in the best trained soldiers. The excursions are smallest in the sitting position, on account of the pendulum being so much shorter; they are larger in standing at "parade rest," still larger in the "position of attention," larger still in the same position with the knees well pressed backward; smaller in the position assumed when shooting on account of the basis of support being larger than in standing, and largest of all in the position of "knees bent," simply because in this position the basis of support is only two-thirds of what it is during standing.

Every soldier has learned from practice that a march of ten or twelve miles does not prove as fatiguing as will a parade of two hours' duration and the privilege of stepping out after a long parade is welcomed as a great relief.

2. *Position of "Parade rest,"* or the "position *hangée*" of the French, is also fatiguing, but less so on account of the work required of the muscles in maintaining the position, than on account of the painful sensations of pressure exerted on hip, knee and ankle joints of the one side. In this position, fatigue comes on sooner than in the position of attention, because, in the latter, the weight is evenly distributed between the two sides of the body, while in the former, the weight of the entire body rests on one leg only.

3. *Walking.* In walking, the upper part of the body is slightly inclined forward and, consequently, also the point of gravity. In order to prevent the body from falling, one leg is swung

forward. Since the hip joints stand slightly lower whenever the body is inclined forward, the leg while swinging to the front, must be slightly shortened, in order to pass over the ground without touching. In the meantime, the rear leg is lengthened because the foot is lowered for the purpose of shoving the body forward, whereupon the rear leg is brought forward, swinging by the other like a pendulum and in a slightly flexed condition.

In Germany, two kinds of military walking or marching are distinguished. The one implies a well measured, somewhat rigid step, the foot striking the ground sharply and flatly with the entire sole, body and head erect and kept well balanced; in the other, the foot is not brought down on the ground with such force, nor strikes it flatly. The first form of a step is used on parade and is, therefore, also sometimes called the "parade-step."

This parade step, when practised slowly and emphasizing, as it were, every detail necessary for its smooth and complete performance from beginning to end, has become one of the most valued means for the development of all the step-muscles, as well as the muscles that balance the spinal column and head.

The reason why this form of step is not used in ordinary distance marching of a battalion, but only as a parade step and as a means for developing the entire step-musculature, is, because it is too fatiguing on account of all the muscles of the trunk and legs being in a state of rigid contraction during its performance. During long marches, therefore, and in order to spare the soldiers all unnecessary expenditure of energy, the easiest form of step, that which requires the least expenditure of energy for its performance, without, however, allowing the body to become crooked, is allowed.

As regards the keeping of the chest well out and the body erect and slightly inclined forward, which is the rule both in the position of attention as well as in walking or marching and running, I was able to produce much better results by explaining to the men that this particular position was insisted upon not alone because it looks well, but for the more important reason that, by maintaining this position, all the internal organs, such as the heart and lungs, are in the most favorable position for the performance of their respective functions; the lungs, by being free from the least compression, can expand more freely, and the heart, for the

same reason, has the fullest play in all its movements, while the stomach and the intestines are well supported by a moderately contracted abdominal wall, the contractions of which co-operating well with those of the diaphragm.

There are six groups of muscles that are more especially engaged in marching, and the proper and efficient development of which is of the greatest possible importance to the soldier. (1) The Psoas and Iliacus which elevate the thigh. (2) The Quadriceps extends the leg upon the thigh, throwing the foot forward and, when the foot is fixed upon the ground, it raises the entire body weight, by straightening the leg, bent at the knee. (3) The various extensors of the foot and toes, situated on the front and outer side of the leg, elevating the foot and guiding it over the ground. (4) The very strong bundle of muscles about the seat which extend the thigh and pull it backward. (5) The muscles, situated at the back part of the thigh, which bend the leg upon the thigh and enable the foot to take hold of and grasp the ground. (6) The muscles of the calf, which elevate the heel of the foot and advance the body forward.

Upon the proper and efficient development of the above six groups of muscles depends the success of the modern infantry soldier and with him of the entire army. The field-marshal of Saxony places the whole secret of modern warfare in the legs and with good reasons, for, by far the greatest and most important part of the work required of the soldier consists in marching.

In accordance with the importance of these muscles to the soldier, and in order that they may be developed to the highest degree of efficiency, the most thorough and painstaking leg-gymnastic has been evolved and is practiced in the German army. This practice consists chiefly in slowly, but thoroughly, going through the different movements which together make up the parade step, and some of you may have seen German recruits going through the maneuver, while passing some of their parade grounds. In order to realize the full value of this practice as a gymnastic exercise, I should advise you to practice it yourselves, systematically emphasizing every and all the separate movements of the dismembered step.

Running.—This differs from walking not only in the increased rapidity and length of the steps taken, but in that the step

is converted into a jump. While in walking, one foot always touches the ground, in running, there occurs a short period during which both feet are off the ground as in jumping and the body is thrust forward through the rapid forward extension of the rear leg.

The muscles which are engaged in running are the same as those that are engaged in walking or marching. During this, the point of gravity is put much further forward than during walking and hence the rapidity with which one foot is put in front of the other, to keep the body from falling in that direction. Picture to yourselves a soldier, loaded down with fifty pounds of equipment, taking 170 steps in a minute, each step of the length of one meter, and you will realize in some measure, the amount of work his leg muscles are required to perform.

The Germans also distinguish a so-called "jump-step" in running. Just as the parade step, or rigid step, is derived from the ordinary walking step, is a "higher powered" step; just so is the jump-step a higher grade of step used in running, of no practical value in itself, but of *very great* value as a gymnastic exercise and, presupposing in the performer already a high degree of strength and elasticity. The jump step is in fact the parade step used in running. While, in ordinary running, the entire sole of the foot is put to the ground, when using the jump step, only the two anterior thirds of the sole of the foot are used, both in supporting the weight of the advancing body as well as in thrusting the latter forward. This maneuver puts extraordinary requirements on the muscles thus engaged.

Jumping.—The same six groups of muscles, enumerated above, that are chiefly concerned in walking and running, are also the principal ones concerned in jumping. In the jump, the discharge of the strength, resident in these muscles, takes place like a sudden explosion. The hip-joint, knee-joint and ankle-joint being entirely flexed and suddenly extended by the contraction of the extensor muscles, the body is hurled forward and upward. Before clearing the obstacle, the legs are again drawn up by the flexor-muscles and held in this position until just before reaching the ground, the weight of the body descending upon the lower extremities as if on a spring. While, then, a successful high-jump depends upon the quick and powerful contraction of the extensor

muscles of the lower extremities, it must not be forgotten, that the equally sudden and powerful flexion of the thighs upon the abdomen, and the legs upon the thighs, their closest possible approach to the body until the knees almost touch the shoulder and the heels the buttocks, is an important element in its execution. A much higher obstacle is cleared with the same expenditure of force and elevation of body, when the legs are well drawn up than when they are not; the difference ranging from ten to fifteen inches. In the standing broad jump, we do not get this advantage and this is, therefore, a more accurate measure for the power with which the jumper can throw himself from the ground than is the high jump. In the running high and broad jump, proper co-ordination and an accurate eye as regards the point from which to jump off, to be acquired only by experience, are also quite essential.

Riding.—At first sight, riding on horseback would seem to imply but a very small amount of muscular work on the part of the rider. Indeed it must be admitted, if there is any benefit derived through horseback-riding, when considered as merely an amusement, the horse deserves to get the lion's share of it, and gets it, too. While the horse is doing a more or less large amount of active muscular work, according to its charge, its rider, on the other hand, is rather in a blissful state of *being* exercised and, in this way, seems to derive by simple contact, a certain amount of benefit from the more active exercise which the horse takes, in the same way that a parasitic animal derives the benefit from foods which his host must digest, but without himself expending hardly any nerve-force and very little muscular force.

It is, however, somewhat different when we come to study horseback-riding as an accomplishment of the soldier. The more or less solid connection between rider and horse is formed by the seat of the former and the back or saddle of the latter. The connection may be likened to a ginglymoid joint, allowing only a backward and forward movement. While, then, the seat and the inner surfaces of the thighs are closely attached to the body of the horse, the spinal column and the legs must, in all the movements, be so balanced that they remain vertically to the point of gravity of the horse unless other positions have become necessary for the purpose of either aiding or preventing certain movements of the horse. The muscles that are engaged in riding, therefore, are those that

keep the head and body erect from the hips up and this is done by the back and neck extensor-muscles and those that keep the inner surfaces of the thighs in close touch with the sides of the body of the horse, which is done by the adductors and the seat muscles. These muscles, when properly managed, form powerful aids in driving the horse forward. Inasmuch as even those of the muscles by which the legs are kept in touch with the horse, are controlled by muscles having their origin in the hip or thigh, the musculature concerned in the act of horseback-riding, may briefly be said to be located in the seat and the thigh.

The soreness and stiffness experienced in the beginning of the exercise, also, is found to be confined to these regions and the back, especially the lumbar region. The amount of work done by the muscles of the legs is reduced to a minimum, because the movement of the feet in the stirrups is, comparatively speaking, slight and consists only in an up and down motion requiring but little force. This may be seen in professional riders, in whom there exists a disproportionate development between thighs and legs as may be ascertained by measurements. This disproportion, also, is soon developed in cavalry recruits.

A good horseman depends not so much upon the amount of strength of his muscles as he does upon the development, in his seat and thighs, of a certain muscle sense or "horse-sense," by means of which he feels the movements which his horse makes or is about to make, so as to enable him to give timely aid to his horse in favorable movements, or prevent any that are not favorable to the accomplishment of his own purposes. Good horsemanship indeed consists in this very co-ordination, acquired either by experience or inheritance, this working together between horse and rider for a common purpose and to the desired end.

Horseback-riding, even for the most accomplished rider, means the performance by the rider of a definite amount of muscular work and must, consequently, in the end lead to a corresponding degree or form of fatigue. Aside from the consequences resulting from the active work of the muscles directly engaged in balancing, etc., those of the muscles and internal organs that receive a merely passive form of exercise, a shaking-up and jolting will, in time, give rise to an increase in temperature and to an increase in the frequency of the heart's beats and the number of res-

pirations. Still, riding alone does not lead up to even temporary heart and lung insufficiency as is the case in running and other similar exercises. This only occurs sometimes on the turf during racing.

Swimming.—By virtue of our ability to retain a certain volume of air within our lungs, the specific gravity of our bodies is somewhat lighter than that of the water, so that we are enabled to float in it. In order to move about in the water or propel our bodies, certain muscular movements are necessary. In the forward movement, the extensors of the legs are principally engaged, very much after the same manner as in the jump. The legs are drawn up close to the body, the thighs forcibly abducted, the legs extended and quickly brought together, feet describing a semi-circle during the maneuver. The body slides forward owing to the pressure exerted by the inner surfaces of the legs upon the cone of water included between them. During this movement the arms must be extended in the forward direction, the fingers of both hands touch each other to facilitate the movement. Next follows the drawing up of the thighs close to the body, by a contraction of the psoas and the iliacus and this is counteracted by the simultaneous movements of the arms and hands backward and downward, effected by the muscles of the shoulder plate and the broad back muscles, or lat. dorsi. The pectoral muscles attract the arms again toward the sides of the body and the extensors of the arms throw the hands forward. In the meantime, the back muscles keep the back hollow and the head well out of water. The respiratory muscles keep up a vigorous movement of the thorax, in which they are supported by the lateral movements of the arms.

The suddenly increased frequency in the number of respiratory movements, made on the part of the lung, which are needed to satisfy the suddenly increased want of oxygen in the blood, is proof of the large number of muscles that must be employed in the act of swimming. We have here, indeed, all the muscles of the trunk and extremities engaged simultaneously and not only mere groups of them. And there is no difference either in the degree of their contraction between any of them nor in the amount of the work which they are doing; all the muscles are engaged in working to their best possible ability. It is this that makes swimming one of the best general exercises there is. Swimming, therefore,

makes the greatest possible demands on the functions of the heart and lungs and presupposes that both are strong and sound; on the other hand, when carefully taught, swimming is one of the best gymnastic exercises for both of these organs.

Vigorous swimming, particularly against current and wind, is very apt to bring on pulmonary and cardiac insufficiency, before the fatigue of the muscles engaged in the exercise, is a complete one. This double insufficiency would occur still sooner, were it not counteracted to a certain extent by the temperature of the water surrounding the body and which has a cooling effect. By filling our lungs well with air, we are able to float on the surface of the water and rest, when fatigued.

Diving or swimming under water is one of the severest tests on the heart, especially its right, or venous, side for, besides the large amount of air already taken into the lung immediately before diving, which distends it and compresses its capillaries at the same time, thus offering a great impediment to the circulation of the blood through the lung, we must, in addition, take into account the pressure upon the thorax which the column of water, resting above the body, exerts on the outer surface of the chest walls. Thus we find that diving just as much as the lifting of heavy weights, is one of the few exercises which may easily cause overdistension of the heart muscle. Persons having had rheumatism or suffered from some infectious fever, or who have indulged excessively in the use of alcohol and tobacco, must take such exercise with caution.

While walking, running, jumping, dancing, riding and swimming form the natural and, at the same time, simple bodily movements, the remaining movements of the soldier, such as climbing, pole-vaulting, fencing, all apparatus work, calisthenics, bicycle riding, skating, etc., are the combined body movements in which upper and lower extremities are engaged more or less simultaneously and form mutual supports and aids to one another. In such combined movements we find in the first place, that they engage a greater number of muscles at one time than is the case with the simple and more natural movements. Thus, in climbing, we have the muscles of the inner side of the thighs and legs. In pole-vaulting, although most of the work being undoubtedly done by the arm-muscles, those of the lower extremities come into play in

jumping off the ground. In bilateral fencing, we find pretty nearly all the muscles of the body and the extremities engaged, although in exclusively right handed fencing it often occurs that we get a unilateral hypertrophy of the respective arm-muscles and, on rare occasions, also curvature of the spine occurs.

Bicycling is more nearly a natural exercise in spite of its being performed on a machine. It is but a modified walking and exercises more especially the step-musculature, with this difference, that the muscles of the seat remain rather inactive as compared to the muscles of the thighs and those of the legs. For the development of the calf muscles, bicycling and mountain-climbing are about equally good. Bicycling, it must be remembered, puts very heavy demands on the heart and lungs on account of the tendency of some of the riders to get over the ground as fast as possible, as is done in scorching.

Wrestling, like swimming, engages all the muscles of the trunk and of the extremities, but, while in swimming, the resistance offered to muscular action and to be overcome, is uniform, that which is required during wrestling is irregular and not always easy to foretell; it trains the eye to quickness in action. The same is true for bayonet exercise.

There are, besides, a number of these combined movements as distinguished from the natural movements, many of which are done in the gymnasium. From a study, however, of the anatomy and physiology of the natural movements, described in the foregoing pages, their interest and purpose may easily be inferred. The same is true of the few exercises that are comprised in what is known as the setting up drill and to which, as a general thing, much more importance is attached than it deserves.

The classifications of these free movements as well as those done on the different apparatus in the gymnasium, will be left to the judgment of the instructor, or trainer, and the purposes he has in view in applying them to the individuals under his care and in his training. It should always be kept in mind that there must be a definite aim as regards every individual's development, the exercises being merely a means to attain a certain well-conceived end.

The Personnel to be Trained.—All military training naturally divides itself (1) into the training of the individual soldier and (2)

into that of a large body of men as a whole. The object of the former is to train the man, develop his individual physique, loosen his joints, strengthen his muscles, raise the standard of his health and endow him with endurance in walking, running, jumping, etc., the object of the latter consists in the employment of such means as are best calculated to still further develop the qualities acquired in the former and assure their continuance and maintenance. The principal exercise employed to attain this end consists in marching which shall be brought up gradually to approach the conditions that obtain in an actual campaign and resembling in all its details those of war.

It is of fundamental importance that the military trainer should, first of all, know the personnel which it is his duty to train and, for the purpose of obtaining that much-desired knowledge, a thorough examination must precede the training itself. At Annapolis, the instructor of gymnastics, acting as recorder, had the advantage of being always present when these preliminary examinations were made and, consequently, knew as well as the director himself what were the good as well as bad points about the physiques of the different individuals who were about to begin training.

The first impression of a new class upon both the director and instructor, although they had already passed the Medical Board, were often not exactly encouraging and, if this was the case with cadets, how much more so must this be the case with recruits. The ideal of symmetrical physical perfection which is gradually formed in the mind of an experienced trainer as the result of years of experience, is so rarely reached by even a single individual out of many that annually present themselves, that it appears to him more and more evident from year to year and, as his experience increases, that without individualizing, his task would be a hopeless one. For, even among an apparently well selected class of people, round shoulders, slight spinal curvatures from faulty positions during childhood, with unsymmetrical hips and shoulders, drooping heads and bow-legs, deficient development of the back and arm muscles may all have their representatives in even so small a number as one hundred. Fortunately, though, as long as heart and lungs are perfectly sound, these are, nevertheless, attended with results often quite remarkable in the hands of judicious

and careful trainers who know the importance of individualization and have experienced the great advantages of the use of special exercises. Training, perhaps more than anything else, requires patience for many of the most uncomplimentary, even intemperate remarks made by onlookers, often concern men of the greatest promise and those who turn out, in the end, the very best subjects not only as regards endurance in drills but on parade.

Almost the first criticism that will be made, not only by the public, but by officers as well, when watching a military drill or parade, is sure to be with regard to the symmetrical carriage of one or two persons in the ranks. It is, no doubt, a great desideratum that every officer and man in the ranks should learn to so control his anatomy as to form a homogeneous link in the chain of his battalion; that he should be ever conscious of the fact that he is one of the wheels of this great, living machine and, that he alone would be all sufficient to destroy the beautiful symmetry of a parade, or that upon him alone might depend the success or failure of an assault. Indeed, a knowledge of the importance of concerted action on the part of every man within the ranks, is looked upon as one of the pedagogical results of any and all the drills in which many men are engaged at a time. A parade, however, should never be looked upon as the *end* in the education of the soldier but only as one of the means to that end.

The chief qualifications that determine the military fitness of a man are: Height, weight, lung capacity, strength, chest circumference, and their mutual relations to one another. These, together with a pair of good lungs and a sound mind, are necessities. Whenever the material to choose from happens to be unusually large, other points of a less essential nature may be taken into account. But much greater care and attention, of course, must be exercised in the physical examinations of cadets, than is done in the examination of recruits for obvious reasons.

With the view of establishing a series of more reliable and trustworthy standards and giving greater definiteness, as it were, to the extent and amount of certain recognized normal and, therefore, allowable deviations, an attempt was made a few years ago to work out the averages with their normal deviations in certain dimensions, such as height, weight, circumference of chest, etc., from a large number of measurements that had been recorded

during a previous period of thirty years, and arrange these data according to age. The measurements from which these calculations were made, having been originally taken from normal subjects, that is, cadets who had passed the Board of Medical Examiners, it ought, naturally, to follow that the deviations, calculated from an average standard, previously established for certain dimensions, must also be within strictly normal limits. This, indeed, was found to be true and the tables which were published in the report of the Surgeon General to the Secretary of the Navy for 1893, have since been in constant use at the Naval Academy as aids in the examination of cadets.

In a general way, however, it is perfectly true and in accordance with our own experience, when Leitenstorfer states, that, "in spite of such attempts having been made, the physical fitness of the soldier cannot be expressed by any mathematical formula." The eye, experienced in training as well as examining men, may often be relied on, when numbers fail to do so. No amount of experience, on the other hand, will absolutely insure against failure in regard to individual cases.

Military Training in General.—The training of men for military purposes and achievements, while differing in many ways from that employed for the various sports and athletic events, has also, on the other hand, many features in common with it. The aims and ends of all training must include a higher standard of health, greater endurance, more will power and an ultimate increase in weight. All these may be attained by means of well systematized muscular exercises.

By measuring a large number of professional foot-ball men, runners, oarsmen, infantry men, cavalry men and sailors and, averaging their measurements in different dimensions, we would, undoubtedly, arrive at certain figures, corresponding approximately to what might be called (but is not) a type for each of these classes of men. Yet these figures, at best, would only represent anatomical facts and, as such, tell us nothing with regard to the physiological functions which each type represents. I can conceive of the possibility of the measurements of two or even three out of the above number of types approaching each other so closely, that, so far as measurements alone are concerned, they might all be placed into one and the same class or type. One group of measurements

out of these three might represent a typical foot-ball player, the second an infantry man and the third an oarsman. These three are chosen, as instances, because they happen to present much the same development as regards the muscles of their backs and legs, consequently, would be most likely to be placed in the same class from measurements alone and without taking into account their previous history. Yet it is not to be expected that the one could be substituted by either of the other two, so far as his skill and his special accomplishments are concerned and the training for which has given him his physique, without material detriment or danger to the success of the game, race or maneuver. This would show that we may arrive at the same ends, so far as muscular development alone is concerned, in many different ways and by more than one method of training; it also shows, that a well developed foot-ball player is not necessarily a good soldier, nor a thoroughly trained soldier a perfect oarsman, in spite of the muscular development of each being much the same. All three have been trained for different purposes and are, consequently, physiologically, if not anatomically, different.

We know, furthermore, that the period of training for any of the sports must never be extended over a time of six weeks on the average, if we wish to avoid the consequences of overtraining. The period of training a soldier is extended over a much longer space of time. The various branches peculiar to the calling of the soldier or man-of-war's man require as much training and leave as sure an imprint on the anatomy and physiology as do the most complicated muscular movements. An essential difference in the training of the soldier, as compared to that of a man-of-war's man, is, moreover, to be found in the period of life at which each begins to learn his calling. A sailor begins young and, before this period of normal growth and development is completed, while the soldier does not generally enlist before he is twenty, an age at which growth in height, at least, is nearly at an end. Both need, therefore, different treatment not only as compared with each other, but also as compared with athletes generally. This fact, however, remains true for all, namely: The highest degree of efficiency within the limits of a man's capacity having been reached, it cannot be long maintained either with or without detriment to his health and a period of comparative rest must follow

and is quite imperative after a period of training. Nor does the training of a soldier or sailor mean that he should constantly be kept at the highest point of physical endurance and efficiency. This sort of training is to be undertaken only periodically and, in Europe, generally precedes the great annual fall-maneuvers.

While it is perfectly true and must be admitted that, in adults, the period of training being over, the former condition of bodily physique returns in about the same period which was spent in training, it is equally true and quite significant that a certain permanent and lasting addition accrues to the organism as regards height, weight, lung-capacity and muscular strength over and above the normal *in persons who had not reached the adult stage of their normal physiological development*, or about 21 years of age, when undergoing training.

And, even in adults, long after the condition of their highest physical efficiency and endurance have passed off and their former natural physique has returned, certain permanent gains can be noted which, according to Leitenstorfer, are as follows:

1. "An acquired freedom in the articulations."
2. "An increase in muscular development which, under the influence of a moderate amount of exercise, may be maintained for years."
3. "Increased co-ordination of muscles; a certain muscle-memory has been created by means of which all the movements are quickly recalled even after years, ex. the mere sight of a musket will cause the veteran to go through all the movements which its contact with his hands seems to suggest."
4. "A larger lung-capacity and a stronger heart with freer circulation."
5. "Moral strength from consciousness of power. In other words, the normal standard of his health and strength has been raised far above the former average, he lives on a higher plane and has acquired more tone throughout his entire organization, which is ready, at any moment, to be again trained, in a short time, to the highest possible degree of efficiency and endurance."

Individual Training.—For the best of reasons, Leitenstorfer insists that "it is not and must not be the object of individual training to at once fit the soldier for enduring long and exhaustive marches, such as he is expected to perform in the end, and to en-

ture, without danger to his health or the condition of his training." In this respect the training of the soldier is different from that which is employed for the runner, foot-ball player, or oarsman. These are trained for an event which is soon over, while the soldier must be carefully trained for a career which may last for years. To start with, the most careful and gradual development of the entire step-musculature is to be aimed at and this object can be attained only by a precise analysis of the step itself and by emphasizing every movement necessary to complete it. The soldier must be taught to walk and step out vigorously, get over the ground at the rate of 80 centimeters per step, endure such walking for days and over great distances, his body being heavily laden, and arrive in the field still fresh enough to go into battle. There is no calling, no athletic sport, which puts such heavy requirements on the step muscles as are demanded from the soldier taking to the field. In view of such demands and requirements, we must find it most logical, that the step-musculature of the recruit should receive the greatest possible attention from the very beginning. There is but one disadvantage, and a serious one, in this method of exclusively training the step-muscles without having due regard to the other parts of the body. Such training must result and generally always does result in the asymmetrical development of the body as a whole, and direct measurements have proved this to be the case. It is found that the muscles of the back and legs are developed much at the expense of the muscles of the arms and upper parts of the body.

While then, says Leitenstorfer, "the systematic exercise or practice of the different and distinct movements of the dismembered step has proved itself to be the most valuable gymnastics for the development of the step-musculature, it must be supplemented by exercises which tend to develop the arms and the upper part of the body, and should not be too rapid." The soldier needs good muscular development of his arms, his shoulders and his neck for the purpose of an erect, strong and enduring carriage, for climbing fences and other obstacles as well as for shooting.

Those who have had experience in examining and measuring recruits will no doubt agree that there exists a greater difference or discrepancy between the strength of the arms of different persons than between their legs. We have even found it one of the

most difficult undertakings to develop the muscles of the arms of different individuals and the upper parts of their bodies, in order to correct faulty carriage, naturally resulting from such weakness. These muscles seem, at least, to respond less promptly to the influence of exercise, than do those of the lower back and lower extremities.

The soldier who is supposed and expected to carry a heavy knapsack on his back, with leather straps over his shoulders, needs good muscular cushions to keep these things from pressing upon the chest-walls, thus impeding his respiration and chafing the bones, and at the same time, allow the free and unhampered movements of his arms.

All this proves the necessity and importance of attending to individual faults in recruits. A company of recruits may, not inaptly, be compared to a chain, in which every link possesses a different degree of tensile strength. While it is impossible to so train and develop every recruit that each one shall be the exact equal of his fellow in both endurance and strength, as can approximately be done with the chain, this must, nevertheless, be our aim, for it has been said, and truly so, by experienced generals, that the rapidity of the advance of an army is not the rapidity of the swiftest, not even that of the average, but that of the slowest, just as the strength of the chain is not that of its strongest, but only that of its weakest links. It is of great importance to advance the whole army, every man being of consequence, especially so in modern warfare.

In the light of facts such as these, it must seem clearly absurd and contrary to the end in view, to train five or ten per cent. of a battalion to do athletic feats, while the remaining ones look on and applaud, and it should never be forgotten, that the highest aim of individual training of soldiers is to produce as nearly as is in our power and as our means will allow that much desired homogeneity as regards endurance in the ranks and out of them, which will enable the commander of troops to arrive in the field of battle with his *entire army* and not to leave the greater portion behind on the field, exhausted and broken down, thus inviting sure defeat.

I cannot do better, for the purpose of showing the startling inequalities in many respects that exist among recruits of even the

same age, than produce a table from Leitenstorfer. Measuring a battalion of men, he found the following results which are exhibited in the succeeding table:

DIMENSIONS.	LIMITS.		DIFFERENCE.	MEASUREMENTS.		AVERAGE OF BATTAL'N
				STRONG'ST	WEAKEST	
Height.....	177	157	20 cm.	173	165	162
Chest circ.....	95-103	78-85	17 cm.	95-103	80-86	84-91
Weight.....	81	50-5	30.5 kg.	81	55	61.5
Upper arm.....	30	24	6 cm.	30	24	26.5
Thigh.....	53	45	8 cm.	53	46	49
Leg.....	38	31	7 cm.	38	31	34.5

If such discrepancies, as are exhibited in this table, are found among men of the same age, what are we to expect to find among recruits in whom even age is not only not a uniform factor, but the most variable of all factors, such as we find them in our army, navy and militia. In the face of such difficulties as these, the task of the training officer seems indeed almost hopeless. We must also, in view of the fact that all recruits must sooner or later form a homogeneous whole, clearly see, how useless it would be to train a few for the performance of feats of strength and neglect the rest. A high average working capacity of the battalion must be the constant aim held in view, and to attain this end, the weakest among the men are just the ones that require not only the greatest attention, but also the very best experience and judgment. All those, therefore, who are from absolute lack of natural endowments, entirely unfitted to benefit from or endure the necessary training with its hardships, must be early discovered and promptly excluded, lest they shall become a useless burden on the battalion and dead ballast on its hands.

All these things require the experience and skill as well as personal devotion of the expert military trainer. A high average working capacity of the battalion as an entirety, a high degree of uniformity in strength and endurance among the individual soldiers so as to approach almost the ideal condition of homogeneity, a perfect machine, equally strong in all parts and without a single flaw, these are the objects of individual training.

Diet and Nutrition.—The human body consists, on the average, of 59 parts of water, 9 parts of albuminous substances, 6 parts of glue, 21 parts of fat, 5 parts of mineral matters and 1 part made up of extractive matter (creatin, creatinine) and carbo-hydrates (glycogen and sugar).

During the life of the organism, the relative quantities undergo a constant change and readjustment in accordance with the requirements of its daily needs. No thought can be launched into the world, not a single finger can be raised except through the agency of the fine fabric of brain and muscle substance. But, accompanying the performance of both mental and muscular work, there goes hand in hand a substantial loss of matter, which loss must be made good, so that the disturbed balance may be restored. The craving known as hunger, is but the outward expression of something needed inside and the various forms of fatigue are nothing more or less than so many different kinds of hunger located and felt in those tissues that need nourishment most and, consequently, cry for it the loudest in the only way they can. It will be seen, therefore, that the relation which exists between any kind of training and nourishment, is both intimate and important. Careful weighing has always resulted in showing that there occurs a loss in weight in the beginning of training for any of the athletic sports, but this initial loss is followed just as quickly and surely by a more steady and, finally, permanent gain. Thus the average gain in weight of twenty-five naval cadets in training for foot-ball within the period of two months, amounted to 3.28 kilos. Out of this number, two showed no gain at all, one lost one kilo, the lowest gain was two kilos, the highest six kilos. According to Leitenstorfer, the increase in weight of recruits after three months of training was on the average 3.27 kilos, or almost exactly the same as was found in the cadets.

The initial loss and subsequent gain in weight may always be observed during the training of recruits in which the diet is sufficient and can be controlled. The loss of weight is, very naturally, always greater in the well nourished and fat people, less great in the thin and poorly nourished ones. In order that the gain in weight shall be normal, attention must be paid to the quantity as well as quality of the food. Whenever recruits are undergoing hard training and perform an unusual amount of muscular work,

their rations must be adapted to their needs, or a loss in weight instead of a gain is always sure to follow. It has been repeatedly shown, in Germany, whenever soldiers were maneuvering, the maneuvers approaching the conditions of war, on a *peace-ration*, that they all lost weight and, consequently, also the benefits of the training which it, nevertheless, was the intention they should receive. Such loss has been known to reach an average of 2.78 kilos (L).

We must agree with Leitenstorfer who remarks: "Since the war-ration for the army is, by regulation, a higher one than that allowed on a peace footing, it stands to reason that no one has any right to exact the unusual requirements of war maneuvers from soldiers, who has not also, at the same time, the necessary authority to increase the soldiers' rations." That the living organism in all its various functions *can be improved* by the judicious exercise of such functions, under the strict observance of the laws of physiology, lies at the bottom of all training, mental as well as physical. But, increased work demanded from either, requires an increased supply of fuel, if not, the machine itself is to be worn out and ruined.

As a general rule, for purposes of training, that diet is the ideal one which nourishes the body without burdening the stomach, in other words, a diet which supplies the necessary amounts of albumen, fat and carbohydrates in the form which is most easily digested and assimilated. The growing muscles need albumen and, since during muscular work, the fats and carbohydrates are being burned up, it becomes necessary in the first place, to increase the amount of fat in the food. An increase in the amount of carbohydrates is not so necessary because all the rations contain a superabundance of those foods that contain them. The most frequent errors and the most serious mistakes in the composition of rations occur with regard to the quantities of fat which are allowed and which, in most of them, is much below what it ought to be.

The most valuable albuminous diet for growing muscles is fresh meat, especially fat beef. The vegetable foods that contain a large percentage amount of albumen, vegetable albumen, are not so easily digested; besides, they contain a large surplus of carbohydrates and are, consequently, too voluminous a diet for the purpose of supplying the soldier with albuminous food for men undergoing training.

During muscular work, the muscle is not itself consumed as long as there is at hand a sufficient supply of fats and carbohydrates. An increased quantity of fat must be taken by those who are expected to do an increased and increasing amount of muscular work. Fat is the best fuel and its presence protects the growing muscles from being itself consumed. Both fats and carbohydrates must, of course, be given in a mixed form. In case the meat happens to be too lean, the necessary fat must be added in the form of bacon or butter. No form of fat, however, is so easily digested and, consequently, so little of a burden for the digestive organs, as is the fatty meat from our domestic animals.

It is evident, from what has been said, that an officer in command of a number of men, is not doing his whole duty, when he is satisfied to merely fill the stomachs of his men; he must also look after the quality of food which they consume.

Another point of great importance is the quantity of water which is taken by men in training. Water must not only be pure and wholesome, but a certain quantity of it is absolutely necessary to a perfect diet. But, the percentage composition of all food-stuffs shows that they contain a not inconsiderable amount of water and, therefore, it would not seem necessary that much water need be drank in addition to that which the food already contains. Indeed it may be urged as one of the objections to the common ration of the soldier and man-of-war's man, that it is too sloppy, too wet. Soups and similar slops, while no serious objections under ordinary conditions, during training, are to be reduced on account of their occupying too long a time for their absorption and, thus, form an unnecessary burden or ballast.

It has long been known that horses fed on moist grass, clover or oats, sweat on making the least exertion and have little endurance. A large quantity of water, taken with meals, dilutes the food material as well as the gastric juice; digestion is much delayed and the absorption of the digested food is much retarded; the stomach is distended and unnecessarily burdened with ballast; the tissues themselves become too moist, if not altogether œdematous and the combustion of the fats and carbohydrates remains incomplete, while the deposition of adipose tissue is favored.

Besides the proper quantity and quality of a diet, we must have a frequent and a wholesome change. The most hungry stomach

will refuse to be satisfied at times with the same food for all times. An exhausted soldier will often, even in a state of hunger, refuse the proffered food, preferring to go to sleep without taking the much-needed nourishment and suffer the consequences, if there is an unwholesome sameness about the bill of fare.

The temptation of consuming too large a portion of the daily ration at one meal is also to be guarded against and a more judicious division very desirable. As regards coffee for breakfast in the morning, it is, undoubtedly, a most desirable adjuvant. But it must be coffee and not one of the numerous substitutes for coffee. Then again, it must be remembered that coffee is only a nerve stimulant and not a food. Coffee simply stimulates the motor-nerves and cannot take the place of any other part of a perfect diet. In order to give the "coffee" or the "tea" the significance of a nourishing meal, we must add milk and sugar to it, and eat bread and butter with it, with perhaps some bacon.

Alcohol.—We have seen in the foregoing, when water is taken in too great quantity during training, its use is anything but useful. It retards the effects of training and, in the fully trained, lessens muscular tension, overburdens the heart by increasing blood pressure, overtaxes the activities of the lungs, the sweat glands and the kidneys, consequently, depresses the working capacities and the endurance of the men.

A still greater danger, however, arises from indulgence in alcoholic beverages. These affect the men in training not only as water does by necessarily increasing their ballast and retarding their digestion, but by a direct destructive action upon their energies and endurance. The question of the effects of alcohol and its derivatives on human organization has, of late years, been extensively studied in all parts of the civilized world and is rapidly approaching the condition of final settlement among scientific physiologists. Physiologists are agreed that alcohol directly attacks the substance of the brain-cells and after a brief period of stimulating them to abnormal activity, finally paralyzes them completely. The prolonged influence of alcohol destroys these substances not only temporarily but attacks their structure, upon the integrity of which their continued activity depends. Experiments have established the further fact that alcohol is not a food and cannot take the place of one. Moreover, the idea held formerly,

that its presence in the blood would retard the combustion of nitrogenous material, has also been entirely disproved and it was found that instead of retarding it, it causes an increased combustion of these substances. Practical experiments, made with alcohol on large bodies of men who had to endure long and fatiguing marches during the war of the rebellion, have also conclusively shown that it is disadvantageous. We know of its disastrous effects in hot climates and of the dangers of its use in the polar regions. Therefore, alcohol is not entitled to form any part of the rations of men training, especially of soldiers.

Mental Training.—An experience of five years at the Naval Academy where I was given charge of Physical Training, has taught me among other things, the great value and influence which the mind exercises over muscular work. There is, in my opinion, no system of exercises, no code of law, physiological or municipal, no regulation or discipline, that does not need to possess elasticity sufficient for an occasional and timely relaxation, a special interpretation and application to suit the present and ever-changing condition of men's minds, if otherwise we would depend on the best quality of their work. In superintending the exercises of the cadets, and sometimes noticing how mechanically these were gone through with, and how far off their minds, apparently, were from their work, it was perfectly surprising to note the difference in the performance of the exercises that immediately followed a short rest, a few encouraging words, an earnest and well-intended appeal to their manliness and an explanation as to the higher purposes, meaning and significance of the work in which they are engaged.

I am firmly convinced that the difference in the effects on the human organism to be obtained through muscular work from the different systems of gymnastics is, at least as much due to the personal influence of the individual instructor over the minds of his men, as it is due to the special inherent virtues of the particular system employed and, as compared with another.

Different minds need also different treatment, and the experienced trainer, in order to obtain the same results in all cases, modifies his treatment to suit the natural requirements of the individual. The mental discrepancies which exist among a lot of men, are at least as great as the physical ones are, and, since, as we have

seen, muscular work is directly dependent on the condition of the mind, the treatment of the latter should engage as much the attention of the trainer as does the development of the body.

There is, for example, the city boy, up to all sorts of pranks and always bent on mischief, trying to get everybody into trouble except himself; alongside of him we find the good-natured but slow, if not stupid, country lad, still laboring under the depressing influence of the newness of his surroundings and falling an easy prey to the pranks of the former. These must not any more be treated alike, than they can be pressed into the same mould, at least not for the purpose of producing the best results of individual training. The sailor-boy, who as a general rule, begins his training from 4-6 years earlier in life than the soldier, requires in this respect also much more careful training than does the soldier.

But, over and above the merely temporary mood, the mere frame of his mind, stands the soldier's mental endowment, his intelligence and inherited mental capacity. This also must be trained and cultivated. Both soldier and sailor must be educated in order that they may become intelligent machines and, whenever a time should come, when the necessary word of command is missing, that they shall go on working in the way they should, without any command. The better the education, the better also will be the results of individual training. Moreover, while it must be freely admitted that in a military organization and for purposes of military discipline, it is absolutely necessary that a man should learn to subordinate his own will to that of his superior, his superior or trainer should remember that the man's self-respect is not to be crushed out of him during his training, but must be carefully preserved and developed.

Thus, it will be seen that the successful training of the individual soldier implies a certain amount of intelligent instruction and forms, in its entirety, a most difficult and responsible sort of problem. *Cæteris paribus*, we may sum up by saying, that the best soldier will be the one who has received the best mental training; and the best instructor will be the one who has the highest conception and the profoundest and broadest knowledge of his duty and his calling, coupled with the ability of communicating both to his men.

The greatest and most successful commander of troops will be he who has himself acquired the most thorough knowledge and appreciation of the principles involved in training his men and is thereby enabled to constantly keep in the closest possible touch with the needs and requirements of the ever-changing conditions of his troops, during the great maneuvers or an actual campaign. A maneuver of so large a body of men as a commander is responsible for handling at times, is an experiment in which every detail concerning the care of men, must receive the greatest and promptest attention by the commander himself, in order that it shall be successful, because nothing can be done without his order, hence, also, his responsibility.

Training of the Troop.—The recruit having been gradually and symmetrically developed, understanding the use of arms, having, moreover, been thoroughly drilled in all the movements of the company, battalion and the regiment, in other words, having received all the educational benefits and advantages to be derived from individual training, he is now ready and prepared to join larger bodies of troops.

The training of the troop, as distinguished from the individual training consists, according to Leitenstorfer, "in the systematic and gradual increase in the efficiency for marching and in the maintenance of a high average ability and endurance."

Though we must accept it as a fact, that the highest possible physical efficiency and endurance which a man is capable of reaching, through individual training, cannot be maintained for any desired length of time, either with or without danger to his health, it is, nevertheless, one of the outcomes of individual training that the soldier is kept in such a condition of physical perfection, so as to enable the commander to force his troops up to this point for a short period of training, whenever the exigencies require this to be done. The recruit, moreover, cannot be considered ripe for troop-training until he has successfully completed his individual training and passed through the various company, battalion and regimental drills.

The period of troop-training should never be extended over three weeks, since experience has shown that such efficiency and endurance, as is the aim of this training, cannot be maintained be-

yond this period without the troops passing into the condition of overtraining with all its attendant dangers.

In the German and other European armies, this begins in the fall of the year and ends with the great maneuvers, which, as we all know, approach in severity and in their demands upon the endurance of the soldiers, the conditions of war as nearly as these can be anticipated and reproduced.

The greatest danger that threatens the maneuvering of large bodies of men, of course, is the heat stroke, but since the discussion of this would lead us too far, it is perhaps just as well to leave this subject for a future occasion.

Troop-training must be regarded as the finishing touch upon a soldier's training and a short period of rest, generally two weeks, should always follow.

Have we anything in this country that would approach such training? Is it even desirable that we should? Are the requirements and the conditions which we have to meet, sufficiently different from those prevailing in other countries, that we can afford to dispense with the complete and thoroughly efficient training of our soldiers and men-of-war's men? Is there anything we could substitute for such training? These are some of the questions which we must ask ourselves and I know of none in relation to the personnel of our military establishments that are of such real importance, whenever the *efficiency* of the service is urged and made a prominent feature in the argument.

It is not for me to suggest reforms with regard to the technical training of our soldiers and men-of-war's men, and far be it from me to lose myself in vain and useless criticisms of existing conditions of things, but, from a point of view of training and developing the physique and endurance of those whom we look upon as the bulwarks of our defense, much as yet may be learned from an examination into the methods employed by other nations.

II. WHAT TO AVOID IN ARMY ATHLETICS.

BY LIEUTENANT JOHN STEWART KULP,

FORT WALLA WALLA, WASH.,

ASSISTANT SURGEON IN THE UNITED STATES ARMY.

A GENERATION ago found England in the same position as regards athletics as we are in to-day. The first day of April, 1865, happened to be clear and pleasant, and saw many an athletic meeting throughout the United Kingdom. The year before had witnessed the first inter-varsity contests, the initiation of Civil Service athletics, and the foundation of what was to be afterward the London Athletic Club. Deerfoot, the Canadian half-breed, had previously won match after match and awakened public interest in such contests, so that every college and school seemed mad over its runners and jumpers, and according to Shearman, thousands of athletes were contesting upon various English fields that Saturday afternoon.

Three thousand miles away, the gallant cavalry of the Army of the Potomac, the 24th, and one division of the 25th Corps—athletes all,—were moving towards Appomatox. Few men, before or since that time, have carried as did they, forty pounds for thirty miles daily. They were athletes because they did work which only athletes could do, and the requirements of war made it necessary. No one can say from just how many men these seasoned, veteran regiments had been developed, but an average of all available data gives about forty per cent. at the end, exclusive of casualties. A month from the time of which we speak 202,709 men were carried on the rolls of the army as "absent"—202,709!

These men were absent because of injuries received, a few were on leaves of absence, but the vast majority had physically failed where other men had stood the strain.

Anything then that will make an army stronger in its everyday fight against disease, quicker to recover from the blows of an antagonist, harder to conquer by hunger and thirst, heat or cold, and better able to bear its burdens is of importance, the highest

importance, and this is what we believe that properly conducted athletic exercises will do.

In the old days, when battles were decided by the strength of the right arm behind the short sword, there was a method of rapid elimination of the weaklings, and no red-cross societies kept the wounded soldier alive to consume food, transportation and attendance. It is improbable that a Centurion would have enlisted the best carpenter of that day were he a poor specimen of humanity. Then it was not necessary to prate of athletics.

But now, when brain has so far triumphed over muscle that we are apt to forget the latter, and to regard our soldier as a mere piece of mechanism, we disregard perhaps the material of which the machine is made. Every man's cosmos consists largely of ego, and it is an axiom that this personal equation can be best eliminated by discipline. The true athlete is he who has taught his muscular system absolute, unflinching, unquestioning obedience; and such a one is most amenable to control.

For the past four or five years the prevailing sentiment in our Army and National Guard has been more and more favorable to athletics. Mistakes have been made and corrected, lessons have been learned and experience gained, results have been achieved and various methods and "systems" advocated. Ideas coming from so many, and from such various sources have, all things considered, harmonized wonderfully well, and every department of the service has benefited in greater or less degree. It is not the province of this paper to criticize those who have been the pioneers in army athletics. They have worked, and are working, an educational campaign and deserve all praise. Most of those who were far-sighted enough to foresee the results, and to reason from analogy, were men having little technical, or even practical knowledge of athletics, and they had to depend upon what little reading they could find. Two or three officers have had some little experience in gymnasium work and they also have labored faithfully in their line.

But the subject of physical development and especially the department of it that includes athletics, is very largely a technical one. Its mastery cannot be accomplished by reading a few books, or by any system of theoretical instruction. It is eminently practical; as truly so as is the preparation of a trotting horse for a race.

Would we consider the average medical officer, or company commander competent to train a valuable horse? Men who have had years of experience have formulated certain governing rules, which have been found best calculated to carry out the fundamental principles. So far as athletics is concerned, it is as necessary for the officer to know these rules, as it is for him to know the principles of rifle-fire if he would teach marksmanship. We are striving to introduce athletics, not as a pastime, but in order to produce results, and in order to compare results uniformity is a *sine qua non*. These rules have received the sanction of the Amateur Athletic Union and, embracing all usual forms of exercise, can be procured anywhere at a nominal cost. They are in force at every amateur athletic contest, whether collegiate or club, throughout the United States, and might well be officially adopted by the service.

It is needless then for each post to attempt to frame a set of rules for its guidance, and some of the unbusiness-like arrangements, with contests often at unknown or irregular distances, and in outlandish costumes are deplorable. Events are misnamed, distances are measured by "Times around the track," measurements are improperly made from ignorance, and carelessly from lack of interest, while incompetent timing creates many a phenomenal "record." Given a fair hundred-yards sprinter, and a starter and time-keeper who are novices and no record is safe. Events called "Novelty Races" are introduced because they provoke the risibilities of the spectators, wherein enlisted men perform clownish antics in climbing over brush obstacles, or in picking up a given number of cartridges; while officials, appointed apparently at random, produce a field day reminding one irresistibly of a country fair. In a recent instance the days of O'Leary and Weston were recalled by a "Half-mile go-as-you-please race." Our people are too fond of fair play, and retain too much of the spirit of their ancestors to need any "bush" to excite their interest in straightforward, earnest, manly contests of skill and strength.

The giving of money-prizes is, in itself perhaps our worst fault. The value of emulation wanes as the intrinsic worth of the prize grows, for never has money-prize been so coveted as was the simple laurel-wreath. The mere fact of contesting for a staked bet or money-prize thereby makes a man a professional, and he can never again compete with amateurs. It is the actual forfeit-

ure of his athletic citizenship. The prizes should be neither money, orders representing money, nor yet "useful articles" donated by tradesmen and easily convertible. They should be metal badges, of small value, suitably engraved, simple and uniform in design, and valuable only as souvenirs. More than almost anything else the writer values his forty-four "firsts."

If the men of an organization are properly exercised the result may be that a number of athletic specialists are developed, or that the physical condition of the whole command is improved. We should strive for neither of these things separately, but for a combination of both. The best athletes of an organization should be encouraged in their special events as they set a standard of excellence for their companions, represent their company in its contests with others, and create, and keep alive, an interest and rivalry in athletic affairs. On the other hand the strength of a chain is but that of its weakest link, and still more important is the building up of the weaker men of the company. They do not win applause on field day, but their improvement changes them from the non-effective to the effective list, and the care and attention bestowed on them is repaid with interest when the test of real service is at hand.

Even officers, whose whole idea of athletics is "movements with dumb-bells, and running on the toes with nasal breathing," can grasp the idea of systematic, carefully graduated, progressive gymnastics, (using the word in its broadest sense). Exercises which improve and build up a whole company will be known by their fruit if given an opportunity. We cannot convert the older generation, who believe "the shovel to be the best gymnastic apparatus for soldiers," for they do not know the meaning, nor indeed would they notice, occupation hypertrophies or inharmonious development. It matters little how strong a man's back and arms may be, if his legs are too weak, and his lungs too muscle-bound to let him march; and it requires no trained military mind to judge whether a detachment of active trained men, or one of day-laborers, would deliver the steadier fire after a skirmish run.

In some of our posts regular exercise is given solely in the gymnasium. It is hard to make men understand that the benefits derived from athletic work extend to every part of a man's structure, and not merely to his muscles. The clear healthy skin, the

throwing off of waste fat from heart, lungs, and abdomen; the quickening of sluggish perceptions, and the whole feeling of *bien être* are all directly acquired results. Intelligent gymnasium work is of great importance, and is invaluable for building up weak and undeveloped parts, but it cannot do everything and develops principally the muscular system. The chief factor in determining vital capacity is the strength of heart and lungs, and these organs can only be brought to perfection by exercises involving progression, such as running, rowing, swimming or bicycling. The track and the gymnasium are both necessary, each supplementing the other, though it is important that the gymnasium drill be made as interesting as may be to achieve the best results for, as Mr. Koehler says, "The human brain has more effect upon the human muscles than all the apparatus ever designed by man."

Army athletics, as a whole, are *sui generis*, because we have here large numbers of able-bodied men under perfect control so far as regards almost every act of their daily lives. They are accustomed to outdoor exertion, they observe regular hours for food and sleep, they are healthy, and they are well housed. Such conditions exist nowhere else and are particularly favorable for physical culture. To proceed systematically, and in order to better understand the whole subject of athletics, we can perhaps with advantage subdivide it somewhat as follows:

A. OUTDOOR ATHLETICS.

I. Track Athletics.

- a. Running.—100 yards' dash, 220 yards' dash, 440 yards' run, 880 yards' run, 1 mile run.
- b. Walking.—1, 3 and 7 miles, (latter unusual).
- c. Bicycling.—Various distances. Where it forms but one event, 2 miles.
- d. Hurdling.—120 yards, hurdles 3 feet 6 inches; 220 yards, hurdles 2 feet 6 inches.
- e. Skating.—Straight-away or backward, at various distances.

2. Field Sports.
 - a. Field sports proper—
 - a. Jumping.—Running broad, running high, standing broad, standing high, hop-step-and-jump.
 - b. Tugs-of-war.—Prone on cleats. Standing.
 - c. Throwing Hammer.—Weight 16 lbs., length 4 feet.
 - d. Putting shot.—Weight 16 lbs.
 - e. Throwing 56-lb. Weight.—For distance; for height.
 - b. Games.—Base-ball, foot-ball, hare-and-hounds, lacrosse, polo, etc.
3. Aquatic Sports.
 - a. Swimming.
 - b. Diving.
 - c. Rowing.
 - d. Water Polo.

B. INDOOR ATHLETICS.

1. Gymnasium Work.
 - a. Free gymnastics or calisthenics.
 - b. Minor exercises, using dumb-bells, bar-bells, Indian clubs, punching bag, chest weights, etc.
 - c. Major exercises, using parallel bars, horizontal bar, vaulting horse, flying or fixed rings or trapeze, inclined plane, ladders, etc.
2. Competitive Exercises.
 - a. Boxing, wrestling, fencing, lifting.
 - b. Jumping, as above.
 - c. Games.—Bowling, hand-ball, basket-ball, etc.

Each and every one of these exercises subserves some useful purpose, and no expensive apparatus is required for their employment. A quarter-mile track, with slightly banked turns and a firm but not unyielding surface, a few sixteen-pound shot, a tug-of-war board, and hurdles and uprights made by the post carpenters are sufficient for all outdoor work. Surely there is little labor or expense involved.

But someone asks, "Are not contests injurious, calling as they do for such great exertions?" We reply that no man should be

allowed to contest with another without proper preparation, for it is a well known fact that exercises which are beneficial to a trained athlete are often positively injurious to a man of sedentary habits. A novice luckily dreads contests, and yet it is only by their means that his interest can be maintained. It is difficult for a strong, healthy man, who is in good condition, to injure himself by any exertion which he can put forth, and trials of speed should be encouraged, when not carried to excess. In this way each man is made zealous for his own prowess, for that of his company, his post, his regiment and his department. The performances, not alone of those who excel in strength or speed, but of every man should be known to the officer in charge so that each unit may feel that there is not only a personal knowledge of his work, but also that there is a personal interest taken in it as well.

The officer in charge should be able to instruct each man in each athletic specialty. He teaches the runners, for instance, the various methods of starting—than which nothing better trains both ear and mind to alertness. He sees that each man studies his own particular stride and action; his speed at the various points in his distance, as well as what effects the condition of the track, the temperature, or any abnormalities of weather have upon his strength and speed. Whether he does better in practice or in competition; and, if a distance runner, how to so plan his race as to give himself the final advantage. The instructor also teaches the elements of personal hygiene in regard to cleanliness; the care of the skin, the muscles, and the digestive organs, as well as the avoidance of alcohol, tobacco and other drugs. In this manner by training the man to run he is also trained to think. He learns to judge distance, to be alert, to be temperate, to be healthy. Gradually, as his training progresses, he becomes more and more interested in his increasing power, and when the contest comes, and the last hundred yards of the race finds him almost spent, and dizzy from exhaustion; when the track swims before him, and the blood-taste which every athlete knows, fills his throat; when brain is deadened by exertion and every muscle seems of lead: then he knows that his rival is in the same condition, and answers spurt with spurt until, winning by the strength of his will and muscle, he finds that his training has developed courage also.

The contests naturally divide themselves into three classes: The first, which for convenience we may call organization games,

are trials between members of a company or detachment, under the personal supervision of the officer in charge. These should be held at least every month during the season of active athletics, and if practicable as often as every two weeks. In order to encourage the men they should be handicaps, framed slightly to the advantage of the scratch men, and they should be carefully timed, measured and managed, in order to give them practical knowledge in the details of athletic meetings.

The second, and more important games are those in which a whole regiment or post is concerned, constituting a field day. This should be held twice yearly, in spring and fall, and the following plan, which has already been tried with success is recommended: A board of three officers, including the instructor of athletics, is appointed by the post or regimental commander and this board appoints the necessary officials and arranges the list of events. Each company enters two men for each open event, and a suitable number for each team contest. Each contestant is given a number, those from the same company having the same color, and these numbers must be worn conspicuously. A certain number of points is credited the winner of each contest, and the organization which sums the highest total wins a suitable trophy. Prizes are also provided for the first and second in each event.

Yearly a department competition should be held, the committee in charge being appointed by the commanding general. In this the team from each post should be selected by the officer who has trained them, and should consist of the winner of each post event, provided that he reached a fair standard, and a suitable number for the relay races and tug-of-war. Prizes should be awarded to the first and second in each event, and to the post team scoring the highest total.

The success of our recent tournament in Madison Square Garden shows with what enthusiasm the public patronizes any gathering of this kind, and the extended notices which it received brought our Army and National Guard in closer touch with the people than ever before, while those Departments which have already tried the experiment have met with success beyond their most sanguine expectations.

But it may be said that for these contests months of preparation are necessary, and so they are. Months, during which the

man is keeping away from the saloon, and from the dance hall, while the up-building of the man within him is going on, and during which he is exchanging habits of idleness and intemperance for endurance, dexterity, strength, and presence of mind. It is this very preparation that we are striving for.

Space does not permit an extended reference to the gymnasium exercises as they are carried on, but here also there may with reason be a plea for uniformity. Every post now has its own exercises, some of them excellent, others not. We have every gradation from the light aimless movements of the Swedish Army, through the precise stiffness of Prussia, where every movement is "made with the greatest possible amount of mental and physical exertion," to the *ollapodrida* of France, which includes everything under heaven, and some things that are not. Maclaren says of the French soldier, "He is taught to walk on pegs of wood driven into the ground; to push, to pull, and to wrestle; and although the boxing which he is taught will never enable him to hit an adversary, he is taught manfully to hit himself, first on the right breast, then on the left, and then on both together, with both hands at once; and last, but not least, he is taught to kick himself behind, of which performance I have seen him as proud as if he were ignominiously expelling an invader from the *sol sacre* of La Belle France."

And so we say, now that we are almost through with the experimental stage, give us some standard system of indoor athletics for the winter months? We have the men, we have the time, the place, the apparatus, and we need only that which every other civilized army has—a thorough manual of gymnastic training.

The school for the soldier's muscles has come to stay, and now has a place beside those which train his eye, hand, and brain. The great difficulty lies in the selection of the schoolmaster, and in his education. Unfortunately the fact that an officer is young, or is popular with the men, or has played on some foot-ball team in his youth, does not necessarily make of him a good instructor, although unfortunately the instructor is usually appointed for one or more of these reasons. It is not an essential that the officer in charge be able to do even time, or in fact, that he be an athlete at all, if he knows how to develop men and is active, energetic, and progressive. The one thing he does need is a love for his work,

which will grow with it, and knowledge which can be acquired only by reading and experience. He must know what constitutes a fair average performance in any event, and how to get out of a man the best that is in him. The theoretical part of his work requires real study, and the practical part close observation and untiring application. No officer can do the subject justice unless he is practically relieved from other duty and given as much latitude as possible, and the present custom of adding this to a man's other duties cannot be in the interest of good results. The following books, amongst the many on this subject, are of more or less interest:

The Laws of Athletics, and rules of the Amateur Athletic Union, (25 cents), A. G. Spalding & Co., N. Y.

Physical Education, A. Maclaren, new edition, Oxford, Clarendon Press.

Practical Training for Contests, Health and Pleasure, Randolph Faries, Outing Company, 239 Fifth avenue, New York.

Athletics and Foot-ball, Montague Shearman, Longmans, Green & Co., London.

Training in Theory and Practice, Maclaren, Dick & Fitzgerald, New York.

Track Athletics in Detail, Shearman, Harper Bros.

Perhaps an active athletic experience of over seven years has caused the writer to take a too roseate view of his subject, and yet no one who has had any extended experience in recruiting will deny that physical education is a necessity. No one doubts but that our Army can already drill, march and fight well, but that is no reason why we should be satisfied; and it is only hoped that the above lines will be accepted in the spirit in which they were written, for after all, we of the Army and National Guard are of but one great family, all striving for a common end.

III. PHYSICAL TRAINING IN THE NATIONAL GUARD.

BY CAPTAIN WILLIAM ALFRED WESTERVELT,

COLUMBUS, OHIO,

ASSISTANT SURGEON IN THE OHIO NATIONAL GUARD.

TO those acquainted with the nature of the work demanded of the National Guard the necessity of preparation need not be mentioned. The sudden call; the hard, unbroken round of duty; rest obtained when and where possible, and mostly not at all; food taken in the same way as rest—all demand a great capacity for endurance and adaptability. We are soldiers for the time—the exigencies of the service demand these hardships, so the one alternative left for us is to prepare as best we may for what may come any minute, and having come, we do the work cut out for us stoically, calling all our fortitude to our aid.

Active service in the Guard demands muscular versatility and flexibility. Our men are enlisted from all classes, but no matter whether they be bank clerks or laborers, book-keepers or farmers, service brings an entire change of occupation, habits of life, and diet. We have learned from experience that if we would make our part of the work a success we must give strict attention to the instruction of the men, not only in "first aid" and personal hygiene at home and in camp, but also as to exercise and the best methods of physical training.

A greater part of the training a man thinks he must undergo in order to get himself into condition is absolutely wrong, the theories being founded upon wrong principles and in the end succeeding only in producing the most disastrous results. Our bodies are delicately adjusted and nature never intended us to make pile-drivers of them. Comparatively few Guardsmen expect to make prize fighters or professional strong men of themselves. What we want is as nearly a perfect physical development as possible, but there can be no perfect development of body or mind, where either the *biceps* are cultivated at the expense of the heart or the pectoral muscles so greatly enlarged as to produce a more fatal

compression of the lungs than the most extreme case of lacing. We cannot turn our attention especially in the direction of physical training—some of us must spend the greater part of our time and attention toward the best ways of conducting field hospitals; the best form of litter and ambulance; the most simple and effective methods of rendering "first aid;" while some of us must use our talents in studying the action of drugs, pathology and such minor matters. However, a slight amount of use of the knowledge we possess of anatomy and physiology, together with a little exercise of our reasoning faculties might aid us materially in arriving very shortly at a solution of the problem of that form of training most beneficial to the National Guard. We have to deal with men who are under our observation but little of the time—with men who are soldiers because they like the work and believe in government and law—with men who are intelligent and of social and business standing among their associates—with men who take a sufficient interest in their work to sacrifice time and money for the advancement of their organizations—with men who are in the ranks only about two hours a week—with men who in the face of such discouragements as are attendant upon ungrateful State governments and a derisive public and beggarly financial support, accomplish such results as excite the wonder and admiration of the careful observer. With such men a few plain lectures upon the objects of training, together with a little anatomy and physiology will simplify the work itself and you will find the recruit will take up the "setting up" exercises assiduously and what is of greater benefit, will practice them voluntarily and regularly at home.

We shall grant for the time that the men are all fairly symmetrical and well developed; under such circumstances, what will be the course of training we shall devise? Shall we follow the course pursued by prize fighters, professional athletes and such like, urging a rigid course of hard work for one or two months in the twelve? Shall we build up muscle at the expense of health, discovering when it has grown too late that our men are developing heart and lung troubles, dying before they have reached middle age? Observation may teach us many things, only we are prone to see without observing and observe without reasoning. While man may be physically the most magnificent of animals, comparatively he is the weakest of all animals, yet he is the only one culti-

vating any of the many systems of physical training. How much more powerful draught horses might be obtained if only some one should institute a school for the physical training of horses? While under a severe course of training the lion, should he choose to submit himself, could very easily multiply his strength! In training animals they are worked gradually for a long space of time. In the training of men they are impelled to unremitting tasks, accomplishing in a short space of time work which should require years to produce lasting results. A sudden change in the entire habit of living; a constant series of strains, called by courtesy "training," and what is the result? A marked increase in the development of certain muscles, a sudden and unlooked for increase of work demanded of the heart, because of the unwonted exertion and increased labor demanded to enforce proper circulation, and the entire neglect of the lungs beyond seeing that the man "keeps his wind," there being no indications of disease at the time. Consequences—the trial of strength over, all work ceases, with the result that in a short time, the gymnast finds himself in a worse condition physically than the one he occupied before beginning his period of straining; and finally the enthusiastic disciple of training complains of lightness of the head and trouble with his heart, or he is suddenly warned that he is dying of *phthisis pulmonalis*. We are willing to admit that the lion does grow ill and that the horse may die, but do they suffer so many ailments as the more cultivated animal, man? We are also willing to admit that as the higher the scale of life rises the more delicate becomes the organization, but does this fact give the supporters of the so-called scientific physical training any reason for this artificial cultivation? We are all aware of the disadvantages as well as of the advantages of "forcing beds" in gardening.

However, we have dwelt a sufficient length of time upon the evils of modern gymnastic training—they are so evident they might almost be termed axiomatic. What course should we recommend for the guidance of our men? First, we should begin at the beginning and teach them to stand correctly. It is comparatively easy to tell a man to stand with:—

"Heels on the same line, and as near each other as the conformation of the man permits.

Feet turned out equally and forming with each other an angle of about sixty degrees.

Knees straight without stiffness.

Body erect on the hips, inclining a little forward; shoulders square and falling equally.

Arms and hands hanging naturally, backs of the hands outward; little fingers opposite the seams of the trousers; elbows near the body.

Head erect and square to the front; chin slightly drawn in, without constraint; eyes straight to the front."

So much is easy, but how awkward and constrained the position until the day when, *mirabile dictu*, the body discovers for itself with what ease it may maintain itself erect. It requires a little more work to explain to the men just how the body should be carried—that when in the erect position the lips, chin, chest and toes should come upon the same line. It demands effort to explain that the body was not intended to be an accordion; the muscles of the back have some action in supporting the weight of the body, besides that of lifting other weights. In standing, the muscles should be trained to sustain the body in a correct position. Left to themselves, it is impossible for the parts of the skeleton to assume their proper relationship. Neither were the intervertebral cartilages intended to bear the dead weight of the body; besides, if the constant pressure of the body be received by them their use in taking up the effect of sudden jars is materially diminished. If the correct use of the muscles in supporting the body is not taught and practiced, we might almost as well have a solid vertebral column, while the various joints might be practically abolished. By following a correct method of instruction in this respect, an undue amount of pressure is removed from the various articular surfaces, the height of the man is increased, his carriage becomes more easy and graceful, his step more springy, he holds himself in hand better, and finally his balance is less easily overcome.

The next step in the course of training of the National Guardsman is instruction in breathing. Statistics prove that women are less liable to lung troubles than are men. It is also a significant fact that a large proportion of our "trained" men die prematurely from lung troubles. We acknowledge the importance

of health in the bodily economy—we urge and exhort our clientele to develop their lung space—we tell our patients with hereditary taint of their danger—and then we stop. We practice prophylaxis. We should consider it the height of absurdity to warn a man exposed to the small-pox of the dangers of infection without advising vaccination. Is it not as nonsensical to tell a man of his danger of lung troubles and neglect telling him how he may strengthen the resisting power and increase the capacity of his lungs, thus greatly lessening his chances for contracting the diseases to which he is especially prone?

We men are much given to self-congratulation on our deep breathing and we cultivate the abdominal type almost to the utter exclusion of that of the chest variety. Another lesson neglected! Is it not in the apices of the lungs that tuberculosis most frequently begins its ravages? If women, using the chest breathing almost exclusively, suffer less from such complaints than men, is there not a suggestion of a reason contained in this difference? Corsets may have some *raison d'être* aside from those of æsthetics. Granted for the moment that the use of all corsets is absolutely pernicious, how much better off is that man whose thorax is so bound down by masses of muscle that his chest expansion reaches barely two inches, his normal chest measurement being forty-one inches? Which produces the more deadly results, to constrict the thoracic or abdominal cavity? If some portion of the lungs must be compressed and rendered useless, would it not be better from the point of health to wear corsets and omit the over-development of the chest muscles?

In the economy of nature no part of the human body is intended for merely ornamental purposes—every muscle, every tendon, every organ has its uses. If atrophy results from disease, if disease gains entrance owing to a lack of development, then we are to blame—not Nature. The lungs are expected to supply the blood with oxygen—is it possible for them to accomplish their work properly when they are not capable of being fully inflated? In the healthy man the process of oxygenization is rapid, and in order to maintain health, the lungs must be acting freely and fully. Knowing the importance then of full, free action that is attendant upon a healthy condition of the lungs, would it not be wise for us to give some little instruction upon the physiology of breathing

and the function of all the muscles concerned therein, together with those simple exercises which develop the capacity of the lungs and at the same time give a due amount of exercise to the muscles of the chest and shoulders.

We must also explain to our men something of the action of the heart—its work of distributing the blood through the body and the necessity of perfect circulation to perfect health. They must be shown that to be "muscle bound" is by no means a slight evil consequent upon over-development. Show them how the abnormal muscles press upon and constrict the arteries, throwing an undue amount of work upon the heart as a consequence. Show them how an over-developed heart must necessarily suffer the same process of atrophy as any other muscle when it is allowed to rest. Show them that the result of such a straining of the heart muscles must necessarily result in similar though far greater evils than a strain of any other muscle, and see if they do not take an intelligent interest in your explanations and directions.

Now we come to the results of our preliminary training. The National Guard is formed primarily as a peace force—the body called upon to preserve peace and enforce the law in the last extremity, and secondarily as a reserve force to the regular establishment. In order to maintain respect for it, it is necessary that we should make it worthy of respect. In order to accomplish any good it is necessary that its benefits be apparent. The simplest way of producing this result, it seems to me, aside from the impetus such service gives to the patriotism and citizenship of our men, is by sending out men, strong healthy and vigorous, men who have been correctly instructed in the laws relating to health and exercise, men who have learned the possibilities of proper development of their bodies and who will improve the race by disseminating the knowledge they have acquired.

The means I should recommend are: First, teaching the men to stand correctly and easily and to use the muscles in doing so. Second, slow, forced inspiration and expiration, especial attention being paid to the development of chest breathing. Both of these will require conscious effort at first, but in a short time, the effort will be given unconsciously and a buoyancy will be added to the carriage before deemed impossible. Third, the "setting up" drill. This should be explained as to its action and effect and a

little work will produce surprising results in increasing the suppleness and possibilities of motion in the body. For gymnasium equipment—if I had any—I should not go beyond light dumb-bells and Indian clubs. Fencing, boxing and wrestling all under proper restrictions are allowable. Bicyclers should be urged to sit straight, with shoulders thrown back. Walking, running and jumping are to be encouraged, but not to the exclusion of the development of the upper extremities. The means are many—the only trouble being that they are too simple for most of us.

DISCUSSION.

BRIGADIER GENERAL PRIESTLEY: I have nothing but commendatory remarks to make in reference to the paper, except where the essayist made reference to the *genus homo* being the weaker animal. I do not think this will bear investigation. For instance, a backwoods Indian will outrun a deer. Man is the only animal that can stand a caper from the equator to the pole, and these instances might be multiplied indefinitely to show that man is by all odds the stronger animal.

GENERAL OLIVER: Our (British) soldiers have to go through a process of physical drill. Their drill is both with and without rifles. This cannot be dispensed with. Every soldier must be an athlete in future war. Our soldiers are not only put through the physical drill, but they are, also, trained in climbing walls, getting over houses, etc. The physical training is found of the utmost importance from a war as well as a hygienic view. This is a matter I considered very much some years since, before it was brought into use, because I found our soldiers deteriorated very materially and were subject to disease. The ordinary laborer is supposed to lift 300 pounds, but we found that the soldier, from the nature of his exercises, going on guard duty and not bringing these organs into force, would lift only one-half as much as an ordinary man. During the absence of the drills the tissues became degenerated. Of course, much could be laid to making the clothes improperly for them.

CAPTAIN WESTERVELT: I think General Priestley has misunderstood the meaning of that portion of my paper referring to man as the weakest of animals. Man has mind and adaptability, but he is comparatively the weakest of all animals. In proportion to its size the flea is many times stronger. Man rules not by strength but by mind. He is able to go from the equator to the pole not because of his greater strength, but because of his ability to adapt himself to a great variety of circumstances. If it is possible for even *one* Indian to outrun a deer my paper stands good for I believe the Indian has not as yet adopted any of the systems of training now in vogue. He is the product of nature solely until contact with the superior white race civilized him into degeneracy and annihilation.

IV. THE PHYSICAL PROPORTIONS OF THE AMERICAN SOLDIER.

BY MAJOR HENRY S. KILBOURNE,

MADISON BARRACKS, N. Y.

SURGEON IN THE UNITED STATES ARMY.

THE most capable men¹ of any race or nation, are the typical men; the typical men are those whose physical proportions vary least from all others; whose like in any large group of a people, is found in greater numbers than any other. From this class, all others are deviations, on an ascending or descending scale of dimensions, and a diminishing scale of numbers; hence it follows that the law of deviation having been established from a sufficiently large number of observations, the standard type may be calculated for a still larger number, or for all. Degree of representativeness then becomes the standard of degree of evolution. Three dimensions of the body have hitherto had general acceptance in estimating the physical powers of men; these are stature, chest-girth—including chest-capacity—and body weight, and despite other requirements of modern science, which has attempted to substitute and supplement them, these three within certain limitations, still hold good. It has been ascertained that for every inch of height, between five and six feet, the extreme breathing capacity (“vital capacity”) is increased eight cubic inches; the vital capacity is at its maximum at 35 years of age, and there is an annual decrease of 1.21 cubic inches onward to 63 years, backward to 15 years of age.²

The influence of weight on capacity of respiration is less marked than that of height. It is well known to physiologists, that the respiratory processes are intimately connected with the nutrition of the body. These facts support the theory that the physical power of a race, or people, and consequently their capacity for work, is directly as their average stature. The limita-

¹En masse.

²Landois' Physiology.

tions of height to physical capacity are important. The law holds good between the extremes of five and six feet, certainly for the white races, and probably for all. Height above six feet, rarely implies a corresponding increase of physical powers; giants are really a feeble folk; and among men of Saxon and Celtic lineage the opposite limit of five feet, is much too low for efficiency. Above the height of six feet, the increase is generally in the lower limbs, without a corresponding development of the trunk and augmentation of strength and endurance. When however the increased dimensions are symmetrically distributed, there is a maximum of power, though not necessarily of endurance. The majority of powerful men are in stature, nearer the average; but blood and fineness of fiber count for work. A man of five feet three inches, may have staying power equal to the best, but as a rule he will not be able to stay long in the company of men of five feet eight inches; but if of the Latin blood, he is not far below the type of his fellows. Stature is largely a matter of race, yet within racial lines it is also a matter of class, and among classes, it is affected by age and occupation, but most of all by the standard of living. A well-fed people will, other things being equal, surpass in stature those habitually under-fed; scantiness of food arrests growth. The health and strength of all peoples are intimately dependant on their diet.¹ Among civilized people, the professional classes are everywhere superior in height to the laboring classes; the white races are generally taller than the dark races. The Anglo-Saxons, Celts and Scandinavians are of greater stature than the peoples of Southern and Eastern Europe. Americans, a composite people, in whom the blood of Northern Europe predominates, are taller than their German and English ancestors; and of Americans, the men of the West and South are of greater height than those of the North and East. Among the American aborigines, the dominant tribes of the North, the Iroquois, Sioux, and Nez Perces, were of greater stature than the Comanches and Cherokees of the South.

The following table exhibits at a glance the average stature of peoples of various races and nationalities and especially the

¹Atwater—Chemistry and Economy of Food, Bull. 21, U. S. Dept. of Agriculture, 1895.

height of the immigration classes of the United States, according to the latest available authorities:

RACE OR NATIONALITY.	AUTHORITY. ¹	REMARKS.	METERS.	FEET.	INCHES.
Polynesians	Various		1.762	5	9.33
Patagonians	D'Orbigny		1.754	5	9.00
Angamis	Woodthorp	Naga Hills	1.754	5	9.00
Negroes	Topinard	Congo	1.752	5	8.95
Scotch	Brit. Anth. Com.		1.746	5	8.71
N. A. Indians	Baxter		1.728	5	7.93
Irish	Brit. Anth. Com.		1.725	5	7.90
U. S. White	Baxter	Northern U. S.	1.719	5	7.67
English	Baxter		1.719	5	7.66
Norwegians	Baxter & Beddoe		1.719	5	7.66
Zulus	Roberts		1.707	5	7.19
Scotch	Baxter	U. S. Immigrants	1.705	5	7.06
Canadians	Baxter	U. S. Fr. Immig.	1.703	5	7.01
Swedes	Baxter & Beddoe	U. S. Immig.	1.700	5	6.90
Irish	Baxter	U. S. Immig.	1.698	5	6.74
Welsh	Brit. Anth. Com.		1.695	5	6.66
Danes	Baxter	U. S. Immig.	1.694	5	6.65
Dutch	Baxter	U. S. Immig.	1.693	5	6.62
Ameri'n Negroes	Baxter		1.693	5	6.62
English	Baxter	U. S. Immig.	1.692	5	6.58
Hungarians	Baxter	U. S. Immig.	1.692	5	6.58
Germans	Baxter	U. S. Immig.	1.691	5	6.54
Swiss	Baxter	U. S. Immig.	1.687	5	6.38
Russian	Baxter	U. S. Immig.	1.687	5	6.38
Belgians			1.687	5	6.38
French	Baxter	U. S. Immig.	1.683	5	6.27
Poles	Baxter	U. S. Immig.	1.682	5	6.20
French	De Quatre fages	Upper Class	1.681	5	6.14
Germans	Novara		1.680	5	6.10
Mexicans	Baxter		1.680	5	6.10
Italians	Baxter	U. S. Immig.	1.677	5	6.00
Austrians	Novara	Slavs	1.669	5	5.68
Spaniards	Baxter	U. S. Immig.	1.668	5	5.66
Portugese	Baxter	U. S. Immig.	1.663	5	5.43
French	De Quatrefages	Working Class	1.657	5	5.24
Bavarian	Novara		1.643	5	4.68
Chinese	Novara		1.630	5	4.17
Poles	Mayer		1.622	5	3.87
Japanese	Ayrtoun		1.604	5	3.11
Malays	Various		1.583	5	2.34
African Pigmies	Stuhlman		1.250	4	1.21

We note in the foregoing list, the obvious superiority of the Celts among northern Europeans; the Scotch overtop all the whites and are closely followed by the American Indians. The most notable feature for our attention, is the variation from the

¹Smithsonian Reports, 1884, mainly.

averages given by other authorities, of the foreign population of the United States as computed by Baxter from the measurements of more than half a million of enrolled men, from which the Federal Armies were drawn during the American Civil War. In some instances there is shown a gain and in others a falling off in height; the latter is marked in British immigrants, while in the French there is a gain over the higher class of their nationality. Among the United States'whites, of Baxter, the Southern States which had formerly furnished the tallest men for the army, are not proportionately represented. The true standard for the native Americans of that period is probably nearer sixty-eight inches. Taking the largest statistical group of native white Americans, now available for study, we have the following exhibit for the determination of the height and chest girth of the men of the North and West, of the last generation.

TABLE SHOWING THE HEIGHT, CHEST-GIRTH AND AGE OF 190,621 NATIVE WHITE AMERICANS, EXAMINED AND ACCEPTED FOR THE MILITARY SERVICE OF THE U. S. 1863-5 (BAXTER):

HEIGHT.	NUMBER	AGE 18 TO 45.	CHEST GIRTH.	REMARKS.
Under 61 inches..	609			
61 to 63 " ..	4929			
63 " 65 " ..	21712	Mean Age	Mean Chest Girth,	
65 " 67 " ..	47731	26.96 Years.	35.25 inch.	
67 " 69 " ..	58348	Type.
69 " 71 " ..	38935			
71 " 73 " ..	14858			
73 inches and over	3499			
Total 190621		Mean Height 67.35.		

In this group the number of men below 63 inches in height is seen to be but little greater than that of the class above 73 inches. The most numerous and therefore the typical class, is included between 67 and 69 inches. This standard class having a greater number of other classes below, than above, it would accordingly have a greater chest girth than the average for the whole group. For the sub-groups, the data are incomplete.

The following tables afford figures of a later date, but of numbers not sufficiently large for a safe generalization:

TABLE OF PHYSICAL PROPORTIONS OF NATIVE WHITE AMERICANS OF DIFFERENT CLASSES.

CLASS.	NUMBER.	YEARS MEAN AGE.	INCHES MEAN HEIGHT.	POUNDS MEAN WEIGHT.	CHEST MEASUREMENTS.			RATIO OF WEIGHT TO HEIGHT.
					INCHES MEAN CHEST GIRTH.	INCHES MEAN CHEST MOBIL.	CU. INCHES MEAN CHEST CAPACITY.	
U. S. Naval Cadets. ¹	272	24.01	67.69	137.86	34.14	3.33	2.42	2.036
Amherst College Students. ²	1416	24.18	68.31	138.90	36.74		2.61	2.033
U. S. Army Rec'ts Native White.	4547	26.80	67.50	145.06	35.58	2.91		2.134
U. S. Naval Cadets. ³	125	23 to 27	67.80	139.00	34.30	3.50	2.44	2.050

The mean height of 125 U. S. Naval Cadets above the age of 23 years, was 67.80 inches.³ As these men are drawn from all parts and classes of the United States, they represent very nearly the typical physical development of the American people of 25 years of age. From what source has the superior stature of the Americans been derived? Assuming that the relative height of the ancestors of the Colonists was as their national types remain to-day, we find the racial type of stature in the large limbed Celt, whose physical proportions are still the first in Europe. Next in order is the English blood, a composite strain bred on the Anglo-Saxon stock. The Northmen are third, led by the Norwegians and Swedes, the Danes ranging below the latter, but above the Germans. All these are well above the average height of man.⁴

¹Gihon—Reference Hand Book of the Medical Sciences.

²Annual Report of the Surgeon General U. S. Army, 1895.

³Gihon—*Ibid.*

⁴5' 5.25".

The relation of body weight to vital capacity, appears in the physiological law, that when the body weight exceeds the normal by seven per cent., there is a diminution of 37 c.c. (2.2 cu. in.) of vital capacity for every kilo (2.2 lbs.) of increase of weight.¹ This again confirms the view that respiratory capacity, rather than body weight, is the better indicator of the physical *stamina* of a people.

Assuming the normal weight to vary with race and climate, which is probable, the average American of 145 lbs. would begin to be overweight at 155.16 lbs., and beyond that weight would lose in vital capacity. Considering these figures, we are inclined to believe that too much importance has hitherto been attached to the value of the ratio of weight to height. Effective weight should be chiefly in bone and muscle, for fat more than is necessary for filling in and rounding the figure, is dead weight, and diminishes, rather than augments capacity for work.

The *maximum* American Army service weight of 190 lbs. is well placed; an overweight man is handicapped by his surplus flesh and expends his energies in carrying it about. But the underweight man lacks quantity of bone and muscle for effective work. Muscle may be built up on a sound frame, as a builder fills in the material of a house, but the trainer cannot, like the builder, supply certain essential materials, where nature has failed to provide them; he can only enlarge and develop what is already in place. The elemental muscular fibers must not be wanting in the human structure. According to Gihon, increase of height practically ceases with the twenty-third year, which he considers the period of completion of adolescent growth,² but his record of measurements of cadets shows an increase beyond that limit, and the record of Amherst students exhibits a gradual increase of stature up to the twenty-sixth year, with a corresponding increase of chest girth and weight. Military statistics confirm the view that development continues into the sixth quinquennium, and that the *maximum* development of Americans is found between the ages of 25 and 30 years. After the period of full development is reached, the excess of nutritive material, over and above that required to maintain the

¹Landois' Physiology.

²Surgeon Beyer, U. S. Navy, from observations on Naval Cadets fixes this period two years earlier.

body in health, is deposited in fat; and it will be found that a disproportion of weight over height occurs usually in adults or men of middle life.¹

The effects of systematic physical training on the development of the body are too well known to require more than an allusion here; it is not perhaps so well known that such training is capable of increasing the stature on an average of one and three-fourths inches above the limit obtained without training; and what is of more importance, it has been shown, that the taller the individual at the beginning of the training, the greater also was the amount of weight and strength gained by the exercise he was made to perform; an increase in height, therefore, means a corresponding increase in strength as well. "The agent, whatever it may be," says Surgeon Beyer, "which influences height, must be profound as well as far-reaching, for growth in height means growth in bone."²

Most important of the three body dimensions are those of the chest; three kinds of chest measurements are employed. These are the chest girth, chest mobility,—or expansion in respiration—and chest capacity ("vital capacity"). These, although closely related, are not convertible terms. A man may have a large chest, without amplitude of expansion or mobility; the chest in well developed men is ample, it contains the vital machinery and represents the staying powers of the man.

The average vital capacity (volume of air expired in forced respiration) in well developed Americans is rather more than a gallon (U. S. standard 231 cu. in.). The tidal air of ordinary quiet breathing is about a pint. The chest expansion, in mature, well-formed Americans is about three inches, which is the difference in chest girth in full expiration and inspiration. The later reports of the Surgeon General of the U. S. Army furnish data for comparison of the physical proportions of the native white, colored and foreign population, from which recruits are drawn. The ratio of foreign-born to natives, in the following table, is much larger than in the aggregate population, and, as during the present year, enlistments have been restricted by citizenship, the military ser-

¹Greenleaf's Epitome of Tripler's Manual.

²On Normal Growth under the Influence of Gymnastic Exercise—Report of the Surgeon General, U. S. Navy, 1896.

vice has already become more representative in character. The tide of foreign immigration, which has been large and continuous for more than half a century, probably touched high water in the census of 1890; at that period, in a total population of sixty-two and one-half millions, nine and one-fourth millions were of foreign birth; a ratio of 1 to 6.77. Of 7,434 recruits accepted during the year 1894, there were native whites, 4,547; foreign whites, 2,388; negroes, 499, with a ratio of foreign to native white of 1 to 2. A large majority of the foreign recruits were British and Germans.

AVERAGE HEIGHT, WEIGHT, CHEST MEASUREMENTS, RATIOS OF WEIGHT TO HEIGHT AND RELATIVE ORDER OF PHYSICAL PROPORTIONS OF 16,077 RECRUITS ACCEPTED FOR THE U. S. ARMY, DURING THE YEARS 1894-95, ALSO OF 197 INDIANS ACCEPTED IN THE YEAR 1892:¹

RACE OR NATIVITY.	NUMBER EXAMINED AND ACCEPTED.	AVERAGE HEIGHT, INCHES.	AVERAGE WEIGHT, POUNDS.	CHEST MEASUREMENTS.			RATIO OF WEIGHT IN POUNDS TO HEIGHT IN INCHES.	ORDER OF HEIGHT.	ORDER OF WEIGHT.	ORDER OF CHEST MOBILITY.	ORDER OF RATIO OF WEIGHT TO HEIGHT.
				EXPIRATION, INCHES.	INSPIRATION, INCHES.	MOBILITY, INCHES.					
1894 Aver. Age 26.8, U. S. Native, White.	4547	67.50	145.06	34.08	36.99	2.91	2.14	II	IV	III	III
Foreign Born, Wht.	2388	67.18	146.77	34.63	37.57	2.94	2.18	IV	II	II	II
American Negro...	499	67.21	149.19	34.25	36.83	2.58	2.21	III	I	IV	I
American Indian ...	197	68.30	146.04	33.64	36.80	3.16	2.13	I	III	I	IV
1895, Aver. Age 27.2, U. S. Native, White.	5699	67.68	145.68	34.26	37.17	2.91	2.15	II	IV	III	III
Foreign Born, Wht.	2351	67.14	147.18	34.80	37.73	2.93	2.19	IV	II	II	II
American Negro...	593	67.37	149.85	34.27	36.89	2.62	2.22	III	I	IV	I
American Indian ...	197	68.30	146.04	33.64	36.80	3.16	2.13	I	III	I	IV

The salient features shown in the detailed tabulations are, first, a regular increase in all the dimensions up to, and including the

¹Reports of the Surgeon General of the Army, 1893-5-6.

group of the mean age. Second, an increase of weight with age beyond maturity. Third, a loss of height and chest expansion with advancing age beyond the fortieth year. These features appear constant in all classes of the recruits of the three years, excepting that the maximum height of the Indians and of the recruits of 1895, was attained before the twenty-fifth year. Comparing the averages of the foregoing table, we find that of the four race classes the negro has the greater weight, and the native white the least; the greater chest girth is shown by the foreign white and the least by the Indians; the native white is superior in stature to all but the Indians. The relation of stature to vital capacity is marked in the savage; his additional inch of height taking him to the head of the list in respiratory power, notwithstanding his lesser chest girth, both before and after the period of maturity. On the other hand, the surplus weight of the negro goes along with the diminished lung power. The slight superiority of stature of native whites is not accompanied by a corresponding increase in respiratory power. The larger ratio of height to weight does not take with it an increase in chest capacity in the negro. A comparison of the totals of all ages is vitiated by the greater youth of the native whites. But it appears that notwithstanding a greater proportion of their number below the age of 25 years, their mean average chest expansion was but .03 inch less than that of the older foreign whites. While in the immature class, the native white, with the least weight and one-half inch less chest girth, has a chest expansion which is practically the same as his foreign comrade. Selecting the two groups, between 20 and 30 years, the results differ somewhat.

In the following table, the all-round superiority of the savage at the period of maturity is strikingly obvious. The comparison is valuable, however, only as showing the physical proportions of the highest class of the aborigines, the principle of selection in their case having been carried further than has been done in other selections of the majority of soldiers. The actual gain in weight here shown in the native whites, on reaching maturity, does not appear to be accompanied by a corresponding gain in the relative order of the respiratory power. On the whole then, the native white soldier appears to be taller and slighter in mould than his foreign comrade; he has accordingly less juice and more bone. These

AVERAGE HEIGHT, WEIGHT, CHEST MEASUREMENTS, RATIO OF WEIGHT TO HEIGHT AND RELATIVE ORDER OF THESE PHYSICAL PROPORTIONS OF 5,237 RECRUITS FROM 20 TO 30 YEARS OF AGE, ACCEPTED DURING THE YEAR 1894, AND OF 139 INDIANS ACCEPTED DURING 1892:¹

RACE OR NATIVITY.	NUMBER EXAMINED AND ACCEPTED.	AVERAGE HEIGHT, INCHES.	AVERAGE WEIGHT, POUNDS.	CHEST MEASUREMENTS.			RATIO OF WEIGHT IN POUNDS TO HEIGHT IN INCHES.	ORDER OF HEIGHT.	ORDER OF WEIGHT.	ORDER OF CHEST MOBILITY.	ORDER OF RATIO OF WEIGHT TO HEIGHT.
				EXPIRATION, INCHES.	INSPIRATION, INCHES.	MOBILITY, INCHES.					
Age 20 to 24 Years, Average 22 Years, U. S. Native, White	2332	67.49	123.6	33.88	36.78	2.90	2.127	II	IV	III	III
Foreign Born, Wht.	838	67.21	144.5	34.36	37.28	2.92	2.147	IV	III	II	II
American Negro...	188	67.24	145.8	34.22	36.70	2.48	2.168	III	I	IV	I
American Indian ..	93	68.55	145.2	33.67	36.93	3.26	2.116	I	II	I	IV
Age 25 to 29 Years, Average 26.8 Years, U. S. Native, White	1103	67.58	146.5	34.33	37.27	2.94	2.167	II	III	III	IV
Foreign Born, Wht.	657	67.22	145.9	34.48	37.50	3.02	2.170	IV	IV	II	III
American Negro...	119	67.40	149.7	34.08	36.74	2.66	2.221	III	II	IV	II
American Indian ..	46	68.45	152.2	34.40	37.72	3.32	2.223	I	I	I	I

NOTE.—Standard minimum height 64 inches. Minimum weight 125 lbs. Minimum chest-girth 32.50 inches. Minimum chest mobility 2 inches. Minimum age 21 years, except by consent. Maximum height governed by maximum weight. Maximum age 30 years, excepting re-enlistments.

features he has acquired in part from his native soil, over whose dryer continental areas lately roamed a tall and sinewy aboriginal race. Considering the body as a machine, the American working-man has as strongly built a machine as any other and more fuel to run it with than his European brother. While it is not absolutely proven, it seems in the highest degree probable that the higher

¹Reports of the Surgeon General, U. S. Army.

standard of living, the better nutrition of the body, the larger product of labor and the higher wages go together.¹ In estimating the physical capacity of a people, the question of quality cannot be excluded. Apart from stature and muscular development, the uncivilized man is less powerful than the civilized man; he is unable to expend suddenly as great an amount of force, and he is unable to continue the expenditure for so long a time. An irregular food supply, mostly inferior in quality, dirty and uncooked, besides entailing mechanical loss, gives to the primitive man only an irregular supply of nervous power, smaller in average amount than that which follows good feeding.²

Another question remains to be considered, What is the proportion of these able-bodied men to the entire population? The number of recruits rejected on primary examination, as shown by the reports quoted above, equals the number accepted. The causes of rejection, though mainly diseases and deformities constituting imperfect physique, also include mental and moral infirmities, as well as some disqualifications referable to social and political status. The census of 1900 will show of men of all classes, from 20 to 29 years of age,—the flower of the nation—a number exceeding six millions; dividing this number by two, there will remain a possible military potential of three millions of this class alone; not of soldiers, but of the raw material of which soldiers are made. If but one in five should be called into service, they might compose an army larger than any now organized. General anthropometric statistics of the American people are yet wanting; those collected during the Civil War pertained chiefly to the Northern States, already depleted of the flower of their youth: No similar records of the Confederate armies are available, and the Southern States, prior to the war, furnished the larger men of the army. Since the war, the South has, excepting colored men, furnished comparatively few soldiers. While military statistics cannot be accepted as conclusive in estimating the physical character of a nation, unless the army be the nation in arms and the quiescent army the people, all available statistics tend to prove that an enrollment of the American people, which would separate all those incapacitated by disease and infirmity, would show a physical de-

¹Atwater—Bull. 21, U. S. Dept. of Agriculture.

²H. Spencer, *Sociology*.

velopment not below any standard, and second in quality of form and condition to no other in the world. Our figures thus far have enabled us to arrive with tolerable precision at the physical proportions of the average American. But such a method produces an arithmetical phantom—not a veritable man—for by actual enumeration few will be found to conform exactly to a standard so obtained. By the method of counting the most numerous class between fixed limits of height, a standard type of stature is obtained. From this basis by a continuation of the method, the other physical proportions are deduced, and a rational and practical standard secured. We turn in vain to the enormous assemblage of figures in the census for such data. Buried in this huge statistical shell heap, lie many things of value to the statesman, the economist and the politician, but the physical proportions of the American people are not yet to be found among them.

And here finally comes into view a significant question: The Americans are a composite people resulting from the blending of various nationalities; the type now is, and for some indefinite time will continue to be a variable. The commingling strains of alien blood have thus far apparently worked no deterioration of quality; they are remotely of the same stirp as our own, homogeneous and compatible. Not so the swarthy, low-browed and stunted peoples now swarming to our shores. Absorbed into the body of the people, these multitudes must inevitably evolve an inferiority of type. To realize the result of such a contingency, let it be considered that the loss of an inch in stature might bring in its train the loss of national ascendancy. Let us take care then that the State shall suffer no injury.

CHAPTER IX.

The Military Medical Officer.

I. THE BETTER TYPE OF MEDICAL OFFICER.

BY LIEUTENANT COLONEL ALFRED A. WOODHULL,

MEDICAL DEPARTMENT UNITED STATES ARMY.

THESE are two conceptions of a medical officer one or the other of which, consciously or unconsciously, generally dominates when his duty is under consideration. One is that of a professional person attached to an army to care for the sick and wounded, whose only functions are clinical and who for convenience receives a fixed salary and has the permanence of his position secured by a commission that incidentally assures him a social status, but whose further value is purely ornamental. There are supposed to be some who think the commission entirely superfluous, and that this functionary would better be distinctly classified as simply an attached civilian. In military life this view obtains chiefly, but not entirely, among those who spend long years in permanent works and who have little familiarity with or have lost sight of the requirements of active service. It is not uncommon for civilians with pardonable ignorance to draw a verbal as well as a mental distinction between "the officers" and "the surgeons" of an army; and sometimes the novice is surprised to learn that he has any duty apart from the sick bed. Were our troops always in cantonments near inhabited places and the service required solely remedial, it might be simpler, although more costly, to engage a physician by the visit or the case, precisely as in civil life. In this view, the medical officer as such is a necessary evil of which the less required the better.

The other view is that his commission introduces him into the military hierarchy, as other civilians are from time to time introduced, as a responsible integral part thereof, interested in all

that goes to make up its efficiency, specially charged with advising or carrying out methods to increase its physical power, ever watchful against conditions that might sap its vigor, and necessarily acquiring the martial spirit so as to be in sympathy with every object, whether actually participating therein or not, that elevates and invigorates the military body. This may result in want of balance, and by infatuation with the ornamental details of the service, or indeed by devoting too much attention to serious but only correlated parts of his duty, the medical officer may invite depreciation of himself and indirectly of his corps by the apparent or real neglect of his own special functions.

The mean lies between these extremes. The medical officer who ostentatiously avows that he is not a soldier and who parades his ignorance of and indifference to the conditions among which he has voluntarily cast his lot, and he who is forever insisting upon his relative precedence, who is unduly engrossed with the consideration of tactical or other non-medical special problems and who imagines that his commission has given him a place that can be honorably maintained without further and particular special study, are alike in error. To be simply a medical recluse or to "sleep with his spurs on," is an equal violation of common sense and of taste.

The better type is a happy mean between these. Even the best judgment and the sincerest motives fail by natural limitation to attain in any particular case the true ideal or even to accomplish their own design, just as human nature fails in other directions. But it seems the duty of those who are interested to contribute of their experience and their hope for the consideration, if not the guidance, of their comrades.

Whether he likes it or not, the medical officer is a soldier. At the same time his very particular and most important duty is that pertaining to his special function. The first and essential reason of his being is to heal the sick and to restore the injured. This is not incongruous with the larger military quality, as some may think. The ordnance officer makes a weapon, the engineer runs a line, and the medical officer keeps in condition the man who using the one defends the other. The medical degree is not a limit of capacity, any more than is that of master of arts or doctor of philosophy when bestowed upon avowed soldiers. Scholastic honors,

whatever the exception, indicate widened not narrowed faculties. To assume that, in an army such as ours, either as minimized and focalized into the forty regiments of peace, in its potential form as the National Guard, or when vitalized and distended into the mobile volunteers, the mature men who carry into it their habits of study and their learning are in any essential the abstract inferiors of the callow youths or the untaught patriots upon whom commissions are bestowed, is absurd upon its face. They can learn, as well as others. And they must learn if they would hold their place, if they would be more than tolerated. The military society is an artificial one with its own usages and its own rules, not intricate but exacting, and for their acquisition there is no magic formula. More than thirty years ago I heard that admirable and accomplished veteran, Col. Cuyler, repeat the injunction he had received in his youth, that every young medical officer should steep with the regulations under his pillow for at least two years. That is good sound sense. The regulations should be as the catechism to the neophyte, to be learned as a guide and for their doctrine. The words of the regulations change, but their principles endure. If in the fancied superiority of his special knowledge he neglects what belongs to his new world, he will incur the derision if not the contempt of those to whom such details are familiar. They will judge him by their own standards, and will not condone his ignorance of what is before his eyes by any presumed intelligence of some other kind. He is not required to master the not very complicated exercises of a battalion, but it is essential that he shall learn the principles, not necessarily the minutiae of company drill, if he is not to blunder with his detachments of the hospital corps. Why such information is spurned, as it is by a few very intelligent men, is incomprehensible. A medical officer may repeat, parrot like, certain routine commands for litter-drill, but he can correct no errors if he is not familiar with the principles upon which the drill is based. The suitable exercise of these men is required for a practical purpose; no one can do it who does not know how it is done. An exalted position or peculiar erudition gives no warrant for sneering at a duty that any corporal can discharge, but that equally may devolve upon an officer.

The newly appointed medical officer should, at the very beginning, set himself to learn practically all the administrative de-

tails connected with the medical service. He is familiar enough with disease as such. In the civil hospitals he has seen many more cases than, unfortunately for his easy study of medicine, he will soon see in peace. But he should, either voluntarily or by direction, master every paper and the motive as well as the method of its preparation. This is best accomplished by doing the work himself. Whoever depends upon his enlisted men for the stated official papers, without a clear ability to prepare every one himself, is handicapped by that ignorance. One who should know better once told a young officer sent to him for instruction, "Don't bother about papers; the steward always makes them out." The young man was paralyzed just to that extent until under better auspices he did learn. The officer who must depend upon a soldier for instruction is that soldier's servant, and he is not apt to have a good master. Synchronously with learning official papers and military hospital methods, he should also learn the general principles that control his new surroundings. His first lesson, and often the hardest of all to one unaccustomed to obedience as a virtue in itself, is that of subordination; filling his particular place without encroaching upon those above or below him. Socially there is practical equality off duty among all commissioned officers. On duty the sooner one learns to comply without delay or hesitation with the direction of his seniors, the sooner will he be fitted for responsibility. Those who would command well must first learn to obey well. The best colonels are not those who have never been captains.

The young medical officer, every medical officer for that matter, cannot embrace too many opportunities to examine the particulars of the soldier's life. He should learn thoroughly all about his barracks, his bedding, his food and its preparation, his equipment and its use, and his duties by day and by night, in garrison and in the field. He may avoid some mortifying blunders and he certainly will add to the respect in which he is held and to his own efficiency by a clear knowledge of what is and what is not required of the soldier. Sympathy with the man and fondness for the service are necessary for this complementary education. Nothing will so quickly enable the medical officer who has red blood in him to assimilate the military conditions as to go at once on active campaign. After being in peril with them for a little while and

observing the steady courage and uncomplaining endurance of well-disciplined troops, he will come to love soldiers if he never did before and be proud to be called by their name. His status as a soldier will never be questioned by the men of the field. When once he has acquired that state, the rest is easy. When he finds a body of men depending on him and upon whom he must in turn depend, the heart reinforces the head. Fondness for good soldiers need not lead to imposition by bad ones. He must be clear-headed to discern trickery, and mindful of his responsibility to maintain discipline. Discipline is that excellent system by which every man does all that is required of him at the right time and in the proper place. Its maintenance rests upon all officers in their proper spheres. By the silent example of his own character he sets a standard, and no enlisted man should leave a hospital a worse soldier for having entered it. The conscientious attention to detail, however uninteresting, that marks the good officer soon shows its influence in better men. The principle of love for the service and for the men in it once established, his efficiency is assured. He will study the relation of his own branch to every other, and will follow the details of military life with interest and pride as his affection and intelligence direct his energy. The hospital itself will be spotless, its approaches and surroundings immaculate, and its service prompt and accurate. The very fact that he cannot be intelligently supervised in his special department will stimulate him to greater efficiency than if he were directly controlled therein, and in all the military features of his command, that he may hold in common with them, he should rival his comrades of the line. The formal "rounds" of the morning will be supplemented by frequent visits, and regularly at retreat. Two professional visits daily to the hospital are the minimum, and the seriously sick will be watched with an assiduity and a keenness not paralleled by work that is regulated by fees. His commissioned subordinates will be inspired by his example and if necessary stimulated by his admonition, and his enlisted men will be encouraged by praise rather than driven by censure. But neglect, disorder, or disobedience should meet with prompt and sufficient but judicious punishment. In his work parallel with that of the line, as on courts or boards, in preparing reports, in the sanitary examination of the post or camp, he should take pride in doing it completely

and logically and in every point of official contact with others he should constantly remember that he is under observation, generally kindly but always real, and that those who recognize his intelligence and his fidelity will honor his corps. The standing of the corps is made by its own members.

Another and a very difficult role for the medical officer in garrison is the clinical one of a practitioner among the families. In the nature of the case he is repeatedly asked to see patients who in civil life, where the question of compensation is an important factor, would not be visited. In a large post this becomes a serious tax upon time and strength that cannot well be avoided. There is the converse advantage that when he so desires, he may frequently visit a serious case without an unworthy suspicion of interested motives arising. In order to do his best professional work, it is a moral duty for the medical officer to maintain cordial relations, so far as it is at all possible, with every officer's family. There is so frequently no other recourse for the invalids of a garrison, that a kindly feeling should always be maintained from altruistic as well as from official motives.

What is sometimes a very delicate duty often calling for extreme tact is the presentation of sanitary advice to the commanding officer. Such advice should never be tendered without occasion and always with the single motive of the public good. Bearing this in mind, the utmost pains will be taken to avoid the least unnecessary irritation. To offer advice offensively may practically defeat the object. The difference between instituting work oneself and having it inaugurated at the suggestion of a junior, should never be overlooked. In this and in every other military matter it must never be forgotten that there can be but one commanding officer. However unpleasant it occasionally may be, it must always be recognized that in all military matters the ultimate responsibility rests upon that commanding officer and through him upon higher authority. That does not lessen the necessity for every one to do his full duty, or to represent judiciously what is needed in his own particular province; but when this condition is appreciated, while it is not an excuse for listless or perfunctory service it does relieve the pressure of personal responsibility.

In his social relations with his comrades of the line, a punctilious sense of personal dignity, which does not mean a foolish

assumption of superiority, should always govern. The one point invariably to be resented is that of any derogatory nickname reflecting upon his profession. That would only be attempted by the young and foolish, but it should be suppressed with dignity at the beginning.

To discuss the administrative grade of medical director, minimized in the present regulations into that of chief surgeon, would unduly expand this paper. His functions should not be those of a clerk, to detect technical errors in formal papers and serve as a channel of transmission, up and down, with little advisory and no executive power; but by an interested personal supervision in peace to learn the character and foster the efficiency of the medical department under him, and in war actively to superintend the health and the hospital service of the army in the field. He should not be a King Stork to demoralize his juniors by distressing attention, and certainly not a King Log to sit in his office clothed with stupid inefficiency.

II. THE MEDICAL OFFICER IN THE NATIONAL GUARD.

BY LIEUTENANT COLONEL LEONARD B. ALMY,
NORWICH, CONN.

MEDICAL DIRECTOR (RETIRED) IN THE CONNECTICUT
NATIONAL GUARD.

SOME years ago a handful of us formed this Association for the purpose of mutual instruction and profit, not financial. We have sometimes glorified ourselves a trifle and it has occurred to me that perhaps a little friendly criticism occasionally would not do us any serious harm. Anything which I may say in this connection is in the most friendly spirit, as one of yourselves, who desires only the best good of the service. If the small word with the capital letter "I" may appear too frequently, it is because I am giving my individual opinion, based upon some years of observation among the surgeons of the National Guard. We have been sometimes criticised, and more or less rightly, but no one not in the State service can justly appreciate the difficulties which surround the surgeon of State troops, who tries to do his full duty.

Imprimis: In most, if not all the States, the system of appointment and tenure of office is absolutely wrong. Upon the resignation or promotion of the colonel of a regiment, the staff officers, including the surgeons, are expected to resign and a new staff is nominated by the new colonel and appointed by the Governor of the State. Naturally the colonel wishes to have with him some personal friends, and as in my own case, the appointment was made from civil life of one who, as it chanced, had been trained in early life in a military school. But as a general thing the appointee has had no military education. He may or may not be a good surgeon and physician; he is a friend of the colonel or of one of his friends and there he is with the rank of lieutenant, captain, or major. After a while he is called before an examining board and asked about his duties as a staff officer and a little later he may be

called before a medical board for examination as to his professional qualifications. This last may be severe or not, as the case may be—*usually not*. This depends on the board and what they know of the standing of the embryo surgeon. My own examination was begun and ended by the inquiry as to which I preferred, “rye or bourbon.”

Our new surgeon, having been duly commissioned, is now in the service of the State, but his appointment having come through his colonel and his tenure of office being entirely at his pleasure, he naturally does not feel any great amount of respect for his medical superior officers, who may or may not be his seniors in years. The situation is very peculiar sometimes, for with us a surgeon general or medical director has absolutely no command over one of the medical officers, except through brigade and regimental headquarters. However, once on duty a man can, if he pleases, make himself a competent military surgeon, or he may go to the end of his service shirking his work and knowing little more of his duties in “time of war, insurrection and rebellion” than he did when he received his commission. Now, it has always seemed to me that a surgeon who accepts an appointment in the National Guard takes upon himself a grave responsibility. When we consider the fact that in the past ten years nearly a hundred thousand National Guardsmen have been called into the field on account of riots, strikes, and such incidents of civil life, we must realize that the position of medical officer in the State service is liable to be no sinecure. Then, too, in the last five years, there has rarely been a time when the black war cloud has not threatened the country for any considerable time. We are, therefore, any of us liable to be called into active service at short notice and in the field, knowledge of military surgery and hygiene is only to be purchased at the price of many valuable lives. Looking at the matter from this standpoint, a medical officer who does not do his utmost to perfect himself in this branch of his work is comparable to one, who in civil life omits to keep pace, as far as in his power, with the strides of medical and surgical progress.

The more that a medical officer knows of matters military, even if not pertaining to his own department, the more valuable he will be considered. Military men who think the medical department an attachment to, not a part of the army, will be more liable

to put confidence in a surgeon who keeps his hospital corps under good discipline, and whose knowledge of military matters is sufficiently good to prevent him from blunders, which may cause ridicule. We sometimes hear this remark made by medical officers: "Well! My Colonel doesn't care much for the medical department." The remedy for this state of affairs is to show the commanding officer how much can be made of the medical department and what good work it can do. If the surgeon does his duty to the utmost and shows that he is laboring to benefit the regiment, his endeavors will be appreciated by all good men among the officers of the line. To do this requires work, hard work and study, and demands a vast amount of time to be given, without other remuneration than the satisfaction of knowing that we have given to the State a good deal in exchange for the golden leaves or silver bars on our shoulder straps. If, on the other hand, we content ourselves with a cursory examination of the men who present themselves at "sick call," and after that let our medical and other matters look after themselves and delegate to the hospital steward everything that we can—it is no great wonder that the Colonel and other officers think that "the medical department doesn't amount to much," *for it doesn't*. However, if a Colonel finds that by the efforts of his surgeon and his care in the attention to the diet of the men, the sick list drops one-half all of a sudden; if he sees when an accident happens, a well-trained liter squad rush to the scene and, working like a machine, handle the injured man as though they knew what to do and how to do it; if he finds the quarters of the hospital corps a model of neatness and the personnel of the corps good soldiers as well as nurses; that Colonel, if he has any appreciation of good work done in his regiment, will have a very respectable opinion of his medical department, and his surgeon will not be troubled by any animadversion on his sphere of usefulness other than as an extra aide. Work of this kind tells in many ways, and when a surgeon has made himself familiar by study and observation of the ordinary military customs, and shows some knowledge of military matters in general, the respect for the medical department will be greatly increased. After the battle of "Wounded Knee" the question of the moving of the wounded was a very serious matter, but in a short time the report was made by a medical officer, "Wounded are ready for transportation, sir!" My impression is that the

officer in command had an idea that the medical department had done some very good work and this remark came from an old cavalry captain who "didn't think much of the medical department," "I have made lots of fun of your hypothetical corps, but I'll never do it again."

I have seen surgeons acting as aides to Colonels when on outpost duty, at a time when their place was with the field hospital, and their business the instruction of the hospital corps. When officers are so far outside their legitimate sphere of usefulness, it is no wonder that the ambulance with the hospital corps was considered fair game for capture, as happened in my own State a few years ago. It will never occur again, for I think that in Connecticut most of the officers have learned to respect the rights of the medical department. However, not so long ago, one of our Colonels started to give me a great "wiggling" on finding that his surgeon was detailed for duty at the brigade hospital, when he wanted him to make his staff complete. He subsided when he found that it was "by order of the General commanding."

But, to return to what our medical officer should know and do. He should make himself thoroughly familiar, as a matter of course, with all the details of his own department—of the work of the hospital corps—and be able to *show* the men how to lift and carry the wounded. He should be alive to teach his men the difference between nursing in a well-appointed hospital and in the field, and should study that he may learn to do the most good with but few conveniences. At the same time he must be changing his methods of instruction, so as to keep up the interest of the men. He should be familiar with the ration, and the best method of preparing palatable food with what he happens to have, for as it is well said, "an army moves on its belly." He must be on the lookout for chances to improve the health of the men in every way, and to do this must make a careful study of hygiene. It is necessary for him to be conversant with the various locations for camp sites and the advantages and disadvantages of each. He should be observant in noting the proper place for dressing stations and field hospitals, for if he has this in his mind in time of peace, it will come much easier in time of war. Especially should he be careful about the condition of the "sinks," for I have found that the men who are detailed to keep the sinks covered with

earth worked far better when they appreciated the fact that an officer was interested in seeing that this work was properly performed.

It is also well for him to have as much knowledge of military affairs in general as possible. He must know about the disposition of troops of his command. Even in marksmanship it is well for him to excel, if possible, for it increases the respect of the men for a surgeon if he wears a sharpshooter's badge, and the more respect we deserve the more we are liable to receive. We sometimes hear it said of a surgeon, "He may be a good doctor, but he is a poor soldier." Don't let any one have the chance to say that of any of us.

And let me beg my colleagues of the National Guard to consider their positions as of grave responsibility and to look upon the service as a serious thing and give to it the best measure of their ability, realizing that the State may have reason to be deeply grateful for "long and faithful service" by the medical officers of the National Guard.

CHAPTER X.

Sanitary Work in the National Guard.

I. HISTORY OF THE HOSPITAL CORPS IN CONNECTICUT.

BY MAJOR JULIAN LA PIERRE,
NORWICH, CONN.

SURGEON IN THE CONNECTICUT NATIONAL GUARD.

THE nearest approach to hospital corps work in the early history of Connecticut was in the removal of the wounded from Fort Griswold after the battle of Groton Heights and the wholesale massacre of the gallant Colonel Ledgard and his heroic command. Although Connecticut had furnished brave men and hard earned money to carry on the colonial wars, yet, her location was such that fortunately for her inhabitants, no engagement ever took place within her borders.

Following the famous collision at Lexington, six years of sanguinary contest and strategic manœuvring had been marked off on the calendar of Liberty when one morning in the early September of 1781, the British fleet, under the guidance of Benedict Arnold, was discovered off the mouth of New London harbor at the east end of Long Island Sound. The enemy, losing no time, soon landed in two divisions of about eight hundred each, that on the west side of the river under the command of Arnold proceeding at once without opposition to the town of New London, two miles up the river, which was soon sacked and reduced to ashes. The force landed upon the east side of the river met with stubborn resistance at the hands of the garrison occupying Fort Griswold, on the summit of Groton Heights, opposite from New London.

The garrison was composed of about one hundred and sixty men, many of them being hastily gathered in from the surrounding country. Of these, eighty-five were killed and the rest were

wounded, thirty-five so severely that they were put on parole and left behind, while about forty were taken as prisoners of war to New York.

The gathering of the wounded that were scattered within and without the walls of the open fort and their removal to the little village lying along the river bank at the foot of the hill, was the first and most extensive occasion calling for hospital corps service that has ever occurred in the history of our State and has been described in the following graphic language by Stephen Hempstead one of the survivors: "After the massacre, plundering us of everything we had, they commenced gathering us up together with their own wounded, putting theirs under the shade of the platform and exposing us to the sun in front of the barracks, where we remained over an hour. Those that could stand were then paraded and ordered to the landing, while those that could not, (of which number I was one) were put in one of our ammunition wagons and taken to the brow of the hill, which was very steep, and at least one hundred rods in descent, from whence it was permitted to run down by itself, but was arrested in its course, near the river by an apple tree. The pain and anguish we all endured in this rapid descent, as the wagon jumped and jostled over rocks and holes is inconceivable. Our cries were distinctly heard and noticed on the opposite side of the river, nearly a mile away, amidst all the confusion which raged in burning and sacking the town.

"We remained in the wagon more than an hour, before our conquerors hunted us up, when we were again paraded and laid on the beach, preparatory to embarkation. By humane interposition thirty-five of us were paroled in the usual form, and being near the house of Ebenezer Avery, who was one of our number, we were taken into it. Here we had not long remained before a marauding party set fire to every room, evidently intending to burn us up with the house. The party soon left it, when it was with difficulty extinguished and we were thus saved from the flames. A sentinel was obtained to remain and guard us until the last of the enemy embarked, about 11 o'clock at night. None of our own people came to us till near daylight the next morning, not knowing previous to that time that the enemy had departed.

"Such a night of distress and anguish was scarcely ever passed by mortal. Thirty-five of us were lying on the bare floor—

stiff, mangled and wounded in every manner, exhausted with pain, fatigue and loss of blood, without clothes or anything to cover us, trembling with cold and spasms of extreme anguish, without fire or light, parched and excruciating thirst, not a wound dressed nor a soul to administer to one of our wants, nor an assisting hand to turn us during these long tedious hours of the night; nothing but groans and unavailing sighs were heard, and two of our number did not live to see the light of the morning, which brought with it some ministering angels to our relief."

Such were the simple words of one who took an active part in that memorable event and all its attendant sufferings, but you and I, living with all the conveniences of the present age, can never fully appreciate the significance of the language used. There was no surgeon attached to the garrison, but the fort was considered within the limits of the Eighth Regiment of Connecticut militia, and had been garrisoned for some time by detachments from that regiment. Joshua Downer, surgeon, and Avery Downer, assistant surgeon of the Eighth Connecticut, resided in the town of Preston, fourteen miles inland from the fort. "The booming of distant cannon and a cloud of smoke arising above the town of New London, were the messengers that summoned them to their post of duty on the 6th of September, 1781. As Surgeon Downer drew near to the scene of carnage he met and cared for some of the straggling wounded, who had escaped in the confusion following the massacre, and as soon as the enemy had departed, he proceeded under orders of the field officer of his regiment to the house of Ebenezer Avery, and took charge of the first dressing station. Soon after midnight he was joined by his assistant surgeon, but there was no hospital corps to come to his aid. Bayonets had been freely used for probing, and an ammunition wagon with gravitation for its motive power had served for an ambulance, but beyond these all grotesque semblance to hospital corps service may cease.

The writer, perhaps, may be excused for stating here that his great grandfather, then a youth of sixteen years, was one of a company of militia located at Colchester, an inland town about twenty-five miles away, that receiving intelligence of the British attack early in the morning of Sept. 7th, at once started upon a forced march to the scene of devastation and slaughter, but found

on their arrival that the enemy had taken to their ships and sailed away, and there only remained for them the melancholy duty of assisting in the burial of those who unflinchingly in the face of an overwhelming and unmerciful enemy had met death at their posts of duty as brave and patriotic a band as ever gave up life in defense of their country's flag.

The history of hospital corps service proper began in Connecticut in the spring of 1889, when largely through the individual efforts of Major L. B. Almy, the military laws of the State were so amended by its Legislature that the hospital corps became a distinct organization, independent from company detail and attached to regimental headquarters, where it has since remained. The first enlistment into that branch of the service from civil life was made in October, 1889, and the first encampment was at Camp Embler, Niantic, in August, 1890.

In 1887 the surgeon of the Third Regiment, C. N. G., gave lectures during the drill season to the different companies in his regiment upon the various methods of rendering first aid to the injured. In 1888 the several surgeons were instructed to draw a detail of four men from the ranks for hospital corps service in each regiment, but for various reasons this method was found to be far from satisfactory, and resulted in the establishment of the hospital corps as a separate organization.

In 1890 Major Almy drew up a condensed form of litter drill, adapting it from various sources, and forwarded it to the commandant of his regiment for approval; by him it was forwarded to the Adjutant General, where, meeting with approval, it was ordered published and distributed for use in connection with Smart's Manual.

The present military law of the State of Connecticut was enacted by the General Assembly at the January session of 1895, and so far as it has reference to the medical department, is as follows:

Public Acts of 1895, Chapter CCCXXXIII, Sec. 16. In time of peace the Connecticut National Guard shall consist of not more than forty companies of infantry, and four divisions of naval militia, one signal corps, one battery of artillery, one machine gun battery, and to each regiment, one hospital corps, and one band, fully armed, uniformed and equipped, and organized into one

brigade. This force shall be located throughout the State with reference to the military wants thereof, means of concentration, and other military requirements.

Sec. 19. (The field officers of a regiment shall consist of a colonel, a lieutenant-colonel and a major for each battalion, all nominated by the field and line officers of the regiment.) Each colonel shall nominate on his staff (an adjutant with the rank of captain, a quartermaster and paymaster each with the rank of first lieutenant,) a surgeon with the rank of major, an assistant surgeon, with rank of first lieutenant, (an inspector of small arms practice, with rank of captain, and a chaplain, who shall be commissioned without rank, but be entitled to the same pay and allowances as a regimental adjutant. The non-commissioned staff of a regiment shall consist of a sergeant-major, a quartermaster-sergeant, a commissary sergeant, two color sergeants,) a hospital steward, (a chief trumpeter, a drum-major, and a mounted orderly with rank of corporal, to be enlisted and appointed by the colonel and warranted by him. Each major shall nominate on his staff an adjutant with the rank of first lieutenant, and a sergeant-major, the latter to be warranted by the colonel.) All surgeons and assistant surgeons must be graduates of a lawfully established medical college, and all hospital stewards must be duly licensed by the State Commissioners of Pharmacy.

Sec. 20. Each hospital corps shall consist of such number of non-commissioned officers and privates as the commander-in-chief may from time to time prescribe.

Sec. 45. The surgeon-general, by and with the advice of the commander-in-chief, shall have general supervision and control of all matters pertaining to the medical department of the militia, and prescribe in general orders the physical and mental disabilities exempting from military duty. A board, to consist of the surgeon-general, medical director and senior regimental surgeon of the brigade, shall examine and report to the commander-in-chief upon the professional qualifications of persons nominated for regimental surgeons, assistant surgeons and hospital stewards.

Sec. 52. The Connecticut National Guard shall parade for drill one day annually in April or May, by company, or regiment, or battalion, as ordered by the commander-in-chief, and shall encamp for drill and instruction six successive days between the

10th day of August and the 20th day of October, annually, by brigade or otherwise, as ordered by the commander-in-chief.

Sec. 83. All acts and parts of acts inconsistent with the provisions of this act are hereby repealed.

Sec. 85. This act shall take effect from its passage.

It may be summarized from the foregoing that the personnel of the medical department in the Connecticut National Guard consists of one surgeon general, with rank of brigadier general attached to the staff of the commander-in-chief, one medical director, with rank of lieutenant-colonel upon the staff of the brigade commander, four surgeons, with rank of major, each being attached to one of the four regiments, four assistant surgeons, with rank of first lieutenant, also attached to the four regiments, four hospital stewards, with rank of first sergeant, four acting hospital stewards, with rank of sergeant, and sixteen privates, divided into four squads, one of which is attached to each of the four regiments. The term of enlistment is for three years, and all re-enlistments are for two.

The drill season begins with November and is continued through seven months, covering five hours in each month.

Drills may be weekly or fortnightly, at the discretion of the corps commander, but are usually held once in two weeks, the first fifteen minutes being devoted to setting up exercises, then a lecture of one hour duration upon some subject in anatomy, physiology, or first aid treatment in accidents and emergencies.

The course of instruction the present season has been but a slight modification of the program laid out in the excellent paper on "Hospital Corps Instruction at Military Posts," by Capt. W. C. Borden, and presented to this Association at its meeting in Buffalo.

The time allotted after each lecture is given to the various forms of litter drill, lifting and handling wounded, applying splints, bandages, etc. Advantage is taken of the wild, out-door surroundings in the various exercises rehearsed at the spring parades. At our annual encampments a brigade hospital is established and run by daily details from the surgeons, stewards and hospital corps of the four regiments, under the general supervision of the medical director.

II. THE HOSPITAL CORPS OF THE NATIONAL GUARD OF PENNSYLVANIA.

BY MAJOR JOSEPH K. WEAVER,

NORRISTOWN, PA.

BRIGADE SURGEON OF THE FIRST BRIGADE OF THE
NATIONAL GUARD OF PENNSYLVANIA.

IN presenting this brief paper on The Hospital Corps of the National Guard of Pennsylvania, the purpose is not to present it as a model, nor even as possessing any special features of interest or novelty, but simply as a sanitary organization of the eight thousand soldiery of a great State in a division organization and to show its weaknesses and deficiencies as well as its merits and excellences. It is not what it ought to be, it is not what it can be, and I think I can say it is not what it will be in the near future. The material is there, the interest and enthusiasm are there and the earnest desire is not wanting. There is lacking but two things, but they are very important—indeed essential; measures and means, or, in other words, legislation and money. The purpose of the organization at all I take it is, that assistance may be rendered to the wounded and sick promptly, intelligently and humanely at the earliest possible moment, and then removal to a place of safety where more thorough attention can be given them and their condition made more comfortable. While in time of peace the organization for this purpose need not be so elaborate nor the facilities so great, yet we appreciate the fact that in time of peace we should be ready for war, and therefore, the model at least should exist upon which could be built, without delay, a complete sanitary organization which would meet every emergency and so far as possible ameliorate the horrors of war.

This, in my judgment, the present sanitary organization of the Pennsylvania Guard does not afford. The National Guard of Pennsylvania, as a whole, is as fine a military organization as can be found in any State in the Union. It is composed of three brigades, with a battery and troop of cavalry for each brigade and

two battalions of naval militia, the total force aggregating, officers and enlisted, 8,705 men, formed in one division and commanded by a major general and three brigadiers, with their respective staffs. The brigades are formed into regiments, the regiments into battalions. The medical department consists of a surgeon general, with the rank of colonel, a division surgeon with the rank of lieutenant colonel, three brigade surgeons, each with the rank of major, three medical officers for each regiment, the senior officer having the rank of major, and two assistants, with the rank of first lieutenant. Where there are separate battalions, or battery, or troop of cavalry, there is one medical officer, with the rank of first lieutenant. There is to each regiment one hospital steward and four enlisted men to constitute the hospital corps, and two men designated by the company commanders in each company, who are known as company bearers, who bear arms, perform all the duties of a soldier in their respective companies, who are instructed in first aid duties, but who are not called upon except in emergency, which has up to the present time, never arisen, so that, the sanitary force for a regiment would be three medical officers, one hospital steward, four hospital corps men, and twenty company bearers, who would constitute the sanitary force of about five hundred and fifty soldiers.

You will observe that there is no provision made for an Ambulance Corps or Field Hospital, which are recognized at the present day as being a necessary part of every well-organized military body. The only semblance of an Ambulance Corps is the existence of an ambulance wagon in some of the regiments, provided from the funds of the regiment and not by the State. These ambulances are built after the pattern of the army, modified as to weight and convenience, the better to adapt it to the needs of the Guard. I may say that the Surgeon General is appointed by the Governor, the Surgeon in Chief or Division Surgeon by the Major General commanding the Division, the Brigade Surgeons by the General commanding the Brigade, the Regimental Surgeons by the Colonel of the Regiment; the Hospital Steward by the Regimental Surgeon, and the members of the Hospital Corps are selected by the Surgeon, from the regiment with permission of the Captain and the approval of the Colonel and occasionally enlisted directly for the Corps.

The personnel of the men composing the Corps is of a high order, as a rule. The Hospital Steward is generally a graduate in pharmacy and, therefore, familiar with drugs. The men are selected for their intelligence, physique, general appearance and taste for that kind of work. He is required to be familiar with the drill and the general duties of a soldier, for no man can be an efficient sanitary soldier without first being a soldier of the line. In these respects, we think the men will compare favorably with those of any Hospital Corps of the Army.

Equipment.—In this respect, we have the Army as our model, retaining, however, a Hospital Corps' knife, which we understand has been discarded by the Army, and although sometimes in the way, is found a very useful instrument. So far as the litter is concerned, the Guard has adopted one which differs in some slight degree from that of the Army in weight, material, and brace, as to its form and to its movements, and fastenings to the poles. The litter sling is that of Major Appel. As to the Hospital Equipment, we are in a condition of transition. We are fairly well supplied with modern instruments and surgical appliances and dressings. We have not, as yet, found a medicine chest for packing and carrying medicines and surgical instruments to suit our taste, although we soon expect to solve that problem—not being satisfied with that of the Army, or any other that we have thus far seen. As to the supply table, of medicines, we have not as yet been able to adopt one, owing to the varying tastes and ideas of many of the surgeons, especially of the country regiments. We believe, however, that the supply list of the Army is far from perfect. The ideal supply table will be one in which there will be but few liquids and one made up largely of compressed tablets and tablet triturates, which are not only convenient for transporting, easy of administration, convenient for the soldier to carry on his person, and as reliable and potent as medicines in any other form.

We believe that the facilities for carrying medicines on the march or the form of the camp chest is not what it should be. So far as our Guard is concerned it is left to the ingenuity of each regiment. We first had a hand chest made of leather containing four and six-ounce bottles, which provided only for liquid remedies, which was used for several years, answered a fairly good purpose, but was heavy, inconvenient and tiresome to carry. For years a

hospital medical knapsack was used, which provided for liquid and other forms of medicines and surgical dressings. It was found after a few years of trial to be unsuited by reason of its size, its weight, its inconvenience and liability to breakage and disarrangement of its contents. We hope soon to reach the ideal in this regard. The ideal emergency case will be one which can be fastened to the belt of the soldier as is a cartridge box, which can be moved to the rear when not in use, and moved to the front when necessary, and supplied with the very few remedies that are necessary in rendering first aid.

Instruction.—The instruction which the Hospital Corps receives is methodical, practical, and given with considerable attention to detail. Each man of the Corps, so far as possible, is supplied with a copy of the Hospital Corps Drill adopted by the Army, and at least one copy to each corps of first-aid, by Doty, or by the still more recent work, more comprehensive and more thorough, by one of the most distinguished and energetic members of this Association, Captain Pilcher. This instruction is under the direction of one of the surgeons, often given by himself, or by the Hospital Steward and under the observation of the Surgeon, and is given weekly at the Armory with some degree of regularity throughout the year. The men are interested in this part of their duty, and acquire rapidly, and soon become proficient in their duties. A great deal of attention is given to practical instruction in location of the arteries of the body, in the character of the wounds, which the soldier in active service is likely to receive, the location of the important organs of the body and what is the first thing, and the best thing to do, and the best way to do it, when such a part or organ is injured. We do not believe that it is necessary to burden the men with unnecessary detail, and a great deal of theory. The essentials are all that is absolutely necessary.

The duties of the Corps during the tour of the summer encampment, which lasts a week, in the month of July or August, are such as to familiarize the Corps in a practical way with their duties. These duties consist in the Manual of the Litter and in the method of handling men with the litter and without it; the ambulance drill in seeking for, and finding the imaginary wounded, applying first-aid and carrying them to the ambulance station or to the imaginary field hospital. The men are quartered near the Regi-

mental Hospital tent so as to be within easy call. All are on duty at the same time and all the time, if necessary. When not necessary, but one is in charge of the hospital. They assist the surgeons at a sick call in administering medicines, dressing of injuries and wounds. They are expected also to prepare special diet for the sick in hospital, and to act as nurses in cases requiring such care. Towards the close of the encampment an inspection of the Brigade Hospital Corps is held, to which the commandant of the camp, the Governor of the State, who is usually in camp, and all who may be interested, are invited. A complete exhibition of the entire drill is given which draws a large crowd and awakens a great deal of enthusiasm on the part of the spectators, and the Hospital Corps, at least for the time being, is voted an important part of the soldiery of the State.

What I have said thus far applies more especially to the First Brigade, with which I am connected. All the troops of this brigade, being located in or near Philadelphia, have advantages and opportunities which the other brigades do not possess. In no one city of the State, outside of Philadelphia, is there more than one regiment. In the great majority of cases, companies of which the regiment is composed, are widely distributed, making it impossible to mobilize except on occasions of ceremony or active service: The members of the Corps, as a rule, being enlisted men from the companies, and therefore serving with their companies, cannot be gotten together for the purpose of drill and instruction and therefore they are a hospital corps more in name than in practice. The pressing need is immediate reorganization. What this reorganization shall be is not for me at this time to say although I have a well-defined opinion on the subject and am not without hope that in the near future Pennsylvania will be able to present, during their tour of annual encampment, the Sanitary Department organized after the best methods. Moreover, we believe that the model will be found in that of the Army with such modifications as our needs and exigencies may demand. There are many advantages to be gained by such reorganization. It is recognized by all that in time of war, and no one can tell when that time may come, the chief reliance of the country would be upon her National Guard, and as they are now uniformed, equipped, drilled, disciplined and organ-

ized, largely, if not entirely, in accordance with the organization of the U. S. Army, we do not see why the Sanitary or Hospital Department should be an exception.

We believe the best interest of the National Guard will be subserved by a uniform organization of the Medical and Sanitary Departments of all the States, and as that of the Army is the result of years of careful study and observation and comparison, and could, with but slight modification, be made to apply to the Guards of the several States, I suggest that one member of this Association from each State be appointed, who shall confer with the others, looking to uniformity in this respect.

III. THE HOSPITAL CORPS OF RHODE ISLAND.

REMARKS BY LIEUT. COLONEL CHARLES H. FRENCH,

PAWTUCKET, R. I.

MEDICAL DIRECTOR IN THE RHODE ISLAND MILITIA.

I HAVE prepared no set paper, but it may not be out of place for me to relate briefly what Rhode Island has been doing in this Hospital Corps matter. Up to the encampment of 1895 there had been no attempt made to organize anything in the shape of a Hospital Corps. We simply got along as best we could under the surgeon's care and if anything out of the ordinary took place, sent our severely sick and injured to the City Hospital at Providence, our encampment being only a few miles away. In 1893 we went into camp at what was to be and is now the permanent camping ground, some twenty miles away from Providence and a hospital of any kind. It became very evident to our authorities that what the surgeons had been asking for—a hospital corps—was a necessity. They granted that something should be done, and I was asked to prepare some rules and regulations with that end in view. In the fall of 1895 we were allowed to attempt to organize a hospital corps on the detail plan. My friend Captain Standish, of the Massachusetts Hospital Corps, said it would not work successfully, and I did not think so myself, but I thought that I could see that it would be a step toward what we really did need, and worked with that end in view. The first order issued was as follows:

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS.

ADJUTANT GENERAL'S OFFICE,

General Orders,

PROVIDENCE, September 24, 1895.

No. 25.

Brig. Gen. Hiram Kendall, Commanding Brigade R. I. Militia, is hereby directed to organize a Hospital Corps for the Brigade R. I. Militia, in accordance with the following rules and regulations:

I. The Hospital Corps of the Brigade R. I. Militia shall consist of the hospital stewards of regiments and battalions, and pri-

vates belonging to the brigade and detailed for duty in the corps as hereinafter provided.

II. Commanding officers of the regiments will detail eight privates, commanding officers of the battalions not parts of regiments will detail four privates, and commanding officers of separate companies, troops and batteries will detail one private for such duty, but no private shall be so detailed unless with his own consent, and on the recommendation of the senior medical officer of the organization, nor unless he is well instructed in the school of the soldier.

III. Men may be specially enlisted upon the recommendation of the senior medical officer of the organization, for the purpose of such detail, in which case the detail will be permanent, but the men so enlisted will be required to drill with their organization until they are well instructed in the school of the soldier.

IV. Except in cases of emergency members of the hospital corps will not be detached from the organization to which they belong and in which they have enlisted.

V. The senior medical officer of an organization will be in charge of the members of the hospital corps furnished by his organization.

VI. Privates detailed for duty in the hospital corps will be subject while on such duty to the orders of the medical officers of their organization, and will be relieved from all drills with their companies, troops or batteries, and their commanding officers will report them as on "special duty" or on "detached service," as the case may be.

VII. Privates of the hospital corps will not be relieved as such except upon the recommendation or request of the senior medical officer of the organization.

VIII. The Surgeon General will prescribe the course of instruction and be responsible for the efficiency of the hospital corps. Medical officers will be responsible for the continued efficiency of the detachments of the hospital corps under their charge and instruction.

IX. The medical officers of the brigade under the direction of the senior medical officer shall instruct the privates of the hospital corps, by means of lectures and demonstrations, in the meth-

ods of rendering first aid to the sick and wounded, the elementary principles of anatomy, physiology, hygiene, and therapeutics, in the care and use of hospital and field appliances, modes of ordinary cooking, and as litter bearers in accordance with the manual used by the United States Army.

X. Attendance at instruction and drills of the hospital corps and active duties of the command it pertains to will be compulsory for members of the corps, and those absent without valid excuse will be reported by the medical officer in charge to their respective organization commanders.

XI. With the approval of the senior medical officer of the organization, enlisted men of the organization may be permitted to attend the course of instruction prescribed for members of the hospital corps, but such attendance will not be made compulsory and no enlisted man shall be excused by reason thereof from any part of his regular military duty.

XII. At ceremonies the detachments of the hospital corps will take position six paces to the left and in continuation of the line, or six paces in rear of the column, of their regiments or battalions; they will be posted by their hospital stewards, who will then remain in charge of them and take the position as prescribed in the drill regulations for non-commissioned officers in command of troops. On practice or service marches they will follow their regiments or battalions at a distance of six paces under the charge of a hospital steward and medical officer. In cavalry, light artillery and separate companies, not parts of battalions at the time, they will take position as directed by their commanding officer.

XIII. On the march when in active service medical officers may be attended by a mounted private of the hospital corps, to act as orderly and carry such supplies as may be deemed necessary.

XIV. The medical officer in charge of a detachment of the hospital corps will render a report of his command, detailing its personnel, equipment, instruction and service on the last day of each annual encampment, through the regular channels to the Surgeon General. The medical director or chief medical officer of the brigade will also on the same date render a report through the

brigade commander to the Surgeon General as to the condition and requirements of the hospital corps.

By order of CHARLES WARREN LIPPITT,
Governor and Commander-in-Chief.

ELISHA DYER,
Adjutant General.

Revoked October 9, 1896.

The plan was a partial success only, and then only by much personal attention on the part of the surgeons and myself. It was hard work to get the details together for instruction and harder yet to keep them, for many reasons. Good men would be granted promotion in the companies and others might be discharged and the details were constantly changing. We had in camp, 1896, our Adjutant-General and it was possible to show him the faults of the "detail" plan. In the early fall of last year it was decided to ask the Legislature then in special session, to grant us a permanent corps, and we were fortunate enough to be able to get the following bill passed:

* * * * *

An Act establishing a hospital corps to be attached to the Brigade R. I. M.

(Passed October 2, 1896.)

It is enacted by the General Assembly as follows:

Section 1. In addition to the organizations comprising the active militia, there shall be allowed a hospital corps, which shall be attached to the Brigade.

Sec. 2. The hospital corps shall consist of a captain, one first lieutenant and one second lieutenant, who shall be members of one of the chartered State medical societies, two hospital stewards and not to exceed forty-five privates who shall be enlisted for the purpose. They shall be uniformed and equipped as the commander-in-chief shall direct, and shall receive the same pay as officers and men of the cavalry.

Sec. 3. When ordered out upon state duty, there shall at no time be allowed pay for an excess of two officers, two hospital stewards, and a number of privates to exceed two per cent. of the number of enlisted men in the Brigade.

Sec. 4. The system of instruction of the hospital corps shall be prescribed and directed by the medical director of the Brigade with the approval of the Surgeon General.

Sec. 5. This act shall take effect immediately, and all acts and parts of acts inconsistent herewith are hereby repealed.

* * * * *

Our service is not a very large one. We take only about one thousand men into camp. It was thought best to have a full company in order that it could be held together as a social organization in addition to the military side, but the act limits the drawing of pay to only two per cent. of the force in camp—for one thousand men twenty men with two stewards and two officers. Following the act passed by the Legislature came the following General Order:

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS.

ADJUTANT GENERAL'S OFFICE,

General Orders

PROVIDENCE, October 9, 1896.

No. 26.

General Orders No. 25 A. G. O., series of 1895 is hereby revoked.

Brig. Gen. Hiram Kendall, Commanding Brigade R. I. M., is hereby directed to organize a Hospital Corps to be attached to the Brigade R. I. Militia, in accordance with the authority granted by an act of the General Assembly, passed October 2, 1896, detailing the proper officer or officers to enlist men for this duty, said corps to be governed by the following rules and regulations.

I. The Hospital Corps shall consist of one captain, one first lieutenant, one second lieutenant, two hospital stewards who must be graduates of medicine or registered pharmacists, and not to exceed forty-five privates.

II. Company officers shall be elected in the manner prescribed by Section 68 of Chapter 296 of the General Laws "Of the Militia."

III. Commissioned officers shall be uniformed in the same manner as medical officers of the staff of like rank. Hospital stewards and privates in the manner prescribed for the hospital corps

of the United States Army, with the exception that the letters "R. I." shall be substituted for the letters "U. S."

IV. The medical director of the brigade, with the approval of the Surgeon General, will prescribe the course of instruction and be responsible for the efficiency of the corps, assisting the officers in command, at such times as he can by lectures and demonstrations.

V. The drill of the corps in the use of hospital and field appliances and as litter bearers will be in accordance with the manual used by the United States Army.

VI. Attendance at instruction, drills and all active duties pertaining to the corps will be compulsory for members and they will be subject to the same rules of discipline as govern other military organizations under Chapter 296 of the General Laws "Of the Militia."

VII. Upon the request of the senior medical officer of an organization of the militia, with the approval of the commanding officer of the hospital corps, enlisted men of the organization may be permitted to attend the course of instruction prescribed for members of the hospital corps, but no enlisted man shall be excused by reason thereof from any part of his regular military duty.

VIII. The Brigadier General Commanding the Brigade will grant permission, at such times as to him may seem advisable, for a detail from the hospital corps to perform voluntary duty, upon occasions of parades, celebrations or other public gatherings in any of the cities or towns of the State, upon the request of the proper authority of said city or town.

IX. The commanding officer of the hospital corps, upon the completion of each tour of duty of his command, or any detachment thereof, will immediately render a report of it in triplicate to the medical director of the brigade, who will forward one copy to the Adjutant General and one copy to the Surgeon General. The medical director or chief officer of the brigade will within ten days after each annual encampment of the brigade render a report through the brigade commander to the Surgeon General as to the condition and requirements of the hospital corps, detailing its personnel, equipment, instruction and service.

X. At ceremonies the hospital corps will take position to the left and in continuation of the line, or in rear of the column at such intervals or distances as may be prescribed by the commanding officer thereof.

XI. On the march when in active service, medical officers may be attended by a mounted private of the hospital corps, to act as orderly and carry such supplies as may be deemed necessary.

By order of CHARLES WARREN LIPPITT,
Governor and Commander-in-Chief.

FREDERIC M. SACKETT,
Adjutant General.

We are fortunate in having in charge as commander of our hospital corps a man of high standing, both socially and professionally, ably assisted by his two lieutenants of the same stamp. He has in his command some of the very best material in a social and educational sense in the State. We are a small State, the two larger cities being practically one and the entire corps is made up of young men from these two cities.

The following extracts from a letter from Captain N. Darrell Harvey, who commands the company, are of interest:

"In the first place the corps is really a military company, commanded by the usual number of commissioned officers. It is larger than the Brigade needs for its own personal use, but as we have a large number of independent companies in the State militia, the corps can undertake its share of duty for the entire militia. The corps is composed of two divisions each under a lieutenant and having attached to it one first sergeant, who is a hospital steward, and eleven privates, detailed as acting hospital stewards, each being in command of a litter squad, and divided up between the two divisions. The company has now forty-six enlisted men out of a possible fifty, but no hurry to fill up the ranks unless with superior men is encouraged.

"We have, on the whole, a good class of men, who as a whole are doing good work and taking a decided interest in its success. Many men who have enlisted but who have failed to show the desired amount of interest, particularly in the attendance at drills, have been discharged. No excuse for absence from a drill is entertained unless on account of illness (when a physician's statement

to that effect is in order) or very urgent business. Each man is placed entirely on his honor in this respect and so far we have had, I think, an average attendance of over 75 per cent.

"The corps is now equipped with uniforms and overcoats, caps with a red enameled cross, full number of letters, 18 H. C. pouches packed, plenty of bandages and 'first aid packets;' a skeleton and other appliances for instruction and a sufficient number of muskets and blankets for blanket litter drill. The officers are all members of the Association of Military Surgeons.

"The company drills for one and a half to two hours on each Tuesday evening, at which meeting a short talk for twenty minutes on first aid is given, usually preceded by a quiz of ten minutes on the matter gone over at the previous meeting, while the last part of the hour or so is spent in drilling, according to the regulations of the United States Army Hospital Corps. The corps has been in existence, of course, only six months and probably will go to camp in two separate divisions, each doing three days' duty."

IV. SOME SUGGESTIONS REGARDING THE MEDICAL DEPARTMENT OF THE NATIONAL GUARD.

BY CAPTAIN GILBERT I. CULLEN,

CINCINNATI, OHIO,

ASSISTANT SURGEON IN THE OHIO NATIONAL GUARD.

THE first thing to be considered on this subject is that of a proper organization of the Medical Department. When we stop for a moment to consider the magnitude that the National Guard of the United States has assumed in recent years and the consequent importance of the Medical Department we are forced to a realization of the need of a permanent organization that will meet the many and ofttimes pressing demands of the service, and will be prepared to cope with the most unfavorable conditions, such as unfriendly administrations, serious riots, internal disagreements, lack of just and sufficient financial support, etc. What can be more important in this connection than the chief executive who can control exclusively this department? The regular army has set us the example of separating the Medical Department from that of the rest of the service and organizing it as a distinct corps under the direction of a surgeon general. The wisdom of such a move has been many times demonstrated. We should have a surgeon general in each State appointed from among those who have served in the Guard, for it is a most essential point to have an executive head of a department familiar with all the working details of each branch coming under his jurisdiction, and this can be secured in no other way than by personal experience. The wisdom of this is shown in the selection of men to occupy the heads of important departments in all large corporations such as railroads, manufacturing industries, etc.

The surgeon general should have an able corps of assistants, with the ranks of division, brigade, post or regimental surgeons, as the requirements of the service would demand, together with the requisite number of assistant surgeons attached to or detailed with the several regiments. The appointment of the junior offi-

cers should be by competitive examination and promotions, made after the manner adopted in the regular army. The pursuance of this plan would prevent the appointment of incompetent men and would be a double incentive to the junior officers to better prepare themselves for promotion, which would in such a case depend upon their fitness for the office rather than upon the number of votes they can control or the degree of friendship that may exist between them and the appointing power.

Among the many other advantages to be gained by this plan would be greater facility in equipping the department in cases of emergency or in the supplying of new outfits and equipments, more satisfactory supervision of the working of the several hospital corps and the avoidance of possible friction between the medical officers of one regiment and the commanding officers of others in cases where they were stationed together for camp duty or active service.

The method, for obvious reasons, would be demanded in the event of the National Guard being called upon for service in connection with the regular army, as in the case of the recent Chicago riot, or in the event of the culmination of the present threatening international disagreements.

The prospect of securing increase of efficiency in the department that would undoubtedly result from this form of organization will no doubt insure the support of the regimental commanders in this movement, for not only would it give them a more systematically equipped and far more proficient and valuable corps, but it would also relieve them of much of the annoying details that are now added to their office.

Another point to be gained would be the uniformity of equipment and supplies. At present our medical outfit evidences nothing more or less than the individual preference of the regimental surgeon, and in the event of two or more organizations being stationed together this lack of uniformity in the medical and surgical armamentarium would in many instances be most embarrassing.

The next subject to be considered is that of the means to be adopted for promotion of more enthusiastic work on the part of the individual members of the several hospital corps, which is next in importance to the question of organization.

The great tendency on the part of the enlisted men is to enter the service with the idea that they can do about as they please and if the exactions of the service be too great to suit their tastes they can drop out at any time. This is the greatest mistake possible and one that the medical officers should take every possible means to correct. Impress upon both the enlisted men and those contemplating enlisting, the seriousness of this work, that it is not simply a case of meeting occasionally at the armory and putting on a uniform and being drilled in the movements of the manual for an hour or so, but that they may be called upon at any time to perform duties which involve the saving of life or the alleviating of sufferings of a fellow being, and that these duties can only be performed faithfully and well after many hours of tedious practice and preparation. In addition to this they take a solemn and binding oath to abide by the articles of war and the army regulations, both of which should be carefully read to each man before he enlists, the former in its entirety and such portions of the latter as will give him an idea of the important and exacting service he is about to enter. By so doing, we will not only form a different idea in the mind of the recruit but we will in time educate the general public to the point of better appreciating the principles upon which the National Guard is organized and supported.

The selection of men for the hospital corps is a very important matter and one which is too often neglected. The same idea seems to prevail that we sometimes find in a company, viz: the member of the company who can get the largest number of recruits is deserving of a medal. The service required of a hospital corps man is entirely different from that of the line and the recruits should be selected accordingly. We should bear in mind that our men must be able to learn to put on a bandage well, exercise judgment in the handling of the sick and wounded, dispense medicine, perform the duties of a hospital nurse, as well as obtain a good general knowledge of anatomy, physiology, and dispensing. All this only goes to emphasize the importance of accepting only those who are inclined naturally to medicine or surgery, who are intelligent, and who manifest more or less desire for military training and discipline. After these men are enlisted it becomes our duty to make the service of such a nature that the men will be properly instructed and come to thoroughly appreciate the good

work they are doing; we should put forth every effort to give them diversion in their training, for men will soon become tired of any one line of work; we should prepare for them interesting lectures upon general anatomy, physiology, hygiene, first aid to the injured, dosage and uses of the drugs most commonly employed, comparative anatomy and physiology.

Practical demonstrations should be given often, and in this connection I want to mention the idea of having the hospital corps in some way connected with the municipal department in the city in which they are located, in order to give them better opportunities of observing the handling of the sick and wounded. The plan suggested is to have the members of the corps made a part of the ambulance service to the extent of allowing them (upon proper identification by badge or card) to accompany the ambulances or patrol wagons to and from the scenes of wrecks and accidents and be present in the receiving wards of the city hospitals where they can witness the various dressings applied, remedies administered, and such other procedures as they may in time be called upon to perform. This has proven a very successful method of stimulating the enthusiasm of the men and they are enabled to gain much valuable and practical knowledge and experience in return for the gratuitous services they render as assistants.

The appointment of the hospital stewards by competitive examination seems so obviously to be the only plan to be followed that I do not consider it necessary to emphasize it.

As to the inspection of the Medical Department, I think it is very important that some officer be detailed from among those in the medical service whose duty it should be to visit each armory at least once a year and witness what is being done during the year, and at each annual encampment he should visit the camp and remain long enough to become thoroughly familiar with the proficiency of each corps in field work.

V. CAMP SANITATION OF THE NATIONAL GUARD.

BY CAPTAIN JAMES JAY ERWIN,

CLEVELAND, OHIO.

ASSISTANT SURGEON IN THE OHIO NATIONAL GUARD.

THE sanitation of camps of the National Guard, so far as my observations have been conducted, has revealed in most cases such forms and features as are peculiar to the tastes and executive ideas of the officers in command; many of which might have been improved upon had the commanding officers and the senior medical officers studied more deeply the Army Regulations, now made more explicit through the Manual for the Medical Department. It is not unusual for these officers in their efforts to supply financial aid which the State has neglected to provide, to secure permission from their superiors in grade to locate their camps where a bonus can be obtained from sources which the locating of the camp at that place is supposed to reimburse with profit. In considering this convenience other features of equal or greater importance are liable to be overlooked, among which is the sanitation of the camp. In this, the commanding officer may have overlooked the fact that provision for sanitation should come directly under the official prerogative of the senior medical officer, and that he and he alone should be entrusted with this particular responsibility. There has been an obvious difference in this respect between the camps commanded by ex-officers of the army who have become commandants in the National Guard and those who have come to their position from the civilian classes. The training of the former has taught them how far obligations in this respect belong to the requirements of this office, and how much is to be entrusted to the care of each staff officer, for the faithful performance of the duties of which he is to be held responsible.

The principles laid down in the Army Regulations and the Manual for the Medical Department of the regular service, have resulted from long experience in special study by those who have

devoted an active life to such service. And their conclusions should be as patent when applied in the National Guard service as they have been shown to have been in that of the army.

The work of the National Guard surgeon at these encampments is much more arduous than that of the surgeon of the army at army posts, because of the character of the diseases they are called upon to treat. The men of the army have become inured to their environments. The men of the National Guard have come from various walks in life, and are now called upon to conform to practices and surroundings in many cases so different from their daily customs as to precipitate crises eventful in their results. The National Guard surgeon, too, is better prepared to care for this kind of service, because of aptness, the result of experience in private practice, which surgeons in the army seldom meet. Owing to a misconception, which happily is uncommon, the duties of the surgeon of the National Guard are too apt to be regarded by him as display features, designed to embellish the splendor of the regimental staff on Decoration Day, 4th of July, dress parade and special occasions of ceremony. He is liable to overlook the extent of his duty to the unfortunate, and the education and disciplining of the sanitary soldiery on whom he is to depend for assistance in times of greatest need. He who would do his whole duty in the sanitary supervision of the commissary department, quartermaster department, the water supply, the sinks, the quarters, the policing of the camp, the sick in hospital and the casualties which arise, the school of the hospital corps and company bearers; who would keep correct and adequate reports of all these and see that the many minor duties not mentioned do not pass neglected, has occupation for himself and assistants beyond the glittering features so agreeable to æsthetic fancy.

I have seen camps of the National Guard where the appointments of such service would baffle criticism, and I have beheld others, typical of the opposite extreme, where criticism would have been lost on the vague comprehension of the officer entrusted with this charge, because of his ignorance of what an officer occupying his position should know.

While criticism is being applied to camps on fields other than those owned and controlled by the States, even the latter are not free from faults in a sanitary sense.

In one the geological formations may not have been observed, and the sinks may have been placed on that side of the grounds from which the strata slope. Then the wells from which the water supply is drawn are sunk on the side to catch the drainage from the opposite, and thus become contaminated from this very unwholesome source. Another may have resorted to driven wells without any system or record of arrangement adopted at each annual camp, this having been left each year to the whims or caprices of the commanders. One year the sinks may have been located on one side of the field, and the driven wells on the opposite. The next year another commander may locate his camp, reversing the arrangement of the preceding years, and unconsciously have the pipes for his wells driven through the excrement deposited years before. Under such circumstances the consequences would be obvious. Where the water supply is taken from streams or lakes, in either extemporized or permanent grounds, a system of filtering should be adopted, the utility of which has been so effectually shown, first by tests, and then by adoption in the French army. Level and unbroken fields are liable to be selected because of the convenience and tasty provision for field work. But when the weather becomes inclement and the soil soaked because of inadequate drainage, the work of the sanitary department is enhanced in proportion thereto. Permanent grounds should be located near bodies of water where facilities for bathing should be adequately provided, the advantages from which when properly conducted are so ably portrayed in papers by Lieut. H. Lincoln Chase, M. V. M., and Surgeon H. G. Beyer, U. S. Navy, published in Vol. VI, Proceedings for 1896.

While conditions cited no doubt represent such as prevail at the present time, much more might with equal propriety have been said of this work only a few years ago. To what, or to whom are we indebted for this desirable change? Shall we associate the same with fruits from the meetings of the Association of Military Surgeons of the United States? Men cannot fail to receive lasting impressions from associations with others of similar views and congenial minds as well as from subsequent perusals of papers once listened to, but then studied from the published proceedings of our annual deliberations. While thus recognizing the merits of our organization—which all who appreciate the power of its

advantages will acknowledge it to be a source of inestimable value—there is another institution which has not been patronized in a manner that would show that the surgeons of the National Guard have appreciated the value of the benefits it would secure to them even in their private practices. I refer to the Army Medical School, an institution authorized by the general government, to which medical officers of the National Guard may be admitted by applying for admission to the Surgeon General of the army. A post-graduate course of study at this institution would enhance the practical knowledge of the National Guard surgeon to an extent which could not fail to be recognized in the subsequent performance of his duties in camp, field, or in private work.

Year after year the work in this department shows to some degree in most camps, an improvement over the same which had been done years before. To make this principle universal should be the laudable ambition of every surgeon of the National Guard. As a means by which information may be imparted to secure this end, and not to parade the past and unalterable faults of any command, I wish to present for your consideration some observations recorded while visiting a camp of the National Guard in 1895. This camp was located on sandy soil, covering not very deeply a bed of lime rock. No inspection of the proposed camp grounds had been made by a medical officer previous to the laying out of the camp, and no medical officer superintended the provisions for the camp's sanitation. The water supply was bad, the water used having been taken from a lake near the shore, and conveyed in open barrels, covered with burlap, to the different quarters. The sinks were inadequate, only two, size 6x8, being provided for the officers and men, and no disinfectants were used. The men were mostly compelled to resort to the copse, corn fields, orchards and vineyards near camp for shelter, secrecy and convenience. Fortunately the soil was thin and porous, covering the limestone rock but a few inches, and affording good drainage. Though the garbage was as well collected in barrels as previous directions and a casual observation would obtain, it was not before the fifth day of the encampment that orders were given for what had been thus collected to be removed. Much had been thrown on the ground near the cooking quarters, from which it was subsequently collected and burned, with the grass and other combustible material raked from

the grounds during police duty. The food supply was reasonably well selected, and as a whole was wholesome and well served. Aside from cooks, waiters and other supernumeraries, the working force of the regiment numbered 681 men, of whom 625, or a little less than 91½ per cent. had lived in towns, and 56, or a little more than 8½ per cent. had come from the country. Of these 98, or a little more than 14 per cent. were under twenty; 395, or more than 58 per cent. were over nineteen and under twenty-six; and 189, or a little less than 28 per cent. were over twenty-five years of age. The average age of the command was $26\frac{23}{38}$ years. Of the whole number 183 or nearly 27 per cent. were mechanics; 39, or more than 5½ per cent. were merchants; 49, or a little more than 7 per cent. were professional men; 129, or nearly 19 per cent. were clerks; 28, or but little more than 4 per cent. were accountants; 41, or about 6 per cent. were students; 51, or nearly 7½ per cent. were farmers; 23, or 3½ per cent. were painters; 15, or a little more than 2 per cent. were railroad men; and 122, or nearly 18 per cent. were composed of men whose vocations were not included among the others mentioned.

To care for the health of these, this regiment which ranks in a military sense, among the best National Guard organizations in the United States, went into camp with a hospital corps composed of seven men, six of whom, which included the hospital steward, had been enlisted in this service not more than eight or ten days, and had had no instruction in their work.

During the six days of encampment 120 men, or 17.62 per cent. of the whole force, representing 133 cases of sickness aside from casualties, reported at the hospital and received treatment. The number of casualty cases cared for was 42, equal to 6.16 per cent. of the numerical strength of the camp.

Of the 175 men who worked in shops, 40, or 22.85 per cent. reported at sick call, while of the 323 who worked in doors, other than in shops, only 51, or 15.79 answered the same. 112 men had worked in the open air in towns; of these 18, or 16.07 per cent. became sick. These may be contrasted with 72 who had worked in the open air of the country, 8 of whom, or 11.11 per cent. were likewise afflicted. Of the 625 whose homes were in town and whose conditions in business are not now considered, 112, or 17.92

per cent. sought medical relief. 56 had lived in the country, and of this number 9, or 16.07 per cent. sought the same sanctuary.

Out of the whole number of cases treated 93, or 69.92 per cent. were for stomach and bowel troubles, representing 13.65 per cent. of the regimental force.

Considering the ages of the men, we find that 98 were under twenty years; 22.44 per cent. of these were treated at the hospital. 395 representing ages between nineteen and twenty-six; 21.77 per cent. of these sought like attention. Of the remaining 189 who were over twenty-five years of age, only 14, or 7.40 per cent. received medical relief. This will show in a sanitary sense that young men below twenty years of age do not make good National Guard soldiers, and that as age advances to a limit not mentioned, their powers of endurance increase.

Data taken would admit of further subdivision, giving the per cent. of sick representing each vocation present, but sufficient, I think, has been given for the drawing of practical conclusions.

DISCUSSION.

GENERAL OLIVER, British Army: Of course, it is different in your country, where warfare is sure to be confined to your own country and your civil hospitals will be utilized, but at the same time, if I might be allowed to suggest, it seems to me it would be a beneficial move to have some of your hospital corps instructed in the art of nursing. This might be done in some permanent or civilian hospital. Nursing is one of the most important features with us. Another important feature is the necessity of having trained troops for preparing the food and drinks for the sick and wounded. Of course, in your city hospitals the sick and wounded can be attended to, but it is necessary for the hospital corps to be instructed.

THE PRESIDENT: I will say, for information, that we are seeking to have established in the Medical Department of the United States Navy a systematic school for nurses, to qualify the members of hospital corps to act as nurses, when such a corps shall be authorized.

COLONEL SENN: The papers read by Majors Weaver and La Pierre prove to us what the National Guards are accomplishing in their respective States. The paper by Colonel Almy deals with a different subject. His grievances are widespread and well founded. The causes of them should be removed in the course of time. All such radical changes in the National Guard must necessarily be slow, but eventually, if we work shoulder to shoulder, the final object for which this organization was founded will be realized. For this reason I am particularly anxious that this Association shall keep in touch with the State Departments for

the reason that the power of each Governor in appointing the chief of each department will never be sacrificed. But such movements as the one set afoot this morning will certainly bring disrepute. Governors cannot be forced to do a thing, but we can lead them, we can guide them. If the Governors year after year are asked to send representative men here to this Association, they will finally find it to their interest to look around and find a chief for the military family with greater care. Men who desire to be with us will come in here and work with us. Unworthy men will either not come at all or they will not return. We can do much by advice, even to Governors. They are willing to listen to advice. I know a number of instances in which advice from a proper source was followed. We can suggest men that we know can be relied upon in working up the medical department of the United States. In reference to the hospital corps, as well as organizing a medical department, I believe the nearer we copy after the regular army medical corps the better.

GENERAL BYERS: I wish to say, in answer to the gentleman from Connecticut, that one of the things he complains of, that is the manner of selecting men for the National Guard, I think can be remedied the same as we have done in my State and in other States, that is by having the field and line, and especially politics, divorced from the medical department. As long as the advent of every commander is characterized by the change of the medical staff, so long that state of things will continue. But if you arrange things so as to have a medical department by yourselves and under the control of a medical man, I think you will avoid nearly all those things. At least, we have had no friction after we got this appointment. I am surprised to hear him say that now and then a man might be charged with being a good doctor but a poor soldier. I don't know but I think a soldier may be a physician, but a competent physician is always a good soldier.

GENERAL PRIESTLEY: Iowa has practically the same law as Connecticut, and we are very much improved there now, but we can never expect to have a law to make our offices the same as they are in the National Army. The National Guard is a training school and you want to educate new officers, and so long a term is not to be recommended as in the Regular Army.

LIEUTENANT COLONEL ALMY: I would like to ask General Byers how he managed to do that. We have tried to get a medical department in Connecticut, but have not been able to get it.

GENERAL BYERS: We just told the Representatives what we wanted and we bore down so strongly,—our recommendations were so decided they could not help but give us what we wanted.

THE PRESIDENT: I think it is well known that in the western States the medical men have much more influence than they do in the East.

COLONEL ALMY, Connecticut: In listening to the very excellent paper of Captain Erwin, his description of an unsanitary camp site and its results brought to my mind the camp site of the Connecticut National Guard, at Niantic, which is fairly good, and its results. It is situated on grounds such as he describes. It consists of 76 acres of fairly flat ground. On the east side is a deep bay, and on the south side is Long Island Sound. The sinks are located on the north side of the encampment, a sink for each regiment and each separate company. Those are on the bluff which leads down to the lagoon that leads off to the bay. The soil is so sandy that after a heavy rain, when the water stands in pools, the next morning it is entirely gone. The driven wells are perhaps 200 yards from the sinks, and are driven down to good water. We have had no difficulty there, except one time a case of typhoid fever contaminated one of the wells. The State owns the ground. Last year, previous to the encampment, the Surgeon General inspected the ground, and afterwards the camp was turned over to me as medical officer. We had 2,700 men in camp from all conditions of life, from shops, work-houses, stores, etc. The showing we made I think is remarkable, showing the advantages of as good sanitation as we could get under the circumstances. The refuse was taken outside of the guard line and there burned or covered with earth. The combustible material was burned, and the watermelon rinds and everything of that kind was buried. Out of 2,700 men in camp, we had 11 men all told excused from duty in six days. At the hospital there were 22 men treated during the week, and those were mostly cases of heat exhaustion and small accidents from base-ball, foot-ball, etc., and were soon discharged. The great majority of the time we had only one or two men in the hospital. We had only surface drainage.

GENERAL BYERS (Wisconsin): I do not want to criticise Ohio, but it appears to me, from the paper read by our Treasurer, that here is a field for missionary work. I will not undertake it, the field is too big. I do not know but the Society for the Prevention of Cruelty to Animals ought to look up this matter, because I think there are other things besides men and monkeys who are fearfully and wonderfully made. In fact, it seems to me the camps of the National Guard are farmed out. I heard from an officer of the National Guard of Ohio that some months before going into camp he received bids from different cities, to know how much they would contribute and how much the railroads would do and whether he could secure something better than one cent a mile. Now, that may be all right from a financial point of view, but I do not know whether it is from a sanitary point of view. I do not know that his surgeon was even consulted. As long as we board around, as the old fellows did teaching school forty years ago, we will have just such a state of affairs as Captain Erwin has described. I know I would hate like thunder to report such a case from Wisconsin.

MAJOR EGLE (Pennsylvania): I have but a word or two to say. We had a paper on "The Medical Officer of the National Guard," by Lieutenant Colonel Almy. Now, we have a paper on "Camp Sanitation in the National Guard," by Captain Erwin. I make the suggestion that those gentlemen change the titles of their papers, that Colonel Almy's paper be "The Medical Officer of the National Guard in Connecticut," and Captain Erwin's paper, "Camp Sanitation in the National Guard of Ohio." We of Pennsylvania do not like to be placed with these gentlemen in the matter of sanitation. You would imagine from the paper of Captain Erwin to-day, that there must have been a state of pestilence abroad at the time of that camp in Ohio. In Pennsylvania, where we had 9,000 troops, there was not an amount of sickness such as there was in that camp of 600, and we were in Homestead six weeks, in a place of pestilence, for if there ever was a polluted place it is that place of Homestead. If I am spared another year I would like to prepare a paper on the sanitary conditions of the camp in Homestead. But the entire sickness there was far less than in Ohio. I think, therefore, it would be well to give the name of the States in these papers.

COLONEL MYERS (New Jersey): I am very much obliged to Colonel Almy for giving this description of our camp in New Jersey, with this change, that we have the Atlantic Ocean instead of the Long Island Sound. The State first leased the ground about 1885. Six or eight years ago it was purchased by the State. During the time it was under lease we used well water for drinking, and we suffered a great deal from bowel troubles among the men at that time. Since then deep wells were sunk. I do not know just how deep the well is. The water is pumped into large tanks, and pipes from these lead all over the grounds. The driven wells we kept for a number of years for washing purposes, but the water being much colder in the driven wells, the men naturally took to drinking that water. On the first day of camp we had considerable bowel trouble, and then we ordered the removal of all the handles. That was the end of all the trouble. Our sinks are on the edge of the lagoon. They are simply trenches with rails to sit on inside an open shanty, and the deposits are covered twice a day with chloride of lime. And now the surgeons have literally nothing to do, except to attend to a few accidents. There is very little sickness.

CAPTAIN JARRETT (New York): While the paper read by Captain Erwin states a state of affairs as facts that are rather unpleasant, I do not know whether he has reached the gist of it yet. I would like to ask how about the sanitary arrangements of the tents? I have been to camps in many States and the sanitary conditions of the tents and the personnel of the men has been simply horrible. I have found many where they never cleaned the floor, they slept in their clothes, they ate in the tent on the floor, they urinated behind the tent and defecated at the side of it.

VOICE: Don't mention the State!

CAPTAIN JARRETT: No; I will not; it was not only true in one State, but I have found this condition of affairs in two or three States. I have found places where they had wooden floors and slept on straw; they would turn over in the night and without getting up urinate across on the opposite wall. Gentlemen, that occurred not only in one State, but in two or three. If that condition exists in the tents, how do you expect to have the sanitary cleanliness that is so desirable and that is preached so much about in this Association?

MAJOR CLARK (Minnesota): The papers of Colonel Almy and Captain Erwin point a moral to this Association and also show the deplorable state of affairs in the camps examined by the last gentleman. This Association should be eminently practical, and these papers and remarks have brought out the fact that the medical officer of the National Guard is not given that status which his office and duties demand. He is not consulted in most cases as to the selection of camp site and those things of which and to which he should be cognizant, but he is held responsible as a medical officer. If we had the proper recognition in the selection of camps and the arrangements and then sickness ensued, we should be held responsible. But until such time as we are given our due authority, as medical officers we are not responsible. That is one objective point towards which this Association should work and to which this discussion should contribute to the results of this meeting. The question of delegates to this Association, which was brought out yesterday, is a very important one, because this Association should work to have the States assume the expense of part of the men who come here to learn, that they may go home and give the State the benefit of what they receive here. Therefore, these discussions, Mr. President, I consider one of the most valuable features in our Association. In Minnesota the garbage is removed twice a day, as in New Jersey. Our sinks are provided with galvanized receptacles, urinals and all. These receptacles are kept clean and every particle of garbage and offal is carried out of camp and buried elsewhere. We have 500 or 600 men—three regiments, that camp separately at intervals of two or three days.

MAJOR WEAVER (Pennsylvania): I would like to say just a word on this subject. The force of Pennsylvania, you know, is a large one, aggregating a total force of almost 9,000 men. Once in three years we have a divisional encampment. We used to have a regimental encampment, but that has been abolished. We have no State camping ground, but we select such a place as is central and easily gotten at. The conditions on which the camp is selected are that there shall be plenty of water, from a reservoir generally or from a flowing stream, and that the water be carried through iron pipes throughout the camp to every company's street; and that the location be one which is susceptible of drainage and with conveniences for swimming. We have no difficulty in securing a site. There are always demands from three or four localities. The Brigade Surgeons are always consulted in the selection of this camp

and we have entire control of it. The sanitation of the camp is very rigidly scrutinized and we have uniformity in all respects as far as possible. The sinks, for instance, throughout the encampment, are uniform in depth and length. They are covered with dry earth, rather than disinfectants, which we think is preferable. All garbage which is not burned is covered over. Our sick list is necessarily very small, practically none at all. Indeed, as a rule, the morning reports come in "no sickness." This I believe is all owing to the selection of the site and the observation of the Brigade Surgeons and the Surgeons of the different regiments. This matter is entirely in the hands of the medical officers and they ought to supervise these camps. The conditions we have heard described this morning should not exist in any camp.

MAJOR ROHÉ (Maryland): I did not propose to enter into this discussion, but it has been said the like of such camps as those described in the paper by Captain Erwin could only occur where the medical officer is not consulted. I think that is quite likely. Captain Jarrett has described a condition of affairs not depending on any official recognition of the medical officer. It is my opinion, and I presume I am not alone in that opinion, that any camp in which such personal uncleanness occurs as Captain Jarrett describes, is due to the neglect of the medical officer in charge. I want to say also that as one who has given some attention to sanitation, I do not know of a post hospital in so bad sanitary condition as the camp the Captain describes.

COLONEL FRENCH (Rhode Island): I want just a word to say what Rhode Island has got, with reference to camps. We are beautifully situated on Narragansett Bay. We have 125 to 130 acres of plain, level ground, which is in a very good sanitary condition. Before it was selected the medical officers were sent there to make an examination of the ground and report whether it was fit for occupation. Examination of the water showed it was almost perfectly pure. Our sinks were built on the ground. Each regiment has one sink, which has about ten compartments under lock and key, and each company is held responsible for its own compartment, as far as cleanliness is concerned. It is covered over each day by men sent out by the Quartermaster's Department. The garbage is taken away twice a day and either burned or carried a long way away. Our sick list is almost nothing. We went into camp a year ago and reported throughout the entire week not a single sick man, and the other regiments have reported only 25 or 30 men, mostly the result of indiscretion as far as diet is concerned. All the medical officers have to do then is to supervise the selection of the camp.

MAJOR MOORE (Ohio): With regard to the National Guard of Ohio and its encampment, the State owns, some 32 miles east of Columbus, an almost perfectly ideal camp ground, but for the reason that this State, in the full development of the Ohio idea, does not and never has given a sufficient amount of money for the support of its Guard, it is necessary from a pecuniary standpoint to select a camp somewhere else. This

camp ground is in every way hygienic, with a stream of water on either side of the encampment, with a hillside furnishing a target range of 1700 yards, but has been used now only three times for the reason that the commanding officers deem it necessary to raise a revenue. Our hospital corps receives no appropriation from the State whatever, and they deem it necessary to farm out for that reason. It is not common in this State for a medical officer to go and examine the farm. Sometimes a physician is sent with the first details.

LIEUT. COL. GRIFFITH (Missouri): It sounds to me as if this were all soldiering made easy; camping made easy, etc. These galvanized urinals, for instance, and things of that kind are very hard to get in States where we have little or no appropriation, like Missouri. This year we are in regimental camp right along. We have a decidedly malarial country. I have gone over these camps, generally inspected them on the second day, and when I have gone I have invariably found it rains about the first night, when we are encamping on the banks of some creek and depending on it for water, and the next morning we find the water in the barrels all full of mud. It does not look very well, at least. It don't taste well, and I have instituted this kind of an arrangement to get pure water: Take a barrel, bore two, three or four augur holes in one end of it, fill in with brick, two or three layers, and some sand, then set it on another barrel and filter the water through it. Then we use ice, which is anything but healthy when analyzed. It is full of germs. So I always put in an ounce or two of muriatic acid into the barrel of water and ice. It would surprise you to see the sick reports in our intensely malarial districts.

Now, as to this matter of throwing the excrementitious material, urine, etc., right around the tent. If a man wanted to get into a guard-house right quickly and stay there the rest of the time, just let him urinate by the side of the tent or anywhere near it. That is one of the most stringent orders we have.

We have instituted our own ambulances when we go into camp. We have not been able to get an ambulance, except in Battery A in St. Louis, which has a very good ambulance. But the rest of the regiments, the Second, Third and Fourth, have nothing of this sort, nor will the Legislature appropriate anything for it. We have a very peculiar Legislature in our State. They do not believe the soldiers are a necessity, and they are really kept up by the different cities and towns, who take a pride in keeping them up. I hope some day to get this organization to meet in Missouri and enthuse them with a proper idea.

GENERAL BLOOD (Massachusetts): Well, I must say I have been a little surprised to hear the remarks about camps in the large States in the West. Massachusetts is a small State and we do not brag much about it, but I wish some of you could come down to our brigade camp and see the way we do it. We have a camp of something like 110 acres, I think. The water supply is from a supply in the town, forced on a hill and then

brought into the camp through pipes. We have there a chance for bathing,—bath houses. Our sinks are properly located and kept reasonably clean. We use earth and sulphate of copper, which is the best disinfectant we have found. We use sulphate of copper in solution twice a day in the sinks. In the morning the General, his Medical Director and the Surgeons of the various regiments, go the round of the camp on inspection. Everything is kept in the cleanest possible manner. I heard one of the Generals say last year that if he found the slightest let up in the caring for the offal he would go for the officer. The Generals are as careful as the Surgeons, and the Surgeons have the backing up of the commanding officer. He has as much interest in inspecting the camp and keeping it in a strictly cleanly manner as the Surgeon himself, and I must say the Surgeons are extremely enthusiastic in the matter of cleanliness. I know one Surgeon in the Eighth Regiment who told me he was up at 4 o'clock and he was working himself to death because they were short of men. Everything is kept perfectly clean. The sun is allowed to enter, and the tents are kept clean. Everything is run as near as in Regular Army as we can get it. We have there something like 6,000, we have two brigade camps, and I think it would be difficult to find a cleaner camp in the country. Our sick percentage is very small. We have almost no sickness whatever. I don't think last year there was more than one man went into the brigade hospital, and he I think was not well when he came to camp. Of course, our brigade quarters are made of wood, and they are kept clean and in good sanitary condition. I think it is a model affair.

MAJOR BURGIN (Pennsylvania): Honesty is said to be the best policy, but it sometimes gets people into trouble. I think Captain Erwin has told the truth and the others have not told the whole truth. The Captain has recited every case of sickness that has come up. Now, we all know that when the report comes in in the morning, we say, "That is not a bad case; don't send that in," and so the report shows that we do not have much sickness. But the Captain has been more conscientious. The whole discussion here is not along the lines we should take up. We are really a State police and thus we are subject to be called out in emergency. Of course, it is very nice to have the camps in good condition. All appliances should be of such character that they can be readily erected and quickly fixed with small expense. In the Pennsylvania Guard we have tried to simplify the matter. We have one general arrangement for the sinks. The material does not cost more than \$17, and the whole thing can be fixed by two men in a day. The medical officer's duty is to prevent sickness. I think water in abundance is one thing they should have. Bath houses should be arranged. A bath house six feet wide and ten feet long will suffice for one battalion, and this year I will try to secure that in our own brigade. I know Major Weaver is very much in favor of it.

GENERAL PRIESTLEY (Iowa): It is with rather a feeling of diffidence I get up, but we are so healthy in Iowa that we have not any sick. My friend, Dr. Rohg, was telling me last evening about passing through the State and in the car he met a gentleman who told him that in Iowa the percentage of illiteracy was the lowest in the country. On the outside he thought he saw some mint growing. Being interested in medicine, he asked a man if that was not mint growing there, and he asked him what mint was! He thought if that was not an instance of illiteracy he did not know what illiteracy was. Like Ohio, we go out wherever the citizens give us the best inducements. We make the best of the location we get. Our sinks are dug in the ground and every morning are covered with lime and dirt, and at the end of camp this material is utilized by the farmers to scatter over the ground as a fertilizer. We have plenty of room out there. Our water is derived generally from driven wells, but the water usually is good. We have very little bad water anywhere. Our camp is policed every morning. Our medical officers each day have a school of instruction. They meet at a certain hour and talk over every point that engages their attention. Occasionally part of the Chaplain's time in the morning is utilized for a general discourse on the general hygiene of the troops, with good effect. The men pay good attention. So we generally have little sickness that amounts to anything at all.

CAPTAIN BUNTS (Ohio): I listened to Captain Erwin's paper with considerable interest, and I was sorry our Surgeon General was not here to defend our State, if there was anything to be said. I can hardly believe that the deplorable sick list given by Captain Erwin is due to the fact that the site was picked out by regimental officers instead of by medical officers. I do not think that should be held up as the cause of the great prevalence of sickness in camp. The time the regiment is in camp is so short that I can hardly believe, with anything like ordinary precautions, that could come from defective water supply and defective drainage. If we follow the percentage list in regard to the age of the young men in camp, we notice a very large percentage of them are about nineteen years of age. These young men go into camp with rather different ideas from those maintained by men of mature age. They go in to have a good time, and their idea of a good time is not that of having plenty of water, but plenty of something else to drink. A large percentage of the bowel and stomach trouble in camp is due to the bad dietary, sometimes furnished by the commissary and sometimes furnished by their own indiscretion and bad hours. I heard from the driver of the ambulance, who was in camp at the camp mentioned by Captain Erwin, that nearly every run made by the ambulance was to pick up a drunk. Those cases should not be ascribed to the selection of the camp site.

COLONEL HENRY (New York): The last speaker has touched a little upon the point I was going to speak about. I have listened to these favorable reports in regard to no sickness. I am at a loss to understand

what they mean by "no sickness." If they mean there is no sickness which is to be attributed to the care taken of the men, that is another matter. As I look upon the sick in camp, it includes every man who cannot perform duty. I would like to take a trip with any State representative here to any encampment where there are 600 or 1,000 men, who are put into camp from the sedentary life they have been leading, and I do not believe there can be shown so many men without a certain percentage being unfit for duty. In New York State I never felt it a disgrace to report men unfit for duty. I was always honored by having the commanding officer of the regiment a strict disciplinarian. We have a morning drill between six and seven o'clock in the morning, and it is a pretty hard drill. In my own regiment the men who are not in quarters at six o'clock have to be accounted for; they are either on the sick list or just off guard duty or among the quartermaster's men. In my regiment the company officer would be called to account if he did not have the proper number out on duty. I simply wish to repeat that I do not think it is possible for any commander to go in and perform good duty without having a certain percentage of the men excused from duty because of their inability to perform duty. This may be due to a change of life, but there will be a certain percentage excused by the surgeon if the proper discipline is carried out. I find this is true in New York State according to the number in camp. If the commanding officers are good, strict disciplinarians we see on the first and second day probably fifteen or twenty excused, and this number dwindles down until on the third day we have perhaps only one out of a thousand excused from duty. Then, we have other commands in which the sick list claims no report. I know when I inspected one of these, I happened to see in the paper there had been two accidents the day before, in which one man had been thrown from his horse and the other had been skylarking and had been thrown in a blanket, where, according to the paper, he received a slight concussion of the spine. I came the next morning and I found there was no record made of those accidents. Unless the State troops represented here are entirely different from the New York troops in behavior in camp and are models in behavior in every way, and are models in attention to physique before coming to camp, I cannot understand how they can avoid a certain percentage in the sick list if there is honesty on the part of the company and medical officers.

MEDICAL INSPECTOR WISE (U. S. Navy): I am inclined to believe that the difference in statements we hear here is due to the fact that there is some difference in the nature of the troubles considered. I had some experience this spring in the Marine Corps. I think every man who is kept from duty by any sickness, however trivial, should be counted a sick man. I believe under such circumstances it is very rare that there is not a sick list or at least an excused list. I think it is very different taking men from a garrison and from a civil life to encampment. I was astonished by the change for the better in the health of the men on the

change from barracks to camp. They used tobacco and perhaps the canteen too much in the barracks, and in camp the heart trouble, functional in character, disappeared. We know how rapidly those things disappear when the men accustom themselves to open air life. I think the men who are not able to fall in line are always put in the sick list.

MAJOR LA PIERRE (Connecticut): It seems to me, from what has been said by some of the speakers, that there is a little doubt or reflection cast on the small report of sick sent from Connecticut, and perhaps a few words might be in order. I wish we could have heard more from the Surgeons and Assistant Surgeons from the National Guard instead of from the gentlemen with stars and eagles on their shoulders. I think the Surgeons and Assistant Surgeons come more immediately in contact with the men. Of course, I am speaking from experience in the Connecticut National Guard. The Surgeon there has to make two inspections of the camps, the kitchens and sinks and all that pertains to the camps, one in the morning and one after dinner. We have a sick call in the morning. All that are supposed to be sick present themselves at that hour, and they are divided into perhaps four classes: Those who are deserving, who are really sick and are sent to the brigade hospital; second, those who are sick in quarters; third, a class who are marked for police duty, the result of some dissipation, usually men who like to work the medical officers if they can. They are able to be about their quarters and do police duty. The fourth class receive some advice and are not excused from duty. This will account for the small sick report made by Colonel Almy, which, of course, is derived from the brigade hospital. For myself, and I think it is true with all the Surgeons, we intend keeping our list as small as possible. We like to take care of our own sick and not send them to the brigade hospital for whatever medical officers may be detailed there.

COLONEL ALMY (Connecticut): I intended to tell more about the Connecticut National Guard, but as the time is approaching when we ought to stop, I will simply say, in answer to Major Egle, who wants me to change the title of my paper, that he missed one-half of my paper. I described what the medical officer should not do and what the medical officer should be. We have in Connecticut a number of medical officers who are all that a medical officer should be; we have occasionally medical officers who are all that medical officers should not be. I believe the Major is wrong if he claims Pennsylvania has no medical officers in the National Guard who never shirk their duty, who are instant in season and out of season, and who are all that medical officers should be.

MAJOR EGLE (Pennsylvania): An honest confession is good for the soul, they say. My brethren who have spoken about the bad sanitary condition of their camps I think are responsible for that work. In Pennsylvania the commander of my brigade holds me responsible for the sanitary condition of my brigade camp, and I in turn hold my medical

officers responsible. If, as my Rhode Island friend says, they have nothing to do except to have a good time, no wonder the sanitary condition of their camp is bad. In Pennsylvania we have no such good time; it is no picnic for us; it is hard work and attention to duty. I would invite those gentlemen to come to our camp and I will show them a model camp, a model sanitary camp, and if they will bring their own blankets I will give them the soft side of a plank. I do not wish to take up any more of your time, Mr. President, but really I think the Medical Department is responsible and should be held responsible for the bad sanitary condition of any camp.

CAPTAIN ERWIN (Ohio): I will agree with the last speaker exactly, with this difference, that every medical officer should be held responsible for the sanitary condition of his camp, but unfortunately not every medical officer has the privilege of being held responsible. He is domineered over by a man who knows nothing about sanitation, every part of his work is delegated to others, who know nothing about it, and that brings about a condition over which the medical officer has no control. That is a thing I hope next year will be corrected by proper laws, and that by advice from this Association. (Applause.)

Another point is this. Every medical officer will bear me out in the fact that when they inspect the quarters of the men, if they go deeper than the surface they will find soiled linen, not conducive to the best condition of the camp, out of sight. I am very much afraid that certain medical officers, who present such glowing reports, only show the surface and do not go deep enough to bring out that which is of so much interest to this Association or any association of this kind. While I have given records here, I can prove everything I have mentioned. I have brought out thus a discussion here which will do more good than anything else which could have been brought forward. I do not claim anything for myself in that; I do not wish any aggrandizement; I am simply going in for the best of the work in which we are engaged. Now, in another thing you will agree with me, no doubt. Such conditions can be excused only on two points. The first is that which I have covered, in which the medical officer is not allowed to do his duty, and in the other is where the medical officer is incompetent or is derelict in doing his duty.

VI. THE LEADVILLE CAMPAIGN.

BY COLONEL CLAYTON PARKHILL,
DENVER, COL.

SURGEON GENERAL OF THE NATIONAL GUARD OF COLORADO.

AND MAJOR L. H. KEMBLE,
DENVER, COL.

SURGEON IN THE NATIONAL GUARD OF COLORADO.

ON June 15, 1896, the Cloud City Miners' Union, of Leadville, declared a strike. This strike is supposed to have involved about three thousand men, with the result that work in all the mines, both of gold and silver in that district, was practically suspended. No agreement could be reached between the mine managers and the striking miners, and on the night of the 20th of September, 1896, an attack was made upon the Coronado and Emmet mines.

The Coronado is located three blocks from the center of the city of Leadville and consisted of a shaft house, a pumping plant and a trestle about twenty-five feet in height, extending across the street to the adjoining block, on which the refuse of the mine was dumped. The mine was guarded by about a dozen men armed with Winchester rifles, and shot guns loaded with buckshot. Inasmuch as there had been rumors of an attack upon the property it had been surrounded by a stockade of heavy pine boards about eight feet high. It is impossible to accurately determine the number of men who made the attack, but it has been estimated at several hundred. They were armed principally with Marlin and Winchester rifles of the latest pattern and heavy calibre, and also with dynamite bombs. The attack began about midnight and lasted about one hour and it is supposed that many thousands of shots were fired. Finally a dynamite bomb exploded the oil tank and ignited the building. The defenders in order to escape were obliged to pass along the trestle above described and leap to the "dump," some ten or twelve feet below. This was lit up by the fire and in full view of the attacking party.

The only casualty among those defending the mine was the loss of a toe by one of the men. A fireman was shot and killed while in discharge of his duty in attempting to put out the flames. The fire was finally controlled, after a large part of the property had been destroyed.

Following this the attacking party proceeded to the Emmet mine, a distance of a mile from the Coronado, and made an attack



Fig. 1.—Camp McIntire, Leadville, Colorado, from a Photograph.

upon it. In addition to the weapons which they had used in attacking the Coronado, they had a cannon of home manufacture. It consisted of about five feet of three-inch iron pipe, inserted into a four-inch iron pipe, the interspace being filled with Babbitt metal. This was secured in a crevice of the rocks above the shaft house and fired from that position. It was loaded with chain and scrap iron and was aimed at the oil tank, but fortunately did no more damage than tearing a hole through both sides of the building. The attack lasted about an hour. The attacking party in the two

engagements lost six men killed, but accurate information could not be obtained in regard to the number of wounded.

Upon receiving information of these attacks, Governor McIntire ordered out the entire National Guard of the State. This consisted of one brigade of two regiments of infantry, one troop of cavalry and one battery of artillery. Within twenty-four hours 653 men had reported for duty.

The campaign which followed, lasting 172 days, was remarkable in several respects. It was the longest campaign that the National Guard of any State has endured as an organization. The camps at the Ibex and Resurrection mines were the highest ever occupied by any troops in the world. No troops, either State or National, in this country have ever experienced a campaign of such length at such an altitude. Notwithstanding the very arduous duties imposed upon the men, the number unfit for duty on account of illness or injury was remarkably small.

The city of Leadville has an altitude of 10,250 feet. The area guarded by the troops was practically ten miles square. This country is exceedingly rugged and mountainous. The main camp was located in the city of Leadville, and was called "Camp McIntire." Other camps were established at a number of the principal mines. The properties guarded in this district with their distance from camp and their altitude is as follows:

NAME.	DISTANCE.	ALTITUDE.
Ibex	5 miles.	11500 feet.
Resurrection.....	7 "	11500 "
Herman Lease.....	4 "	11250 "
Emmet ..	2 "	10500 "
The R. A. M.....	2 "	10700 "
The Bohn.....	1 "	10200 "
The Bon Air.....	1 "	10175 "
The Last Chip.....	$\frac{3}{4}$ "	10325 "
The Bison.....	$\frac{3}{4}$ "	10350 "
Delantis, Nos. 1 and 2.....	$\frac{1}{2}$ "	10250 "
Powder Magazine	1 "	10075 "
Maid of Erin	$1\frac{3}{4}$ "	10450 "
Penrose	$\frac{3}{4}$ "	10275 "

Camps were established at the Ibex, the Maid of Erin, the Emmet and at the Resurrection a part of the time.

When it is considered that this campaign was made in the winter; that at times the temperature was as low as fifteen to

twenty degrees below zero; that the snow at times had a depth of from two to five feet; that the majority of the members of the guard came from much lower altitudes, ranging from 4,000 to 5,000 feet, some conception may be had of its trials and difficulties.

The troops were ordered out about midnight on a Sunday, consequently many of them had no opportunity to properly clothe themselves for such an experience. They arrived in camp with thin shoes and linen or cotton underclothing. They were illy prepared to make camp in the cold rain and mud which greeted them in Leadville. Many of them were on duty continuously for two days and a half. These duties consisted in marching to the various properties which have been mentioned and standing guard over them in absolutely exposed positions. The quartermaster and commissary departments were entirely unable to properly clothe and feed the men at first, consequently they were fed at the Hotel Vendome for a few days. The facilities of the hotel were limited and the food was poor and imperfectly cooked. It was impossible during the first few days to provide bedding for the men in their tents. Straw and hay could not be procured, so the only protection they had were their blankets on the cold, muddy ground. Notwithstanding all these disadvantages the record for health was remarkable. These conditions were quickly altered by the efficiency and energy of Adjutant General Cassius M. Moses. Too much praise cannot be given him for the excellent way in which he clothed and fed the men. Warm woolen underclothing, which later included sweaters, caps, overshoes and gloves, were rapidly procured. When the weather became more severe sentry boxes were furnished at the main camp, each containing a stove. No man was permitted to walk his beat unless provided with overshoes. The commissary department was equally well equipped. The meats were cooked in Buzzacotts. All the supplies were of excellent quality. The men at outlying camps were provided with shelter and sleeping quarters in the mine buildings.

Three cases of gunshot injury and one of bayonet wound are of interest. Captain McGwire, while bearing an order to Denver, stepped from a moving train at Burnham, Colorado. He was thrown forward and his left foot was caught under the car wheels and was completely crushed. He was removed to St. Luke's Hospital, Denver, and it was found necessary to amputate the leg at

the junction of the lower with the middle third. His recovery was satisfactory and complete.

Sergeant Hamilton, of G Company, Second Regiment, while acting as Corporal of the Guard, was fired upon by mistake at a distance of about 250 yards. The shot was from a Springfield rifle and penetrated the left patella, taking a course backward and outward, crushing the external condyle in its way and finding exit at the inner side of the tendon of the biceps. He was conveyed to St. Luke's Hospital in Leadville and a careful antiseptic dressing applied. At the end of forty-eight hours he was removed to St. Luke's Hospital in Denver in order to secure better facilities for treatment. The joint was opened and the comminuted fragments of the outer condyle removed together with large quantities of blood clots. The explosive force of the bullet had been terrific. The joint was drained, a sterile dressing applied and the extremity placed in a plaster splint. His recovery from the operation was entirely satisfactory and very rapid. There was no infection of the wound. At the end of two months new bone had apparently re-formed to take the place of the condyle which had been destroyed, but there remained a cavity half an inch in diameter and three-fourths of an inch in depth. Some motion was present in the joint. At this time he was transferred to Alton, Ill., in order that he might spend the remaining time of convalescence with the members of his family.

Private Bonner, of C Company, of the First Regiment Infantry, received a gunshot wound by the accidental discharge of his pistol while in the holster on his hip. The pistol was of the Colt pattern, 32 calibre. The bullet entered the left popliteal space on the outer side of the inner hamstring muscles and passed downward and forward, striking the inner side of the fibula, where it was slightly diverted from its course, and lodged finally quite superficially four inches above the ankle joint. It carried with it a patch of the pantaloons and another of the drawers. It was dressed antiseptically at the camp hospital, and he was transferred to St. Luke's Hospital in Denver for further treatment. The fragments of clothing carried with the bullet gave rise to infection of the wound and necessitated operation. The entire tract of the wound was laid open and the bullet removed. The infection rapidly cleared up and his progress to recovery was perfect.

Private Cramer, of C Company, Second Regiment, dropped his rifle and the piece was discharged. The bullet entered the lower border of the pectoralis major muscle and found exit at the outer third of the clavicle. The wound was superficial and under antiseptic dressing healed satisfactorily.

Sergeant Wilson, of K Company, while climbing over a high stockade slipped and fell upon his bayonet which, contrary to instruction, was fixed upon his rifle. The bayonet entered at the lower border of the left pectoralis major muscle and emerged at the tip of the acromion process. The shoulder joint was not penetrated and no important structures were involved. Under careful dressing the wound healed perfectly.

Below will be found a tabulated statement showing the diseases from which the men suffered in this campaign, the number of cases of each, the duration of each and the period of disability, as shown by the hospital records:

DISEASE.	NO. OF CASES.	DAYS SICK.	TERMINATION.
Alcoholism	1	1	Recovered.
Bilious	2	1	“
“	1	3	“
“	1	3	“
Bronchitis	1	3	Furloughed.
“	2		“
“	1	1	Recovered.
“	2	6	“
“	1	9	“
“	1	10	“
“	1	12	“
Catarrh, (Chronic).....	1	17	Improved.
“ (Nasal).....	1	3	“
“ (Gastric).....	2	2	“
Colic, (Lead).....	1	3	Recovered.
Cold, (General).....	1	2	“
“	1	4	“
“	1	5	“
“	2	8	“
Diarrhœa	1	6	“
Dysentery	1	2	“
Erysipelas.....	1	33	“
Exhaustion	1	1	Improved.
“	1	2	Recovered.
“	1	5	Furloughed.
“ (Alcoholic).....	1	7	Recovered.
Fever, (Bilious)	4	1	“
“	2	2	“
“	1	3	“
“	1	5	“
“	1	7	“

DISEASE.	NO. OF CASES.	DAYS SICK.	TERMINATION.
Fever, (Bilious)	1	15	Recovery.
“ (Delirious)	1	5	“
“ (Mountain)	1	2	“
“ “	1	4	“
“ “	1	6	“
“ “	1	5	“
“ “	1	9	Furloughed.
“ “	1	28	Recovered.
“ (Unclassified)	2	3	“
“ “	2		Furloughed.
“ “	2	4	Recovered.
“ “	2	5	“
“ “	2	5	“
Gastritis	1	4	Recovered.
Gingivitis	1	3	Improved.
Heart, (Irritable)	2	3	“
“ “	1	6	“
“ “	1	11	Discharged.
Jaundice	1	18	Recovered.
Laryngitis	3		Furloughed.
“	1	7	Furloughed.
“			Recovered.
Necrosis of Turbinate Bone.	1	Indefinite	
Orchitis	1	6	Recovered.
“	1	16	Furloughed.
Otitis Media, (Chronic)	1	5	Improved.
“ “	1	8	“
“ “	1	Indefinite	
“ “	1	Indefinite	
Pharyngitis, (Chronic)	2	Indefinite	
Pneumonia	1	2	{ Sent to Denver.
“	1		{ Died.
“	1		{ Sent to Denver.
“ (Complicated by Secondary Syphilis)	1	56	{ Recovered.
Syphilis	2		“
Stricture	1	8	Discharged.
Tonsilitis	4	3	Improved.
“	1	5	Recovered.
“	1	6	“
“	1	6	“
“	2	7	“
“	1	8	“
“	1	10	“
“	1	11	“
“	1	14	“
Gonorrhœa	1	4	Furloughed.
Rheumatism	1	3	“
“	1	9	“
“	1	6	Recovered.
“	1	7	“
“	1	9	“
“	1	27	“
Sprain, (Ankle)	1	8	Relieved from duty
“ “	1	1	“ “ “
“ (Shoulder)	1	2	Recovered.
“ (Back)	1	11	“

DATE.	NO. IN CAMP.	NO. UNFIT FOR DUTY.	PER CENT.	DATE.	NO. IN CAMP.	NO. UNFIT FOR DUTY.	PER CENT.
1896.				1896.			
Sept. 21....	230	None		Nov. 10....	616	16	.026
" 22....	653	"		" 11....	609	19	.03
" 23....	706	3	.004	" 12....	614	17	.027
" 24....	776	10	.012	" 13....	608	23	.037
" 25....	767	17	.022	" 14....	616	12	.019
" 26....	765	10	.013	" 15....	625	8	.012
" 27....	752	15	.019	" 16....	628	11	.017
" 28....	749	12	.016	" 17....	635	13	.02
" 29....	734	13	.017	" 18....	635	15	.023
" 30....	725	12	.016	" 19....	646	18	.027
Oct. 1....	719	12	.016	" 20....	731	18	.024
" 2....	710	13	.018	" 21....	810	11	.013
" 3....	696	13	.018	" 22....	778	10	.015
" 4....	683	13	.019	" 23....	795	12	.015
" 5....	680	10	.014	" 24....	827	15	.018
" 6....	675	13	.019	" 25....	808	16	.019
" 7....	662	12	.011	" 26....	805	17	.021
" 8....	649	17	.026	" 27....	817	19	.023
" 9....	640	22	.034	" 28....	823	14	.017
" 10....	641	29	.045	" 29....	823	17	.02
" 11....	637	24	.037	" 30....	827	18	.022
" 12....	635	14	.022	Dec. 1....	803	18	.021
" 13....	639	17	.026	" 2....	821	12	.014
" 14....	627	11	.017	" 3....	810	15	.018
" 15....	616	10	.016	" 4....	801	16	.019
" 16....	616	10	.016	" 5....	779	16	.02
" 17....	615	11	.017	" 6....	767	15	.019
" 18....	628	9	.014	" 7....	761	18	.023
" 19....	629	12	.019	" 8....	762	14	.018
" 20....	620	14	.022	" 9....	652	13	.019
" 21....	613	9	.014	" 10....	622	12	.019
" 22....	610	10	.016	" 11....	614	12	.019
" 23....	611	9	.014	" 12....	605	13	.021
" 24....	612	10	.016	" 13....	603	9	.014
" 25....	636	13	.02	" 14....	603	10	.016
" 26....	612	12	.019	" 15....	599	9	.015
" 27....	610	10	.016	" 16....	599	9	.015
" 28....	619	12	.019	" 17....	599	8	.013
" 29....	633	12	.019	" 18....	545	6	.011
" 30....	599	11	.018	" 19....	540	8	.014
" 31....	608	11	.018	" 20....	535	8	.015
Nov. 1....	602	12	.019	" 21....	532	6	.011
" 2....	620	15	.024	" 22....	532	8	.015
" 3....	591	13	.022	" 23....			
" 4....	606	13	.021	" 24....	510	9	.017
" 5....	624	13	.02	" 25....	501	8	.015
" 6....	616	12	.019	" 26....	504	7	.013
" 7....	610	13	.021	" 27....	503	9	.017
" 8....	614	12	.019	" 28....	507	8	.015
" 9....	615	15	.024	" 29....	511	8	.015

DATE.	NO. IN CAMP.	NO. UNFIT FOR DUTY.	PER CENT.	DATE.	NO. IN CAMP.	NO. UNFIT FOR DUTY.	PER CENT.
1896.				1897.			
" 30....	510	9	.017	Jan. 24....	249	2	.008
" 31....	511	9	.017	" 25....	248	2	.008
1897.				" 26....	247	2	.008
Jan. 1. ...	505	9	.017	" 27....	245	2	.008
" 2....	502	9	.017	" 28....	246	2	.008
" 3....	369	3	.008	" 29....	242	2	.008
" 4....	369	3	.008	" 30....	152	1	.006
" 5....	371	4	.01	" 31....	77	0
" 6....	366	3	.008	Feb. 1....	77		
" 7....	371	3	.008	" 2....	77		
" 8....	364	2	.005	" 3....	77		
" 9....	363	2	.005	" 4....	77		
" 10....	362	3	.008	" 5....	76		
" 11....	359	2	.005	" 6....	76		
" 12....	251	2	.007	" 7....	75		
" 13....	250	2	.008	" 8....	75		
" 14....	252	3	.007	" 9....	75		
" 15....	250	3	.008	" 10....	73		
" 16....	254	3	.007	" 11....	73		
" 17....	255	3	.007	" 12....	74		
" 18....	253	3	.007	" 13....	72		
" 19....	253	1	.003	" 14....	72		
" 20....	257	2	.007	" 15....	71		
" 21....	256	2	.007	" 16....	71		
" 22....	255	2	.007	" 17....	64		
" 23....	254	2	.007	" 18....	57		

Average number of men in Camp..... 422.
 " " " " from Feb. 18 to Mar. 10..... 55.
 " " unfit for duty 7.85
 " per cent. of men unfit for duty 1.8
 Largest number of men unfit for duty in any one day, 29—out of total
 of 641 or 4.5 per cent.

CHAPTER XI.

Transportation of the Disabled.

I. HOSPITAL CORPS DRILL BY A DETACHMENT OF THE UNITED STATES ARMY HOSPITAL CORPS AND THE COMPANY BEARERS OF THE SEVENTEENTH UNITED STATES INFANTRY.

THIS Drill was arranged in response to a request for a demonstration of the Hospital Corps Drill Regulations, by a large detachment. The bearer detachments connected with most military organizations are so small that a complete bearer drill is a novelty to many medical officers. The question of a demonstration of first aid methods in connection with the bearer drill was considered and rejected (1) because such demonstrations had already been given before the Association at two of its meetings, *viz*: in 1892 at St. Louis, and in 1894 at Washington, and (2) because a complete demonstration of the drill alone would occupy as much time on the program as seemed desirable to devote to this purpose.

The detachment consisted of eight litter squads with eight men as dummy wounded. Seven of these squads were composed of Company bearers, the first squad consisting of Hospital Corps privates. Three Hospital Stewards and one Commissioned officer in command completed the *personnel*.

The detachment was commanded by Captain James E. Pilcher of the Army Medical Department.

After the detachment was duly organized, rifles and blankets were procured, and the blanket-litter drill demonstrated. Following this the drill with the empty litter was shown, including the entire manual of the litter and the marchings with the litter both in column of litters and by sections.

The methods of loading and emptying the litter were then demonstrated, including the drill with the loaded litter, in connection with which the litter was carried over low and high obstacles and up and down stairs.

This was followed by an exhibition of the ambulance and the methods of preparing, packing, loading and unloading this vehicle.

The travois was next demonstrated, the Surgeon General of the Army having courteously loaned for the purpose the model travois belonging to the Army Medical Museum. The travois was prepared, hitched, loaded, unloaded, unhitched and packed according to the drill regulations. The litters were now returned, the dummy wounded dismissed and the detachment again aligned and divided into sets of threes by the command, "Count threes," not in the drill book. Each No. 2 was then directed to lie down and he was then successively lifted by the two-handed seat and by the extremities in connection with which some marching was done to display these methods of carriage.

Places in ranks were then resumed, fours counted and a two rank formation obtained. The front rank having lain down they were lifted and lowered successively by the rear rank men as single bearers, into arms, astride of back, across back and across shoulder.

The drill was then closed by sending the rear rank men off to a distance of some fifty yards and then directing the front rank men by the command, "Search for wounded," to proceed at the double quick and bring them in by the single bearer methods, each bearer choosing his own method.

The drill here outlined occupied a full hour and no manoeuvres were repeated. To produce the various manoeuvres, one hundred and fifty commands were executed, the drill thus averaging two and a half commands per minute.

II. A METHOD OF LIFTING AND CARRYING A PATIENT BY A SINGLE BEARER.

By MAJOR HENRY M. W. MOORE,

COLUMBUS, OHIO,

SURGEON IN THE OHIO NATIONAL GUARD.

PARAGRAPH 138 of the Drill Regulations for the Hospital Corps, U. S. Army, very properly reads: "While it is not desirable that one bearer should, ordinarily, be required or permitted to lift a patient unassisted, emergencies may arise when a knowledge of proper methods of lifting and carrying by one bearer is of the utmost value."



Figs. 1 and 2.—Anterior Views of Bearer Lifting a Patient by Major Moore's Method.

The method presented to-day is one which I learned from my father several years ago.

If the patient be unable to help himself into position, the method of lifting the patient erect, described in paragraph 139, must be used, unless other bearers are at hand to help. From the "patient erect" the bearer easily assumes the position I am describing. The bearer drops to his left knee, having his right thigh horizontal, the leg making an angle somewhat less than a right



Figs. 3 and 4.—Lateral Views of Bearer Lifting a Patient by Major Moore's Method.

angle with the thigh, and seats the patient on his thigh. The patient's left arm is behind the bearer's neck, his right hand on the bearer's left shoulder. The bearer's right arm is around the patient's waist and his left forearm under the patient's knees. The

bearer is now careful to have his back perfectly vertical. He slides his right foot a little more nearly under him, and, keeping his back vertical, rises, using the great muscles on the front of his thighs. I trust I have made emphatic enough the essential point: The back is not to be used in lifting at all, and if the vertical position is maintained it will not be.

Reversing of this position may be advisable on account of the location of injuries or disabilities, or to accommodate a left-handed bearer. Carried in this way bearer and patient occupy less breadth of space than in any other with which I am acquainted, and so can pass through narrower halls and stairways. For this reason I should think this method would be of value on shipboard.

If the patient can help himself, or if assistance is at hand, the patient is seated on the bearer's thigh from any available position, and the strain to the bearer of lifting erect is avoided.

Before rising the sling made from two waist belts may be adjusted, and thus long carriages made easier for both patient and bearer.

CHAPTER XII.

Medical Service in the field.

I. A UNITED STATES ARMY FIELD HOSPITAL.

LIEUTENANT-COLONEL William E. Waters, Deputy Surgeon General, U. S. Army, Surgeon at Columbus Barracks, displayed at that Post for the information of the members of the Association a model field hospital, which was on exhibition during the entire meeting, but particularly on the afternoon of the third day, when the sixth session was held at that station.

In this hospital was comprised an exhibit of the field appliances of the army medical department such as accompany troops into the field from Columbus Barracks.

The hospital proper was formed by arranging four hospital tents in the form of a cross as shown in Fig. 2, the space between them being covered by an extra tent fly, and still another tent fly being extended out in front. Under the front tent fly, "sick call" and consultations with the surgeon not requiring privacy are held. The front tent is the dispensary, the central space is designed for an operating and examining room, and the rear tent is the mess tent. The lateral tents are the hospital wards.

Two wall tents were used, one fronting on the line of the front of the hospital, for the surgeon, and one in the rear for a cook tent. Each of these was provided with an additional tent fly affording an extra shelter.

The hospital attendants and the stores were accommodated respectively in two conical wall tents situated as shown in the diagram.

The latrine was enclosed in one common tent.

The equipment used in the hospital thus formed and shown in Figs. 1 and 2 was as follows:

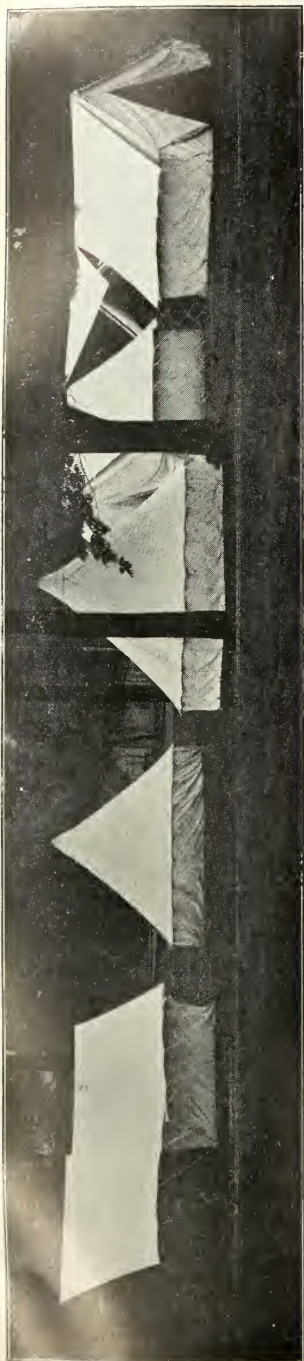


Fig. 1.—The Field Hospital at the Columbus Barracks. From a Photograph by Lieut. W. C. Wren, U. S. A.

- Four hospital tents.
- Six hospital tent flies.
- Nine hospital tent upright poles.
- Six hospital tent ridge poles (three with extra long pins at top).
- Four hospital tent long guys.
- Two wall tents.
- Four wall tent flies.
- Four wall tent ridge poles.
- Six wall tent upright poles.
- Two conical wall tents.
- Two conical wall tent poles.
- Two conical wall tent tripods.
- One common tent (latrine).
- One common tent ridge pole.
- Two common tent upright poles.
- Two ambulances, complete.
- One folding table.
- Ten folding beds.
- Eleven folding chairs.
- Ten folding tables (bedside).
- Six galvanized buckets.
- Six agate basins.
- One field operating case (M. O.)
- Two lanterns.
- Four candlesticks.
- Matches.
- Soap.
- One medical chest.
- One surgical chest.
- One commode set.
- One food chest.
- One mess chest.
- One set fire irons and hooks.
- One Buzzacott oven, small (complete).
- Three camp kettles.
- Two axes.
- One hatchet.
- Hand towels q. s.
- Roller towels q. s.
- Rope (small) 100 feet.
- Tent pins, large and small q. s.
- Two spades or shovels.
- Flag pole.
- One field hospital flag.
- Two guidons.
- One orderly pouch.
- One field desk.
- Hospital Corps pouches (one for each private, except M. O. orderly).

Field blankets (at least 25).
 Forty cotton sheets.
 Sixty cotton pillow slips.
 Ten hair pillows.
 Ten mosquito bars.
 Two hospital brooms.
 Four dippers.

One large piece rubber sheeting
 (for bed bathing and operations), 8x4.
 Blanket cases for linen.
 Folding seat for latrine.
 Sulphate of iron for camp sanitation.

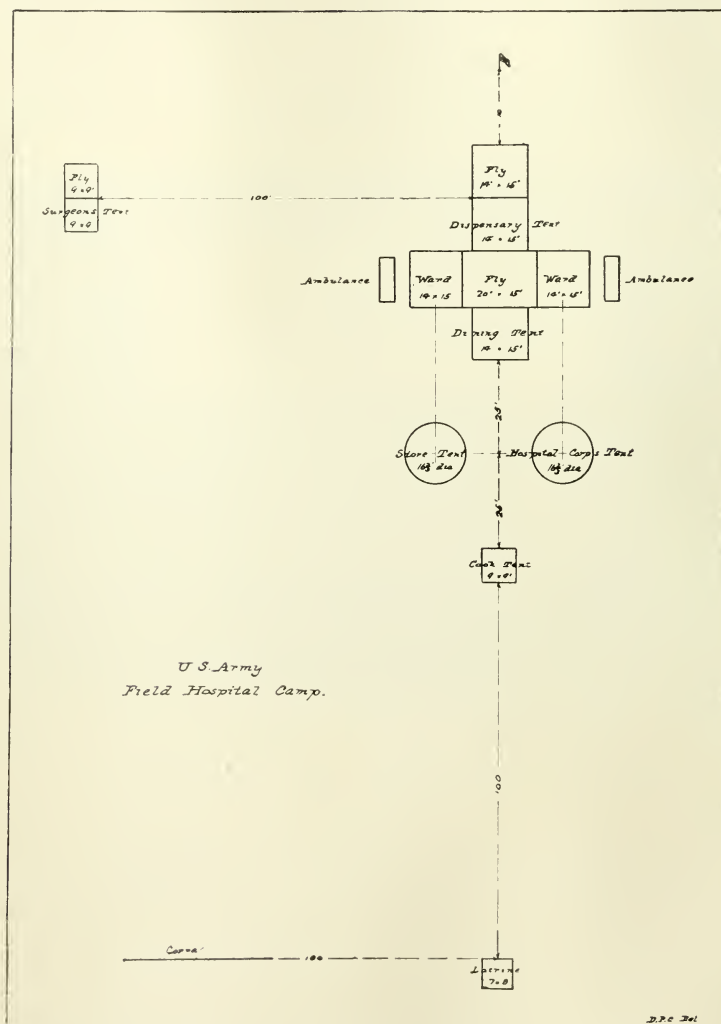


Fig. 2.—Plan of the Field Hospital at Columbus Barracks.
 From a Drawing by Lieut. D. P. Cordray, U. S. A.

Mr. Charles Truax exhibited in the Field Hospital, two improved Senn's field chests.

The Remington Arms Company displayed a Remington Bicycle Ambulance, (Fig. 3), constructed of two regular Remington tandems connected with a series of braces which serve to support a stretcher to which is attached a small canvas shelter tent. The ambulance is constructed—including the stretcher and braces—of steel tubing which renders it extremely strong while reducing the weight to only 116 pounds. The stretcher and its tent are detachable from one another and from the bicycles. It can be propelled by two persons, no previous training in balancing being

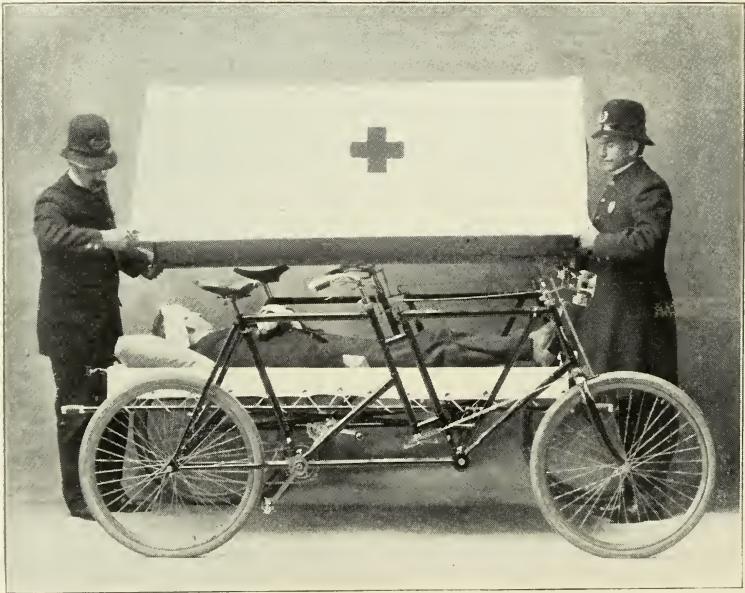


Fig. 3.—The Remington Bicycle Ambulance, Loaded and Cover Tent being Adjusted.

necessary, with a speed of ten miles an hour which can, of course, be much surpassed by expert cyclists. The advantages claimed for this apparatus in addition to the foregoing, (1) the reduction of jar to a minimum by pneumatic tires, (2) the detachability of the tent with the stretcher so that the patient may remain covered until he is ready to be laid in bed, (3) the collapsability of the tent to favor speed in proceeding to a patient, and (4) the high quality of material and workmanship.

II. A FIELD APPLIANCE FOR THE EXTEMPORE PREPARATION OF HYPODERMATIC SOLUTIONS.

BY MAJOR HENRY M. W. MOORE,
COLUMBUS, OHIO,

SURGEON IN THE OHIO NATIONAL GUARD.

PROBABLY the first man in medical practice who attempted to sterilize, extempore, the water in which he was going to make his hypodermatic solution experienced a difficulty which has been common with all of us.

If you have an assistant with a good steady hand, who will hold the spoon properly while you employ both hands in taking up the solution into the barrel of the syringe, all well and good. But it will usually happen that the hypodermatic injection must be administered without assistance.

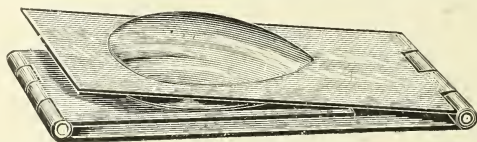


Fig. 1.—Moore's Pocket Spoon for Hypodermatic Injections—first form, closed.

The spoon, if held over any flame but that of an alcohol lamp, is sooted on the bottom and will blacken everything with which it comes in contact. If the spoon must be laid down, it tips and part of the solution may run out at the back of the bowl, and it is liable to roll with the loss of all the fluid. And, on account of the flatness of the bottom of the bowl usually not all the solution will be drawn into the syringe.

A few months ago my friend, Dr. Dickson L. Moore, President of the Columbus Academy of Medicine, described an invention of his own which obviates all these troubles.

They were first made here in Columbus, of aluminum, the bowl being of the size and shape of the ordinary teaspoon. But

The aluminum article is too light and unsteady. It is now made of brass, nickeled, by Tiemann. It is so arranged as to fold up into

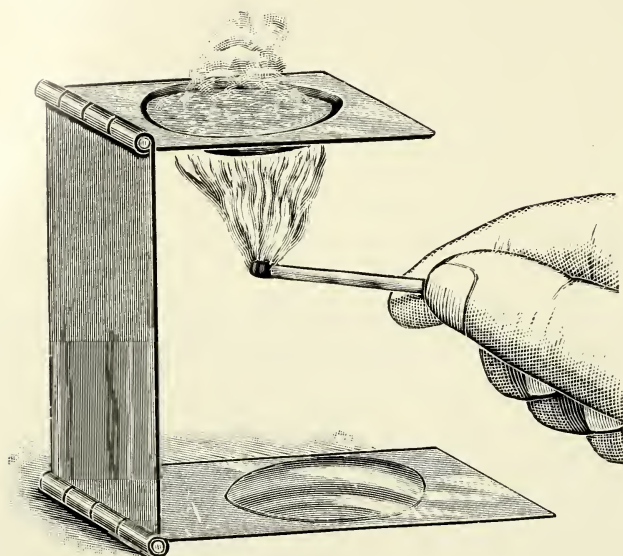


Fig. 2.—Moore's Pocket Spoon for Hypodermatic Injection—first form, open, and Showing Method of Boiling the Solution by a Lighted Match.

very small bulk. The outer spoon, or cover, is the foot of the appliance, when turned back. The inner bowl is used to contain the

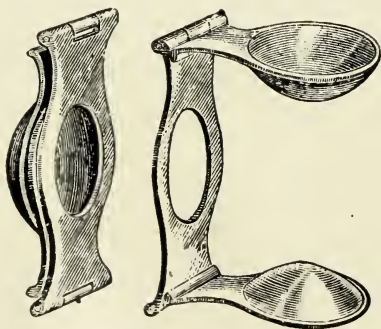


Fig. 3.—Moore's Pocket Spoon for Hypodermatic Injection—Improved Form, closed and open.

solution to be sterilized. The ordinary amount of water can be made to boil in this spoon by the burning of a single match. In

the field, a candle might be used, but best of all will be the match called the "vest pocket flamer," but more commonly known to hunters and fishermen as the "blow and be damned."

Now I have blackened the under surface of the spoon and I have no convenient means of getting rid of the soot. So I turn the blackened bowl back against the stem so (indicating), and cover it over with the foot, so it may go into my pocket without risk of soiling anything.

This spoon was used last year in the field hospital of the Ohio National Guard in camp with a great deal of satisfaction.

The price is seventy-five cents with the customary discount, making the net price fifty-eight cents.

III. A MEDICAL CHEST, SUITABLE FOR A BATTERY, TROOP OR INDEPENDENT COMPANY.

BY FIRST LIEUTENANT HERBERT A. ARNOLD,

ARDMORE, PA.,

ASSISTANT SURGEON, BATTERY "A," NATIONAL GUARD
OF PENNSYLVANIA.

NO regulation medical chest is provided for the Medical Department of the National Guard of Pennsylvania, for the transportation and ready dispensing of any quantity or variety of medical supplies.

A tour of the hospitals at division camp proves the truthfulness of the old adage, "Many men of many minds," and reveals a diversity of appliances varying in kind from a soap box to an arrangement of shelves and vials that would do credit to a well-equipped drug store. Indeed, upon assuming my position as surgeon to the Battery, when I asked for the medical supplies, I was taken into the Quartermaster's Department, and in an obscure corner was shown a soap box, as nearly as I could see, filled with old straw, and was told that the medicines were in it, just as brought back from the last summer camp.

I would not have you think that things are in such a chaotic condition throughout the Medical Department of the National Guard of Pennsylvania, for such is not the case. Unfortunately for Battery "A," its Medical Department seems to have been little more than a name.

On examination of the contents of the aforementioned soap box, I found a lot of ancient drugs that had outlived their usefulness and consequently were consigned to the dump. An effort to bring order out of chaos resulted in the medical chest I desire to submit to you to-day.

It is not my intention to go into the merits or demerits of other chests, but simply to describe one of light weight, small size, and yet sufficiently strong and capacious to provide all medical supplies needed by one hundred or two hundred men: every por-

tion readily accessible without disturbing any other part, and its contents possessing the merit of both quantity and variety.

This one is made of mahogany, but oak or some other hard wood would answer better. Like the chest designed by General Senn, it may be made of a composition, shellacked to make it waterproof, and metal bound to strengthen it. This one, however, has stood some hard usage already and is apparently none the worse for it.

The exposed edges are all rounded to prevent scarring or breaking, and the joints are securely dovetailed. The lid and bottom may be fastened by screws, if deemed advisable, to give additional strength.

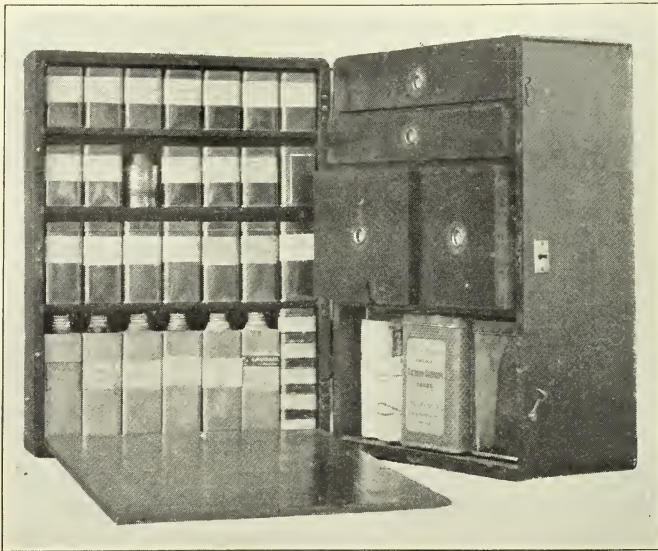


Fig. 1—The Arnold Medical Chest.

Instead of the customary lid it is divided *vertically* into two unequal parts, strongly hinged at the back. There is a very convenient handle on the top, principally used in lifting it into or out of its canvas cover.

The unequal division of the case provides on one side a row of shallow shelves of varying height, closed in by a hinged lid, and on the other side a bottom shelf and four deep drawers.

The lid which closes in the shelves is hinged at the bottom, and when not used to retain the contents of the shelves in their places it makes a useful table for dispensing or writing.

The shelves vary in height from $2\frac{3}{4}$ inches to $5\frac{3}{4}$ inches, but are uniformly $1\frac{3}{4}$ inches in depth. This is done to admit different sized receptacles for the drugs, giving large boxes for the drugs most often used, smaller ones for medicines seldom required.

These shelves were first fitted out with screw cap glass bottles. Their fragile nature, and increased weight and thickness caused me to discard them for the cans, the square top and extreme thinness of the latter giving extra capacity. The lids are interchangeable, being uniform in size. Waxed paper neatly fitted to the inside of the cans will keep the medicine from contact with the metal, and the placing of a pledget of cotton on top of the drug will prevent all attrition and consequent pulverization of tablets or uncoated pills.

We can in this way provide for pills, powders and tablets that are not hygroscopic or erosive. Solids possessing such properties are treated the same as corrosive liquids, and are contained in glass bottles, rubber stoppered, and enclosed in metal cases that prevent leakage by screwing tightly together, and being corrugated reduce the risk of breakage to a minimum.

For liquids, non-corrosive, I have made square tin cans, with tight-fitting screw caps. Each one of these metal bottles has a capacity of $8\frac{1}{2}$ fluid ounces.

Each shelf will hold 7 cans, $1\frac{3}{4}$ inches square, 28 in all, or by using short cans for the drugs seldom needed the number can be increased according to the individual fancy. These are all securely fastened in place by raising the lid to its proper position.

The opposite side contains two long drawers, the top one for hypodermic syringe, clinical thermometer, and instruments, such as pocket case, dressing forceps and scissors. The lower long drawer will hold a stomach pump, fountain syringe and several elastic catheters.

There are two square drawers, the larger of which is filled with gauze and muslin bandages.

The other square drawer is a general receptacle for graduate, cartons, spirit lamp, adhesive plaster, etc.

The open shelf at the bottom gives a space $5\frac{3}{4}$ inches high, 5 inches deep and 12 inches long. Here we have a can containing

5 yards of gauze, another that will hold 4 ounces of absorbent cotton, four tin bottles for liquids, and a tin basin 12 inches long, $5\frac{3}{4}$ inches wide and $2\frac{3}{4}$ inches deep. A space $1\frac{1}{8}$ inches deep, $5\frac{3}{4}$ inches high and 12 inches long is left either in front or back of the chest for bottles, splints, first aid packets, etc.

This chest has been especially designed as a container for the following list of drugs, instruments, etc., which have been carefully selected to meet every exigency that may arise, and all so arranged as to be readily accessible.

DRUGS.

Tablets.

Ammon., mur., gr. v.
 Acetanilid, gr. v.
 Bismuth sub nit., gr. v.
 Calomel 1-5, Ipeac $\frac{1}{4}$ et soda.
 Dovers' Powder, gr. $2\frac{1}{2}$.
 Lead acetate, gr. v.
 Zinc sulphate, gr. v.
 Morph. sulph., gr. $\frac{1}{2}$.
 Morph. $\frac{1}{2}$ atropia 1-200.
 Opium $\frac{1}{4}$, Camphor $\frac{1}{4}$.
 Potas. Brom., gr. v.
 Potas. Chloras, gr. v.
 Potas. Iodide, gr. v.
 Purgative.
 Quinia sulph., gr. ii.
 Salol, gr. v.
 Soda Bicarb., gr. v.
 Soda Salycilas, gr. v.
 Sun cholera m. xv.
 Terpin Hydrate, gr. ii.

Hypodermic Tablets.

Morph. sulph., gr. 1-6.
 Atropia sulph., gr. 1-200.
 Strychnia sulph., gr. 1-30.
 Pilocarpin Mur., gr. $\frac{1}{2}$.
 Cocaine Mur., gr. 1-6.

Powders.

Acid Tannic.
 Acid Boric.
 Iodine.
 Iodoform.
 Magnesia sulphate.
 Zinc, oxide.

Liquids.

Alcohol.
 Acid, carbolic.
 Chloroform.
 Ether.
 Glycerine.
 Olive oil.
 Oil of turpentine.
 Petrolatum.
 Sp. Ammon. Aromat.
 Tincture Opium.
 Castor oil.
 Oil of cloves.
 Creosote.

SURGICAL INSTRUMENTS.

Catheters.	Ligature and needles.
Fountain syringe.	Dressing scissors.
Penis syringes.	Thermometer (clinical).
Tubing for Tourniquet.	Hypodermic syringe.
Stomach Pump.	Trephine.
Rubber bandage.	Saw.
Pocket operating case.	Razor.

SURGICAL DRESSINGS AND ACCESSORIES.

Bichloride Tablets.	Soap.
Bandages, roller.	Alcohol lamp.
Bandages, triangular.	Pencil.
Cotton, absorbent.	Tablet pad.
First aid packages.	Graduate.
Gauze, sublimated.	Tape measure.
Iodoform box.	Teaspoon.
Adhesive plaster.	Corkscrew.
Sponges.	Candles.
Pins.	Matches.
Pins, safety.	Tape.
Tin basin.	Splint material.
Hand brush.	Cartons, bottles and corks.

When the sides are approximated, two brass pins and corresponding sockets prevent swaying, and two hooks fasten and securely hold the case together when closed.

It is 17 inches high, 13 inches wide and $8\frac{1}{2}$ inches deep. A canvas cover with lid is provided to protect the chest. This cover may be made waterproof or made of waterproof material.

For purposes of transportation leather straps pass under the chest outside the cover, to which they are fastened, and a third strap passing around all prevents their slipping from position or causing any strain to come upon the canvas.

The empty case with its cover and straps weighs but 15 pounds. As presented to you with all cans in place and partially equipped with instruments and drugs its weight, ready for service, is 35 pounds.

I present this chest believing that it possesses the merits of compactness, lightness and accessibility that commend it to favorable consideration.

U. S. A.—Two chests each, 16x14x23 inches, weight 185 lbs.

Senn's—One chest, $12\frac{1}{2}$ x $12\frac{1}{2}$ x19 inches, weight 76 lbs.

Arnold's—One chest, $8\frac{1}{2}$ x $12\frac{1}{2}$ x17 inches, weight 35 pounds.

IV. PERSONAL EQUIPMENT FOR FIELD SERVICE.

BY LIEUTENANT COLONEL HENRY R. TILTON,

ST. PAUL, MINN.,

DEPUTY SURGEON GENERAL IN THE UNITED STATES ARMY.

THE Army Regulations, par. 1119, gives the allowance of baggage in the field for the different grades; the allowance of equipage, tents, etc., is promulgated in General Orders annually. The details are left to individual selection. When an officer receives his first order for field service he is very much in doubt as to what is required. One will go totally unprepared, while another will be encumbered with many useless articles, which will prove a nuisance to himself and to all who are required to daily handle them. To provide a proper outfit, the season of the year must be considered. In summer the clothing should be of much lighter weight than that suitable for the balance of the year. There ought to be two complete outside suits, coats and trowsers, also vests for those accustomed to wear them, so as to be able to make a change in case of being caught out in a sudden rain, or an accident at the crossing of a stream. It is well known that clothing in use in the field will seldom be fit for much subsequent service at a garrison: and while uniformity is desirable, there is usually a greater latitude permitted in regard to uniform than in a garrison. For field work ample pockets, both inside and out, are most convenient, and the material of the pockets should be of heavier twill than ordinarily provided. Coats after the pattern used by sportsmen enable many convenient articles to be carried upon the person with the greatest facility. Flannel and serge of good quality are best for summer wear. For head covering, a campaign hat and a forage cap will be sufficient provision, except in the extreme South, where the pith helmet or straw hat would be more desirable. Shoes and leggings are much lighter in weight than top boots, but as the boots are a part of the uniform, one pair will be required, also two pairs of shoes with leggings. A pair of slippers will add much to one's comfort. Six pairs of cotton socks

will be needed. While there is a general consensus of opinion as to the desirability of all wool underwear, it must be borne in mind that the facilities for washing are generally of a very primitive character in the field. Unless flannels are washed in a careful way without rubbing or wringing out they are bound to shrink and have to be discarded from this cause long before they are worn out. Gray, drab or brown colors are better than white. At least three undershirts and three pairs of drawers will be required. Two outside shirts may be either of gray or blue, and less annoyance will result in having at least one-quarter cotton. Negligee shirts are usually made with a collar. As the collar will require washing much oftener than the shirt, it is better to have them made separately: about three to each shirt. Two black cravats or handkerchiefs will be needed. India silk is light and comfortable for hot weather. Four colored silk handkerchiefs will be required, and as handkerchiefs occupy little space and are a great convenience, two dozen linen handkerchiefs will be none too many. Besides the articles mentioned, an overcoat should always be taken. When the days are hot, the mornings and evenings may be cool. A change of fifty degrees Fahrenheit sometimes will occur within a few hours. A waterproof coat should be always accessible. It is better to carry it upon the saddle, than not be able to get it when needed. The question of suspenders must be left to each one. Some never wear them. I never go without them.

In preparation for a winter campaign, without making any recommendations, I will give a list of articles which proved useful in the winter of 1876-77, while in the field in Montana, where the temperature was at times nearly forty degrees F. below zero. We were not uniformly outfitted, as we were compelled to take such articles as were obtainable. Fur caps, blanket caps, comforters, heavy cloth coats, blanket lined overcoats, buffalo overcoats, heavy all wool undershirts and drawers, perforated buckskin shirts and drawers, blanket lined canvas leggings, extending well up on the thighs, these were supported from the waist belt by means of loops extending up from the outside. Outside shirts made of blankets or heavy woolen material, heavy cloth trousers, blanket overalls, two pairs of woolen socks, buffalo leggins and moccasins, over the moccasins buffalo overshoes or arctics, buckskin gloves lined with lamb's wool, inside of buckskin mittens lined

with flannel. To protect ourselves we were bundled up to such a degree as to be comparatively helpless.

It can readily be seen that great improvements have been made since 1876. Union suits were then unknown. These would properly protect the person without unnecessarily encumbering the body by having too much material around the waist. Steam shrunk all wool underclothing obviates to a certain degree the shrinking which usually occurs with all wool goods. One drawback to having the head too much wrapped up is the muffling of the hearing which is of special importance to a sentinel upon whose vigilance the welfare of an entire command may depend. Sweaters, in such general use among athletes, would add very materially to one's protection in extremely cold weather. It must be understood that the above long array of articles is not recommended to be provided, but is only suggested in case circumstances should occur to require preparation for a severe winter campaign.

The same list of articles required for summer, may be duplicated for winter, substituting heavy material in place of light-weight goods. While visiting a friend last October at Fort Meade, South Dakota, I saw several reversible riding jackets, black leather on one side and brown corduroy on the other; they had strong, large pockets on both sides, and were very popular with those who wore them. They are wind proof and do not gather dust. A union undersuit, then buckskin undershirt and drawers, a sweater, with corduroy trousers and the reversible riding jacket, a cloth cap with generous ear flaps would make a beau ideal suit for rough service in cold windy weather.

FIELD BED.—A sheet of canvas is required to protect the bedding, and it also enables one in case of necessity to dispense with a tent. The tent makers make what are called stockmen's bed sheets which are in demand on the frontier, particularly among the cattlemen. These sheets are made in different widths and lengths as well as weights of canvas, from six to eight feet wide and from twelve to eighteen feet long, and of 13-15-18 oz. duck and weigh from ten to twenty-two pounds. A sheet seven feet by fourteen feet is a very convenient size and 13 oz. duck is sufficiently heavy. They are provided with eyelet holes or with small snap hooks on two borders, corresponding with small rings

on the two opposite borders. The snap hooks and rings will be found more convenient. A waterproof sheet large enough to protect the mattress from dampness will be desirable. The Quartermaster Department has on hand rubber blankets forty-five by seventy-two inches. Officers can purchase such articles from that Department for their own use. A mattress three inches thick, thirty inches wide and six inches longer than the height of the person will be a satisfactory size. Various materials are used, but nothing is better than good curled horse hair. Besides the tick there will be required a twill muslin cover; this is removable and can be washed at the close of a campaign. For the summer season three woolen blankets will be enough, one beneath and two above the sleeper: In cold weather two additional blankets will afford none too much protection. The overcoat is always available as an extra cover.

To prepare the bed, spread out the canvas sheet, put on this the rubber blanket at equal distances from the two long sides, and a foot nearer the top than the bottom, then the mattress on the rubber sheet, then the blankets. A medium sized feather pillow will be appreciated many times over the bother of carrying a somewhat bulky article. There is a very great difference in habit with different people as to the comfortable height for the head when resting. For those who require a greater height than one pillow affords, it is better to take an extra pillow case and put sufficient underclothing in it to make the height satisfactory, rather than be encumbered with a second pillow.

To pack the bedding. Fold the two sides towards the middle of the bed, securing two or more snap hooks into the opposite rings. Fold the bottom of the canvas over the bed, and using one or more snap hooks as may be convenient; then roll from the head towards the foot. A cotton rope may be used to secure the roll, but as it must be rolled and unrolled nearly every day, it will be found much more convenient to use two stout buckled leather straps, each about seven feet long. These are united by a looped leather strap which is a ready means of handling the bundle when strapped up. In the winter it is not necessary to use a field cot. One can be warmer with the bed made upon the ground, the air being kept from sweeping under the bed; but in the rainy season it is much more comfortable to have a cot. Going into a dry

camp in the afternoon, and having a heavy dash of rain in the night which may cover the camp three or four inches deep, means, either getting up, or if one is on a cot, looking with equanimity upon the surrounding waters. A great deal of ingenuity has been expended upon field cots, to combine strength, lightness and portability. The old time two trestles with three boards of suitable width and length, make a portable and strong cot when properly constructed. The boards are readily carried in a wagon, without occupying very much space, and the two trestles can be tied on the side of the wagon body, without encroaching, at all, upon the inside space. Another portable cot, quite popular, is made out of two pieces of hard wood for head and foot boards with mortise holes near the ends to admit the side bars. Legs, on pivots, nearer together than the mortise holes, swing out and rest against a notch in the projecting side bars, which must be long enough to project moderately beyond the head and foot boards. The side bars pass through loops in a heavy canvas bottom, which should be six inches longer than the person, and thirty inches wide. The side bars should be eight inches longer than the canvas. I once saw a portable cot in use by an English ex-army officer. He said that style was well known in the East Indies. The ends were each made of two suitable poles between five and six feet long, joined at the top by a stout metal strap hinge. When the cot was to be put up, the poles were opened out like the letter A, an iron hook and staple from eight to ten inches below the apex was fastened to one pole, and hooked into a staple in the other pole. This served to keep the poles rigid. Loops of iron were fastened on the outside of all four poles at such a height that, when the side bars were passed through the loops, the canvas bottom was supported about sixteen inches from the ground. A cord was attached to the apex of each pair of legs and these were tied together upon putting up the cot. A mosquito bar could be suspended from the frame, and if desired a light canvas cover, with an opening in the middle of one side, could also be constructed, which served to complete the whole arrangement, cot with mosquito bar and tent combined. The ends and side bars could all be rolled up together for transportation. A very portable cot has been made of iron gas pipe, with suitable loops at the ends. The drawback to many light cots is their frailty. One's stout friends

call upon him and proceed to indulge in a practical joke by innocently sitting down on the side bars of the cot; many of them give way under this form of pleasantry.

All of the cots so far referred to, have the drawback of requiring wagon transportation. The most compact cot in the market, so far as I am familiar with, which is strong, portable, light and yet capable of sustaining heavy weights, is the one made at Racine, Wisconsin, by the Gold Medal Camp Furniture Company. These cots are made of hard maple, and by an ingenious malleable hinge the side bars fold, which enables the cot to be reduced to a package four by five inches, by three feet, and weighs but fourteen pounds. With all camp cots having canvas bottoms, a mattress can very readily be omitted. The cot does away with the inequalities of the surface, and many times means the difference between a good night's rest or tossing sleeplessly upon an uncomfortable bed. If one is ambitious to have his field equipment of the least possible weight, there are sleeping bags on the market which with the wool linings weigh less than twenty pounds. These bags will afford ample protection from wind and cold, and will be found less bulky than the canvas roll with its mattress, blankets, feather pillow, etc., which has been described and recommended. With the sleeping bag, extra clothing can be rolled up which will serve a double purpose, a pillow and the necessary changes of garments. One will soon grow accustomed to a firm, hard bed, and need have no fear of becoming uncovered during sleep.

OTHER CAMP FURNITURE.—Camp chairs are of such a variety of patterns that each one will have to select for himself. At least one chair is a great comfort after a day's march. Having but one chair, frequently means its occupation by a visitor while the host sits on a piece of baggage or on the ground, "à la Turc," making pretense that he prefers it. There are very compact portable tables and circumstances must govern whether one can afford the luxury of a table or not. A wash basin, a long-handled dipper, a water pail and a small tub will be necessary. A pail and a dipper will prove the most convenient method of securing and bringing water, which generally has to be carried a greater or less distance. Since the introduction of aluminum, a great reduction in weight of many camp equipments has been secured; although as yet, aluminum utensils are quite expensive. Collapsible buck-

ets are obtainable at the camp outfitting stores. Some of these are of heavy duck and others of mackintosh with a metal bottom and braces; but a wood fiber article will, undoubtedly, stand more rough service, and upon the whole will give better satisfaction and cost much less. A tub being rather an unwieldy article, we must compromise by taking one of small size. A wood fiber tub, eighteen inches in diameter and seven inches high, will be found a most useful article, not only for bathing purposes, but as a means of having clothing washed. Rubber bath tubs can be packed in a much smaller compass, but there would be greater weight and much greater expense. The wood or paper fiber tub is without hoops and can be carried in a special canvas sack which will receive other articles, so that it can be taken without sacrificing very much space on account of its shape. It will be found, at least eight months in the year, that no more useful article can be on hand than a tub which will permit of a good wash after a dusty march.

MESS-KIT.—Mess-kits are in the market made expressly for field service, but it is not necessary for every officer to invest in a mess-kit for six people. However, it is prudent for everyone to provide himself with the soldiers' kit as a reserve. First Lieutenant Guy H. Preston, Ninth U. S. Cavalry, has devised an improved field mess-kit which is fully described and illustrated in the *Army and Navy Journal* of March 23, 1896. Officers are liable to be sent on detached service, which will temporarily separate them from their regular messing arrangements, then the Preston kit is very compact and answers admirably for meeting such a contingency. One must remember to provide a compact salt box and pepper box filled to complete the Preston kit.

A small trunk or chest in which can be kept under lock and key such articles as do not bear rough handling, or which may have to be left temporarily at a depot, is a desirable article for use. The most generally useful receptacle will be a heavy canvas case which can be readily packed either in a wagon or on a pack animal. One similar to that which the Medical Supply Department has for blankets. It is fourteen by fourteen by thirty inches, the ends have flaps which project and are fastened by two straps and buckles which cover the top of the case, the rear has a long wide piece which covers over the closed end flaps, and is fastened by three straps and buckles. The convenience of such a case over the usual camper's bag, is the open view and facility for packing.

It will be found convenient to take at least two seamless grain sacks for emergencies in the field; they are inexpensive, take scarcely any room and are very handy for extra articles, or in case of detached service, serve for rations or other things. Many mess-kits require careful nesting of articles to pack contents, and in a hurry at the last moment some article won't go in. Then a seamless bag shows its usefulness.

The following list of toilet articles must be provided, such as hair brush, comb, tooth brush, looking glass, shaving set, whisk broom, soap in cup, toilet paper, towels, blacking brush and blacking, the last named while sometimes convenient, will more frequently be replaced by the use of neatsfoot oil. A cotton clothes line will be useful. One section can be tied between the upright poles in the tent and serve as an improvised wardrobe. While suitable occasions must be utilized for airing clothing and bedding, it is better to make everything snug over night for moves are sometimes sudden, and the possibility of high winds must not be overlooked. When everything is secure, one can rest without the idea that by morning his camp effects may be widely distributed by a gale of wind.

A large single-bladed pocket knife of good quality will be a most useful companion. This need not exclude the usual pocket knife which is universally carried.

A useful tool in camp is a hollow handle containing a spool of waxed thread, three stout needles, three awls which fit and clamp in the socket of the handle. After a gale, repairs will be made in time by the Quartermaster, but as a storm frequently causes damage to many tents, the handy tool enables one to make small repairs without delay. A ball of cotton twine and one of hemp will be very convenient, a sail needle, a bagging needle, a housewife containing, needles, thimble, scissors, pins, buttons, thread, and a cake of beeswax.

A small tin box, such as a fine cut tobacco box or preserved ginger box, will serve to carry a couple of stout short lantern candles. A thin piece of wood about an inch wide and long enough to go diagonally in the box, and having a semicircular notch at both ends will serve to brace the two candles, thus making an improvised candlestick. One or both candles may be lighted at the same time. Matches will be carried by all smokers, and those who don't smoke will need them for candles and fires.

A small package of fish hooks and lines will occasionally be the means of adding variety to the bill of fare which is apt to get monotonous. Whether rifles and shot guns are to be taken will depend upon the character of the expedition, the region of country, etc. Circumstances must govern. Note book and facilities for writing must be provided.

Sometimes the tents have to be appropriated for other uses, or the command may temporarily use shelter tents. The canvas cover of the field bed will afford excellent protection even without the tent. In such a case the bed should be shifted from the center of the canvas towards one border, governed by the direction of the wind, so that the free border can be brought well over the bed, leaving the opening away from the draught of wind. I recall two occasions when we were temporarily without our wall tents. Once to facilitate a rapid march, the command cut loose from the wagon train and took what was necessary on pack animals. I had provided myself with a small tent which I made while at my station, partly to occupy time and with the idea that it would at least serve for a play house for my child if I should never have occasion to use it. This tent, with the necessary jointed uprights and pins, weighed less than twelve pounds. It covered a surface of six by seven feet and was four feet high to the ridge. It answered the purpose admirably. In a rain storm I was very comfortable. Not long after this pack mule march our tents were required for the wounded, and I used the light tent for two weeks. When I returned to the wall tent again it seemed like a grand marquee. I have since had a small tent made which covers an oblong hexagonal surface. It is six feet wide, seven feet long, four feet high, and the center extends thirty inches beyond the jointed uprights. There is also a jointed ridge pole. A field cot can readily be set up in this tent. It is a much more substantial affair than the twelve pound tent above referred to. This tent with all its fixtures weighs nearly seventeen pounds. Without making any recommendations, I merely mention the possibility of such small tents in case of emergency.

A good field glass is a very useful article to take. It is not necessary to get the largest size such as used by the Signal Corps. One of good power and not very bulky will be found a great convenience.

I have not mentioned axe, hatchet and spade, because these articles are provided by the Quartermaster Department, but if one is to go out with a small party, or go into camp independent of a military body, these very necessary articles must not be overlooked. While on the subject of tents and camping I will mention a wrinkle about tent pins. These are usually extracted by tapping with a mallet or axe until loosened and then pulled up by direct force. Many are broken, particularly in frosty weather. One method, which is worth knowing, is by attaching a loop of rope to a stout hard wood handle and converting the latter into a lever of the second class. Tent pins can very readily be extracted in this way without the risk of breaking.

Horse equipments must not be forgotten. When I obtained my first set of equipments, the saddle was provided with all the accessories, even to the crupper. One article after another was discarded until the saddle was without surcingle and sweat leathers, the martingale was dispensed with, although in some cases this may be necessary. The Mexican broad girth and method of securing the saddle by a special mode of passing the strap without a buckle, enables one to secure a saddle with great certainty. I will not attempt to describe this in detail, as one can readily ascertain by a short practical lesson. Besides the bridle and saddle, saddle pad, halter and strap, picket rope and pin, circumstances must govern whether hobbles will be required. Small saddle bags and the proper number of straps to secure articles to the saddle, should also be provided. Spurs should not be forgotten. In winter campaigns, one's equanimity will be preserved by having the extra large sized wood stirrups, such as are used on the frontier. The ordinary size which will be entirely satisfactory when the foot is without an overshoe, will be too small when the foot has an arctic or any other covering which increases its proportions. I never experienced more mental wear and tear, than on a winter campaign when the foot would take up a portion of snow, which would soon be converted into a cake of ice and cause the foot to constantly slip from a stirrup which, while ample for summer use, was too small for an overshoe.

SUMMARY.

CLOTHING.—Two complete outside suits, campaign hat, forage cap, in the extreme South pith helmet or straw hat, two pairs of shoes, with leggings, extra shoe laces, one pair of top boots, riding gloves, spurs, one pair slippers, six pairs cotton socks, three undershirts, three pairs drawers, two outside shirts, two black cravats or silk handkerchiefs, India silk for hot weather, four colored silk handkerchiefs, two dozen white linen handkerchiefs, overcoat, waterproof coat. For winter, same list of articles substituting thick material, cloth cap with ear flaps, or fur cap or blanket cap if the season is very inclement, arctic overshoes in addition to regular foot covering, six pairs of woolen socks, all wool heavy undershirts and drawers or still better union suits, buckskin undershirt and drawers, sweater, heavy blanket lined overcoat, buckskin gloves lined with lamb's wool.

OTHER ARTICLES.—Field bed. Individual mess-kit, including salt and pepper boxes. Folding camp chair. Folding table. Wash basin, dipper, pail, small tub. Memorandum book and writing conveniences. Field glass. If possible, a good map of the country. Toilet articles. Large single-bladed pocket knife. Handy tool for repairs to tent and harness. Housewife, sail needles, bagging needle, a ball of cotton twine, a ball of hemp twine. Cotton clothes line. Tin box for candles and candlestick. Matches in safe. Package of fish hooks and lines. Gun, rifle and pistol upon suitable occasions. Horse equipments and, of course, a good well trained horse to carry them.

It is well to have all articles plainly marked.

This will impress some as a long list of articles to provide; but many of them occupy little space. Sometimes we are confronted by such an order as the following: "Officers' baggage will be limited to blankets, one small valise, or carpet bag, and a moderate mess-kit." By the aid of the preceding sketch, I am sure that one can secure a proper outfit with less uncertainty than attempting it unadvisedly.

V. SOME REMARKS ON MOUNTAIN CAMPAIGNING FROM A MEDICAL STANDPOINT.

BY CAPTAIN HENRY P. BIRMINGHAM,
FORT TRUMBULL, CONN.,

ASSISTANT SURGEON IN THE UNITED STATES ARMY.

FIELD service in a mountainous or broken country, where the use of wheeled vehicles is precluded and where actual hostilities are to be counted upon, has always presented difficulties to the military head of an expedition operating in such country, and the cares and responsibilities of the accompanying medical officer are, as a matter of course, proportionate to the difficulties of the general situation. To begin with, extended operations with large bodies of men are not often called for and expeditions of this kind usually set out from a supply camp, or station, comparatively near the scene of action and, as in this country, such operations have, as a rule, been conducted against rather small bodies of Indians, the commands have been proportionately small and have been made up with a view to the greatest possible utility of everything pertaining to the expedition. No dead weight, either in men or material, has always been considered an absolute and indispensable condition.

Such being the case and the medical officer being compelled to conform to the minimizing in bulk and weight, the question confronts him what, with the limited means of transportation at his disposal, can best meet the demands of the situation. The indispensable articles are, of course, medicines, instruments, and surgical dressings, and after these are to be considered means of transportation for the seriously wounded.

Let us first consider the matter of medicines, instruments and dressings. The small quantity of medicine that will suffice for a command composed of able-bodied, healthy men who are used to campaigning and who consequently do not suffer from avoidable errors of diet and the results of unnecessary exposure, is rather surprising. In the summer of 1885 I was attached to a command operating in the mountains of Sonora and Chihuahua, Mexico,

against hostile Apaches, and during a period of four months in a command of nearly 200 men—soldiers, Indian scouts, and civilian packers—I think I can safely say that all the medicines dispensed, barring quinine, and there was not much of that, could have been carried in the small hand emergency case such as is now issued to medical officers of the army. Of course, two rather exceptional conditions existed in this case; the men were thoroughly inured to the work and the country, although hot, was not unhealthy, but in a number of shorter scouts or campaigns, under similar conditions, my experience, generally speaking, was that a little medicine would go a long way.

If I may be pardoned for digressing a moment I would like to say, while on the subject of self-care among men in the field, that in visiting camps of the National Guard I have been struck with the lack of consideration paid to two conditions which probably have as much to do with the ultimate efficiency of the soldier in actual warfare as any two that could be named, viz: practical instruction in the means of protecting himself from the elements, and the imparting of some knowledge concerning the preparation of the ration that will be issued to him. A man may be perfect in drill, discipline, etc., but if he is on the sick list with rheumatism or catarrhal ailments from exposure, or indigestion and diarrhoea from improperly cooked food he is, of course, a burden rather than a help. The short time in camp usually allotted State troops undoubtedly renders it impossible to do many things known to be necessary, and furthermore many men will only learn to take care of themselves in the field by hard experience; but it would seem that some very essential knowledge could be imparted to the men, without greatly interfering with their other work, if instead of finding tents ready pitched, and nicely floored and ditched, and a caterer on hand to furnish them with the fare and dining-room appurtenances of a good hotel, they were compelled to do a little in the way of making and breaking camp, utilizing shelter tents and the like, and finally having at least a few men in each company taught something concerning the possibilities of the army field ration. One meal each day, for instance, might be made to consist of the army ration cooked, by the men themselves, on the Buzacott field range or oven.

To return to the subject we are discussing: It might be said that with comparatively few exceptions the conditions calling for medical treatment will be those pertaining to the alimentary canal, principally constipation from the use of concentrated food with now and then a case of diarrhœa, rheumatic ailments in bad weather, as a rule sub-acute or chronic in character; and malarial diseases of course, when operating in a malarious country. The medical armamentarium might then be made to consist principally of laxatives, and anti-diarrhœal remedies, salicylates, quinine—in quantity depending on the locality—and a goodly supply of morphine, and—for fear I might forget it—a hypodermic syringe that will never fail. Of course many other articles in small quantity can and should be carried, and in tablet form will not require much space, but as I have said before, it is surprising how seldom you will be called upon to use other than the few remedies I have enumerated.

In the way of instruments the Surgeon's field case now issued to the army (7x5x1 $\frac{3}{4}$ in.) enclosed in a leather pouch with a sling for carrying it over the shoulder, a small pocket case, and possibly a few additional hemostatic forceps would probably meet the requirements; a number of field tourniquets, depending on the size of the command, should be on hand, and Esmarch's packets might be issued to the men if they know how to use them intelligently, otherwise they will do more harm than good, and finally, in the matter of chloroform and dressings: take all that can be reasonably carried. I do not mention ether for the reason that it is not only too bulky, but it does not compare with chloroform as a field anæsthetic. The orderly pouch issued by the Medical Department of the Army would be found very useful; the contents are as follows: Ammoniæ spiritus aromaticus, in flask with cup, c. c. 60. Antiseptic tablets, bottle, 1. Bandages, roller, No. 6. Case, pocket, No. 1. Chloroform, in case, gms., 100. Catheters, Eng., rubber, in box, No. 1. Diagnosis tag and pencil book, 1. First-aid packets, No. 4. Gauze, plain, one yard pieces, No. 4. Jack-knife, with saw blade, No. 1. Ligatures, catgut, assorted, bottle, 1. Mist. chloroformi et opii, in case, c. c. 30. Pins, common and safety, of each, paper, 1. Rubber tourniquet, No. 1. Scissors, No. 1. Splints, wire gauze for, in roll, yard 1. Surgical plaster, spool, 1. Syringe, hypodermic, No. 1. Tray, No. 1. It

is carried slung over the shoulder and with the small Surgeon's field case, referred to above, carried in like manner by an intelligent orderly with some training as an assistant, the medical officer would be fairly well equipped to meet almost any emergency that might arise. The orderly's instructions, of course, would be to remain in constant attendance upon the medical officer.

And now a few words on means of transportation for the wounded. The contrivances used for this purpose under the conditions we are discussing have been mainly the travois, horse-litter, and cacolet. The travois, to my mind, is far the best arrangement of the three. The idea of the travois was taken from the Indians, among whom it has been in use for a long time, not only as a means of transporting the sick and injured, but as a sort of general utility cart for carrying camp effects and at times the women, children and even the dogs. It consists, as is generally known, of two poles about 15 feet in length, the smaller ends (about two inches in diameter at the extremity), forming the shafts between which the animal is hitched, the butt ends dragging on the ground; two cross bars either nailed or firmly lashed to the poles hold it together; they—the cross bars—are so placed as to allow 6 feet space for the resting place and about 6 feet shaft room for the animal, the lower bar being about 3 feet from the butt ends. By firmly securing a strong blanket or piece of canvas between the poles and cross bars a fairly comfortable place can be made for the patient. If one pole is made 8 or 10 inches shorter than the other, the motion, in passing over rough places, will be more equally distributed and the shock lessened. The travois, as may be seen, can be readily improvised. The Indians generally utilized for the purpose a couple of lodge poles and a wicker arrangement or buffalo robe. Two modifications of the original travois have been devised, known as the Greenleaf and the McDougall, after the originators—Colonel Greenleaf of the Medical Department of the Army, and Captain McDougall, retired, formerly Seventh United States Cavalry. They both accomplish the same object, viz: Keeping the patient in an approximately horizontal position in a somewhat different manner. The Greenleaf travois, which I believe has been exhibited before the Association, is intended to be used with a litter and by suspending the front handles of the litter to the forward cross bars and securing the rear legs to

the rear cross bars, the litter is not only maintained in a horizontal position, but the suspension of the front handles eases the motion materially. I have not used this travois in the field, but I tested it in the rough foot hills about Ft. Grant, Arizona, and it will do all that a travois can. The modification in the McDougall travois consists in bolting or otherwise attaching to the shaft poles, at an angle of about 30 degrees, two poles or pieces about six feet in length; the upper ends of these pieces are attached to the shafts near the upper cross bars and the angle at which they are fixed gives them a horizontal position when the travois is fastened to the animal; the rear ends are held in place by props fixed to the butt or trail-ends of the shaft poles and a couple of cross braces at the ends makes a horizontal frame to which canvas is attached for the resting-place. A shade of canvas or oil cloth resembling a buggy top protects the occupant. Two of these were sent out to Ft. Cummings, N. M., in 1883, for trial. I saw them used in a campaign, and while correct enough in principle, they were structurally too weak for the rough country and broke down. The two-horse litter is simply an ordinary litter with rather deep bed and with long poles or handles which are used as shafts for two animals, one being placed before and the other behind the litter. I have had no practical experience with it myself, but I have been told by some who have that unless the animals used are much more docile than the average army horse or mule that they would hesitate before putting even a sound man in it. For that matter though, none but perfectly reliable animals should be used in any of these contrivances and they should always be *led* by trustworthy men, for even the quietest beast will at times object to being hitched to them. As a matter of fact if there was much work of this kind to be done the animals would have to be specially trained for it.

The French have, as a part of their ambulance equipment, a so-called mule-litter which consists of a wrought iron frame and canvas litter bed about $6\frac{1}{2}$ feet in length jointed into three parts so that the whole may be folded up compactly. A pair of these are attached to an animal equipped with a pack saddle, one on either side; they are fitted with a canvas hood for protection against sun and rain and also an apron of the same material which can be drawn up so as to completely cover the patient. The occupant

lies at full length, head first, and it would seem from the confined and rather rigid position the patient is compelled to assume that the arrangement must be a very uncomfortable one, even at rest, not to mention the pitching, swinging movement imparted by the motion of the animal.

The cacolet is essentially a folding chair with a foot board arrangement—the frame being of wrought iron—capable of being hooked to a pack saddle, one on each side of the saddle. The cacolets are for patients who can be carried in the sitting posture, while the mule-litter, as stated, is for those requiring a recumbent position. Both of the above-mentioned contrivances were first introduced as articles of ambulance equipment in the French army in Algeria, and they were found to be so useful that it was said that the country could hardly have been conquered without them, so dispiriting would have been the effect upon the troops if they could not have felt secure that they would have been saved from the Arabs if wounded while operating in the mountain regions. Mule-litters and cacolets were afterward used by the English in the Crimean war, and Longmore speaks well of them.

Major McElderry of the Medical Department of the Army devised a hinged litter, capable of being adjusted at any desired angle so that a patient could be transported in a recumbent reclining, or sitting posture; the litter is secured to the animal by means of the *aparejo*, or Mexican pack saddle, and it was said to have been found very effective in transporting the wounded during the Modoc campaign in the lava-beds of Oregon in 1873. An awning, or shade, can be attached to it and when in place on the animal, with this attachment, it resembles somewhat the howdah on the camel or elephant. I have been told by some officers who saw it tried at the San Carlos Agency, Arizona, that its appearance was rather terrifying to animals, although the inventor distinctly states that the average pack-mule does not object to it. I have never seen it myself.

I have had some little experience with the travois, and in my opinion it will be found more generally useful for the work in question than any of the others, but unless a man is so seriously hurt as to absolutely prevent his sitting up he will prefer the ordinary saddle, and will not ride in the travois or anything else of the kind. I have had a number of sick and in-

jured men request to be taken out of the travois after a short ride over a rough trail, they preferring to ride in the saddle if able to remain in it, and whenever their condition permitted it I allowed them to do so. While speaking of the travois I would say that if the country is very rough the trail end of it will have to be carried by men, often for long distances, and by temporarily lengthening the trail poles so as to throw the burden of the load upon the horse, the patient can be made quite comfortable with comparative ease to the men. A distinguished and much lamented officer of cavalry who was mortally wounded in the Sierra Madre, Mexico, was carried for five days preceding his death over an exceedingly rough country in this manner.

In conclusion it seems hardly necessary to say that the foregoing remarks were written only for the purpose of calling attention to a few points that might be worth remembering by one called upon to participate in a mountain scout or campaign and that the discussion of general considerations pertaining to field work at large was not contemplated.

CHAPTER XIII.

The Service of Aid to the Disabled.

I. SCHEME OF MILITARY SANITARY ORGANIZATION.

BY MAJOR JOHN VAN RENSSELAER HOFF,

VANCOUVER BARRACKS, WASH.,

SURGEON IN THE UNITED STATES ARMY.

THE Sanitary Requirements in Organization, Personnel, and Transportation from Front to Rear of a Division¹ of an Army, numbering 13,000 Officers and Men, in active Service, are:

(A) REGIMENTAL DETACHMENT, FOR EACH REGIMENT.

	1 Major, Surgeon.
3 Medical Officers.	1 Captain, Asst. Surgeon.
	1 Lieutenant, Asst. Surgeon.
3 Non. Com. Officers, H. C.	1 Hospital Steward.
	2 Acting Hospital Stewards.
	3 Medical Officer's Orderlies.
5 Privates, Hosp. Corps.	1 Cook.
	1 Regimental Dispensary Attendant.
24 Company Bearers, in a Regiment	1,200 strong.

¹The requirements of the Medical Department as set forth in this table are based upon par. 1590, Regulations 1889, which reads: "The privates of the (Hospital) Corps to perform the duties of litter bearers, service with the ambulances, and at dressing stations, and ambulance stations, should number at least 2 per cent. of the aggregate strength of the Command;" and upon par. 1602, which reads: "Members of the Hospital Corps * * * to General and Division Hospitals, six privates to every thirty beds, with such numbers of Hospital Stewards and Acting Hospital Stewards as the Surgeon General * * * may direct."

The number is obviously inadequate or other armies are overmanned in this direction. At least 4 per cent. of the aggregate strength of the Division will be required for sanitary purposes in the field, exclusive of the company bearers and 1½ per cent. on the lines of communication, at the base, and with transportation to interior hospital.

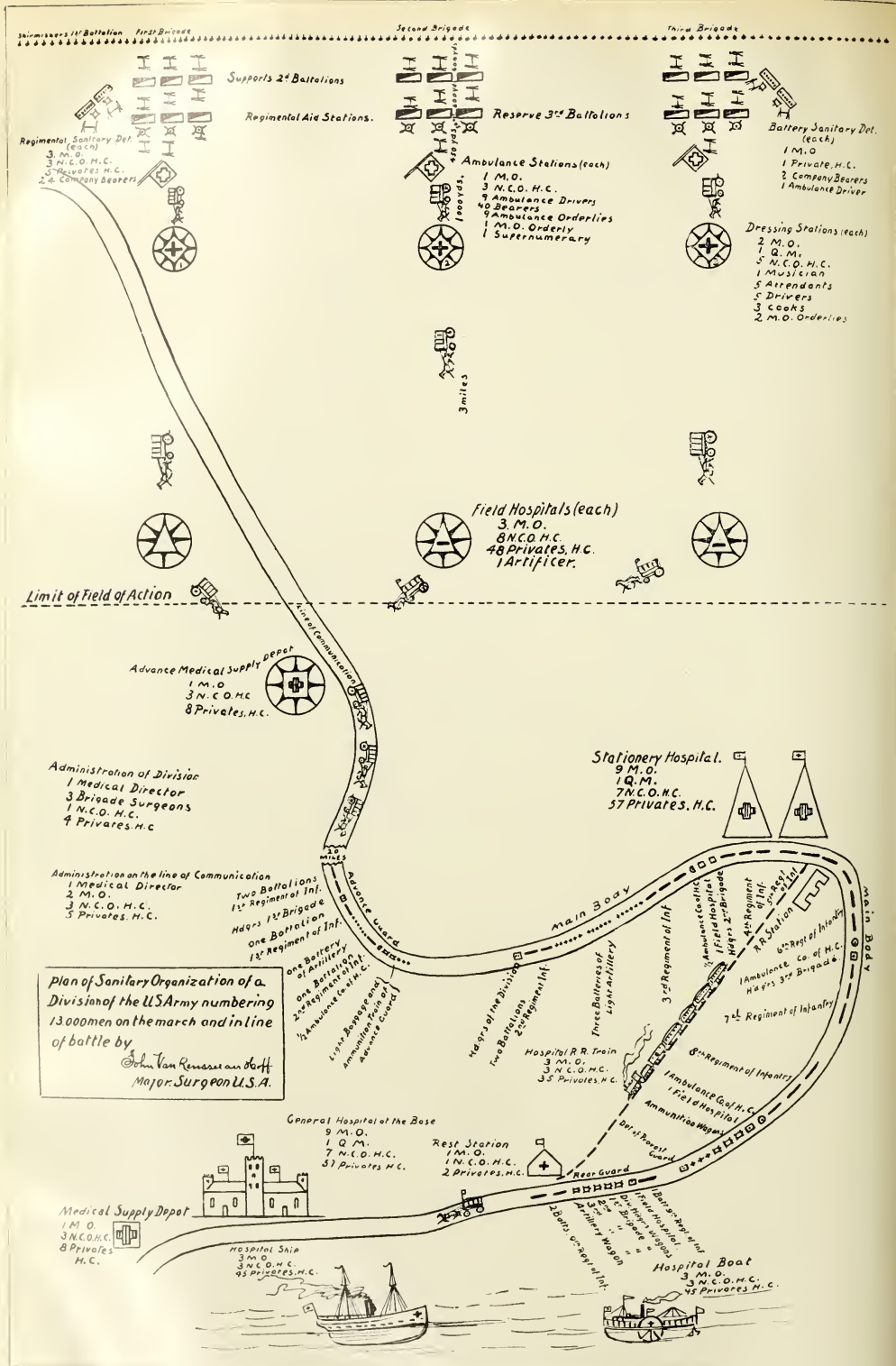


Fig. 1.—Plan of the Sanitary Organization of a Division of the United States Army, Numbering 13,000 Men, on the March and in Line of Battle.

Wagner² gives the war strength and composition of the Division in the U. S. Army, as follows:

	OFFICERS.	MEDICAL OFFICERS.	PRIVATES AND NON-COM. OFFICERS.		AGGREGATE.	GUNS.	OTHER CARRIAGES.	HORSES.	MULES.	TOTAL ANIMALS.
			COMBATANTS.	NON-COMBATANTS.						
C. O. and Staff.....	11	1		22	34		3	28	18	46
Inf. Brigades each of 3 reg's	405	30	11142	222	11799		69	258	378	636
4 Batteries.....	22	4	703	4	733	24	44	635		635
Bearer Co.....		3		60	63		4	12	12	24
Ambulance Co.....		3		72	75		53	118	18	136
Field Hospital		3		40	43		7	12	30	42
	438	44	11845	420	12747	24	180	1083	456	1519

The company bearers number 2 per cent. of the fighting effective. They report to the senior regimental medical officer at the beginning of an engagement and with the men of the Hospital Corps are permitted to escort the wounded to the rear, par. 1413, A. R., 1895.

On the battlefield the regimental sanitary detachment is distributed as follows:

The senior medical officer at the regimental aid station, immediately in rear of the regimental reserve, with the hospital steward, three privates of the Hospital Corps and the cart carrying the medical and surgical chests and twelve hand-litters. The two junior medical officers, with their orderlies, and with each officer, an acting hospital steward and twelve company bearers (with three hand-litters) search for wounded, and when found carry them to the regimental aid station.

(B) BATTERY DETACHMENT.

- 1 Medical Officer.
- 1 Private, H. C.
- 1 Ambulance Driver.
- 2 Company Bearers.

²P. 34 Organization and Tactics.

Under the act approved March 11, 1864, Sec. 3, one ambulance is allowed to each battery of artillery, to which it is permanently attached.

Three ambulance companies of the Hospital Corps are attached to each Division of normal strength; such a company has the following organization:

(C) AMBULANCE COMPANIES OF THE HOSPITAL CORPS.

	1 Major, Surgeon, Commanding.
3 Medical Officers.	1 Captain, Asst. Surgeon.
	1 Lieutenant, Asst. Surgeon.
13 Non-Com. Officers, H. C.	
1 Musician, and	
47 Private Soldiers, H. C.	

Unless this company can be furnished with its own transportation (consisting of 9 ambulance wagons, 1 medicine wagon, 3 army wagons for material, and 1 water cart), and the personnel therefor, there must be attached for this purpose:

1 Quartermaster.	
3 Non-Com. Officers.	1 Sergeant.
1 Blacksmith.	2 Corporals.
1 Saddler.	
1 Trumpeter.	
14 Drivers.	
1 Cook.	
2 Supernumeraries.	

If it mans its transportation, which by law it is now required to do, its personnel will have to be increased by the number of officers and men heretofore attached from the Q. M. D., or detailed from the line, making a total of 88.

On the battlefield the ambulance company is distributed as follows, at the

- (a) Dressing Station.
- 2 Medical Officers. (The senior medical officer usually remains here.)
 - 4 Non-Com. Officers, H. C.
 - 1 Musician.
 - 5 Attendants.
 - 1 Cook.
 - 2 Medical Officers' Orderlies.

The Medicine wagon is stationed here as well as the three army wagons and water cart under the charge of the Quartermaster, who also has general charge of the ambulance wagons and their workings. This adds to the dressing station force:

- 1 Quartermaster.
- 1 Non-Com. Officer.
- 5 Drivers.
- 2 Company Cooks.

(b) Ambulance Station.

As soon as the dressing station is formed the rest of the company moves forward and forms an ambulance (collecting) station at which the ambulance wagons rendezvous and between which and the dressing station they are constantly plying. Each ambulance wagon has a driver and an orderly, and carries a medical and a surgical chest,

- 1 Medical Officer.
- 3 Non-Com. Officers.
- 9 Ambulance Drivers.
- 9 Ambulance Orderlies.
- 40 Bearers.
- 1 Medical Officer's Orderly.
- 1 Trumpeter.

Each company is so organized that it may be subdivided into two platoons capable of independent action.

As soon as the work on the field and at the ambulance station is completed the company rendezvous at the dressing station to assist the permanent detail there, and when the work at the dressing station is completed, the wounded having been transferred to the field hospital by the ambulance wagon of the company, it, when practicable, goes into camp near the field hospital.

To this Division three field hospitals will be attached, each accommodating 100 patients.

Each field hospital should have the following personnel:

(D) FIELD HOSPITAL.

- 3 Medical Officers.
- 1 Major, Surgeon, Commanding.
- 1 Captain, Asst. Surgeon.
- 1 Lieutenant, Asst. Surgeon.

4 Non.-Com. Officers.	2 Hospital Stewards.
	2 Acting Hospital Stewards.
	20 Nurses.
	2 Cooks.
	2 Assistant Cooks.
36 Privates, H. C.	1 Dispensary Assistant.
	4 Operating Tent Assistants.
	2 Property Men.
	5 Canvas Men.

In addition to the foregoing there should be 17 non-commissioned officers and men whose duty it is to man the transportation, consisting of 1 medicine wagon, 7 army wagons, and 2 water carts, viz:

- 2 Sergeants.
- 2 Corporals.
- 10 Drivers.
- 1 Artificer.
- 2 Supernumeraries.

(E) THE ADMINISTRATION.

The administrative sanitary officer of the Division is the Medical Director, a Lieutenant Colonel, of the sanitary department, who is a member of the staff of the Division Commander. He has on duty with him 1 non-commissioned officer, H. C. (hospital steward), and 1 private, H. C. (medical officer's orderly). On each Brigade Staff is a Chief Medical Officer (Major) who has one private of the Hospital Corps as orderly.

The exigencies of war not infrequently require some of the field hospitals which ordinarily accompany the fighting force to remain, for the nonce, fixed. But the rule is that these hospitals must be mobile. In order to permit this, the wounded are, at the earliest practicable moment, evacuated along the lines of communication towards the base of operations. All organizations on these lines belong to a separate military jurisdiction.

The first sanitary organization immediately in rear of the field of military operations is the advance medical supply depot, containing a reserve supply for the sanitary organizations in front.

The personnel of this depot should be as follows:

- | | | |
|---|---|------------------------------|
| 1 | Medical Officer or Storekeeper (Captain). | |
| | | 1 Hospital Steward. |
| 3 | Non-Com. Officers. | 1 Acting Hospital Steward. |
| | | 1 Quartermaster Sergeant. |
| | | 5 Drivers. |
| 8 | Privates, H. C. | 2 Packers. |
| | | 1 Medical Officer's Orderly. |

The transport equipment should consist of five Army wagons.

At least one stationary hospital, able to receive 200 patients from the field hospitals, should be located on the line of communication. Its personnel should consist of:

- | | | |
|----|-------------------------|--------------------------------|
| | | 1 Major, Surgeon, Commanding. |
| 9 | Medical Officers. | 2 Majors, Surgeons. |
| | | 3 Captains, Asst. Surgeons. |
| | | 3 Lieutenants, Asst. Surgeons. |
| 1 | Quartermaster. | |
| | | 2 Hospital Stewards. |
| 7 | Non-Com. Officers. | 5 Acting Hospital Stewards. |
| | | 35 Nurses. |
| | | 4 Cooks. |
| 57 | Private Soldiers, H. C. | 7 Attendants. |
| | | 2 Ambulance Drivers. |
| | | 9 Medical Officers' Orderlies. |

One or more rest stations may have to be established at points of entrainment or embarkation, or the contrary. The personnel of such would probably not exceed:

- 1 Medical Officer.
- 1 Non-Com. Officer, and
- 2 Privates.

At the base of operations there must be established a general hospital of, at least, two hundred beds, the personnel of which should be:

- | | | |
|---|-------------------|--|
| | | 1 Lieutenant Colonel, Surgeon, Commanding. |
| 9 | Medical Officers. | 2 Majors, Surgeons. |
| | | 3 Captains, Asst. Surgeons. |
| | | 3 Lieutenants, Asst. Surgeons. |

1	Quartermaster.	2	Hospital Stewards.
7	Non-Com. Officers, H. C.	5	Acting Hospital Stewards.
		35	Nurses.
		4	Cooks.
57	Private Soldiers, H. C.	7	Attendants.
		2	Ambulance Drivers.
		9	Medical Officers' Orderlies.

For the evacuation of the base hospital and depending upon its location, ships, boats, or railroads, or all of these will be necessary.

A hospital train of 9 cars, 7 of which are assigned to patients, will carry 200 men. The personnel of this train will consist of

3	Medical Officers.	1	Captain, Asst. Surgeon Commanding.
		2	Lieutenants, Asst. Surgeons.
3	Non-Com. Officers, H. C.	1	Hospital Steward.
		2	Acting Hospital Stewards.
		21	Nurses.
		2	Cooks.
35	Private Soldiers, H. C.	9	Attendants.
		3	Medical Officers' Orderlies.

A hospital boat, or ship, of 200 beds requires a personnel of

3	Medical Officers.	1	Major, Surgeon, Commanding.
		1	Captain, Asst. Surgeon.
		1	Lieutenant Asst. Surgeon.
3	Non-Com. Officers, H. C.	1	Hospital Steward.
		2	Acting Hospital Stewards.
		30	Nurses.
		4	Cooks.
45	Private Soldiers, H. C.	8	Attendants.
		3	Medical Officers' Orderlies.

The medical supply depot at the base requires the same personnel as the advance depot, viz.:

- | | | |
|---|--|------------------------------|
| 1 | Medical Officer or Storekeeper, (Captain). | |
| | | 1 Hospital Steward. |
| 3 | Non-Com. Officers, H. C. | 1 Acting Hospital Steward. |
| | | 1 Quartermaster Sergeant. |
| | | 5 Drivers. |
| 8 | Private Soldiers, H. C. | 2 Packers. |
| | | 1 Medical Officer's Orderly. |

The necessary force to maintain order at the different sanitary stations is furnished from the provost guard of the Division.

The sanitary administration on the line of communication, and base is under a Medical Director, who is on the staff of the General Officer Commanding the lines and base.

This service requires:

- | | | |
|---|--------------------------|---|
| | | 1 Medical Director, Lieutenant Colonel. |
| 3 | Medical Officers. | 1 Major, Surgeon. |
| | | 1 Captain, Asst. Surgeon. |
| | | 1 Hospital Steward. |
| 3 | Non-Com. Officers, H. C. | 2 Acting Hospital Stewards. |
| | | 1 Janitor. |
| | | 1 Messenger. |
| 5 | Private Soldiers, H. C. | 3 Medical Officers' Orderlies. |

The foregoing estimate is based upon the requirements of a *single* division of normal strength. For an aggregation of Divisions, forming an Army Corps, there would have to be a proportionate increase in personnel and material.

It may be laid down as a rule that the sick and wounded of every *one hundred* men will require at least *six* men (with quite likely the additional assistance of two company bearers) and four horses or mules to care for and carry them between the firing line and base hospital.

If this number is not furnished by the sanitary troops it will have to be taken from the fighting effective.

RECAPITULATION OF PERSONNEL AND TRANSPORTATION
OF THE SANITARY ORGANIZATION OF A DIVISION 13000
STRONG.

ORGANIZATION AT THE FRONT.	MEDICAL OFFICERS. QUARTERMASTERS.	NON-COM. OFFICERS, H. C.	PRIVATE SOLDIERS, H. C.	COMPANY BEARERS.	AGGREGATE EXCLUSIVE OF COM- PANY BEARERS.	PER CENT. OF STRENGTH OF DI- VISION, EXCLUDING CO. BEARERS.	AMBULANCE WAGONS, 2 HORSES. ²	ARMY WAGONS, 6 MULES.	MEDICINE WAGON, 4 MULES.	CARTS, 1 HORSE.	LITTERS, HAND.	FORGE AND TOOL WAGONS, 4 MULES	HORSES.	MULES.	
9 Regim. Detachm.	27	27	45	216	99					9	108		72		
4 Battery "	4		8	8	12		4				12		12		
3 Ambulance Cos.	9	3	48	204	264		27	9	3	3	64	3	90	78	
3 Field Hospitals . .	9		24	147	180			21	3	6	36		17	138	
Administration . . .	4		1	4	9								9		
	53	3	100	408	224	564	4 ³ ₁₀	31	30	6	18	220	3	200	216
On the Line of Communication and at the Base.	Not included in strength of the Division.														
Adv. Med. Supply Depot	1		3	8	12			5					4	30	
Stationary Hosp. . .	9	1	7	57	74		2	2			12		17	12	
Rest Station	1		1	2	4						1				
Base Hospital	9	1	7	57	74		3	3			12		19	18	
Med. Supply Depot	1		3	8	12			5					4	30	
Administration . . .	3		3	5	11								8		
	24	2	24	137	187	1 ⁷ ₁₀	5	15			25		52	90	
Hospital R. R. train	3		3	35											
Hospital Boat or Ship	3		3	45											

¹Including personnel of one hospital R. R. train or a boat.

²It is probable that so soon as some genius discovers a practicable method of applying power to a bicycle the number of light ambulance wagons, which our war experience taught us was necessary, will be materially reduced, and in their places bicycle litters used.

ORDER OF MARCH OF A DIVISION OF INFANTRY.¹

- | | | |
|-----------------|---|---|
| ADVANCE GUARD. | } | 2 Battalions 1st Regiment of Infantry.
Headquarters 1st Brigade.
1 Battalion 1st Regiment of Infantry.
1 Battery of Light Artillery.
1 Battalion 2d Regiment of Infantry.
½ Ambulance Company of the Hospital Corps.
Light baggage and Ammunition train of Advance Guard. |
| MAIN BODY..... | } | Headquarters of the Division.
2 Battalions 2d Regiment of Infantry.
3 Batteries of Light Artillery.
3d Regiment of Infantry
½ Ambulance Company of the Hospital Corps.
1 Field Hospital.
Headquarters 2d Brigade.
4th Regiment of Infantry.
5th Regiment of Infantry.
6th Regiment of Infantry.
1 Ambulance Company of the Hospital Corps.
Headquarters 3d Brigade.
7th Regiment of Infantry.
8th Regiment of Infantry.
1 Ambulance Company of the Hospital Corps.
1 Field Hospital.
Ammunition wagons.
Detachment of Provost Guard. |
| REAR GUARD..... | } | 1 Battalion 9th Regiment of Infantry.
1 Field Hospital.
Division Headquarters Wagons.
1st Brigade Wagons.
2d Brigade "
3d Brigade "
Artillery.
2 Battalions 9th Regiment of Infantry. |

¹For convenience of illustration no Cavalry is attached.

II. THE INFLUENCE OF CERTAIN MODERN MILITARY CONDITIONS IN MODIFYING THE LINES OF SURGICAL AID ON THE BATTLEFIELD.

BY CAPTAIN JAMES E. PILCHER,

COLUMBUS BARRACKS, OHIO,

ASSISTANT SURGEON IN THE UNITED STATES ARMY.

THE opinion of Archibald Forbes, the distinguished English war correspondent, upon any point concerning practical war must be received with great deference. And when he states that "in the war of the future the service as now existing will be found utterly impracticable, since with the improved man-killing appliances certain to be brought into action, the first battle would bodily wipe out the bearer organization carried on under fire," he is certainly entitled to a most thoughtful hearing. Moreover in support of his position, he further quotes Billroth, "we must come to the conclusion that in future, it will be no longer possible to remove the wounded from the field during the battle by means of bearers, since every man of them would be shot down, as bearers would be more exposed than men in the fighting line; and the most that can be aimed at is that the wounded man of the future shall be attended to within twenty-four hours." Bardeleben, Surgeon General of the Prussian Army, also remarks: "Some urge an increase of bearers; but we must not forget that bearers have to go on to the firing line and expose themselves to the enemy's fire. If we go on increasing their number, shall we not also be simply increasing the number of the wounded? The number of men provided for the transport of the wounded now exceeds one thousand for each army corps. It is no true humanity, in order to effect an uncertain amount of saving of human life, to sacrifice a number of other human lives. The whole system of removing the wounded on litters during the battle must be abandoned, for it is altogether impracticable."

Considering the increased range of modern small arms, it seems to be admitted that the first-dressing station must be in the

rear, at least two thousand yards from the enemy's firing line, unless irregularity in the ground or artificial fortifications afford efficient protection at a nearer point. Admitting then, for the sake of argument, what Bardeleben would consider a hardly admissible fact, that bearers may with a reasonable degree of safety proceed to the firing line and bring in the wounded,—the removal of the injured during a battle would still require too many bearers to be practicable. Lieutenant V. Kries¹ of the German army, in a series of practical experiments, endeavored to determine the removing capacity of a litter squad. Allowing a distance of 350 meters between the assumed line of battle and the Dressing Station, he found that his weakest bearers began to break down after traveling 5,600 meters, at eight round trips. The strongest were able to travel 7,700 meters, eleven round trips, and could have done more. If, however, the Dressing Station were two thousand meters from the enemy's line, it would more likely be a thousand meters from its own, and the length of each trip would easily be not less than that distance and probably more, so that the weakest bearers would be exhausted after two and a half round trips. After three round trips, a considerable number will doubtless be disabled and, accepting V. Kries' estimate of 7,000 meters—probably a very high rate—as the average ground a bearer can cover, each litter could then make not more than three and a half round trips, bringing in at most four patients.

The same experiments place the average extreme distance to which a litter could be carried without a halt at 1,100 meters, apparently, however, when the bearers are fresh. Allowing half an hour for each round trip and a quarter of an hour for necessary halts, the four trips possible for each litter would occupy three hours of unintermittent work and a number of disabled men exactly equal to the strength of the bearer detachment could be brought in by working the latter to their full capacity. But this still does not take into account the unavoidable casualties among the bearers themselves, which, as stated by Billroth, would be even larger in number than those of the fighting troops themselves, because of the peculiarly exposed nature of their work.

If in a force of 5,000 men, the bearer detachment have a strength equal to $2\frac{1}{2}$ per cent. of the total strength of the command, we have a bearer detachment of one hundred and twenty-

¹ *Jahrbuch fuer die Deutsche Armee und Marine*, 1895.

five men. At least one-fifth of this number will be occupied about the dressing stations and field hospitals, leaving one hundred bearers for collecting the wounded.

At Gravelotte the percentage of casualties was 15 per cent. With the greatly increased lethal capacity of the modern armament, it is likely that this will be increased rather than reduced. Taking the very modest estimate, then, of 20 per cent. of casualties, we find that our brigade of 5,000 men will still lose one thousand. If one-fifth of the number be deaths, eight hundred men will still be left to be removed from the field; two-thirds of these will be able to find their own way to surgical relief, leaving 233 more to be borne off the field by one hundred bearers—a manifest impossibility.

If the mortality of the Chilian war of 1891—80 per cent. of the casualties fatal—should hold good, however, two hundred men would be left, 133 of whom could find their way to the rear, leaving 67 to be carried off by bearers, which could readily be done provided that the bearer detachment was not itself reduced by casualties below an effective strength, as would be quite possible.

In fact, because of the much greater exposure of members of the hospital corps to the enemy's fire in removing the wounded, it must be anticipated that the casualty rate among the bearers will be much greater than among the combatants. Even if we do not go as far as Forbes, Billroth and Bardeleben, and admit the total annihilation of the bearer force, it would be no ungrounded presumption to assume that the rate would be at least ten per cent. more. This would give the bearers a disability rate of thirty per cent., reducing the force available for work in our brigade of 5,000 men to 70, which would add still more to the difficulties of handling the numerous body of wounded men. Moreover, it must be remembered that when a bearer falls he not only reduces the bearer force by one man,—himself,—but by two men,—himself and the bearer whose duty it becomes to remove him. Each seriously wounded bearer then is equal to a loss of two bearers from the working force.

The condition of the wounded man as affected by this casualty rate,—including every third bearer during the course of the action,—must not fail of consideration. Lying on his litter, he is not only exposed to the danger of additional wounds, but to the

further risk of a fall from breakage of a litter pole by a direct or stray shot, or of concurrent injury from the combined fall of the litter and of the wounded bearer upon the patient.

From these facts it is evident that the attempt to remove the wounded from the battlefield during an engagement is undesirable, on account of (1) the large number of bearers necessary to perform this duty, (2) the unnecessary mortality—not to say, with Forbes, total annihilation—which it would impose upon the bearers, and (3) the additional danger incurred by the wounded through added exposure to gunshot and other injuries.

If it be undesirable to remove the wounded from the battlefield during the progress of an action, it goes without saying that proper temporary treatment must be applied upon the line of battle sufficient to stay imminent death and place the patient in a condition favorable to recovery. For this purpose, three classes of assistance should be available:

1. The Medical Officer;
2. The Sanitary Soldier (Hospital Corps man);
3. The Combatant Soldier.

To meet the increased number of the more serious emergencies of battle, the surgical staff of the firing line could with advantage be increased, not only on account of the increased mortality which will affect the surgeons, but to enable the medical officer to devote more time to individual cases and to apply temporary treatment of a more permanent character, so that the patient may more successfully weather the period between the time of receiving the wound and the cessation of hostilities, and finally to render it possible for a larger proportion of the injured to receive prompt aid at the hand of a medical officer.

The Hospital Corps man whose qualifications go little beyond litter-bearing, is of no use on the firing line, but there is room at the front for a sanitary soldier of a more highly educated type than the ordinary bearer. An attendant something between the nurse and the surgeon, with the ability to check hemorrhage by the ligature or by forcipressure, to apply sutures and to replace fractures, as well as to dress wounds, would be of great advantage here. These men would not only be of great value in treating the less serious wounds and injuries, but they would have a special

function in designating the cases to be treated by the commissioned medical officer. They will necessarily be picked men of exceptional ability.

But of prime importance is the instruction of the entire combatant force in the measures necessary to apply self-aid. Such a measure has been inaugurated in the regular service, where the medical staff have instructed in first-aid all the subaltern officers, who have in turn transmitted the instruction to all enlisted men. Some excellent work has been done in this line by some of the more conscientious and efficient young officers, with the result that many men are qualified to avert impending death, who would otherwise have been doomed in case of a dangerous wound. The essential feature of this instruction is the first-aid packet, numerous varieties of which have been devised in our own and foreign armies, and with which every soldier is provided in time of active hostilities. The first-aid packet has been in use for a score of years in foreign armies and has been found to be of great value in numerous engagements. In a paper, read before the Association last year, the writer referred to the fact of the preparation of a small first-aid remembrancer composed mostly of illustrations, as a useful aid to the instruction of the soldier. When completed it is hoped that this work will have some value as a supplement and index to the first-aid packet in the instruction of the soldier of the line. Hardly less important to the combatant than the use of his arms—for it will help to preserve his ability to employ his weapons—first-aid instruction is the most valuable addition made to the soldier's armamentarium in many years.

So far as the writer has been able to ascertain, the National Guard—usually so ready to adopt the advances made by the regular army—has not yet taken up this most indispensable feature of our work. In view of the imminent demand for such knowledge in case of war, the necessity for the immediate incorporation of general first-aid instruction into the National Guard cannot be too strongly urged.

Under the conditions to which brief reference has been made, the Dressing Station loses much of its former importance, and becomes during action chiefly a depot for the treatment of such minor injuries as may find their way to the rear unaided, regaining its position only in case of a temporary cessation of hostilities

during which it would be possible for the bearer detachment to enter upon the work of carrying the severely wounded off the field. In case of a retreat or the removal of the scene of action to some other locality, the Dressing Station would naturally be transferred to the more immediate vicinity of the greater number of wounded, *viz* the recent line of battle. Accordingly, while the Dressing Station remains as a point of minor importance in battlefield surgical assistance, most of the work formerly done there must in future either be entirely omitted or done on the line of battle.

With the evident probability then that organized succor on the battlefield will either be unable (or not allowed) to keep pace with the enormously increased deadliness of future wars,—when, as Forbes aptly remarks, if an observer “should be in the field about the second evening after a battle, he would probably find a wounded brigadier-general competing eagerly for a share of a country dung cart for his conveyance to the field hospital,”—training in self-help under fire becomes more and more essential. The move, toward extending this training to the State forces, may properly originate with this Association, and in further execution of the cardinal principles of our organization,—“to promote and improve the science of military surgery,”—each member is urged in season and out of season to press the necessity for general training in prompt self-aid in wounds upon the authorities in every State and Territory in the Union, and thereby to assist in meeting the requirements imposed by Modern Military Conditions upon the Lines of Surgical Aid on the Battlefield.

III. FIRST-AID ON THE FIRING LINE.

BY CAPTAIN JAMES JAY ERWIN,

CLEVELAND, OHIO,

ASSISTANT SURGEON IN THE OHIO NATIONAL GUARD.

VIEWING the probabilities of the future in comparison with the achievement of the past, it would seem that more than has hertofore been true, battles of the future will likely become contests of tact and strategy conducted by commandants of contending forces, rather than the measuring of strength, patriotism and courage on fields of mortal combat, controlled by the undoubted effects of improved implements of warfare.

The fact which must exist in the comprehensive mind of every investigator who has given this problem more than a casual consideration, is one which would regard such an open combat an occasion of so much destruction to human life, so much distress and prolonged suffering among the injured, as would cause the stoutest heart to quail before the picture which a consideration of this work would present. Experiences of the past would avail but little in comparison with requirements of the future. To thus measure strength would be to invite casualty beyond comprehension; and any commander who would risk an encounter when it was known to him that the enemy possessed an advantage over which he had but little hope to prevail, would be guilty of a misdemeanor for which no subsequent sacrifice could atone. The odds would be too great and time too short to even consider the chances of a favorable result when it was realized that the enemy controlled the situation by virtue of position, numerical strength, and the possession of a modern armamentarium. Such an engagement would be justifiable only when the points of advantage were misunderstood, for there could be no result hoped for short of a complete destruction of the weaker forces; and when the relative strength was more nearly equal, an annihilation of both commands. With such a consideration of the future from this point

of observation, the inference is drawn that the manner of achievements in arms during the present century where such forces were arrayed against each other as were found on the fields of Antietam, Gettysburg, Chickamauga, and others of their kind, will be considered by minds which guide the destinies of warfare in the next decade, as being worthy of comparison only with the accomplishments of Alexander, of Caesar, of Hannibal, and of other like military celebrities of antiquity.

Modern manners must be governed by modern implements, and to show the potency of the argument advanced, we will briefly consider some of the capabilities embodied in a few of the more recent patterns of ordnance and small arms, with which the Army of the United States is now provided.

The new magazine rifle of the infantry, and carbine of the cavalry pattern of 1892, 30 caliber, initial velocity of the projectile 2,000 feet per second, with a rotary motion of 2,400 revolutions per second, or one turn in ten inches of flight, and a death dealing range of more than two miles; it has been estimated could be fired at the rate of 40 shots per minute. The estimate goes farther, and declares that this rifle has a range of more than 7,500 yards (a little more than four miles); and that at 7,300 yards its velocity would be about 100 yards per second—a very dangerous point at which the bullet might be met. But as the chamber would have to be loaded eight times in that period, and the other figures look large, this is probably an exaggeration.

To make the estimate more practical; to allow the soldier more time for deliberate aim; and to be more sure that his shot would reach the object at which his aim was directed; there being no smoke to obstruct his view of the enemy we will allow but 20 shots per minute, and reduce the effective range to a little more than two miles.

With the present Gatling guns, such as are used at schools for instruction and for target practice in the regular service, model of 1890, and the same with which many batteries of the National Guard are furnished, 45 caliber shots can be fired at the rate of 800 per minute. With a quick-firing, multiplying arrangement 1,000 shots can be fired each minute. The initial velocity of these projectiles is 1,301 feet per second, and its effective range has been estimated at 2,500 yards, a little less than one and one-half miles

(the velocity is supposed to reach zero at about 3,500 yards, about two miles).

There is, however, a model in existence which would no doubt supplant the older one should necessity demand a practical use of either, the barrels of which are of a caliber to conform to the projectile of the Krag-Jorgensen repeating rifle above mentioned. With the same capacity for firing as is rated for the older pattern 1,000 shots per minute from this gun would carry as many missiles with a death-dealing velocity at such distance, more than two miles.

With the three and two-tenths inch breech-loading rifles with which, in case of war, the Light Artillery of the present would doubtless be furnished until something more destructive should have been invented to supplant it, we have a weapon still more formidable than any other yet mentioned. With its long range, the rapidity with which it can be fired, and the accuracy of its aim, the enemy is almost completely at the mercy of the officer commanding its use. Projectiles from this piece have an initial velocity of 1,100 feet per second. At 4,000 yards they retain a celerity of 763 feet per second, and at four miles an impetus dangerous to resist.

In action, where the range has been ascertained, or had been practically estimated, these guns can be fired, and the projectiles accurately deposited at the rate of six shots in sixty seconds. At this rate a six-gun battery would discharge thirty-six shots per minute. If the missiles used are the Frankfort Arsenal Shrapnel, each shrapnel when exploded will divide into no less than 250 pieces (332 hits from one shrapnel is reported in three targets placed in echelon, each 10x21 feet, and 1,940 yards distant from the gun). These fragments are thrust by the force of the explosion which bursts the shell, in all directions except backwards and at right angles. When the shell is burst by the explosion of powder in the head, the fragments continue the course of the projectile, but assume the form of an extended cone from point of explosion, the apex being represented by the point where the fracture took place, and the base five hundred yards further on when the force of gravity will have brought each remnant to the ground. At a distance of twenty-five yards from the point of explosion, the base of the cone would be represented by about thirty feet. By

the use of this projectile the infantrymen gain only slight advantage by lying down. Another advantage with these guns is: it matters little where the enemy are, only that they are within four miles from the guns, and their whereabouts located. They may be behind hills, back of breastworks, or in rifle-pits. The gunner has only to get his elevation, and he can drop his shrapnel where he likes.

Let us now take a theoretical view of a field defended by modern forces and armament, whose limits are the extreme ranges of the most powerful ordnance in action.

We will picture a command well posted and practically concealed, where all points within the defined radius are under observation. The forces thus stationed consist of a six-gun battery, a regiment of infantry—700 Krag-Jorgensen rifles—and two of the latest improved Gatlings (with the infantry where they most properly belong). There will probably be little use for cavalry to pay attention to what of the enemy remains after this engagement. But for the sake of military etiquette and to fill the complement, we will include a squadron of two troops. The commander, appreciating his advantages, allows the main body of an enemy twice his numerical strength to approach to within 3,000 yards before opening fire.

The range has been carefully estimated, and every artilleryman is at his post ready with that celerity of action which is to accomplish so much in so short a time. The fusc of each shrapnel with which the pieces are charged, are punctured to burst the shell at 2,800 yards, and the guns are trained to cover the line of the enemy from flank to flank. If it has been found necessary to provide for such distance, the length of column covered within the range, allowing for expansion of cone for each shell before reaching the enemy's line to be 240 yards, which would be controlled by each gun, the six guns will cover a line of 1,440 yards. If the line has not extended to that limit, the guns will have been trained to cover the limited distance, and fragments from adjacent shells will mingle with each other, and make destruction more complete.

The infantry commandants are given orders to direct their fire upon the skirmish line and all detached forces of the enemy within range. The cavalry are in reserve. At the command, firing is simultaneously begun along the whole line.

In one minute thirty-six shrapnel have been hurled at that advancing column, and each shell has burst 200 yards in front of the main body. Fragments from these shells would commence to strike the ground far in advance of the main column, which would be dangerous to skirmishers; and would continue to do deadly work among stragglers or others 250 yards to the rear. In that minute, allowing three hundred fragments to represent each shell, 10,800 messengers of death have been distributed among the opposing forces.

The two Gatlings have been vigorously at work, and under the skillful aim of the gunners, there being no smoke to obstruct their view, 2,000 shots have been delivered against points considered most vulnerable.

The 700 repeating rifles in the hands of the infantrymen have been discharged 14,000 times, and the destructive effect of their missiles has told against detachments and others chosen for this work. Thus in sixty seconds this field occupied by more than 1,500 men, all of whom were within the danger limit, has been swept by this tremendous storm of 26,800 missiles—and the work of destruction can by no means be estimated.

Who is to care for the hundreds of wounded, bleeding mortals, victims of this deadly work; among whom will be represented every kind of injury known to this form of casualty? Who is there among you, my colleagues, who can comprehend the destruction of one minute's work under such circumstances? Who, with a spark of human kindness in his nature, can contemplate the same and not think of some plan for effective relief? In an emergency every surgeon provides for the necessities of each individual case. But here we have hundreds of cases and only a few surgeons. Then, too, they occupy positions absolutely beyond reach of surgeons or any of their sanitary soldiers. The danger line extends as far as the range of the guns of the enemy, which, with the shrapnel fire, extends 250 or more yards behind this main body. The effective range of the Gatlings and the rifles is extended far beyond. Outside this greatest limit must be placed the first dressing station, as per se.

The position of the soldier is on the fighting line where duty calls him. Because of injuries received as a consequence of his having been there, it is the duty of the surgeon to keep himself suf-



Fig. 1.—First Aid Dressing Packet Applied on Fatigue and Dress Belts.

ficiently beyond the limit of danger, that his life may be spared to do the work which exposure to the shots of the enemy is sure to bring. No surgeon has either a moral or a legal right to deprive the soldiers of his aid by unnecessarily exposing himself to the dangers of the field.

If life is saved by rapid first-aid work, such assistance must be rendered on the firing line, and the soldiers of the line must receive such instructions, and be furnished with such ready material as will enable them to rationally perform this service when necessity calls. G. O. 9, of March 13, 1896, par. 34, Manual of the Medical Department, 1896, supplies the former. My mission here is to offer something which will provide as effectually for the latter.

In compliance with seeming necessity, I have devised a package for first-aid dressings which I have attached to the cartridge belt so that when this belt is worn, the package is always on the person of the belligerent. The package is made to contain one roll of three-inch bandage, six yards in length, an antiseptic compress, and a small roll of antiseptic gauze rolled around an aseptic probe. Each roll and compress are wrapped in paraffined paper, and the whole is encased in an aseptic rubber casing, sealed from the atmosphere, impregnable to moisture, and placed in the receptacle on the belt; from which it is never to be removed except to be used for dressing purposes, or to be replaced by another, for cause.

The two greatest dangers from gun-shot wounds, or lacerated wounds from irregular shell fragments, are those of hemorrhage and infection. Prompt and direct treatment is necessary to avert the consequences which would arise from either. To preserve the wound uncontaminated, and to save the life of the injured from the dangers of hemorrhage, that he may subsequently come into the hands of the surgeon in better condition for whatever work it may be found necessary to perform, rational first-aid treatment to meet the requirements in both cases is necessary. This may be done in perforating wounds by plugging as quickly as possible the orifice of the wound with antiseptic gauze, and applying a bandage tightly. The plugging of a wound, even when bandaging is not convenient on account of location, will assist coagulation by intercepting and retaining fibrin in the meshes of the gauze. A lacerated wound could be advantageously treated in

the same manner. The soldier should be instructed to remove as much of the clothing as would be necessary to expose the wound, and allow for the application of the bandage without including the clothing beneath it. This, and whatever other preparatory work that might be found necessary, he should be directed to do before the emergency package is opened. Now open the packet and partly remove the paper from the smaller roll. Unroll sufficient of the gauze to begin the work, grasping it between folds of the paper with which it had been wrapped, thus preventing contamination; then firmly grasp one end of the probe and withdraw it from the roll, retaining that hold and that only, using the other end with which to force the gauze into the opening. This is only to be observed where the hemorrhage is great and refuses to be otherwise controlled. The same roll of gauze may be used as a compress where plugging is not necessary. In packing lacerated wounds observe the same precautions. When the perforation has been successfully plugged, or the laceration adequately packed, fold the surplus gauze down upon the wound and apply the bandage when it can be thus done. When large vessels are torn or cut and it is necessary to improvise and apply the tourniquet, the wound may be protected from sepsis, and future comfort be secured to the soldier by the use of the gauze and compress as above directed.

DISCUSSION.

GENERAL BYERS: I think in many respects the pouch and arrangement here is admirable. As Captain Erwin says, the pouch goes with the belt and the cartridge box, but those of us who had a little experience in the unpleasantness a few years ago, know the belt and cartridge box do not always go with the soldier. I have seen an engagement in which every man was stripped of cartridge box, and by the time an individual would recover from the shock his package would be gone. The cartridge boxes are very valuable and the belts are taken without any regard to anything. I think the cartridge box would be likely to remain with the soldier just as long as there is no scarcity of ammunition. For that reason, I do not think it is a good practice to attach this package to the cartridge box or the cartridge belt.

MEDICAL INSPECTOR WISE: I want to take an emphatic difference with the last speaker. I believe all these packages should be attached to the belt with the ammunition. The old-fashioned method of attaching such packages to the coat and other parts of the soldier's dress has

been abandoned. He may throw away his coat and everything else but his ammunition. There is nothing to which it could be better attached than the ammunition.

GENERAL BYERS: If the gentleman had had any experience at Chickamauga, he would have said different.

CAPTAIN BUNTS: While appreciating to a certain extent the package, our Adjutant General has asked me to inquire of the author whether or not the presence of these packages has any influence in undermining the courage of the soldier who goes into battle. Besides that question, I would like to take a very strong issue with the speaker with reference to the method of using this package. It seems to me there could be no more pernicious instruction given to a troop than that of packing a wound. If I am ever wounded in battle, I hope they will please forbear infecting me in that way. It is enough for one not familiar with the rules of aseptic surgery, to apply a dressing of any kind, but when it comes to packing a wound and forcing down necessarily into it filth and everything else, the avoidance of sepsis is practically impossible. That cannot be done on the line of battle, or anywhere else, with any degree of safety, and I believe the mortality from it would be much greater than from hemorrhage.

MAJOR HENDLEY: I would like to ask why it is necessary for us, in selecting a first aid package, to try to get away from the first aid package known as the Esmarch package. That meets the objection of the last speaker. The only thing I think we have to determine is where this package should be carried, whether in the coat or on the belt, and I certainly believe it is better on the belt than in the coat. A man may throw away his coat, but he will keep his belt as long as he is doing any fighting, and if his belt is taken, the man taking it should stop long enough to apply the temporary dressing.

MAJOR ADAMS: Some years ago, in Chicago, Surgeon General Senn suggested a package that seems to me to meet the requirement. The Esmarch package is a little too bulky, and this package, it seems to me, is a little too irregular in shape and it is likely to be torn off the belt in going through woods, etc. The package of Senn is sewed on the belt, is absolutely water-proof and contains everything necessary for first aid dressing. I have used that package in the instruction of my hospital corps and the entire First Regiment. The men have full instructions, and every man who goes into action knows how to take as good care of himself as is possible during the engagement. Of course, it is thoroughly impossible for bearers or hospital men or surgeons to go on the field during the engagement.

GENERAL OLIVER: In the line of firing, where those dressings are supposed to be applied, of course, the first thing to do is to stop hemorrhage. That is the point towards which we have to concentrate our

attention in saving the ebbing life of the soldier. I know no more simple way to accomplish that end than by what has been recommended by Esmarch. Esmarch recommends that each man shall be supplied with rubber braces, and that each man shall be taught how to apply those braces. They will always have them in possession. From what I have learned from the remarks, I fear the plugging of the wound would be useless. As regards the dressing, I do not think we can suggest anything better than the package of Esmarch. In our service we use the package, and now we have decided to carry it in a special pocket. One pocket is employed entirely for the dressings.

CAPTAIN ERWIN: The person who would expect to offer anything to suit everybody must necessarily be a very much disappointed man. In regard to the effect of carrying a package, on the mind of the soldier, it would seem to me that if I were going into danger with the assurance I would have something to help me in time of need, I would go in with a lighter heart than I would without. As far as plugging the wound is concerned, with proper instructions to the men and the proper application, as I described it, hemorrhage can be stopped with scarcely any danger of causing the wound to become septic. When you use an antiseptic dressing, the antiseptic dressing would go far towards destroying any germs which may have been there before. So I cannot see why we should not use an antiseptic dressing, to destroy the germs as far as possible, and place the patient under a better condition to come under the care of the physician. As far as packing is concerned, it is not intended that all cases shall be packed. By an enlisted man without a knowledge of anatomy and the technical knowledge of other kinds which it is necessary for us to have, as a matter of course it would be less scientifically done. But by not allowing the fingers to touch any part of the dressing, and the bandage being kept clean by the parafin covering, and by allowing the probe to touch nothing except where it is grasped, no germs will be carried into the wound. You have six yards of bandage to use in any way you may choose, and it is kept so pure and free from contamination it is always ready for use, and safe for use as far as I can see. I would be perfectly willing, were I placed in those circumstances, to have what I have described performed on me rather than to bleed to death, and I believe any of you placed in that position would be very glad to do likewise.

IV. MILITARY SANITARY ORGANIZATION ON THE LINES OF COMMUNICATION AND AT THE BASE.

BY MAJOR JOHN VAN RENSSELAER HOFF,

VANCOUVER BARRACKS, WASH.

SURGEON IN THE UNITED STATES ARMY.

THE evacuating to the rear, of the sick and wounded, forms the basis of the military medical service in the field, the essentially military function of the medical officer being to free the front of the army from these *impedimenta*. It needs no labored argument to prove that any army not so relieved is handicapped, oftentimes beyond the possibility of effectiveness. History is not lacking in evidence to support this statement, and more than once has the fate of a nation been decided by the sanitary condition of its army.

To the proper performance of this duty military sanitary organization is directed—its chief object in active service being the collection of the wounded, under the best possible conditions, and the immediate transfer of all serious cases to hospitals more or less distant from the theatre of war.

The important subject of the organization for collection on the field—in other words battlefield sanitation—I have heretofore presented for the consideration of this Association.¹ The equally important subject of the disposition of the sick and wounded after collection, technically their evacuation via the lines of communication to the base hospitals, also demands careful consideration.

The base of operations of an army is defined as “that secure line of frontier or fortress, or strong country occupied by troops, or of sea occupied by fleets, from which forward movements are made, supplies furnished, and upon which a retreat may be made if necessary.” At this base there are always established a general hospital, a convalescent camp, and a medical supply depot. The character and extent of these organizations in certain details depend upon the distance therefrom of the army, the number of

¹ See Proceedings of the Association of Military Surgeons, U. S., 1896, p. 207.

troops engaged, the means of transportation between the front and base, etc., etc., but the general principles of their formation do not vary.

The base hospital is intended to receive all soldiers taken sick while *en route* to the front, those stationed at the base, and ultimately, after the campaign is inaugurated, all the sick and wounded from the front.

The convalescent camp, as its name implies, is intended for the reception of those who no longer require hospital treatment, but who are yet not quite fit for full duty, or who being more or less permanently disabled but not requiring treatment, are awaiting discharge or assignment to special duty. This camp is an important adjunct to the sanitary department; it is in fact the connecting link of the chain running from the hospital to the front. In our service (1861-65), as in most other armies, it was under command of a non-medical officer of suitable rank, who conducted it for the most part as he would any other military camp. The final disposition of the men in the convalescent camp was with us determined by the recommendation of a medical director, or inspector. In the British service an invaliding board is part of the official routine of the base hospital.

The medical supply depot is the usual source of supply to the sanitary organizations at the base, on the lines of communication, and at the front. It is not a part of the base hospital and has its own personnel. On the lines of communication there are several subsidiary sanitary organizations, which may become of the utmost importance, and which with their determining factors, will hereafter be considered.

We learn from the *Medical and Surgical History of the War 1861-65*, that our first military hospitals were opened in Washington, D. C., the F Street Dispensary and the Union Hotel (Georgetown) both receiving patients in May, 1861, but their capacity was small. In August of that year 2,700 hospital beds were available, and at the close of the war the military hospitals in and about Washington had a capacity of 21,426 beds. It is stated by the same authority that on Dec. 17, 1864, there were in the various military hospitals throughout the country 118,057 beds, of which number 83,409 were occupied.

The Germans, in the war with France, established their first base hospital at Mannheim. Longmore, in describing the sanitary arrangements of the British army in the war with China, (1860) says:¹ "The base of operations was Hong Kong and the principal general hospital was established there. Here were left the sick and weakly men of the expeditionary force starting northward, and to it invalids were subsequently sent from the force which was operating in the field. A stationary intermediate hospital was established in Talién Wan bay, where the force made its rendezvous before landing on the north coast near the mouth of the Peiho. The hospital ships in the mouth of the Peiho afterwards formed a second set of intermediate hospitals on the line of communication with the base; and when troops moved to Peking a third line of hospital establishments was formed at Tien-tsin. The movable field hospitals were with the army itself."

The latest development in this direction is that of the Japanese, which, being based upon an intelligent consideration of modern military organization and results, is worthy of study.

We learn from the instructive report² upon the sanitary arrangements of the Japanese army made to his government by Surgeon Colonel W. Taylor, of the British service, which I venture to quote at length, that their "base hospital was established at Hiroshima, where general army headquarters were located. It is a town of 75,000 inhabitants, a mile and a half inland from the splendid roadstead of Ujina, near the eastern entrance to the Island sea. It is the headquarters of one of the military districts, with * * * * a station hospital for 200 men. * * * * War was declared in June, 1894. On the 5th of that month the 5th division of the army was mobilized. On the 8th of July * * * it was ordered that the station hospital (Hiroshima) should become the base hospital, and it was decided to occupy the old parliament building as one division, and to build three temporary divisions in convenient vacant spaces of the town. Suitable sites were selected on the day (8th July) on which the order

¹ *Gunshot Injuries*, p. 568.

² An admirable review of this report by Col. Dallas Bache, Assistant Surgeon-General, U. S. A., appeared in the Proceedings of the Association of Military Surgeons, U. S., 1896.

was given. They were approved and buildings directed to be commenced. On the 30th of the same month the three new divisions were completed, i. e., new buildings capable of accommodating 2,555 patients, with offices, kitchens, operating theatres, stores, and all necessary accessory buildings had been erected and made ready for occupancy in twenty-three days. Each of these divisions had its own administrative and other offices, consisting of thirty-two separate buildings, all connected by a covered way."

As heretofore stated, the base hospital was some little distance from the port of landing, Ujina, between which and Hiroshima there is shallow water communication. Our author continues: "It was soon found that the best way of taking the sick and wounded to the base hospital was by river, but it was also found that it was necessary, after the discomforts and fatigues of a long and possibly rough sea voyage, to give the sick and wounded a rest on arrival at the port of disembarkation. On the 12th of November an auxiliary hospital or rest house for sick, was opened at Ujina, consisting of temporary wooden buildings for the accommodation of 300 patients," etc.

These people have the wonderful faculty of learning by the experience of others, and should they continue in this disposition, will soon compass all knowledge.

During the War of Secession we worked out the sanitary problems very much in the same way, not, however, in anticipation of the necessity, but because of it. By 1864 there had been established in and about New York city military general hospitals of a total capacity of 5,169 beds. For convenience in receiving and distributing patients who could not be sent directly to one of the general hospitals, there was located on the Battery a small receiving hospital called the "Transit" hospital, under the immediate command of the Medical Director of Transportation, whose duty it was, as the title indicates, to supervise the distribution of the arriving invalids. The "Transit" hospital was, however, simply a resting place or emergency hospital, most of the sick for the harbor hospitals being sent by ocean steamer if they came that way, or by river steamer if they arrived by rail, direct to the hospitals to which they had been assigned. These hospitals formed one of a number of groups corresponding in effect to the Japanese

base hospital, but which technically were not such, since they were not established at the base of operations.

It may well be that with a shifting base the so-called base hospital will become practically only a connecting or communicating hospital or resting place. Such were constantly being established and abandoned during the War of Secession. Sanitary organizations of this character cut a very important figure in the evacuation of the wounded, their number and form depending upon the length and character of the lines of communication. If communication be by the roads of the country, practicable for wheel transportation, a day's march determines the distance between hospitals. If railroad or water transportation is available, there is in effect no limit to the allowable distance between the field hospitals and the base, a rest station only being required at the place of entrainment or embarkation.

In any campaign we are likely to have with a civilized enemy we may safely assume that the base hospital will be permanently established reasonably near the theatre of warfare in some city easily reached by boat or railroad, or preferably both, and that the more or less permanent hospitals intended to receive the wounded from the field hospitals will be organized as communicating hospitals, or as general hospitals on the line of communication.

The very carefully prescribed sanitary formations of the rear in the French service as set forth in their *reglement sur le service de sante en campagne* 1892, may be taken as typical. These regulations recognize two groups, the first of which includes the field hospitals, located in the zone immediately in rear of the theatre of operations, whose function is the care of the wounded who can not safely be moved; the permanent military and civil hospitals in the theatre of war; and the auxiliary hospitals created by the aid societies. The second group embraces the so-called evacuation hospitals placed at the heads of the different lines of communication, in immediate connection with which are the *depots de convalescents et d'eclopes*; the station infirmaries; the hospital transport (wagons, boats, railroad cars, etc.) and the medical supply depots.

It might here be remarked that the convalescent depots in the French army are established by the Chief Medical Officer of

the lines of communication. They are divided into division sections and brigade sub-sections.

In Germany the hospitals on the lines of communication and at the base are to a considerable extent manned by the personnel of the aid societies, thus leaving the medico-military establishment free for service at the front. In this army, as indeed in all European armies, in active service, the aid societies are absolutely under military control.

The character and number of the personnel required by the different sanitary formations in rear of an active army demand, and in most armies have received, careful consideration. By reference to the above-referred to report on the Japanese Medical Department, we learn that the personnel of their base hospital was as follows:

- 1 Chief medical officer, commanding.
- 2 Medical officers.
- 1 Commissary officer.
- 3 Chief attendants, non-commissioned officers.
- 1 Pharmacist.
- 2 Privates commissary corps.
- 30 Attendants.
- 1 Cutler.

In all 42 officers and men for the care of an average of 150 patients and the plant. For an increase of 40 patients over 120 one medical officer and ten attendants were added to the force, thus making the allowance for a hospital of 400 beds 11 officers and 107 men.

The requirements of the British service in this direction, as laid down in their official publications, are, for a general hospital of 400 beds:

- 1 Chief Medical Officer, commanding.
- 17 Medical officers.
- 1 Quartermaster.
- 140 Non-commissioned officers and private soldiers.
- 10 Female nurses.

If a 500 bed hospital is required 2 medical officers and 25 non-commissioned officers and private soldiers are added to the above.

The number of officers and men on duty in our general hospitals, 1861-65, is nowhere specifically laid down. We undoubt-

ably worked that problem out satisfactorily, through practical experience, but not even the muster rolls of the different hospitals would enable us to more than approximate the number of men actually at work. In the *Medical and Surgical History of the War*,¹ 1861-65, we find it stated that the commissioned personnel of a general hospital usually consisted of 1 surgeon commanding, 1 surgeon as executive officer, and 1 surgeon to an average of 75 patients. Three or four hospital stewards were employed at each hospital, one of whom was in charge of the dispensary and of the medical property; another acted as quartermaster sergeant, having charge of the clothing, etc.; a third acted as a commissary sergeant, and sometimes there was a fourth, who performed the duty of head ward master. "The proportion of attendants, cooks, and other employes varied exceedingly in these hospitals. * * * * It was the general opinion of officers in charge that one ward master and two able-bodied nurses were sufficient for a pavilion of 50 beds, where the cases were not of an acute character, otherwise five nurses with help from convalescents might be required to perform the duties in a satisfactory manner. A hospital of 1,000 beds had, therefore, on its rolls 20 ward masters and from 40 to 100 nurses. But besides these 5 or 6 men were required as cooks, and 8 or 10 as assistants, the latter usually convalescents; the laundry required 4 or 5 with occasional helpers for its management; the bakery 3 or 4; the blacksmith, paint, and carpenter shops, and the stable 10 or 15, and the dispensary, knapsack room, quartermaster, subsistence and hospital storerooms as many more; the dead house and cemetery 3 or 4; the headquarters office, including the library, about 10 men as clerks, messengers, etc., and the quarters and mess room of the officers about 3 more, making a total of 120 to 200 employes."

Taking the mean of the above estimate as our basis of calculation, we find that a 400 bed hospital required:

8 Medical officers.

4 non-commissioned officers, and
68 attendants of various kinds.

—
80 Total.

¹ Third part, *Medical*, p. 957.

Paragraph 1294, Army Regulations 1863, furnishes some information. It reads: "Ordinarily hospital attendants are allowed as follows: To a general hospital, one steward, one nurse as ward master; one nurse to ten patients; one matron to twenty, and one cook to thirty. * * *" Nothing is said as to the number of medical or other officers, and we have seen that more than one non-commissioned officer was found necessary. Upon the basis of this regulation a general hospital of 400 beds would ordinarily have:

1	Hospital steward.
1	Ward master.
40	Nurses.
20	Matrons.
13	Cooks.
—	
75	Total.

Paragraph 1602, Army Regulations, 1889, reads: "For the care and treatment of the sick while in hospital or in transport members of the hospital corps will be allowed as follows:

"(a) To general and divisional hospitals, six privates to every thirty beds, with such numbers of hospital stewards and acting hospital stewards as the Surgeon General, with the approval of the Secretary of War, may direct.

"(b) To a railway hospital train of twenty cars, carrying six hundred sick and wounded, two hospital stewards, six acting hospital stewards and one hundred privates. * * *

"(c) To a hospital boat of three hundred beds, three hospital stewards, six acting hospital stewards and sixty-five privates." * * * *

The Regulations of 1895 are silent upon this important subject. Analyzing the regulation of 1889 we are still left in doubt as to the number of non-commissioned officers required in a general hospital. The proportion on a railway hospital train is one to twelve privates and on a hospital boat one to seven privates—a mean of one non-commissioned officer to ten privates. Again,

nothing is prescribed as to the number of medical officers. Under this regulation a general hospital of 400 beds would be allowed:

- 8 Non-commissioned officers, and
- 80 Private soldiers of the hospital corps.

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88 Total

The personnel of *hopitaux d'evacuation* in the French service, presumably to accommodate 400 patients numbers

- 12 Medical officers, and
- 44 Non-commissioned officers and men.

—

56 Total.

For the so-called war hospitals which they provide to take care of the wounded who cannot be moved to the rear when the field hospitals must advance, the Germans mobilize for each army corps

- 19 Medical officers.
- 3 Apothecaries.
- 6 Officials.
- 27 Dressers.
- 3 Non-commissioned officers.
- 36 Attendants.
- 24 Private soldiers of the train.
- 3 Cooks.

—

121 Officers and men.

The permanent military hospitals of Russia are divided into four classes: those of the 1st class have 200 beds and of the 4th class 1,100 beds; their personnel is as follows: First class: 5 medical officers, 5 other officers and officials, 84 non-commissioned officers and men; 4th class: 19 medical officers, 12 other officers and officials, 266 non-commissioned officers and men. The first evidently represents the minimum considered necessary for the work, and the second shows the increase of personnel necessary to care for the 900 additional patients.

The Vienna Military General Hospital (1,000 beds) has:

- 12 Medical officers.
- 2 Officers of the *Armee Stand*.
- 1 Chaplain.
- 1 Accountant officer.
- 4 Principal division officers.
- 190 Principal division men.
- 1 Instruction division officer.
- 59 Instruction division men.
- 16 Servants.

Total, 21 officers and 256 men.

From the foregoing we find that the personnel of the general hospitals (400 beds) of the different armies herein considered is approximately as follows:

Army of	Medical Officers.	Other Officers and Officials.	Non-Com. Officers and Private Soldiers	Women Nurses.	Remarks.
Japan	10	1	107		
Great Britain.	18	1	140	10	
France	12		44		
Germany	10	5	47		
Russia.....	8	6	119		
*Austro-Hungary.....	6	4	133		
†The United States.....	8		72	7	
	72	17	662	17	* Estimated.
Mean (7).....	10	2	95	2	† The number of men is the mean of the three authorities quoted.

We may assume that in the event of hostilities hospital accommodation must at once be provided at the immediate base of operations for 2 per cent. of the strength of the army.

The number of beds that may be satisfactorily aggregated under one administration of course depends upon various circumstances. We have seen that each of the four divisions of

the Japanese base hospital was intended for about 750 beds, and we know that permanent military hospitals have been organized in our own, and other countries, quite as large as that at Hiroshima. Probably a safe rule to follow would be one that prescribed an organization, the personnel necessary to which, could be personally supervised by one man—the commanding officer.

The British regulations provide two general hospitals, each of 400 beds, to an army corps (36,000 strength). The 400 occupants of these beds plus the 160 officers and men to look after them make a total of 560, something more than the average size of our regiments during 1861-65, and presumably enough for one man to oversee. Observing the rule that the segregation of the wounded is greatly to their advantage, and in connection therewith, considering the economics of the organization necessary to their care, we may safely assume that hospitals to accommodate not to exceed 500 patients will prove the most desirable.

We have heretofore seen that the mean of the allowance of personnel for the care of 400 patients by the several armies, whose regulations upon this subject have been consulted is:

10 Medical officers.

2 Other officers (1 quartermaster, 1 commissary), and

95 Non-commissioned officers and private soldiers; and that for each additional hundred patients

2 Medical officers and

25 Non-commissioned officers and men are required.

We cannot fail to be impressed with the difference in the estimated requirements in different armies, and it seems probable that in both France and Germany a considerable addition in the lower ranks must be looked for from the aid societies. But what can we say of our own regulations in regard to the personnel? Why should British invalids require twice as many attendants as our own? Evidently we must have actually had more than prescribed, and it is not difficult to believe that the required excess came from the convalescents.

Based upon the average allowance of the various services above referred to, we find that there must be provided for the base hospital a personnel equal to six-tenths of one per cent. of the army. The organization of this personnel is, of course, of the utmost importance to the efficiency of the hospital. The mere

throwing together of a hundred or more officers and men is the simplest factor in the problem, the fitting them into their proper places is quite another matter, and involves the whole question of military hospital administration, which forms no part of the scope of this paper.

We may briefly consider the requirements in men of the sanitary organizations on the lines of communication. We have heretofore seen that these organizations consist of hospitals, more or less fixed, variously called "war," "reserve," or "stationary," the function of which is to immediately relieve the field hospitals, in order that the latter may advance with the army.

The Austro-Hungarian army regulations require that there be at least one reserve, 200 bed, hospital to each division (10,000 strength), and this is practically the requirement in other armies. Longmore says of these hospitals: "They are so placed along the lines of communication, whether they be railroads, ordinary vehicular roads, or water communication, as to receive without difficulty the wounded from the field hospitals. They are provided with sufficient medical and surgical stores for greatly disabled men to be treated and cared for in them until they are in a fit state to be sent on to the principal general hospital at or near the base."

The British Army regulations require that there shall be two "stationary" hospitals of 200 beds each per army corps, on the lines of communication and that the personnel of each shall consist of:

- 9 Medical officers.
- 1 Quartermaster, and
- 75 Non-commissioned officers and men.

- 85 Total.

This is in remarkable contrast to the allotment to like hospitals in the Austro-Hungarian army, the permanent personnel of which consists of

- 1 Medical officer, and
- 7 Non-commissioned officers and private soldiers.

We must, however, in this connection, remember that in that army, as in most other European armies, back of the theatre of operations the medical service is usually in the hands of civilian

physicians, the medical officers for the most part being at the front. We may, therefore, assume that the personnel above enumerated is simply the *cadre* into which unlimited outside assistance can be fitted. On the other hand, the British have evidently fully manned their "stationary" hospitals to meet the demands of war without their own borders, so we may accept their conclusions as to the actual requirements in this direction, no matter from what source the personnel may be obtained, and we find that to be four-tenths of one per cent. of the strength of the army.

The resting places on the *ctap* lines, usually at railway stations, are generally under charge of the national aid societies, and if they have any official personnel it is extremely small.

The transportation service calls for a highly organized and thoroughly efficient medico-military personnel. It naturally divides itself into wheel, railroad, and boat transport, each and all of which reached a high state of development in our country 1861-65. While this is an essential part of the subject of this paper, it is itself quite broad enough to demand the separate consideration I hope to be able to give it at some future time.

The medical supply department, while not requiring so great a personnel as other branches of sanitary organization, is of the utmost importance, and upon its proper organization and working depend in large degree the efficiency of that service. It, too, demands separate consideration.

From the foregoing we conclude that in addition to the personnel, numbering four and six-tenths¹ per cent. of the strength of an army, required at and in front of the field hospitals, one per cent. is demanded for the lines of communication and base hospitals, exclusive of the requirements of the sanitary supply and transport services.

What all this really means is difficult to appreciate unless we apply it to a great army in active service. We need no more convincing illustration of the necessity for a well considered organization of the sanitary department than the bare statement that in December, 1864, the Surgeon General of our army had under

¹ What is the most practicable plan of sanitary organization for active service in the U. S. Army? Proceedings Association Military Surgeons, U. S., 1896.

his immediate command, with all that the word implies, in the military general hospitals, 83,409 sick and wounded, and 31,860 sanitary personnel, a total of 115,269 officers and men.

But this is entirely exclusive of the personnel in more or less direct contact with the troops, which, based upon the strength of the army at that date (959,460) must have numbered about 53,730. Even excluding the invalids immediately with the armies, for whom he was likewise responsible, and also the personnel of the supply and transport services, there remained the enormous number of 169,000 officers and men who looked to the Surgeon General, not only for "succor and professional care, shelter and transportation," but everything for which a soldier looks to his superior..

CHAPTER XIV.
Military Surgery.

I. THE RADICAL CURE OF INGUINAL HERNIA
FROM THE STANDPOINT OF THE
MILITARY SURGEON.

BY MAJOR JOHN MONRO BANISTER,
SURGEON IN THE UNITED STATES ARMY.
FORT LEAVENWORTH, KANSAS.

EVERY practical surgeon well knows that, until very recent years, the radical cure of hernia existed in name only. As late as the year 1890, Dr. Bull, of New York City, published a paper giving the results in 134 cases operated upon during the preceding four years. These results were three deaths, and 38 per cent. of relapses. In this paper Dr. Bull says: "In reflecting on the experience of these cases, I am obliged to conclude that in these methods, which I have faithfully tried, there is no prospect of obtaining a radical cure in any form of hernia, and the majority of cases will be found to relapse if followed for a sufficient time."¹ Dr. W. B. Coley, of New York City, in commenting upon this former opinion of Dr. Bull, in a recent paper published in *Annals of Surgery* for March, last, goes on to say: "Sir William MacCormac states in his Bradshaw lecture for 1893 that the mortality in cases of non-strangulated hernia operated upon in four of the leading London hospitals was 6 per cent. These examples are sufficient to justify the attitude, which conservative men have manifested towards all operations for the radical cure of hernia even up to the most recent times. That this attitude has gradually given way to one of confidence and increasing favor has been largely due to the brilliant work of Bassini, of Padua, whose operation for inguinal hernia has been generally ac-

¹See *Medical News*, July 5th, 1890.

cepted throughout the world as the best yet devised." To the above remarks of Dr. Coley, I shall venture to add that equal honor in this respect should be accorded to Professor W. S. Halsted, of Baltimore, whose perfect technique, and brilliant operative skill, in carrying out his own method, have done so much to inspire confidence in the American surgeon, and to place the operation for the radical cure of hernia upon its present pinnacle. All honor, say I, to Halsted, and, in according his just dues to Bassini, let us not forget our own brilliant countryman.

There is no question that the operations of Bassini and Halsted are the best yet devised, and that by these operations, independently evolved by their distinguished authors, the radical cure of hernia has been made what it now is—a cure in fact, not in name only. Great credit is also due to Championnière, Macewen, Marcy, and Bull, as stated by Coley in the paper referred to, but I shall add here, also, that to Dr. Coley, himself, the profession of our country is under a debt of gratitude for his able advocacy of the operative treatment of hernia, and for the brilliant statistics, which he is able to furnish from his four operations in support of his opinions. The views, expressed by Dr. Bull in 1800, are still quoted against the radical operation, but their weight has been lost since the operations, upon whose results this surgeon founded his opinions, have been justly relegated to the past, and are no longer considered by the operator of to-day. Our present knowledge of aseptic technique, the use of the buried suture, and the inventive surgical genius of our day have enabled us to realize the dreams of Celsus and Heliodorus.

In order that the radical treatment of hernia may be successful, three indications must be met, viz:—

First—The hernial sac must be obliterated.

Second—The internal abdominal ring must be narrowed, or a new internal ring made.

Third—The inguinal canal must be reconstructed, and its obliquity restored.

These indications are provided for in the successful modern methods. A fourth essential to success is a rigid system of aseptic technique, without which the most beautifully performed operation will come to naught, for pyogenic infection of the deeper portion of the wound will almost invariably lead to relapse, to say

nothing of the danger to life from sepsis, and septic peritonitis. It is a well-known fact that hernia wounds are especially liable to become infected, owing to their site, and to the fact that, in repairing the inguinal canal, the tissues are subjected to necessary tension, in consequence of which the normal resistance to bacterial development is lessened. Consequently the surgeon cannot be too careful in the matter of asepsis, when he undertakes one of these operations. I have instituted at Fort Leavenworth a most rigid system of asepsis, which is carried out in every detail at each operation. Under this system, I have performed twelve Bassini operations since January 7, 1896, and every wound has remained absolutely aseptic, union in every case being virtually primary. I have not had in my cases a single stitch abscess, and not one deep suture has yielded, or given the least trouble. Furthermore, there has not been a relapse in any of these cases. I am particular to make this statement, as I have heard it said that the military surgeon, in army hospitals, cannot carry out an elaborate system of asepsis in all its details. This latter is a great mistake. I can say that my wounds have remained aseptic, for I have proved this fact by bacteriological methods, inoculating culture tubes at the bedside in cases of the least doubt. Invariably the tubes have remained sterile.

When a case of hernia has been presented to an American military surgeon for operation, he need not hesitate long in selecting the special method to pursue, as his choice may safely be limited to the operations of Bassini and Halsted. Without further preface, I shall proceed to give a brief description of the method of performing the Bassini operation, which in my few cases, now twelve in number, has been followed by 100 per cent. of successes. Commencing at the spine of the pubes the incision is carried through the skin, upwards and outwards, above and parallel to Poupart's ligament, to the extent of three, or three and one-half inches. Bleeding vessels are clamped as soon as divided. The aponeurosis of the external oblique muscle is clearly exposed, and the external abdominal ring recognized. The ring is cleared, and a grooved director passed up the canal, on which the external oblique aponeurosis is divided, thus laying open the inguinal canal. The infundibuliform process of the transversalis fascia is seized with toothed forceps just below the arching fibres of the

internal oblique muscle, that is, as near the internal abdominal ring as possible, and, with the handle of the scalpel, or the blunt dissector, is rapidly torn through until the white sac is reached. It is important to reach the sac proper. Then grasping with clamped forceps the tissues on each side of the tear, we divide the tissues embraced downwards, towards the pubes, for a short distance, the clamps being left in situ. The sac is then dissected out, and separated from the cord, the latter in the oblique variety of inguinal hernia being, of course, behind the sac. Having dissected out the sac, the tip of the index finger should be carried around its neck, just inside the internal ring, to separate adhesions at this point. Then, while the sac is held up in the grasp of two pairs of forceps, placed near the base, it is opened between the forceps, and the index finger inserted to explore its interior. If empty, the sac is slit down with scissors toward the neck to lay it well open, and, while gentle traction is being exercised, it is ligated near the internal abdominal ring with kangaroo tendon or silk, preferably the former. If the sac is small, it can be transfixed, and ligated en masse; if large it is best to ligate it by a series of mattress sutures. After ligation the sac is cut off beyond the ligatures, and the peritoneum allowed to retract into the abdominal cavity. Having disposed of the sac, and its contents, we separate the spermatic cord from any loose tissue binding it down to the floor of the canal, and passing a blunt hook under it, draw it into the upper and outer portion of the internal ring. Then the divided transversalis fascia is stitched together again closely around the dislocated cord, and the sutures continued downwards toward the pubes until the opening in this tissue is entirely closed. Kangaroo tendon buried sutures are used for this purpose. Next the conjoined tendon is united to Poupart's ligament, closely around the still dislocated cord, with kangaroo tendon, and the union of these structures continued, by means of interrupted sutures of the same material, to a point as near the pubes as possible. If the conjoined tendon gives out in the lower part of the canal, the edge of the rectus abdominis is made to supply its place. The cord is then laid upon the new floor of the canal, formed by the union of the conjoined tendon to Poupart's ligament, and the aponeurosis of the external oblique is united over it by means of interrupted sutures of kangaroo tendon, thus completing the anterior wall, or roof,

of the canal. The last suture completes the new external ring. The skin wound is united by interrupted sutures of silkworm-gut, which are removed about the eighth day. The patient remains in bed for three weeks. I am firm in the belief that kangaroo tendon should invariably be used for all the buried sutures. It is easily sterilized, and will remain unabsorbed, without causing the least irritation, for from two to three months, thus giving the tissues involved in the sutures time to unite firmly. I am also of the opinion that the plan of uniting the incision in the transversalis fascia by a separate row of buried sutures is an excellent one. This has been advised by Marcy, Fergusson, and others. In the case of direct inguinal hernia the sac will be found to the inner side of the cord, and not contained in the infundibuliform process of the transversalis fascia. It will, of course, push a process of the transversalis fascia in front of it, which fascia must be incised before the sac proper is reached. The sac is then dissected out, ligated, and excised as before, after which the divided transversalis fascia is united by a row of buried kangaroo tendon sutures. The cord is then exposed, and dislocated, and the remainder of the operation performed as in the case of the oblique variety. If the sac is of the congenital variety of oblique inguinal hernia, it must be divided into two portions, the upper portion being treated as already described, in the case of the acquired sac, and the lower portion being stitched around the cord low down to form a tunica vaginalis.

Halsted's operation meets the same indications as does the method of Bassini, and, being now well understood in this country, I shall forbear attempting a description of it. I shall only mention a few points, in which the two methods differ. In Halsted's operation the inguinal canal is laid open, and all the layers of the abdominal wall, with the exception of the peritoneum, divided from the internal abdominal ring upwards and outwards for about an inch, or less. This latter incision, which forms the new internal ring, divides, therefore, the external oblique, internal oblique, and transversalis muscles, and transversalis fascia. The sac is treated as before described. The superfluous veins of the cord are then excised, and the reduced cord dislocated, and drawn up into the incision made for it, above the old internal ring, where it is snugly anchored between two mattress sutures, which pierce the tissues

above enumerated as being involved in the incision. The union of the tissues on either side is continued by a series of mattress sutures down to a point as near the pubes as possible. When these sutures, six or eight in number, are fastened, the old canal is completely closed, and the cord is found to emerge from the abdomen through a new internal ring, which perforates all the layers of the abdominal wall except the peritoneum and skin. The cord is, therefore, superficial to the external oblique aponeurosis, and is covered only by the skin. Dr. Halsted uses silver wire for the buried sutures, which are twisted, cut short, and left permanently in the abdominal wall. He closes the skin wound by a running buried suture of silver wire, which is withdrawn about the twelfth day. Dr. Halsted's results by this method have been brilliant, but, in my humble opinion, the substitution of kangaroo tendon for the buried silver wire sutures would make the operation an ideal one, and remove one serious objection now urged against it. This substitution has been made in one case by Major S. Q. Robinson, Surgeon U. S. Army, with an ideal result.

Am I justified in stating that, by either of the methods given above, we have found a genuine radical cure for inguinal hernia? Let us examine the very latest statistics, and decide this question.

In his last paper, published in *Annals of Surgery* for March, 1897, Dr. Coley, of New York, states that he has, since August, 1891, operated by the Bassini method with *kangaroo tendon*, *three hundred times*, with *one death*, and *two relapses*; once by the Bassini method, with *silk* for the deep sutures, with a relapse in this case, and 24 times by a modification of Bassini's method, in which the sac was treated as usual, and the conjoined tendon sutured to Poupert's ligament above the cord, *i. e.*, without dislocation of the cord. In these twenty-four cases he had *three* relapses. This record speaks volumes in favor of the Bassini method with dislocation of the cord, and the use of kangaroo tendon for the deep sutures. Dr. Coley has thoroughly traced 280 of these 300 cases, with the result given. The one death resulted from pneumonia, and, as Dr. Coley remarks, should not be properly charged against the operation. In 1890, Bassini published a series of 251 cases of his operation upon reducible inguinal hernia. He was able to trace all but four of these cases. In seven cases there was relapse; one

case died from pneumonia, which commenced after complete healing of the wound.¹

Coley's 300 cases, in which kangaroo tendon was used for the deep sutures, with two relapses, compare favorably with Bassini's 251 cases, with seven relapses, and point quite forcibly to the value of the tendon suture.

In a recent private letter, Dr. Bloodgood, who is Dr. Halsted's house surgeon at the Johns Hopkins Hospital, has kindly furnished me with the statistics of their operations up to the present time, their first operation having been performed over seven years ago. As these results have not yet been published, it may be of interest to give them in this connection. During the time mentioned, at the Johns Hopkins Hospital, 170 operations for inguinal hernia in the male have been performed by Halsted's method. One hundred and fifty of these cases healed *per primam*.

Of these 150 cases, 121 have been traced with no relapse found after from seven years to two months after operation. Twenty-nine cases could not be traced. In 20 cases, out of the total 170, the wound suppurated. Fourteen of these cases have been traced, and six lost sight of. There has been a slight relapse in one of these 14 cases. Out of the whole series there was one death from acute diphtheritic colitis, which occurred on the tenth day after the operation. The results in wounds which healed *per primam* are, Dr. Bloodgood says, practically perfect in every case. To sum up, Halsted's results are, *one death, and one relapse in one hundred and seventy cases.*

Drs. Bull and Coley have collected 5,000 cases of operation for the radical cure of hernia, in the practice of many different operators, with a mortality of 1.16 per cent., which proves that, when the operation is skillfully done, we need not consider the mortality a factor in the case. Considering, therefore, that the value and expediency of the radical cure of hernia in civil life has been fully proved, what, as practical military surgeons, are we to think of its applicability to the needs of our military services?

In September, 1895, Brigadier General George M. Sternberg, Surgeon General, U. S. Army, assumed a position on this matter.

¹See "The Anatomy and Surgical Treatment of Hernia"—Marcy, pages 332 and 333.

which has proved of the greatest importance to the military service. In his official report for the fiscal year ending June 30, 1896, General Sternberg thus defines his position: "In September, 1895, after fully considering the results attained by surgical treatment in the radical cure of hernia, together with the small amount of risk involved in the operation as now conducted under careful aseptic supervision, I came to the conclusion that the operation might be made available to preserve good soldiers, although ruptured in the service, and to lessen the number of men discharged for disability and subsequently pensioned for hernia. The annual loss of men by rupture has always been considerable. During the six calendar years ending December 31, 1894, 153 men were discharged. I did not consider that the progress of surgery warranted a resort to operative proceedings in all cases, but felt confident that surgical interference would enable many to continue in the military service, or earn their livelihood with comfort in civil life, who are now discharged and pensioned for hernia. Accordingly on September 9, 1895, the following was published from Headquarters of the Army, A. G. O., as par. II of Circular No. 9, of that date:—

"II. *Treatment of Enlisted Men, Who Have Been Ruptured in the Line of Duty.* Cases of hernia suitable for an operation should receive surgical treatment, which, by the most approved modern methods, is successful in a large proportion of the cases operated upon, and in skillful hands is attended with little risk. Operations for the radical cure of hernia will be performed, with the consent of the soldier by medical officers specially designated by the Surgeon-General of the Army.

"Medical Officers will report cases of hernia considered favorable for operation to the Surgeon-General.

"If the case is considered unsuitable for operation, or if an operation is declined by the soldier, the fact will be noted upon the certificate of disability. (Decision Acting Secretary of War, August 14, 1895.)"

Since then the medical officers of the army have operated 67 times, with *no death*, and *three relapses*. I shall add here the names of the operators, giving the number of cases treated by each, the list being arranged on the basis of numbers.

OPERATOR.	TOTAL CASES.	CASES ON ACTIVE LIST.	MORTALITY.
Col. W. H. Forwood	20	15	0
Major J. M. Banister.....	12	11	0
Major H. McElderry.....	8	7	0
Capt. W. D. Crosby	5	3	0
Major L. M. Maus	4	3	0
Major L. A. LaGarde.....	4	4	0
Capt. W. C. Borden	4	3	0
Major S. Q. Robinson.....	2	2	0
Capt. W. P. Kendall	2	2	0
Capt. Guy L. Edie	2	2	0
Major A. H. Appel	1	1	0
Capt. J. L. Phillips	1	1	0
Capt. R. G. Ebert	1	1	0
Lieut. J. H. Stone.....	1	0	0
Grand total.....	67	55	0

Colonel W. H. Forwood, Assistant Surgeon General, U. S. Army, heads the list with a brilliant series of 20 cases, all perfectly successful, the last case, however, having only very recently been subjected to operation. Four of these cases occurred among the inmates of the Soldiers' Home, at Washington, D. C., and one was a civilian employe; the remaining 15 operations were performed upon men in active service. In one case of his series, Colonel Forwood has had a very striking proof of the value of a properly performed Bassini operation. On October 18, 1895, he operated upon a soldier affected with an inguinal hernia on the right side, securing a perfect result. On April 10, 1896, while reaching upward with a heavy weight this soldier sustained a rupture on the *opposite side*, the side *operated upon nearly six months previously remaining firm*.

One of the three relapse cases, noted above, has since come under my charge, and was operated upon by me on February 3, 1897, being included in my series of 12 cases. He was first oper-

ated upon by another surgeon at a distant post on December 12, 1805. The wound at this first operation became infected, and the deep sutures, which were of silk, sloughed out. The sac at this time was *not discovered* in the canal, and hence was left *untouched*. The hernia relapsed in April, 1806. When this man first came under my observation at Fort Leavenworth, I found a large complete oblique inguinal hernia, of the left side, easily reducible, and as easily recurring when pressure was removed from the position of the internal ring, the bowel passing down into the scrotum with a rush, so to speak.

The cicatrix in the groin, marking the site of the wound resulting from the first operation, was about $3\frac{1}{2}$ inches long by $1\frac{1}{4}$ inch in width. The skin, in the position of the cicatrix, was thin, and evidently somewhat devitalized. An operation having been authorized, I operated by the Bassini method on the date specified. I was afraid to trust the devitalized scar in the integument, so removed the entire cicatrix by an oval incision surrounding it, its separation from the external oblique aponeurosis being accomplished with difficulty. When the canal was opened, the sac was found to be very large, and united firmly to everything in its neighborhood, which rendered the process of dissecting it out, and removing it, most tedious. The conjoined tendon was found still united to Poupart's ligament in the lower portion of the canal, but these structures were widely separated above this point. The vas deferens was found detached from the rest of the cord, and firmly bound down to the floor of the canal by dense adhesions, great care being required to get it dissected out without injury. Having accomplished this, the edges of the conjoined tendon and Poupart's ligament were freshened to remove cicatricial tissue, and were again united with strong kangaroo tendon sutures around the dislocated cord, and down to the point of permanent union before mentioned. The external oblique was united as usual. Then there remained the wide oval space in the integument, from which the superficial cicatrix had been removed in toto. This space was closed in by undermining the skin on each side, and sliding the flaps of integument towards each other until they met. Union in this case was primary, a linear scar resulting, and the case has been a perfect success so far. I have every reason to believe that the cure will be permanent. This case is interesting from the

fact that it is the first army relapse case, which has been subjected to operation for the cure of the recurrence. The accompanying photograph shows the present condition of the soldier.

One of my cases, operated upon in August, 1896, has recently been discharged at Hot Springs, Ark., in consequence of disability resulting from phlebitis of the long saphenous veins in both sides.

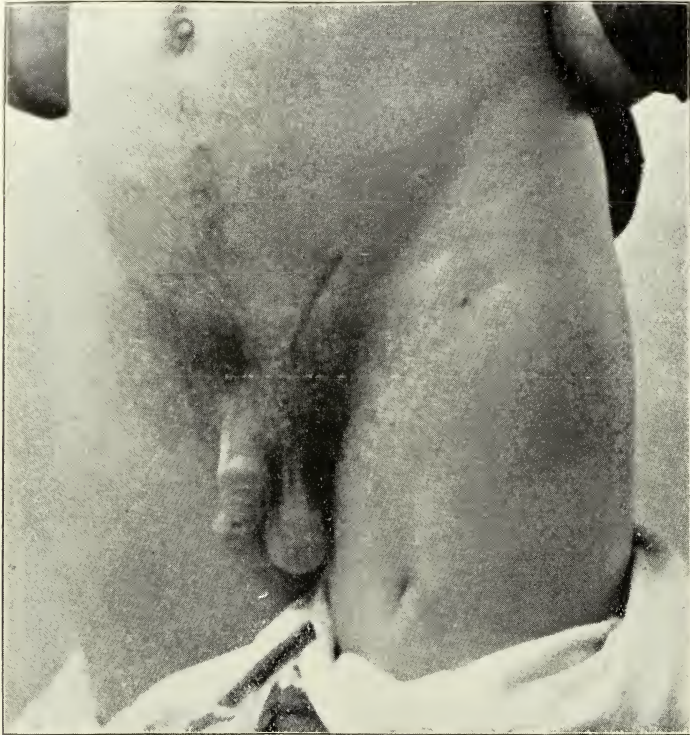


Fig. 1.—Condition of Parts After Operation for the Radical Cure of Hernia.

This trouble began in the side *opposite that operated upon* on the sixteenth day after the operation, and after the wound had healed *per primam*, and the temperature had been normal for days. This soldier returned to his proper station on October 10, 1896, about seven and a half weeks after the operation, when the other side became similarly affected. I do not see how this double affection coming on as it did, can be charged against the operation. *The*

hernia in this case has remained cured. With this exception, and that of one soldier, who was discharged by reason of expiration of term of service, and who is now earning his living in civil life, all of my official cases are in the service to-day, with no return of the hernia in any case. Two of these men are cavalry soldiers, and perform, with impunity, all the mounted exercises required of enlisted men in the cavalry service. I know of no more severe test of the efficiency of the operation than this. By the operations tabulated above, the medical officers of the army have during the last twenty months, retained in the service valuable trained soldiers, and have saved to the Government life pensions for 52 otherwise healthy men in the prime of life. The fact that these men are able to conform to all the exigencies of military life, both in the field and garrison, proves the adaptability of the radical operation for hernia to the military service.

In no other army than our own has the radical cure of hernia been made a matter of special provision, as far as I can learn, and it should be a source of pride to the Medical Corps of the U. S. Army that its members have not proved false to the trust reposed in them by their chief, when he recommended the operative treatment of cases of rupture occurring in our service.

In the English Army, as I have been informed by the Director General, Army Medical Department, no special provision has been made with reference to the radical cure of rupture, and no special returns are made concerning the number of operations performed in non-strangulated cases. At the Royal Victoria Hospital, Netley, six operations for the radical cure of oblique inguinal hernia were performed in 1896, all successful. I have also received a communication from the Surgeon-General of the Prussian Army stating that there are no provisions made for the cure of hernia in that service. In the French Army there have evidently been no steps taken in an official way to establish the routine treatment of hernia by operation, judging from a paper in *Archives de Medecine et de Pharmacie Militaires* for December, 1896. This periodical is official in character, and is published each month by order of the Minister of War. The paper referred to is an analysis of a report of Major Wissemans, a French army surgeon, and from the remarks of the officer making the official review, it is evident that the operative treatment of hernia is com-

paratively untried ground in the French service. Major Wissemans had, in the eight months preceding the writing of his report, performed the operation on six soldiers, doing in four cases the complete operation of Championnière, consisting in a dissection and obliteration of the sac by ligation and excision, and then in a narrowing of the canal by sliding the flaps of the divided aponeurosis of the external oblique, the one over the other, and securing them in this relation. In the two remaining operations, in which the sacs were confined to the canal and supposed to be small, no attempt whatever was made to expose or excise the sac, but the operation was completed, in each case, by simply overlapping the flaps of the anterior wall of the canal, as is done in Championnière's operation. Major Wissemans advocates the advisability of leaving the sac untouched, in such cases, as a routine measure. The first four cases may be radically cured, as Championnière's method is highly esteemed in France, but, as regards *the other two, in which the sacs were left intact*, I feel certain that there will be a recurrence of the hernia, and that our French confrère may very soon have the pleasure of operating upon *two* cases of relapse at any rate. It is interesting, in this connection, to note that the *three relapses*, which have, so far, occurred in our army cases, resulted in instances where the sac was not discovered and removed. I should hate to see the practice of leaving the sac intact in certain cases, as advised by Major Wissemans, become common with the operators of our service.

I have been unable to learn anything positive with reference to the operative treatment of rupture in other foreign services, than those mentioned, but I am convinced that the Medical Corps of the U. S. Army leads in this direction, and that to our Surgeon-General belongs the honor of having taken the initiative in placing the operation for the radical cure of hernia in the military service on an official basis. It having been proved by the work of the medical officers of the United States Army that the operative treatment of hernia is well adapted to the military service in time of peace, it now remains to discuss the feasibility of carrying out the present policy in time of war. The Medical and Surgical History of War of the Rebellion states that hernia caused 65.9 discharges per thousand of the total discharges for disability during the civil war, the total number of discharges for rupture during the 5 1-6 years being 9,002. The total number of cases of rupture among the white troops of the Union Armies amounted to 24,353. Strangulation was an uncommon occurrence, only 39 cases having a fatal termi-

nation, which goes to show that the 9,002 cases discharged for this disability included nearly all of those seriously affected, the remaining cases being able, with the aid of trusses, to stand the hardships of the soldier's life in the field.

In a future war, we need not expect a larger number of cases requiring discharge than in the last, which would give an average per year, in round numbers, of 1,742 men absolutely disqualified for service by this cause. Could we manage this number of cases each year, and at the same time care for the immense number of wounded thrown on our hands in consequence of the improved weapons of the present day? It is certain that we could not attend to these chronic cases with an army actively occupied in the field. All of the resources of our department on duty with the active forces would be taxed to the utmost in caring for the seriously sick and wounded. Assuming, then, that the operative treatment of hernia could restore to the ranks 90 per cent. of those absolutely disqualified by reason of rupture, or 1,568 men each year, which would be a low estimate, would it be of advantage as a government policy to attempt their treatment? I believe that it would, under certain conditions, and the following plan seems feasible:

Those ruptured soldiers, whose hernia could be securely retained by trusses, and whose infirmity, therefore, would not entirely disqualify them for active service, should be supplied with trusses, and left with their colors. As before mentioned of 16,351 cases so treated, who remained with their colors during the War of the Rebellion, only 39 died of strangulation. The remaining 1,742 cases occurring each year should be sent to special hernia hospitals, established in cities removed from the sphere of military operations, and should there be operated upon by surgeons specially designated for this work. This could easily be accomplished if the theatre of war should be in our own country. On the other hand, should our troops be operating upon foreign soil, the ruptured soldiers could be sent home along the lines of communication, which must of necessity be kept open. Each bed would on an average easily accommodate nine cases per year, so that 200 beds would probably be sufficient for the average number of men given above as requiring treatment each year. It would be best, however, in my opinion, to establish four hospitals of 60 beds each in different well-protected and accessible cities, which would give each hospital about 435 cases per year, furnishing in round numbers an average of eight operations per week. It would be an essential feature of this plan that such hospitals

should be strictly limited to hernia cases, otherwise we could not expect success. After spending five weeks apiece, on an average, in these hospitals, the convalescents could be quartered in convalescent camps or barracks, and after a month longer of easy exercise for each man, could be returned to their commands.

I do not see anything impracticable in this idea. It would be possible for the Government to follow this plan without enormous outlay, and the 1,576 men retained in the service each year (90 per cent. of the total 1,742 cases requiring operation yearly being assumed cured), not to mention the great saving in the matter of pensions, would amply repay the expense incurred. In these special hospitals, all the details of a strict and thorough aseptic technique could be carried out, and, with an operating staff gaining in experience each day, superb results would undoubtedly be secured. In conclusion, I shall formulate the following propositions:—

First—The radical cure of hernia by operation is a treatment well adapted to the military service in time of peace, as proved by the success already secured in this direction by the Medical Corps of the Army.

Second—The most rigid asepsis must be followed in our military hospitals in order to insure success.

Third—In time of war, it is probable that operative treatment for this condition will prove of decided value, if pursued in special hospitals, removed from the seat of war, upon the lines roughly indicated.

APPENDIX.

Since the presentation of the above paper to the Association of Military Surgeons of the United States, I have received a most interesting communication from the Chief of the Corps of Military Surgeons of the Austrian Army, giving the methods of procedure in use in this service, with a tabulated list of the operations for the radical cure of hernia performed since 1888. From this communication I learn that, in the Austrian service, soldiers, who become ruptured after their entrance into the service, are furnished with trusses and discharged, as no one is compelled to undergo a capital operation. Should, however, soldiers afflicted with hernia give their consent, they are operated upon in military hospitals by military surgeons. The results of these operations, owing to the tabulated list of operations, the brilliant results of which need great care and interest taken in them by the surgeons of the Austrian service, are described as phenomenal. I shall here insert no comment as they speak for themselves.

LIST OF HERNIA OPERATIONS PERFORMED IN THE AUSTRIAN ARMY SINCE THE YEAR 1888. FURNISHED BY THE COURTESY OF THE K. K. CHIEF OF THE CORPS OF MILITARY SURGEONS.

YEAR.	NUMBER OF OPERATIONS FOR THE RADICAL CURE	KIND OF HERNIA.	METHOD EMPLOYED.	RESULTS.
1888	1	Inguinal Hernia.	Bassini	Healed and able to perform duty.
1889	1	"	"	Not given.
1890	1	"	"	Healed and able to perform duty.
1891	3	"	2 Bassini 1 Czerny	Not given.
1892	11	"	Bassini	10 healed and able to perform duty. 1 died on account of delirium tremens.
1893	9	"	"	Healed and able to perform duty.
1894	20	"	19 Bassini 1 McEwen	19 healed and able to perform duty. 1 discharged from the service.
1895	23	"	22 Bassini 1 Kocher	22 healed and able to perform duty. 1 discharged from the service.
1896	34	30 Single. 1 Double Inguinal Hernia.	Bassini	All healed and able to perform duty.
		1 Femoral Hernia, Double.	Fabritious	
		1 Femoral Hernia and at the same time Ventral Hernia.	Closing up of opening of Hernia by suture.	
		1 Hernia of linea alba.	Tying and removing of the sac, suture of rectal fascia.	

DISCUSSION.

PROFESSOR PILCHER: In regard to the subject of hernia, during the past few years a considerable experience has been accumulated by myself, as by all operating surgeons, in the efforts to secure its radical cure. I have listened with very great pleasure to the paper this morning, which shows what our colleagues in the regular army medical service are doing in the same direction. There is one point I would like to call attention to particularly for the reason that it seems to me that it points to the difficulty that has been most pronounced in all the efforts which surgeons have been making of late years to secure thorough, radical relief by any of their operative measures. I refer to the expression that we must restore the obliquity of the inguinal canal. I desire to take exception to that and would like to have impressed upon the minds of operating surgeons the fact that what we wish to do is not to restore the obliquity of the inguinal canal but to obliterate the inguinal canal altogether. It is that which Bassini does practically in his operation, it is that which Halstead does absolutely in his operation, and according to the degree of perfection with which any surgeon in his operation will obliterate absolutely this canal, will his positiveness of relief in the particular case be. You will remember that in the operation of Bassini the cord is lifted up and is transplanted; that in the operation of Halstead the whole covering of the canal is removed, the cord is lifted up and transplanted, and then with very great care the walls of the canal are brought together by the sutures which he uses, and complete obliteration of the canal is secured. The only weak point that is left is the point through the wall, through which the elements of the cord come up. In many of these cases, especially those that are old and that have been large, there has been a varicose condition of the veins of the cord developed and so voluminous does this make the cord that notwithstanding the other efforts made to obliterate the canal, if these voluminous veins are left here, there still remains so great separation of the fibres forming the wall that there is a possibility of a direct protrusion of the intestine through this weak point. Therefore, the extirpation of a fair portion, not by any means all, of these varicose veins is a point in securing a permanent effect to our operations. If we can in all we do hereafter do away and remove from our minds the idea that we are to preserve the obliquity of the inguinal canal, which once existed, I think we will succeed in a much larger proportion of cases than we have heretofore. That is the only point I wish to call attention to.

COLONEL BOECKMAN: I do not exactly like to talk about radical operation for reducible hernia. I am not an admirer of Bassini's operation and not at all of Halstead's. However, I hope I shall never be compelled to resort to them, for even in good hands there is such a tremendous percentage of relapses that I cannot see why I should resort to one of these operations. If it were a necessity to obliterate the inguinal canal, of course, I would select such an operation; but, on the other side,

you have an oblique canal and if you can restore the canal to a physiological condition, I think that would be the ideal operation. My operations for hernia have not been very numerous; there might be some one hundred, I believe. I have seen suppuration, but I have had no death from sepsis, and in no case am I aware of a relapse. I go to an operation for reducible hernia perfectly unprejudiced. I operate, of course, along the inguinal canal. I split that open, dissect out the sac, sew up the canal and that is all. I treat the stump extraperitoneally. I think you fortify the inside of the canal by the regenerative reaction that will follow any operation where you will necessarily have to do some tearing. I do not see why I should have to leave that operation, because the practical results for me have been very good. I do not like to stand up and say this in the face of a great man, who has favored this operation, but I know my colleague to the left and my friend here can say that the operations mentioned have been laughed at. I call my method a simple, common sense operation, and the reason I stick to it is because I cannot see any reason for leaving it. In regard to the suturing, I am not so extravagant as to use kangaroo tendon. On account of the method I use, treating the stump extraperitoneally, I am not afraid of suppuration, if I should not make use of a suture that is perfectly aseptic. When the operation has been done, we give the patient the same chance for the relapse of the hernia as he had on the other side, and when I can obtain that I am satisfied.

DOCENT DR. KUKULA (Prague, Austria.): You must excuse me, gentlemen, for I cannot express myself in the English language as I would. The reason we do not practice more the radical cure of Bassini is because we cannot conceive how it is possible for the fascia to prevent a relapse of the hernia. We think when the cord is translated to the internal ring, it is in the best location for a relapse. Therefore, we are now practicing the modified method of Czerny of Heidelberg.

CAPTAIN BUNTS: In the discussion of the radical cure of hernia I have not heard mentioned the method which I employ, which appears to me very simple and concerning which the statistics so far are extremely satisfactory. The sac is simply dissected loose, a hole made through the external oblique, with scissors or forceps, the sac brought up and ligated. Formerly it was just ligated, but now it is ligated and stitched to the external oblique, because by the old method some cases of gangrene occurred. I have so far never read of a complication which fell to my lot in the Bassini operation. So far as the operation was concerned, it was a success, but there developed a very painful and sensitive cord and a persistent neuralgia of the testicle, which might have occurred from making the new internal ring too small. It is rather surprising to me that result has never, at least as far as I know, been recorded in the observations of others. The fact that sepsis is so liable to follow hernia operations, it seems to me, may be due, possibly, not only

to the difficulty of disinfecting or rendering aseptic the external parts, but also to the fact that the bacillus coli communis finds its way, especially in irreducible hernias, into the hernia, and when the hernial sac is opened, it may, also, be the source of infection of the newly-incised tissues. And so infection, I believe, may come from within, as well as from without. The bacillus coli communis is a pus-producing micro-organism under certain circumstances, and I am inclined to believe that this accounts for some cases of suppuration.

COLONEL ALDEN: I do not know that I have anything specially to say in closing. I wish to refer to one point, spoken of by Professor Pilcher, in drawing attention to a remark in the paper, in regard to the restoration of the obliquity of the inguinal canal. It seems to me that the Doctor there, possibly, attempts to carry out the same idea as Professor Pilcher and that he does not seek so much to restore the inguinal canal as the oblique direction of the cord. I think, from the reading of the paper, that he does depend on obliteration of the inguinal canal but attempts to restore the position of the cord.

II. SLOWLY ABSORBABLE, ANTISEPTIC CATGUT BY A MODIFICATION OF THE BOECK- MANN METHOD.

BY CAPTAIN W. C. BORDEN, F.R.M.S.,
FORT SNELLING, MINN.,

ASSISTANT SURGEON IN THE UNITED STATES ARMY.

BEYOND question the ideal method of repairing a traumatism is by accurately approximating the separated parts, and holding them in such position by a material, which will keep them in apposition until they unite with sufficient strength to withstand physiological strain, and then by absorption of the holding material leave nothing foreign in the tissues. To accomplish this, the material used must be aseptic, sufficiently strong to resist strain, and must not be absorbed before the tissues are united. Neither should it be too slowly absorbable, for, if so, it frequently acts as does non-absorbable material, producing after-trouble in many cases. For cases where there is not much strain, and where rapid absorption is not contraindicated, as in suturing the peritoneum, ligating blood vessels, etc., catgut, prepared by Boeckmann's improvement upon the heat sterilization method of Benkisser, is all that can be desired. Catgut so prepared is aseptic, strong and very convenient. I have used it, and have seen it used in many cases, and consider it one of the greatest aids in surgical technic. It is, however, not well adapted for skin sutures, or for sewing up the fascial planes and muscles, where the latter are liable to strain before becoming united, as in laparotomies, operations for the radical cure of hernia, and the like. In the skin it is not desirable from the well known difficulty, or impossibility, of making the skin entirely aseptic, and, as sterile catgut itself is an excellent medium for the growth of bacteria, the micro-organisms, remaining in the deep layers of the skin by growing into the catgut, avoid the full inhibitory or destructive action of the leucocytes. In this way a slight infection, which with non-absorbable sutures like silk worm gut or silver wire could be overcome, may by the aid of the nourishment, afforded by the sterile catgut, enable the bacteria to gain ascendancy, and so produce stitch abscess. This has been recognized by Boeckmann, who has done so much to perfect the heat sterilization method, and who says:¹

¹ Journal, Am. Med. Association, Vol. 26, pages 171 and 226.

In the skin, which only with difficulty, if at all, can be rendered aseptic, sterile catgut will likely produce stitch abscess, as the catgut will form a good culture soil for the bacteria present. In order to preserve catgut as a skin suture to the exclusion of all others it will be necessary, so far as I am able to judge, to continue along the line indicated in retaining the fat and seek an agent, which will render catgut an impossible culture medium and remain with it, until the last fiber is absorbed."

To render catgut a desirable skin suture it must, therefore, be not only aseptic but antiseptic as well, and this is accomplished by the means hereafter described. The use of absorbable sutures in the skin is, however, secondary to their use in the deeper tissues, where for perfect result they must neither be too slow of absorption, as is the difficultly sterilizable chromicized gut, nor too quickly absorbable, as is the heat sterilized material. Kangaroo tendon has been largely exploited as fulfilling these indications, but it has many disadvantages. It is difficult to sterilize, is of unequal strength and size, and is so weak in places that it frequently breaks when tightened during tying, so delaying the operation and annoying the operator. Also, as I will show farther on, its slowness of absorption has been greatly overrated. For some time I used kangaroo tendon for deep suturing in hernia operations and like work, completing its preparation and sterilization by boiling it in a 1 to 500 solution of mercuric bichloride in alcohol for an hour and a half. When so treated, it answered well, being sufficiently slow of absorption to insure union of the tissues, but was still open to the annoying objections of irregularity in size and strength, weak places, and considerable cost. Thinking that possibly its chief value—slow absorption—was due to the boiling in bichloride alcohol, and that possibly the unbichlorided tendon was no more slowly absorbable than the heat sterilized catgut, I determined to test it experimentally. A military convict, having received a deep cut on the outer surface of the upper arm, I thoroughly cleansed the wound, and inserted two sutures of unbichlorided "Fowler's" kangaroo tendon, and two of No. 8, heat sterilized catgut, about one inch from the wound, deep into the tissues, and applied an aseptic dressing. On the fifth day the dressing was removed, and the wound was found perfectly dry, and united without a trace of suppuration. This was important, as suppuration materially affects the lasting qualities of animal ligatures. On

examining the sutures, at three places, where the kangaroo tendon emerged from the skin, the tendon was completely eaten through by the leucocytes, and lay loose and dry upon it. The fourth end was still not entirely absorbed at the skin level, and the part immediately beneath the skin had still sufficient cohesion so that upon gentle traction it was withdrawn. The part withdrawn was about seven millimeters in length, white, and very soft. Of the catgut sutures, two ends were lying loose and dry on the skin; the other two were still attached, but somewhat less so than was the fourth tendon end. The softened end of the kangaroo tendon was hardened, sectioned, stained, mounted, and examined microscopically, when it was found infiltrated with leucocytes, which had penetrated every part beneath the skin level, softening and nearly absorbing the tendon fibers.



Fig. 1.—Longitudinal section of kangaroo tendon suture. $\times 25$ diameters, showing disintegrated condition of part (b) after being five days below the skin. The part (a) above the skin, is unchanged.

Fig. 1, a reproduced photomicrograph of one of the sections, shows admirably the extensive destruction of the tendon, and the completeness with which leucocytes had penetrated to every part.

Several sections were stained for bacteria, but none could be found, and this, in connection with the dry, united condition of the wound, makes it reasonably certain that the absorption was aseptic, and entirely due to the action of the leucocytes. From this I cannot argue otherwise than that kangaroo tendon in itself is not very resistant to absorption. My next experiment was to test the relative absorbability of the bichlorided tendon and bichlorided catgut, and, having an osteotomy of the tibia, I sewed up the in-

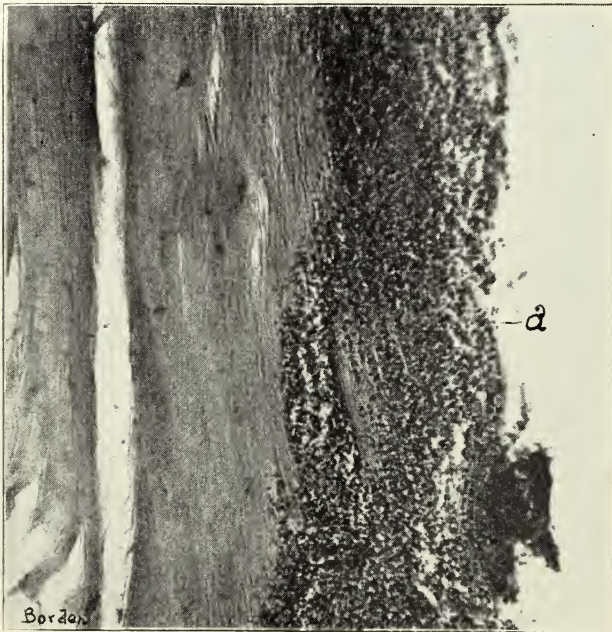


Fig. 2.—Longitudinal section of bichlorided catgut suture, x 90 diameters, showing condition after three days in a suppurating wound. The leucocytes have attacked and disintegrated the outside (a) but have been unable to penetrate or soften the interior. Owing to the magnification but one side of the section is shown.

cision with deeply placed sutures of bichlorided tendon and catgut. I hoped to make the operation aseptic, but the bone was already infected, and the symptoms and temperature were such that the dressing had to be removed on the fourth day, and the wound opened and irrigated. All the sutures, both tendon and catgut, were found holding tensely. This could have been due but to one cause, viz: the bichloriding of the sutures, for under similar cir-

cumstances they would either have been entirely disintegrated within the pus bathed wound, or, at least, softened and eaten through. One of the catgut sutures was removed, and the part lying within the suppurating wound was hardened, sectioned, and examined. The difference between the unbichlorided kangaroo tendon, before described, and the bichlorided catgut, was as striking as was the disintegrated condition of the former, and the still strong condition of the catgut. This is shown in the reproduced photomicrograph, Fig. 2, where it is seen that the leucocytes have attacked the edges of the catgut strand, but were unable to gain entrance to the interior, the latter being entirely free from them and unchanged. The bichloriding of the catgut had made it difficult of attack by the leucocytes, their assault upon it being confined to its exterior, and the progress of absorption being thereby greatly slowed, thus differing strikingly from the unbichlorided kangaroo tendon, where absorption was hastened by free ingress of the leucocytes to every part.

These experiments convinced me that boiling animal ligatures in bichlorided alcohol made them much more slowly absorbable, and, therefore, adapted for use where such slow absorption was a desideratum and at the same time, by thus impregnating them with an antiseptic, they became better adapted for use as skin sutures.

Hence, by the method of dry heat sterilization as perfected by Boeckmann we have a convenient sterile catgut, useful for the ligation of vessels, and for buried suturing, where the tension is not great, and where rapid absorption is allowable and by boiling the same material in bichlorided alcohol it is available for use where there is tension, and where slow absorption, or an antiseptic material is required. Since making the above experiments I have used the boiled, bichlorided catgut clinically in three cases, where I would previously have used kangaroo tendon, and in one where I would have trusted only to silkworm gut or silver wire. Of the three cases, two were operations for hernia, and one was removal of the appendix for recurring appendicitis. The result in these cases was most excellent, union was primary, febrile action (see chart, Fig. 3) was moderate, and the after condition was all that could be desired.

Contrary to the opinion expressed by Senn,¹ the amount of wound secretion was not unusual, nor was the irritating effect of

¹Journal, Am. Med. Association, Vol. 27, page 1220.

bichloride apparent. The amount of bichloride contained in the sutures left in the tissues is quite small, and can readily be disposed of without injury. Probably there is as little danger of bichloride irritation as of iodoform poisoning from using the formalined catgut, soaked in an alcoholic solution of iodoform, recommended by Senn.

The fourth case was an operation for acute suppurative appendicitis, and demonstrated the excellence of antiseptic, slowly absorbable, animal sutures in suppurative cases. In this case, after evacuating the appendiceal abscess, and inserting a rather large gauze drain, I closed the incision except the opening for the drain with deep sutures of bichlorided catgut. The case progressed

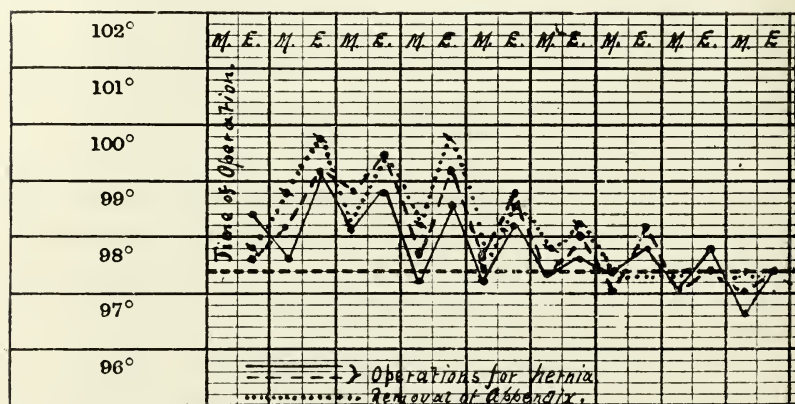


Fig. 3.—Chart showing temperature curves of two cases of operation for Hernia, and one case of removal of appendix in which sutures of heat sterilized catgut, boiled in bichlorided alcohol were used.

favorably, and was returned to light duty at the end of the eighth week after operation. There was considerable discharge from the wound, the pus having a strong faecal odor, and had non-absorbable sutures of silkworm gut or silver wire been employed, there would have been extension of infection to these, and convalescence would have been delayed until every suture was either discharged spontaneously or removed. The catgut impregnated with bichloride was inimical to infection, and union went on synchronous with absorption of the sutures.¹

The method of sterilization of catgut by dry heat has been fully described by Boeckmann.² His process briefly being to

¹Journal, Am. Med. Association, Vol. 26, pages 167 and 226.

² Since writing the above, I have had another, and similar case in which bichlorided catgut was used with equally good result.

wrap suitable lengths of raw catgut in paraffined paper, enclose these in envelopes, place them in a hot air sterilizer, and raise the temperature gradually to 140° C., where it is maintained for three hours. While catgut so prepared may be made antiseptic and slowly absorbable by removing it from the envelopes, and boiling it in bichlorided alcohol, it is unnecessary to wrap it in paraffined paper, and enclose it in envelopes before heating. It can be more simply and easily prepared by placing coils of catgut of suitable length in clean Petri dishes, or straight strands may be placed in glass tubes with the ends of the tubes closed with absorbent cotton. These are then placed in the hot air sterilizer at 100° C., and raised slowly to 140° C., where they are kept for three hours. To bichloride the catgut so prepared a sterilized, glass covered jar—a pint fruit jar answers well—is filled about half full of a 1 to 500 solution of bichloride of mercury in 95 per cent alcohol, and in this the heat sterilized catgut is placed after removal from the Petri dishes, tubes, or envelopes with sterilized forceps. It is then boiled slowly on a water bath, and preserved either in the jar in which it was boiled, or in a sterilized glass capped bottle, filled with a solution of bichloride in alcohol of the same strength, and from which it is removed with sterilized forceps, when required for use. The strength of the catgut is not impaired by boiling. The following table gives the tensile strength of the catgut under different conditions, and as compared with kangaroo tendon:

TABLE SHOWING MAXIMUM, MINIMUM, AND AVERAGE TENSILE STRENGTHS IN POUNDS OF CATGUT AND KANGAROO TENDON BY FIVE TRIALS OF DIFFERENT STRANDS, TAKEN AT RANDOM FROM COMMERCIAL SAMPLES, AND TREATED IN THE DIFFERENT WAYS INDICATED, AND SOAKED IN NORMAL SALT SOLUTION BEFORE TESTING:

	MAX.		MIN.		AVERAGE.	
	NO. 0.	NO. 9.	NO. 0.	NO. 9.	NO. 0.	NO. 9.
Raw catgut.....	6	36	2¾	21	4½	25½
Heat sterilized catgut.....	4½	35	2¾	19	3¾	22½
Heat sterilized catgut boiled in bichlorided alcohol.....	5	34	3¼	20	4⅓	24
Catgut by the Hofmeister (formalin) method.....	3	17¼	2	12	2½	15½
Fowler's kangaroo tendon ...		15		7		11½

It is to be noted, that the tests were made after soaking the materials in normal salt solution. This, I consider, the proper method, for it places them in much the same condition as when in the tissues. Catgut and tendon so treated have a somewhat lower tensile strength than when dry. The great variability in strength, and comparative weakness of kangaroo tendon is shown by the table as well as the comparative uniformity of the catgut. The tensile strength of the No. 9 catgut only is to be compared with that of the tendon. No. 0 being fine, was tested simply to show the strength of fine catgut under the different methods. But two sizes of catgut are compared, the fine and coarse, others are intermediate in strength, and would show only variations in strength between the extremes given. The larger sizes as Nos. 7, 8, and 9 are sufficiently strong for all purposes where strength is required, and No. 0 and No. 1 answer well for fine suturing; No. 3 being suitable for tying small arteries, and intermediate work.

Catgut prepared by the formalin method of Hofmeister has been exploited of late. I cannot think it in any way equal to the bichlorided catgut, and it has some decided points of inferiority. It swells much more when soaked in normal salt solution, is more slippery, and is much weaker as is shown by the table above given. Its relative rate of absorption will have to be determined by experiment, but judging from the way in which it swells when placed in salt solution, I am inclined to believe that it is not very resistant. Certainly heat sterilized catgut, boiled in bichlorided alcohol, is both antiseptic and aseptic, strong, and slowly absorbable, and where a material having these properties is required, it can be relied on.

III. SOME EFFECTS OF BULLETS.

BY LIEUTENANT COLONEL JEFFERSON D. GRIFFITH,

KANSAS CITY, MO.,

MEDICAL DIRECTOR IN THE MISSOURI NATIONAL GUARD;

SURGEON GENERAL (RETIRED) OF MISSOURI.

TWO years ago at Buffalo it was my pleasure to present for your consideration a report upon some practical experiments with the new Springfield (Krag-Jorgensen) rifle, calibre 30, adopted by the United States Army, and while the experiments reported at that time were not entirely satisfactory even to myself they were, in a measure, indicative of the general characteristics of the arm, and its effects upon animal tissue; and more recent experiments along the same lines have not, in any sense, changed the views enunciated at that time.

In the consideration of a subject of this kind there are certain fundamental principles that cannot be lost sight of. The causes which may be said to have lead to the adoption of this gun were: First, that by a reduction in calibre, the ballistic property would be increased to such an extent as to result in the production of an arm, which, by common acceptance of the term, would be humane, that is, whose effects would be to kill outright, or to produce wounds that would not result in permanent disability. Second, convenience of the new charge, thus, "enabling" a man to equip himself with double the amount of defensive material without additional weight.

Whether or not these points have been maintained remains to be seen.

The results of the experiments which I present this time would seem to indicate that they were not; that is, so far as the humane feature is concerned, with the possible exception of the one providing for death outright.

In order to present the subject more fully it will be necessary for me to incorporate some of the material contained in my paper of two years ago.

With this explanation, I will proceed to take the matter up in regular order. Just here I desire to say that I do not propose to present to you a scientific treatise on this subject; nor to deal in abstruse theory, but to present to you the results of actual experiments with the gun in the field, and under such circumstances as

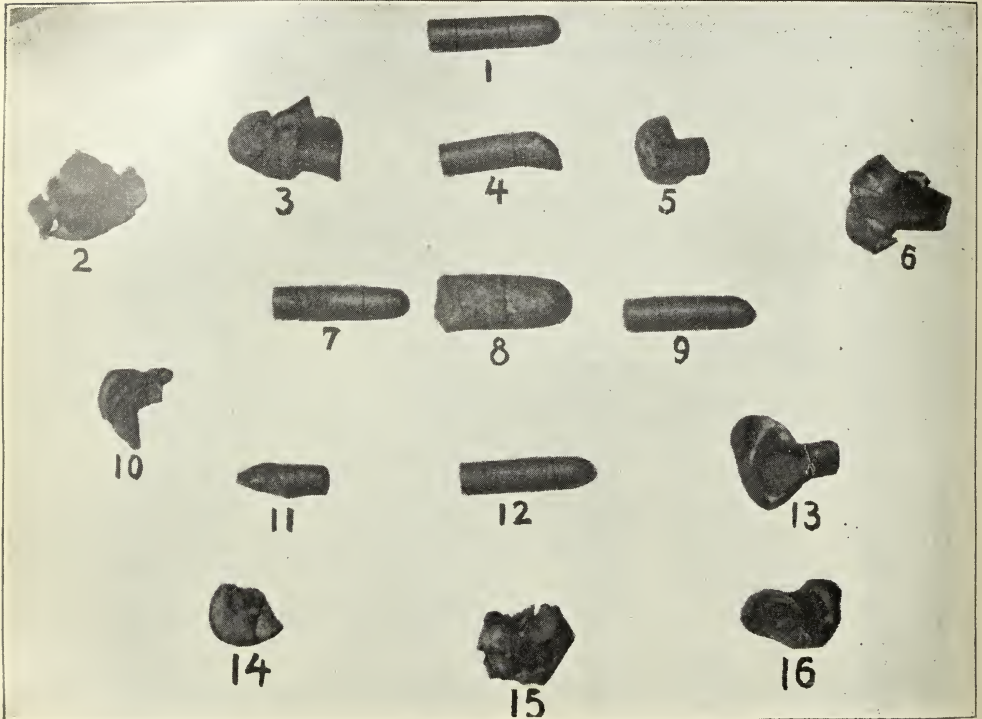


Fig. 1.—Deformation of Bullets at Various Distances: 1, Old earth works; 2, Fresh rifle pit—16 in.; 3, Fresh rifle pit—12 in.; 4, Through and through body and in fresh earth works; 5, Fresh earth works; 6, Fresh earth works—12 in.; 7, Old earth works—18 in.; 8, Springfield, old earth works; 9, Through and through body and 3 in. in fresh earth works; 10, Core of bullet; 11, Piece from fresh earth works; 12, Old earth works; 13, Fresh earth works—16 in.; 14, Piece from fresh earth works; 15, Fresh earth works—12 in.; 16, Fresh earth works.

it might be likely to be used in actual service. To that end I have the good fortune to bring to my assistance the stereopticon handled by Captain Stark, who, in addition to making many of the shots which will be presented on the screen, also prepared the slides.

The day of small bore guns is now at hand. With the progress in surgery, has kept apace improvement and change in weapons of war. The surgeon's work in future wars will be of very different character. By actual experiment we have shown on the field, that the penetrative power of the U. S. A. rifle is such that "at a distance of ten yards from the muzzle of the rifle, its bullet perforated 24 inches of well seasoned white oak; at 200 yards it went through 45 poplar planks, each an inch thick and one inch

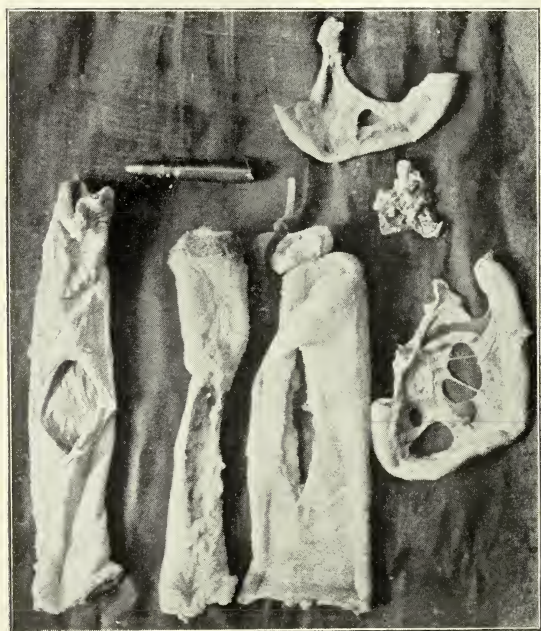


Fig. 2. Wounds of Intestine at Three Hundred and Fifty Yards—Krag-Jorgensen Missile.

apart; at 2,000 yards it perforated a horse's body at the shoulders, and at the same distance passed through three human bodies; at 2,800 yards it perforated four inches of deal plank and at two miles yet retained sufficient velocity to penetrate the human body," when such a gun and bullet have been adopted and are already used by our army, why should not a thorough study of the gun, the bullet and especially the wounds caused thereby, be of vital importance to every surgeon in the land?

The Germans were probably the first of all European nations to pay much attention to the increase of range and the lesser weights of the cartridges of the small calibre gun, procuring thereby a greater velocity, flatter trajectory, more rapid rotation and increased power of penetration.

The old Springfield rifle has an initial velocity of 1,315 feet, the new gun, that of 2,100 feet, a rotation on its own axis of 2,500 times per second instead of about 710. At 1,000 yards a velocity of 885 instead of 235 feet. The extreme range of the Springfield rifle, at which the velocity is zero, is 3,500 yards. The small calibre bullet and the Krag-Jorgensen gun at a range of 7,300 yards has still a velocity of 95 yards to the second, which is sufficient to cause a very severe injury. A short description of the calibres of these guns introduced by the principal nations may be interesting, to-wit:

	NAME OF GUN.	CALIBRE.	HOLDS IN. CARTRIDGES.	SIGHTED TO.
Canada	Martin-Metford.	303	1	1,900
Mexico	Mondragon.	256	8	2,603
Columbia, Argentina, Belgium, Spain and Turkey	Mauser.	301	5	2,187
Brazil, Chili, Peru, Austria and Roumania.....	The Mannlicher.	296	5	2,600
England	The Lee-Metford.	303	10	2,900
France	Lebel.	315	8	2,187
Greece	Gras.	433	1	1,968
Italy	Carcaus.	256	6	2,077
Portugul	The Kropfeshek	315	8	2,406
Russia	The Mouzin.	30	5	2,096
Servia	Koka.	284	6	
Sweden.....	Remington.	315	1	2,100
Switzerland	Schmidt-Reuben.	296	12	1,750
Hawaii	Springfield.	45	1	2,000
Japan	Murata.	315	8	2,800
Denmark, Norway, U. S. A.	Krag-Jorgensen.	30	5	2,200
U. S. Navy	Lee.	236		

(Of course, these figures are only approximate as the calibre, sight, and number of cartridges vary with each nation.)

While the average weight of these guns is 8 lbs., that of the Springfield was 9.30 lbs.; the weight of the cartridge was between 22 and 26 grams (340 to 431 grains), compared to that of the

Springfield of over 1,200 grains. The average length of the bullet in the modern rifle is 30 mm., somewhat greater than that of the Springfield, but the weight only 232 grains to that of the late weapon of 500.

It will be seen from this condensed statement that the length of the bullet of the modern weapon is nearly four times its diameter, the weight less than half that of the .45 calibre, the velocity, more than one-third greater, and the range nearly double.

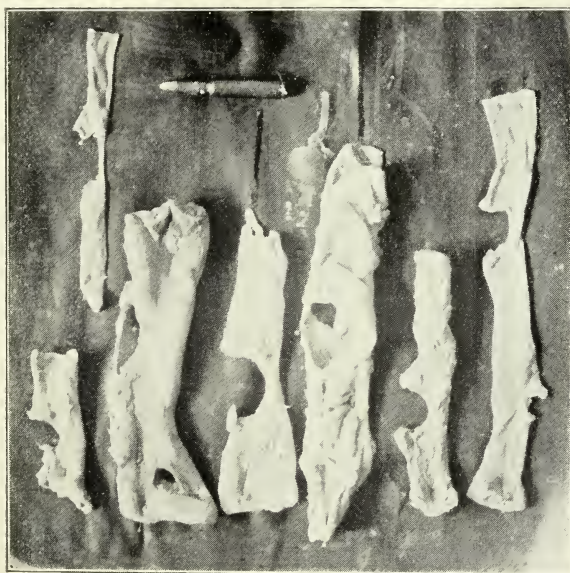


Fig. 3.—Wounds of Intestine at Three Hundred and Fifty Yards—Krag-Jorgensen Missile.

As to the material of the projectiles, it was found desirable to increase the hardness of the lead with 10 per cent. antimony without great loss of the specific gravity necessary to give the proper energy. This metal, however, would not take the rifling with the enormous velocity and the shorter curves of the modern gun and it was found indispensable to cover them with a thin jacket of harder metal for which steel, copper and nickel, or their composition, were found best adapted. From a surgical point of view this had the very desirable effect of preventing the great deformation sus-

tained by the former projectiles on sudden arrests of energy. Since completing my paper, which was read before this honorable body in 1895, we have carried on two series of experiments with the Krag-Jorgensen rifle.

On the 20th of June, 1896, accompanied by a goodly number of gentlemen, including Brigadier General Milton Moore, and Lieutenant Colonel R. I. Pearson, of Kansas City, I conducted a series of experiments at Ft. Riley, Kansas, (through the kindness of my friend, Lieutenant W. S. Scott, of the First U. S. Cavalry, at Ft. Riley). Lieutenant Scott secured the range and several sharpshooters, as well as a number of horses, and we tested very thoroughly the rifle and the shrapnel shot, using the horses and human cadavers for targets. We also tested the penetrative power of the new bullet from the rifle on old and new earthworks, on wood, sacks filled with sand, and tin cans filled with sand (dry and wet), and water, with the following results, viz:

1500 yards.—Tibia, in middle third—bone shattered for a distance of about 6 inches—wounds of entrance and exit in skin almost the size of the bullet. No vessels.

1500 yards.—In abdomen. Rt. iliac region. Wound of entrance in skin somewhat larger than the bullet; passed through intestines and ilium. Wound in bone, only a little larger than bullet. Exit in skin about the size of bullet.

1500 yards.—Abdomen. Almost same as above, except of the shattering of a part of the crest of the ilium. These wounds in the intestines are very large ugly wounds, and numerous.

1500 yards.—Tibia. Upper third. Wounds same as above. Bones shattered with nothing apparent on the outside.

The wind so that we could not secure hits, so moved up to the 1000-yard mark.

1000 yards.—Wound in chest under left nipple. Skin entrance size of bullet. Passed through heart making frightful wounds entrance and exit (in heart), large (torn) wound in left lung passing through the lower part of the scapula shattering this bone and leaving the wound at exit almost the same as entrance.

1000 yards.—Femur. Middle third. Shattered bone about 8 or 10 inches. Split the bone for this distance. Wound in skin and tissues very little larger than the bullet. Entrance and exit in skin about the same. (See Fig. 4.)



Fig. 4.—Wound of Femur at One Thousand Yards Krag-Jorgensen Missile.

1000 yards.—Elbow. Rt. Entered a little below the joint. Fractured the ulna and passed through the condyle of the humerus. Tract of the bullet in the humerus was somewhat larger than the bullet but not very much. Shattering wound of exit little larger than the entrance. (See Fig. 5.)

1000 yards.—Abdomen. Center. Just below sternum. Frightful wound in stomach. Duodenum and in fact everything in reach. Explosive action here terrific. Bullet passed through the body of the vertebra completely shattering it and leaving wound of exit in the skin about the size of the bullet.

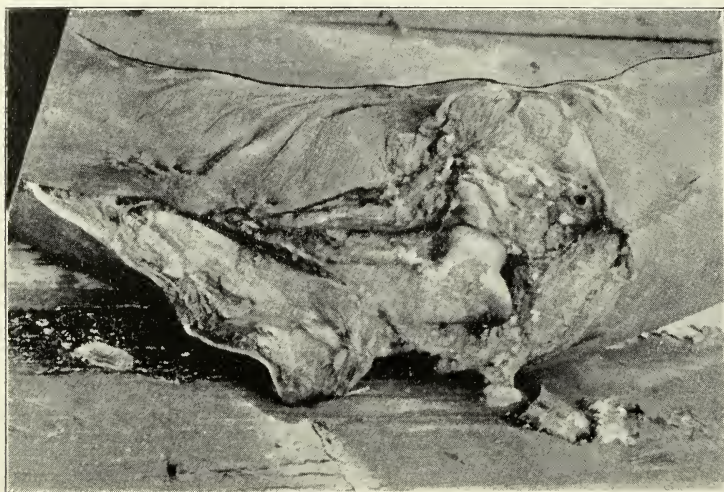


Fig. 5.—Wound of Elbow at One Thousand Yards—
Krag-Jorgensen Missile.

1000 yards.—Neck. Entered just above the middle third of the left clavicle. No damaged vessels. Nothing of importance.

1000 yards.—Femur. Same as above. Frightful in bone.

1000 yards.—Scrotum. Wounds of entrance and exit here somewhat larger than the bullet but nothing of importance.

1000 yards.—Hand. Carpal bones. Fractured; macerated. Could not tell about the vessels as everything was torn to pieces.

1000 yards.—Knee. Head of tibia perforated. Entrance and exit in skin almost the size of bullet. In the bone a little larger. Bone almost pulverized in head of tibia.

1000 yards.—Chest. Under the right nipple. Fractured rib. Perforated wound. Large irregular wound. Tissue has the appearance of being torn or bursted. Passed out below the scapula. Exit same as entrance.



Fig. 6.—Wound of Crest of Ilium at One Thousand Yards—
Krag-Jorgensen Missile.

1000 yards.—Abdomen. Left iliac region. Passed through the sigmoid. Frightful wound in the gut. Passed out through the ilium, making fractures in several directions, but not shattering.

1000 yards.—Forearm between ulna and radius. Flesh wound. No bones. No vessels.

1000 yards.—Abdomen. Almost center. Wounds in intestines are larger irregular wounds. Some two or three inches long. Exit and entrance three inches in diameter. Passed through right kidney making large irregular wound in it.

500 yards.—Elbow. Passed through the joint fracturing condyles of the humerus, in the lower portion. Small wound. Bone not badly fractured. Several wounds in the abdomen and chest with about the same results as at longer ranges. Wound in clavicle and one in humerus with same results given in their localities. Almost no appreciable change with the difference in range. Wound in clavicle, splitting it for about two inches in length.

2500 yards.—With shrapnel shot. One shell burst on subject, making a frightful wound in the left side and cutting off the arm completely from the body. Lacerating it and the body frightfully. (See Fig. 7.)

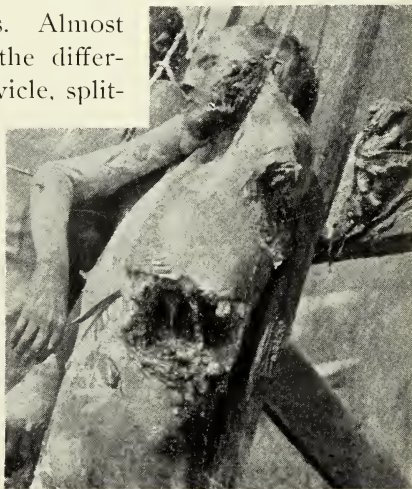


Fig 7.—Shrapnel Wound at Twenty-five Hundred Yards—Shell Burst on the Subject.

On horses, at 2500 yards with the shrapnel shot. Struck one of the horses with one of the grape shot. Felling the animal, but death

would have been slow, hence was killed with a carbine. The wound with the shrapnel was under the shoulder. (See Fig. 8.)

Another horse was shot in the side, the shot passing almost entirely through the body. These shells burst at about 20 paces in front of the animals.

I will not enter into a minute description of this gun and shell at this time, but suffice it to say that the working of this piece is something terrific. Stops horses at 2500 yards of about a mile and one-half!!

On April 3, 1897, accompanied by several gentlemen, including this time also General Moore and Colonel Pearson, I conducted my last experiments with the rifle at Waldo Park (near Kansas City, Mo.), at ranges of 500 and 250 yards, for the purpose of demonstrating a little more of the bone and joint injuries together with those of the skull. Here we demonstrated the fact that this bullet fired at short range was probably more humane than when fired at longer range (so far as bone is concerned).

A shot fired at a range of 500 yards striking the tibia in the upper epiphysis made only a small wound of entrance and exit, and produced not near so much mutilation through its explosive effects as the shot in exactly the same locality on a former occasion at a range of 1500 yards. Again a shot fired at a distance of only about 75 yards struck the tibia at about the junction of its lower and middle thirds. The bone here was completely mutilated, of course, but only for about six inches, while the bone above was not nearly so badly shattered and splintered as in a former wound in the same locality made at a longer range. In this latter case care of the patient (in a live subject, supposing that the wounds should have been the same in a live subject) would have been very much lighter and more satisfactory. An amputation here could have been made successful even below the knee, and if necessary even about eight inches above the wound of entrance proper (or two inches above the shattered portion). We notice further that tendons were cut in the short range firing instead of being pushed aside as in the long ranges.

A shot fired at a range of 500 yards struck a skull immediately between the frontal prominences, cutting the scalp and grazing the bone for two inches, appearing to have deflected upward at an angle of about 75 degrees, without any fracture whatever; however, we have all reason to believe that this bullet had been changed in its course before striking this skull and that instead of a deflection, this wound is really an example in bone of that nipping out effect, or rather condition, which has been shown in wounds in the intestines. For we have on record a case in which a similar shot caused a complete shattering of the whole skull, the tract of the bullet being straight and the wound of exit being opposite the wound of entrance; and this shot fired at a range of 350 yards (see photograph in last paper).

I have never found a deflection of the bullets in its course at any range, to be caused by any of the tissues in the body, and although this bullet may possibly pass clear through the body and do no vital damage, it is due to this very fact, that the bullet continues in the direction in which it starts, being changed in its course by nothing, not even when striking a rib of vertebra at an angle.

This bullet being of much smaller calibre, longer and of a much harder substance (lead and jacked) and wearing a German silver jacket, together with an increased velocity, meets with much less resistance when it strikes bone, hence its explosive, lateral or rotary (!) effect is much greater than the old 45 calibre.

When a cavity is struck its work is very much more disastrous than when bone is struck.

Loose earth is the only material which we have found to deform the bullets to any considerable extent, and we have found them almost perfect after passing through 18 or 20 inches of compact earth.

Captain La Garde (Lieutenant Stiles' paper, Eighth Cavalry Lyceum), thought that of all bullets striking bone under 200 yards the German silver mantle was ruptured. My more recent experiments leave me still convinced that such is not the case.

The effects of this bullet are variable with different kinds of bones. Cancellous bone (ilium) is punctured without any appreciable lateral or explosive effect, the wounds of entrance and exit as well as the tract of the bullet being only a very little larger than the bullet.

In bone when the external part is compact over a considerable amount of cancellous tissue the explosive effects is more marked at the long ranges (as the head of the tibia).

In the shafts of the larger bones, the fractures, especially at the longer ranges, are frightful, and in the small bones mostly compact tissue, frequently we find a piece pushed out as it were, or fractured in several places through the bone as in the clavicle.

The explosive of the bullet on lung tissue, heart, spleen, liver, kidney, small and large intestine, bladder and in fact all vital organs, or on cavities is enormous, especially when these are full. This explosive or lateral effect was demonstrated in my former experiments in a case in which a live dog was struck by a bullet, while running from the marksman, at a distance of about 100



Fig. 8.—Shrapnel Wound of Horse at Twenty-five Hundred Yards--One of the 260 Pieces of Shrapnel.

yards, in which the wounds of entrance and exit were about the size of the bullet, which passed clear through the dog longitudinally and a post mortem examination which immediately followed revealed the entire contents of the dog loose and full of the most terrific wounds of all shapes, sizes and kinds.

APPENDIX I.

Letter from Captain W. T. Stark, A. D. C., N. G. Mo.:

Having assisted in all of your experiments with the new Springfield rifle, and having done a not inconsiderable amount of the firing of it, I have very naturally formed some opinion as to its adaptability to army service.

That it is a hard-shooting, far-carrying weapon, with flat trajectory, no one questions; or, that it is fairly accurate; I say fairly accurate, for it appears to possess a natural driftage of about eight feet in a thousand yards which it would seem should be overcome in the arrangement of its sights.

The magazine feature is strong, fairly simple, and the action of the lever easy of manipulation under favorable circumstances. I should dislike, however, for my safety to depend on its rapidity and ease of operation under *all* circumstances. I have recently with plenty of time at my command, with no occasion for trepidation, with the magazine of the gun filled, worked the lever back and forth four or five times without driving a cartridge to its seat on the breach; once I snapped the plunger down while the barrel was empty, thinking it loaded.

In action, with the noise and excitement incident to a battle, I doubt if I ever should have discovered this condition of affairs at all. Cartridges would catch in their passage from the magazine to the barrel and jam in such a manner as to render them very difficult of dislodgement. The bolt not having been freshly oiled, seemed to catch and stick as if gummed, which was not the case for it was recently cleaned, but owing to the peculiar lever, with its knob, at right angles to the bolt, the application of power is indirect. I should say the action of the old Springfield is far superior to that of the new; that the new gun deprived of its magazine feature and fitted with the action of the old, would be far safer and a more satisfactory service gun, and I doubt not many army men hold similar opinions.

As to the flight of the bullet I find it very slightly affected by the wind as compared to the .45 calibre. I have seen it pass through 12 inches of oak when the oak was represented by three four-inch sawed pieces placed at different angles, and at a distance of 350 yards from the gun, and I have seen the same depth of dry, loose dirt stop and so disfigure the bullet and jacket that all semblance to its original shape was lost; and this at a distance of 20 paces. Have also seen it penetrate a solid bank of earth to a depth of 18 to 25 inches, making a hole 1½ inches in diameter without deforming the missile. In damp earth the hole

made was two inches in diameter with distinct evidences of having been caused by the ball's rotation.

Penetration is unquestionably greatest in damp earth whether loose or compact at any distance.

The humanity of this new weapon is problematic, a question for the moral philosopher, but who that has seen it work can doubt that it will prove a great labor-saving device so far as the surgical department of the army is concerned (in the field).

The photographs taken by Mr. Thomas James and the writer and the stenographer's reports show that at 1000 yards and less the mortality would be terrific. If the seat of the wound be the head, pleural or abdominal cavities, or any of the large bones. One photograph especially presents most conclusive evidence of its riddling propensity; the femur having been struck midway between the knee and hip joint is split a distance of nine inches and broken in many pieces, and this at a distance of 1000 yards. The results of wounds on other bones bear out the above observations. In photographing wounds in the feet it was found that tendons were seldom cut at long range, but apparently pushed aside by the bullet, or only slightly frayed, evidently by the rotary motion of the projectile. This tissue (tendon) seems to be the only one which escapes so easily. I have among the series of photographic plates one showing a gut just grazed by a bullet, but the part touched was carried away and I do not doubt that the action would have been similar on a large blood vessel. This peculiar nipping out effect, I believe, to be undoubtedly due to the rotary motion and much of the lateral effect to the same cause. The particularly churned up appearance of a part of a brain, marking the passage of the bullet, of which we made a photograph, would seem to indicate such was the case.

While it is true that a bullet from a Krag-Jorgensen rifle passes through a given distance so quickly that it has time to make but few turns, I am fully satisfied that these few turns or even part of a turn exert a force so intense as to produce disastrous effects on living tissue. As to the shrapnel from a 3½ inch rifle with which the experiments were concluded; its appearance in action is demoniacal, its probable results, judged by the manner in which it spattered the hillside and disposed of some superannuated dumb brutes, simply irresistible.

Some of the missiles from the exploded shell, fired from a distance of 2500 yards, passed almost entirely through the body of a horse, and I should say that if there has ever been any question of the lead balls, with which this shell is loaded, possessing force enough to be destructive, the results of the experiments on this occasion should furnish evidence of the presence of that force.

APPENDIX II.

Letter from Lieutenant Colonel R. I. Pearson, Assistant Adjutant General of the First Brigade, National Guard, Missouri:

I have the honor to acknowledge receipt of your communication of recent date asking an expression of my views on the merits of the "Krag-Jorgensen" rifle and carbine, as exemplified by the several tests which you so kindly afforded me an opportunity to observe.

In reply I would say that inasmuch as I am in no sense a marksman, and consequently can only form an opinion from observation, I am scarcely capable of technically criticising the firing qualities of the gun, but as you are well aware from the first test made by you in 1894 I have been exceedingly lukewarm in my advocacy of it as a military arm and nothing has occurred through subsequent tests to in any way change my opinion in this direction.

The fact that the "Krag-Jorgensen" gun has been adopted as the arm of the U. S. Army, and doubtless after thorough tests by experienced men whose business it is to judge correctly the merits of such things, from the standpoint of the practical, as well as the scientific, soldier, it would seem as though there were characteristics of superiority in the gun that has escaped my observation, and in consequence leaves me but a very poor authority on such a subject, and the probabilities are that I would show discretion, by simply saying with the great agnostic, "I don't know," as in fact I do not, and the only comment I can make upon the gun, will be along the lines of mechanical construction, and confined exclusively to that part known as the loading and firing device.

In the hands of skilled marksmen, upon the rifle range, and with nothing more formidable confronting them than a target, or even a cadaver, there is no question of its effectiveness, but while the range may develop the marksman, it goes but a short ways in the development of moral and physical courage, in the face of danger, such as the soldier trained, or untrained, meets in actual service.

During the last series of tests made by you April 3d, it was my privilege to be stationed with the firing party, and while, of course, I entered into an observation of general results, my principal attention was centered upon the action of the loading and firing device, of both the infantry and cavalry gun, and my former opinion of them was only intensified, and I predict, that if ever occasion arises for a test of them, in active service, the army using them will become demoralized through the uselessness of its arms, and find itself praying for the old Springfield rifle, even with its defective construction.

I am clearly of the opinion that the "Springfield" with diminished calibre, and some modification in its firing device, would be the safest, and most serviceable infantry arm, for even the old trained soldier, to say nothing of such men as would compose the volunteer contingent of such an army as this country could put in the field.

IV. THE AMBULANT TREATMENT OF FRACTURES.

BY MAJOR EDWARD MARTIN,

PHILADELPHIA, PA.,

SURGEON IN THE NATIONAL GUARD OF PENNSYLVANIA.

THE ambulant treatment of fractures is dependent for its success on the principle of suspension and fixation, with the leg so encased in a rigid dressing that the weight of the body is carried from the knee to a point below the sole of the foot. When the case is properly applied the patient is able to walk without the support of either crutch or cane, without the possibility of the fragments being displaced or being moved one from the other. The dressing should be applied as soon after the fracture as possible. The materials required are cotton batting cut in rolls about 5 inches wide, eight plaster-of-paris bandages 3 inches wide and five yards long, sufficient plaster-of-paris to make a paste and iron strips about $1\frac{1}{2}$ feet long, 1 inch wide and sufficiently flexible to be bent with the hands. Flannel bandages may also be employed, although these are not necessary. The plaster-of-paris should be fresh and fine and the bandage into which it is rubbed should be of gauze deprived of its fat and in wide meshes.

The first essential in treatment is thorough reduction. Unless it is absolutely certain that the bones are in proper position ether should be given to the point of complete relaxation, thus enabling the surgeon readily to put the bones in their proper position. The foot and leg and the lower third of the thigh are then wrapped in the cotton batting. It is applied in a thin layer about the tibial tuberosities and expansion of the knee and a very thick layer about the malleoli. Beneath the sole of the foot which is kept at right angles to the long axis of the leg is placed a roll at least three inches thick. The purpose of abundantly padding the malleoli is obvious, since thus the plaster is flanged out and these bony projections are prevented from the upward pressure of the plaster when the patient throws his weight on the foot. The padding having been smoothly applied one or two layers of the plas-

Plaster-of-paris bandages are then wrapped about the leg, the surgeon employing distinctly more pressure than is admissible when these bandages are applied without cotton padding. Two of the flexible iron bands are then bent so that they fit closely to the leg and flanged out slightly at the ankles to accommodate themselves to the extra thickness of cotton and curved beneath the sole of the foot. One is applied on each side of the leg and the leg and lower third of the thigh are then enveloped in plaster-of-paris bandages, a little of the thick paste being rubbed in between each layer. The bandage is finally completed by coating the plaster over it and smoothing this with wax paper. If the patient has been etherized he should be kept relaxed until the plaster has become fairly hard. Twenty-four hours after this dressing the patient is allowed to be out of bed. He walks at first on crutches, then with crutch and cane and finally without support.

I have applied this dressing in upward of 40 cases with results, so far as deformity was concerned, certainly equal to those obtained by the usual methods of treatment. This ambulant splint has been applied to both simple and compound fractures. Indeed it is the routine practice in the hospitals to which I am attached to put it on as soon as a fracture below the knee is admitted to my wards.

As in the case of every single form of dressing, it is obviously not indicated in all cases. Thus when there is very great swelling involving the entire leg it is obvious that the dressing cannot be used so that the support will be carried over the tuberosities to the ground. In enormously fat people or in those exhibiting such conformation that the bony projections of the knee-joint are not prominent a dressing will be likely to fail. In many infected compound fractures it might not be applicable, since trapping for drainage would be likely to weaken it so that it would not serve the purpose, but for the great majority of cases of fracture of the leg it affords the simplest, safest and most efficient means of treatment we possess.

Its advantages in military surgery are obvious, it vacates beds, enables patients to help themselves and others and greatly facilitates their transportation, while at the same time it effectually guards against local injury from jolting or jarring.

V. FRACTURES OF THE LOWER EXTREMITY OF THE RADIUS.

BY LEWIS STEPHEN PILCHER, M. D.,

BROOKLYN, N. Y.,

SURGEON TO THE METHODIST EPISCOPAL HOSPITAL; LATE
PASSED ASSISTANT SURGEON IN THE UNITED
STATES NAVY.

FRACTURES of all kinds are notably military injuries and fracture of the bones of the forearm in the immediate vicinity of the wrist joint by indirect force transmitted from the hand is of especially frequent occurrence. In many cases the lower end of the radius only is fractured, but not infrequently the styloid process of the ulna is also broken off, and in some cases the shaft of the ulna is fractured at a point some distance above. The frequency with which the force of a fall is broken by an outstretched hand causes fracture of the radius at its lower end to be the most common of all fractures; the peculiar mechanism of the wrist joint is such as to give to these fractures as a class quite a uniform type; the proximity of the intricate and important radio-ulnar and radio-carpal articulations, and the numerous tendon sheaths of the flexors and extensors of the wrist and hand entail special liability to functional disability from adhesions resulting from the accident, while whatever deformity may result is kept in constant view by the superficial and prominent position of the bones.

The lower extremity of the radius, whenever strong backward or forward flexion of the hand upon the forearm occurs, is subjected to cross breaking strain through the common carpo-radial ligaments, anterior or posterior as the case may be. The frequency with which the force of a fall is partially sustained by the outstretched hand, and the hand is thereby forced into strong backward flexion, explains the frequency of the fracture in question. Fig. 1 shows the relations of the lower end of the radius to the elements of the wrist joint when the hand is bent backward until the anterior ligaments are taut. Further strain, if sufficiently

violent, must rupture either the ligamentous fibres or the bones of the carpus, or tear off some portion of the lower end of the radius. The projection of the anterior articular lip of the radius into which the ligament is inserted mechanically favors the transmission of the greater part of the strain to that portion of the bone, and renders it less able to resist than are the fibres of the ligament itself.

The manner in which the resulting fracture is produced is shown in Fig. 2.

The amount of the bone thus torn off varies greatly in different cases, on account of the differences in the shape and structure

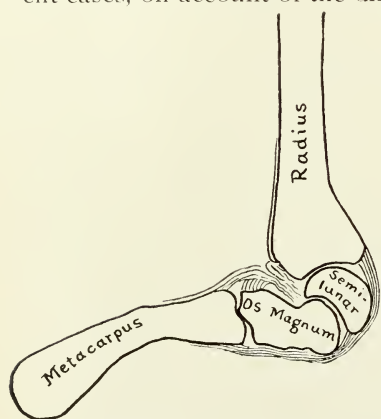


Fig. 1.—Diagram showing the relations of the lower end of radius to the elements of the wrist-joint; longitudinal section with hand in moderate backward flexion.

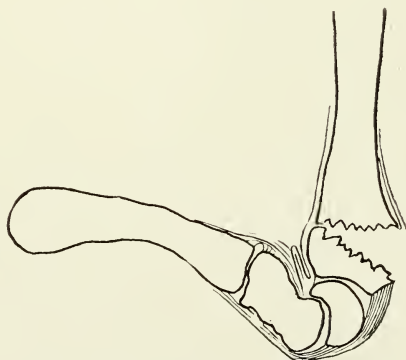


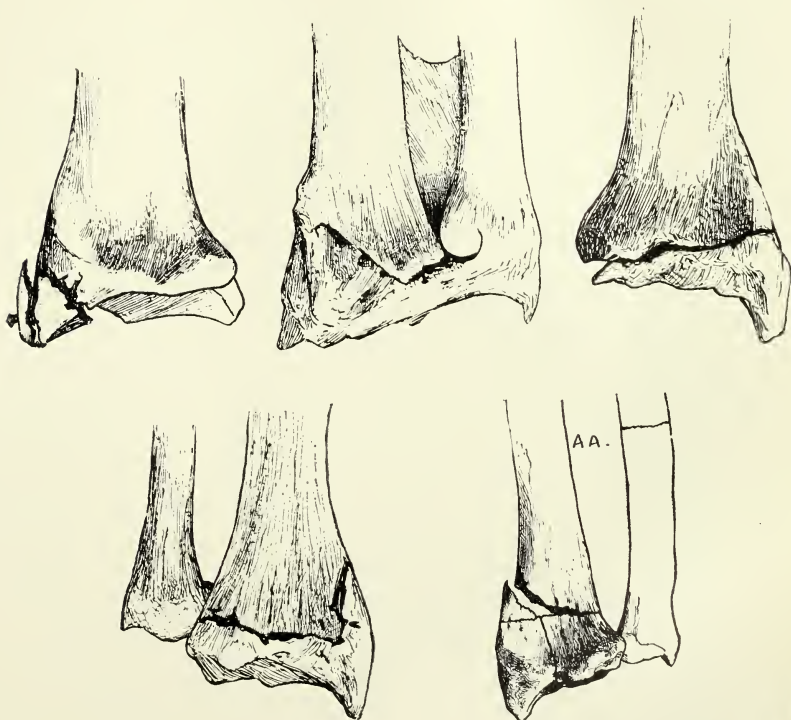
Fig. 2.—Effect upon the lower end of the radius of the cross-breaking strain produced by extreme backward flexion of hand.

of the bone, in the relative strength of the different fasciculi of the ligament, and in the amount of strain and pressure in action.

The following cuts, drawn (Figs. 3-7) from museum specimens, show some of these varying lines of fracture.

In most cases of falls upon the outstretched hand the cross breaking strain from the backward flexion of the hand is further complicated by a vertical force due to the impact against the ground of the weight of the body transmitted through the limb to the hand. The amount of this in different instances must vary within very wide limits depending upon the weight of the particular body and the distance and velocity of the fall. An equal amount of this force will also produce different effects in different

individuals, and in the same individual at different times. In many instances a cross-breaking strain to the point of fracture at the wrist is successfully resisted by the tissues, and the composite strain is transmitted higher along the limb, to be ultimately decomposed without serious injury, or to produce dislocation or fracture at some other point.



Figs. 3-7.- Five illustrations showing various lines of breakage in fractures of the lower extremity of the radius.

Whenever, however, the tearing away of more or less of the lower end of the radius has resulted, the effect of the surviving vertical force is to thrust backwards and upwards the fragment that has been torn off, and to impale it upon the sharp strong edge presented by the thick compact tissue of the posterior surface of the upper fragment. See Fig. 8.

The amount of backward displacement thus produced may be of any degree, from a slight slip, merely sufficient to efface the

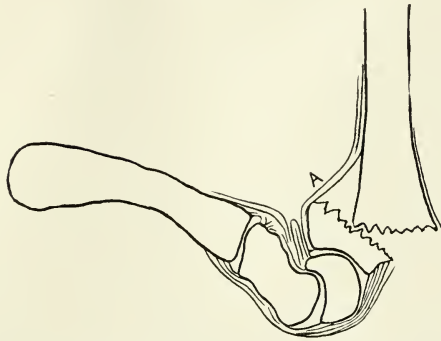


Fig. 8.—Illustrating mechanism of the backward displacement of lower fragment of radius produced by resistance of wrist and hand resting upon the ground to force transmitted through forearm; periosteum (A) stripped up from back of upper fragment and still connecting the two fragments; impaction of upper into lower fragment probable; hand still in primary position of backward flexion.

natural projection of the anterior articular lip, to dislocation so complete that the whole of the lower fragment overrides the lower end of the upper. Fig. 9 shows moderate degree of displacement, one frequently met with.

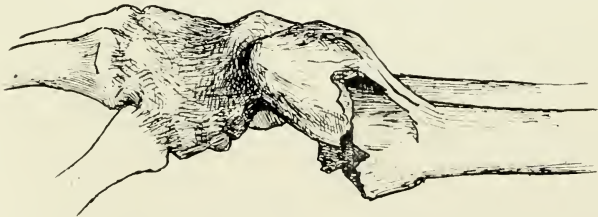


Fig. 9.—Moderate backward displacement of lower fragment of the radius after fracture near its lower end. From specimen presented to the Anatomical and Surgical Society of Brooklyn, by Dr. G. W. Westbrook.

The degree of impalement suffered by the lower fragment is also subject to the widest variations, from that of a slight mutual entanglement of the irregular fracture-surfaces to that of deep penetration of the upper into the lower, with splitting of the lower into many fragments: See Figs. 10, 11 and 12.

Even in its lesser degrees this interpenetration of the fragments, by the crushing of the cancellous tissue of the lower fragment which attends it, produces some positive change in the form and structure of the lower fragment more especially, which is essentially a mass of spongy tissue enclosed in a thin compact shell. As the result of this, some permanent alteration from the normal contour of the bone is inevitable (Fig. 10), with a more or less marked deformity of the region following. Even though the fragments are disengaged from each other and put in their proper position to each other, the lower fragment remains shortened, the direction of its articular face is changed, and, according to the degree of the comminution, it is broadened both laterally and antero-posteriorly..

By the backward displacement of the lower fragment of the radius further important changes in the relations of the other constituents of the wrist-joint are produced. The torn-off fragment with the attached carpus is forcibly rotated into supination, the position being as shown in Fig. 13.

The radio-ulnar ligaments are strained, possibly in part rup-

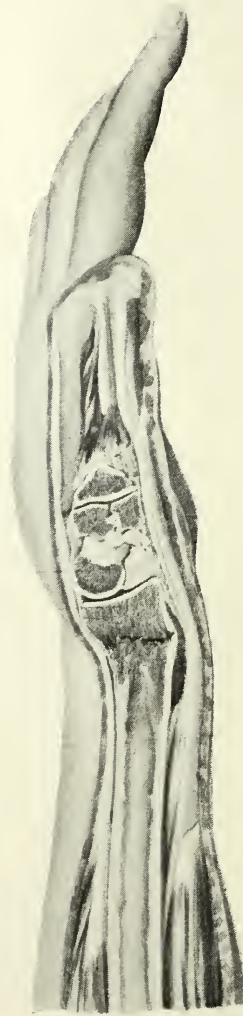


Fig. 10.—Showing change in contour of lower fragment, and alteration in direction of articular facet, and loss of projection of anterior lip consequent upon fracture of the lower extremity of the radius—Adapted from Anger; Park's Surgery.

ture, and the lower end of the ulna is made to project abnormally upon the front and ulnar side of the wrist; the further strain of the



Fig. 11.—Moderate backward displacement, with penetration of posterior part of lower end of upper fragment into the lower fragment.

From specimen furnished by Professor McGraw.

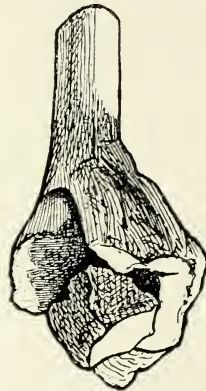


Fig. 12.—Marked backward displacement, with comminution of lower fragment by driving down into it of the lower end of the upper fragment.

From specimen, No. 189, in the Museum of the Roosevelt Hospital.

continued dorsal flexion falls especially upon that strong fasciculus of the anterior common ligament which passes obliquely from the

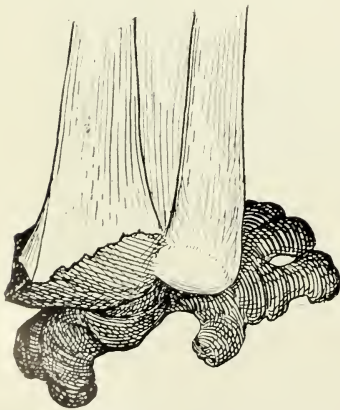
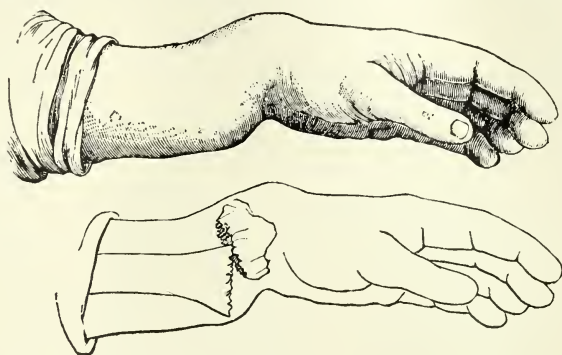


Fig. 13.—Showing relations of elements of wrist-joint following backward displacement of torn-off fragment of radius; hand in position of forced dorsal flexion.

middle of the carpal mass to the side and base of the styloid process of the ulna; as a result the projection of the ulna is intensified, and in many cases the styloid process itself is torn off by the strain. (See Fig. 15.) As long as the displacement of the radial fragment is unreduced, the carpus remains locked in the position of supination; and the anterior projection of the head of the ulna is perpetuated by the continued tension of this fasciculus. When the hand is taken up from the ground, and is allowed to recover from its position of dorsal flexion, a characteristic deformity of the wrist is

presented (See Figs. 14 and 15), due to the posterior projection of the carpus and lower radial fragment, the anterior pro-

jection of the lower end of the upper radial fragment, and the antero-internal projection of the head of the ulna. Dissection of the parts in this state shows that the periosteal and aponeurotic structures that were stripped up from the back of the proximal radial fragment, instead of being torn across, constitute now a strong band A, Fig. 16, which is made tense by the forward flexion



Figs. 14 and 15.—Deformity at wrist consequent upon displacement backwards of the lower fragment of the radius after fracture at its lower extremity. (Levis.)

of the wrist, and while thus tense, tends to hold the fragments in impaction, and hinders their separation by traction and ready reposition by pressure. If union occurs without complete reposition

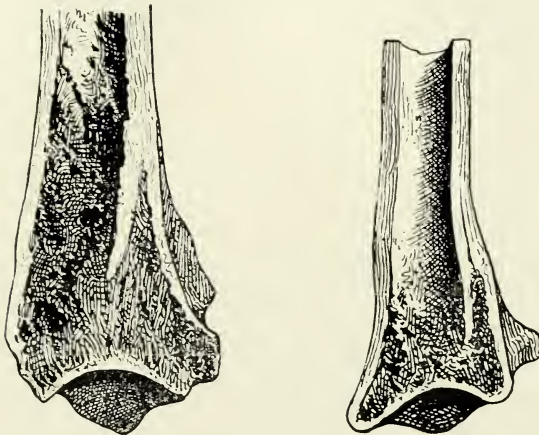


Fig. 16.—Diagram showing position of the parts at the wrist after fracture of the lower end of the radius, with displacement, upon return of hand to natural position; A., unbroken periosteum.

sition of the lower fragment the space which is left between this detached periosteal layer and the posterior surface of the bone becomes filled with plastic material which by subsequent ossification so encases this portion of the radius in new bone that upon subsequent section it presents the appearance of deep penetration of the lower by the upper fragment. See Figs. 17 and 18.

Anterior displacement of the lower fragment, after fracture of the lower end of the radius, is occasionally met with, as shown in Fig. 19.

This particular form of injury has been recently minutely studied by Roberts, who has assembled a considerable number of clinical histories, and of museum specimens illustrating it. In a large proportion of these cases the injury was known to have been occasioned by falls upon the back of the hand, and may be referred to a cross-breaking strain exerted through the posterior common ligament of the wrist upon the lower end of the radius by the



Figs. 17 and 18.—Antero-posterior section of old fractures of the lower extremity of the radius, healed in deformity, showing enclosure of lower part of the posterior compact wall of the upper fragment by newly formed bone deposited in the space formed by the crowded back and lifted up periosteum attached to lower fragment. (Voillemier.)

hand thrown into extreme palmar flexion. In a well marked case, seen by myself, the patient had fallen backwards out of a wagon to the ground. The rarity of falls upon the back of the hand, and the absence of any posteriorly projecting articular lip to exaggerate the force of strain exerted through the ligament, explains the relative rarity of this form of displacement.

The effect of the direct impact of the carpus, violently driven against the broad shallow saucer-like articular surface of the radius, is also to add a direct crushing and splitting force to the indirect cross-breaking strain heretofore considered. By this direct force the posterior lip may be crushed off, or stellate lines of frac-

ture may be created, radiating from a central point, comminuting the lower fragment, if a transverse fracture coexists, or in other cases extending upward as longitudinal crevices for a variable distance along the shaft, without transverse fracture. See Figs. 20 to 25.

The injuries sustained by the soft tissues about the wrist-joint, coincident with the bone-lesions that have been described, are extensive and important. The ligaments are violently stretched, partially lacerated, sometimes entirely ruptured; the synovial sacs of the articulations are badly contused, sometimes

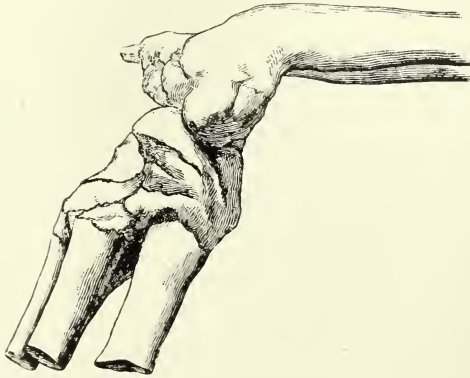


Fig. 19.—Fracture of the lower end of the radius with anterior displacement of the lower fragment, united in deformity. From specimen in the Museum of Edinburgh College of Surgeons. (Roberts.)

lacerated and filled with blood; the sheaths of the tendons, both in front and behind, are injured; in front the projection of the ragged edge of the upper fragment into the midst of the flexor tendons may lacerate their sheaths and irritate the tendons, behind the violent stripping up and continued tension of the periosteum is an injury done to the floor of those extensor tendon sheaths into the formation of which it directly enters.

Effusions of blood and lymph into the anterior tendon-sheaths and adjacent connective tissue spaces early produce a well marked swelling on the front of the wrist, above the annular ligament, which exaggerates the deformity formed by the bone displacement, and may simulate displacement when none exists. Such an

effusion-tumor may result from injury to the soft parts alone, without the presence of any lesion of the bone. On the back of the carpus some swelling of similar character also forms as a rule.



Fig. 20.—Longitudinal fissure with fracture of Styloid process. N. Y. Hosp. Museum.

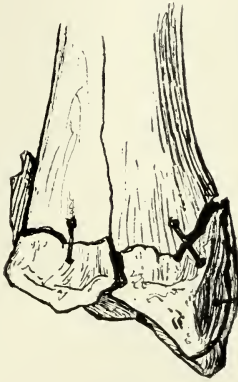


Fig. 21.—Longitudinal fissure with transverse fracture. (Hamilton.)

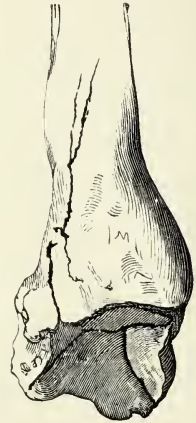
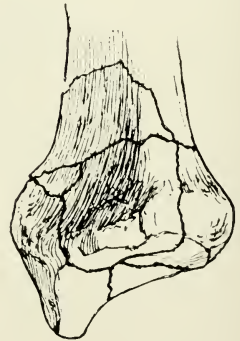
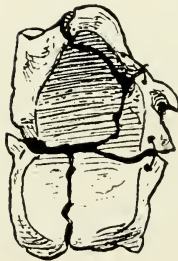


Fig. 22.—Longitudinal fissure without transverse fracture. (Bigelow.)



Figs. 23, 24 and 25—Showing radiating lines of fracture produced by impact of carpus against articular surface of the radius. N. Y. Hospital Museum. Hamilton and Stimson.

Figs. 20 to 25—Showing crushing and splitting effects of direct impact of the carpus against the lower articular surface of the radius.

These effusions are firm, are slowly absorbed, especially in the feeble and aged, and tend to provoke the formation of adhesions along the course of the tendons which they envelop.

The diagnosis is usually to be made from the deformity present rather than from the recognition of crepitus and abnormal mobility, which often are not to be elicited on account of the displacement and impaction and the resistance of untorn fibrous connecting bands.

In cases in which the degree of displacement, and consequently the extent of deformity, is but slight, careful palpation will usually enable the surgeon to recognize the loss of the projection formed by the anterior lip of the sound bone and some abnormal elevation of the lower fragment on the back of the wrist. In the absence of any appreciable displacement the lesion of the bone may still be inferred if pressure elicits a point of special tenderness on the outside of the radius near the base of the styloid process, since such tenderness at that point could not result from any ligamentous rupture. Forward displacement of the head of the ulna is recognized at once on inspection of the wrist and when present indicates the coexistence of fracture of the radius; fracture of its styloid process is indicated by special tenderness at its base; manipulation may elicit undue mobility and crepitus, but it is rarely so completely torn away as to become notably displaced.

Fracture without great displacement is often overlooked, and being regarded as a simple sprain is permitted to heal without effort to prevent deformity. In cases of severe injury to the wrist, accompanied with ecchymosis, local swelling and impairment of function, the presence of fracture is always to be inferred, and only the failure to elicit any of the signs of it that have been mentioned should warrant the conclusion that it is absent.

Fracture with extreme displacement may be mistaken for a dislocation of the carpus, an error which was universal until within the present century. Such uncomplicated dislocation is an extremely rare occurrence, and should be accepted as present only when careful examination has demonstrated beyond question that the radius is intact.

PROGNOSIS.—Rapid bony union is the invariable rule, but the impairment of the function of the wrist is often slowly recovered from, and in some cases the adhesions among the periarticular structures, especially along the tendon sheaths, are so dense that for many months the wrist remains rigid, and the movements of the fingers are limited. The amount of actual deformity that

remains will depend largely on the success of the efforts to secure primary accurate reposition of the displaced fragment. In a considerable proportion of cases, however, such actual alteration in the form of the lower fragment has been occasioned by the injury that the restitution of the perfect normal contour of the part is impossible by any treatment, and some deformity is unavoidable. The involvement of the epiphyseal cartilage in the fracture in children has been known to induce premature ossification and arrest of growth of the lower end of the injured bone, with later gradually increasing deformity from its shortness relative to its fellow ulna. The most common alteration, as the result either of incomplete reduction or damage to the bony structure, is the loss of the anterior projection of the articular lip and the imposition of a more or less backward inclination upon the plane of the articular surface. The consequence is a perpetuation in some degree of the deformity which has already been described as characteristic of the primary injury. The inward and forward projection of the lower end of the ulna in many cases persists, often when there is no appreciable deformity of the radius, owing to the permanent elongation of the ligaments which bind it to the radius, although in some cases coexisting minor changes in the shape of the radius may be concealed by the overlying tissues.

The bony deformity, even when marked, of itself entails very little, if any, functional disability. The articular rigidity, the matting of tendons and the contracture of ligaments and fibrous bands, due to the lacerations and irritations of these structures in connection with the bony injury, and the persistence of the exudates that follow, and the effects of prolonged immobilization, produce the chief sources of disability following this injury. This disability is particularly prone to be marked and persistent in elderly persons, but usually ultimately yields, even in these, to patient efforts at massage and mobilization.

TREATMENT.—If displacement exists its accurate reduction is of first importance. The chief obstacles to ready and perfect reduction are the impaction or entanglement of the uneven surfaces of the fragments, and the tension of the untorn periosteal-fibrous band which still unites them at the back. The latter can be overcome at once by placing the hand in dorsal flexion; while the hand is still in this position extension will disengage the fragments, and

firm thumb pressure upon the back of the lower fragment will push it forward into place. If the hand is then brought into palmar flexion the fracture surfaces fall together, and the normal contour of the bone is restored, the carpo-ulnar ligament is relaxed and the ulna assumes or may be pressed up into proper position in relation to the radius. Should the first effort to secure perfect reduction be unsatisfactory in its results, renewed and more thorough attempts should be made, until it is evident that the best possible position of the fragments has been secured.

Ordinarily there is but little tendency to renewed displacement after reposition, provided the part is protected from further direct force. Any pressure on the anterior surface of the wrist will bear upon the projecting anterior lip of the lower fragment, and may crowd that fragment back to the plane of the shaft of the bone. Antero-posterior pressure also tends to crowd the soft tis-

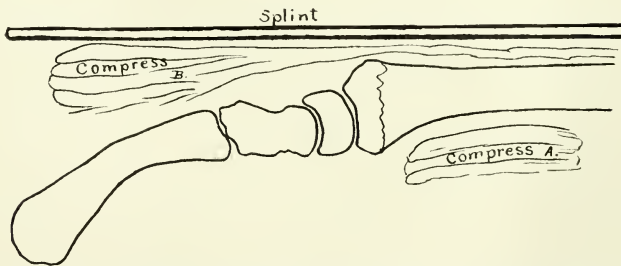


Fig. 26.—Diagram showing arrangement of compresses and splint best adapted to retain fragments in proper position after reduction.

sues in between the radius and ulna, and, forcing the ulna away, to renew and perpetuate its diastasis. The first indications are to give the injured part support and protection, and by immobilization and equable compression to limit effusion and promote repair. With the subsidence of the primary wound reaction, especial precautions to maintain the mobility of the wrist and finger joints are indicated.

In very many cases the application of a flannel roller bandage and the support of a sling will be all the apparatus required. A small compress, about one-quarter inch in thickness should be first adjusted upon the front of the forearm, its lower edge being permitted to come down nearly but not quite to the level of the anterior lip. (Fig. 26, A.) Over this the roller passing, binds the strained and shattered parts of the wrist together and gives an agreeable sense of security and support.

This circumferential compression is especially important to maintain the lower fragment and the carpus in their proper position to the ulna. It is further reinforced during the after-treatment by keeping the forearm supported on its ulnar side in a narrow sling, not extending forward beyond the distal end of the ulna, in which position the weight of the unsupported hand and wrist is an additional force tending to press the ulna into position. At this first dressing allowance must be made for the primary traumatic swelling that follows the injury, and the bandage must later be loosened or cut, if its constriction becomes a source of discomfort; as the swelling subsides it should be tightened again.

Whether to this dressing should be added a splint will generally depend upon what may be called collateral circumstances. In cases of those who are quite young, or are careless, or are apprehensive, the additional protection of a splint is a wise precaution to be used if the surgeon also remembers that its prolonged use may create finger and wrist stiffness, and by its pressure deformity may be perpetuated. For a young surgeon also, it will in most cases be more discreet not to disregard the popular sentiment as to the necessity of a splint in the treatment of a fracture.

Many special forms of splints have been devised by surgeons for this injury. None of them possess such special advantage as to justify their description here. A light straight splint, such as can be extemporized anywhere from a pine shingle or a cigar-box, answers the indications perfectly. One splint only should be used, and this should be applied to the dorsum of the wrist and forearm (See Fig. 26). It should not be wider than the wrist itself; it should extend below only to the heads of the meta-carpal bones, so that the fingers shall not be confined by it; it should be well padded, and the padding should be made thicker over the carpus and metacarpus, so as to keep the hand in slight flexion while it is in place; it should be secured with a roller to the hand and forearm, and the forearm then suspended in the narrow sling already recommended. From the third day the thumb and fingers should be frequently and systematically flexed, and after the first week the splint should be daily removed and the wrist should be massaged and moved; by the end of the third week the splint should be discarded altogether, and thereafter active and passive movements of the wrist and fingers, with massage, be practiced systematically until the normal function of the parts has been restored.

CHAPTER XV.

Instruction in Military Medicine and Surgery.

I. MILITARY MEDICAL PROBLEMS.

BY LIEUTENANT COLONEL ALFRED A. WOODHULL,
MEDICAL DEPARTMENT UNITED STATES ARMY.

PREFATORY NOTE.—This essay has been prepared at the special request of the Secretary of the Committee of Arrangements. The excellent paper upon the same subject by Colonel Bache, read last year at the Buffalo meeting, appears to me to render this superfluous, but there may be some value in repetition. We should certainly constantly remember that, while the professional element in our official character is the most important and upon it our existence depends, there is another factor which is absolutely essential for medical officers to possess in their relation to bodies of men.

IT is an axiom that rank carries responsibility with it. Notwithstanding that of late years the Medical Directorship has not only been shorn of its appropriate title, but has been bereft of some of its more important functions, a responsibility toward others and toward affairs must adhere to the position. It has greatly shrunk as an active power during peace, but it is impossible that in war it shall not resume its former and necessary importance. Without the possibility of the active exercise of physical force, there would be no reason for the existence of an army; and the army that is unprepared when called upon, is a reproach to the government and a disgrace to itself. The medical department is under peculiar disadvantages in such preparation, and it is the object of this paper to indicate one of the ways by which that backwardness may be lessened. Although with such diminished influence it is still the moral duty, albeit nowhere directly so expressed in the regulations, of the administrative medical officer on the staff of a Department Commander not only to supervise the formal reports and returns that pass through his office, to

be only to advise the commanding general upon points of sanitation within his jurisdiction, and to carry out such instructions as he may receive from Washington, but as I understand it to direct and encourage the medical officers in his department in official matters beyond those that are clinical. Without doubt the clinical service of a medical officer is the most important that he can render to the particular person requiring it. But in medicine there are anticipatory and preventive measures, which carried out may obviate a large proportion of ineffectiveness that otherwise would occur; and in the overwhelming and exigent surgery of battle, were there no prevision, system, and comprehensiveness of organization for the disposition of the wounded, the skill of individual operators would be of little avail. In the former case preventable disease may abound, and there is too much testimony to the value of preventive hygiene to disregard it. In the latter, the surgical staff at the extreme front will be swamped by the refluxing tide of blood, and a suffering multitude will waste and die in growing and unrelieved agony. Peace also, as well as war, has its exceptional conditions, and garrison life does not teach all the possible phases of duty.

It will be cordially admitted by all directly concerned that such subjects should be mastered in advance; but it is true that few of us voluntarily sit down and devise a possible situation in order to think out the service it would demand. Very few occupied with daily work are disposed to anticipate trouble that may arise and prearrange the means to overcome it. To many the experience, or the reading, that would enable them to design a contingency bearing a fair similitude to nature is lacking. As a rule, then, one cannot depend upon the individual, zealous in other respects as he may be, to evolve emergencies of this character for the sole purpose of disembarassing himself of their conditions. It thus appears to be the duty of certain officers, who by reason of their detail to administrative positions may be assumed qualified, to direct the thoughts of those under their official guidance to such considerations.

Work similar to this is constantly being required of the line. Much of it is practical, as marches, martial operations with skeleton commands, reconnoissance work, and summer camps, the minor analogues of the autumn manœuvres of European armies,

where as large bodies of troops as possible are brought together. The medical department derives but small profit from all this, because its daily work must go on and the peace establishment is not large enough to supply surplus officers. The troops march out and leave behind their sick, the post guard, and the whole non-combatant horde of camp followers that drain so heavily the medical resources of men and material. These must be taken care of. And the incidental camp sick, not instructive for the wider field of work, also divert energy that might be employed in its own proper part in mimic war. The medical department has some share in this field work, but proportionately less than the other forces. In what may be called the sedentary season there are post lyceums instituted by authority, where recitations, essays and discussions of practical military subjects are carried on by officers of the line. There are also schools of application for all arms, post-graduate courses that may fairly be designated War Colleges, where as far as possible the theory and the practice of war are taught. Except in the meagre and occasional service already referred to, the medical officers get little practical work in these subjects, and certainly neither experience nor enforced study in those more serious duties whose efficient discharge is one of the final causes of their official existence. But beyond his part in the great incidents of war, there are occasions where the advice of the medical officer is important to rescue from actual conditions or to arrest impending dangers. Until the time for action comes these can only be considered from a theoretical standpoint; for epidemics, unwholesome sites, and general sanitary emergencies are not to be occasioned for the mere sake of successfully avoiding or correcting them. Should the foregoing and the every-day work of sanitation not be among the functions of medical officers, then the government would be justified in engaging by the visit or the case competent practitioners of medicine and surgery and dissolving the whole medical organization as it now stands, a consummation that more than once has been hinted at as desirable by young gentlemen upon whom active service has not yet severely pressed. If these are legitimate duties, then they should be pre-arranged: and the obligation seems to rest with the administrative officers for such precautionary care.

All of the foregoing applies directly to the regular service, but there is no reason why, *mutatis mutandis*, the principles should not be applicable to the National Guard.

For the past eighteen months such a scheme has been in operation in a military department containing twenty executive medical officers, substantially as follows:

There has been issued, at first quarterly and afterward semi-annually, a problem in medical administration divided into three parts: or, more strictly, three problems were sent out simultaneously on one paper. These were arranged for the lieutenants, the captains and the majors of the medical service, and as far as the duties of those grades are liable to differ it was sought to have the inquiries correspond with them. Clinical questions are scrupulously avoided, because there is no reason to doubt the professional qualifications of officers whose commissions are secured and retained by careful and systematic examinations. Not only the appearance but the design of an examination has been persistently excluded. There has been no effort to determine what any particular officer might know of any given subject, above all no comparison of answers and no grading has been made, but every one has been urged to consult all the authorities within his reach and to avail himself of conversation with officers, whether of the line or of the staff, so as to familiarize himself with the subject. The intention and the hope has been to interest officers with conditions beyond the range of daily work, but with which they may at any time be confronted. There has been no effort to lower the distinctly professional element, but to elevate the administrative side of the official character. Notwithstanding the notion of competition has been steadily excluded, it was announced at the beginning, in the hope that it would be a stimulus, that copies of particularly meritorious solutions would be sent to the Surgeon General for his information. One or two such papers have been sent from each set, but without attracting public attention.

Much pains has been taken to give the problems the similitude of fact. Sometimes a general object has permeated the whole paper, at others there has been a central idea that it was desired to impress. In order that the subject might be rounded out, all the questions are carefully considered by the administra-

tive officer and a general, not detailed, solution embracing the salient points of each, is published for the information of all concerned. There is no pretence at infallibility in this discussion, but it represents what would be the probable action of such an officer under the assumed circumstances. At the same time a letter is sent direct to each officer, where it appears well, calling his attention to errors of apprehension on his part or to conditions of his solution that do not seem practicable or desirable, as far as they are not covered by the printed discussion.

As might be expected, these problems meet with different receptions among so many. Some officers by the very careful and thorough work that they put into them show that their hearts are in the subject. Occasionally, there is a brief, bald answer, indicating that what must be done, must, and that is the end of it. Once or twice an officer replies that the regulations would be followed, or that a tactical condition was involved—such as the arrangement of a camp—that was beyond his province. But he overlooks the fact that the object is to bring to bear his knowledge of regulations just as he would his knowledge of general sanitation, and while for instance he would not be called upon to lay out a camp for the line (although this might be required for a large Hospital Corps detachment or for a field hospital) he must understand the principles in both cases, so as not to make impracticable suggestions in the one or to fail in pointing out errors of sanitation and their remedy in the other. In the very nature of the official relations that must exist, a direct expression of opinion of their practical value by those to whom these problems come does not reach the controlling office: and it is perhaps not too much to say that the exercise is unpopular as a whole. This does not detract from the character of the possible objectors, for there are few of us who are enthusiastic over required work, however desirable we may admit the end to be. Nevertheless there have been received assurances, direct and implied, that the study of the points at issue has proved attractive as well as instructive.

As Colonel Bache pointed out last year, work over these general lines might well be laid before the medical officers of the National Guard, either as optional or as required exercises, depending upon the authority of the respective Surgeons General. The nature of the problems would be governed by the probable na-

ture of the duty required of the mobilized Guard, but would be chiefly of a sanitary nature.

The examples that follow are problems and discussions actually issued. The parts assigned to the three grades of officers are distinguished by the Roman numerals I, II, III, respectively, but officers are encouraged to attack those of grades other than their own. This is sometimes done. Occasionally, in order to emphasize a particular train of thought the supposed condition has been exaggerated and purposely drawn out of proportion. For instance:

"I. A. A medical officer is detailed on a steam transport, that will be at sea two weeks, with five hundred newly-raised troops. On the first day out is observed a case of undetermined fever that excites suspicion, which on the third day proves to be variola. It is found that five per cent. of the troops have never been vaccinated, and twenty per cent. have only a single vaccine mark dating from infancy. The officers, the remaining troops, and all of the crew appear to be protected. There is no vaccine virus on board, no ships are in company, and it is not permitted to seek a port. A three months' garrison supply of medicines and disinfectants is at hand, but no clothing beyond that in the kits.

What course should be pursued:

- (1) For the sake of those on the ship?
- (2) To avoid spreading the disease on debarkation?

B. Discuss the same problem for a sailing transport to be at sea four weeks."

Here the special point to be developed is the importance of inoculation in the absence of vaccine virus.

The following was the discussion of that condition:

"I. The objects in view are: First, the care of the unprotected men on shipboard, and secondly, to keep the vessel as free from infection as possible, followed by the limitation of the disease after landing.

In our service a transport is a hired merchantman, and for the voyages suggested would be in either case of about 1,000 tons, with two decks. Ordinarily the men would be provided with temporary wooden bunks, in two or three tiers, with no approach to the cubic space allowed on shore, and the officers would have state-rooms or berths.

Twenty-five men will surely have small-pox if exposed, and one hundred are liable to varioloid with the possibility of becoming infecting centres through their clothing and otherwise. A young officer might not think of small-pox at first, but he should remem-

ber that among newly-raised troops the mere bringing together of many and, as would usually be the case, their concentration under a changed environment greatly increases the risk of contracting contagious disease. Therefore, any suspicious fever, and the fact of fever in an unprotected person under such circumstances makes any fever suspicious, should be at once isolated.

The discomfort of such a transport is always excessive, and complete isolation is very difficult to maintain; but, bearing in mind the possibility just suggested, the sick man should be placed by himself and as suspicion became certainty be as completely isolated as possible. At first a ship's hammock, or an extemporized bunk would be used wherever the hospital was designated. Later a part of the main deck at the stern, enclosed in awnings, or one of the boats hanging at the davits, if the weather permits, should be occupied. Otherwise the forecabin must be taken possession of. Immediate provision should be made for a number of seriously sick, as soon as variola is diagnosticated. At the first suggestion of infection the medical officer will determine who are and who are not liable to small-pox, and will have their positions arranged so that the most susceptible will be the least exposed, this arrangement to be enforced if necessary by guards. Regardless of questions of rank or of their own comfort short of their liability to other forms of disease, the unvaccinated should be kept in the open air and as remote as possible from the sick men.

The vital point in this problem is the positive protection of the unprotected. Under the conditions named it is almost impossible for all to escape. Assuming that no other than the original case had contracted the disease ashore, (although the contrary might be probable), the current risk is heavy. On the steamer the voyage would terminate about the time new cases would show themselves, but on the sailing vessel the season of risk would be doubled. There can be no doubt that on the latter direct inoculation should be practiced. Inoculation properly performed results in a disease so thoroughly protective and of such inconsiderable danger that duty to the men themselves requires its use as soon as possible, which would be on the sixth day of the eruption in the primary case. The practical objection to inoculation is that the inoculated person becomes a centre of variolous infection. This would have no force under the conditions of compulsory isolation for all from shipboard, who on debarking would necessarily be held apart for at least a fortnight after the last case. Inoculation would almost certainly save some lives and much grave disease, and would shorten the period of detention.

The unvaccinated men should first be inoculated and then those who had been vaccinated, in inverse order to their apparent protection, as far as the material allowed. Whether the same

course should be followed on the steamer would depend in part upon incidents of its destination not explained. Under ordinary circumstances it would be the safer, at least for those entirely unprotected. Inoculation for isolated communities where vaccine virus is inaccessible, is a good general rule.

It is not necessary to detail here the usual methods of careful disinfection, which include the burning of all exposed clothing and similar personal property, the collection and destruction of exuviae, the scrupulous and repeated washing of convalescents, the burial at sea and preferably the cremation on land of the dead, the use of steam on the steam-vessel and on the other should it have a donkey-engine, thorough scrubbing of the ships with bichloride solution, and the employment of concentrated sulphurous acid fumes.

The sick remaining at the end of the voyage should go into a hospital camp, those not yet attacked into a camp of observation, and the convalescents into a convalescent camp. Those not attacked should be detained fifteen days from the occurrence of the last case among them. There can be no fixed limit for the detention of convalescents, which must persist in each instance until no particle of dried crust remains."

Parts I and II of another problem with the actual solutions submitted by a lieutenant of the medical department were published in the Proceedings of the Association, Vol. VI, p. 391. In both of these the motive was the relative spread through contagion, vaccine being available, of small-pox and measles and the importance of the latter among unprotected adults.

"I. The first wounded from an infantry affair in a wooded country over a mile front are brought to a dressing station at 10 a. m., and continue to arrive at that station at the rate of twelve an hour while the fighting is in progress. At 12 m., after an advance occupying five minutes through a narrow marsh, which proved passable only over a length of three hundred yards on the right centre, against a chain of rifle pits supported by very low shelter extemporized from tree trunks along the whole front, the enemy gave way and the fighting practically ceased. The ground is irregular, affording numerous positions for dressing stations.

(1) Three junior medical officers are required to establish as many dressing stations along this mile line. The enemy is armed with modern small-bore, long-distance rifles similar to our own. How near to our own firing line should these dressing stations be placed? If not observable from the front, how should they be marked? What should constitute the party and the equipment, and what would be expected of the medical officer?

(2) The stations as actually established cover a slightly concave line nearly equidistant from the field hospital one mile at the rear, to which they all send their wounded. Tolerable wood roads converge to a fair country road that is at right angles to the line of battle, up which the troops have passed and near which are the central dressing station and the field hospital. These stations are served by six ambulances until 11 a. m., about which time one is totally disabled and one is damaged but resumes work at 11:30.

How many wounded and of what character will be collected at the front after the firing ceases? When will the last wounded be likely to reach the field hospital, and how many will there probably be in all? (Allowance must be made for those who will drift past the dressing stations and for the very gravely wounded only found by carefully searching the front.)

(3) At one station a wounded man receives a flesh wound from a bullet that flew over, and four or five bullets struck the trees overhead in the space of as many minutes. What change, if any, would be required, the station being in full operation?

(4) What duty, if any, does the medical officer sustain to the dead on the field."

The discussion of this was as follows:

"I. Under the conditions the offensive front would be occupied by three regiments, each with a medical officer at his dressing station. As the action is purely one of infantry and the ground wooded and rolling, it may be assumed that the first contact would be at closer range than usual and the time between 10 and 12 o'clock be chiefly occupied by a cautious advance, and in searching for a place to cross after the marsh had been discovered. It may also be supposed that the enemy would be in a weak line not far behind the marsh, with its greatest strength protecting the crossing. When fire of any severity opens under these conditions of arm and of natural and artificial shelter, the rear of the fighting line, which includes both the firing line and the supports, would be about 600 yards from the enemy and the reserve would be about 400 yards further to the rear. In open country, or opposed to artillery, these distances would be greater.

(1) The dressing stations should be so far to the front as reasonable shelter can be secured and, as they would form no obstacle to the advance of the reserve, might under the supposed circumstances be in advance of the reserve line. When the station is adequately protected from the front, it will really be more secure within the first 800 yards from the enemy, or two or three hundred yards behind the fighting line; for the elevation of fire at that range would be so slight that dropping shots could easily be guarded against. The further such stations are to the front, the more easily are they reached by the wounded, whatever the

character of the ground; and the proximity of shelter and assistance, notwithstanding these may be temporarily unavailable, has a most encouraging influence upon the morale of the troops engaged.

Dressing stations should be marked by the red-cross flag (par. 38, Manual).

Each medical officer should have at his disposition, for service at this station and to assist in loading the ambulances, the two non-commissioned officers and eight privates that in theory would be attached to the regiment, (Wagner; *Organization and Tactics*, p. 20). The equipment would probably be the field case, the orderly's pouch, the ordinary hospital corps pouches, a fountain syringe, additional chloroform 100 gms., beef extract, 2 100-gm. tins, and whiskey, 1 litre. These should be husbanded carefully and, as well as other articles, might be renewed as necessary by a special call on the field hospital. Camp or other kettles for boiling water are not specifically allowed for the front, but two of these and basins should be obtained if possible. Under any circumstances the tin cups of the wounded and of the detachment are to be utilized. A field spirit lamp, as is used in some foreign services but not yet furnished in ours, would be most valuable to heat water rapidly and to prepare soup.

The company bearers are required to convey the disabled to but not beyond the dressing station. At the beginning of the fight the medical officer with one of his non-commissioned officers and a part of the detachment may properly succor the wounded as they fall; and later, in the intervals of personal service at the stations, he should see that they are brought in promptly. Under all circumstances he should, either directly or through a subordinate, be certain that every man does his allotted work.

The service at the dressing station would be limited to careful record upon the attached diagnosis tags, retaining fractured bones in approximate apposition by suitable splints with an antiseptic dressing to the wound, the suppression of actual hemorrhage, the removal of limbs only when further transportation in their damaged condition is impracticable, and particularly support during shock by artificial heat, by hypodermatic medication, and by moderate internal stimulation with food and alcohol. Especial care should be taken not to hurry a collapsed man away, but to give him the advantage of warmth and recumbent rest free from the fear of further injury. Drinking water should be freely provided, especially for those who have lost blood. Malingers should be turned over to the provost guard, and men with trivial wounds should be returned to the firing line unless their services can be judiciously utilized at the station, as in carrying water, cutting underbrush, increasing the shelter, or like work. As far as pos-

sible, the medical officer should make himself actively known to the troops to which he is attached, for upon every field his immediate presence has been recognized by the best men as an encouragement.

(2) The theoretical arrangement of surgical help in an engagement embraces that at the firing line, the dressing station, the ambulance station, and the field hospital. Circumstances may require serious modification of this system and the problem assumes, as would sometimes occur, that the first three stations are practically consolidated. It is quite possible that the ambulances might not always be able to maintain continuous contact with the dressing station, and that they would be forced under cover a little distance away, whither those who could not walk would be borne by hand. But even were the ambulance service really suspended, a necessary delay of an hour or two would be no hardship for the wounded after they had received a first dressing and were under reasonable shelter. However, for the purposes of the problem the light fire indicated may be supposed not to interfere with the ambulances, except as therein shown. As the field hospital is only a mile away, it must be in a protected situation and the irregular ground will prove a fair covered way for the transportation. A loaded ambulance should traverse this mile in fifteen minutes. With reasonable system and energy each vehicle should be loaded and unloaded in ten minutes more, divided between the two termini. The return trip should occupy about ten minutes. The round trip of each ambulance would, therefore, average thirty-five minutes. But as the wounded begin to reach the stations only by 10 a. m., it is not probable that the loading of the first ambulances would commence before 10:25, and at first only one ambulance from each station would go out. The second ambulances would probably start about 10:55, and afterward as rapidly as they rejoined.

The engagement would be practically divided into two parts, the determination of the situation and the serious attack. Its natural course would lead first to very moderate casualties, gradually increasing until the marsh was fairly developed, then diminishing on the left as the impracticability of forcing the obstacle appeared. By 11:30 there would probably be no fighting near the left station (A), and only a few skirmishers would remain in front. The field tributary to the centre (B) would also have fewer casualties, but the firing on both sides would increase near the right (C), and the rush between 11:52 and 11:57 would cover that front with wounded. If we suppose 1,500 men to be under fire in the direct assault, twenty per cent., or 300 men, will be struck, of whom one-fifth, or 60, would be killed outright or would die before possible removal. There would, therefore, be 240 wounded, besides the seventy-two men accounted for in the problem, and a few

badly hurt who had not been brought in during the first movement. These would increase the total disabled to at least 320.

Now of the seventy-two received at the three dressing stations before noon, whose movement further to the rear would begin at 10:25, probably six will be too prostrate to be carried further immediately, if indeed they survive the shock. Twenty-four may have flesh wounds above the waist that will not necessarily compel them to be carried the additional mile. Of the remaining forty-two, ten would probably require recumbent transportation. To move these ten would take six trips of an ambulance supposing that, in the absence of emergency, one trip is devoted to a seriously wounded officer. On one of these trips, when only one man is lying down, three others could be carried inside and one on the front seat between the driver and an attendant. There would, therefore, remain twenty-eight men, or four ambulance loads. In all, ten ambulance trips would be necessary to carry from the dressing stations those received before the bulk of the casualties occurred at noon. But as these men are supposed to be brought in in succession, the last ambulances will not be able to leave stations B and C until a little after noon, returning to them about 12:45. Of the first three ambulances, two are disabled at 11 a. m., or just as they had returned from the hospital. If for convenience we number them successively, No. 1 would make one round trip and be disabled. No. 2 after making one trip and being disabled at 11, is ready for work again at 11:30. No. 3 makes one trip between 10:25 and 11. All these at different stations. Meanwhile Nos. 4, 5 and 6 have begun loading at 10:55 and re-join at 11:30. Nos. 2 and 3 would reload at 11:30 and Nos. 4 and 5 would complete at 12:15 the removal of all those received at the stations from the earlier part of the affair. This accounts fairly for the ten loads; but no calculation of this kind has more than a suggestive value.

Meantime work has ceased at station A at 11:30 and, after examining as well as possible the ground which is yet under occasional fire, the party is preparing to follow the progress of the troops to the right. Immediately upon the cessation of active firing and the retreat of the enemy, stations A and C are consolidated by order of the Medical Director or of his representative and established at the first convenient place (D) on the scene of the fight. This would be immediately by the side of the main road which must, by bearing to the right, use the dry ground between the wings of the marsh. At 12:15 this new station would be in full operation, and the party at B would be carefully searching for those left on the field on the original line, and be engaged in sending to the rear those remaining at B and those left under a non-commissioned officer at C when that station was advanced. At 2 p. m. the three parties would have practically coalesced at D,

about a fourth of a mile further from the hospital. The round ambulance trip would be increased by the distance and the more encumbered road to forty-five minutes. Meantime two of the six originally suffering from severe shock will have died, but the other four will have been sent to the rear in ambulances 6 and 2 at 12:30. Ambulance No. 3 would be at D by 12:15; 4 and 5 would be there at 1 p. m.; and 2 and 6 at 1:45.

Counting the eight men brought into D by the searching party from B, there would be 248 wounded to be cared for at that station after it began work at 12:15. Of these 248, fifteen, or a trifle over six per cent., would die at the station or before actual removal to it. Of the remainder 100, or about 43 per cent. would be able to walk to the field hospital. Formerly the proportion of these cases where great engagements were taken as the standard was larger, but under the circumstances here supposed it is believed that fewer would be able to walk.

Of the 133 requiring transportation thirty-three, or about twenty-five per cent., would require recumbent carriage, which means 17 ambulance trips, and the remaining 100 cases at 7 per wagon would need 15 trips. In all 32 trips of an ambulance would be needed, which divided among the five vehicles would mean practically 7 trips each. Six of these would be round trips requiring 45 minutes apiece, and one single trip from the station to the hospital would take 30 minutes. The aggregate time would, therefore, be five hours. Allowing for the difference in starting the ambulances, 1:30 may be taken as the mean, and the last wounded would, therefore, reach the field hospital with this transportation at 6:30 p. m.

Practically, more ambulances and more medical officers would be hurried forward if they were available as soon as the completion of the fight was announced.

According to these figures, 303 wounded will reach the field hospital through the dressing stations and about five per cent. may be added for those who would drift past, or a total of 320 wounded would require accommodation. If the action had not been successful, the proportion of the whole drifting past would be much larger. No attention is paid to the hostile wounded in these figures.

It is frankly admitted that these calculations are purely hypothetical, for there are no trustworthy statistics as to the fire action of the modern arm as employed in conflict. The object of the problem will be attained when serious thought is aroused upon conditions that are not before us day by day, but that may be precipitated without warning.

(3) Under such circumstances the station should not be moved. If there are spare men, a little additional shelter might be thrown up.

(4) When other duties permit, the medical officers directly attached to the troops and the company officers should mutually assist each other in preparing lists of casualties for their respective reports (A. R. 707, 1466). The medical officer enters on his register those officially known to him to be killed (par. 166, Manual). It would be desirable to verify personally and to report the nature of the fatal wounds, but that is seldom practicable after a severe engagement. The burial of the dead on the field rests with the Quartermaster's Department, although the Medical Director might properly advise as to place and manner should sanitary questions affecting water supply or camps seem likely to arise."

The careful estimate of the time and means to transport the wounded might be completely disarranged by unavoidable and unforeseen incidents, and in itself is of no importance. But it is important to encourage junior officers to anticipate conditions and to make mental preparation for them.

"I. Two companies of infantry and one troop of cavalry are a guard over prisoners in an arid and uncultivated region, such as would be found between 31° and 33° N. and 34° and 36° W. (from Washington). Circumstances require them to remain on that duty for a year, the railroad is not available for supplies, and fresh vegetables either in bulk or in reduced form are very limited. After six months scurvy appears in July among the soldiers, and its premonitory signs are detected among the captives, a mixed Indian and native Mexican group.

Required to depend upon the country, what remedial and preventive measures would be proper for the medical officer to advise?"

The object of this exaggerated proposition, whose solutions are not yet due, is to emphasize local measures of great value not generally appreciated.

"II. For military reasons an eight-troop post must be established on the northern slope of a mountain range. At site No. 1 the soil is a tenacious clay 10 feet deep, resting on coarse sandstone which is underlaid by impure limestone, and 175 yards to the south and eight feet above the proposed line of the parade is the Undine spring with a constant flow of 10,000 gallons an hour. Much other water oozes from the adjacent rocks, forming small springs in some places. Immediately on the west is the ravine of a small water course, with walls 15-20 feet deep. But the general drainage and the overflow of the spring as undisturbed would be over a sloping plain to the north and east.

Another site (No. 2) may be had one mile to the west, magnesian limestone covered by ordinary mould, whose highest point

would be 40 feet lower than the spring, with an intervening valley 75 feet at its lowest point. This site is without a sufficient water supply of its own, but by making a detour over a line two miles long a uniform grade for pipe or ditch may be followed from the Undine spring.

The winter temperature ranges from the extremes of 8 to 70° F. The ground freezes 2½ feet deep. The annual precipitation is about 15 inches, of which seven inches is between October and April. The summers are dry with hot days and cool nights, ranging from 42 to 96° F.

(1) The site below the main spring is selected. Should the flow be undisturbed except to divert the water necessary for consumption, what will be the probable general effect on the post site? The overflow from the spring and the precipitation will raise the ground water to within two feet of the surface at the east line. What influence, if any, will that have on the men and animals in ordinary barracks and stables? Will that vary with the season, and, if yes, in what manner? Describe in some detail how that ground-water may be lowered, taking into account the topography. If the ground-water cannot be lowered, what modifications, if any, should be made in the barracks for sanitary reasons? What would be the highest permissible level of the ground-water to render a modification of the barracks unnecessary, assuming that otherwise it would be necessary?

Should the site be built upon in the ordinary way without preparation or modification, what diseases may be assumed to prevail at different seasons?

(2) The westerly site (No. 2) is selected. What arrangements must be made to conduct to it water for eight troops of cavalry? Give the daily quantity of water to be used for the command and authorized attachés; the character, capacity and dimensions of the reservoir, if any is required; the route, size and character of the supply channel and its hourly delivery; precautions against frost, and any other points in relation to the water supply that may seem advisable.

(3) Which site would be the better in a sanitary view, assuming that the modifications to be suggested in the solution could be made in each, with the reasons in brief?"

This represents an actual condition and is a lesson in the selection of permanent sites.

"II. A division of newly-raised infantry volunteers recruited in the central western states goes into three brigade camps, a mile apart, on the left bank of the Ohio, above Fort Thomas, June first. The camp was originally intended only for temporary purposes, but circumstances prolonged its occupation until September 30th. The usual diseases affecting such troops prevailed in due course,

but by July 10th the sick list represented ten per cent. of the strength and there had been ninety deaths in camp.

Visiting the camp as a Medical Inspector July 15th, and continuing as such for these and other troops until this camp was broken up, what would you expect to find the medical condition had been and to be at the time, what diseases would you fear might arise or continue to prevail, and what result would you hope would be attained, should your advice be followed, with reasons? Give in this connection a carefully prepared schedule of the advice proper to be tendered for the preservation of the health of these troops."

The discussion is intended to show the peril that may follow the retention of large bodies of raw troops in camps of any permanence, without careful arrangement of the site and the utmost attention to their sanitary needs.

DISCUSSION: "II. A division of infantry on a war footing and newly-raised, would consist in the aggregate of 12,014 officers and men, with 884 animals, exclusive of four batteries that might be attached to it as an active force. The command would be divided into three nearly equal parts as brigades. Were the artillery with it, there would be a fourth camp of 733 officers and men and 635 animals, but those may be disregarded in this account. The regiments would have been raised in part from the towns but also from the rural districts of Ohio, Indiana, Illinois and Kentucky. The average nominal age would be not far from twenty-two, for there is no reason to suppose that the fatuous precedents of previous wars would not be followed and the minimum age be the arbitrary one of 18 instead of the physiological one of 21 or, better, 22. A certain number would be actually even less than 18 years, having enlisted under false pretences. In other words, a very large fraction would be physically immature. Certainly 6,000 men, 2,000 in each brigade, would not have been previously exposed and therefore would be susceptible to at least one, if not more, of the contagious diseases usually encountered in youth. These are conspicuously measles, and in the order named mumps, rubella (rotheln), pertussis and scarlatina. The most of these men and a proportion of those from the towns would not be immune against enteric fever. Variola is presumed to be protected against at enlistment, but will probably furnish a few cases. These would be more troublesome in themselves than serious numerically. Excluding typhoid fever, the town recruits would yield a few but not many examples of this susceptibility. For typhoid fever the men from the smaller towns would be nearly on an equality with those from the farms.

Independently of these contagious diseases there should be anticipated temporary disability due to change of water and un-

accustomed food, and from bronchial catarrhs and from rheumatisms superinduced by unusual exposure. There would be some revival of malarious disease, a development of concealed venereal, and after the first few weeks the appearance of pre-existing disabilities not recognized or appreciated at enlistment. There would be other and minor complaints, hardly noticed in civil life, but coming into view because of their interference with formal military exercises. Before the middle of July there will be more persistent diarrhœas and by that time, unless the camp police is very good, some dysentery. But a sick-rate of ten per cent., that is a daily ineffectiveness of 1,200 men, if real, six weeks after the camp was established would mean an epidemic or general morbid influence of some kind. Taken by itself it might simply indicate the carelessness or incompetence of the medical officers; but combined with a mortality of ninety within the same period, which represents an annual death rate of 65 per thousand, it would mean serious illness excessive in amount for selected men under proper care.

The Inspector then would expect to find that eruptive fevers, particularly if the men had not been detained long at their regimental rendezvous, almost necessarily prevailed among the rural troops. Throughout the civil war the annual rate per thousand of white mean strength in the national army from these diseases was 240.82 with a death rate of 14.85 per thousand of those diseases, or 84.19 per thousand of all deaths from disease. But in the nature of things the highest rates of such sickness occur in the early months of service. For instance, during July, August and September, 1861, in the Confederate army in Virginia, one man in every seven was attacked with measles, and it was officially reported that, speaking generally, it greatly impeded in that service the organization of new regiments from the country. "It so diminished the effectiveness of the troops and proved so fatal in camp that companies, battalions and whole regiments had to be disbanded for a time and the men sent home." But while it must be anticipated that newly-raised rural regiments will be remorselessly harried in this way, the mortality depends upon the season and the surroundings. Dry and spacious camps mitigate its severity and check its dissemination. The want of ventilation is a sensible factor in its diffusion. Warm, pleasant weather reduces its fatality to a minimum. There would, therefore, be a high sick-rate from measles early in camp-life, but there should not be a high death-rate from that cause at that season. But if the hospitals were not ample, so that the men were crowded and imperfectly cared for, and especially if they were exposed to unreasonable cold, either dry or wet, there might be serious results. In winter camps measles is a highly dangerous complaint, both directly and through its complications.

The Inspector would also expect to find normally the other diseases already enumerated, with a slight mortality from an occasional pernicious malarial fever, pneumonia, dysentery and typhoid fever. No allowance is made for the exceptional condition of a possible epidemic of influenza nor for variola. The mortality of ninety must, therefore, be accounted for in other ways. Such an enormous death rate for troops properly selected and not run down by fatigue can only come from neglect of sanitation, and the Inspector would discover something like this. Superior authority has placed these camps, without consultation with the Medical Department, and intending them only for temporary occupation, almost literally on the river bank especially on account of the ease with which troops and supplies could be transported and of the abundance of drinking water, while awaiting further orders. As the establishment was believed to be provisional and the principle that every camp of more than twenty-four hours should have careful sanitary arrangement was disregarded, they would be found crowded, the sites ill-drained, the sinks insufficient and badly situated, the disposal of refuse and the general sanitary police imperfect, the water supply of the down stream brigades possibly especially contaminated, and as a rule the officers as well as the men indifferent to or ignorant of the requirements of military hygiene. Heavy showers are liable to occur there at that season, where the average rainfall is 2.5 inches per month, and the tent sites would probably be damp and the streets muddy. In some regiments drill would be required at unreasonable hours and to excess, in others the necessary exercise would be insufficient; in many, attention to personal cleanliness would not be enforced, and in all there would be exposure to the alternating heat of day and chill of night, to moderate but increasing malarial influences, to irregularity of diet, and possibly to disability not in the line of duty following ease of communication with Cincinnati. When 4,000 men unaccustomed thereto are suddenly required to care for themselves within the limits of an ordinary brigade camp, the ground will become saturated with organic filth in a very short time. If they sleep in closed tents whose canvas is swollen by rainfall or by the fog and dew of night, the ventilation will be imperfect. Should there be only shelter tents, it will take much time to arrange them as a permanent camp requires. Notwithstanding the outdoor life which, after all, would be no more than that to which the men from the country were used, there would soon be physical deterioration, mild at first, but steadily becoming severer and more general. This would be intensified by the *ennui* of all and the nostalgia of some, detained in a camp of inaction after enlisting under the stimulus of an expected campaign. With so large a command suddenly raised and with few, if any, officers practically acquainted with the administrative care of troops in the

field, the physical condition would proceed from bad to worse. The Inspector would find, as a consequence of what has been outlined, that the hospital was overcrowded from the measles epidemic, with probably a few fatal cases of consecutive pneumonia in feeble men. These would have been superinduced by crowding and by personal neglect. He would find the common prejudice among the uninformed against hospitals intensified by these fatalities and by one or two other unlooked for deaths, and that many so-called "diarrhœa" cases had failed to report at sick call or had begged off from the hospital until very weak. Some of these would be ambulant typhoid fever, and they would be leaking reservoirs of the disease, distributing it throughout the camps. Whatever may be our theoretical views as to the specificity of typhoid fever and the immutability of the bacillus Eberth, it should be a maxim of military camp-life that every continued diarrhœa should suggest that possibility, and every diarrhœa with fever should be treated as typhoid fever until that is positively disproved. It will not be necessary to look for a polluted general water supply to account for the introduction or the spread of typhoid fever in that camp. Among so large a body of men, the most of whom must be susceptible to the disease, brought together from so extensive a territory and through such numerous and various channels, it is almost certain that a few cases will have been imported at once. The condition of the camp, as already explained, will afford a fertile field for this vicious seed, and there can be little doubt that the primary cases will rapidly multiply. It cannot be necessary to detail the various modes of propagation. As already suggested, the men will be in bad condition when taken into the hospital, and with the overwrought medical staff and untrained hospital corps, there will be many fatalities. That is to say, typhoid fever will be epidemic and will account for the mortality in excess of the normal rate.

By the time of the arrival of the Inspector there would be a general uneasiness as to the sick-rate and his advice, directed in part to the superior and in part to the local authorities, would be considered with respect. He should insist upon a change of camps. If in the bottom, they should be taken to the bluffs, which are "hog backs" with good drainage into lateral ravines. If already on the bluffs, they should occupy an uncontaminated site. In either case the old site should be thoroughly cleansed, the ground scraped, trenches filled, and all combustible debris burned. The new camps should have ample space, but not be so large that they may not be thoroughly policed. The sinks should be narrow, deep, protected, numerous, accessible and carefully looked after. Urinals should be more accessible than the sinks and attention be paid to their care and disinfection. The tents are to be well ditched, floored if possible, inspected daily, the inte-

rior exposed to the sun daily, and be changed to alternate sites weekly. They must be preserved from overcrowding, and for a permanent camp the regulation allowance should be doubled. The surface drainage of the camp should be thorough and systematic. If not already done, camp bakeries should be established and the company cooking be carefully supervised. Food should be inspected before as well as after cooking, and unripe or over-ripe fruit be prohibited as far as possible. Water should be secured by driven wells if detained in the bottom, by safe wells if on the bluffs, or by an extension of the Fort Thomas supply, from the Newport and Covington reservoirs. If the water to be drunk is suspicious, it should be boiled. Although this is troublesome, it is practicable in a permanent camp. Constant and varied occupation not beyond the point of fatigue, with precautions against insolation and infection from malaria, should be arranged for every man. Personal cleanliness should be insisted upon, and be made an object of regular inspection by company officers and at intervals by medical officers. Intoxicants should be efficiently excluded from the military territory. A drunken camp is always a sickly camp. All the seriously sick who can properly be moved should be transferred to a General Hospital, and the field hospital be re-established on a new site. In this connection the establishment of a double board should be advised, (1) to eliminate especially all men with pre-existing disabilities to save a burden to the service and to the pension list, and all already actually disabled in the service, and (2) to review such proceedings by a superior board in order that malingerers and others really fit may be retained. A system of careful regular sanitary inspections by the regimental medical officers and of similar irregular inspections by the superior medical officers should be instituted, with written reports to the respective commanding officers. Occasional addresses, at which attendance should be compulsory, should be made to all officers below the grade of general on the objects and methods of military sanitation. The removal of inefficient officers, especially of the medical staff, should be rigorously enforced. Every camp of new troops is full of object lessons to be carefully studied for present and future profit."

III. The differentiation of two possible sites for a summer camp was the subject of a problem published with a solution by an officer in the Proceedings, VI., p. 377.

"III. An army of observation, prepared for hostilities, but not expecting active operations before the spring, is in the field. An independent infantry division is ordered into winter quarters in the forest not far from Houlton, Maine, about the middle of October.

As chief medical officer of the division, report:

(1) What will be the climate for the next six months, and what additions, if any, to the regular clothing will be required for the health of the troops?

(2) What addition to, or change in, the ordinary ration is recommended, and why?

(3) The quarters must be prepared by the troops and must be either tents or huts, or a combination of these. Which is recommended on the ground of health, and how should they be constructed?

(4) How many men should each habitation contain, what should be its dimensions, and how should it be arranged for their accommodation?

(5) What should be the lateral distance between adjoining quarters? Should two rows be allowed, back to back, and if yes, at what distance apart, and how wide should be the company streets?

(6) How much space would be occupied by a regiment? By a brigade?

(7) The division lying together, what would be the distance between brigades?

(8) Assuming the infantry regiment to consist of three four-company battalions, at the war footing what would be the strength of the rank and file of the division on going into winter quarters?

(9) Should the division not be under fire and have no desertions and no accessions, what would be its probable strength after six months in camp?

(a) If composed of rural troops marched directly from the rendezvous?

(b) If composed of town-bred men of no greater military experience?

State under each condition the probable cause of deaths, of discharges for disability, and the number of men likely to be left in hospital on abandoning the cantonment in the middle of April.

(10) The ordinary allowance of medical officers would consist of three regimental officers for each regiment, one to every other organization, and one staff officer to each brigade and one for the division. Would any more medical service be required; and, if yes, why and how should it be supplied?

(11) A base hospital will be established for the division at Houlton, six miles from division headquarters. What should be its capacity? Explain in detail what other, if any, hospitals should be established, and how they should be manned by officers and enlisted men. (No attention need be paid to the equipment.)

(12) What modification of the ordinary ambulance service would be recommended, with reasons?"

This opens the subject of winter cantonments in a cold climate, and its discussion was this.

DISCUSSION III: "(1) Cool, fairly clear weather will prevail with occasional cold rain and decreasing temperature until the latter part of November, when the snow that will continue until April will begin to fall. The cold and snow will increase and the humidity decrease until March. The snow will reach a level of three or four feet in the woods with enormous drifts away from the forest. There will be freezing nights in October and by February the mercury will have ranged from 65° to -39° F. (18° to -39° .4 C). The mean winter temperature will be about 16° .5 F. (-8° .6 C). Cold and snow like this will demand clothing in excess of that ordinarily worn, notwithstanding the troops will become gradually habituated by going into camp in October. The authority contained in A. R. 1186-1198, '95, will have to be drawn upon and the clothing actually required will be substantially as follows:

Knit woolen drawers and shirts as now issued, but in two sizes for each man that they may be worn together. Two suits of underclothing are much warmer than the same material in a single suit. In like manner two blue flannel shirts of different sizes, the second to be worn as required. The blouses and trousers should be extra large to accommodate the additional underclothing, and the ordinary woolen sweater is commended as a most desirable additional or alternate garment. The use of the sweater and possibly the issue of the extra size shirt and drawers may require special authority, which should be promptly applied for to avoid possible technical obstacles. A buckskin glove thickly lined with wool is superior for military use to the fur glove, which is cumbersome and easily tears in the palm when dry and shrivelled after wetting. Each man should have three instead of two blankets, a pair of arctic shoes, a canvas-lined hood and canvas mittens, and a double allowance of stockings of two sizes to use as the other underwear. Fur or heavy blanket lined overcoats would be required for the guard. The dress uniform would only be an incumbrance and should not be issued. The tendency common to new troops to wear comforters or woolen wraps about the neck, should be discouraged. The extra warmth leads to perspiration and increases the liability to cold after partial exposure.

(2) Rations for such a command should fulfil two special objects: (a) adaptability to the taste of the men unused to army diet, (b) resistance to severe cold. For the first, there should be a twenty-two ounce ration of bread to be supplied by brigade field bakeries. Well-made bread never palls upon the appetite and is an excellent general food. For the second, the heat producers or fats and oils should be increased to the limit of complete digestion, because of their value as fuel, and because they seem essential to

animal growth, for almost certainly there will be immature men in the division. It probably will be better to issue bacon three days in the week, pork one, and beef two. The full allowance of beans, carefully cooked, as energy giving and fat producing, should be supplied, and, either by issue or purchase, at least two gallons of molasses to the hundred rations. Good molasses would probably be more serviceable than the sugar for which it is an equivalent in the ration. It is supposed to correct possible ill effects of an extreme diet of fat, and it helps to supply bodily fat, which is not directly derived from the animal fats eaten. As an extra, cheese, which should keep well in that climate, would be a good occasional substitute for butter, to which many of the men would have been accustomed but whose issue would be impracticable. Should there be any indication of scurvy late in the season, which probably will not be the case if the men are properly cared for, the issue of onions should be increased from one-fourth of the vegetable allowance to one-half. Raw potatoes sliced, with molasses between the layers, might properly be prepared in advance for use as an antiscorbutic. It does not come within the conditions of the problem as laid down, but medical officers cannot too strenuously press upon those of the line the importance of cheerful and complete mental occupation as a preservative of health. Such a division as indicated unless actively employed and amused, notwithstanding an ample food supply, may suffer from scurvy to which mental depression lends a cause.

(3) The shelter would necessarily be huts. It is presupposed that there is an abundance of standing timber, and from it logs dressed on two sides could easily be cut. The joints should be chinked with clay or with mud mixed with lime, and might be reinforced with strips of wood. The typical shelter in a cantonment in a wooded country is that hut described by Lieut. Col. Smart and conveniently known as the "Smart" hut. The canvas roofing well suited in other climates would not sufficiently conserve the heat and might yield under the snow. The roof therefore should be of slabs or trimmed saplings well covered with small evergreen boughs, and the ridge-pole should be proportionately strong. The pitch should be as high as practicable and the joining near the chimney carefully made, for the melting snow to run off. The best draft would be secured by having the chimney directly opposite the door. The chimney should be outside the house, made of sticks and lined with clay. The floor should be well pounded, and if necessarily damp be covered with slabs or "shakes," or if possible concreted. The slabs unless very accurately fitted should be removable for policing. The hut should be ditched a little distance from the foundation and the floor should be at the level of the top of the lowest log and not lower than the outside ground, and the walls should not be banked.

(4) Experience has shown that the proper and maximum allowance for one hut is four men, that it should measure thirteen feet by seven on the inside, walls six feet, the door in the middle of one long side opposite the chimney, with a broad platform for three men to sleep on at one end, and a small "living" space at the other where the fourth man when present could lie on the floor. In a temperate climate the roof would be of detachable canvas. But with the present tactical division of a company into squads of seven privates and a corporal, there will be a strong desire to build huts for eight men each. The probable reconciliation of this sanitary and military antagonism is the construction of two huts, standing end to end six feet apart, with continuous roof and with the doors in the adjacent ends. This excellent solution is the suggestion of an officer not of the medical staff. The eight men would then be grouped together without violating the requirements of health. This plan also encourages a slight modification in the size of the hut to accommodate the entire half-squad with bunks at once. Each hut would be eight by eleven feet, the chimney would be in the middle of one long side and the door in the end but not midway. A platform $6\frac{1}{2}$ by $4\frac{1}{2}$ feet running length-wise would accommodate two men, and one of the same size across the end would serve for two men. The four men would sleep with their heads adjacent. This leaves a space $3\frac{1}{2}$ by $6\frac{1}{2}$ near the door and a continuation of it $1\frac{1}{2}$ feet wide at the foot of the end bunk clear. A post should support the ridge-pole, $4\frac{1}{2}$ feet from the farther end. A door two feet wide would be sufficient, and a window should be let in the door. Under certain conditions of the wind the chimney might smoke, but there are worse sanitary evils than an occasionally smoky chimney. Should the chimney not always afford adequate ventilation, sliding ventilators could be provided in the door. The covered porch between the two huts common to both would be six feet wide by nine feet long. The walls should be six feet in the clear and the ridge ten and a half from the floor. The sleeping platform should be open beneath and under no pretence should two-story bunks be allowed. Special care should be taken to draw heavy snow from the roof, and a movable snow-break of brush might be set at the windward side of the porch in storms. The reasons for the contracted floor space are explicitly given in Smart's Hand-Book (par. 197); although with the double hut and the fixed squad these lose some of their force. It has been suggested that principles established by experience in Virginia may not apply to conditions in Maine, and that an absolute answer cannot be given until these are met face to face. Undoubtedly the best answer will be reached after the event, but in actual practice an attempt to answer them must be made at the beginning of the season and the object of these discussions is to accustom the mind

to consider them in advance. The principles laid down by Smart (*Hand-Book*, par. 139-207) cannot be too sedulously studied.

(5) The lateral distance between adjacent huts should be the height of the wall, six feet, and between alternate sets of quarters twelve feet for access of teams. The ground permitting, the better arrangement would be to quarter the companies each in two rows of huts facing each other, instead of in a single row all facing in the same direction. This would leave the flanking platoons of a battalion with abundant space beyond them, and the interior platoons should have twelve feet between the backs of the huts for police purposes, especially to facilitate the removal of the accumulated snow. In consideration of the locality and of the season, the width of the company streets should be about thirty-six feet, or about fourteen and a half paces.

(6) The full regiment on the color line including flanking intervals would require 530 yards or 636 paces, and the brigade front would be 1,670 yards or a little more than 2,000 paces. It may be assumed that the company will be quartered in twelve double huts for the privates and corporals, two for the sergeants, and one for the first sergeant with the company office in one half. The field music would replace the cooks. This would place seven huts in each row, and the depth of the street proper would be 168 feet. The kitchen would be in prolongation of the huts, the further extremity 60 feet away. At the other end of the street the company officers' quarters and kitchens occupy a depth of 45 feet. The more densely inhabited part of the camp would, therefore, have a depth of about 85 paces or 70 yards, and a width of about 105 paces or 87 yards. These figures are exclusive of those required for sinks. But as the battalion front on the color line would be about 198 paces or 165 yards, there would be a vacant area between the battalions 85 paces deep by 63 paces (52.5 yards) in width. After the weather becomes severe the company sinks might properly be arranged in this area about 18 paces from the flanks, two on each side. Unless such service is made convenient, the health of the men as individuals would suffer and the camp become liable to defilement. Early in the season the urinals should be arranged conveniently and later urine-tubs be placed on the porches at night. The battalion of 425 officers and men would thus inhabit an area of 6,000 square yards or nearly at the rate of 340 persons per acre. Including, however, the full regimental front and the depth occupied by the field and staff the actual area occupied by the three groups constituting a regiment would have a frontage of 636 paces or 530 yards, and a depth of 180 paces or 150 yards, which is about sixteen and a half acres. The brigade camp, including brigade headquarters one hundred and fifty yards to the rear, with trains and store, would cover a little more than one hundred acres. While a medical officer would not ordi-

narily be called upon to lay out a camp, he should be prepared to explain the evils of overcrowding, or of too diffuse a formation as the case may be, and not only to show what should be avoided, but how it should be avoided. The preparation of a winter cantonment is a very serious matter, that once started wrong becomes increasingly difficult to remedy.

(7) The tactical distance between the infantry brigades of a division is seventy-two paces, or sixty yards. It is by no means necessary to regard the division quartered with a uniform front, and it would be an interesting independent exercise to arrange the sanitary details of a cantonment under varying conditions. No reference is made thereto in the problem, but facilities for preserving cleanliness and for abundant exercise are indispensable for the health of stationary troops.

(8) On the authority of Wagner, the infantry and artillery in such a division would consist of 12,265 enlisted men, to which in its independent condition a squadron of 400 cavalry would be added, total 12,625, or in round numbers 12,500. In its more restricted sense all these might not be included in the rank and file, but for the manifest purpose of the problem the foregoing may be accepted as the strength. The object is not to determine the rations to be issued nor the arms to be supplied, but that medical officers may accustom themselves to look upon the approximate number to whom medical care and sanitary oversight should be extended and for whom hospital accommodation might be required. The officers of all grades nominally belonging to these troops would be about 500.

(9) The conditions that would deplete such a force are deaths, discharges for disability, by court-martial, and by favor, and desertion. Only the first two come under the intent of the problem, are those considered in the solutions, and alone need be discussed.

Under the system of recruiting volunteers that has heretofore prevailed and that doubtless will continue in the earlier stages of the next war, large bodies of men will be hastily raised whose physical examination will be in the hands of officers without practical experience in the requirements of military life, and who may unconsciously be influenced to accept imperfect or immature men, in order the more speedily to fill the organization upon whose completion their own commissions will depend. Apart from concealed or unrecognized infirmities, the great element of weakness will be physical immaturity, although the legal requirements of age may be fulfilled. This will especially occur among the strictly country lads who mature slowly, and a certain number would require discharge very early in active operations from sheer inability to withstand the hardship of campaign. Under the conditions assumed physical overwork except as involved in the con-

struction of cabins will be at the minimum, and the tendency will be towards too little rather than too much exercise. But while all will feel the strain of confinement unless regular exercise and abundant entertainment are provided, the country recruits will suffer from imperfect cookery, impure air at night, from nostalgia that will exert its peculiar depression in conjunction with every ailment and that by itself is serious, and above all from the eruptive contagions.

The town-bred men of corresponding years will be more mature than those from the country, will be more adaptable to circumstances and, speaking generally, will better assimilate their food and be less influenced by the imperfect ventilation and the broken rest of guards and similar service. They will be more liable to the consequences of antecedent venereal, more to alcoholism, and more liable to have concealed tuberculous conditions. They will be practically exempt from the contagious diseases of childhood that so frequently overtake rural troops in camp, and will probably be more immune against typhoid fever. With neither class are the chronic diarrhoeas and dysenteries of warmer climates liable to occur; small-pox should be completely guarded against; diphtheria if introduced would be controlled by its anti-toxin; with a good water supply there should be no wide-spread typhoid fever, and under antiseptic treatment the mortality among the occurring cases should be much below the former standard. The malarial fevers should not be beyond a few cases lying over from some earlier condition.

Should influenza be introduced it is liable to prove a serious epidemic, regardless of class. The same would be true of spinal meningitis, although this is less likely to occur. Contrary to a somewhat common impression in regard to severe climates, bronchial catarrhs are not likely to prevail nor to be severe; and pneumonias might occur late in the season, without much liability to do so earlier. About one-third of the pneumonias would be complicated with pleurisy.

Injuries in one form or another would prevail about equally among the two sets of men, accidental gunshot wounds being always high with raw troops.

(a) The division if rural would probably lose by deaths from disease during the six months in question at the rate of 33 per thousand. This loss would be about one-third more than one-half of the entire first year's loss. In other words two-thirds of the deaths by disease in the first year (50 per M.) will occur in the first half of it. The deaths by accidental injury will be one per thousand in six months or about three-fourths of all (1.33 per thousand) that would occur during the year exclusive of battle wounds. The total loss by death would, therefore, be 425 men.

The discharges for disability for disease under the same circumstances would be about 30 per thousand, or about one-half of what might be the anticipated rate for the year (60 per M.). The discharges for injury would be about three per thousand, or for the six months three-fourths of the annual rate (5 per M.) exclusive of the casualties of battle. The total number of discharges for disability may be, therefore, regarded as 413, and the division would be reduced by these causes to 11,662 enlisted men. About 2 per cent. would remain in the base hospital when the division moved in April.

These losses may appear excessive, unless it is remembered that by the terms of the problem the entire division is made up of freshly-raised rural troops, a condition not likely to occur in fact but used here for the sake of emphasis. In general, military statistics do not separate these classes. The original recruiting will not be as well done as it would be in cities, so that a considerable proportion will be discharged for disabilities antedating enlistment, the men will not adapt themselves as readily to the new conditions, they will not have acquired immunity against what may be called the diseases of contiguity and of multitude, and above all they will present a fair field for the ravages of contagion. It is not improbable also that the medical officers, themselves taken from the same communities, will be more facile in granting certificates of disability. The natural selection always in force in cities will now begin among these lads, many immature, crowded together for the first time.

The causes of death and discharge will be found among a few cases of typhoid fever, contracted en route and followed by others unless great care is taken, although this fever should be fairly controlled, possibly scarlet fever, mumps without mortality but with unpleasant complications, digestive derangements, late pneumonias and widespread measles. The seriousness of measles as a camp disease has been spoken of in the preceding section, and it will require all the intelligence, prudence and resource of the medical staff to combat such an epidemic. An occasional rheumatism may be followed by a damaged heart. As the winter advances there will be a general adynamia, and should influenza appear its complications will be serious. The injuries will be hernia from lifting, incised wounds in hewing wood, occasional frost bites crippling the extremities, gunshot wounds while yet unfamiliar with the modern weapons, and a few fractures and sprains from working in the timber and among the attached artillery and cavalry. For the sake of sanitary morale, country troops should always be mingled with those from town.

Both in this case and in the succeeding section the figures offered are to be taken as probable rather than as established.

(b) If the division were urban, the mortality from disease would be about eight per thousand or one-half of the annual rate (16 per M.) and that from accidental injury one per thousand or three-fourths of the first year's annual rate. The total loss by deaths would be 113 men.

The discharges for disability under the same circumstances would be about 18 per thousand or rather less than half of those for the year (40 per M.). The discharges for accidental injury may be reckoned as practically the same as those for the rural troops, or three per thousand. The total loss by these discharges will, therefore, be 225 men. The division would thus be reduced by death and disability to 12,162 men. These figures are lower than they would be if the command were in a situation essentially unhealthy, and as well as those under "a" they are based on the assumption that the cantonment will not be allowed to fall into an unsanitary state. After the first necessary weeding out the losses would gradually increase for eighteen months whatever the place or the duty, while except under very bad conditions those of the rural troops would diminish. About 1 per cent. would be in hospital when the troops depart.

The deaths would be from pneumonia, from the complications of influenza, possibly from acute intestinal disease, and with acute cardiac complications of rheumatism. The discharges would be for latent venereal disease, incipient tuberculosis, concealed epilepsy and other nervous diseases, and possibly an occasional stiff joint, all existing before enlistment, and for rheumatism, frost bite, bronchitis, cardiac weakness, skin diseases, alcoholism, and injuries similar to those among the country troops. Each division would suffer from snow blindness; and night blindness as well as a pseudo-muscular rheumatism, should either occur, would at once suggest the possibility of incipient scurvy.

In making these estimates of death and disability no positive accuracy is assumed, for the presumed conditions have never been tested under modern sanitation, medicine and surgery. But they are presented as a study in a not impossible situation.

(10) The suggested allowance of medical officers ordinarily would be sufficient. Under the emergency of special sickness among them, or should the hospitals so increase as to reduce the medical officers below one to a regiment or similar command, more medical help would be required. If a volunteer medical staff exists it would be better to draw upon it rather than to detach regimental medical officers from other divisions. If there were no general staff it would be better to employ civilian physicians for ward service, releasing those in commission for the troops. They should be applied for by the division commander upon the recommendation of his medical director, giving exactly the number required with the specific reasons.

(11) The base hospital at Houlton should have a capacity of 2 per cent., or 4 per cent. of the enlisted men of the entire division, or 250 men, or 500 men, as country or town, and an officers' ward for 10 patients. The entire hospital need not be built at once, but the plan should embrace such a scope. To it should be transferred all cases likely to be confined long in bed and every man recommended to be discharged for disability for observation. With the troops should be a division hospital, arranged on the basis of brigades with the sections divisible but not divided. It should have a capacity of 3 per cent., or 5 per cent. of the command, or for 375 or 600 men, depending on the source of the troops. Every man that could not remain in quarters without perfect impunity to himself and his comrades should be retained in one hospital or the other. Each hospital should have an isolation division, not unduly detached and capable of indefinite expansion. The division hospital should be under the immediate control of a regimental surgeon selected for his administrative ability regardless of his comparative rank. There should be one executive officer charged with records and accounts of all descriptions, except those of the subsistence and quartermasters' departments for which an intelligent officer of the line should be detailed if possible. For every 75 beds there should be one junior medical officer in immediate charge. These should be detailed as the occupation of the hospital increases and should be relieved as it diminishes. All the medical officers, except the administrative and executive officers, should be relieved every two months, or sooner for imperfect discharge of duty. There should be one private of the hospital corps to every 10 beds, for it is to be hoped that in calling out volunteers steps will be taken to organize a hospital corps simultaneously. These men would not all be nurses, and from them cooks, clerks, and general indoor police should be taken. There should be one non-commissioned officer in charge of the register, the professional records, and patients' effects, with assistants as the work grows; one in charge of the kitchen; one with assistants in the dispensary, and one for every 75 beds, responsible that the medical officers' orders are carried out.

The bearer company should be quartered near the hospital and be used for exterior police and for necessary special service with the hospital.

The isolation hospital should be organized as for 25 cases, to be increased as necessary, with one medical officer, one non-commissioned officer for every 15 beds or fraction thereof, and one private for every 5 beds. Contagious diseases spread so rapidly that a large margin should always be in reserve. But when the hospital is not required it may be left with one or two guards. The country troops will require from five to ten times as much accommodation as those from the city.

(12) Upon going into winter quarters the ambulance service should be inaugurated on a basis of one for each regiment, one for the artillery and one for the cavalry. These could be added to as occasion arose up to the limit of three to a regiment and one to a battery. They should be parked for convenience of control near the division hospital, for it may be assumed that there will be telephonic communication within the cantonment. Otherwise they should be placed with the other regimental trains. The ambulances would report immediately after sick call at the several regimental dispensaries to carry to the hospital those designated, and later would transfer to the base hospital the patients to be sent thither. The cantonment should always have one ambulance available, and as the season advanced such, taken by roster, should be ready to respond to emergency calls without delay. When contagious disease appears, special ambulances must be reserved for each variety of it. Stated drill would be required regularly when the conditions permit. When snow lies on the ground runners must replace wheels, and for the regular trips between the division and the base hospitals large sleighs properly sheltered might well be substituted. The ambulance service is to be performed by the men of the Hospital Corps."

"III. A general engagement has occurred between forces of nearly equal fighting capacity and equipped with modern arms. During the night the enemy, who has been on the offensive, retired leaving his dead, a large proportion of the severely wounded still on the field, and his hospital two miles in rear of the line of battle with 300 badly wounded. With these there were left five officers and twenty-five enlisted men of his medical corps, with tents, medical supplies and subsistence for one week, but no transportation. The army that held the field went into action with 30,000 men of all arms (divided into two corps) present, of whom 25,000 were actually engaged. The battle occurred in October in latitude $30^{\circ} 30'$ north, ten miles south of a river navigable for fair-sized steamers. The field base was on that river, against which the defeated army had been advancing. The country is fairly level and moderately wooded with three good country roads five miles apart, but with no railroad between the base and the battle field. The Medical Director was informed twenty-four hours in advance of the probable site and time of the battle.

What arrangements should be made for the field and base hospitals? What number of wounded should be expected, and how would they be divided, in anticipation, among those requiring no transportation, those who could be carried in army wagons and those for whom ambulances would be necessary? Explain the arrangements made for the Medical Department, assuming that the full complement of medical officers and men is with the troops and that the base hospital is independently equipped.

The army moves forward at daylight after the battle and anticipates contact with the enemy's rear guard, leaving one regiment of infantry to guard the hospitals and for urgent outside fatigue. The Medical Director remains throughout the day and re-joins the army in the night. Explain in such detail as convenient how he will have been engaged through the day and write out the principal orders he will give for the disposition of his own wounded and those of the enemy. It may be assumed that it will rain hard within twenty-four hours after the battle."

DISCUSSION. "III. For convenience of reference the victorious army may be designated the Blues, and the defeated forces the Reds. The key-point of the engagement may be known as Edgar's Woods, which would come to be applied to the battle. The roads from the river may be named from west to east the Sandtown, the Deertrack and the Trellis; and it may be supposed that small creeks would flow toward the river, as Brier Creek midway between the Sandtown and Deertrack roads, Stony Creek one mile east of the Deertrack, and Grapevine Creek, very near to whose east or right bank the Trellis road runs. Of course, there would be a river road parallel to and near the main stream. From the river road the ways just named would run south from near a common point, with an east and west trend to the Trellis and Sandtown roads leaving them, as stated in the problem, ten miles apart where they cross the line to be contested. Bridle paths and wood roads would be the modes of neighborhood communication.

As the Blues are on the defensive, the probable site of the approaching battle would be marked by infantry shelter placed to command the three roads to the rear and the flanks of the defensive line. With the selection of place and twenty-four hours' warning the Blues doubtless would make moderate slashings along their immediate front, and would cut a fairly broad way about a mile to the rear of the main line and parallel to it, in order to reinforce rapidly a threatened flank or intermediate point. The slashing would not be so dense as to forbid passage through it, otherwise the Reds might be compelled to select a completely new line of advance and avoid the battle that it would be the policy of the Blues to invite. The whole line to be observed and to be defended where required would, therefore, be from twelve to fourteen miles long, extending about two miles beyond the outside roads with each flank moderately refused. There would be cavalry of observation still further on both flanks, and probably a cavalry combat would occur on one of them.

No great battle has yet been fought with the new arm, so that statistics as to the actual character of the wounds received and their division as to severity are at present conjectural. But human nature remains the same, and an engagement ceases when a cer-

tain loss has been sustained by one side or the other or when sharp contact shows the assailed position to be secure. The rates for those engaged at Gaines's Mill, 24.45 per cent., Antietam nearly 22 per cent., Stone's River, 30 per cent., and Gettysburg, nearly 25 per cent., which were extreme, are not likely to be exceeded, if equalled, when the moral influence of a magazine fire, known to be in reserve for the assailants not immediately successful, is taken into account. In a fairly open country the low trajectory of the new arm will inflict severe additional injury on the attacking force during their recoil, and thus add to their losses. Under the supposed circumstances, as the Blues might have been defeated by sufficient pressure, it may be presumed that 18 per cent. of all the Reds had been put out of action when they left the field, at an expense to the defenders actually engaged of 12 per cent. Of those about one in five, or 600 Blue, and one in six, or 900 Red, would be killed outright. For while the Blues maintaining a successful defense behind partial shelter would not have so many men hit, their proportion struck in the more exposed vital regions would be greater. There would, therefore, be 2,400 wounded Blues, and the Reds would have on their hands 4,500 wounded. But neither the actual number engaged, the place of the severest fighting, the final result of the battle, nor the exact number wounded could be foreseen. The Blue Medical Director would, therefore, try to arrange for the care of the greatest number at any one place, and also in the aggregate. One or another of the roads, whether the attack should be in front or in flank, naturally would be the most hotly contested, and it is conceivable that 20 per cent. might fall in defense of any one of those lines of communication. But to anticipate the casualties of the whole defensive force at 15 per cent. would give sufficient margin. The Medical Director should, therefore, keep these two possibilities in view in his preparation. Consequently he would select three points for division field hospitals, actually pitching in advance not more than a brigade section of each and preparing for their rapid extension and reinforcement. To determine how this would probably be done, the strength of the Medical Department must be approximately established.

No official proportion of the Hospital Corps to the whole of a large command prepared for hostilities has been promulgated, and equally good authorities vary in estimating it at from 2.3 to 2.9 per cent. of the entire army. Two Blue Corps of 15,000 men each would represent six reduced divisions and attached troops. By Wagner's standard (*Organization*, p. 35), two full corps would contain 77,560 men of all arms and 1,780 soldiers of the hospital corps, with 307 medical officers. With the medical department reduced in proportion to the main force, its strength would be about 120 officers and 680 men. But as the relative number of

such special troops must increase as the aggregate size of the command diminishes, doubtless there would be an effort to have the enlisted strength of the hospital corps when the army marched from the base as 2.9 or perhaps 3 per cent. of the whole, that is 870 or 900 men.

The problem, as stated, gives no clue whether the force was reduced by the loss of individuals, or consisted of fewer well-filled regiments with the number of brigades and divisions consequently diminished. One or the other condition must be assumed, and, therefore, we may arbitrarily suppose that the normal corps organizations were maintained with the elimination of no command except a few batteries, but diminished by individual losses. The regiments would, therefore, average 480 rank and file apiece. At that rate the ambulance train for the whole army would not exceed one hundred and twenty. There would be every effort to maintain the division hospitals near their total capacity of 3,000 cases, which would absorb about 240 hospital corps men, but the reserve corps hospitals would necessarily be discontinued. The bearer company for each division would be reduced to 25 men apiece, total 150, and the ambulance companies to 36 men each, total 216. Six hundred and six men would thus be required for the distinctively medical organization, leaving for service with the regiments 84, or 294 men, depending upon what may be the aggregate strength of the hospital corps. The foregoing figures represent the full complement of the two reduced army corps.

In anticipation of the battle the Medical Director of the army would cause the base hospital to be evacuated by means of hospital boats to a General Hospital in the rear, retaining men that might be employed in light duty in the hospital and convalescents who could be used as guards to trains. These latter should be assigned by the General's authority to such temporary duty. The object would be to have the hospital available for as many disabled as possible, and at the same time to retain in touch with the army in the field all liable to rejoin within a reasonable period. As the battle would be defensive, that is as the main Blue line could not be expected to advance, certainly not until after the heaviest fighting, and as it may be pushed back, the field hospital line would be established at least two miles in the rear of the Blues' selected line of fire. But even at that distance advantage must be taken of natural shelter. But as serious fighting could not occur along the whole of the nominal front of ten miles, and it would be impossible to foresee where the real engagement would be fought, a brigade section from two field hospitals would be pitched not far from the Sandtown and the Trellis roads respectively, and a division hospital be formed two miles and a half to the rear, between the Deertrack road and Stony Creek, near the Red Tavern. The hope would be to group the other field hospitals near by. There

would remain in reserve three complete division hospitals and two each of two-thirds strength. These should be concentrated on their wagons near the Red Tavern hospital, a little further to the rear and out of the main road, ready to pull out promptly and extend either of the hospitals already set up or to establish a new one. One-sixth of the ambulance train, or twenty ambulance wagons, should be held as a special reserve. As an attack on the rear of one flank or the other must be anticipated as probable, each brigade section already pitched should be warned that it might be necessary to retire, and a secondary position must be provided for it to retire upon where a full division hospital would probably be required. Should the attack be very severe and the flank forced back it may be necessary to abandon for the time the hospital equipment, transferring the wounded if possible or leaving sufficient personnel with them. Only one of these flanking hospitals would be required, but it must be arranged to be expanded as necessary in either in position. The extended hospital would receive the wounded from a part of the front as well as from the flank, and would necessarily be pressed pretty well to the rear and toward the central perpendicular. The Director of the army having selected these places at least approximately, the corps directors would remain at the front until the battle should be well developed, when they would concentrate their respective hospitals as required. In the meantime the first wounded from the general front could be transferred to the division hospital already established. It would be better that the final hospital arrangements should be a little dilatory than that they should be made prematurely with the risk of compulsory removal, or be rendered useless by those changes along the line that would occur early in the battle. The preliminary twenty-four hours should be utilized by the division surgeons, the ambulance and the company bearer officers, in thoroughly exploring the cross-roads and, if necessary, removing obstacles, in finding or making convenient approaches to the creeks, in learning the resources of the neighborhood, and in determining provisionally possible ambulance and dressing stations. In other words, with twenty-four hours' notice the whole country three miles to the rear of the selected line should be thoroughly studied for its accessibility, water and field hospital sites, and those in the immediate charge of the field hospital trains should have them prepared to move at command over certain designated routes. The commanding general should be requested to order all supply trains returning empty to the base to stop at the Red Tavern hospital for wounded capable of such transportation. In anticipation of that, supplies of boughs, straw or hay should be collected for the wagon beds.

As already estimated, the wounded Blues, exclusive of those killed outright, would be 2,400, for whom the hospitals once estab-

lished would be ample. Of the 2,400, five per cent., or 120, would be so slightly injured as not to require immediate hospital attention, and fifteen per cent., or 360, would make their own way to the hospitals. Five per cent. of all the wounded, or 120, would probably die at or before reaching the dressing stations. There, therefore, would be left 1,800 requiring ambulance transportation from some part of the field and the 100 ambulances in use would probably average five trips each from the ambulance stations to the division hospitals carrying 600 recumbent and 1,200 sitting. As the enemy retired in the night leaving many wounded on the field, the battle probably began after noon, with firing until after the sun went down. Nearly all the Blue wounded should be in hospital by 10 p. m., but if the night were very dark and it were clear that few disabled were still on the field, general search should be suspended at midnight to be renewed at daylight.

In order that the hospitals might be kept as mobile as possible, especially after it was seen that the Reds would be repulsed, the wounded should be concentrated in three or four of the division hospitals and the brigade sections not occupied, or vacated, be held ready to move. The reserve train of twenty ambulances would leave the Red Tavern for the base about 5 p. m., carrying 20 men lying and 60 sitting, and soon after sunrise a train of thirty wagons would carry 240 less severely wounded, and after breakfast 100 men would be sent on foot over the eight miles. During the day one division hospital with a capacity of 500 beds would be designated to retain temporarily such cases as could not be moved at once to the base, and thirty ambulances and such wagons as could be had would gradually transport the remainder to the base after concentrating the hospitals as much as possible. The wagons would make one single trip, but the ambulances should make two round trips each day between the field hospitals and the base. Of all the ambulances, ten may be supposed to be disabled from various causes, thirty would be retained for service between the field hospitals and the base, forty would be required in the service of the Reds as presently seen, leaving forty to proceed with the advancing army.

Having learned in the night from the Commanding General that the army would pursue, the Medical Director would immediately direct the corps directors to proceed with such sections of their division hospitals as possible, leaving orders for the concentration already intimated. He would designate the number of ambulances to remain and would assume the supervision of the transfers. He would notify his inspector or assistant of his intention to relieve certain division hospitals, and at daylight he would require that officer to satisfy himself of the complete collection of all the wounded within the lines. The director himself would seek the medical authorities and hospitals of the Reds as early as prac-

ticable, and he would furnish the Commanding General a rough estimate in writing of the number of wounded prisoners and of their supplies, and would request a regiment for guard and fatigue with both sets of hospitals. He would send for forty ambulances of his own train and one bearer company for the immediate removal of the Red wounded still on the field, and would assign a few of his own medical officers, with one to manage the whole, for temporary duty at the captured hospital. It may be supposed that at least 800 Red wounded would be still on the field, and subtracting those who had died of their wounds before midday it would be found that 3,000 had gone on with the retiring army. Fully one-half of these might ultimately be captured. Having satisfied himself that the collection of the Red wounded had been begun systematically, he would visit all the Blue division hospitals, and might ride to the base, returning about dusk to the Red hospital. From that place he will give further orders for the transfer of the disabled.

He will have telegraphed the Surgeon General once or more during the two days, and will prepare a *resume* of the situation in writing that night, after which, or at dawn, he will start to rejoin his own headquarters, leaving his medical inspector as a representative.

Written orders should be prepared with a carbon pad and thus duplicated in fac simile. All such should be properly dated. Notes should be made at the time of important oral orders.

The following are those that would be necessary under the conditions assumed:

Oct. 20,—1 P. M.

Med. Dir. 1st and 2d Corps:

Keep 10 ambulances parked near Matson house, Brier Creek, for further orders. Keep 20 at Red Tavern to distribute after division hospitals are pitched. Move remaining ambulances with divisions or as you prefer.

Indications are direct attack on Edgar's Woods and on left flank (Trellis road).
Anderson,
(Copy to each.) Med. Dir.

Edgar House, Oct. 20,—3 P. M.

Ambulance Officer,

Reserve Train, Matson House:

Report at Red Tavern with 20 ambulances at 4 p. m., prepared to carry wounded to base. Return to present park to-night.
Anderson,
Med. Dir.

Edgar House, Oct. 20,—3 P. M.

Surg'n—————Div. Hosp.,

Red Tavern:

Twenty ambulances will report at 4 p. m. Load with dressed wounded and start for base hospital as near 5 p. m. as possible.

Anderson,
Med. Dir.

(Copy to Corps Med. Dir.)

Oct. 20,—5 P. M.

Med. Dir. 1st and 2d Corps:

Enemy repulsed. Concentrate wounded as much as possible so as to set brigade sections and, if possible, division hospitals free for other service to-morrow.

Anderson,
Med. Dir.

(Copy to each.)

Oct. 20,—6 P. M.

Med. Dir. 1st and 2d Corps:

Thirty Q. M. wagons will be at Red Tavern by daylight to carry wounded to base. Order hospital surgeons there to designate men by midnight and load them fed in *early* morning.

Send to base on foot after early breakfast, under their own n. c. o's., but with authenticated nominal lists, all wounded from all hospitals who can walk there. Start early to avoid possible rain. All wounded transferred must be properly tagged.

Anderson,
Med. Dir.

(Copy to each.)

Oct. 20,—10 P. M.

Med. Dir.,—————Corps:

The Commanding General directs as follows: Have one division hospital ready to advance with your corps early in the morning, and see that it moves promptly. No wounded to go forward, except trivial cases with companies. Leave one bearer company and all but 20 ambulances. Other division hospitals will be sent as soon as possible. Remain yourself consolidating field hospitals until relieved by this office. Direct senior division surgeon to act for you till you rejoin.

Acknowledge receipt and report now or in the morning which hospital goes forward.

Anderson,
Med. Dir.

(Copy to Director and to Adjutant General each Corps.)

Oct. 20,—10 P. M.

Ambulance Officer,—————Corps:

Have 20 good ambulances ready to advance in the morning. Keep all the others occupied to-morrow.

Anderson,
Med. Dir.

(Copy to each.)

Red Hospital, West Fork Grapevine Creek,

Near Baptist Church, Oct. 21,—7 A. M.

Med. Dir. 2d Corps:

Send one bearer company at once to transfer enemy's wounded to this hospital, and also one brigade section of hospital (two, if can be spared), with good executive officer to control whole.

Anderson,
Med. Dir.

Oct. 21,—7 A. M.

Ambulance Officer,

Army—————:

Send 40 reserve ambulances and one ambulance company, without delay, to transfer enemy's wounded from field to Red Hospital, near Baptist Church, Grapevine Creek.

Anderson,
Med. Dir.

Oct. 21,—9 A. M.

Med. Dir.,—————Corps:

Rejoin your headquarters, first reporting in writing whatever requires special attention. Take forward any unemployed men and released hospitals.

I will superintend for the day movement of wounded and expect to join Army Hdqrs. to-morrow morning.

Anderson,
Med. Dir.

(Copy to each.)

Edgar House, Oct. 21,—12 M.

To all officers in charge

Division Hospitals:

All our wounded must be transferred before to-morrow night to field hospitals near Red Tavern, and hospitals thus relieved must follow troops at daylight the next day.

If called on by senior officer Red Tavern, transfer to him one brigade section for temporary duty.

Anderson,
Med. Dir.

(Copy to each.)

Edgar House, Oct. 21,—12 M.

Major Hastings:

Assume charge of all field hospitals near Red Tavern. Prepare to receive at once all wounded from other field hospitals. When absolutely necessary, call on each division for one brigade section. Transfer all wounded as soon as possible to base, and despatch to the front by brigade sections your hospital as evacuated.

The army is in pursuit and it is necessary for all hospitals to rejoin as soon as possible.

Anderson,
Med. Dir.

Red Hospital, Baptist Church, Oct. 21,—7 P. M.

Surgeon Base Hospital:

Nearly one thousand severely wounded in this hospital, will require transfer as soon as practicable after our men are properly cared for. This place should be vacated within a week. Wire Washington by my authority for water transportation and necessary supplies. Red supplies will be exhausted in a week. Notify me with the army what extra transportation will be required. Our ambulance train cannot be detained for this purpose without further orders. If these wounded *cannot* be transferred as above, food and other supplies must be sent here. Captain Edwards, Medical Inspector, will represent me in this neighborhood until further orders.

Anderson,

(Copy to Surgeon in charge Red Hospital.) Med. Dir.

The ultimate disposition of the Red Hospital is beyond the terms of the problem, introducing as it does some unusual features, but it has been touched upon in some of the solutions. In general terms it may be said that as "an ambulance" under the Geneva Convention, should that be in force, the material would appear to be exempt from capture.

Under the most favorable conditions of trained troops and experienced officers, the apparent confusion that follows a battle is very great, and much suffering occurs that with time and facilities would be avoided. With inexperienced officers and men the real disorder would be enormous, and under any circumstances the principles of administration must be grasped if order is to be evolved out of the multitude of pressing and conflicting details."

Other problems referring to the introduction of yellow fever in garrison, of a manner of introduction and of the management of cholera in the field, the location of a defensive camp in a highly malarious region, the care of wounded in a village in the enemy's country, active service by junior medical officers with cavalry are omitted for want of time and space.

As previously explained, there is no pretense at special wisdom in the discussions and above all there is no effort to enforce such views as final. They represent voluntary labor of the same character as that required and they are printed for the information of the medical officers interested. As hints and suggestions they are laid before this Association for its consideration.

II. REGIMENTAL INSTRUCTION IN FIRST AID.

BY SURGEON CAPTAIN RORY FLETCHER,

LONDON, ENGLAND,

CENTRAL LONDON RANGERS (EIGHTH V. B. KING'S
ROYAL RIFLES).

TO have been asked to write a paper for the meeting of your Association is an honor, as well as a privilege, for which I desire first to thank you. That you should wish for a statement of the method we employ in the instruction of first aid in the British service is but another evidence of the universal brotherhood which animates our profession, a witness of our desire to pick up any fragment of information that may help us to repair the results of what is now commonly called civilized warfare.

That I shall bring any new ideas to your notice I think unlikely for the teaching of First Aid has now for some years been the constant occupation of doctors both in town and village till a demi-semi-medical knowledge has impregnated all classes,—peer and ploughman, young misses and maiden aunts,—till the forms in which this instruction has been administered vary but as crystals of the same system.

In Regimental Aid on the field of battle there are two separate points to be considered—the immediate treatment of the wound and the carriage of the patient to a place of safety.

In the dim distant days first aid was performed by the surgeons accompanying the troops, and Hugo of Lucca when sailing with the Crusaders to Palestine received his medicaments and outfit from the good people of Bologna. Some idea of the ratio of the medical staff to the number of troops, at that period, is furnished by the record of the army of 30,000 men who sailed from Southampton on August 11, 1415, under Henry V. The medical officers on that occasion consisted of a surgeon general, Thomas Morestede; a physician, Nicholas Colnet, and twelve assistant surgeons. A chariot and two wagons were given them for baggage. This may appear very inadequate provision for an army of 30,000 men, but we must remember the world had not yet arrived

at the era of international law and civilized warfare, and that the number of wounded was probably not so great as the enormous slaughter of some of the mediæval battlefields would lead us to suppose. The hand-to-hand fighting of the day, with the *arme blanche*, raised the proportion of dead to wounded; besides other factors which no longer operate. Take Agincourt for instance where 10,000 French are said to have been killed. Henry, during the alarm of an attack on what has been called "the poys and paggage," ordered the French prisoners to be slain.

We'll cut the throats of those we have,
And not a man of them that we shall take
Shall taste our mercy.

So likewise the day after the battle, all the French wounded found on the field and considered incapable of paying ransom were murdered in cold blood—an atrocity which history informs us was common in the 15th century. These arrangements must have simplified the labors of Thomas Morestede and his companions and have left Henry no uneasiness as to the future mobility of his army.

It was the barber surgeons who generally accompanied the armies. In the 15th century we find that the contingent supplied by each German town was provided with a *Feldscheerer*, pharmacies and hospital wagons. The German regulation of the period was that each *Stauffen* of infantry, a body of 5,000--10,000 men, had its *Obrist-Feldarztet*, and that to every 250 men was allotted a *Feldscheerer* with his *Knecht* or assistant.

In the Civil War in England in 1643 members of the Company of Barber Surgeons were attached to the six regiments of the Trained Bands of the City of London, commanded by Major General Skippen. After the first battle of Newbury they did excellent service, so much so that the Royalist journal, *Mercurius Aulicus*, makes special mention of them, saying that the Parliamentarians left behind them "very many chirurgions' chests full of medicaments."

Whether these surgeons penetrated as far as the fighting line; whether Thomas Morestede visited in his chariot—the prototype, I presume, of the modern brougham or perhaps of the omnibus which accompanies the French "Ambulance"—or whether Mr.

Physician Colnet was only to be consulted in his office at the historic windmill on the field of Agincourt, history telleth not; but in them and the barber surgeon we find the precursor of the modern regimental medical officer.

Assistance was also given in the early 15th century by women. In the old troubador song, "Aucassin and Nicolette," Nicolette "inquired about his hurt, found his arm out of joint and put it in again." All women of gentle birth in the feudal days were instructed by their mothers in the preparation of medicines and the simple dressings of wounds, while love impelled them to follow husband and sweetheart to the wars. If Nicolette was able to reduce a dislocated arm I am afraid she imbibed more knowledge in her mother's bower than her present-day certificated sister does from first-aid lectures in the parish school room.

Not only did the ladies of the day help in the field, but they nursed the wounded who were collected into a special hospital tent.

However, *tempora mutantur et nos mutamur in illis*, as the old monastic Latin has it, and whether it was that the class of woman changed, or the contamination of camp life had its effect, we find in the 16th century that these first-aid sisters had been put in charge of an official called a Hurenwaibel (whore sergeant)—fairly conclusive evidence that they had changed the method of their philanthropy.

Nor was the provision of bearers altogether wanting in the armies of bygone days, for as early as the 6th century the Emperor Maurice ordered eight to ten stout fellows to be selected from each division of cavalry—200-400 men—whose duty it was to bring the severely wounded to the rear and to refresh them with water from their canteens.

It was not, however, till 1792 when Larrey took up the subject that any systematic method was thought of, by which the wounded could be attended to and quickly removed from the site of the contest. I will not linger over the changes which have taken place since then or enumerate the hopes, and the failures to settle the question, for they are all set down in Longmore and other similar treatises. Wars change in their character and the experience of yesterday is not always the lesson of to-day. Though

we can learn much from the past the future is to some extent a matter of speculation.

Let us pass at once to the present time, and enquire what we expect from the regimental stretcher bearer? This is the name by which the man who gives first aid in the fighting line is known in England: he corresponds to your "company bearer," but while he keeps with the battalion during an engagement he does not necessarily remain with his company. May I suggest that the term company bearer is too much like bearer company to be convenient?

Each infantry battalion consists of eight companies and is on service accompanied by a Medical Officer who has at his disposal

- 1 Non-commissioned officer.
- 1 Private as orderly.
- 16 Regimental stretcher bearers (two per company).
- 1 Mule and pair of field medical and surgical panniers.
- 1 Field companion and water bottle.
- 1 Surgical haversack.
- 1 Circular tent (surgery).
- 8 Stretchers (one per company), carried in the company carts. This double allowance enables the bearers to leave wounded at Collecting Station and return at once without waiting for the stretcher.

When an action is expected and the main body deploys into line of quarter columns, say at 3,000 yards from the enemy or less if there is cover, the 16 stretcher bearers fall out, leave their rifles and packs in the company carts and take out the stretchers. They then form up under the regimental surgeon, who is accompanied by his orderly carrying the field companion, surgical haversack and water bottle,—no small burden for one man,—but the corporal with the mule and panniers remains near the reserves to be ready during and immediately after the action.¹ The bearers wear a white band with S. B. in red upon it, on the left arm above the elbow; in the same way that your company bearers wear a red band and the French a cloth band with a white maltese cross.

It will be noticed that the valises are placed in the company carts, not stacked on the ground near a wagon, as in the French

¹ Med. Regulations § 697.

service—the latter plan readily leading to their loss. In the British service the rifle is also placed in the cart, but in the French and German it is retained and slung across the shoulder “en baudontiere.” As the regimental stretcher bearers are not covered by the Geneva Convention there is no reason why they should part with their rifles, but anyone who has tried to lift a patient or carry a stretcher thus hampered will soon come to the conclusion the bearers and their weapons are at those times best apart. This question suggests another, a little off the lines of subject, but of great importance to us, and one which might lead to a great deal of trouble—the retention of the arms of a wounded man. Regulations exist in most services that a wounded man’s rifle and equipment should accompany him from the field through all the different lines of assistance even to the base hospital; a place is made for it in the ambulance wagon, and the pack storekeeper has it in fast keeping in hospital. A very nice and tidy arrangement certainly, but if you retain these firearms can you claim neutrality under the Convention of Geneva? At Froeschwiller a German staff officer threatened to shoot everyone in the French “Ambulance,” established under Sarrazin in the town hall, if a rifle was found inside it. Sharp measures but legally correct, and therefore the question deserves our consideration.

To return to regimental aid—it is the duty of the medical officer and his stretcher bearers to keep up with the fighting line, never losing touch of their corps, but keeping in close proximity to it; giving temporary assistance to all who are injured and attaching a tally¹ to each describing the nature of his wound; but they will on no account attempt to carry back the wounded for long distances or in any case beyond or in the rear of the Collecting Stations formed by the Bearer Companies. The regimental bearers only are allowed to carry a man back or attend to a wounded companion, otherwise there might be straggling; and although we may instruct every man in the ranks in first aid, it must be thoroughly understood that it is with the object that he may be able to look after himself, if necessary, and that he has no roving commision in ambulance duties.

How will the new condition of things—increased range, smokeless powder, and magazine fire—affect the regimental aid?

¹ Med. Regulations § 699.

I am not one of those who believe that we shall have a very great increase of wounded to attend to, for I believe the man to be a much larger determining factor than the weapon. This question is too long to be discussed here, but as a personal opinion I believe Melville's estimate¹ of a 10 per cent. loss is much more probable than Fischer's of 30 per cent.

The increased range of the modern rifle will compel us, in anything like open country, to place the Collecting Station 1,000 to 1,500 yards in rear of the fighting line—Fischer says 2,000 metres—a distance impossible, as the experiments of Von Kries have shown, for even stalwart bearers to accomplish with any appreciable number of wounded. Moreover it seems that the time occupied in long journeys might be better employed in attending to the wounded in situ. This does not mean that the regimental bearer will require no stretcher drill, but only that long journeys are impossible.

Now for the duties. In the earlier stages of the fight, during the artillery duel at a range of 3,500-2,500 yards casualties will be few and principally among the gunners and their infantry escort and can be easily attended and removed to a place of safety. As the infantry advance to the attack they will come under fire as soon as visible at a range of, say, 1,700 yards and the casualties few at first and till 800 yards is reached, will gradually increase from that distance to the decisive range of 500 yards where the firing is point blank. Over this ground 1,700-500 yards which Surgeon Captain Melville² calls the "chance zone," the number of killed and wounded will depend on the celerity with which the men are brought across it. At first the wounded can be treated and transported to the rear, perhaps handed over to the Bearer Company; but as the decisive range is approached they must be collected in groups behind any natural cover the ground may afford. It is at the decisive range that the regimental bearer will find the necessity for all his courage, all his presence of mind and all his discipline. With the dead and dying lying in whole ranks as the Germans did round St. Privat,³ with no curtain of smoke, but only the ceaseless hum of magazine fire in his ears, will the bearer have to flit from post to post tending the wounded and alleviating the dying.

¹ Journal of United Service Institution of India, July, 1896.

² Ibid., December, 1894.

³ The Germans are said to have lost 5,000 men in 15 minutes, and that in 8 hours 21,000 Germans, and 12,273 French were *hors de combat*.

SELF-HELP FOR

THE WOUNDED

From the German of
DR. L. DIEMER,
Stabsarzt in Dresden.

Translated by
Surg. Capt. Fletcher.

PLATE I.

STOPPING BLEEDING IN A WOUND OF THE ARM.

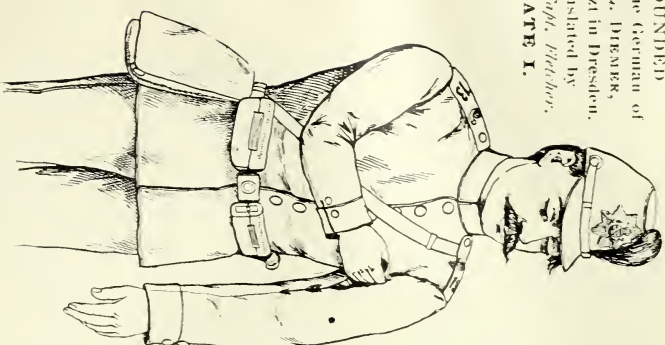


FIGURE 2.



FIGURE 1.

Before the beginning of the action, kneel the handkerchief, which is folded as a narrow bandage, by the two corners. Draw the knot quite tight and carry the sling thus formed in side the front in front where it can most easily and quickly be reached by either hand.

In the case of a wound in the arm, lay it bare by cutting up the seam, place the point of the knife in the seam as depicted in figure 2, and cut in the direction of the arrow. Then take note of the description of the bleeding.

If this is little or none or only in single drops repair to the dressing station. See plate IV, 1, 2 and 3. If bleeding be severe, either splinting or streaming taken at once the knotted handkerchief and put it over the wounded arm in its fleshy part and at least a handsbreadth above the wound—not near the wrist or the elbow. Then put into the loop of the handkerchief a piece of wood (a bayonet, knife, revolver, or anything of that kind handy) and twist it tight, then continue to turn the wooden lever but slowly until the bleeding stops (fig. 3). The wound itself is not to be dressed. If the bleeding stops repair at once to the dressing station, holding the tourniquet firmly and get the wound dressed as soon as possible.

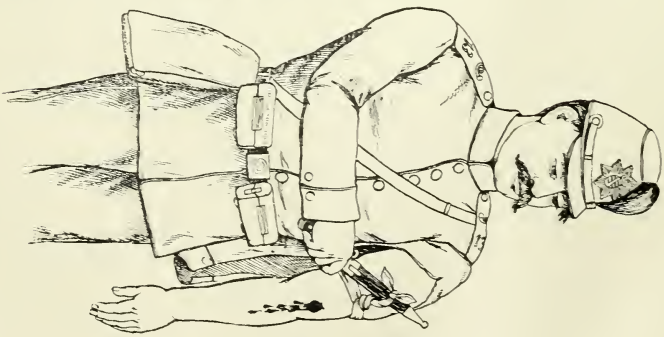


FIGURE 3.

Fig. 1. Dr. Diemer's First Plate.

There will be no question of carrying men to the rear for neither bearers, nor wounded, would live through it. The Balmacedists who were under magazine fire in the Chilian war declared they would sooner be shot outright at the beginning of a fight than undergo the mental torture of that leaden hail again. That the proportion of dead to wounded will be increased seems generally admitted and the proportion estimated at 1 to 3. This will to some extent lighten the bearers' work. The report of Colonel Rivera that in the Chilian war the proportion of dead to wounded was 4 to 1 is, I am told, accounted for by the fact that nearly all the fighting was behind earthworks and the wounds mostly in the head.

We must remember that although the troops are extended earlier than heretofore, and so the area of casualties increased in the first stages of the attack, yet this is the most favorable period for the removal of wounded. A brigade assaulting alone will not have a frontage of more than one-third of a mile, say 600 yards, and consequently an individual battalion will not have a frontage in the first line of more than 300 yards. Should the brigade be part of a division the extent of front will, of course, be still less.

The last stages of the fight, then, will be the trying time. Over a frontage of 300 yards the surgeon with his orderly and 16 men, or what is left of them, will have to tend the injured. There will be no command "search for wounded," for at that period wounds will be served out as fast or faster than they can be dressed, and the battalion may consider itself lucky if its surgeon is not one of the first to fall. The late Japanese war statistics disclose the ominous fact that 4 per cent. of the total casualties were medical officers. A medical officer is an expensive article to train and not easily replaced at a moment's notice. Old Homer says

A wise physician skilled our wounds to heal,
Is more than armies to the commonweal,

—a sentiment in which a tactician would not agree, though he might admit that the records of late wars disclose an enormous butcher's bill of what he generally calls non-combatants. The Japanese follow the English in putting medical officers in the actual fighting line and the reason is the great moral effect it has in promoting confidence in the troops.

Besides the duties mentioned, the regimental bearers should have some knowledge of Bearer Company work, for the latter unit

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PLATE II.

STOPPING BLEEDING IN A WOUND OF THE THIGH.

General Rule.—Practice the necessary movements in time of peace, so that in case of real necessity you can perform them with as much ease as the manual exercises. In this way alone will you be able to do so satisfactorily and with a rapidity sufficient, it may be to save your life, at all events, to ease your condition.

Expose the wound by cutting through the clothes and turning them back. If the bleeding is profuse—in streams or spurting, a handkerchief folded lengthways (a haversack strap, braces, water-bottle or valise strap, a bridle or anything of that sort handy) must be bound round the thigh a handsbreadth above the wound and so knotted that there is room to put the fist between it and the thigh. You then use as a lever a piece of wood, bayonet, knife, &c., and as in the arm twist it gradually until bleeding stops. The best thing for binding round a leg is an elastic India-rubber belt, as so often worn round the waist—it is more easily obtainable than the articles mentioned above.

In case of bleeding remember that every moment is precious and must be made use of. After stopping the blood the wound must not be touched but left unbandaged for the present. As a rule this can safely wait until arrival at the dressing station.

The tourniquet must not remain on more than three hours and therefore medical help must be obtained before this if not you must act as shown in Plate III.

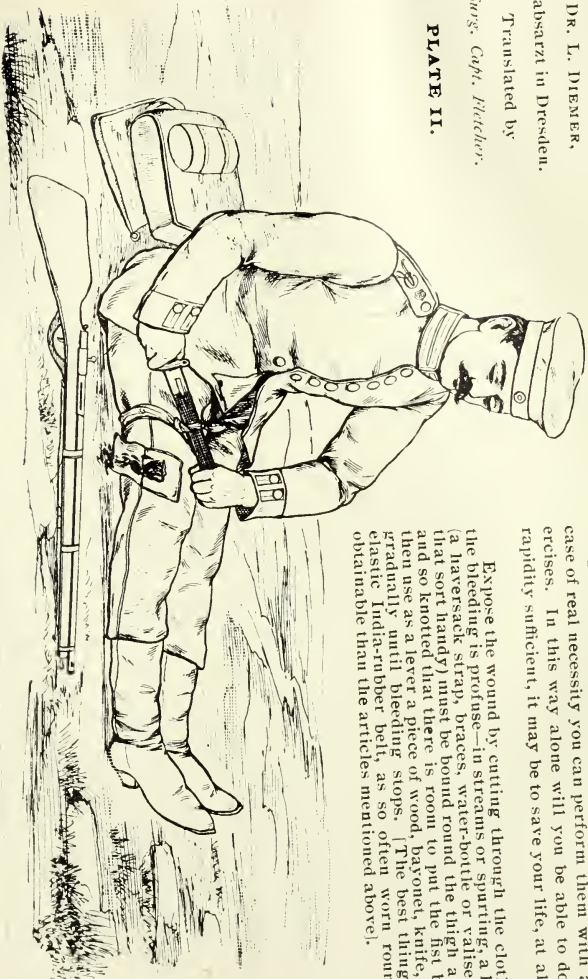


Fig. 2. Dr. Diemer's Second Plate.



has but a limited mobility and is not always able to keep continuous touch with its brigade. So also as is laid down in "Staff Duties in the Field,"¹ a dressing station once established can hardly be moved during the same day. In the case then of a rapid forward movement a great deal of the bearer company work may fall on the shoulders of the regimental aid.

Let us pass to the technical instruction of the regimental bearers. What are the nature of the injuries they will be called upon to treat? Wounds, fractures and especially hemorrhage, and to the rapid treatment of these emergencies must we train them. It is generally admitted that the large increase in the proportion of dead will be due to hemorrhage. Dr. Herman Fischer of the German army considers there is another factor, viz: greater liability to wounds of the upper extremity, but Melville has shown that the statistics of modern wars do not support this opinion. The immediate treatment of hemorrhage, therefore, is the most important point in the instruction of regimental bearers and indeed of all military first aid. The first officer killed in the Egyptian campaign of 1882 was shot about two inches below the groin and in two minutes he had bled to death because there was no one near who understood what to do.

The Regulations for the instruction of regimental bearers in the British service² is as follows: In every unit four men, at least, per squadron and two per company will be trained as stretcher bearers of the corps, according to the instruction in ambulance and stretcher drill and in rendering first aid to the wounded laid down in the Manual for the Medical Staff Corps. The training of officers and men, whether of the Regular Forces, or of the Militia, Yeomanry or Volunteers, in these subjects will be carried out by medical officers under the orders of general officers commanding and principal medical officers of districts.

Commanding officers of units will afford medical officers undertaking the duty every facility for the formation and instruction of classes and will detail a competent non-commissioned officer to assist the medical officer in the drill and take charge of the equipment and appliances used in the instruction.

¹ Grierson's translation of Von Widdern's "*Das XVI Armee Corps, &c.*"

² Queen's Regulations Sec. xiv—§§ 58-66.

On the formation of a class, whether in connection with one or more units, officers and men of any branch of the service will be allowed to attend.

The class will consist of at least 12 lectures and 12 drills, of which attendances at nine of each must be certified by the instructing officer before application is made for examination as to proficiency. A class should consist of not less than eight persons.

When a class has completed its course and is ready for inspection, the instructor will submit the names or the inspection report of the ambulance class (Army Form I, 1224), for transmission through the commanding officer to the general officer commanding, who will send it to the principal medical officer of the district: the latter will forward it, together with authority to inspect the class, to the medical officer he may detail as examiner, who will examine the class and complete the form.

Any number of officers and men may qualify and their names be recorded in the Inspection Report I, 1224. Certificates of proficiency (Army Form E, 596) will not be granted to the Regular Forces, but only to the Militia and Volunteers.

Regimental stretcher bearers when parading as such will wear an armband of special pattern—a white web band with the letters S. B. in red upon it. This is common to all portions of the force, Regular, Militia or Volunteer. In addition non-commissioned officers and men of the Volunteers in possession of the ambulance proficiency certificate, E. 596, will, as long as they maintain their efficiency, wear a badge consisting of the letters S. B. in a monogram, in red and blue, upon a white ground enclosed within a red circle $1\frac{1}{2}$ inches external diameter. It is worn permanently sewn on the right arm above the elbow.¹



Fig. 3. Regimental Stretcher Bearer's Badge in the volunteer force. The outer circle is the cloth of the tunic, upon which the badge is worked. The center is white, the letter "S" is red and the letter "B" is blue, while the inner circle is of a red slightly different from that of the scarlet tunic. The Volunteer Medical Staff Corps wear the Geneva Cross instead of the Monogram.

¹ Vol. Reg. § 875.

To insure efficiency, all trained regimental stretcher bearers are required to attend at least four stretcher drills annually.

The principal medical officer of a district will draw and hold at headquarters a limited supply of stretchers and appliances for instructional purposes and these will be loaned to units holding these classes, on the application of the commanding officer, who will be responsible for their custody and return.

It is also laid down that when troops are exercised during manoeuvres, bearer companies, field hospitals and stretcher bearers of corps will be organized and exercised as laid down in the Regulations for Medical Services of an Army in the Field.

To carry out these orders, in the Regular Forces the principal medical officer of the district, as soon as he receives information a class is to be formed, details a medical officer in his command to act as instructor. In some cases the M. O. in charge of the barracks teaches the class, but it is generally made up from different units and held at the Station Hospital where the material is stored.

In the Militia,¹ one non-commissioned officer and ten men are detailed from each battalion to be instructed in Medical Staff Corps duties during the training. They must be of good character and fair education and should volunteer for the work. They are trained as hospital attendants, in stretcher drill, and other duties pertaining to the M. S. C., under the orders of the P. M. O. of the district in which their battalion is out for training and for this purpose they are attached to a unit of the M. S. C. in a military hospital. The non-commissioned officer has to attend a course of training, not exceeding two months, at the depot and training school of the M. S. C. at Aldershot and it should immediately precede the training of his battalion. These men belong to the Militia Reserve and are drawn upon to make up the complement of bearers in the Regular Bearer Companies when they are mobilized for war. Officers commanding battalions are instructed to exercise judgment in selecting men in view of their duties.

In the Volunteer Force² to which I have the honor to belong we have no difficulty in obtaining a good supply of regimental

¹ Militia Regul. §§ 251-253.

² Vol. Reg. § 91.

SELF-HELP FOR

THE
WOUNDED,

From the German of

DR. L. DIEMER,

Stabsarzt in Dresden.

Translated by

Sarge. Capt. *Nichol.*

PLATE III.

a. With wounds in the arm—walk at once to Dressing Station.

b. With wounds in the leg wait quietly till bearers arrive.



PROCEDURE AFTER STOPPING BLEEDING BY A TOURNIQUET.

If the tourniquet has been on three hours and there is no bearer at hand, you must try to restore circulation in the leg to prevent mortification. Do this in the following way :

1. Fasten the lever (piece of wood) in its position by securing one end of it by means of a piece of string or handkerchief.
2. Open the first-aid dressing; which every soldier carries in the special pocket in the front of his tunic. It contains a compress of charpie, gauze, a piece of thin waterproof, a bandage and two safety pins.
3. Cover the wound with the compress. If there are several small wounds divide compress and put on each. Over this place the gauze and above this in turn the piece of thin waterproof. Round all roll the bandage and fasten on with a safety pin. If there are several wounds the gauze and waterproof must be divided.
4. Now loosen the tourniquet by slowly untwisting the stick and see whether the bandage is closing the wound so tightly that no blood escapes. You must keep hold of the stick.
5. If there is a great deal of bleeding through the bandage you must tighten up the tourniquet again or you will bleed to death.
6. Supporting a wounded part sometimes suffices to stop slight bleeding; it prevents recurrence and diminishes pain.



Fig. 4. Dr. Diemer's Third Plate.

bearers or in undertaking their instruction. The supply of medical officers is liberal. Each battalion of eight companies is allowed three, one of twelve companies four. These medical officers are in civil practice but are bound to pass, within a limited time after commission, an examination before a medical board convened by the P. M. O. of the district. The examination includes squad, company and bearer company drill; the organization of field hospitals and bearer companies; first aid to the wounded, the diseases incidental to military life, a knowledge of the Army Medical Regulations and the sanitary and other duties generally of a medical officer in camp and on the line of march.

To these medical officers is left the organization of first aid in their regiments. Sometimes a brigade class is formed at the headquarters of one of the regiments and instructed by one or more of the regimental surgeons under the direction of the Brigade Surgeon: but most frequently the regimental M. O. is left to train his own men in the way he thinks best. Personally I much prefer a regimental to a brigade class and am persuaded the instruction is better assimilated and certainly the personal supervision which is all important is difficult with the larger number.

Having decided to hold a class for the first aid certificate the fact is announced in the monthly battalion orders, and details given of days, dates and places when they will take place. To these lectures both those who are already trained as well as those wanting the certificate are admitted. There is a stretcher drill every Monday night during the greater part of the year which the ambulance recruits can attend for their twelve qualifying drills.

The subjects to be taught are those laid down in the Manual for the Medical Staff Corps and comprise

Anatomical and Physiological Outlines.

Bandages and Bandaging—triangular.

Fractures and the apparatus for their treatment.

Dislocations and Sprains.

Wounds: Dressings and their application.

Cases of Emergency and their immediate treatment.

Bleeding, burns, dislocations, drowning, fits, poisoning,
shock, sprains.

The various methods of lifting and carrying wounded.

SELF-HELP FOR METHODS OF GETTING TO THE DRESSING STATION.

THE WOUNDED,

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PLATE IV.

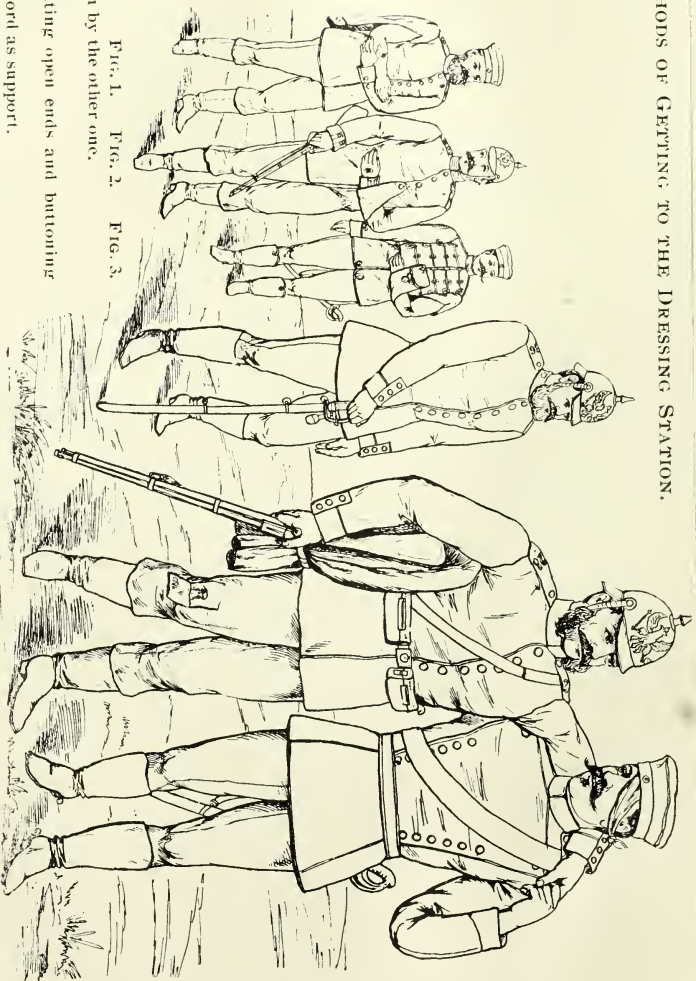


FIG. 1. Supporting wounded arm by the other one.

FIG. 2. By front of limb.

FIG. 3. By sleeve cut open. Sitting open ends and buttoning it up.

FIG. 4. Wounds of leg using sword as support.

FIG. 5. Making crutch of gun or broken lance; folded coat as pad; supported by another slightly wounded comrade.

Fig. 5. Dr. Diemer's Fourth Plate.

To start with it must be noted that the men to be instructed do not bring trained minds which easily grasp these highly technical subjects. In my own case the men all belong to the artisan class and however eager they may be to learn, it is absolutely necessary to present the subject to them in a simple and intelligible form,—stripping it as much as possible of technicality and giving to them only the essentials. An elementary knowledge of anatomy and physiology must be insisted on that they may appreciate the teaching of first aid; but give no more than is sufficient to explain the work they will be called upon to do—train not for an examination but for the treatment of emergencies. The instruction must appeal to the eye as much as possible both by diagram and demonstration and any apparatus likely to be used must be produced and explained. My friend, Surgeon Captain F. J. Warwick of the East London Volunteer Infantry Brigade Bearer Company is now producing some lantern slides for first aid lectures which should be very valuable adjuncts to the instructor.

The plan I adopt is to give to each man a syllabus of the lecture, not only that he may follow it more readily, but may refresh his memory afterwards by looking it over. They are not encouraged to take notes during the lecture, but are provided with notebooks in which they can, when they get home, and with the aid of the syllabus, write out shortly what they remember of it. This plan is found to give good results: and to stimulate their energy, a small prize is offered, generally some first-aid handbook, for the best notes of the course. On one occasion very elaborate notes were received from one of the class, not, however, of the lectures, but extracted from some text-book—a contingency not expected.

The Manual for the Medical Staff Corps is the official text-book and forms the basis of the instruction, each syllabus showing the sections in the Manual dealing with the subject. It contains, however, other subjects that those required by the regimental bearer, is not found a very satisfactory book to assimilate, is of an inconvenient size, and costs one shilling and sixpence. To each recruit, therefore, is given instead of it, Gell's "Aid to the Sick and Wounded," price 2 d., and Hull's "Stretcher Drill" (an excerpt from the Manual), price 3 d. These books are of a convenient size and Gell is a marvel of conciseness and clearness. The ideal book for this work is the Album für Krankenträger, by Dr. Ruhle-

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Surge, Capt., Fletcher.
PLATE V.

METHOD OF LOCOMOTION OF A MAN
UNABLE TO WALK.



The wounded man unable to walk can move himself in a sitting position in the direction of the arrow. This may be necessary to reach a place where he may be sheltered from the enemy's fire, protected from being ridden or driven over—tree, house, wall or ditch—to reach drinking water, to get nearer to the dressing station, out of a woods, or to a place where he may be more easily found by the stretcher bearers.

With his hands stretched behind him he supports the body in a sitting position. Bending the unwounded leg as much as possible and raising himself slightly from the ground he pushes himself backward by stretching this leg and dragging the wounded one after him. He continues this movement until he reaches a place of safety.

Fig. 6. Dr. Diemer's Fifth Plate.

mann: fully illustrated, a handy size for the pocket, and costing only a shilling it is a pity we have not yet had an English translation of it.

Surgeon Captain F. J. Warwick and Surgeon Lieutenant A. C. Tunstall, both of the E. London Brigade Bearer Company, are now drawing up a series of illustrated summaries which are far in advance of anything I have seen—there will be fourteen in all.

It has already been stated that the language of the instruction should be as plain as possible, but it must be remembered also that the class of men dealt with dearly love a long word and will attempt the pronunciation of any technical one they find in their text-books. It is as well, therefore, to write on the blackboard any such word they are likely to come across and teach them its pronunciation. This will save us from being told that a man was suffering from a "bleeding artillery" or that another died of "sign-cop."

Passing to the lectures themselves, they commence with some introductory remarks on the scope of the work to be done, the number of drills and lectures to be attended, and the absolute necessity for understanding the working of the human machine before you attempt to patch it up. The bearers are also given some idea of the actual circumstances under which they will have to give aid on service and that to do so effectually they require knowledge, discipline and self-reliance. The remainder of the first lecture is given up to a description of the general construction of the human body and the relation of the most important organs to the surface. This latter is most important, and beside being shown by means of a diagram exposing those organs, the instructor marks them out in chalk on the living body. A large diagram of figure 100 in Captain Pilcher's book¹ showing the relation of the organs of the chest and abdomen to the clothing would be most useful. There is a great want of a really good set of anatomical diagrams, the ones in use in my class are those of Fielder and Hoclemann (published by Allman), and are as good as any I know. Diagram 1 is 50x36 inches and the five others 36x26.

The second lecture and every succeeding one commences with a catechism on the work done the time before. The subject of

¹ *First Aid in Illness and Injury*. By Captain James E. Pilcher, U. S. A. London: Kegan Paul, Trench, Trubner & Co., Ltd.

IMPORTANT GENERAL RULES FOR THE TREATMENT OF WOUNDED.

1. Never touch a wound with anything unclean—dirty fingers, non-disinfected bandages, dirty water, &c.; it may cause inflammation, ulceration or blood poisoning.
2. Expose the wound by removing the covering article of dress, which contains many impurities. Unbutton or cut clothes and examine extent of bleeding.
3. If the wound does not bleed at all or only a few drops at a time, no immediate bandaging is necessary—leave this to bearers.
4. If the blood is spurting or in a strong stream from a wound in the leg you must bind a tourniquet round a fleshy part, not a joint and at least a hand-breadth above the wound to stop the bleeding. See Plates I, II and III. In this case also wound need not at once be bandaged.
5. Whoever is able to walk after being wounded must repair at once to the dressing station. See Plate IV. Those who cannot walk must be carried by stretcher bearers and must await their arrival by lying down in the manner represented—as quietly and comfortably as possible in order to avoid pain, bleeding and aggravation of the wound.

SELF-HELP FOR

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Translated by

Surge Capt. Fletcher.

PLATE VI.

HOW A MAN UNABLE TO WALK SHOULD LIE DOWN.

Open all articles of clothing which might hinder circulation of blood or breathing (coat-collar, necktie, belt). If wound is in the leg, place it comfortably and bind it to the other leg with a belt, pins, pocket handkerchief, &c.; the feet may be kept together by placing forage cap or haversack over toes. To avoid pain and bleeding raise legs by putting under them a valise, saddle, truss of straw, &c.—slight bleeding will often cease in this position of its own accord, without any bandaging. If a bandage is advisable to protect the wound from dirt, insects, flies or cold, use the little pocket dressing as described in Plate III. The cloak or valise may be used as a pillow.

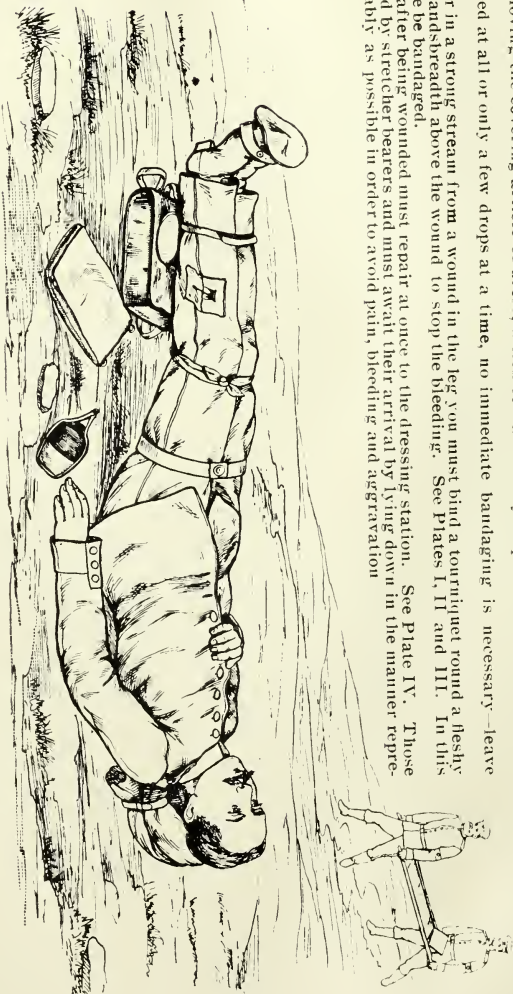


Fig. 7. Dr. Diemer's Sixth Plate.

this lecture is "Bones, Joints and Muscles." The bones are actually given into the men's hands that they may become familiar with them, and they are asked to put them in their proper place in the skeleton. As soon as the lower extremity is reached, the description of a joint is interpolated to show how it is connected with the trunk and each particular joint is described in its place. When we arrive at the ankle joint the men are told its great liability to sprains and that class of injury and its treatment brought to their notice. So likewise dislocations and their treatment crop up with the shoulder joint. This plan makes a break in the dull enumeration of the names of the bones and excites the bearer's interest. The ordinary name of each bone is given and its technical name written very legibly on the blackboard. The lecture concludes with a short account of muscle tissue and by some homely examples its contractility and influence on fractures is demonstrated.

The third, fourth and fifth lectures are devoted to "Fractures and Bandaging." After an explanation of terms the varieties of fracture are demonstrated on a piece of wood and by attaching bits of elastic the distortion by muscular action is easily shown. The mending of a broken bone is explained by a little glue and a splice of putty. Then follows a description of the signs of fracture, its immediate treatment and the methods of improvising splints. No special splints are used, beyond the wire arm splints in the surgical haversack, all others being improvised from some article of clothing or equipment. It is most necessary to impress upon bearers that they do not "set" fractures, but only reduce the deformity as much as possible and immobilize the limb. So too many text-books on first aid give instructions for the reduction of dislocations, a most dangerous proceeding in such hands and not allowed in the British service; the medical officer alone should attempt reduction, the bearer immobilize only. All the work on fractures should be absolutely practical, the putting up of each given separately and copied by the men. Two diagrams of fractures by F. E. Bromley may be used as adjuncts, but not to replace the practical demonstration. The use of the rifle splint in broken thigh requires careful attention to detail, and is perhaps the most important as it is the most complicated of any. The one point men are apt to forget, when putting up a suppositious fracture on a human being, is that having reduced the deformity it is necessary

to keep up extension till the splints are fixed: they are very apt to put down the leg in the middle of it to reach a splint. To correct this tendency the dummy wooden fracture with elastic muscles will show the man at once the mistake he has made, and serves as a good object lesson that he will probably remember. The majority of the bandaging is learnt in the two lessons on fractures and the bearer becomes acquainted with the contents of the surgical haversack at the same time, but the fifth lecture is devoted to a systematic study of the triangular bandage. The best way to teach it is the regulation method in two ranks, the front rank ap-

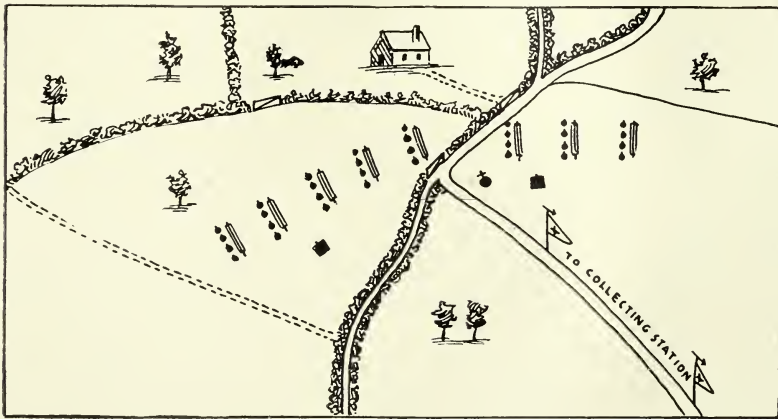


Fig. 8. The Bearer Company in Action—the Stretcher Sections with Fighting Line.

Personnel—1 Surgeon Captain, 2 Sergeants, 32 Bearers.—35.

Equipment and Transport—8 Stretchers, 8 Surgical Haversacks, 8 Water Bottles.

plying a bandage to rear rank and vice versa. Nowhere will you find a triangular bandage more neatly put on than by a soldier when he has been taught the way; tidiness is ingrained in his very soul.

The sixth lecture treats of the Organs of Respiration and the Purification of the Blood: the treatment of the apparently drowned and a very slight sketch of the organs of digestion, the kidneys, skin and nervous system.

The seventh lecture comprises the Organs of Circulation and the Circulation of the Blood. This is illustrated by diagrams and a dead sheep's heart. A suggestion has been made, I think by

Captain Pilcher in his paper read before your Association in 1896 and published also in the *Journal of the Military Service Institution*, that the circulation should be shown in a chloroformed cat. This is, of course, the ideal method, but impossible in England, where vivisection certificates are only allowed to a few persons engaged in research, and never for purposes of demonstration. The nearest practical method to show the changes taking place in the blood during circulation I have been able to devise is a primitive apparatus consisting of two Higginson's syringes marked across their middle into auricle and ventricle, two basins one marked "lungs" and the other "capillaries" and a solution of litmus. Red litmus

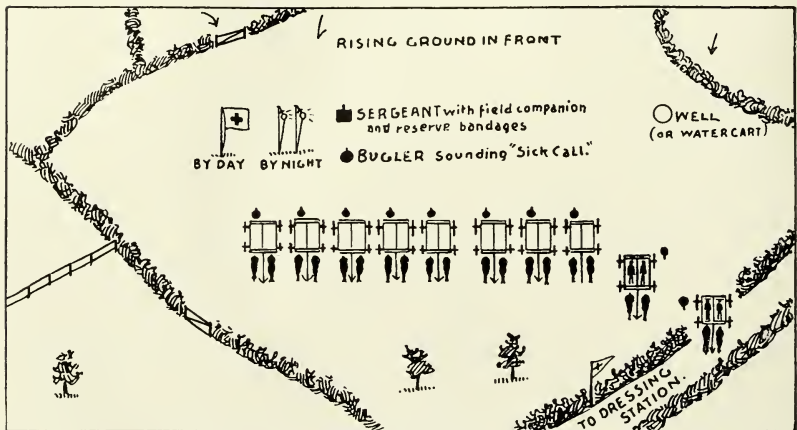


Fig. 9. The Bearer Company in Action—the Collecting Station.

Personnel—At Station, 1 Sergeant, 1 Bugler; on Wagons, 5 Corporals, 5 Privates.—12.

Equipment and Transport—1 Field Companion, 1 Water Bottle, Reserve Bandages, 10 Ambulance Wagons.

from the "lungs" basin is made to enter Higginson No. 1 (left side of heart) and is pumped thence into main artery (Higginson tube) and the "capillaries" basin: a little alkali added shows the change in the capillaries to blue venous blood: thence in second Higginson (R. side of heart) back to "lungs" basin, where a little acid changes it to arterial red and finishes the circle. It is a rough and ready method, but the men seem to grasp the idea.

The eighth lecture on Hemorrhage is perhaps the most important of any. First there is a demonstration of the three kinds of bleeding—arterial shown by a Higginson, venous through an

ordinary piece of tubing and capillary by a soaked piece of sponge under an artificial wound. Following this the different methods of arresting hemorrhage are explained: the construction and application of the tourniquets carried in the surgical haversack and how a tourniquet can be improvised. A point is made of finding out whether besides knowing, the men can impart their knowledge of this subject: a note is made of those who can for future reference when the instruction of the whole battalion in self-help has to be

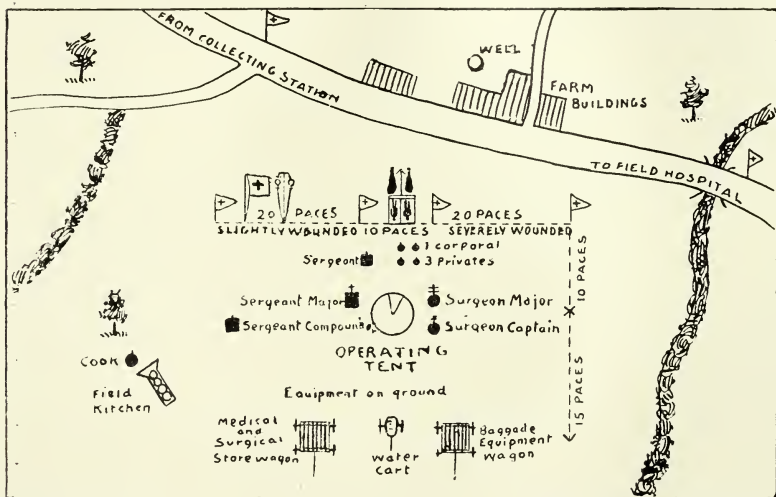


Fig. 10. The Bearer Company in Action—the Dressing Station.

Personnel—1 Surgeon Major, 1 Surgeon Captain, 1 Sergeant Major, 1 Sergeant (Compounder), 1 Sergeant, 1 Corporal, 1 Cook, 3 Privates.—10.

Equipment and Transport 1 Medical and Surgical Store Wagon, containing 1 Pair Equipped Panniers and 2 Field Fracture Boxes; 1 Baggage Equipment Wagon, 1 Water Cart.¹

undertaken. Next the course of each of the principal arteries is marked in chalk on the human model and the treatment of hemorrhage in the different localities explained. As each particular case is demonstrated the class perform it on one another: men here and there are asked what they are doing and not only why they are doing it but why some other plan was not adopted. In this way and with the general knowledge that an artery always takes the

¹In addition to the personnel and equipment enumerated in connection with Figs. 8, 9 and 10, we have in camp, 1 Q. M. Sergeant, 2 Cooks, 3 Batmen and 1 Supernumerary.—7: 1 A. S. C. details Wagon and 2 Forage Carts.

path of greatest safety from external violence the men very quickly pick up the course of a blood vessel, its name, the part against which pressure is made and why in certain localities a tourniquet cannot be applied: It is as well to see the men do actually stop the circulation when making digital pressure that they may understand the force really necessary. Each of the class is given a table with the syllabus showing the arteries, their course, the bone against which pressure is made, and the spots at which to apply it.

The ninth and tenth lectures are given up to Wounds and Dressings, and the utmost care taken that every individual in the class is thoroughly acquainted with every detail of this part of the subject. It may seem a waste of dressings, which naturally get dirtied, but every bearer is made to put a dressing on a wound and explain every part of it. Cleanliness is taught to be the eleventh commandment, and little as one likes filling up a regimental bearer with theoretical knowledge the germ theory of wound pollution has to be imparted that he may understand the essence of antiseptics. On account of its utility in camp, where there may be a temporary hospital, the men are taught the use of wet dressings and lotions, but at the same time given to understand that in the field they will have to depend on dry dressings and never use the contents of the surgical haversack as long as they can find a first field dressing on a wounded man. All bearers must know thoroughly this first field dressing and practice with it on every region of the body that they may accustom themselves to its uses, limitations, and rapid application. For this purpose a couple of these dressings are always kept in my surgical haversacks, although not part of their complement, that when an injury occurs at manœuvre the bearer may use it in preference to any other dressing. When the medical officer has his 18 men thoroughly familiar with it he has a very useful lever to assist him when he has to teach its use to the battalion.

The eleventh lecture is the bugbear of the instructor and the instructed and deals with Insensibility and Poisons. These subjects are part of the regulation course and therefore must be taught, but experience seems to show that though a man of the class we have to deal with may cram them for an examination, as a medical student does *materia medica*, a week or two suffices to "wipe his tables clean, and keep no telltale to his memory." That

any bearer can be trusted to diagnose the different forms of insensibility I cannot imagine, and they are cases where a little knowledge is a dangerous thing. Shock, syncope and sunstroke alone would I try to teach him and a drunken fit is not so great a rarity but what it may be recognized. The other forms of insensibility might well be left alone and why a regimental bearer should be asked to try and load himself with a knowledge of poisons and their antidotes is a mystery. He is not likely to see a case of poisoning once in a blue moon, and if he does will by that time have forgotten all about special antidotes, which is perhaps as well for the patient. The syllabus given the men for this lecture is much more extensive than most, giving exactly what the men must know. Poisons are divided into (1) narcotics, (2) corrosives, and irritants

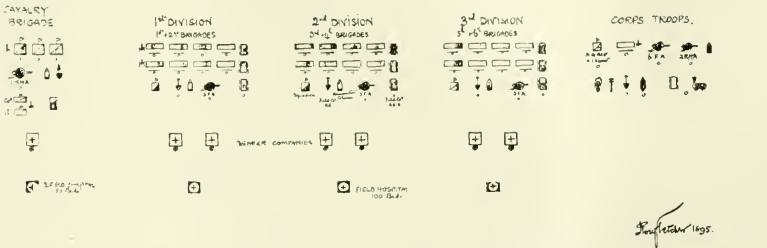


Fig. 11. Diagram of the Medical Arrangements of an English Army Corps with Cavalry Brigade. Home Defence.

(3) excitants,—a handy though not scientific classification, I find easiest understood. The treatment of poisoning is stated in a simple and general form, requiring no great diagnostic skill and special antidotes omitted altogether. The actual summary of the lecture is all the bearer need know and he might as well learn it at home as attend a lecture on the subject.

The twelfth and last lecture treats of the Carriage of Wounded, and also contains a general sketch of the medical arrangements of an English Army Corps in the field. The latter part is no real portion of the regulation course, but is followed with very keen interest by the men and gives them the *raison d'être* of their existence. The regimental aid and that of the Bearer Company is considered in detail that the scope of each in manœuvre may be recognized. I have given before other reasons why the regi-

PERSONNEL OF THE MEDICAL ARRANGEMENTS OF AN ENGLISH ARMY CORPS WITH CAVALRY DIVISION. SERVICE ABROAD.

WITH ARMY CORPS STAFF :

- 1 P. M. O.—Surgeon Major General.
- 1 Surgeon Colonel—Deputy P. M. O.
- 1 Surgeon Major—Secretary.
- 1 Surgeon Captain—Orderly Officer.

WITH A DIVISIONAL STAFF :

- 1 P. M. O.—Surgeon Colonel.
- 1 Surgeon Major in charge of staff.
- 1 Quartermaster.

AT BASE :

- 1 P. M. O.—Surgeon Colonel.
- 2 Surgeon Majors. 1 Embarking Officer. 1 in charge of Med. store.
- 2 Quartermasters.

TOTAL OF MEDICAL OFFICERS AND MEDICAL STAFF CORPS WITH ARMY CORPS—[35,087 MEN].

	M. O.	Q. M.	M. S. C.
With Army Corps Staff....	4		11
“ 3 Infantry Divisions. . .	6	3	24
“ Regimental Units. . . .	41		
“ 6 Bearer Companies . . .	18		366
“ 10 Field Hospitals . . .	40	10	400
	122		801

WITH CAVALRY DIVISION [6,700 MEN] :

Divisional Staff.....	2	1	10
Regimental Units.....	9		
2 Bearer Companies.....	6		122
3 Field Hospitals.....	12	3	120
	33		252

ON LINE OF COMMUNICATION [11,959 MEN] :

H. O. Staff.....	3		7
Staff at Base.....	3	2	17
Staff Advanced Depot.....	1		5
2 General Hospitals.....	36	2	240
2 Stationary Hospitals.....	18	2	150
With Regimental Units . . .	5		
	72		439

GRAND TOTAL :

Army Corps.....	122	801
Cavalry Division.....	33	252
Line of Communication....	72	439
	227	1492

400 Regimental Bearers }
256 M. S. C. Bearers.... } 656.

WHEELED TRANSPORT WITH THE EIGHT BEARER COMPANIES.

- 80 Ambulance Wagons or Accomodation for 480 Men.
- The 2 A. S. C. Co's at Base have 26 Ambulance Wagons.
- The 2 A. S. C. Co's on Line of Communication have 26 Ambulance Wagons.
- The 1 A. S. C. Co. at Advanced Depot has 13 Ambulance Wagons.
- There are 1320 hired wagons plying between Railroad and Advance Depot, and returning empty.

13 Field Hospitals provide for.....1300 sick.
Hospitals on Line of Comm'n'c'n.1200.
Total.....2,500.

REGIMENTAL AID :

- 1 Medical Officer—attached.
- 1 Corporal in charge of panniers (drawn
- 1 Private as Orderly..... from the
- 16 Privates as Bearers..... / Regim't.

WITH BATTERY OR RE. UNIT.

- 1 Medical Officer—attached.
- 1 Private as Orderly—from Unit.

BEARER COMPANY :

- 1 Surgeon Major..... / Army Med.
- 2 Surgeon Captain or Lieut. / Staff.
- 1 Sergeant Major.....
- 6 Staff Sergeants and Sergeants / Medical
- 6 Corporals..... / Staff
- 1 Bugler..... / Corps.
- 47 Privates.....

Total 64.

FIELD HOSPITAL :

- 2 Surgeon Major.
- 2 Surgeon Captain or Lieut.
- 1 Quartermaster.
- 1 Warrant Officer.
- 7 Staff Sergeants and Sergeants.
- Wardmaster 1.
- Compounders 2.
- Steward 1.
- Cook 1.
- Packstore Keeper 1.
- supernumerary 1.
- 4 Corporals.
- Steward 1.
- Cook 1.
- Clerk 1.
- supernumerary 1.
- 28 Privates.
- Ward Orderlies 14.
- Cook 1.
- Pack storekeeper 1.
- Messenger 1.
- Servants 5.
- supernumerary 4.
- Washermen 2.

Total 45.

STATIONARY HOSPITAL :

- 1 Brigade Surgeon Lieut. Colonel.
- 2 Surgeon Lieut. Colonel.
- 2 Surgeon Major.
- 4 Surgeon Captain or Lieut.
- 1 Quartermaster.
- 1 Sergeant Major.
- 8 Staff Sergeants or Sergeants.
- 8 Corporals.
- 48 Privates.
- 10 Servants.

Total 85.

GENERAL HOSPITAL :

- 1 Surgeon Colonel.
- 1 Surgeon Major (Secretary and Registrar)
- 2 Brigade Surgeon Lieut. Colonel.
- 2 Surgeon Lieut. Colonel.
- 4 Surgeon Majors.
- 8 Surgeon Captain or Lieut.
- 1 Quartermaster.
- Total M. O. 19.
- 3 Sergeants Major (1 as clerk).
- 11 Staff Sergeants or Sergeants.
- 1 Bugler.
- 10 Corporals.
- 76 Privates.
- 19 Batmen.
- 1 Interpreter (Civil).
- Total 121.
- Nursing Sisters Attached.
- Lady Superintendent 1.
- Nurses 7.
- Servants 2.

Total 150.

mental bearers should have some knowledge of bearer company work. This lecture is illustrated by a number of diagrams and small copies of three of them are attached as they may be of interest to members of this Association, apart from the subject of first

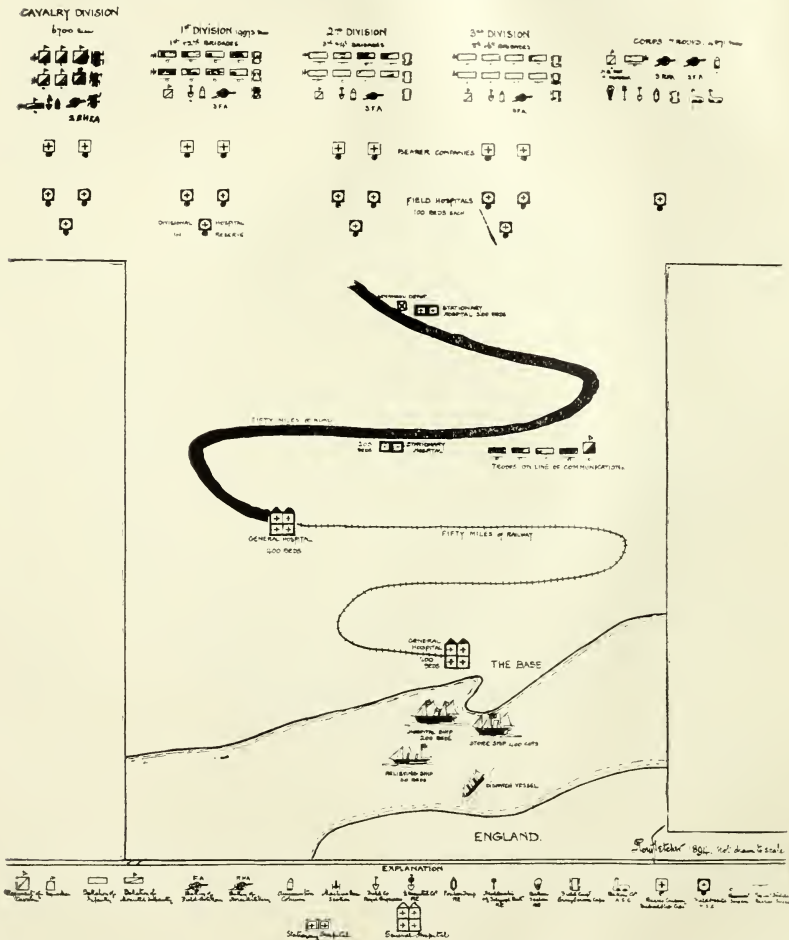


Fig. 12. Diagram of the Medical Arrangements of an English Army Corps with Cavalry Division.—Service Abroad.

aid. I hope soon to have lantern slides of them all. Besides the diagrams bearer company work is easily shown by a small model. It is wonderful what a little paint and some linen will do to transform the carriages of the German small tin trains you buy in the toy shops, into ambulance wagons, and general service wagons.

Take for instance the installation of a dressing station—a piece of painted cloth representing a road and adjacent country, some part the bearers know is best, and on this according to scale the dressing station is laid out in miniature with its directing flags, wagons, field kitchen, tent and equipment,—all marked out just as they may do it on the real piece of ground itself in a day or two under your direction. So too a dressing station installed in a house (after the model of the *Ambulance* in the French Regulations) may be conveniently shown with a box of children's bricks.

Such, gentlemen, is the scope of the class-room instruction and *pari passu* with it the stretcher drills take place.

At the conclusion an officer of the Army Medical Staff is detailed by the principal medical officer of the district to examine the class and certificates E. 596 are granted to those who pass.

These certificated first aid men, or part of them, become the regular regimental stretcher bearers. They make themselves efficient as combatants every year both in drill and musketry. They attend special first aid lectures given by the medical officers for them as well as being present and helping at the recruits' course. They have a stretcher drill every Monday evening for six months in the year and though volunteers and therefore only compelled to do a certain number, it is seldom there is less than twelve at these evening parades. The average stay of the bearers in the battalion is five or six years.

On route marches and manœuvres they are kept together: this insures knowledge of one another and uniformity in work; the same men as far as possible always working in the same stretcher squad.

To make their knowledge thoroughly practical a certain number of casualty cards are given to captains of companies whenever the battalion is out for field manœuvres. These cards are distributed to men in the fighting line and the captain instructs them when to fall out as dummy wounded. The bearers are given the direction of a supposed Collecting Station, generally on a main road, and to this the "cases" are brought and the treatment examined and criticised. This work is not only interesting for the bearers but most useful and instructive and gives them an amount of confidence they would never otherwise obtain. This practical field work takes place about twelve or fourteen times a year.

In the Regular Service the bearer company and field hospital are not peace units and until the last year or two were not mobilized for peace manœuvres. In the Volunteer Force a permanent bearer company is being organized for each infantry brigade. Most of these are now formed and it is hoped that before long it will be possible, whenever the brigade is out, to practice the removal of casualties in the field in co-operation with the bearer company. This will be a great aid and a test to the efficiency of



Fig. 13. The Ambulance Challenge Shield.

the medical services. Perhaps the day may come when the authorities will see the necessity for medical manœuvres on the scale of those held in France near Versailles in October, 1892, but I fear financial aid and other reasons are against it. If we wish to know why the Japanese medical arrangements in the late war were so efficient we have only to read Surgeon Major General Taylor's report¹ and his description of the thoroughness of their peace rehearsals.

¹ Report of the Medico-Military Arrangements of the Japanese Army in the Field, 1894-95.

To stimulate the energies of the regimental bearers in my battalion, the medical officers hold a competition every October. It includes Stretcher Drill, Anatomy and Physiology, First Aid and Bandaging. A prize is given to each man of the best stretcher squad, another to the individual who obtains the highest aggregate of marks and one for the best recruit. The "best man" also has his name engraved on a silver challenge cup which has been given for that purpose.

In addition to these battalion prizes, the Volunteer Medical Association (the Association of the Medical Officers of Volunteers), instituted some years ago a handsome challenge shield (Fig. 13) of the value of 200 guineas to be competed for annually and open to squads of regimental stretcher bearers belonging to any Volunteer Corps in the United Kingdom.¹

¹ The following are the Regulations for the Ambulance Shield Competition :

1. THE CHALLENGE SHIELD, value 200 guineas, is offered for competition by the VOLUNTEER MEDICAL ASSOCIATION to encourage Ambulance Training in Volunteer Regiments, and will be held for the year by the Winning Regiment at each Annual Competition.

2. The Competition for the Shield will take place annually in June, unless the Council otherwise determine.

3. The Competition is open to Stretcher Detachments belonging to any Regiment or Corps in the Volunteer and Yeomanry Forces and the Honourable Artillery Company; the Volunteer Medical Staff Corps excepted.

4. In Regiments in which a definite number of bearers is allowed by regulation, each squad must be composed of Certificated Regimental Bearers.

Non-Commissioned Officers above the rank of Corporal are not eligible as Bearers.

5. Local Preliminary Competitions may be arranged, if necessary, by the Council of the Association, in order to reduce the number of Squads competing at the final competition to not more than twelve.

6. The Judges at all the contests shall be selected by the Council of the Volunteer Medical Association.

7. *Preliminary Competition.*

DRESS:—At Preliminary Competitions the Detachments shall parade in Drill Order (all competitors must appear in the uniform of their regiment), with surgical haversack and stretcher of regulation pattern.

DRILL:—As in final competition.

8. The words of command at Preliminary Competitions shall be given by one of the examining Medical Officers, or by a Non-Commissioned Officer of the Regular or Volunteer Medical Staff Corps.

9. *Final Competition.*

DRESS:—Review Order, with Leggings, if worn by the regiment. All competitors must appear in the uniform of their regiment.

There remains only one other phase of first aid to be considered—the general instruction of all ranks. While Germany and America have adopted this course England has not done so. Till 1894 the only persons trained in ambulance work (except, of course, the technical Medical Staff Corps, the Militia M. S. C. and the Volunteer M. S. C.), were the regimental bearers. In November, 1894, an order was issued that general officers commanding districts were to see that during the winter months all officers and men in their command received instruction in the use of the first field dressing. This is now done, and is perhaps as much as is required, if the information how to improvise a tourniquet is included. The diagrams of Dr. Diemer of the German Army, shown in a greatly reduced form in Figs. 1, 2, 4, 5, 6 and 7, are most useful in this instruction and should be a permanent adornment of every barrack room. Dr. Diemer has kindly given me permission to publish them in English which will be done shortly with all six diagrams on one sheet, the form found to be most convenient. I regret they are not yet published and that my own hand-drawn copy is not at the moment available; but I present for

DRILL:—Stretcher and Wagon Drill.

Lifting and carrying wounded on stretchers and by improvised seats.
First Aid and Bandaging (triangular bandage).

Stretchers will be provided, but each squad must supply its own haversacks, furnished with splints and bandages.

The general smartness and set-up of the men will be taken into consideration.

10. The words of command at the Final Competition will be given by an Instructor of the Medical Staff Corps, but in the case of a tie, No. 4 of each squad may be called upon to work his own squad.

11. Regiments intending to compete must inform the Hon. Sec., Volunteer Medical Association, 20 Hanover Square, W., before the 15th May, who, on receipt of Entrance Fee will send a card, which must be shown to the Examining Officer at all competitions.

Entrance Fee, one guinea each squad.

Each man of the winning team to receive a badge.

The following are additional regulations:

Badges will also be given to members of the second and third teams respectively.

In all competitions (Preliminary and Final) the word of command shall not be given by any Sergeant-Major or Sergeant-Instructor who has been previously engaged in the drilling of any of the detachments competing.

At all preliminary competitions the Medical Officer of the competing regiment shall state, at the time of the competition, the names and ranks of the four members constituting the competing detachments; and at the Final Competition these four members *only* of the several

your notice copies of the original German diagrams and the translation I propose—it differs a little from the German as the first field dressings are not the same in both countries.

Besides this lecture the battalion has one on boots, marching, food, etc., and the general cares necessary to maintain health and remain effective in camp and on the march. This lecture is somewhat similar to the *Gesundheitspflege des Soldaten* of Staff Surgeon Lorenz, and I hope shortly to have on the same lines a small book for the pocket of the English soldier.

Gentlemen, the time between the arrival of your invitation and the date on which this paper must be mailed is short, and unfortunately during this time I had to be out with my regiment for training in brigade. Much of it, therefore, had to be composed in what spare time could be found between field days and other duties and I would ask your kind indulgence for its many shortcomings. I do not flatter myself there is anything novel in this paper, still

detachments successful at the Preliminary Competition shall be allowed to take part in the Final Competition.

It shall, however, always be in the power of the Volunteer Medical Association to consider at any time, having previously received due notice through the Secretary, any circumstance connected with the unavoidable absence of any one or more members of the competing detachments, or in an event of an emergency, the same power shall be delegated to the representatives of the Association on the field at the Final Competition.

In consequence of the difficulty experienced in most districts in getting Ambulance Wagons for drill purposes, the Wagon Drill will be carried out with ordinary spring vans, such as can be obtained for practice by all competing teams.

This arrangement is in accordance with the principles laid down in the Manual for the Medical Staff Corps.

At all competitions each Stretcher Squad will parade with its own Haversack, furnished with splints and bandages.

The Drill as laid down in the most recent MANUAL for the Medical Staff Corps will be adhered to in the Competitions.

The marks will be apportioned as follows :

Drill	100 marks.
Bandaging	100 "
First Aid	60 "
Anatomy	40 "
Total	300 marks.

we can all work for that common cause—"our duty is to save." Some of us must beat the bushes, *Multi pertransibunt et angebitur scientia*. In our work the little that has been done seems nothing when we look forward and see how much we have yet to do.¹

In conclusion, gentlemen, let me once more thank you for your courtesy in inviting me to take part in your deliberations. Speaking the same language and our life blood drawn from the same source we have much in common and salute as cousins rather than strangers. The regiment to which my battalion is attached, the King's Royal Rifles, was originally raised in America in 1755 as the Royal American Regiment of Foot: but now, from that little island off the coast of France which Wendell Holmes has described as a freckle on the face of the globe and in the same breath "our little mother isle, God bless her," I send a hearty greeting to my confreres of the United States Army, and best wishes that they may have a successful meeting.

¹ Goethe.

III. THE PLACE OF MILITARY MEDICINE AND SURGERY IN THE MEDICAL COLLEGE CURRICULUM.

By GEORGE M. KOBER, M. D.,

PROFESSOR OF HYGIENE AND MILITARY SURGERY, MEDICAL DE-
PARTMENT GEORGETOWN UNIVERSITY.

PERHAPS few men will question that Military Medicine and Surgery should have a place in the medical college curriculum; those who are in doubt will simply have to recall our history in the past and consider the possibilities in the future. There is no country of its size which has a smaller standing army, and perhaps no country in the world which may find itself so readily in the throes of a civil war than our own, and "as our strength and safety are in a general dissemination of military knowledge among the people," so the character and efficiency of the Medical Officers of our future armies must depend upon the training received in our medical schools in Military Medicine and Surgery.

In the fall of 1874, while stationed as an Acting Assistant Surgeon on the Pacific Coast, I read in one of the German periodicals, an extract from an oration delivered by Rudolf Virchow on "The Progress of Military Medicine." Since the Germans are accustomed to speak highly only of the practical talent of Americans, but shrug their shoulders in a very significant manner about our scientific attainments, I translated the opinion of this masterly and certainly not over-indulgent critic for the Pacific Medical and Surgical Journal, November, 1874. In speaking of infectious diseases and the lessons of war, he says:

"Truly it is fearful to think of the school of suffering which the armies had to pass through before the truth was finally acknowledged. In the Crimean war the French army lost one man out of three of the whole army, and it is estimated that of the 95,615 lives lost only 10,240 fell before the foe. About as many died of wounds in the hospitals, and the rest, more than 75,000

men, died of infectious diseases. It is calculated that in the American war of secession 97,000 men fell in battle, and 194,000 perished of infectious and other diseases. What an excess of pain and sorrow, what an ocean of blood and tears are contained in these figures! And what a mass of false regulations, and prejudices and misunderstandings, too! It is not necessary to recount here the long lists of sins and mistakes. These are known too well and serve as a terrible warning to others. But it must here be acknowledged, that it was not the necessity alone that revealed the evil and brought the help. That the French in the Crimea learned from their experiences little or nothing, and the Americans in their civil war so much as to create a new era in military medicine—these results were brought about not by the magnitude of the need which the Americans had to suffer—for this was not greater than that experienced by the French in the Crimea,—but rather by the critical and truly scientific spirit, the open mind, the sound and practical common sense which in America gradually permeated all departments of army organization, and which, under the wonderful co-operation of an entire nation, reached the highest point in humane efforts ever attained in a great war. Whoever takes up and reads the extensive publications of the American medical staff will be constantly astonished at the wealth of experience therein found. The greatest exactness in detail, careful statistics, even about the smallest matters, and a scholarly statement embracing all sides of medical experience are here united in order to preserve and to transmit to contemporaries and posterity in the greatest possible completeness the knowledge purchased at so vast an expense.”

This happy appreciation of Professor Virchow of our achievements in Military Medicine applies to an epoch where the United States with a small standing army and a small corps of trained Medical Officers were suddenly involved in a gigantic war, absolutely unprepared for the struggle, except that we had men gifted with good common sense, powers of observation and application and a generous nation to provide over fifty million dollars for the care and treatment of our sick and wounded. I naturally asked myself the question, if the American Medical Staff accomplished so much without special training, how much more might have been achieved had the Medical Officers enjoyed preliminary in-

struction in Military Medicine and Surgery, such as is given at the Army Medical School at Netley, or in the Friedrich Wilhelm Universität at Berlin. But someone will say, "Necessity is the mother of invention," "Experience is the best teacher," "We did it before, and we can do it again."

Yes, but how did we do it? Shall the future medical historian be compelled to chronicle the fact, that ten days after the first engagement "600 wounded still remain on the battle field in consequence of the insufficiency of ambulances and the want of a proper system for regulating their removal; many have died of starvation, many more will die in consequence of exhaustion, and all have endured torments that might have been avoided."

Virchow's comments were based upon 97,000 men, who died of their wounds, and 194,000 who perished from infectious and other diseases. As a matter of fact, the total deaths in the Union Army numbered 359,496, over 15 per cent. of the entire number of enlistments. Of this number 224,586, or nearly two-thirds died from disease, while 134,910 were killed in battle or died from the effects of wounds. Indeed it is calculated that in our Civil War the Union Army treated over six million cases, including 151,384 cases of continued fever, mostly typhoid; 1,739,135 cases of diarrhœa and dysentery, with 44,558 deaths; there were also 76,318 cases of measles, with 5,177 deaths; 18,952 cases of small pox, with 7,058 deaths, and 24,812 cases of erysipelas, with 2,107 deaths.

Think of this array of preventable diseases? Consider, if you please, the fact that in addition to the terrible sacrifice of human life, a generous nation expends one hundred and forty millions a year for the support of invalids of this war.

Who can deny that, had the Medical Officers of the late war known more of army diseases, their causes and prevention, had they appreciated the importance of accurate and complete hospital records, our pension roll would be smaller and a just discrimination would have been possible between deserving invalids and malingerers, and individuals who studiously arrived at a deterioration of their physical condition in order to enlist sympathy and a higher rate of pensions.

Shall the sins of omission and commission, the prejudices and false regulations be repeated? No; for they are too well known and serve as a terrible warning to others. But how shall this

warning be heeded? Simply by transmitting in the medical schools of this country to contemporaries and posterity the knowledge purchased at so vast an expense. Our medical colleges have very generally introduced instructions in personal and public hygiene, in fact the medical profession is striving every day to lessen sickness by the enactment of health-laws, and to thereby cut off its own revenue, and there should be no difficulty in convincing medical schools that it is a patriotic duty to establish courses of instruction in military surgery and sanitation.

After the receipt of Major Hoff's lecture on "The Military Medical Officer in Peace and War," delivered at the Medical School of Harvard University in November or December, 1894, I was requested by the Medical Faculty of Georgetown University to supplement my instructions in hygiene with a course on Military Surgery and Medicine, and I am convinced that interest in the general course on hygiene has been stimulated thereby. It is no more difficult to interest the average student in this than in any of the subjects taught, provided the course is made obligatory and he is required to pass a satisfactory examination. This is sufficient to insure prompt attendance and attention, but apart from this we can appeal to the patriotism and ambition of the student. In my introductory remarks I point out the advantages of a medical career in the Army, Navy and Marine Hospital Service, and that merit alone is the key to success; reference is made to the status of Medical Officers in the National Guards, and their usefulness in time of peace, as educators of the masses in the principles of personal and public hygiene, first-aid and transport of suffering humanity, and lastly, attention is directed to the fact that, in the event of a war, when the services of one Medical Officer for every 150 fighting men are required, it will be clearly their duty to contribute their share for the nation's defense and the manner of doing it will largely depend upon their preliminary training.

It cannot be expected that every young physician will choose the army or other public services for his professional career, but there will be ample opportunities for the application of the knowledge thus acquired as sanitary officers in connection with health-boards, as physicians and surgeons in charge of private or State hospitals, reform schools, jails, prisons, asylums, ship and police surgeons, pension examiners, surgeons in the employ of railroad

and mining companies, surveying expeditions, medical examiners of insurance companies, and in the home of almost every patient. When a student is told, for example, that the general rules to be observed in the examination of recruits will enable him to select able-bodied men for the police force and life insurance policies, and that the question of food, its preparation and the care of cooking utensils are of practical importance in the management of his patients, his interest in these subjects will be stimulated. Indeed he will soon learn that the aphorisms of the army cook's creed are not less applicable to the civilian. Take for instance the following, the truth of which the soldier learned from bitter experience:

"Cleanliness is next to godliness both in persons and kettles. It is less dangerous to work your elbows than your comrade's bowels. Remember that beans badly boiled kill more than bullets, and too much grease is more fatal than powder."

The average student of to-day will not forget the import of these aphorisms, and takes pride in being able to explain that dirty and greasy pots furnish food for certain saprophytic germs and consequent toxic products, which in turn produce gastro-enteric disorders,—that an excess of grease and improperly cooked beans render the digestive tract vulnerable to the germs of water-borne diseases like typhoid fever and dysentery and are to a great extent directly responsible for the many cases of simple and chronic diarrhoea. He will also appreciate the many circumstances under which he may be called upon to investigate an outbreak of so-called cholera morbus, due perhaps to improper food. It is very important to refer to the *practical* application of the knowledge thus acquired under the varied conditions of both civil and military life.

It goes without saying that the student of military medicine should be perfectly familiar with the principles of personal and public hygiene. My lectures on hygiene are delivered to third and fourth year classes, and the course extends over two sessions, at the end of which the lectures on military hygiene and surgery are given.

Among the subjects discussed are:

1. The national necessity of instruction in military sanitation and surgery in our medical schools.

2. The duties of Medical Officers, professional and administrative.
3. The duties of Medical Officers as sanitary officers.
4. The importance of examination of recruits, and discharges on surgeon's certificate.
5. The training of the Hospital Corps.
6. The hygiene of troops in permanent posts.
7. The hygiene of troops upon the march and in camps.
8. Preparation and supplies for field service and active hostilities.
9. Modern firearms, explosives and projectiles.
10. The effects of modern firearms in battle and probable amount of surgical work in a given number of wounded.
11. General consideration of gunshot, sabre and bayonet wounds, primary symptoms and complications of gunshot wounds.
12. First-aid and transport of the sick and wounded.
13. Dressing stations, field, base and general hospitals.
14. Secondary complications of gunshot injuries.
15. The ultimate results of gunshot wounds, especially after excisions of joints.
16. Army diseases, their causes and prevention.

Last year I handed the examination papers to Surgeon Charles Smart, U. S. Army, and asked him to kindly rate them as he would before an Army Medical Board. According to his estimate only one man dropped below 75 out of a possible hundred. In conclusion, it affords me great pleasure to state that the course on Military Surgery in the Georgetown Medical School will be much more thorough hereafter, as the subject, upon my own request, has been assigned to Colonel and Assistant Surgeon General W. H. Forwood, U. S. Army, Professor of Surgical Pathology and Military Surgery.

CHAPTER XVI.

Military Medicine.

I. THE USE OF THE KOLA NUT FOR MILITARY PURPOSES.

BY COLONEL GEORGE H. PENROSE,
SALT LAKE CITY, UTAH.

SURGEON GENERAL OF THE NATIONAL GUARD OF UTAH.

THE Kola tree is a native of Africa, growing most luxuriantly between Sierra Leone and the Congo, but has been planted and grown in the West Indies, Ceylon, Brazil and other South American countries. The kola nut has been known for centuries by the natives as preventing fatigue, but only in the past few years has it been imported to this country in a fresh state and its uses studied.

The tree mostly resembles our domestic horse chestnut, growing to a height of from forty to sixty feet; the leaves are large and slender, the seeds are found in burrs or pods of from one to ten in each.

For the botany, composition and therapeutics I would refer you to the work of Heckel and Schlangden-Lauffen, as my purpose in this paper is merely to report a short series of experiments as to its use in conserving muscular energy, and hence its use for military purpose.

FIRST EXPERIMENT.

Captain F. D. Richards, Signal Corps N. G. U., and the writer started at 6 a. m. upon a march through the mountains midway between Salt Lake City and Park City, Utah. Before starting we partook of a light breakfast. Commencing our march we had an ascent of the mountain about 1,000 feet. On beginning the ascent each took a kola bon, representing 10 grs. of the undried

nut with chocolate; the mountain was covered with thick underbrush and shale rock, making marching extremely hard. We were equipped with nine pounds of ammunition and ten-pound guns.

At first the oppression was very great, as we began the ascent at an elevation of 7,000 feet; breathing difficult, heart bounding and pulsations at 130 per minute. During the ascent of the thousand feet we allowed these kola buns to dissolve in our mouths; before we reached the summit our breathing became easy and the pulse dropped to 88, although we had kept up the same rate of speed. From the summit we descended 1,000 feet to a ravine from where we had a gradual ascent again for four miles. From this time our march was up and down a mountainous country for 15 miles, using nine kola buns. At 1 p. m. we made a halt of one hour and had a light lunch, although we had not the least craving for food, and had only partaken of water once.

We continued our march through a country of underbrush and boulders, making marching hard and fatiguing, every little while we would allow a kola bun to slowly dissolve in the mouth. At no time did we try to force our march, but kept a steady pace, and at 7 p. m. halted, having marched since 6 a. m., covering 29 miles, taking in all 14 kola buns.

Upon halting for the night we experienced no fatigue and could readily have continued through the night. The general feeling of well-being spoken of by Captain Woodruff, Medical Corps, U. S. Army, was again well marked in our experiment. We experienced no difficulty in going to sleep, and the sleep was quiet and refreshing. The following morning, we arose at the usual hour, and to our surprise experienced no soreness of the muscles whatever, although neither of us had been accustomed to walking.

SECOND TO SEVENTH EXPERIMENT.

In six cases I have supplied prospectors, men of fair intelligence, who have had a large amount of hard mountain climbing to do. In five such cases they report they were enabled to walk longer with less fatigue than ever before; in the sixth case he reported that he had experienced no benefit and had discontinued the use of the drug on the second day.

EIGHTH EXPERIMENT.

An actress who had been working very hard and was so completely worn out that, upon consulting me, she said she could not go on with her work that day. Kola (Stearns) was given in half drachm doses every four hours. The sense of fatigue rapidly passed away and she continued her work.

NINTH EXPERIMENT.

This experiment was more extensive and was undertaken to determine if a body of troops could make a forced march, by the use of kola, and be in condition at the end of such to do duty. Through the kindness of Colonel Page of the First Infantry, N. G. U., I started with Company D, First Infantry, N. G. U., Captain Alford commanding, and thirty men, at 8 o'clock in the morning to make a forced march of 34 miles.

The company was unused to marching and their muscles were soft. They carried besides the musket, cartridge belt, haversack and canteen.

The march was over a good road, and was continued fifty minutes with a rest of ten minutes each hour.

One-third of the company was issued 12 oz. kola vin, the other two-thirds two fresh kola nuts each.

The first 17 miles was covered by 1:10 p. m., or five hours and ten minutes, or deducting the time for halts in four hours and twenty minutes. I now allowed a rest of one hour and had lunch. The second 17 miles being marched in five hours and twenty minutes, or deducting halts in four hours and thirty minutes. The total time consumed being ten hours and thirty minutes, or eight hours and fifty minutes' actual marching to cover 34 miles.

The first stretch of 17 miles was done with no fatigue and only one drink of water, although the day was warm. At the mid-day halt little desire for food was noticed, some of the command not eating anything. The second 17 miles there was experienced more fatigue, several of the men suffering from sore feet, and pains in the calf of each leg; one or two showed decided signs of exhaustion during the last five miles, but not one had to fall out of ranks. This is, I believe, the first body of men having made a forced march with the kola nut.

It was a noticeable fact that the sense of thirst was not pronounced. On reaching camp each man was examined and questioned and each stated he could go on for a much longer distance if required.

That there were some of the men decidedly fatigued must be conceded, but I am quite confident in my own mind that if the occasion required each man was in a fit condition to have gone on duty at the end of the march.

The following morning each man was again examined and reported feeling excellent, no muscular soreness existing, except a few who complained of a little soreness of the back of each leg, yet each affirming it would not impair his marching. Each man then attended to his daily work and that night again reported, not one of whom complained of feeling the worse for the march.

From these experiments I conclude that kola has a decided effect in preventing muscular fatigue and thus enabling a body of troops to march long distances, at the end of which they are in a condition to go into battle.

The result is the same with kola buns as it is with the nut. The kola bun is compact and can be kept indefinitely, but I object to it being incorporated with chocolate. In order to overcome this objection Stearns & Co. are preparing me an ounce of the fresh nut with gelatine so that it may be chewed. It will be utilized for troops in the field.

As to the question, is there a kola habit? I do not believe there is. I have corresponded with a number of persons residing in Africa, asking this question, and have received negative answers in every instance.

That it is a powerful drug must be conceded. That it is a drug to be used with proper care must also be conceded, and that it does conserve the muscular energy and hence enable the user to continue muscular exertion much longer without fatigue is, I believe, true.

I will this summer again continue my experiments in the hopes of finding more about the question, and if possible present you with the results at a later time.

II. ON THE MANAGEMENT OF ACUTE AND SUDDEN RECURRENT APPENDICITIS IN CAMP OR IN THE FIELD.

BY BRIGADIER GENERAL M. O. TERRY,

UTICA, N. Y.,

SURGEON GENERAL OF THE NATIONAL GUARD OF THE STATE
OF NEW YORK.

FOR more than five years I have been treating appendicitis in a most radical manner and on a non-surgical plan. My efforts have been directed in line with the cause of more than 95 per cent. of the cases as they come to the surgeon. Vitiated physiology, in the form of constipation, due to unsuitable diet, or to neglect of the bowels, the failure to follow a system of regularity which nature invariably demands for the healthful performance of her functions, are the most frequent causes of this almost unnecessary yet direful difficulty. As it is almost impossible to instruct the public as to the importance of this statement and, therefore, as we must necessarily have these disorders to contend with the question arises, How best can we manage these cases as emergencies?

Of the 45 cases which have come under my personal observation two only underwent the operative procedure. All recovered. Acute cases will respond to the treatment showing gratifying improvement within a few hours. Chronic relapsing with sudden acute recurrence will not yield so readily. The temperature may continue above the normal point for 30 days. It will have a range in the recurrent cases of from 100 to 102 for about twenty days. Then it will hover about 99½ for about one week longer before remaining on the normal line.

The principles involved in the treatment of appendicitis by the non-operative plan are as follows:

Catharsis, colon or high enema, fomentations with flaxseed poultices and applications of hot sweet oil, the prolonged use of sweet oil taken internally and a pultaceous diet.

It really does not matter what cathartics are used (each surgeon may have his own sweet dose) so long as the results are accomplished. My experience has led me to use, whenever possible, castor oil and sweet oil combined. The former is cathartic and the latter is soothing and relaxing to a congested mucous membrane, including the entire bowel tissue. The dose of the former must necessarily vary from half an ounce to an ounce and a half. Of the latter I give double the quantity of the former. The sweet oil should be continued in doses of from one ounce to a wine glassful followed by a glass of hot water, repeating the same every three or six hours according to degree of soreness and pain. But supposing the patient cannot take the castor oil? If none of the mineral waters will produce the desired result give from five to ten grains of calomel with ten to twenty grains of bicarbonate of soda dissolved in a glass of hot water, repeating every three hours until the desired result is obtained. I have never given more than 20 grains. At the same time, however, it must be borne in mind that the external applications must be made of flaxseed and hot sweet oil. Also that the enemas must be given without delay. At times I use three or four ounces of glycerine followed by soap and water. Then, again, I use from half to a pint of sweet oil followed by the enema. I always try to send the oil up as far as the ileo-cæcal valve for its relaxing effects, for this will assist in relieving pain.

It will be well in severe cases to place your patient in a Trendelenberg position. Sometimes it will be best to use the knee chest position. *So long as there is any sensitive condition in the region of the appendix I continue the sweet oil, giving about half an ounce to a glass of hot water half an hour before meals three times a day.* The diet should be of oatmeal gruel (strained), milk with salt or peptonized, and a free allowance of water.

If it be asked if any recurrence takes place after this treatment I say, most emphatically, "Yes," through neglect to observe the instructions given, by which the same causes are set in motion which first induced the attack. It is with appendicitis as with other conditions, like pneumonia, tonsilitis, etc., a patient once having it is more liable to a recurrence than one who has not. If, however, by neglect, or from a cold pain ensues an immediate attention to the difficulty, using poultices, taking the sweet oil and

hot water, and clearing the bowels is undergone, a speedy relief has in my observation followed. Gradually the predisposition to the recurrences will disappear, but by neglect nothing but disaster awaits the patient. This is also true in regard to the operative procedure, for otherwise why do cases return to the hospital for an operation after the appendix has been removed?

It has not been necessary to operate on any of the cases which have come under my notice in the acute stages, or in the recurrent stages, owing to the fact that I have been particular to instruct each of my patients in detail as to the importance of attending to his case in the manner above suggested.

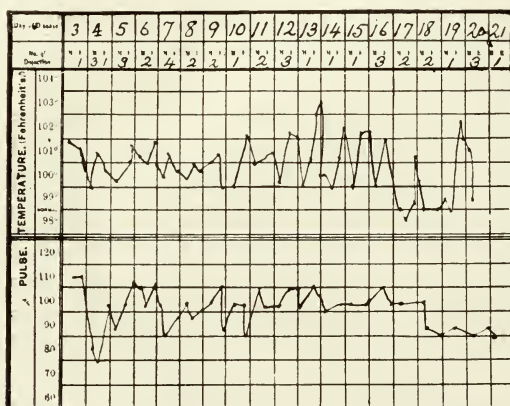


Fig. 1.—Temperature and Pulse Curves in a Case of Recurrent Appendicitis.

I append herewith two charts showing the range of temperature of cases representing repeated recurrences, the first onset having been six and eleven months respectfully.

Seven months have elapsed since the first was relieved. He has had just the slightest sort of an attack, but is now perfectly well. Four surgeons gave him twelve hours to live without an operation. The second has been out of the hospital four months. His was a marked case of chronic appendicitis. A strong, burly son of the Emerald Isle who had been unable to work for months owing to the pain which came on so frequently. He had heard of the oil treatment and had been trying it, he said. When I explained to him the importance of regularity of the bowels he admitted he had not given himself the attention he should have,

not knowing the danger of neglect. The violent attack which brought him to the hospital determined him to have the operation. I set the day, but his improvement was so marked that he insisted that he continue on, and he left the hospital in four weeks. I saw him a few days since and was curious to know if he were sensitive over the appendix. In reply to my question, he

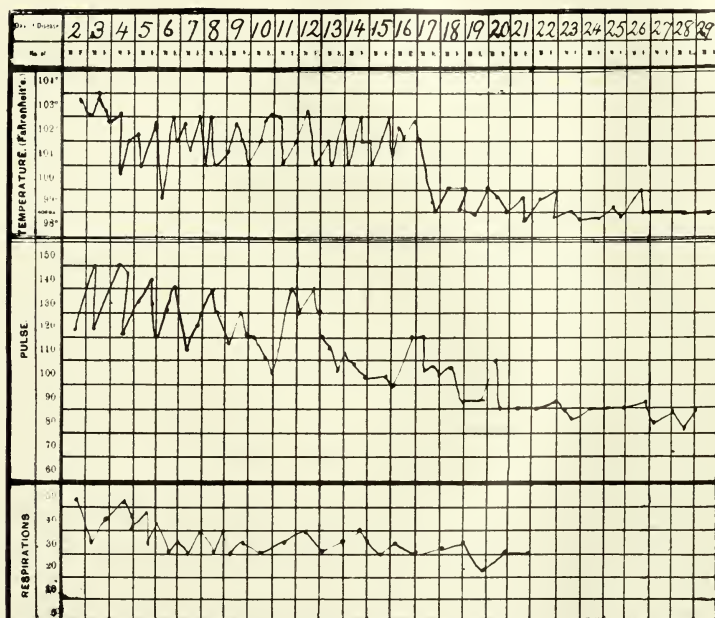


Fig. 2.—Temperature, Pulse and Respiration Curves in a Case of Recurrent Appendicitis.

said, "You know I used to feel before I had these attacks that I could be hit with a hammer without having it hurt me; I feel so now."

The remedies given internally for reducing the fever and inflammation in addition to those mentioned in the various stages as seem indicated are: Aconite, belladonna, bryonia veratrum, phenacetine and Warburg's tincture.

CHAPTER XVII.

Foreign Military Sanitary Matters.

I. THE MEDICAL DEPARTMENT OF THE MEXICAN NATIONAL ARMY.

BY MAJOR LOUIS M. MAUS,
FORT HAMILTON, N. Y.,

SURGEON IN THE UNITED STATES ARMY.

THE medical service of the Mexican National Army is divided into six divisions, namely:

1. Medical Corps.
2. Pharmaceutical Department.
3. Veterinary Service.
4. Administration.
5. Company of Hospital Attendants.
6. Ambulance Corps.

These various branches are component parts of the medical body and are directly under the control of the Surgeon General, subject to the Secretary of War.

The Medical Corps proper embraces the following officers:

- | | |
|---------------------------|-------------------------|
| 1 Surgeon General, | rank Brigadier General. |
| 1 Inspector of Hospitals, | " Brigadier General. |
| 2 Surgeons, | " Colonel. |
| 17 Surgeons, | " Lieutenant Colonel. |
| 47 Surgeons, | " Major. |
| 10 Surgeons, | " First Captain. |
| 10 Medical Cadets, | " First Lieutenant. |

Surgeons holding the rank of colonel and lieutenant colonel are known as medical inspectors, directors of permanent hospitals and professors of the Military Hospital of Instruction. One of the colonels and lieutenant colonels are serving as deputies to the National Congress, and one lieutenant colonel in the office of the sur-

geon general. Three of the majors are serving on coast vessels in the capacity of naval surgeons.

The pharmaceutical department is composed of the following officers:

1 Principal Pharmacist,	Lieutenant Colonel.
2 Pharmacists,	Major.
2 Pharmacists,	1st Captain.
4 Pharmacists,	2nd Captain.
2 Pharmaceutical Cadets,	1st Lieutenant.

VETERINARY SERVICE:

1 Principal Veterinarian,	Lieutenant Colonel.
4 Veterinarians,	Major.
4 Veterinarians,	1st Captain.
4 Veterinarians,	2nd Captain.
2 Veterinary Cadets,	1st Lieutenant.

ADMINISTRATIVE DEPARTMENT:

1 Officer of Detail,	Lieutenant Colonel.
4 Officers of Detail,	Major.
5 Officers of Detail,	2nd Captain.
1 Commissary,	1st Captain.
4 Commissaries,	2nd Captain.
5 Commissaries,	1st Lieutenant.

COMPANY OF HOSPITAL NURSES:

- 1 1st Captain of Infantry.
- 2 1st Lieutenants of Infantry.
- 2 2nd Lieutenants of Infantry.
- 15 1st Sergeants.
- 18 Sergeants.
- 29 Corporals.
- 90 Privates.

AMBULANCE TRAIN:

- 1 1st Lieutenant of Infantry.
- 1 2nd Lieutenant of Infantry.
- 5 Sergeants.
- 18 1st Class Privates.
- 50 2nd Class Privates.

These served in permanent hospitals as nurses, etc., in peace.

In addition to the above there was a regularly organized pack-train which consisted of the following:

- 1 2nd Lieutenant.
- 5 Sergeants.
- 18 Packers.
- 40 Helpers.

The personnel of the above six divisions may be increased in war, the officers thus appointed, however, only having temporary rank.

The enlisted men of the ambulance corps and pack-train enjoy the rank and emoluments of first sergeants, sergeants, corporals and privates.

Annual pay of officers and enlisted men:

Surgeon General	\$4,500 45
Inspector of Hospitals	4,500 45
Colonels	2,826 00
Lieutenant Colonels	1,810 40
Majors	1,562 20
1st Captains	1,208 85
2nd Captains	843 15
1st Lieutenants	781 10
2nd Lieutenants	660 65
Medical Cadets	481 80
Pharmaceutical Cadets	481 80
Veterinary Cadets	481 80
1st Sergeants	361 35
Sergeants	288 35
Corporals	226 30
Privates	182 50

SPECIAL REWARDS AND PAY.

In order to reward medical officers who have distinguished themselves by gallant or heroic conduct in battle or of scientific work of recognized merit, and to make amends for lack of promotion, the following honorable and pecuniary rewards have been established by an Act of Congress:

First: Any medical officer who has distinguished himself on the field of battle, through gallantry in action, or assiduity in as-

sisting the wounded, or who may have rendered honorable service in camp, field or hospital in time of epidemics, or distinguished himself by scientific work of merit or marked benefit to the military medical body, is entitled to the Cross of Honor. In addition to the above pay table all officers of the medical service from captain to lieutenant colonel are allowed a five-year additional increase at the rate of about 10 per cent. of their regular pay.

For five years.....	\$180 00
For ten years.....	480 00
For fifteen years.....	840 00
For twenty years.....	1,440 00

This additional pay, however, is only allowed to those officers having continuous service in the one grade. The period during which they are detailed on any special duty or while on leave is subtracted from length of service in computing this additional pay. I believe, as a matter of fact, that this extra pay is rarely if ever received, and results from a lack of appropriation on the part of the National Congress.

Officers of the medical service also enjoy decorations, retired pay, and other gratifications common to officers in other branches of the service and provided for by general regulations of the army. Honorable mention, decorations and the Cross of Honor are secured through recommendations of commanding officers or generals cognizant of the facts, to the secretary of war. Where these are not known, the medical officer must make an official application for the honorable reward, submitting such facts and testimony as will establish his right to the same.

ADMISSION INTO THE MEDICAL CORPS PROPER.

Surgeons are appointed from the medical cadets or *aspirantes* who have graduated from the National Medical College and completed their course of instruction in the Military Hospital of Instruction. There are some exceptions to this rule, however. The *aspirantes* are taken from fifteen students selected from the company of attendants or *infermeros*, who wish to adopt the career of the medical services. Ten of these *students* prepare themselves for the medical corps proper, three for veterinarians and two for pharmacists. They are required to attend the course of study in the

National Medical, Veterinary or Pharmaceutical Schools in addition to certain studies in the Military Hospital of Instruction, and are required to live there. They are uniformed like the medical cadets or aspirantes except the insignia of the latter and rank as second sergeants, corporals and privates. The medical cadets or aspirantes are selected from these students after the completion of their third University year, the special bright and meritorious ones being taken. Before appointment they are required to undergo a rigorous physical examination and present proper moral testimonials. Pharmaceutical cadets are appointed after one year of study. These cadets before appointment must agree to serve the government four years after commissioned. The students of the Military School of Instruction are subject to military punishments and control, reprimands, light arrest in the Hospital and discharge from the service. They are entitled annually to one full dress uniform, two undress, one overcoat, four undershirts, four drawers, six pairs of socks, four pairs of shoes, four shirts, six handkerchiefs, two cravats, and one day's pay per week. They are required to pursue the studies adopted by the National School for graduation and in addition the following studies in the Military Hospital of Instruction:

First year: Regulations, first and second parts; infantry tactics, and treatise on dissection.

Second year: Regulations, third and fourth parts; cavalry tactics; dissection.

Third year: Artillery tactics; first aids and transportation of wounded; medical chemistry.

Fourth year: Elements of field fortifications; emergency surgery.

Fifth year: Military hygiene and legal medicine.

Annual examinations are required for these studies. They must also attend the medical, surgical and venereal clinics in the Military Hospital.

The veterinary cadets are required to study the first year: Parts 1 and 2 Regulations, cavalry tactics; second year: Parts 3 and 4 Regulations, artillery tactics. They are obliged in addition to the course in the National School to accompany the veterinarians stationed in the city when required by the Director of the School.

The pharmaceutical students must study the first year: Regulations, first and second parts, medical chemistry.

Second year: Regulations, third and fourth parts; first aid to the wounded, their transportation, and a thorough knowledge of the contents of paniers, knapsacks and medical bags.

Tactics are taught in one of the regiments stationed in the city, in the class of sub-officers. The instruction in tactics, I presume, is intended to give them the military knowledge of the ordinary soldier.

MILITARY HOSPITAL OF INSTRUCTION.

This institution is located in the City of Mexico and is established in an old building which was formerly a convent, now confiscated by the government. It has a ward capacity of 300 beds, and suitable lecture and clinic rooms in a building in rear of the hospital. On the first floor of this building the medical library is located. There is also a room fitted up and equipped with chemical apparatus in this building. The hospital is well provided with kitchen, store rooms, a fair collection of pathological specimens and a post-mortem room. The two latter are in a building formerly used as a chapel to the convent.

PERSONNEL OF HOSPITAL OF INSTRUCTION. (OFFICERS.)

1 Director,	Colonel.
6 Professors,	Lieutenant Colonel.
1 Surgeon,	Major.
12 Medical Cadets,	1st Lieutenant.
1 Principal Pharmacist,	Lieutenant Colonel.
1 Executive Officer,	Lieutenant Colonel.
1 Commissary,	1st Captain.

The enlisted men are taken from the company of infermeros or hospital attendants. There is also a guard from one of the regiments serving in the city on duty in the hospital and at the sally-porte.

INSTRUCTION.

In addition to the instruction given at the National Medical School, which the aspirantes and students are required to attend in order to obtain their degrees, they are compelled to attend medi-

cal and surgical clinics, instruction in the use of instruments and surgical apparatus, transportation and methods of using it, military hygiene, surgical emergencies, legal medicine in relation to the penal code and to military legislation, therapeutics and chemical analysis, especially in regard to organic products.

DUTY OF THE DIRECTOR.

The director of the school has exclusive charge and supervision. It is his duty to see that the clinics are regularly held during the scholastic year and that the professors give the instruction prescribed. He will call weekly meetings of the faculty and act on matters pertaining to the school. The minutes of these meetings are forwarded to the secretary of war. The director submits the names of those officers best fitted to fill vacancies among the professors and hospital staff, and presides over the boards of examination. Officers recommended to fill the position of professors are selected from those who have shown special fitness and merit, giving preference to rank, all things being equal.

HOSPITAL PROFESSORS.

The duties of the hospital professors are confined to the Hospital of Instruction, though they are allowed and enjoy private practice in the city. They are not subject to detail away from the City of Mexico with regiments or otherwise, unless in urgent cases. They are selected from the next grade and required to stand a competitive examination for the position.

PERMANENT HOSPITALS.

In addition to the Military Hospital of Instruction which receives all the sick and wounded from the various garrisons in the City of Mexico, there are nine permanent hospitals located in Vera Cruz, Tampico, Mazatlan, Puebla, St. Louis Potosi, Monterey, Matamoras, Guadalajara and Tepic. The government has also established a number of temporary hospitals in less important towns and cities which are subject to change. The personnel of

these hospitals vary according to the size and importance of the commands, but as a rule each one has

1 Director,	Lieutenant Colonel.
1 Sub-director,	Major.
1 Pharmacist,	Major or Captain.
1 Executive Officer,	Major or Captain.
1 Commissary,	Captain or Lieutenant.

The enlisted men belong to the company of *infermeros* or hospital attendants.

QUALIFICATIONS FOR ADMITTANCE INTO THE ADMINISTRATIVE BRANCHES.

Applicants must be graduates of medicine and preferably those who have served in the medical corps proper. In addition to the mental examination they are required to submit to a rigorous physical examination and to present testimonials of moral character. The technical examination consists of double entry book-keeping and a thorough knowledge of official work and regulations. They are examined by a board consisting of three officers, two detailed by the director of the treasury and one by the secretary of war. The appointment is finally made by the President and the new appointee is required to give bonds to the amount of three times the value of the funds he is going to disburse before he can assume the functions of the office.

ADMISSIONS TO THE AMBULANCE CORPS.

Officers for the ambulance corps are selected from the line of the army who have a special fitness for these duties. Enlistments in the corps are voluntary, but the sergeants are required to know how to read and write.

INSPECTOR OF HOSPITALS AND INSPECTORS.

These officers are appointed on account of special fitness, but before appointment must show knowledge in army regulations, especially with reference to hospitals, bookkeeping and a general ability to perform administrative duties. Inspectors must be graduates of medicine. They receive orders directly from the sec-

retary of war and make their reports directly to him. They are authorized to suspend an officer whom they are inspecting in case they have reason to suspect his accounts.

PROMOTIONS.

Promotions to the next higher grades are made lineally except in the case of the surgeon general, which is by selection. The positions of directors and professors are supposed to be by competitive examination.

GENERAL FUNCTIONS OF MEDICAL OFFICERS.

The duties of medical officers embrace the physical examination of everyone who enters the army, the preservation of health, instruction in the physical development and endurance of the soldier, the treatment of the sick and wounded, examinations for discharge on account of physical or mental unfitness, (the veterinary service the care of the animals); medical officers are likewise expected to make such reports, from time to time, regarding progress in military medical matters.

UNIFORM.

Officers of the medical corps wear the same as that of infantry with the following modifications: The collar and cuffs of sleeves and band of cap of carmine silk velvet, a gold lace wave around the collar. The collar of the ambulance and executive officers have no border. For enlisted men cloth in place of velvet. The *esculapius* is worn braided in gold on the left sleeve of the blouse and dress coat. The officers of the ambulance corps, executive department and pharmacists wear the *esculapius* on the cuff instead of sleeve and braided in carmine silk. The trowsers of the officers are ornamented with gold stripes or welts in place of the red cloth welts of infantry. Officers of the ambulance corps and executive departments, red silk welts in place of gold. The sword knot is of carmine silk. The edges of the saddle cloth, knapsack and holsters are trimmed in red cloth. An *esculapius* in gold is worn on the saddle cloth. Officers of the ambulance corps, the same as medical officers, with the following exceptions: The buttons, borders, etc., of silver and welts for trowsers of carmine cord. The

collar of the dress coat no border. The bridles of black leather. The esculapius for medical officers is of silver and gold, the staff of silver; that for the pharmacists consists of a mortar around which is coiled the viper. The veterinarians wear the same uniform as the surgeons, except the buttons, trimmings, mountings, borders, stripes, etc., are of silver. The trowsers have two cords on side of red, like the cavalry use. All officers wear blouse, trowsers and cap of gray for fatigue. The dress coat and trowsers are made of dark blue, color of all branches.

DIRECTORS OF PERMANENT HOSPITALS.

These positions are filled by selection from the professors, who have shown special fitness and zeal. By virtue of recent authority, they also occupy the positions of medical director of the military department, and have control of the medical department serving in it, except when a special medical director has been designated.

DUTIES OF HOSPITAL DIRECTORS.

Directors of hospitals have control over the medical service in their hospitals and military zone. The latter by recent authority from the President of the Republic by virtue of their position as medical director. They assign the personnel of the medical body to hospitals and battalions; have control over the purchase of rations, medicines and hospital supplies, and are required to recommend such repairs or improvements as they deem necessary. In time of peace they assume the duties of division or brigade surgeons, convene boards for the examination of soldiers for discharge on disability, etc. They are likewise required to report to their military chief and the secretary of war all epidemics or contagious diseases within their departments. They submit the monthly muster rolls, reports of loss and gains, ordnance, clothing and equipage reports, reports of medical officers, monthly reports of sick and wounded and reports of instruction given by medical officers.

DIVISION SURGEONS.

These positions are not filled in times of peace. During active service they accompany the respective military headquar-

ters to which they are attached, and establish the division hospital when the headquarters become located. During engagements he will see that the ambulances are properly located and that they are not in the line of fire; that these points are properly designated by the red cross flag. He reports to the general commanding and secretary of war, the number killed and wounded in action, also reports of trivial wounds of those who continue in the performance of their duties. He will also make the following monthly reports: Monthly report of sick and wounded, muster rolls, the loss and gains, number taken sick and returned to duty, expenses of medicines and supplies, reports of fitness and aptitude of the personnel on duty in the division. When medical officers are detached from divisions special reports of the officers' zeal, efficiency and previous conduct to the secretary of war and surgeon general.

SURGEONS.

The assignment of surgeons is made with the utmost equity as far as possible. They are subordinate to the chief of the corps in regard to discipline, good order and government, and are under control of the medical director in whose department they are serving. He will attend sick call daily at a fixed hour in the barracks or quartel of the battalion to which he is attached and assign to hospital all serious cases for treatment. He is permitted to assign to the infirmary in the barracks all mild cases which presumably will recover in three days. The attendants for the infirmary are selected from the battalion, also four litter bearers from each company. When stationed in cities where permanent hospitals are located he can be assigned to duty in such hospitals in urgent cases, provided his command does not change station. He will submit certain reports to the commanding officer and medical director. These reports include morning report of sick and wounded, sanitary report, including the condition of yards, grounds, kitchen, squad room, lavatories and sinks, latrines, prison room, food, drills, fatigues and all matters pertaining to the health of the command with his recommendations. Reports on the appearance of contagious and epidemic diseases, to the commander and medical director; its nature, cause, number attacked and his recommendations in the case. In transferring serious cases to the hospital he will submit a report containing diagnosis and treatment.

He will hold himself in readiness to attend cases or accidents which may occur among his command at any time during the day or night. At sick call he will examine those returned to duty from the hospitals to see whether they are fit for duty, so that no one will be compelled to perform duty until the cure is complete. He will make daily visits to the infirmary as often as is necessary to see that his instructions are carried out. The prescriptions for these infirmary cases are made up from the paniers, kept in the quartel, and recorded in a suitable book. The surgeon is required to see that the battalion is properly vaccinated and to make physical examinations of those entering the service. They will provide themselves with all the necessary dressings and medicines for emergency cases, which may occur during drills, parades, target practice, marches, manœuvres, and changes of station. He is required to give instruction to the nurses in emergency aid and litter drill. A manual has been provided for this purpose by Brigadier General Alberto Escobar, Inspector of Hospitals. The ambulance in use corresponds closely to the pattern of Medical Department, U. S. Army, and the litter to the Halstead pattern. He will carefully investigate the causes of venereal diseases among the command, and to recommend such expulsion among the soldiers' wives as may be necessary to check its further spread. It may as well be stated that the wives of the soldiers, as a rule, have permission to sleep in the quartel enclosure. The surgeon is also responsible for the care of the surgical instruments and surgical apparatus belonging to the battalion. Each battalion is required to purchase a case of instruments costing \$160, which comes from the regimental fund at the rate of \$30 per month. In case of a change in the station of a regiment the surgeon will examine the sick and assign to hospital those not able to march and designate those who are able to undergo transportation. He will see that the paniers, medicine bags, litters and ambulances are always kept in good condition in cases of sudden change of station. While on the march he will act also in the capacity of sanitarian and advise the commanding officer as to camps, water and other matters affecting the health of the command. In making out certificates of disability of a medico-legal nature he will make careful statements as to when and how disability was received, whether in the line of duty. Medical officers are held responsible for the expense incur-

red in the enlistment of men not fit for service and who have to be discharged.

DUTY OF SURGEONS IN THE FIELD.

He will prepare, in time of action, the material for the treatment and transportation of the wounded in compliance with orders received from the division surgeon or military chief, and will locate the ambulance at a point marked by the red cross flag, so that the wounded may be taken there for treatment as expeditiously as possible by the litter bearers. They will carefully attend the wounded of the enemy made prisoners, and see that they are carefully sent to the field or military hospital. He is also to note the character of wounds in case of death during action and identify the dead, which data will be used later in determining pensions; also make out the funeral reports, submitting one copy to the commanding officer and another to the division commander. After an action is over he will assist the chief medical officer at the necessary surgical operations in the field hospital; having completed this duty, he will return to his battalion. In the field the red cross flag will be hoisted at the place where the medical detachment is camped, to mark the spot where medical aid can be secured. Daily reports will be made of the wounded to the division surgeon, submitting all the facts bearing on the treatment. Serious cases will be sent to the permanent hospital.

CHANGE OF STATION OF SURGEONS.

In changing station, the surgeon will report his departure, and date of arrival to the medical chief. On his arrival at headquarters, he will at once report to the department commander, then to the medical director who recommends his assignment. Surgeons detached from regiments at foundries, workshops, prisons and on coast vessels, are subject to the same orders as apply to the regimental surgeon.

MEDICAL TREATMENT OTHER THAN BY ARMY SURGEONS.

When regiments are divided into detachments and it is not practicable to detail a medical officer, commanding officers are authorized to secure such medical service as may be necessary for their command, from civilian physicians.

MEDICAL TREATMENT FOR OFFICERS.

Regimental officers are not required to employ the battalion surgeon. In case the medical officer is not employed, obligation to procure medicine from his supply ceases. Medicine is issued to officers at the rate of twenty-five cents daily for three days, after which the officer gets it at cost price.

GENERAL OBSERVATIONS.

The majority of barrack buildings and military hospital in use by the Mexican Government were built by the Catholic Church for monasteries, convents and churches, and were confiscated by the National Government during the downfall of the Church Party. These buildings are very old, constructed of brick or stone and possess few of the sanitary qualifications of recent structures. As a rule the dormitories of the barracks are dark and poorly ventilated. Except in hospital, the soldiers sleep upon the brick or tile flooring, protected from the latter only by a roughly-woven straw mat. Iron bunks are used for the sick in hospitals. Present regulations require that the soldier shall be taught to read and write and for this purpose a school is established in each quartel or barrack. The ration of the soldier consists principally of common white bread or tortillas made of corn meal, ground in the true Pueblo Indian style, beans, beef, mutton, vegetables and coffee. The cooking is done in barracks in a rather primitive manner, by men detailed from the troops. The cuisine of the military hospitals is very much better, with a greater variety of ration. The officers of the line are supplied, as far as possible, from the Military Academy which is located at Chapultepec. Other vacancies are filled from the meritorious non-commissioned officers who are required to pass an examination. The medical officers, as a rule, are well instructed, and are especially well posted in the theory and practice of medicine; their clinical advantages, however, are not equal to those enjoyed by the medical students in the United States. The text-books in use in medical schools of Mexico, as a rule, are French, and published in that language. I desire to express my thanks to General Epifanio Cacho, Surgeon General of the Mexican National Army, and Major Federico Abrego, Surgeon, for their valuable assistance in the preparation of this report, and to all Mexican Army Officers, whose universal kindness and *bonne camaraderie* contributed so much to my pleasure during my sojourn in our Sister Republic.

PERSONAL DEL CUERPO MEDICO MILITAR.

(OFFICERS OF THE MEXICAN ARMY MEDICAL SERVICES.)

SEPTEMBER, 1895.

SERVICIO MEDICO.

EMPLEO MILITAR.			NOMBRE.	COMISION.		
General Jefe del Cuerpo.			Epifanio Cacho.	Jefe del Departamento.		
id			Alberto Escobar	Visitador de Hospitales.		
Coronel Medico Cirujó			Juan U. Castellanos	Diputado al Congreso.		
id	id	id	Fernando Lopez	Director Hosp ^l de Mexico.		
Tente Coronel		id	Vicente Fonseca	id	id	Tepic.
id	id	id	Manuel Flores	Diputado al Congreso.		
id	id	id	Rafael Caraza	Profesor Hosp ^l de Mexico.		
id	id	id	Eduardo R. Garcia	id	id	id
id	id	id	Enrique Palazuelos	Director Hosp ^l Sn. Luis.		
id	id	id	Zacarias R. Molina	id	id	Vera Cruz.
id	id	id	Augustin Aguirre	id	id	Puebla.
id	id	id	Jose P. Gayon	Profesor Hosp ^l de Mexico.		
id	id	id	Francisco P. Echeverria	Directr.	id	Guadalajara.
id	id	id	Ramon S. Huerta	Profesor id Mexico.		
id	id	id	Carlos Cortes	Jefe de Seccion en el Departamto		
id	id	id	Alejandro Ross	Profesor Hosp ^l de Mexico.		
id	id	id	Octaviano Obregon	Director	id	Mazatlan.
id	id	id	Lamberto Ayala	id	id	Matamoros.
id	id	id	Francisco Vergara	id	id	Monterey.
id	id	id	Antonio Malienzo	id	id	Tampico.
id	id	id	Joaquin Rivero y Heras	Profesor	id	Mexico.
Mayor Medico Cirujó			Jose G. Castellanos	Corbeta Zaragoza.		
id	id	id	Manuel Gordillo Reynoso	Batallon de Ynvalidos.		
id	id	id	Martin Mota	2º id de Artilleria.		
id	id	id	Enrique Jurado y Gama	Subdirector Hosp ^l de Tepic.		
id	id	id	Rafael Gomez Mackelroy	9º Batallon.		
id	id	id	Antonio Trujillo	Subdirector Hosp ^l Puebla.		
id	id	id	Casimiro Preciado	Hosp ^l de Mexico.		
id	id	id	Manuel S. Yglesias	23º Batallon de Ynfa.		
id	id	id	Ramon Galan	3º Bat ⁿ de Artilleros.		
id	id	id	Jesus Valencia	25º id " Ynfanta.		
id	id	id	Maximo Silva	Subdirector H ^l Matamoros.		
id	id	id	Francisco Lopez Baron	26º Batallon.		
id	id	id	Francisco Martinez Baca	3º Regimiento.		
id	id	id	Rafael Rabago	2º	id	
id	id	id	Francisco Montenegro	6º	id	
id	id	id	Narciso del Rio	Subdirector Hosp ^l Vera Cruz.		
id	id	id	Miguel Urriza	id	id	Monterey.
id	id	id	Felipe Morfin	id	id	Guadalajara.
id	id	id	Antonino Correa	Colegio Militar.		
id	id	id	Jesus Carillo	27º Batallon.		
id	id	id	Genaro Perez	Prision Militar.		
id	id	id	Marcelino Mendoza			
id	id	id	Arcadio Ojeda	Fortaleza de Ulna.		

ERVICIO MEDICO.

EMPLEO MILITAR.			NOMBRE.	COMISION.
ayor	Medico	Ciruj ^o	Daniel Velez	Hosp ^l de Mexico.
id	id	id	Joaquin Hernandez	13 ^o Regimiento.
id	id	id	Francisco Arellano	7 ^o id
id	id	id	Daniel Garcia	Subdirector Hosp ^l San Luis.
id	id	id	Angel Rodriguez	3 ^o Bat ^u de Ynfanta .
id	id	id	Filiberto Carriles	17 ^o id id
id	id	id	Felipe Suarez	5 ^o id id
id	id	id	Federico Abrego	Hosp ^l de Mexico.
id	id	id	José L. de Guevara	4 ^o de Artilleria.
id	id	id	Juan Hernandez	10 ^o Regimiento.
id	id	id	Acacio Lopez	8 ^o Batallon.
id	id	id	Constancio P. Ydiaquez	9 ^o Regimto .
id	id	id	Antonio Casillas	19 ^o Batallon.
id	id	id	Ricardo de la Cueva	21 ^o id
id	id	id	Jesus Garnica	4 ^o Regimto .
id	id	id	Jose Martinez Ancira	Bat ^u de Yngenieros.
id	id	id	Augustio Nicto	12 ^o Batallon.
id	id	id	Nicolas Rodriguez	12 ^o Regimiento.
id	id	id	Ricardo Suarez	11 ^o Batallon.
id	id	id	Angel Hidalgo	24 ^o id
id	id	id	Enrique Leal	11 ^o Regimiento.
id	id	id	Ricardo E. Manuell	5 ^o id
id	id	id	Vicente Barragan	
Capitan 1 ^o	Medico	Ciruj ^o	Leopoldo Portas Ramirez	8 ^o Regimiento.
id	id	id	Librado Pota	10 ^o Batallon.
id	id	id	Pablo M. Parra	7 ^o id
id	id	id	Ricardo Juvera	2 ^o id
id	id	id	Felipe Brachetti	15 ^o id
id	id	id	Jesus Gonzalez Uruena	2 ^o Cpo de Auxiliares.
Tente	Aspirante de Medicina.	Fran ^{co}	Carral	Hospital Mexico.
id	id	id	Aureliano Uzzulia	" "
id	id	id	Miguel Cervantes	" "
id	id	id	Juan G. Casasuz	" "
id	id	id	Rafael Dominguez Pastor	" "
id	id	id	Felipe Gulierrez	" "
id	id	id	Ramon L. Campos	" "
id	id	id	Ulises Valdez	" "
id	id	id	Alfredo Ramos	" "
id	id	id	Manuel Bassauri	" "

SERVICIO FARMACEUTICO.

Tente	Coronel	Farmacutico.	Felipe Rodriguez	Hospital de Mexico.
Mayor		id	Manuel Garcia	" Puebla.
id		id	Ygnacio Alvarado Rivera	" Sn. Luis.
Cap ^u 1 ^o		id	Joci Manuel Carillo	" Vera Cruz.
id		id	Pascual Garcia Pena	" Guadalajara.
id 2 ^o		id	Juan B. Tolvezano	" Tampico.

SERVICIO FARMACEUTICO.

EMPLEO MILITAR.	NOMBRE.	COMISION.
Cap ⁿ 2º Farmaceutico.	Culverto Vera	Hospital de Matamoros.
id id	Andres M. Delgado	“ Tepic.
id id	Miguel Cordero	“ Monterey.
Teniente Aspirante de Far- aceutico.	Alfredo Gutierrez.....	“ Mexico.
	Rafael de la Hoz.....	“ id

SERVICIO VETERINARIO.

Tente Coronel Veterinario. ...	Manuel Penunivei	Jefe de Seccion en el Departamento
Mayor	id ... Octaviano Velasco.....	3º Regimiento.
“	id ... Emilio Fernandez.....	Guarnicion Mexico.
“	id ... Carlos Chacon	9º Regimto .
“	id ... Everado Zanabria	Guarnicion Mexico.
Cap ⁿ 1º	id ... Enrique Santoyo	id id
“	id ... Antonio Benitez	13º Regimto .
“	id ... Manuel Lopez Dominguez.....	6º id
“	id ... Carlos Millan Rangel.....	1º id
Cap ⁿ 2º	id ... Feliciano Rebollo.....	1º Cpo Auxiliares.
“	id ... Ramon Pantoja.....	11º Regimto .
“	id ... Ehtimio Vallejo	Guarnicion Mexico.
“	id ... Rafael Cruz	5º Regimto .
Teniente	id ... Carmilo Diaz	Guarnicion Mexico.

SERVICIO ADMINISTRATIVO.

Tente Coronel Administrador.	Zarcarias Gomez	H ¹ Mexico.
Mayor	“ Manuel Garcia Pina	“ Vera Cruz.
“	“ Cristobal A. Pareijon.....	“ Matamoros.
“	“ Alberto Jacha	“ San Luis.
“	“ Eliseo Lopez.....	“ Puebla.
Cap ⁿ 2º	“ Emilio Doring.....	“ Tampico.
“	“ Julian Villasenor.....	“ Guadalajara.
“	“ Joce Salcedo.....	“ Tepic.
“	“ Antonio Garcia Conde	“ Monterey.
“	“ Luis Espinosa de los Monteros..	“ Mazatlan.
Capitan 1º Comisario	Rosendo Ocaranza.....	“ Mexico.
“ 2º “	Pedro Castaneda.....	“ Vera Cruz.
“ “ “	Jesus M. Diaz	“ Puebla.
“ “ “	Jose Fernandez.....	“ San Luis.
“ “ “	Salvador Mendoza.....	“ Guadalajara.
Teniente	“ Roman C. Castro.....	“ Tepic.
“	“ Procopio J. Minon	“ Monterey.
“	“ Carlos Danache.....	“ Matamoros.
“	“ Ysidro Hernandez Oriol ..	“ Tampico.
“	“ Francisco Ondovilla.....	Mazatlan.

II. A MILITARY DELEGATE TO THE SECOND PAN-AMERICAN CONGRESS AT MEXICO,
NOVEMBER, 1896.

BY ASSISTANT SURGEON-GENERAL C. H. ALDEN, U. S. ARMY,
WASHINGTON, D. C.

I HAD the honor and pleasure, in association with Surgeon DeWitt, to represent the Medical Department of the U. S. Army at the second Pan-American Congress which met in the City of Mexico, November 16 to 19, 1896. This Association, it will be remembered, was organized under the auspices of the American Medical Association and is intended to bring together the medical profession of the entire Western Hemisphere, including adjacent islands. Its first meeting was held in the city of Washington in September, 1893. Our visit was a most interesting one, and it would be quite impossible within the limits of such a paper as this to describe adequately all we saw and heard; yet I think a brief report will interest the members of this Association, especially as we saw something of the Mexican Army Medical Department and its School of Instruction.

Many things contributed to the pleasure of our visit. In the first place the climate of Mexico at that season was extremely agreeable, the scenery through which we approached the Capital and in and around the city most picturesque, the city itself full of historic monuments and novel sights, the hospitals and sanitary institutions well worthy of study, the meetings of the Congress in spite of all these distractions well attended and interesting, and lastly, which perhaps I should put first, the hospitality of the authorities and of private citizens not only most generous and cordial, but planned and executed with exquisite and characteristic taste.

In addition to my colleague, Surgeon DeWitt, there were present as official delegates for the U. S. Government, Medical Director Woods of the Navy, Surgeon General Wyman and Surgeon Sawtelle of the Marine Hospital Service. Assistant Sur-

geon Reynolds of the Army, stationed at Fort McIntosh, Texas, was also with us. The companionship of these gentlemen much increased our pleasure.

A large number of the delegates and members of the Congress from the United States arrived on a special official train the day before the Congress opened, being right royally welcomed by the local Reception Committee with music, the station being gayly decorated with bunting. Sunday before the Congress was devoted to sight-seeing. Among the sights most strange to us was a genuine Spanish bull-fight. For the first time, and in honor of the guests, the program was printed in English. This bull-fight was by no means a sham fight as six bulls and seven horses were killed. In the afternoon we joined in the great daily event in the City of Mexico, the drive on the Grand Avenue, the Paseo del la Reforma, leading from the city about two miles to the Castle of Chapultepec, ornamented with statues and bordered by trees. Everybody who has a carriage is out at that hour, passing several times on the route while the bands play. In the evening there was a reception to the Congress by the Faculty of the National School of Medicine, founded in 1768, now appropriately occupying the fine old Inquisition Building. It was a delightful occasion, giving us an opportunity of meeting the great men of the profession in Mexico, among whom I may mention Drs. Carmona y Valle, La Vista, Liceaga, and many others. A generous table was spread.

On Monday, the first day of the Congress, after registering, the fee being \$5 American money, or \$10 Mexican, we attended the meeting of the Section of Military and Naval Surgery (with which Railway Surgery was combined) at the Hospital of Instruction. By the kindness of the Director, Colonel Lopez, we were shown through the hospital, a two-story stone building, which was in admirable order. The operating room was fitted up in accordance with the fullest requirements of antiseptic surgery. Our conductor was Major Federico Abrego, one of the seven professors in the Escuela de Aplicacion, or School of Application attached to the hospital. We were shown also the class rooms for the students in different branches taught. In the courtyard was a display of the field equipment of the Medical Department, tents, ambulances, and hooded wheeled litter. A drawing of the ingenious

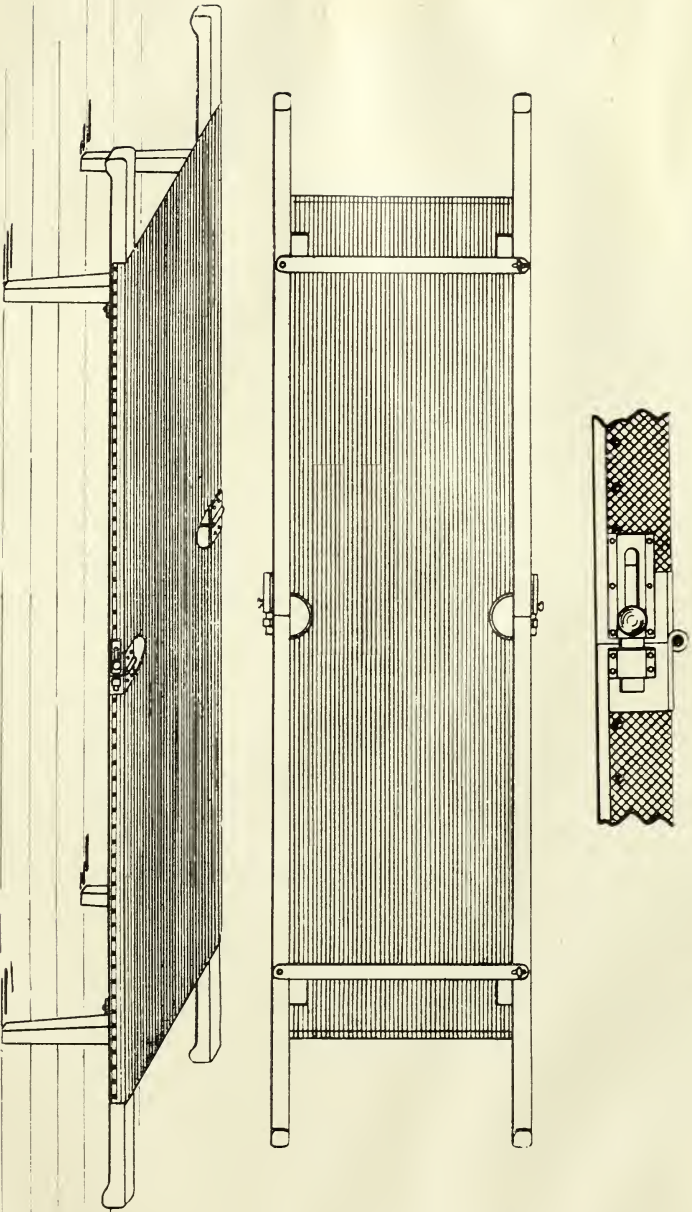


Fig. 1.—The Hand Litter of the Mexican Army, 1896.

hand litter used in the Mexican Army is appended. (Fig. 1.) As Major Maus' article, already read at this meeting, takes up the Medical Department and the Army Medical School of the Mexican Army in detail, it is unnecessary for me to do so.

It is to be observed in studying the Medical Department of the Mexican Army that their arrangements are necessarily different from ours and we cannot directly compare them with ours. Just as our Army was modeled on that of the English and our regulations are largely inherited from England, the Mexican Army inherited Spanish methods which have been modified by its special needs. The Medical School, established in 1880, is patterned after the French School of Val de Grace at Paris. Its professors are appointed by "Concours." The students of the Military Medical School are selected from the students at the National School of Medicine, and complete their course of five years at the Medical School while undergoing special instruction in the Military Medical School for the last three years of that period. Entering the School of Application attached to the Hospital of Instruction with the rank of first lieutenant, they, at the conclusion of the two concurrent courses referred to, receive their degree in medicine and are commissioned as Medical Officers in the Army with the rank of major. The uniform of the Mexican Medical Officer is very similar to that of the French.

I experienced much courtesy from General Cacho, the head of the Medical Department, who has the title of Jefe del Departamento y Cuerpo Medico Militar, and other Medical Officers of the Mexican Army, particularly Dr. Federico Abrego, one of the professors of the school, already mentioned. We are indebted also to Captain Charles G. Dwyer, U. S. Army, Military Attache to the U. S. Legation, for many kind attentions.

Although the Section meetings began on Monday the 16th, the Congress was not formally opened until the evening of that day, at the "Teatro Nacional," or National Theater, when the President of the Republic, General Porfirio Diaz, made a most cordial and graceful address of welcome. He was followed by Dr. Liceaga, Secretary of the Congress; Dr. Carmona y Valle, the President, and Sr. Gamboa of the Board of Health of the Federal District. Dr. William Pepper of Philadelphia, who was the first President of the Pan-American Congress, and is regarded as one

of its founders, made the closing address, and was most warmly received. The tasteful decorations, the exquisite music and the large audience, nearly 3,000, including many ladies in gala attire, contributed to make this a most brilliant and interesting occasion.

The second general meeting of the Congress was held on Tuesday night, the 17th, in the Chamber of Deputies, when interesting addresses were delivered by Dr. Fernandez of Havana, on "Yellow Fever"; by Dr. La Chapelle of Canada, on "Pasteur and His Discoveries"; one by Dr. Walter Wyman, Supervising Surgeon-General of the Marine Hospital Service, on "Quarantine," in which he ably discussed international obligations from a sanitary point of view; and one by Dr. La Vista of Mexico, on "Therapeutics."

The third and closing general session, held in the same place, was devoted chiefly to the presentation of reports and to brief addresses from the representatives of the nationalities represented at the Congress, who returned thanks for the courtesies extended by the Government and people of Mexico. Dr. Charles A. L. Reed of Cincinnati, the Secretary of the first Congress, spoke for the United States in a most fitting manner.

It appeared from the Treasurer's report, read on this occasion, that 445 delegates and members had registered; about 200 from Mexico itself, about 200 from the United States, and the remainder from other nationalities in the Western Hemisphere, including Canada, the West Indian Islands, and the Republics of Central and South America. No list of physicians actually present at the Congress was published, but there was a good representation of the best element of the profession in all the countries referred to. That this number did not embrace more of the prominent physicians and surgeons of this country was no doubt due to the fact that at that season our medical colleges are in session and many notable men, who are teachers, could not spare the time for so long a journey. Among the attendants upon this Congress were quite a number of lady physicians from the United States.

The principal scientific work of the Congress was performed not at the general sessions but at the meetings of the many sections into which the Congress was divided. There were fifteen of these sections, the most important being those of General Medicine, General Surgery, Obstetrics and Abdominal Surgery, and

Hygiene; the others representing all the more important specialties in medicine, and including one of Military and Naval Surgery, to which I have already alluded. All the sections, except a few minor ones, met in the National School of Engineers, a large building with central court affording ample and convenient accommodations. The principal sections, those of General Medicine, of General Surgery, of Obstetrics and Abdominal Surgery, and of Hygiene, held meetings twice daily during the Congress and were well attended. The less important sections held fewer meetings and some of them had so little business and so small an attendance that their separate organization seemed hardly needed.

Although the novel and interesting sights of the beautiful City of Mexico, particularly attractive at this season, naturally diverted the attention of foreign members, great interest was shown in the proceedings of the Congress and the contributions to medical science were numerous and important. According to the published official list there were 340 papers presented at the general or section meetings, though but a part were actually read. It was, of course, impossible for one person to do more than attend the general sessions and to listen to a few of the papers read at the sections, so that only an outline of the work done can be given.

In the section of General Medicine the subjects of malarial and yellow fever claimed much attention. There were twenty papers on these and allied subjects. Among them were articles on "The Urine in Yellow Fever," by Dr. Casabo and by Drs. Acosta and Davalos of Havana; one on "The Biological Character of the Blood of Yellow Fever," by Dr. Coronado of Havana, specially interesting as confirming at this time the conclusions of Surgeon, now General Sternberg, in his investigations in 1888-9; and others by Brazilian and Venezuelan physicians.

In Surgery many papers were presented covering the field pretty generally, and including the interesting subjects of Abdominal Surgery, the Radical Cure of Hernia, Cerebral Surgery, and Roentgen Rays as an aid in diagnosis. Surgical operations were performed before the section at some of the city hospitals.

The section of Hygiene, Demography and allied subjects was an important one, and the papers were numerous and interesting as illustrating the conditions existing in the different nationalities

represented. Quarantine and public health in its international relations naturally came in for much discussion.

Under the direction of the International Executive Commission, a body made up of representatives of the various nationalities and which had in special charge the business arrangements of the Congress, three important special commissions were appointed; one on "Public Health, Quarantine and Medical Legislation," Dr. E. Liceaga of Mexico, Chairman; another on a "Pan-American Pharmacopœia," Prof. J. P. Remington of Philadelphia, Chairman; and a third on the "Pan-American Medical Flora," Dr. H. H. Rusby of New York, Chairman. These special commissions were charged with the consideration of the important subjects assigned them during the interval between this and the next Congress to which they are to make their report.

Upon the invitation of the delegates from Venezuela, the International Commission selected Caracas, the Capital of that Republic, as the place of the next meeting in December, 1899.

My own contribution to the work of the Congress was a paper on "Examinations in Medicine, an enquiry into their influence on Education and the best methods of conducting them," read before the section on Medical Education, and one on "Recent Improvements in the Equipment of the U. S. Hospital Corps," presented at the section of Military and Naval Surgery, of which section I had the honor of being made one of the honorary Presidents.

This meeting of the Pan-American Congress in the City of Mexico will be especially remembered by the delegates and members from other countries for the generous and gracious hospitality extended to them. It is impossible in this paper to give an adequate idea of the magnificence of the public entertainments, and of the attentions showered upon the visitors by both Government officials and private individuals. The arrangements made for the pleasure and comfort of guests were not only extensive and elaborate in the planning, but most successfully carried out. The traditional courtesy of the Mexican nation exceeded itself on this occasion.

The notable opening of the Congress by the President of the Republic at the Teatro Nacional has been referred to. On Wednesday, the 18th, there was a reception by the Governor and

Municipality of the City of Mexico, at the National Palace. Not only was this in itself a brilliant occasion, but the Cathedral and the Plaza Mayor, upon which the palace fronts, were illuminated, and there was a grand display of fireworks in the square. The central court or "patio" of the palace was transformed into a fairy grotto with glistening walls and an artificial cascade, and used as the supper room. The next day, Thursday, the 19th, was the principal social event, the reception by the President and Mrs. Diaz, at the Castle of Chapultepec. The castle or palace, situated on a hill overlooking the Valley of Mexico with snow-clad mountains in the distance and approached by the fine boulevard of Paseo de la Reforma, was in itself a great attraction. The gracious greeting of the distinguished President of the Nation, and his charming wife, the delightful music and generous entertainment, combined to make this a memorable event. An elaborate ball by the Jockey Club of the City of Mexico was the last great festivity of the week.

A number of interesting and instructive excursions took place during the intervals of or after the daily meetings of the Congress. The most important only can be enumerated. Special trains on the street railway or steam lines were provided in all cases, and a generous luncheon when needed. On Tuesday, the new slaughter houses in the suburbs of the city, completed but not yet occupied, were visited. They are on a very extensive scale and equal in their appointments to the best anywhere. On Wednesday, the guests were taken to the new General Hospital, now under construction, destined to be a large establishment of some 35 buildings with the most approved modern arrangements, and to the new Penitentiary, a model building of its kind, both several miles from the city. On the 20th, after the close of the Congress, there was an all-day excursion to the Drainage Works of the Valley of Mexico, and the great tunnel connected with them. This colossal and most interesting undertaking, practically completed but not yet fully utilized, is destined when connected with an improved sewage system of the city, to remedy the one great defect now existing in its sanitary condition. On Saturday, the 21st, the visitors were taken by rail to the ruins of San Juan Teotihuacan, where, after inspecting the pyramids and other interesting monuments, they were hospitably entertained by the Governor of the State of Mexico, within whose jurisdiction they were.

The City of Mexico contains many institutions of interest to medical men, most of which I visited. The principal are, briefly: The National Medical College, at which the reception was held on the night of the 15th; the Pathological Institute; the Offices of the Supreme Board of Health and its well-equipped laboratories; the National Medical Institute, devoted to the collection, cultivation, study, analysis, etc., of the medical flora of the country; and the Regina, Jesus, San Hipolito, San Andres, Juarez and American Hospitals.

What I have said will show you, I think, that the second Pan-American Congress was a notable event both for hosts and guests. The Mexican Government showed their interest by assuming to pay all the expenses of the Congress from the National Treasury. Those present from abroad were not only convinced of the traditional courtesy of the Mexican Nation, of which, of course, we all had heard, but of what one without a personal visit could not appreciate, the wonderful progress the people of Mexico are making under the wise and firm leadership of its distinguished executive, General Diaz, acting under the best scientific advice. This progress is the more notable as the old state of things has not entirely passed away. There is no exaggeration in saying that the completion of the hospitals, reformatory institutions, and sanitary works, now in progress, will place Mexico abreast of any country in the world. Indeed, in many respects she has already reached such a position. The Supreme Board of Health of the city, with its laboratories and disinfecting plants, are instances of this.

Mexico, it will be remembered, is an older nation than the United States, and while its progress has been retarded by most unfortunate political complications, it is at last undergoing a thorough awakening. It will be for our advantage, as well as theirs, to cultivate the closest relations with our nearest southern neighbor. The nation no longer treasures up against us memories of the war of 1846. Our help in expelling the French invasion and the Imperial usurpation in 1867 has restored the cordial feeling and there is now no bar to the most friendly intercourse.

APPENDIX.

The Association of Military Surgeons of the United States.

CONSTITUTION AND BY-LAWS.

REVISED MAY 22, 1895.

PREAMBLE.

The Military Surgeons of the United States, in order to promote and improve the science of Military Surgery, have associated themselves together and adopted the following Constitution and By-Laws:

CONSTITUTION.

ARTICLE I.

Name.

The organization shall be known as "The Association of Military Surgeons of the United States."

ARTICLE II.

Members.

SECTION 1. There shall be Active, Associate, Honorary, Corresponding, and Life Members.

ACTIVE MEMBERS.

SEC. 2. Commissioned medical officers of the United States Army, of the Navy, and of the National Guard, or Volunteer Militia of the several States are eligible for active membership. Active members may retain their membership should they be honorably discharged from the service in which they were commissioned. Active members only shall be eligible for office or entitled to vote.

ASSOCIATE MEMBERS.

SEC. 3. Ex-medical officers and other officers of either of the above-mentioned services, and of the Marine Hospital Service, and ex-medical

officers of the United States Volunteer Service are eligible for associate membership.

HONORARY MEMBERS.

SEC. 4. Persons who are not qualified for active membership, but who have achieved distinction in the military service, are eligible as honorary members.

CORRESPONDING MEMBERS.

SEC. 5. Military surgeons living outside of the United States, who are prominent in the literature of military medicine and hygiene, are eligible as corresponding members.

LIFE MEMBERS.

SEC. 6. On payment of the sum of Fifty Dollars any active member may become a life member and be exempt from further dues.

ARTICLE III.

Officers and Committees.

OFFICERS.

SEC. 1. The officer shall be a President, two Vice-Presidents, a Secretary, a Treasurer, and an Editor, who shall hold their respective offices until their successors are elected and qualified.

COMMITTEES.

SEC. 2. There shall be the following standing committees: An Executive Committee, to consist of the officers and ex-presidents and five (5) members. A Publication Committee, to consist of three (3) members. A Literary Committee, to consist of three (3) members of the National Guard or Militia, and one (1) each from the Army and Navy. A Nominating Committee, based upon a representative, or one vote for each State, Territory, the Army, and the Navy, and for every additional ten (10) members or major fraction thereof, an extra representative or vote; said vote or votes to be cast by a member or members present from each State, Territory, Army, and Navy, to be designated by the members present from each State, Territory, Army, and Navy at the time of the meeting.

ARTICLE IV.

Quorum.

Thirty-five (35) members shall constitute a quorum for the transaction of business, but a less number may adjourn.

ARTICLE V.

Amendments.

All amendments to this Constitution and By-Laws shall be proposed in writing at one annual meeting, and voted on at the next. A three-fourths vote of all the members present at the annual meeting shall be necessary for adoption.

BY-LAWS.

ARTICLE I.

Election to Membership.

SEC. 1. Election to active or associate membership shall be by the Executive Committee, to whom the Secretary shall refer all applications, together with such credentials as may be presented.

SEC. 2. Election to honorary or corresponding membership shall be by two-thirds vote of the Association, after the unanimous recommendation of the Executive Committee.

ARTICLE II.

Loss of Membership.

Any member who may be dismissed from the service for conduct unbecoming an officer and a gentleman shall be expelled and debarred from any further rights or privileges when proper proof has been furnished the Secretary.

ARTICLE III.

Meetings.

The Association shall meet annually, the time and place to be fixed at each meeting for the one ensuing. Special meetings may be called by the President at any time. At the annual meeting the President, Vice-Presidents, Secretary, Treasurer, and Editor shall be elected for the term of one year, the standing committees appointed, and the annual reports received.

ARTICLE IV.

Dues.

The dues to be paid by active and associate members shall be five dollars (\$5.00), due at the time of election; thereafter on January 1 of each year, in advance. Delinquents in the payment of dues will not be entitled to the Proceedings or other publications of the Association.

Delinquency for two years shall terminate membership, after due notice by the Treasurer.

Honorary, Corresponding, and Life members shall be exempt from the payment of dues.

ARTICLE V.

Duties of Officers.

THE PRESIDENT.

SEC. 1. The President shall preside at all meetings, appoint all committees, unless otherwise provided for, approve all proper bills, and perform such other duties as are usually incumbent upon such an officer.

THE VICE-PRESIDENTS.

SEC. 2. The Vice-Presidents, in order of seniority, shall perform the duties of President in the absence or inability of that officer.

THE SECRETARY.

SEC. 3. The Secretary shall keep the records and archives, issue certificates of membership to honorary and corresponding members on election, to active and associate members when notified by the Treasurer that the proper dues have been paid.

He shall present to the Committee on Publication a synopsis of the proceedings, and such papers as the authors desire to have published by the Association. He shall receive all applications for membership and refer the same to the Executive Committee. He shall notify the Treasurer of the election of active and associate members, and shall prepare an annual report. At each annual meeting he shall appoint an Assistant Secretary.

THE TREASURER.

SEC. 4. The Treasurer shall receive all moneys due the Association, collect all assessments, and pay all bills which have been properly approved. He shall have charge of all publications, and distribute the same to those who are entitled to them. He shall notify the Secretary when new active and associate members have paid and are entitled to certificates of membership.

The accounts of the Treasurer shall be audited by a committee appointed for that purpose on or before the annual meeting. He shall present an annual report.

He shall execute such bond of \$2,000 as may be approved by the Executive Committee for the faithful performance of his duties; the Association to bear the cost of this insurance.

THE EDITOR.

SEC. 5. The Editor shall prepare for publication and see through the press all material furnished him by the Publication Committee. All contracts for printing must first have the approval of the President and Treasurer.

ARTICLE VI.

Duties of Committees.

THE EXECUTIVE COMMITTEE.

SEC. 1. The Executive Committee shall perform the duties prescribed by the Constitution and By-Laws, and such other administrative or executive duties as may be referred to it, and for which provision has not otherwise been made. The President shall be *ex officio* chairman.

THE PUBLICATION COMMITTEE.

SEC. 2. The Publication Committee shall determine what portions of the proceedings are of sufficient general interest to be printed.

It shall also decide on the advisability of publishing the various papers presented at the annual meeting, and forward all such material to the Editor, and all papers presented to and accepted by the Association shall be its property, and shall not be published in any other form, except by the authority of the Executive Committee, and shall be credited to the Association.

THE LITERARY COMMITTEE.

SEC. 3. The Literary Committee shall outline the literary work for the annual meeting in advance, making the necessary arrangements for the reading and discussion of papers.

THE NOMINATING COMMITTEE.

SEC. 4. The Nominating Committee shall, at the annual meeting, present a list of candidates for the various officers for the ensuing year.

The vote, or votes, of the Nominating Committee shall be cast by a member, or members, who shall be designated by the members present, from each State or Territory, the Army, and the Navy.

OFFICERS OF THE ASSOCIATION FROM
ITS ORGANIZATION.**1891.**

FIRST MEETING HELD AT LELAND HOTEL, CHICAGO, ILL., SEPT. 17-18, 1891.
BRIG. GEN. NICHOLAS SENN, SURGEON GENERAL OF
WISCONSIN, PRESIDING.

1891-1892.

SECOND MEETING HELD AT MEMORIAL HALL, ST. LOUIS, MO.,
APRIL 19, 20 AND 21, 1892.

President—Nicholas Senn, Brig. Gen. and Surg. Gen., Wis.

First Vice-President—Nelson H. Henry, Major and Surgeon, N. G. S. N. Y.

Second Vice-President—E. Chancellor, Lt. Col., Med. Director, N. G. Mo.

Secretary—F. L. Matthews, Col. and Surg. Gen., N. G. Ill.

Cor. Secretary—Ralph Chandler, Lt. and Asst. Surg., Wis. N. G.

Treasurer—Francis J. Crane, Col. and Surg. Gen., Colorado.

Chairman Com. of Arrangements for 1892—E. Chancellor, Lt. Col. and
Med. Dir., N. G. Mo.

1892-1893.

THIRD MEETING HELD AT RUSH MEDICAL COLLEGE AND THE U. S. GOV-
ERNMENT BUILDING, WORLD'S FAIR, CHICAGO, ILL.,
AUG. 8, 9 AND 10, 1893.

President—Nicholas Senn, Col. and Surg. Gen., N. G. Ill.

Honorary President—C. R. Greenleaf, Lt. Col. and Dep. Surg. Gen.,
U. S. A.

First Vice-President—Nelson H. Henry, Major and Surgeon, N. G. S. N. Y.

Second Vice-President—C. M. Woodward, Lt. Col. and Surg. Gen., Mich.

Secretary—E. Chancellor, Lt. Col. and Med. Director, N. G. Mo.

Cor. Secretary—Ralph Chandler, Lt. and Asst. Surg., Wis. N. G.

Treasurer—Francis J. Crane, Col. and Surg. Gen., Colorado.

Chairman Com. of Arrangements for 1893—Charles Adams, Major and
Surg., N. G. Ill.

1893-1894.

FOURTH MEETING HELD AT THE NATIONAL THEATRE AND THE NATIONAL
MUSEUM, WASHINGTON, D. C., MAY 1, 2 AND 3, 1894.

President—Nicholas Senn, Col. and Surg. Gen., N. G. Ill.

First Vice-President—B. J. D. Irwin, Col. and Asst. Surg. Gen., U. S. A.

Second Vice-President—Louis W. Read, Col. and Surg. Gen., N. G. Pa.

Secretary—E. Chancellor, Lt. Col. and Med. Director, N. G. Mo.

Assistant Secretary—Julian M. Cabell, Capt. and Asst. Surg., U. S. A.

Treasurer—Lawrence C. Carr, Major and Surg., Ohio N. G.

Chairman Com. of Arrangements for 1894—George Henderson, Major and Surg. Gen., D. C.

1894-1895.

FIFTH MEETING HELD AT THE STAR THEATRE AND ALUMNI HALL,
UNIVERSITY OF BUFFALO, BUFFALO, N. Y.,
MAY 21, 22 AND 23, 1895.

President—George M. Sternberg, Brig. Gen. and Surg. Gen., U. S. A.

First Vice-President—Louis W. Read, Col. and Surg. Gen., N. G. Pa.

Second Vice-President—Albert L. Gihon, Med. Director, U. S. N.

Secretary—E. Chancellor, Lt. Col. and Med. Director, N. G. Mo.

Assistant Secretary—Julian M. Cabell, Capt. and Asst. Surg., U. S. A.

Treasurer—Lawrence C. Carr, Major and Surg., Ohio N. G.

Chairman Com. of Arrangements for 1895—Albert H. Briggs, Major and Surg., N. G. S. N. Y.

1895-1896.

SIXTH MEETING HELD AT THE BROAD STREET THEATRE, HOTEL WALTON,
UNIVERSITY OF PENNSYLVANIA, AND UNION LEAGUE CLUB,
PHILADELPHIA, PA., MAY 12, 13 AND 14, 1896.

President—Louis W. Read, Col. and Surg. Gen., N. G. Pa.

First Vice-President—Albert L. Gihon, Med. Director (Retired), U. S. N.

Second Vice-President—Charles H. Alden, Asst. Surg. Gen., U. S. A.

Secretary—E. Chancellor, Lt. Col. and Med. Director, N. G. Mo.

Treasurer—Lawrence C. Carr, Major and Surg., Ohio N. G.

Editor—Philip F. Harvey, Major and Surgeon, U. S. A.

Chairman Com. of Arrangements for 1896—J. Wilks O'Neill, Major and Surg., N. G. Pa.

1896-1897.

SEVENTH MEETING HELD AT THE HIGH STREET THEATRE, THE OHIO
SENATE CHAMBER, STARLING MEDICAL COLLEGE AND
COLUMBUS BARRACKS, COLUMBUS, OHIO,
MAY 25, 26 AND 27, 1897.

President—Albert L. Gihon, Medical Director (Commodore, Ret.), U. S. N.

First Vice-President—Edward J. Forster, Brig. Gen. and Surg. Gen.,
(Deceased), Mass. V. M.

Second Vice-President—John Van R. Hoff, Major and Surgeon, U. S. A.

Secretary—Herman Burgin, Major and Surgeon, N. G. Pa.

Assistant Secretary—James E. Pilcher, Captain and Asst. Surg., U. S. A.

Treasurer—James J. Erwin, Captain and Asst. Surg., Ohio N. G.

Editor—Charles C. Foster, Major and Surgeon, Mass. V. M.

Chairman Com. of Arrangements for 1897—Henry M. W. Moore, Major and Surgeon, Ohio N. G.

Register of Members.

REVISED TO OCTOBER 15, 1897.

NOTE.—The figures preceding each name in the Register of Members, indicate the year of election to membership.

The designations after the name, indicate (first) the grade of Military and Naval precedence, (second) the Corps Title, and (third) the service, State or National, in which commissioned. In the case of Naval Officers the grades are in brackets, indicating what is termed their "relative rank"; they are addressed officially by their corps titles, but in social intercourse it is customary in the Navy to address them simply as "Doctor." The following table exhibits the correspondence of grades and titles in the Army and Navy:

ARMY.		NAVY.	
GRADES.	TITLES.	GRADES.	TITLES.
Brig. General.	Surg. General.	Commodore.	Surg. General. Med. Dir. (ret'd.)
Colonel.	Asst. Surg. General.	Captain.	Med. Director.
Lt. Colonel.	Dep. Surg. General.	Commander.	Med. Inspector.
Major.	Surgeon.	Lt. Commander.	Surgeon.
Captain.	Asst. Surg. (after passing.)	Lieutenant.	Surgeon.
1st Lieut.	Asst. Surgeon.	Lt. j(unior)g(rade.)	Pd. Asst. Surg.
		Ensign.	Asst. Surgeon.

In addressing communications to military officers both the grade and title are used; in addressing naval officers, the latter only is employed, e. g.:

Major A *** B *** C *** , Surgeon F *** G *** H *** , U. S. N.,
 Surgeon, U. S. Army, U. S. S. I *** ,
 Fort D *** , Ariz. Naples, Italy.

LIFE MEMBERS.

ELECTED.

1892 Adams, Charles, Maj. and Surg., N. G. Ill.,
 Central Music Hall, Chicago, Ill.

1891 Alden, Charles Henry, Col. and Asst. Surg. Gen., U. S. A.,
Second Vice Pres., 1895-96, War Dept., Washington, D. C.

1891 Chancellor, Eustathius, Lt. Col. and Med. Dir., N. G. Mo.,
Secretary, 1892-96, 613 Pine St., St. Louis, Mo.
Second Vice Pres., 1891-92,

1894 Pilcher, James E., Capt. and Asst. Surg., U. S. A.,
Secretary and Editor, 1897-98, Fort Crook, Nebraska,
Asst. Secretary, 1896-97,

1891 Senn, Nicholas, Col. and Surg. Gen., N. G. Ill.,
President, 1891-94, 532 Dearborn Ave., Chicago, Ill.

ACTIVE MEMBERS.

ELECTED.

- 1894 Abbe, Edward Harper, Lt. (j. g.) and Asst. Surg., Naval Res.,
M. V. M.,
405 County St., New Bedford, Mass.
- 1895 Adair, George William, Maj. and Surg. U. S. A.,
Washington Bks., Washington, D. C.
- 1891 Adams, Charles Francis, Capt and Asst. Surg., N. G. N. J.,
229 Union St., Hackensack, N. J.
- 1892 Adams, Charles W., 1st Lt. and Asst. Surg., N. G. Mo.,
12th & Grand Sts., Kansas City, Mo.
- 1895 Allen, Gardner Weld, Lt. Col. and Surg., M. V. M.,
417 Boylston St., Boston, Mass.
- 1891 Aimey, Leonard Ballou, Lt. Col. and Med. Dir. (Ret.), N. G.
Conn.,
173 Washington St., Norwich, Conn.
- 1895 Aintree, George Herbert, Act. Asst. Surg. U. S. M. H. S.,
Port Tampa, Fla.
- 1894 Ames, Howard Emerson, Surg. (Lt.) U. S. N.,
Navy Yard, Norfolk, Va.
- 1894 Anderson, Frank, Surg. (Lt.) U. S. N.,
Naval Hosp., Yokohama, Japan.
- 1893 Anthony, Frank, Maj. and Surg., N. G. Ill.,
First Ave., Sterling, Ill.
- 1893 Appel, Daniel Mitchell, Major and Surg. U. S. A.,
Fort Logan H. Roots, Little Rock, Ark.
- 1896 Archibald, O. Wellington, Col. and Surg. Gen. N. D. N. G.,
Jamestown, No. Dak.
- 1895 Arnold, Herbert A., 1st Lt. and Asst. Surg., N. G. Pa.,
Ardmore, Pa.
- 1896 Arnold, Will Ford, Pd. Asst. Surg. (Lt. j. g.) U. S. N.,
U. S. R. S. Richmond—Navy Yard,
League Island, Pa.
- 1895 Ashenfelter, William J., Maj. and Surg. N. G. Pa.,
Pottstown, Pa.
- 1897 Ashley, Maurice C., 1st Lt. and Asst. Surg., N. G. S. N. Y.,
Middletown, N. Y.
- 1897 Ashmun, George C., Maj. and Surg., O. N. G.,
94 Republic St., Cleveland, O.
- 1897 Austin, Charles S., Maj. and Surg., N. G. Mo.,
Carrollton, Mo.
- 1894 Bache, Dallas, Col. and Asst. Surg. Gen., U. S. A.,
Omaha, Neb.
- 1895 Baker, John Walter, Surg. (Lt.), U. S. N.,
Naval Hospital, Mare Island, Cal.
- 1892 Baker, Washington Hopkins, Maj. and Surg. (Ret.), N. G. Pa.,
1610 Sumner St., Philadelphia, Pa.
- 1894 Balch, Lewis, Maj. and Surg., N. G. S. N. Y.,
14 Washington Ave., Albany, N. Y.
- 1896 Banister, John Monro, Maj. and Surg., U. S. A.,
Fort Leavenworth, Kas.
- 1895 Barber, George Holcombe, Pd. Asst. Surg. (Lt. j. g.), U. S. N.,
U. S. N. Academy, Annapolis, Md.
- 1892 Barker, Christopher F., Maj. and Surg., R. I. M.,
32 Bull St., Newport, R. I.
- 1892 Barnes, Algernon S., Brig. Gen. and Surg. Gen. (Ret.), N. G.
Mo.,
5434 Maple Ave., St. Louis, Mo.

ELECTED.

- 1897 Barry, William Frances, 1st Lieut. and Asst. Surg., R. I. M.,
Woonsocket, R. I.
- 1896 Bates, Newton L., Surg. Gen. (Commodore), U. S. N.,
The Shoreham, Washington, D. C.
- 1894 Battle, Saumel Westray, Maj. and Asst. Surg. Gen., N. C.; Pd.
Asst. Surg. (Lt. j. g.), (Ret.), U. S. N.
Asheville, N. C.
- 1896 Baner, Louis Demme, 1st Lt. and Asst. Surg., N. G. Pa.,
715 N. 5th St., Philadelphia, Pa.
- 1894 Bayles, George, Ex-Maj. and Surg., N. Y. Vol. Heavy
Artillery,
408 Main St., Orange, N. J.
- 1896 Belcher, William Nathan, Capt. and Asst. Surg., N. G. S. N. Y.,
25 Portland Ave., Brooklyn, N. Y.
- 1895 Bell, Robert Eddy, 2d Lt. Amb. Corps., M. V. M.,
Lowell, Mass.
- 1893 Benedict, John Mitchell, Ex-Major and Surg., N. G. Conn.,
81 N. Main St., Waterbury, Conn.
- 1891 Bergen, Andrew C., Lt. Col. and Surg., N. G. Ia.,
400 4th St., Sioux City, Ia.
- 1893 Bertollette, Daniel Nicholas, Surg. (Lt.), U. S. N.,
Marine Hqrs., Washington, D. C.
- 1895 Beyer, Ph. D., Henry Gustav, Surg. (Lt.), U. S. N.,
U. S. S. Amphitrite, care Navy Dept.,
Washington, D. C.
- 1895 Birmingham, Henry P., Capt. and Asst. Surg., U. S. A.,
Army Headquarters, Chicago, Ill.
- 1894 Blackwood, Norman Jerome, Pd. Asst. Surg. (Lt. j. g.), U. S. N.,
Care Dr. William Blackwood, Lancas-
ter, Pa.
- 1895 Blood, Robert Allen, Brig. Gen. and Surg. Gen., M. V. M.,
39 High St., Charlestown, Mass.
- 1897 Blubaugh, Charles B., Lt. Col. and Med. Dir., W. Va. N. G.,
1010 Murdoch Ave., Parkersburg, W.
Va.
- 1896 Boardman, Walter, 1st Lt. and Asst. Surg., N. G. Pa.,
Lancaster, Pa.
- 1895 Boeckmann, Eduard, Lt. Col. and Asst. Surg. Gen., N. G.
Minn.,
Lowry Arcade, St. Paul, Minn.
- 1895 Borden, William Cline, Capt. and Asst. Surg., U. S. A.,
Fort Snelling, Minn.
- 1895 Bowen, George Austin, Ex-Brig. Gen. and Surg. Gen., N. G.
Conn.,
Woodstock, Conn.
- 1894 Boyd, John C., Surg. (Lt.), U. S. N.,
Bur. Med. and Surg., Navy Dept.,
Washington, D. C.
- 1895 Boyd, Robert, Ex-Asst. Surg., (Ensign), U. S. N.,
Philadelphia, Pa.
- 1891 Bradbury, Bial Francisco, Maj. and Surg., Me. V. M.,
Norway, Me.
- 1896 Bradley, Alfred E., Capt. and Asst. Surg., U. S. A.,
Ft. Yellowstone, Wyo.
- 1895 Bradley, George Ferley, Medical Inspector (Cmdr.), U. S. N.,
Naval Hosp., Mare Island, Cal.
- 1891 Brannen, Dennis J., Capt. and Asst. Surg., N. G. Ariz.,
Flagstaff, Ariz.

ELECTED.

1892	Briggs, Albert Henry,	Maj. and Surg., N. G. S. N. Y., 267 Hudson St., Buffalo, N. Y.
1897	Brooke, John,	Maj. and Surg. (Ret.), U. S. A., Radnor, Pa.
1896	Brooks, William Allen, Jr.,	1st Lt. and Asst. Surg., M. V. M., 167 Beacon St., Boston, Mass.
1894	Brown, Orland J.,	Maj. and Surg., M. V. M., North Adams, Mass.
1896	Brown, Paul Richard,	Maj. and Surg. (Ret.), U. S. A., Aurora St., Ithaca, N. Y.
1895	Brubaker, John L.,	1st Lt. and Asst. Surg., N. G. Pa., 1224 4th Ave., Altoona, Pa.
1891	Bryant, Joseph Decatur,	Brig. Gen. and Surg. Gen. (Ret.), N. G. S. N. Y., 54 W. 36th St., New York.
1893	Budlong, John Clark,	Brig. Gen. and Surg. Gen. (Ret.), R. I. M., 604 Westminster St., Providence, R. I.
1895	Bunts, Frank Emory,	Capt. and Asst. Surg., O. N. G., 275 Prospect St., Cleveland, O.
1896	Burgin, Herman, <i>Secretary</i> 1896-97,	Maj. and Surg., N. G. Pa., Germantown, Pa.
1897	Burns, Robert,	Maj. and Surg., N. G. N. H., Plymouth, N. H.
1891	Burrell, Herbert Leslie,	Brig. Gen. and Surg. Gen. (Ret.), M. V. M., 22 Newbury St., Boston, Mass.
1894	Buttner, Charles,	Maj. and Surg. N. G. N. J., Orange, N. J.
1891	Byers, Frederick W.,	Brig. Gen. and Surg. Gen., Wisconsin, Monroe, Wis.
1895	Byrne, Charles C.,	Col. and Asst. Surg. Gen., U. S. A., Governor's Island, New York, N. Y.
1897	Campbell, William Francis,	1st Lt. and Asst. Surg., N. G. S. N. Y., 127 Lafayette Ave. Brooklyn, N. Y.
1895	Campbell, William Robertson,	1st Lt. and Asst. Surg., N. G. S. N. Y., Niagara Falls, N. Y.
1897	Carpenter, Dudley Newcomb,	Asst. Surg. (Ensign), U. S. N., Navy Yard, Brooklyn, N. Y.
1893	Carr, George Wheaton,	Lt. Col. and Med. Dir. (Ret.), R. I. M., 27 Waterman St., Providence, R. I.
1894	Carr, Lawrence Carlos, <i>Treasurer</i> 1893-96,	Ex-Maj. and Surg., O. N. G., 143 W. 7th St., Cincinnati, Ohio.
1894	Carrington, Charles Venable,	Capt. and Asst. Surg. Va. Vols., 932 Park Ave., Richmond, Va.
1897	Carter, Edward Champe,	Capt. and Asst. Surg., U. S. A., Fort Harrison, Mont.
1893	Cassidy, Patrick,	Ex-Brig. Gen. and Surg. Gen., N. G. Conn., Norwich, Conn.
1896	Castle, Charles Henry,	Capt. and Asst. Surg., O. N. G., 215 W. 9th St., Cincinnati, O.
1895	Cawley, Morris Franklin,	1st Lt. and Asst. Surg., N. G. Pa., 31 N. 9th St., Allentown, Pa.
1891	Chandler, Ralph, <i>Cor. Sec.</i> 1891-93,	Capt. and Asst. Surg., Wisconsin N. G., 13 Grand Ave., Milwaukee, Wis.
1893	Chase, H. Lincoln,	1st Lt. and Asst. Surg., M. V. M., 126 Harvard St., Brookline, Mass.

ELECTED.

- 1892 Clark, Thomas Chalmers, Maj. and Surg., N. G. Minn.,
Stillwater, Minn.
- 1897 Clarke, Joseph Taylor, Capt. and Asst. Surg., U. S. A.,
Columbus Barracks, Columbus, O.
- 1893 Cole, Charles M., 1st Lt. and Asst. Surg. R. I. M.,
250 Broadway, Newport, R. I.
- 1895 Cook, Charles P., Col. and Asst. Surg. Gen., N. G. S.
N. Y.
243 Warren St., Hudson, N. Y.
- 1896 Cook, Frank Clarendon, Pd. Asst. Surg. (Lt. j. g.), U. S. N.,
U. S. S. Wilmington, care Navy Dept.,
Washington, D. C.
- 1893 Cook, George, Brig. Gen. and Surg. Gen. (Ret.), N. G.
N. H.
16 Centre St., Concord, N. H.
- 1894 Corwin, Richard Warren, Col. and Asst. Surg. Gen., N. G. Col.,
Pueblo, Col.
- 1895 Cowell, George B., 1st Lt. and Asst. Surg., N. G. Conn.,
120 E. Washington Ave., Bridgeport,
Conn.
- 1896 Craig, Thomas Canby, Surg. (Lt.), (Ret.), U. S. N.,
205 Cumberland St., Brooklyn, N. Y.
- 1895 Crandall, Rand Percy, Pd. Asst. Surg. (Lt. j. g.), U. S. N.,
U. S. S. Iowa, care Navy Dept., Wash-
ington, D. C.
- 1894 Crispel, Charles Winegar, 1st Lt. and Asst. Surg., N. G. S. N. Y.,
Rondout, N. Y.
- 1897 Crookes, George Hazard, Lt. and Asst. Surg., R. I. M.,
159½ Benfield St., Providence, R. I.
- 1893 Cullen, Gilbert Isham, Capt. and Asst. Surg., O. N. G.,
714 W. 6th St., Cincinnati, O.
- 1894 Currier, Edward Hervey, Lt. Col. and Med. Dir., N. H. N. G.,
782 Elm St., Manchester, N. H.
- 1895 Dawson, Lewis Reeves, Lt. Col. and Brigade Surg., N. G.
Wash.,
Box 249, Seattle, Washington.
- 1895 Day, Frank Leslie, Maj. and Surg.,
240 Benefit St., Providence, R. I.
- 1894 Dearing, Howard Sumner, 1st Lt. and Asst. Surg., M. V. M.,
607 Tremont St., Boston, Mass.
- 1891 de Niedman, Wladimir Feodor, Maj. and Surg., N. G. Kas.,
Lachta Place, Pittsburg, Kas.
- 1895 Derr, Ezra Z., Surg. (Lt.), U. S. N.,
Naval Recruiting Rendezvous, 66 South
St., New York, N. Y.
- 1894 Devine, William H., Maj. and Surg., M. V. M.,
595 Broadway, So. Boston, Mass.
- 1897 Dickerson, John Henry, Capt. and Ast. Surg., O. N. G.,
225 N. Champion Ave., Columbus, O.
- 1897 Dickson, Samuel Henry, Surg. (Lt.), U. S. Navy,
Care Navy Dept., Washington, D. C.
- 1895 Dixon, Charles Henry, Maj. and Surg., N. G. Mo.,
3345 Morgan St., St. Louis, Mo.
- 1896 Dunn, J. P., Maj. and Surg. N. G. Cal.,
536 24th St., Oakland, Cal.
- 1895 Dunn, Lewis D., Asst. Surg. (Lt. j. g.), N. R. Ill.,
428 19th St., Moline, Ill.

ELECTED.

- 1893 Dutton, Charles Elvan, 1st Lt. and Asst. Surg., N. G. Minn.,
602 Nicollet Ave., Minneapolis, Minn.
- 1893 Eagleson, James Beaty, Col. and Surg. Gen., N. G. Wash.,
512 Burke Bldg., Seattle, Wash.
- 1894 Edie, Guy L., Capt. and Asst. Surg., U. S. A.,
Camp near Klondike, Alaska, care War
Dept., Washington, D. C..
- 1891 Edwards, John B., Maj. and Surg., Wis. N. G.,
Mauston, Wis.
- 1891 Egle, William Henry, Maj. and Surg., N. G. Pa.,
State Library, Harrisburg, Pa.
- 1895 Emmerling, Karl A., 1st Lt. and Asst. Surg., N. G. Pa.,
Pittsburg, Pa.
- 1895 Erwin, James J., Capt. and Asst. Surg., O. N. G.,
1617 Cedar Ave., Cleveland, O.
- 1894 Etheridge, James H., Maj. and Surg., N. G. Ill.,
1634 Michigan Ave., Chicago, Ill.
- 1891 Evans, Theodore W., Maj. and Surg., Wis. N. G.,
3 Pinckney St., Madison, Wis.
- 1895 Ewen, Clarence, Maj. and Surg. (Ret.), U. S. A.,
P. O. Box 641, Los Angeles, Cal.
- 1897 Fales, Warren Dexter, Lt. and Asst Surg., Cmdg. Amb. Corps,
N. G. D. C.
915 L St., N. W., Washington, D. C.
- 1893 Farquhar, Emmer C., Maj. and Surg., O. N. G.,
117 Putnam Ave., Zanesville, O.
- 1896 Farrell, P. J. H., Capt. and Asst. Surg., N. G. Cal.,
235 Post St., San Francisco, Cal.
- 1891 Festorazzi, Angelo, Ex-1st Lt. and Asst. Surg., S. T. Ala.,
153 Government St., Mobile, Ala.
- 1897 Fish, Earl Hamilton, 1st Lt. and Asst. Surg., N. G. C.,
2535 Champa St., Denver, Col.
- 1892 Fitz Gerald, Reynaldo Juan, Lt. Col. and Med. Dir., N. G. Minn.,
128 5th St. So., Minneapolis, Minn.
- 1896 Fitzpatrick, Charles, Jr., 1st Lt. and Asst. Surg., N. G. Pa.,
2223 Jefferson St., Philadelphia, Pa..
- 1897 Flagg, Charles Edward Belin, 1st Lt. and Asst. Surg., U. S. A.,
Fort Du Chesne, Utah.
- 1893 Forwood, William Henry, Col. and Asst. Surg. Gen., U. S. A.,
U. S. Soldiers' Home, Wash., D. C.
- 1894 Foster, Charles Chauncy, Maj. and Surg., M. V. M.,
8 Elmwood Ave., Cambridge, Mass.
- 1892 Foster Romulus Adams, 1st Lt. and Asst. Surg., N. G. D. C.,
2029 Q St. N. W., Wash., D. C.
- 1893 Fowler, George Ryerson, Maj. and Surg., N. G. S. N. Y.,
301 De Kalb Ave., Brooklyn, N. Y.
- 1896 Frazier, Charles Harrison, 1st Lt. and Asst. Surg., N. G. Pa.,
133 So. 18th St., Philadelphia, Pa.
- 1893 French, Charles Henry, Lt. Col. and Med. Dir., R. I. M.,
109 Broadway, Pawtucket, R. I.
- 1897 Frick, Euclid Bernardo, Capt. and Asst. Surg., U. S. A.,
Presidio of San Francisco, Cal.
- 1894 Fritts, Crawford E., 1st Lt. and Asst. Surg., N. G. S. N. Y.,
Hudson, N. Y.
- 1897 Fryer, Blencowe E., Lt. Col. and Dep. Surg. Gen. (Ret.),
U. S. A.,
520 E. 9th St., Kansas City, Mo.

ELECTED.

- 1891 Fuller, Charles Gordon, Maj. and Surg., N. G. Ill.,
39 Central Music Hall, Chicago, Ill.
- 1894 Fulton, John F., Brig. Gen. and Surg. Gen., N. G. Minn.,
St. Paul, Minn.
- 1894 Fulton, William C., Maj. and Surg., N. G. Pa.,
433 Wyoming Ave., Scranton, Pa.
- 1895 Gandy, Charles Moore, Capt. and Asst. Surg., U. S. A.,
Fort Mason, San Francisco, Cal.
- 1894 Gardner, Edwin Fisher, Maj. and Surg., U. S. A.,
Fort Grant, Ariz.
- 1895 Gates, Manley Fitch, Fd. Asst. Surg. (Lt. j. g.), U. S. N.,
Naval Hospital, Chelsea, Mass.
- 1893 Gauntt, Franklin, Lt. Col. and Surg., N. G. N. J.,
Burlington, N. J.
- 1895 Geddings, Henry D., Pd. Asst. Surg., U. S. M. H. S.,
McIntosh, Ga.
- 1894 Geib, Henry P., Brig. Gen. and Surg. Gen. (Ret.), N. G.
Conn.,
Stamford, Conn.
- 1897 Gibson, Robert Jackson, Capt. and Asst. Surg., U. S. A.,
Fort Thomas, Ky.
- 1892 Gihon, Albert Leary, Med. Dir. (Commodore), (Ret.), U. S. N.,
President, 1896-97,
First Vice Pres., 1895-96,
Second Vice Pres., 1894-95,
Reform Club, New York City, N. Y.
- 1893 Girard, Alfred C., Maj. and Surg., U. S. A.,
Fort Douglas, Utah.
- 1894 Glennan, James D., Capt. and Asst. Surg., U. S. A.,
Fort Clark, Brackettville, Texas.
- 1896 Glover, Lawrence Litchfield, Ensign and Asst. Surg., N. R. N. J.,
Haddonfield, N. J.
- 1892 Godfrey, Charles Cartlidge, Ex-Maj. and Surg., N. G. Conn.,
248 State St., Bridgeport, Conn.
- 1892 Godfrey, E. L. B., Col. and Asst. Surg. Gen., N. G. N. J.,
400 Linden St., Camden, N. J.
- 1894 Godfrey, Guy Charles Moore, 1st Lt. and Asst. Surg., U. S. A.,
Army Headquarters, St. Paul, Minn.
- 1891 Goode, Rhett, Capt. and Asst. Surg., S. T. Ala.,
Mobile, Ala.
- 1897 Gotwald, David King, Capt. and Asst. Surg., O. N. G.,
Springfield, Ohio.
- 1891 Grannis, Edward H., Capt. and Asst. Surg., Wis. N. G.,
Menominee, Wis.
- 1894 Grant, Thomas Page, Capt. and Asst. Surg. (Ret.), K. S. G.,
815 Third Ave., Louisville, Ky.
- 1894 Green, Charles Montraville, 1st Lt. and Asst. Surg., M. V. M.,
78 Marlborough St., Boston, Mass.
- 1896 Greene, Francis V., Pd. Asst. Surg. (Lt.), (Ret.), U. S. N.,
39 So. 19th St., Philadelphia, Pa.
- 1891 Greenleaf, Charles R., Col. and Ast. Surg. Gen., U. S. A.,
Honorary Pres., 1892-93,
36 New Montgomery St., San Francisco, California.
- 1891 Griffith, Jefferson D., Lt. Col. and Med. Dir., N. G. Mo.,
President, 1897-98,
9th and Grand Ave., Kansas City, Mo.
- 1897 Guerin, Lovett T., Maj. and Surg., O. N. G.,
578 N. High St., Columbus, O.
- 1897 Gunsaulus, Fred., Capt. and Asst. Surg., O. N. G.,
29 W. Long St., Columbus, O.

ELECTED.

- 1897 Guest, Middleton Semmes, Pd. Asst. Surg. (Lt. j. g.), U. S. N.,
U. S. S. Helena, care Navy Dept., Wash-
ington, D. C.
- 1896 Guthrie, Joseph Alfred, Pd. Asst. Surg. (Lt. j. g.), U. S. N.,
U. S. S. Alliance, care Navy Dept.,
Washington, D. C.
- 1892 Hake, William F., Maj. and Surg., M. S. T.,
47 E. Bridge St., Grand Rapids, Mich.
- 1892 Halberstadt, George Howell, 1st Lt. and Asst. Surg., N. G. Pa.,
218 Market St., Pottsville, Pa.
- 1891 Halley, George, Maj. and Surg., N. G. Mo.,
438 New Ridge Bldg., Kansas City, Mo.
- 1897 Hallock, Harry M., Capt. and Asst. Surg., U. S. A.,
Fort Logan, Colo.
- 3 Hamilton, John B., Ex-Surg. Gen., U. S. M. H. S. Ex-1st
Lt. and Asst. Surg., U. S. A.,
61 Market St., Chicago, Ill.
- 1896 Hanson, G. F., Lt. Col. and Med. Dir., N. G. Cal.,
3534 Mission St., San Francisco, Cal.
- 1895 Harland, William Guy Bryan, Ex-1st Lt. and Asst. Surg., N. G. Pa.,
5200 Main St., Germantown, Pa.
- 1894 Harman, George G., 1st Lt. and Asst. Surg., N. G. Pa.,
514 Penn St., Huntington, Pa.
- 1895 Harris, Henry Sutton Tarring, Capt. and Asst. Surg., U. S. A.,
Fort Washakie, Wyo.
- 1894 Harvey, Norman Darrell, Capt. Comdg. Hospital Corps., R. I. M.,
260 Benefit St., Providence, R. I.
- 1894 Harvey, Phillip Francis, Maj. and Surg., U. S. A.,
Fort Snelling, Minn.
- 1893 Havard, Valery, Maj. and Surg., U. S. A.,
Fort Slocum, New Rochelle, N. Y.
- 1896 Heizmann, Charles Lawrence, Maj. and Surg., U. S. A.,
Fort Adams, Newport, R. I.
- 1891 Helm, Scott, Col. and Surg. Gen., N. G. Ariz.,
Phoenix, Ariz.
- 1892 Henderson, George, Maj. and Surg. Gen., N. G. D. C.,
817 T St., N. W., Washington, D. C.
- 1892 Hendley, Frank W., Maj. and Surg., O. N. G.,
785 E. McMillan St., Cincinnati, O.
- 1891 Henry, Nelson H., Col. and Asst. Surg. Gen., N. G. S.
N. Y.,
14 E. 10th St., N. Y. City.
- 1896 Hersey, Freeman Clark, Lt. Col. and Med. Dir., M. V. M.,
96 Huntington Ave., Boston, Mass.
- 1897 Hobbs, Wilbert A., Capt. and Asst. Surg., O. N. G.,
East Liverpool, O.
- 1895 Hodgman, Alfred Frederick, 1st Lt. and Asst. Surg., N. G. S. N. Y.,
Auburn, N. Y.
- 1891 Hoff, John Van Rensselaer, Maj. and Surg., U. S. A.,
Vancouver Barracks, Washington.
- 1896 Hoffman, John Raymond, Capt. and Asst. Surg., N. G. Ill.,
Ottawa, Ill.
- 1893 Hooper, Henry, Ex-Capt. and Asst. Surg., N. G. Ill.,
541 N. State St., Chicago, Ill.
- 1896 Hopkins, William Evelyn, Col. and Surg. Gen., N. G. Cal.,
803 Sutter St., San Francisco, Cal.

ELECTED.

- 1892 Hough, Charles Pinckney, Ex-Brig. Gen. and Surg. Gen., N. G. Mont.,
415 Atlas Bldg., Salt Lake City, Utah.
- 1895 Howard, Deane Childs, 1st Lt. and Asst. Surg., U. S. A.,
Fort Custer, Montana.
- 1897 Huddleston, John Henry, Capt. and Asst. Surg., N. G. S. N. Y.,
126 W. 85th St., New York.
- 1896 Hyde, James Nevins, Lt. N. R. Ill.; Ex-Pd. Asst. Surgeon, U. S. N.,
100 State St., Chicago, Ill.
- 1894 Ives, Francis Joseph, Capt. and Asst. Surg., U. S. A.,
St. Francis Barracks, Fla.
- 1894 Izlar, Roberts P., 1st Lt. and Surg., S. T. Fla.,
Waycross, Ga.
- 1894 Jackson, Jabez North, Capt. and Asst. Surg., N. G. Mo.,
413 Rialto Bldg., Kansas City, Mo.
- 1892 Jarrett, Arthur R., Capt. and Asst. Surg., N. G. S. N. Y.,
95 Halsey St., Brooklyn, N. Y.
- 1895 Jarvis, Nathan Sturges, Lt. Col. and Asst. Surg. Gen., N. G. S. N. Y.; Ex-Capt. and Asst. Surg., U. S. A.,
142 Madison Ave., New York.
- 1897 Jenne, James N., Brig. Gen. and Surg. Gen., Vermont,
130 Main St., St. Albans, Vt.
- 1894 Johnston, James, Maj. and Surg., N. G. Pa.,
Bradford, Pa.
- 1896 Johnston, William G., 1st Lt. and Asst. Surg., N. G. Pa.,
Titusville, Pa.
- 1895 Johnston, William McCandless, Maj. and Surg., N. G. Pa.,
Sewickly, Pa.
- 1897 Jordan, Charles Simonton, Capt. and Asst. Surg., S. G. N. C.,
Asheville, N. C.
- 1892 Kaufman, Franklin John, 1st Lt. and Asst. Surg., N. G. S. N. Y.,
311 West Genesee St., Syracuse, N. Y.
- 1896 Kean, Jefferson Randolph, Capt. and Asst. Surg., U. S. A.,
Key West Barracks, Fla.
- 1893 Keefer, Frank R., Capt. and Asst. Surg., U. S. A.,
Fort Walla Walla, Wash.
- 1897 Kemble, Lewis Hasbrouck, Maj. and Surg., N. G. Colo.,
P. O. Box 438, Aspen, Colo.
- 1897 Kendall, William Pratt, Capt. and Asst. Surg., U. S. A.,
Fort Brown, Texas.
- 1897 Kennedy, Robert Morris, Pd. Asst. Surg. (Lt. j. g.), U. S. N.,
Naval Hospital, Norfolk, Va.
- 1895 Kenyon, George Henry, Brig. Gen. and Surg. Gen., R. I. M.,
123 N. Main St., Providence, R. I.
- 1895 Kilbourne, Henry Sayles, Maj. and Surg., U. S. A.,
Madison Barracks, N. Y.
- 1895 Kimball, James P., Maj. and Surg., U. S. A.,
Governor's Island, New York, N. Y.
- 1895 Kneedler, William L., Capt. and Asst. Surg., U. S. A.,
San Diego Barracks, Cal.
- 1896 Kulp, John Stewart, 1st Lt. and Asst. Surg., U. S. A.,
Vancouver Barracks, Washington.
- 1896 Kuyk, Dirk Adrian, Maj. and Surg., Va. V.,
4 W. Grace St., Richmond, Va.
- 1895 Lacey, Irving E., Capt. and Asst. Surg., Wis. N. G.,
Neillsville, Wis.

ELECTED.

1891	La Garde, Louis A.,	Maj. and Surg., U. S. A., Fort Robinson, Neb.
1893	La Pierre, Julian,	Maj. and Surg., N. G. Conn., 220 Central Ave., Norwich, Conn.
1896	Leach, Philip,	Surg. (Lt.), U. S. N., Naval Hospital, Brooklyn, N. Y.
1893	Le Conte, Robert Grier,	1st Lt. and Asst. Surg., N. G. Pa., 1625 Spruce St., Philadelphia, Pa.
1895	Lee, Edward Wallace,	Col. and Surg. Gen. N. G. Neb., 315 So. 15th St., Omaha, Neb.
1893	Lee, Simeon Lemuel,	Col. and Surg. Gen., Nevada, Carson, Nevada.
1897	Lemon, James Jesse,	Capt. and Asst. Surg., N. G. Miss., Biloxi, Miss.
1896	Lincoln, Frank T.,	Maj. and Med. Ins., Ga. V., 144 Taylor St., Savannah, Ga.
1894	Linthicum, John W.,	Ex-Capt. and Asst. Surg., Md. N. G., 1327 W. Fayette St., Baltimore, Md.
1894	Lippincott, Henry,	Maj. and Surg., U. S. A., Fort Sheridan, Ill.
1891	Little, Frederick H.,	Brig. Gen. and Surg. Gen. (Ret.), N. G. Ia., 116 W. 2d St., Muscatine, Ia.
1892	Longshore, William R.,	Maj. and Surg., N. G. Pa., 71 Church St., Hazelton, Pa.
1897	Lowes, Joseph E.,	Brig. Gen. and Surg. Gen., Ohio, Dayton, O.
1896	Lowndes, Charles Henry Tilgh-	Pd. Asst. Surg. (Lt. j. g.), U. S. N., Navy Yard, Washington, D. C.
1896	man, Lutz, Frank L.,	Brig. Gen. and Surg. Gen. Mo., 3337 Lafayette St., St. Louis, Mo.
1894	Lydston, G. Frank,	Maj. and Surg., N. G. Ill., 815 Reliance Bldg., Chicago, Ill.
1895	McCandless, Alexander A. E.,	Lt. Col. and Surg.-in-Chief, N. G. Pa., Pittsburg, Pa.
1895	McCarthy, William Daniel,	Maj. and Surg., N. G. Cal., 111 Eddy St., San Francisco, Cal.
1894	McCaw, William J.,	Maj. and Surg., R. I. M., 222 Benefit St., Providence, R. I.
1894	McDill, John R.,	Capt. and Asst. Surg., Wis. N. G., 200 Wisconsin St., Milwaukee, Wis.
1897	McElderry, Henry,	Maj. and Surg., U. S. A., Fort Leavenworth, Kas.
1896	McKim, Robert V.,	Maj. and Surg., N. G. S. N. Y., 32 W. 58th St., New York, N. Y.
1891	McKinstry, Howard L.,	Maj. and Surg. N. G. Minn., Main St., Redwing, Minn.
1891	Mann, Alban L.,	Maj. and Surg. (Ret.), N. G. Ill., 214 Chicago St., Elgin, Ill.
1891	Mann, Horace Edwin,	Capt. and Asst. Surg., Wis. N. G., 1529 Main St., Marinette, Wis.
1894	Marmion, Robert Augustine,	Med. Insp. (Comdr.), U. S. N., Navy Yard, Washington, D. C.
1895	Marsh, William H.,	Act. Asst. Surg., U. S. M. H. S., Solomons, Md.
1893	Martin, Edward,	Maj. and Surg., N. G. Pa., 415 So. 15th St., Philadelphia, Pa.

ELECTED.

- 1894 Martin, John M.,
1st Lt. and Asst. Surg., N. G. Pa.,
620 Centre St., Grove City, Pa.
- 1894 Mason, Charles Field,
Capt. and Asst. Surg., U. S. A.,
West Point, N. Y.
- 1896 Matthews, Willard S. H.,
Maj. and Surg., N. G. Ia.,
Des Moines, Ia.
- 1895 Maus, Louis Mervin,
Maj. and Surg., U. S. A.,
Fort Hamilton, N. Y.
- 1897 Mayer, Daniel,
Brig. Gen. and Surg. Gen., W. Va.
Charleston, W. Va.
- 1895 Mead, Harry,
Capt. and Asst. Surg., N. G. S. N. Y.,
758 Elmwood Ave., Buffalo, N. Y.
- 1894 Merrill, James Cushing,
Maj. and Surg., U. S. A.,
Washington, D. C.
- 1895 Meyer, Robert C. J.,
Asst. Surg. (Ensign), N. R. Ill.,
Moline, Ill.
- 1895 Middleton, Johnson Van Dyke,
Lt. Col. and Dep. Surg. Gen., U. S. A.,
Headqs. Dept. Cal., San Francisco, Cal.
- 1891 Miller, Truman W.,
Maj. and Surg., Ill. N. G.,
612 Reliance Bldg., Chicago, Ill.
- 1896 Mills, George Westgate,
Maj. and Surg., M. V. M.,
60 Salem St., Medford, Mass.
- 1896 Mood, J. A.,
Surgeon General,
Sumter, S. C.
- 1895 Moore, Henry McL. W.,
Maj. and Surg., O. N. G.,
243 E. Town St., Columbus, O.
- 1895 Morris, Lewis,
Pd. Asst. Surg. (Lt. j. g.), U. S. N.,
U. S. S. Essex, care Navy Dept., Wash-
ington, D. C.
- 1895 Mudge, Selden Johnson,
1st Lt. and Asst. Surg., N. G. S. N. Y.,
Union St., Olean, N. Y.
- 1896 Munday, Benjamin,
Capt. and Asst. Surg., U. S. A.,
Fort Wayne, Detroit, Mich.
- 1894 Murray, Robert Drake,
Surg. U. S. M. H. S.,
Mobile, Ala.
- 1891 Myers, Charles F. W.,
Lt. Col. and Med. Dir., N. G. N. J.,
108 Broadway, Paterson, N. J.
- 1896 Neff, George W.,
Maj. and Surg., N. G. Pa.,
Matontown, Fayette County, Pa.
- 1894 Newgarden, George J.,
Capt. and Asst. Surg., U. S. A.,
Fort Yates, N. D.
- 1896 Norton, Oliver Dwight,
Pd. Asst. Surg. (Lt. j. g.), U. S. N.,
Naval Laboratory, New York, N. Y.
- 1894 O'Meagher, William,
Maj. and Surg., N. G. S. N. Y.,
427 E. 84th St., New York, N. Y.
- 1892 O'Neill, James Wilks,
Maj. and Ex-Surg., N. G. Pa.,
2110 Spruce St., Philadelphia, Pa.
- 1897 Osborn, Arthur Leland,
Maj. and Surg., O. N. G.,
Norwalk, O.
- 1892 Owen, William Otway,
Capt. and Asst. Surg., U. S. A.,
Fort Bayard, N. M.
- 1894 Parker, William James,
Maj. and Surg., N. G. N. J.,
418 Bergen Ave., Jersey City, N. J.
- 1895 Parkhill, Clayton,
Col. and Surg. Gen., N. G. Col.,
McPhee Building, Denver, Colo.
- 1896 Peck, George,
Med. Dir. (Capt.), (Ret.), U. S. N.,
926 N. Broad St., Elizabeth, N. J.

ELECTED.

- 1897 Peckham, Charles F., Lt. and Surg., N. B. R. I.,
176 Benfield St., Providence, R. I.
- 1892 Peckham, Cyrus T., Surgeon U. S. M. H. S.,
Detroit, Mich.
- 1897 Penrose, George H., Col. and Surg. Gen., N. G. Utah,
Salt Lake City, Utah.
- 1895 Percy, Henry Tucker, Surg. (Lt.), U. S. N.,
U. S. S. Monterey, care Navy Pay Of-
fice, San Francisco, Cal.
- 1894 Perley, Henry Otis, Maj. and Surg., U. S. A.,
Army and Navy Hosp., Hot Springs,
Ark.
- 1896 Persons, Remus Charles, Surg. (Lt.), U. S. N.,
U. S. Naval Hospital, New York.
- *896 Pettigrew, George Atwood, Col. and Surg. Gen., N. G. So. D.,
Flandreau, South Dakota.
- 1897 Phillips, Albert William, Brig. Gen., Surg. Gen., Conn.,
Derby, Conn.
- 1895 Phillips, Frank I., Act. Asst. Surg. U. S. M. H. S.,
328 Harrison Ave., Escanaba, Mich.
- 1894 Phillips, John Leighton, Capt. and Asst. Surg., U. S. A.,
Fort Walla Walla, Wash.
- 1895 Pigott, Michael Royston, Pd. Asst. Surg. (Lt. j. g.), U. S. N.,
Care Navy Dept., Washington, D. C.
- 1895 Poindexter, Jefferson Dudley, Capt. and Asst. Surg., U. S. A.,
Willett's Point, N. Y.
- 1894 Porter, Joseph Y., Maj. and Surg. S. T. Fla.,
Jacksonville, Fla.
- 1894 Potteiger, Jonathan B., Maj. and Surg., N. G. Pa.,
Hamburg, Pa.
- 1894 Powell, Junius Levert, Maj. and Surg., U. S. A.,
Fort Riley, Kansas.
- 1894 Priestley, James Taggart, Brig. Gen. and Surg. Gen. Ia.,
707 E. Locust St., Des Moines, Ia.
- 1892 Pritchett, Gilbert L., Maj. and Surg., N. G. Neb.,
Fairbury, Neb.
- 1895 Purviance, W. E., Capt. and Asst. Surg., U. S. A.,
Governor's Island, New York, N. Y.
- 1895 Pyles, Richard A., Capt. and Asst. Surg., N. G. D. C.,
Anacostia, Washington, D. C.
- 1897 Rannels, David A., Capt. and Asst. Surg., O. N. G.,
McArthur, O.
- 1892 Read, Louis W., Col. and Surg. Gen., N. G. Pa.,
President, 1895-96, Norristown, Pa.
First Vice Prest., 1894-95,
Second Vice Prest., 1893-94,
- 1894 Reed, Walter, Maj. and Surg., U. S. A.,
5 Cooke Place, Georgetown, D. C.
- 1894 Reynolds, Frederick P., Capt. and Asst. Surg., U. S. A.,
Fort McIntosh, Laredo, Texas.
- 1896 Rhein, John Henry Wallace, Lt. j. g. and Asst. Surg., S. N. M. Pa.,
1330 Spruce St., Philadelphia, Pa.
- 1894 Rice, Charles Henry, Maj. and Surg., M. V. M.,
12 Pritchard St., Fitchburg, Mass.
- 1896 Richards, Theodore W., Asst. Surg. (Ensign), U. S. N.,
U. S. S. Maine, care Navy Dept., Wash-
ington, D. C.

ELECTED.

- 1895 Richardson, William Lambert, Maj. and Surg., M. V. M.,
225 Commonwealth Ave., Boston, Mass.
- 1897 Rieg, Philip S., Ensign and Asst. Surg., N. B. O. N. G.,
338 Summit St., Toledo, O.
- 1896 Ritter, F. Horace S., 1st Lt. and Asst. Surg., N. G. S. N. Y.,
314 E. Church St., Elmira, N. Y.
- 1895 Rixey, Presley Marion, Surg. (Lt.), U. S. N.,
Naval Dispensary, Washington, D. C.
- 1891 Robertson, Charles Moore, Maj. and Surg., N. G. Ia.,
Davenport, Ia.
- 1893 Robins, Robert Patterson, 1st Lt. and Asst. Surg., N. G. Ia.,
2110 Pine St., Philadelphia, Pa.
- 1895 Robinson, Samuel Quincy, Maj. and Surg., U. S. A.,
Fort Reno, Okla.
- 1896 Rockwell, Thomas F., Maj. and Surg., N. G. Com.,
Rockville, Conn.
- 1897 Rohé, George Henry, Maj. and Surg., Md. N. G.,
"Springfield," Sykesville, Md.
- 1894 Rolfe, William Alfred, 1st Lt. and Asst. Surg., M. V. M.,
5 Columbus Sq., Boston, Mass.
- 1895 Sawtelle, Henry W., Surg. U. S. M. H. S.,
New Orleans, La.
- 1894 Schnyler, Clarkson C., 1st Lt. and Asst. Surg. (Ret.), N. G. S.,
N. Y.,
Box 212, Plattsburg, N. Y.
- 1895 Scofield, Walter Keeler, Med. Dir. (Capt.), U. S. N.,
Navy Yard, League Island, Philadelphia, Pa.
- 1896 Seaman, Gilbert E., Capt. and Asst. Surg., Wis. N. G.,
315 Goldsmith Bldg., Milwaukee, Wis.
- 1893 Sevey, Harry Sheldon, Capt. and Asst. Surg. (Ret.), N. G. S. D.,
Arizpe, Sonora, Mexico.
- 1894 Shannon, William C., Maj. and Surg., U. S. A.,
Care Surg. Gen., U. S. A., Washington, D. C.
- 1894 Shaw, John Bliss, Maj. and Surg., N. G. Ill.,
Joliet, Ill.
- 1896 Shipp, Edward Mansfield, Pd. Asst. Surg. (Lt. j. g.), U. S. N.,
Care Navy Dept., Washington, D. C.
- 1897 Siegfried, Charles A., Surg. (Lt.), U. S. N.,
U. S. Torpedo Station, Newport, R. I.
- 1892 Silliman, James E., Maj. and Surg., N. G. Pa.,
137 W. 8th St., Erie, Pa.
- 1896 Simpson, James Edwin, Maj. and Surg., M. V. M.,
348 Essex St., Salem, Mass.
- 1897 Skene, William H., 1st Lt. and Asst. Surg., N. G. S. N. Y.,
143 Clinton St., Brooklyn, N. Y.
- 1894 Skinner, John O., Maj. and Surg. (Ret.), U. S. A.,
Chambersburg, Pa.
- 1893 Smart, Charles, Lt. Col. and Dep. Surg. Gen., U. S. A.,
2017 Hillyer Place, Washington, D. C.
- 1895 Smith, Allen V., Capt. and Asst. Surg., O. N. G.,
Canton, O.
- 1895 Smith, French W., 1st Lt. and Asst. Surg., W. Va. N. G.,
Bluefield, W. Va.
- 1895 Smith, George Tucker, Pd. Asst. Surg. (Lt. j. g.), U. S. N.,
Naval Hospital, New York, N. Y.

ELECTED.

- 1893 Smith, Lawrence Savery, Maj. and Surg., N. G. Pa.,
133 So. 18th St., Philadelphia, Pa.
- 1893 Smith, William Loyd, Maj. and Surg., N. G. Ill.,
306 So. Park St., Streator, Ill.
- 1897 Srodes, J. Lewis, 1st Lt. and Asst. Surg., N. G. Pa.,
742 Penn Ave., Wilkinsburg, Pa.
- 1893 Standish Myles, Capt. Com. Amb. Corps, M. V. M.,
6 St. James Ave., Boston, Mass.
- 1897 Stark, William T., Capt. and Asst. Surg., N. G. Mo.,
Kansas City, Mo.
- 1894 Stayer, Andrew Snowberger, Maj. and Surg., N. G. Pa.,
1501 7th Ave., Altoona, Pa.
- 1895 Steeley, Oscar B., Col. and Surg. Gen. Idaho,
Pocatello, Idaho.
- 1897 Stephenson, Franklin Bache, Surg. (Lt.), U. S. N.,
98 Court St., Boston, Mass.
- 1897 Stephenson, William, Capt. and Asst. Surg., U. S. A.,
Fort Sheridan, Ill.
- 1893 Sternberg, George Miller, Brig. Gen. and Surg. Gen., U. S. A.,
President, 1894-95. Washington, D. C.
- 1895 Stewart, Walter Scott, 1st Lt. and Asst. Surg., N. G. Pa.,
52 S. Franklin St., Wilkesbarre, Pa.
- 1894 Stiles, Henry Ranney, Capt. and Asst. Surg., U. S. A.,
Fort Preble, Portland, Me.
- 1896 Stitt, Edward R., Pd. Asst. Surg. (Lt.), U. S. N.,
Bur. Med. and Surg., Navy Dept.,
Washington, D. C.
- 1891 Streeter, John Williams, Maj. and Surg., N. G. Ill.,
2646 Calumet Ave., Chicago, Ill.
- 1897 Stroud, Harrison Edward, Col. and Surg. Gen. Arizona,
Phoenix, Arizona.
- 1896 Sullivan, Thomas J., Maj. and Surg., N. G. Ill.,
4729 Ashland Ave., Chicago, Ill.
- 1894 Taneyhill, G. Lane, Maj. and Surg. (Ret.), Md. N. G.,
1103 Madison Ave., Baltimore, Md.
- 1894 Taylor, Walter L., Ex-Capt. and Asst. Surg., O. N. G.,
933 Grand Ave., Price Hill, Cincinnati,
Ohio.
- 1892 Terribery, George W., Col. and Div. Surg. N. G. N. J.,
146 Broadway, Paterson, N. J.
- 1895 Terry, Marshall Orlando, Brigadier Gen. and Surg. Gen., N. G. S.,
N. Y.,
196 Genesee St., Utica, N. Y.
- 1895 Tesson, Louis S., Maj. and Surg., U. S. A.,
Fort Ethan Allen, Vt.
- 1893 Thayer, Frederick C., Col. and Surg. Gen., Me. V. M.,
119 Maine St., Waterville, Me.
- 1895 Tilton, Henry Remsen, Lt. Col. and Dep. Surg. Gen., U. S. A.,
Army Bldg., St. Paul, Minn.
- 1895 Town, Francis Laban, Colonel and Asst. Surg. Gen. (Ret.) U.
S. A.,
San Antonio, Texas.
- 1894 Tuholske, Herman, Maj. and Surg., N. G. Mo.,
410 N. Jefferson St., St. Louis, Mo.
- 1893 Turnbull, Charles Smith, Ex-Maj. and Surg., N. G. Pa.,
1719 Chestnut St., Philadelphia, Pa.
- 1896 Turner, William D., Maj. and Surg., Va. V.,
Fergusson's Wharf, Va.

ELECTED.

- 1895 Tuttle, Jay, Act. Asst. Surg., U. S. M. H. S.,
Astoria, Ore.
- 1894 Twitchell, Herbert Eugene, Capt. and Asst. Surg., O. N. G.,
24 So. B St., Hamilton, O.
- 1896 Vaughan, Bolivar Alvearr, Lt. Col. and Asst. Surg. Gen., N. G.
Miss.,
Columbus, Miss.
- 1897 Von Wedekind, Luther Lock- Pd. Asst. Surg. (Lt. j. g.), U. S. N.,
man, U. S. Naval Academy, Annapolis, Md.
- 1895 Wakeman, William James, Capt. and Asst. Surg., U. S. A.,
Fort Huachuca, Ariz.
- 1894 Wallace, David L., Maj. and Surg., N. G. N. J.,
192 Clinton Ave., Newark, N. J.
- 1896 Wallace, Henry, Capt. and Asst. Surg., N. G. S. N. Y.,
183 Congress St., Brooklyn, N. Y.
- 1896 Ward, John M. Broomall, 1st Lt. and Asst. Surg., N. G. Pa.,
Quarantine Station, Marcus Hook, Pa.
- 1897 Warfield, Ridgely Brown, Brig. Gen. and Surg. Gen., Md.,
214 W. Franklin St., Baltimore, Md.
- 1892 Warren, Frank Sumner, Maj. and Surg., Me. V. M.,
17 South St., Biddeford, Me.
- 1896 Waters, William E., Lt. Col. and Dep. Surg. Gen. (Ret.), U.
S. A.,
Care Surg. Gen., U. S. A., Washington,
D. C.,
- 1893 Watson, Wilbur S., Lt. Col. and Med. Dir., N. G. Conn.,
66 West St., Danbury, Conn.
- 1896 Weaver, Clarence A., Capt. and Surg., N. G. D. C.,
1614 Q St., N. W., Washington, D. C.
- 1892 Weaver, Joseph K., Maj. and Surg., N. G. Pa.,
Norristown, Pa.
- 1896 Weaver, William G., 1st Lt. and Asst. Surg., N. G. Pa.,
Wilkesbarre, Pa.
- 1894 Wedge, Albert Clark, Lt. Col. and Asst. Surg. Gen., N. G. M.,
Albert Lea, Minn.
- 1893 Wertenbaker, Charles Poindex- Pd. Asst. Surg., U. S. M. H. S.,
ter, Delaware Breakwater, Del.
- 1897 Westervelt, William Alfred, Capt. and Asst. Surg., O. N. G.,
Asst. Sec., 1897-98, 62 E. Broad St., Columbus, O.
- 1891 Wheaton, Charles A., Brig. Gen. and Surg. Gen. (Ret.), Minn.,
326 Wabash St., St. Paul, Minn.
- 1897 Wheaton, James Lucas, 1st Lt. Hosp. Corps, R. I. M.,
Summer St., Pawtucket, R. I.
- 1896 Wieber, Francis William Ferdi- Pd. Asst. Surg. (Lt. j. g.), U. S. N.,
nand, U. S. Naval Hospital, Norfolk, Va.
- 1891 Wilkie, Frederick J., Maj. and Surg. Wis. N. G.,
61 Merritt St., Oshkosh, Wis.
- 1894 Willard, J. J., Capt. and Asst. Surg., N. G. Col.,
Pueblo, Colo.
- 1897 Willard, William G., Capt. and Asst. Surg., N. G. Ill.,
544 Washington Boul., Chicago, Ill.
- 1895 Willcox, Charles, Capt. and Asst. Surg., U. S. A.,
Fort Bliss, Texas.
- 1897 Williams, John Hey, Col. and Surg. Gen., N. C.,
53 Haywood St., Asheville, N. C.
- 1897 Wilson, James Sprigg, 1st Lt. and Asst. Surg., U. S. A.,
Camp Eagle Pass, Texas.

ELECTED.

1894	Wilson, John S.,	1st Lt. and Asst. Surg., N. G. S. N. Y., 29 Garden St., Poughkeepsie, N. Y.
1896	Wilson, William E.,	Maj. and Surg., R. I. M., 20 Park Place, Pawtucket, R. I.
1891	Wilson, William W.,	Ex-Capt. and Asst. Surg., Ind. Inf. Legion, 620 Third St., Wassau, Wis.
1894	Wise, John Cropper, <i>Second Vice Pres.</i> , 1897-98,	Medical Inspector (Comdr.), U. S. N., Care Navy Pay Office, San Francisco, Cal.
1896	Wood, Frederick John Jennings,	Maj. and Surg., N. G. S. N. Y., 299 Dekalb Ave., Brooklyn, N. Y.
1895	Wood, Marshall William,	Maj. and Surg., U. S. A., Boise Barracks, Idaho.
1894	Woodhull, Alfred Alexander.	Lt. Col. and Dep. Surg Gen., U. S. A., Denver, Colo.
1893	Woodruff, Charles Edward,	Capt. and Asst. Surg., U. S. A., Fort Custer, Mont.
1896	Woodruff, Ezra,	Maj. and Surg., U. S. A., Fort Trumbull, New London, Conn.
1896	Woods, George Worth,	Medical Director (Capt.), U. S. N., U. S. Naval Hospital, Brooklyn, N. Y.
1897	Wright, Thompson B.,	Capt. and Asst. Surg., O. N. G., Circleville, O.
1894	Wyeth, Marlborough Churchill,	Capt. and Asst. Surg., U. S. A., Baltimore, Md.
1894	York, George William,	Maj. and Surg., N. G. S. N. Y., 190 Franklin St., Buffalo, N. Y.

ASSOCIATE MEMBERS.

ELECTED.

1897	Asch, Morris J.,	Ex-Maj. and Surg., U. S. A., 5 W. 30th St., New York N. Y.
1897	Ayres, Stephen Cooper.	Ex-Capt. and Asst. Surg., U. S. V., 14 E. 7th St., Cincinnati, O.
1895	Barker, John W.,	2d Lt. 3d Infantry, U. S. A., Fort Snelling, Minn.
1896	Bradfield, George Milton,	Ex.-1st Lt. and Asst. Surg., U. S. V., 1230 Spring Garden St., Philadelphia, Pa.
1895	Brush, Edmund Cone, M. D.,	Col. 1st Light Artillery, O. N. G., Zanesville, O.
1897	Conner, Phineas S.,	Ex-Bvt. Maj. and Asst. Surg., U. S. A., 215 W. 9th St., Cincinnati, O.
1894	Donnelly, Richard A.,	Brig. Gen. and Q. M. Gen., N. J., Trenton, N. J.
1896	Fife, George Storrs,	Ex-Asst. Surg. (Lt.), U. S. N., 1201 California St., San Francisco, Cal.
1896	Grove, John H.,	Ex.-Bvt. Lt. Col. and Surg., U. S. V., 1504 Arch St., Philadelphia, Pa.
1897	Hamilton, Charles S.,	Ex-Capt. and Asst. Surg., O. N. G., 142 E. Long St., Columbus, O.
1897	Harris, George,	Maj., N. G. D. C., Washington, D. C.
1897	Loving, Starling,	Ex-Maj. and Surg., O. V. I., 229 E. State St., Columbus, O.

ELECTED.

1897	Manley, Thomas H.,	Ex-Capt. and Asst. Surg., U. S. V., 115 West 49th St., New York, N. Y.
1892	Moore, Milton,	Brig. Gen. Comdg. 1st Brig., N. G. Mo., New York Life Bldg., Kansas City, Mo.
1896	Morris, Henry,	Ex-1st Lt. and Asst. Surg., N. G. Pa., 313 So. 16th St., Philadelphia, Pa.
1894	Ordway, Albert,	Ex-Brig. Gen., N. G. D. C., Washington, D. C.
1896	Osgood, Frederick	1st Lt. and Vet. Surg., M. V. M., 50 Village St., Boston, Mass.
1897	Hart, Hugh A.,	Ex-Brig. Gen. and Surg. Gen. of Ohio, Wooster, O.
1897	Rodgers, John H.,	Ex-Maj. and Surg., 104th O. V. I., 120 S. Limestone St., Springfield, O.
1894	Sander, Enno,	Ex-Maj., N. G. Mo., 129 So. 11th St., St. Louis, Mo.
1894	Spencer, B. W.,	Brig. Gen. and Insp. Gen., N. G. N. J., Passaic, N. J.
1894	Truax, Charles,	77 Wabash Ave., Chicago, Ill.
1896	Van Pelt, Joseph K. T.,	Ex-Maj. and Brig. Surg., U. S. V., 1529 Spruce St., Philadelphia, Pa.
1896	Wagner, Clinton,	Ex-Bvt. Lt. Col. and Surg., U. S. A., 19 E. 38th St., New York.
1897	Whitaker, Hervey Williams,	Ex-Pd. Asst. Surg. (Lt.), U. S. N., 72 Grant Ave., Columbus, O.
1897	White, J. William,	Ex-Capt. and Asst. Surg., N. G. Pa., Philadelphia, Pa.
1896	Younger, William J.,	Ex-Col. and Med. Dir., N. G. Cal., 200 Stockton St., San Francisco, Cal.

CORRESPONDING MEMBERS.

ELECTED.

1892	General Darby Bergin, M. P.,	Surgeon General of Canada, Cornwall, Ontario.
1897	General Epifanio Cacho,	General Jefe del Cuerpo Medico Militar Mexicano, (Surgeon General, Mexican Army), Ciudad Mexico, Mexico.
1897	Captain Hans Daal,	Sanitary Captain, Norwegian Army, Christiana, Norway.
1892	Medicinalrad Edvard Martin Edholm,	Ofverfaltlakare vid armeen, (Surgeon General Swedish Army), Stockholm, Sweden.
1897	Surgeon-Captain Rory Fletcher,	Surgeon-Captain, Central London Rangers, Groome, Streatham Park, London S. W., Eng.
1892	General Thien Hi,	Medical Inspector General, Siamese Army, Bangkok, Siam.
1897	Docent Dr. Otokar Kukula,	K. K. Assistenzarzt, (Asst. Surg. Austro-Hungarian Army), Prague, Austro-Hungary.

ELECTED.

- 1897 Coronel Fernando Lopez, Coronel Medico Ciruj., Director Hosp. de Mexico, (Col. and Director Hospital of Instruction, Mexican Army), Ciudad Mexico, Mexico.
- 1892 Sir Wm. A. Mackinnon, K. C. B., Major General and Director General (Retired), A. M. D., London, England.
- 1896 Professor Nicolaysen, University of Norway, Christiania, Norway.
- 1897 General William Silver Oliver, Deputy Surgeon General, British Army Medical Department, 127 South Park St., Halifax, N. S.
- 1892 Sir J. O'Neil, C. B., Surgeon General (Ret.), Indian Med. Service, London, England.
- 1892 Dr. Adolph Alexandrovitch Remert, Inspecteur Général de Service de Santé Militaire, Ingénieriaia and Bolchaia Sadovaia Streets, St. Petersburg, Russia.
- 1892 Surg. Lt. Col. George Sterling Ryerson, Deputy Surgeon General, Canadian Militia, 60 College St., Toronto, Ontario.
- 1892 Generalmajor Johan Frederik Thaulow, Sanitetsgeneral og Chef, Kongelige Regjerings Forsvars-Departement, (Surgeon General Royal War Ministry), Christiania, Norway.
- 1892 M. G. M. F. Vanderlinden, Inspecteur Général de Service de Santé Militaire, Saint-Josseten-Noode, Belgium.
- 1891 General Stabsarzt, Prof. Dr. von Bergmann, Geheimer Med. Rath, (Surgeon General 1st class—Brigadier General), Kriegs Ministeriums, Berlin, Germany.
- 1892 Excellenz, General Stabsarzt der Armee, Prof Dr. von Coler, Chef der Medizinal Abtheilung des Kriegs Ministeriums, (Surgeon General German Army, Chief of the Medical Section of the War Ministry—Major General), Kriegs Ministeriums, Berlin, Germany.
- 1891 General Stabsarzt, Prof. Dr. F. von Esmarch, Geheimer Med. Rath, (Surgeon General 1st class—Brigadier General), Kiel, Germany.
- 1892 General Stabsarzt Dr. von Fichte, Chef der Med. Abtheilung im Konigl. Wurttembergischen Kriegs Ministeriums, (Surgeon General 1st class, Chief of the Medical Section of the Royal Wurttemberg War Ministry), Stuttgart, Germany.
- 1892 Colonel Adolf Ziegler, Médecin en Chef de l'Armée federale Suisse, Département Militaire, (Surgeon General of the Swiss Army), Berne, Switzerland.

HONORARY MEMBERS.

[In explanation of the presence in this list of gentlemen eligible to active membership, it may be stated that all such were elected prior to the adoption of the constitutional provision rendering them ineligible to honorary membership.]

ELECTED.

- 1894 Book, James B., Lt. Col. and Surg. Gen. (Ret.), M. S. T.,
33 Campau Building, Detroit, Mich.
- 1894 Brinton, John H., Late Surgeon, U. S. Volunteers,
1423 Spruce St., Philadelphia, Pa.
- 1895 Flint, Austin, Late Surgeon General of New York,
603 34th St., New York, N. Y.
- 1891 Henrotin, Fernand, Maj. and Surg. (Ret.), Ill. N. G.,
353 La Salle St., Chicago, Ill.
- 1897 Humiston, William H., President Ohio State Med. Society,
122 Euclid Ave., Cleveland, O.
- 1891 Irwin, Bernard John Dowling, Colonel and Asst. Surg. Gen. (Ret.),
U. S. A.,
Army Headquarters, Chicago, Ill.
- 1894 Keen, William Williams, Late Acting Asst. Surg., U. S. A.,
1729 Chestnut St., Philadelphia, Pa.
- 1892 Kimball, A. D., Maj. and Surg., Nat. Mil. Home, Ind.,
Marion, Ind.
- 1897 Kober, George M., Late Acting Asst. Surg., U. S. A.,
1819 Q St., N. W., Washington, D. C.
- 1894 Love, Isaac Newton, Lt. Col. and Med. Dir. (Ret.), N. G. M.,
Grand Ave., St. Louis, Mo.
- 1892 McIntyre, John H., Maj. and Surg. (Ret.), N. G. Ind.,
710 Olive St., St. Louis, Mo.
- 1894 Mills, Hiram R., Lt. Col. and Surg. Gen. (Ret.), Mich.,
Port Huron, Mich.
- 1895 Moore, John, Brigadier Gen. and Surg. Gen. (Ret.), U.
S. A.,
903 16th St., N. W., Washington, D. C.
- 1895 Murray, Robert, Brigadier Gen. and Surg. Gen. (Ret.), U.
S. A.,
47 E. 28th St., New York, N. Y.
- 1895 Page, Charles, Col. and Asst. Surg. Gen. (Ret.), U.
S. A.,
1216 Mount Royal Ave., Baltimore, Md.
- 1895 Park, Roswell, Prof. of Surgery, Univ. of Buffalo,
510 Delaware Ave., Buffalo, N. Y.
- 1895 Smith, Joseph Rowe, Colonel and Asst. Surg. Gen. (Ret.), U.
S. A.,
2300 Delancy Pl., Philadelphia, Pa.
- 1895 Tryon, James Rufus, Medical Director (Capt.), U. S. N.,
New York City, N. Y.
- 1896 Wilson, Ezra Herbert, Director of the Hoagland Laboratory,
194 Keap St., Brooklyn, N. Y.
- 1892 Wyman, Walter, Supervising Surg. Gen., U. S. M. H. S.,
Washington, D. C.

DECEASED MEMBERS.

ACTIVE MEMBERS.

Browne, John Mills,	Surg. Gen. (Commodore Ret.), U. S. N.
Eggers, John T.,	Capt. and Asst. Surg., N. G. Mo.
Fisher, Walter W. R.,	Capt. and Asst. Surg., U. S. A.
Forster, Edward Jacob,	Brig. Gen. and Surg. Gen., Mass. V. M.
<i>First Vice Presl., 1896-97,</i>	
Halbert J. E.,	Col. and Surg. Gen., N. G. Miss.
Hayes, Charles,	Lt. Col. and Med. Dir., R. I. M.
Hope, James Shirley,	Pd. Asst. Surg. (Lt.), U. S. N.
*Hutton, W. H. H.,	Surgeon, U. S. Marine Hospital Serv.
Jessup, Robert B.,	Col. and Asst. Surg. Gen., N. G. Ind.
Leach, Hamilton E.,	Col. and Asst. Surg., N. G. D. C.
Macaulay, C. N. Berkeley,	Capt. and Asst. Surg., U. S. A.,
Matthews, Frederick L.,	Col. and Surg. Gen., N. G. Ill.
<i>Secretary, 1892-93,</i>	
Murphy, John Henry,	Brig. Gen. and Surg. Gen., N. G. Minn.
Ottilie, Charles,	Act. Asst. Surg., U. S. M. H. S
Pickman, H. Derby,	Brig. Gen. and Surg. Gen., N. G. Mont.
Sanborn, Perley Putnam,	Capt. and Asst. Surg., Ind. Inf. Legion.
Woodward, Charles Meredyth,	Lt. Col. and Surg. Gen., Mich. S. T.,
<i>Second Vice Presl., 1892-93,</i>	
Worthington, James Cheston,	Maj. and Surg., U. S. A.,

CORRESPONDING MEMBERS.

Berenger Feraud, M.,	Med. Dir., Marine M. Serv., France.
Colin, M. Leon Jean,	Med. Inspector General, France.
Pecco, Giacomo,	Insp. Gen., Army Med. Service, Italy.
*Strange, Fredk. Wm.,	Deputy Surg. Gen., Canada.
Timmerman, M. R.,	Insp. Gen., Army Med. Serv., Holland.

HONORARY MEMBERS.

Leighton, Walter H.,	Maj. and Surg., U. S. Soldiers' Home, Milwaukee, Wis.
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Index.

A CCOUTREMENTS for the infantry soldier.....	250
ADAIR, GEORGE W., Identification.....	23, 227
ADAMS, CHARLES, Remarks on first aid packets.....	462
Adams, Charles, Auditing Committee.....	7
Aid, First (<i>See</i> also First aid), on the firing line.....	454
on the battlefield, Lines of surgical.....	448
to injured on shipboard.....	120, 136
to the Wounded.....	183
ALDEN, CHARLES H., A Military Delegate to the Second Pan-American Congress at Mexico, November, 1896.....	21, 641
Remarks on Identification.....	248
Remarks on Radical Cure of Hernia.....	496
The Identification of the Soldier.....	23, 209
ALMY, LEONARD B., Remarks on National Guard Medical Officer...	391
Remarks on the Connecticut State camp.....	383
The Medical Officer in the National Guard.....	17, 347
Ambulance, Remington bicycle.....	410
Ambulance train, Mexican.....	625
Ambulant treatment of fractures.....	521
American Soldier, Physical Proportions of the.....	328
Antisepsis on vessels of war.....	169
Antiseptic Catgut, Slowly absorbable.....	497
Appendicitis, Acute or sudden recurrent, in camp or field.....	620
Arm, Fracture at lower end of fore-.....	523
Arms (<i>See</i> also rifle), Effect of large.....	455, 510, 582
Army, Methods of Identification in the U. S.....	209
Treatment of hernia in the.....	478
ARNOLD, HERBERT A., A Medical Chest suitable for a Battery, Troop or Independent Company.....	32, 414
Arrangements, Report of Committee of.....	15, 72
Votes of thanks to committee of.....	15, 34
Asepsis on war vessels.....	169
Association of Military Surgeons of the State of Ohio.....	73
Association of Military Surgeons (Senn).....	3, 100
Athletics, What to Avoid in Army.....	311
Auditing Committee, Report of.....	49
Austro-Hungarian army, Hernia in.....	492
Military hospitals	473
ANLINE, Adjutant General H. A., Ohio National Guard.....	3, 94

B ACTERIA, Thermal death point of.....	150
B ANISTER, JOHN M., The Radical Cure of Inguinal Hernia from the Standpoint of the Military Surgeon.....	30, 478
Base, Organization at the.....	464
Bassini operation for hernia.....	480
Battle, Care of wounded after.....	567
Treatment of wounded in.....	544
Battlefield, Lines of surgical aid on the.....	448
Bearers, Instruction of.....	577
Number on shipboard.....	181
BEYER, HENRY G., Military Physical Training.....	33, 265
Bicycle Ambulance, Remington.....	410
Bilges, Disinfection of.....	159
BIRMINGHAM, HENRY P., Some Remarks on Mountain Campaign- ing from a Medical Standpoint.....	22, 430
BLACK, Mayor S. L., City of Columbus.....	3, 86
BLOOD, ROBERT A., Remarks on Massachusetts State camp.....	387
BOECKMANN, E., Remarks on Radical Cure of Hernia.....	494
Boeckmann method for slowly absorbable antiseptic catgut.....	497
BORDEN, W. C., Slowly Absorbable, Antiseptic Catgut by a Modi- fication of the Boeckmann Method.....	30, 497
Bravery of Medical Officers.....	83, 108, 119
BRIGGS, A. H., Report of Committee on Transportation.....	15, 70
British (<i>See</i> also English) army.....	3, 98
Brooke, Lawrence.....	119
BROWN, PAUL R., Objections to the System of Identification in Use in the United States Army.....	23, 243
Report of Literary Committee.....	53
Bubonic plague, Disinfection of ship infected with.....	167
Bullet, Action of small caliber.....	115
Some effects of.....	505
BUNTS, FRANK E., Remarks on camp hygiene.....	389
Remarks on first aid packets.....	462
Remarks on Radical Cure of Hernia.....	495
BURGIN, HERMAN, Remarks on Camp sanitation.....	388
Burgin, Herman, <i>see</i> Secretary	
BUSHNELL, Governor A. S., State of Ohio.....	3, 87
Bushnell, Governor, Thanks of Committee of Arrangements.....	78
BYERS, FREDRICK W., Remarks on first aid packets.....	461
Remarks on National Guard Camps.....	383
Remarks on separating the National Guard from politics....	382

Byers, F. W., Committee upon recommendations in president's address.....	10
C AMPS of the Colorado National Guard in the Leadville campaign	393
Sanitation	551
Sanitation of the National Guard.....	376
Selection of sites for.....	556
Sites	550
Carbolic acid as a disinfectant.....	157
CARR, L. C., Remarks on association finances.....	46
Casualties from small caliber rifle.....	115, 448, 455, 595, 581
Casualty-rate of modern war.....	116
Catgut, Slowly absorbable.....	497
Chancellor, Col., Relation to Association.....	47
Chest, The Arnold medical.....	414
Chloride of Lime as a disinfectant.....	158
Cholera, Disinfection of ship infected with.....	160
Circulation, Demonstration of.....	597
CLARK, THOMAS C., Delegation from Minnesota.....	12, 14
Remarks on National Guard camps.....	385
College Curriculum, Military medicine and surgery in the.....	610
Colorado National Guard, Leadville campaign of the.....	393
Columbus, City of.....	3, 82, 86
Medical Journal, Thanks of Committee of Arrangements....	79
Committee, Auditing.....	7
Report of....	49
Executive	vi
Report of....	7, 50
Literary	vi
Report of....	10, 53
Nominating.....	15
Report of....	80
of Arrangements	x
Report of	15, 72
Vote of thanks to.....	15, 34
on Credentials	vii
Report of.....	57
Discussion of report of.....	12
on identification of enlisted men.....	ix
on instituting Post Exchanges.....	ix
on necrology	vii
Report of.....	15, 16
on official recognition of badge.....	vii
Report of.....	11, 53

Committee on rationing bodies of men.....	viii
on recommendations in president's address.....	10
Report of.....	79
on transportation.....	vii
Report of.....	15, 70
on uniformity of organization in States.....	viii
on uniformity of outfit and supplies for States.....	viii
on Ways and Means, Report of.....	15, 69
Publication.....	vi
Report of.....	10, 52
Communication, Organization on the lines of.....	464
Competition, British ambulance.....	606
Connecticut Hospital Corps in.....	352
Constitution and by-laws.....	650
COOK, G., Remarks on official delegation.....	14
Corrosive sublimate as a disinfectant.....	157
Cost of meeting.....	77
CRAIG, THOMAS C., The Practical Disinfection of Ships of War.....	22, 147
CRANDALL, R. PERCY, Venereal Disease in the Navy and its Prevention.....	21, 194
CULLEN, GILBERT I., Some Suggestions Regarding the Medical Department of the National Guard.....	17, 372
D ELEGATES, Advisability of official.....	12, 381
List of official.....	58
Delinquent members, Action on.....	45
Diemer on self-help to wounded.....	583, 585, 589, 591, 593, 595
Diet, Naval.....	144
Diphtheria, Disinfection of ship infected with.....	164
Disabled, Transportation.....	402
Transportation by Single Bearer.....	404
Transportation on ship board.....	177
Discussion on Association finances.....	46
on First aid packets.....	461
on identification.....	248
on Military physical training.....	327
on National Guard Camps and medical officers.....	381
on radical cure of hernia.....	494
Disinfectants.....	149
Disinfection.....	169
Plant at navy yards and hospitals.....	191
of Ships of War.....	147
Double bottom compartments of ships, Disinfection of.....	159
Dressings, Naval table for.....	205

E DITOR, Abolition of, Amendments for.....	51
Report of.....	7, 49
Editorship, President Gihon on the.....	7
Education, <i>See</i> Instruction.	
EGLE, WILLIAM H., Remarks on camp hygiene.....	392
Remarks on Pennsylvania State camp.....	384
English (<i>See</i> also British) army, First aid in.....	588
army, Hernia in.....	489
arrangements for instruction in first aid.....	580
base hospital organization.....	469
militia, First aid in.....	588
volunteer force, First aid in.....	588
Entertainments, List of social.....	4
Equipment, Personal, for field service.....	419
ERWIN, JAMES J., Camp Sanitation of the National Guard.....	22, 376
First Aid on the Firing Line.....	32, 454
Remarks on camp hygiene.....	392
Remarks on first aid packets.....	463
Treasurer's report.....	7, 39
Erwin, James J., <i>see</i> also Treasurer.	
Erysipelas, Disinfection of ship infected with.....	164
Executive Committee report.....	7, 50
Expenses of meeting.....	77
F IELD (<i>See</i> also Mountain) Appliances for hypodermatic solutions.....	411
arrangements of an English army.....	601, 602, 604
hospital, A United States Army.....	407
Medical Chest, The Arnold.....	414
service, Personal equipment for.....	419
First aid (<i>See</i> also Self-help) dressings on shipboard.....	181
on the firing line.....	454
Regimental instruction in.....	577
Fisher, Capt. W. W. R., Obituary.....	67
FLETCHER, R., Regimental Instruction in First Aid.....	24, 577
Foot Dress, Infantry National Guard.....	261
Forearm, Fracture at lower end of.....	523
Formaldehyde as a disinfectant.....	151
Forster, Gen. E. J., Obituary.....	63
FOSTER, C. C., Editor's report.....	7, 49
Fractures, Ambulant treatment of.....	521
of the lower extremity of the radius.....	523
FRENCH, CHARLES H., Delegation from Rhode Island.....	12
Remarks on the Rhode Island State Camp.....	386
The Hospital Corps of Rhode Island.....	17, 364
French army, Hernia in.....	489
military hospital personnel.....	473

G ERMS of Disease, Prevention of implantation of, on ship-board.....	188
GIHON, ALBERT L., President.....	1, 7, 18, 23, 29, 32, 34, 36, 37
Amendments to Constitution, Remarks on.....	7
Farewell of.....	37
President's annual address: On the Status of the Military and Naval Medical Officer.....	4, 102
Remarks on official delegation.....	12, 13
Gihon, President, Introduction of.....	101
GLADDEN, Rev. Washington, Invocation.....	3, 81
Gouttiere, Metalique de Bonnet.....	182
Governor, Address of the.....	3, 87
Grade, Meaning of.....	105, 106
GRIFFITH, J. D., Remarks on Missouri State camps.....	387
Remarks at Installation as President-elect.....	36
Some Effects of Bullets.....	29, 505
Griffith, J. D., Committee upon recommendations in president's address.....	10
Installation as President-elect.....	36
Guerin, Major, Thanks of Committee of Arrangments.....	78
Gunsaulus, Capt., Thanks of Committee of Arrangements.....	78
Gunshot (<i>See</i> also rifle) wounds.....	505
Gymnastics, Military.....	265
H ALLEY, GEORGE, The Infantry National Guard Foot Dress.....	22, 261
Halstead operation for hernia.....	480
HENDLEY, FRANK W., Remarks on first aid packet.....	462
HENRY, NELSON H., Remarks on camp hygiene.....	390
Hernia, Inguinal, Radical cure of.....	478
HOFF, JOHN V. R., Military Sanitary Organization on the Lines of Communication and at the Base.....	32, 464
Report of Committee on official recognition of badge.....	53
Scheme of Military Sanitary Organization.....	437
Hope, Passed Asst. Surg. J. S., Obituary.....	67
Horse litters.....	434
Hospital, A United States Army field.....	407
Corps drill.....	402
Corps in Connecticut.....	352
Corps, Instruction of.....	577
Corps of Rhode Island.....	364
Corps of the National Guard of Pennsylvania.....	358
Mexican army.....	630
Nurses, Company of, Mexican.....	625
of Instruction, Mexican.....	629, 642
organization, Military.....	464
Personnel of base.....	469

Hygiene (<i>See also</i> Sanitation), Naval.....	189
of Camps.....	551
of ships of war.....	169
Hypodermatic solutions, Field appliance for.....	411

I DENTIFICATION, Discussion on.....	248
New Method of.....	227
Objections to the U. S. Army system of.....	243
of the Soldier.....	209
The U. S. Army Method of.....	209
Infantry shoe.....	261
Soldier, Accoutrements for.....	250
Inguinal Hernia, Radical Cure of.....	478
Instruction, College, in military medicine and surgery.....	610
in military medicine and surgery.....	537
Instruments, Preparation of, on shipboard.....	177
Table, Naval.....	205
Introductions at opening session.....	3, 82, 85, 87, 90, 94, 98, 99, 101

J APAN, Base hospital personnel.....	469
J ARRETT, ARTHUR R., Advisability of official delegates.....	12, 13
Official recognition of badge.....	11
Remarks on National Guard Camps.....	384
Journals, Publication of papers in, Conditions of.....	51

K EMBLE, L. H., The Leadville Campaign.....	17, 393
K ILBOURNE, HENRY S., The Physical Proportions of the American Soldier.....	33, 328
KOBER, G. M., The Place of Military Medicine and Surgery in the Medical College Curriculum.....	30, 610
Kola nut, Use of, for Military purposes.....	616
KUKULA, O., Remarks on Radical Cure of Hernia.....	495
KULP, JOHN STEWART, What to Avoid in Army Athletics.....	33, 311

L A PIERRE, JULIAN, History of the Hospital Corps in Con- necticut.....	17, 352
Remarks on camp sick reports.....	391
Leach, Philip, Auditing Committee.....	7
Leadville Campaign.....	393
Leg, Ambulant treatment of fractures of.....	521
Leitenstorfer on military physical training.....	266
Letters of regret.....	5
Lime as a disinfectant, Forms of.....	158

Lines of surgical aid on the battlefield.....	448, 454
Literary Committee, Report of.....	10, 53
Litter, Hand, of the Mexican army.....	643
Horse.....	434
LOVING, STARLING, Welcome to Starling Medical College.....	29
M ARINE Hospital Service, claims to membership.....	8
MARTIN, E., The Ambulant Treatment of Fractures.....	32, 521
MAUS, LOUIS M., The Medical Department of the Mexican National Army.....	21, 624
MAYER, D., Remarks on Official delegation.....	13
Mayor, Address of the.....	3, 86
M Disinfection of ship infected with.....	165
Medic Chest, The Arnold.....	414
College, Military medicine in the.....	610
Corps, Mexican.....	624
Department in War, Organization of.....	437
Department of the National Guard.....	372
Officer in the National Guard.....	347
Officer, The better type of.....	340
Meeting, Minutes of the.....	1
The opening session of the.....	3
Members, Active.....	658
Associate.....	672
Corresponding.....	673
Deceased.....	676
Delinquent, Action on.....	45
Elected in 1896-1897.....	50
Honorary.....	675
Life.....	657
List of, by States and Services.....	677
Present at the meeting.....	1
Membership in Ohio, Recruitment of.....	75
Mercuric chloride as a disinfectant.....	157
Mexico, Army of, Medical department.....	624
Medical officers of, List of.....	638
Military delegate in.....	641
Micro-organism, Thermal death point of.....	150
MILES, General, Letter of regret.....	5
Military sanitary organization.....	437
Sanitary organization on the lines of communication and at the base.....	464
Surgeon, The better type of.....	340
Surgeon, The, in the National Guard.....	347
Surgery.....	478
Militia (<i>See</i> also National Guard), Hospital Corps of Rhode Island..	364

MILLIKIN, Dr. Dan, Medical profession of Ohio.....	3, 91
Minutes of the meeting.....	1
MOORE, H. M. W., A Field Appliance for the Extempore Preparation of Hypodermatic Solution.....	24, 411
A Method of Lifting and Carrying Patient by a Single Bearer.....	32, 494
Announcements for the meeting.....	4
Remarks on Ohio State Camps.....	386
Report of Committee of Arrangements.....	15, 72
MOORE, H. M. W., Vote of thanks to.....	34
Mortality from small caliber rifle.....	115, 448, 454, 505, 581
of modern naval actions.....	117
Mountain Campaigning.....	450
MURRAY, R. D., Claims of Marine Hospital Service to members.....	8
MYERS, C. F. W., Remarks on New Jersey State Camp.....	384
N ATIONAL Guard (<i>See also Militia</i>), Camp sanitation of the..	376
Guard, Hospital Corps of the Connecticut.....	352
Guard of Ohio.....	3, 94
Guard of Pennsylvania, Hospital Corps of.....	358
Guard, Physical Training in the.....	311
Guard, Suggestions regarding medical department of.....	372
Guard, The Leadville Campaign of the Colorado.....	393
Guard, The medical officer in the.....	347
Naval sanitation.....	139, 147, 189
Necrology, Report on.....	15, 61
Nominating Committee.....	15
Report of.....	80
O FFICERS and Committees for 1897-98.....	v
of Association for 1897-98.....	80
of the Association from its organization.....	655
of Mexican medical department.....	638
Problems for medical.....	537
The better type of medical.....	340
The medical, in the National Guard.....	347
Ohio, Increase of Membership in.....	75
Ohio, State of.....	3, 87, 91, 94
OLIVER, WILLIAM SILVER, Accoutrements for the Infantry Soldier.....	22, 250
Remarks on first aid packets.....	462
Remarks on military physical training.....	327
Remarks on training hospital Corps in nursing.....	381
The British Army.....	3, 98
Oliver, W. S., Vote of thanks.....	22
O'NEILL, J. W., Report of committee on ways and means.....	15, 69

Opening Session, Addresses at.....	82
Operating table for use on shipboard.....	205
Operator on shipboard, Preparation of.....	175
Organization, Military sanitary.....	437
Military sanitary, on the line of communication and at the base	464
Outline-figure Card, Objections to.....	243
Card, The Army.....	213
P ACKET, A new first aid.....	458
Pan-American Congress, Military delegate at second.....	641
Papers, Conditions of journal publication.....	51
PARKHILL, CLAYTON, Report on Necrology.....	15, 61
The Leadville Campaign.....	17, 393
PEAL, R. I., Remarks on Effects of Small Caliber Bullets.....	520
Pennsylvania, Hospital Corps of National Guard of.....	358
PENROSE, GEORGE H., The Use of the Kola Nut for Military Pur- poses	24, 616
Pharmaceutical Corps, Mexican.....	625
Physical Proportions of the American Soldier.....	328
Training in the National Guard.....	321
Training, Military	265
PILCHER, JAMES E., A United States Army Field Hospital.....	407
Hospital Corps Drill by a Detachment of the U. S. Army Hospital Corps and the Company Bearers of the Seventeenth U. S. Infantry.....	31, 402
Introduction at opening session.....	3, 82
Introduction of speakers at opening session.....	85, 87, 90, 94, 98, 99, 101
Motion for Committee upon recommendations in president's address	10
Remarks on Official delegation.....	14
Report of Committee on credentials.....	12, 14, 57
The Influence of Certain Modern Military Conditions in Modi- fying the Lines of Surgical Aid on the Battlefield.....	32, 448
Pilcher, J. E., List of publications prepared by, for the meeting....	74
Thanks of Committee of Arrangements.....	78
Vote of thanks to.....	34
PILCHER, LEWIS S., Fractures of the Lower Extremity of the Radius	31, 523
Remarks on Radical Cure of Hernia.....	494
Pilcher, L. S., Vote of thanks to.....	31
Plague, Disinfection of ships infected with.....	167
Poland, Col. J. S., Thanks of Committee of Arrangements.....	79
President's address, Committee upon recommendations in.....	10
of the United States, Letter of regret from.....	6
Recommendations of	113

PRIESTLEY, JAMES TAGGART, Remarks on Iowa State Camps.....	398
Remarks on military physical training.....	327
Remarks on National Guard in Iowa.....	382
Priestley, J. T., Auditing Committee.....	7
Committee upon recommendations in president's address....	10
Prize for first aid work.....	605
Problems, Military Medical.....	537
Proceedings, Amendments relating to publication of.....	51
Stock of back volumes on hand.....	43
Program, Work of Committee of Arrangements on.....	76
Proportions, Physical, of the American Soldier	328
Prostitution, Regulation of, for Naval service.....	195
Publication Committee, Report of.....	10, 52
President Gihon on methods of.....	7
Q UARANTINE hygiene of ships of war.....	169
R ADIUS, Fractures of the lower extremity of the.....	523
Rank, Meaning of.....	105, 107
Recruits, Affections of.....	551
Reed, R. Harvey, Thanks of Committee of Arrangements.....	79
Regret, Letters of.....	5
Rhode Island, Hospital Corps.....	364
Rifle, Action of small caliber.....	115, 448, 455, 505, 581
ROUÉ, GEORGE H., Remarks on National Guard Camps.....	386
Rownd, Hon. R. M., Thanks of Committee of Arrangements.....	78
Rush, Benjamin	110
Russian Military hospitals.....	472
S ANBORN, Capt. P. P., Obituary.....	68
Sanitation, Naval.....	139, 147, 189
of the National Guard, Camp.....	376
Sanitary organization, Military.....	437
organization, Military, on the lines of communication and at the base.....	464
Scarlet fever, Disinfection of ships infected with.....	165
Secretary of the Navy, Letter of regret.....	5
of War, Letter of regret.....	6
Vote of thanks to.....	7, 34
Self-help for wounded.....	583, 585, 589, 591, 593, 595
SENN, N., The Association of Military Surgeons of the United States	3, 100
Remarks on necessity of keeping the Association in touch with State authorities.....	381
Remarks on Official Delegation.....	13, 381

Senn, N., Committee upon recommendations in president's address.	10
Relation to foundation of Association.....	47
Ship, Disinfection of.....	139, 147, 189
of war, Organization of medicine department on.....	16, 115, 124
Small pox on a transport.....	542
Shoe, The Infantry National Guard.....	261
Shrapnel shot wounds.....	510
Sick bay, Location of, on war ships.....	169
SIEGFRIED, C. A., A New United States Navy Portable General Operating Table, and a New Portable Folding Dressing and Instrument Table.....	32, 205
The Work of the Medical Department on Naval Vessels....	16, 124
Sites for camps and posts.....	376, 550
for summer camps.....	376, 556
Small pox, or a transport, Treatment of.....	542
Soldier. Physical Proportions of the American.....	328
Souvenir book	4, 76
STARK, W. T., Remarks on Effects of Small Caliber Bullets.....	518
Sterilization of patient for operation.....	175
Sternberg, Surgeon General, Letter of regret.....	6
Sulphurous acid as a disinfectant.....	152, 189
Surgeon General of Army, Letter of regret.....	6
General of Navy, Letter of regret.....	5
Surgeon, Mexican Military.....	624
Problems for the military.....	537
The better type of military.....	340
The military, in the National Guard.....	347
Surgery, Military.....	478
Surgical aid on the battlefield.....	448
Armamentarium of the Navy.....	173
Operating Table for the Navy.....	205
Staff in War, Organization of.....	437
Sutures, Slowly absorbable catgut.....	497
T ABLE for dressings and instruments, Naval.....	205
Table, Operating, Naval.....	205
TERRY, M. O., On the Management of Acute and Sudden Recurrent Appendicitis in Camp or in the Field.....	24, 620
Thanks of Committee of Arrangements.....	79
Votes of, to Committee of Arrangements.....	15, 34
Vote of, to Gen. Oliver.....	22
Vote of, to Professor Pilcher.....	31
Vote of, to Secretary.....	7
Vote of, to Treasurer.....	22
Vote of, to various contributors to the meeting.....	34
TILTON, HENRY R., Personal Equipment for Field Service.....	24, 419

Title, Meaning of.....	107
Training, Military Physical.....	265, 311
Physical, in the National Guard.....	321
Transportation of the Disabled..	402, 404, 433
of wounded on shipboard.....	177
Report of Committee on.....	15, 70
Travois transportation	433
Treasurer, Vote of thanks.....	22
Tryon, Letter of regret from Surgeon General.....	5
Tuberculosis, Disinfection of ship infected with.....	164
Typhoid, Disinfection of ship infected with.....	163
Typhus, Disinfection of ship infected with.....	165
U NIFORM, Mexican medical officers.....	632
V ENEREAL Disease in the Navy.....	195
Ventilation of ships.....	142, 191
Veterinary service, Mexican.....	625
W ATER, Drinking, at sea.....	141, 187
Waters, Col. W. E., Thanks of Committee of Arrangements	79
United States Army field hospital exhibited by.....	407
Ways and Means, Report of Committee on.....	15, 69
WEAVER, JOSEPH K., Remarks on Pennsylvania State Camp.....	385
The Hospital Corps of the National Guard of Pennsylvania..	17, 358
WESTERVELT, WILLIAM ALFRED, Physical Training in the National Guard	33, 321
Remarks on military physical training.....	327
Westervelt, Capt., Thanks of Committee of Arrangements.....	78
WISE, J. C., A plea for the more efficient organization of the medical department on our ships of war.....	16, 115
Remarks on camp hygiene.....	390
Remarks on first aid packets.....	461
Remarks on Identification.....	249
Remarks on Official recognition of badge.....	11
WOODHULL, ALFRED A., Military Medical Problems.....	21, 537
The Better Type of Medical Officer.....	24, 340
WOODS, GEORGE W., Some Practical Points on Asepsis and Antiseptics and the Methods of Carrying out the Same on Board Vessels of War.....	22, 169
Woodward, Lieut. Col., C. M., Obituary.....	65
Worthington, Maj. J. C., Obituary.....	66

Wounded, Aid to the.....	183
after battle, Care of.....	567
in battle, Care of.....	544
Regimental instruction in first aid to.....	577
Self-help to.....	583, 585, 589, 591, 593, 595
Transportation on shipboard.....	177
Wounds, Gunshot	505
Wrist, Fracture near the.....	523
Y ELLOW fever, Disinfection of ships infected with.....	165



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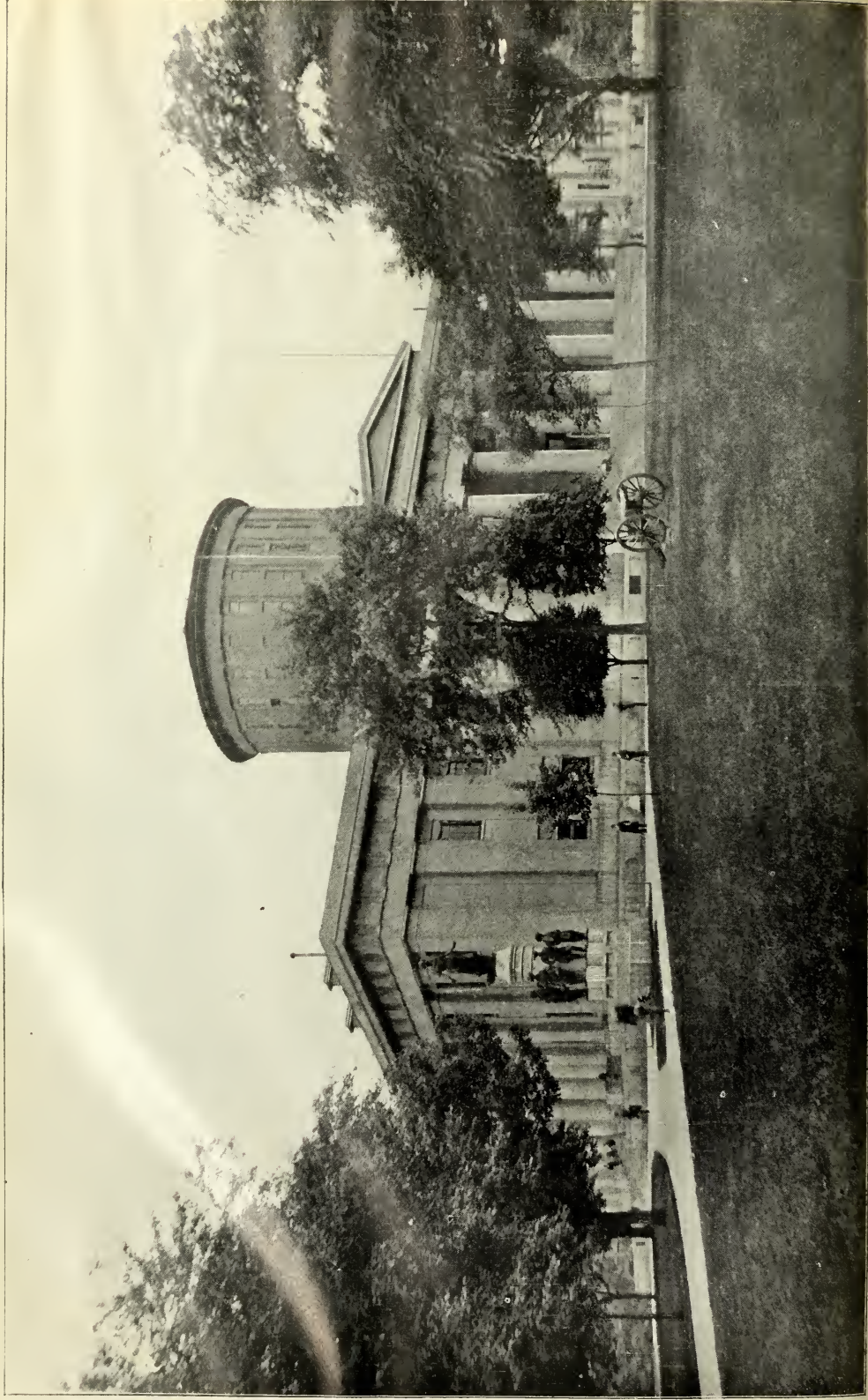
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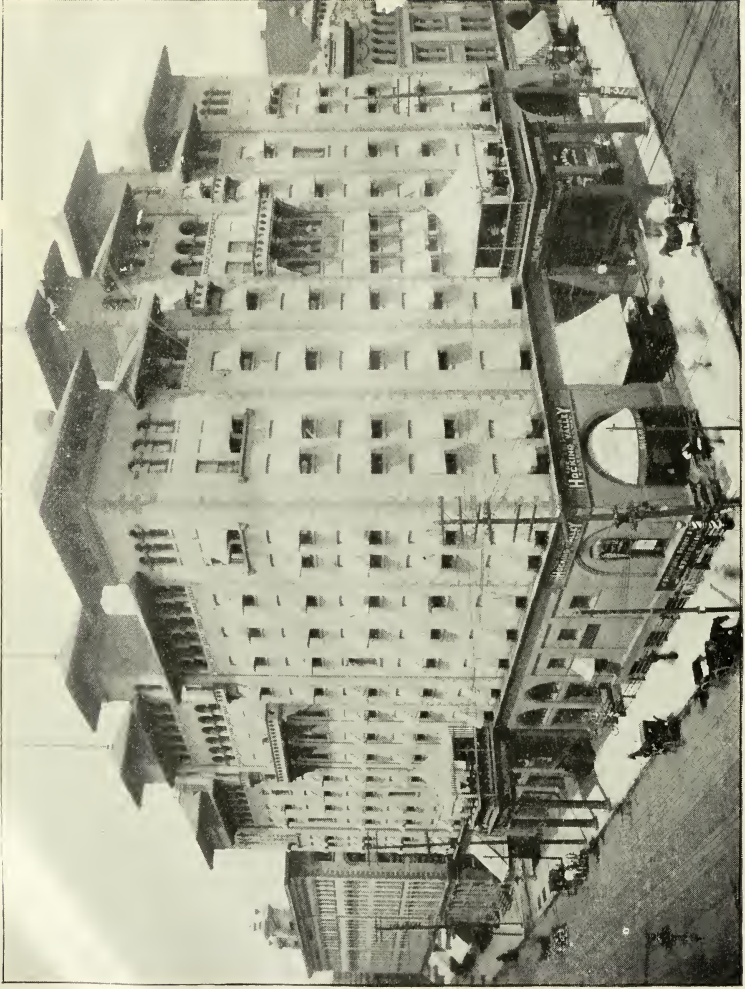
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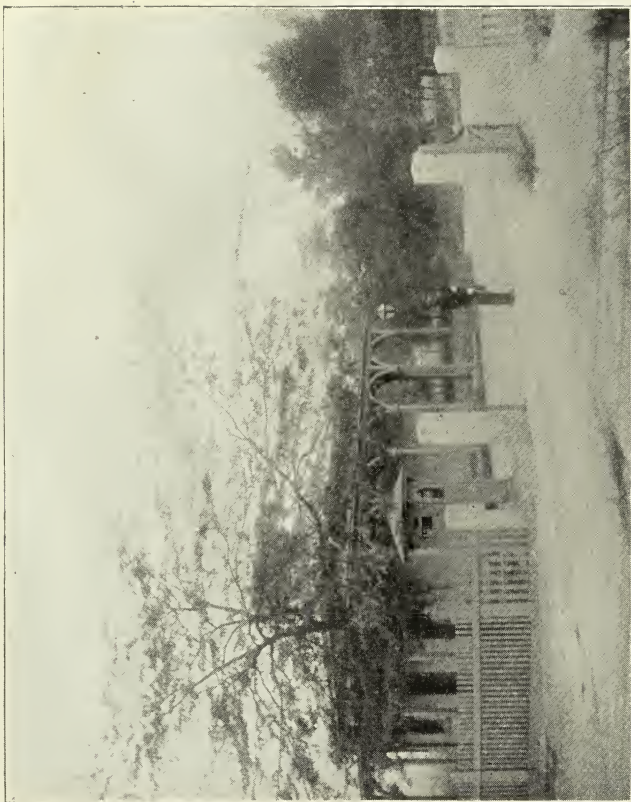
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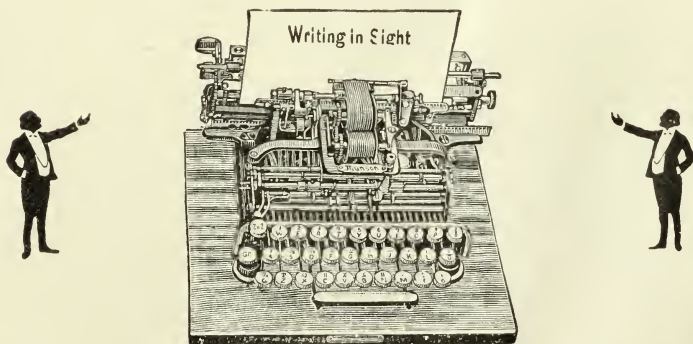
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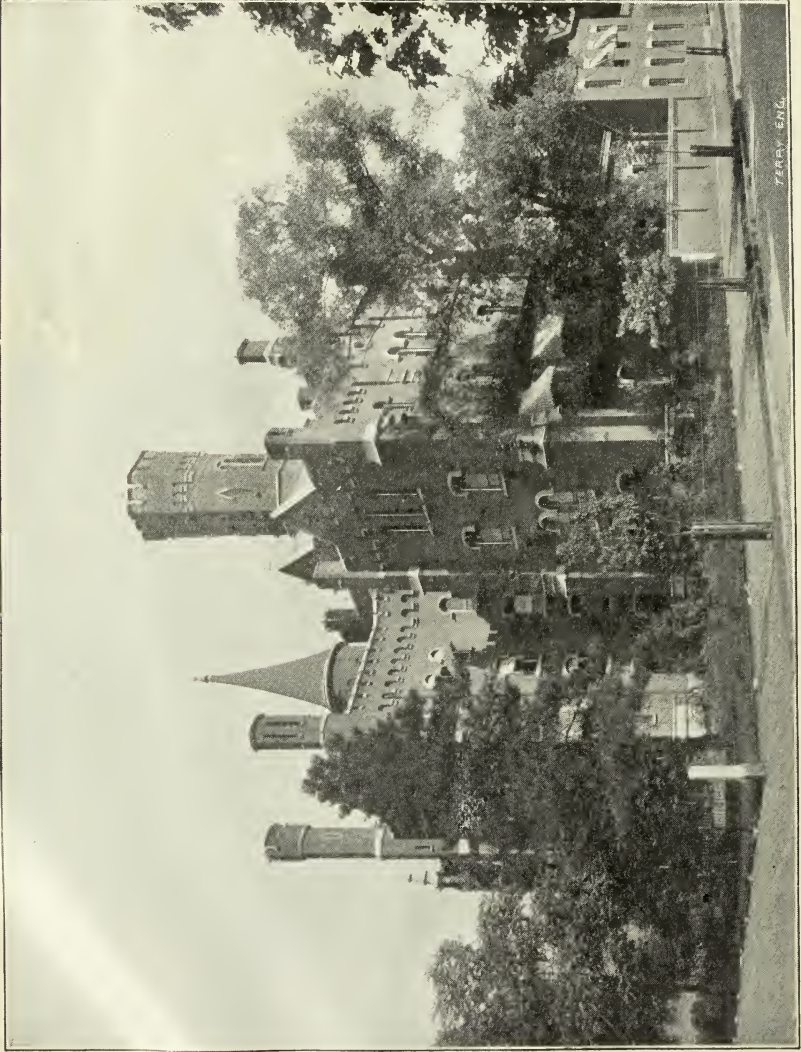
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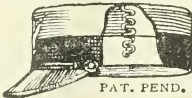
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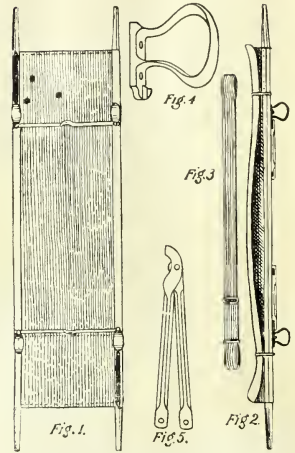
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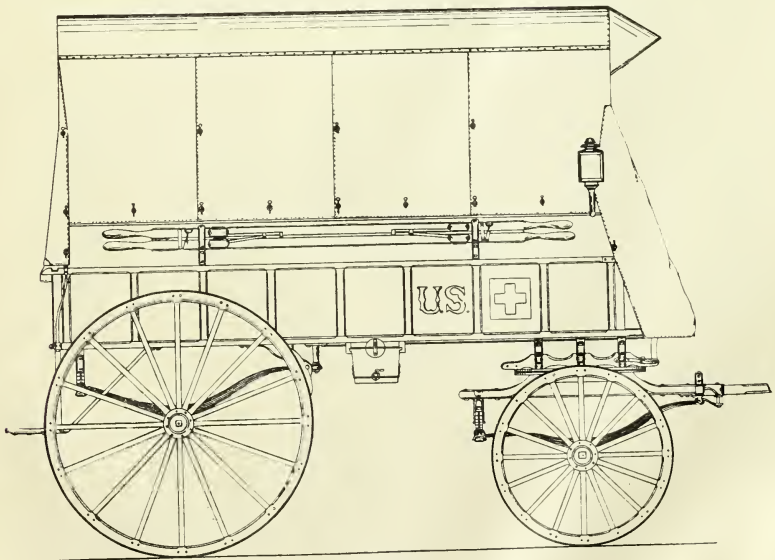
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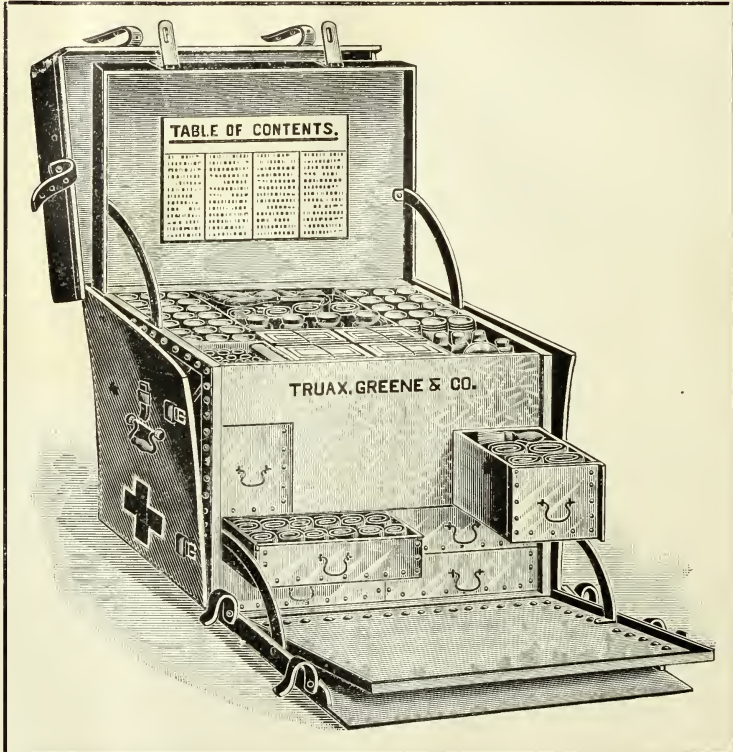
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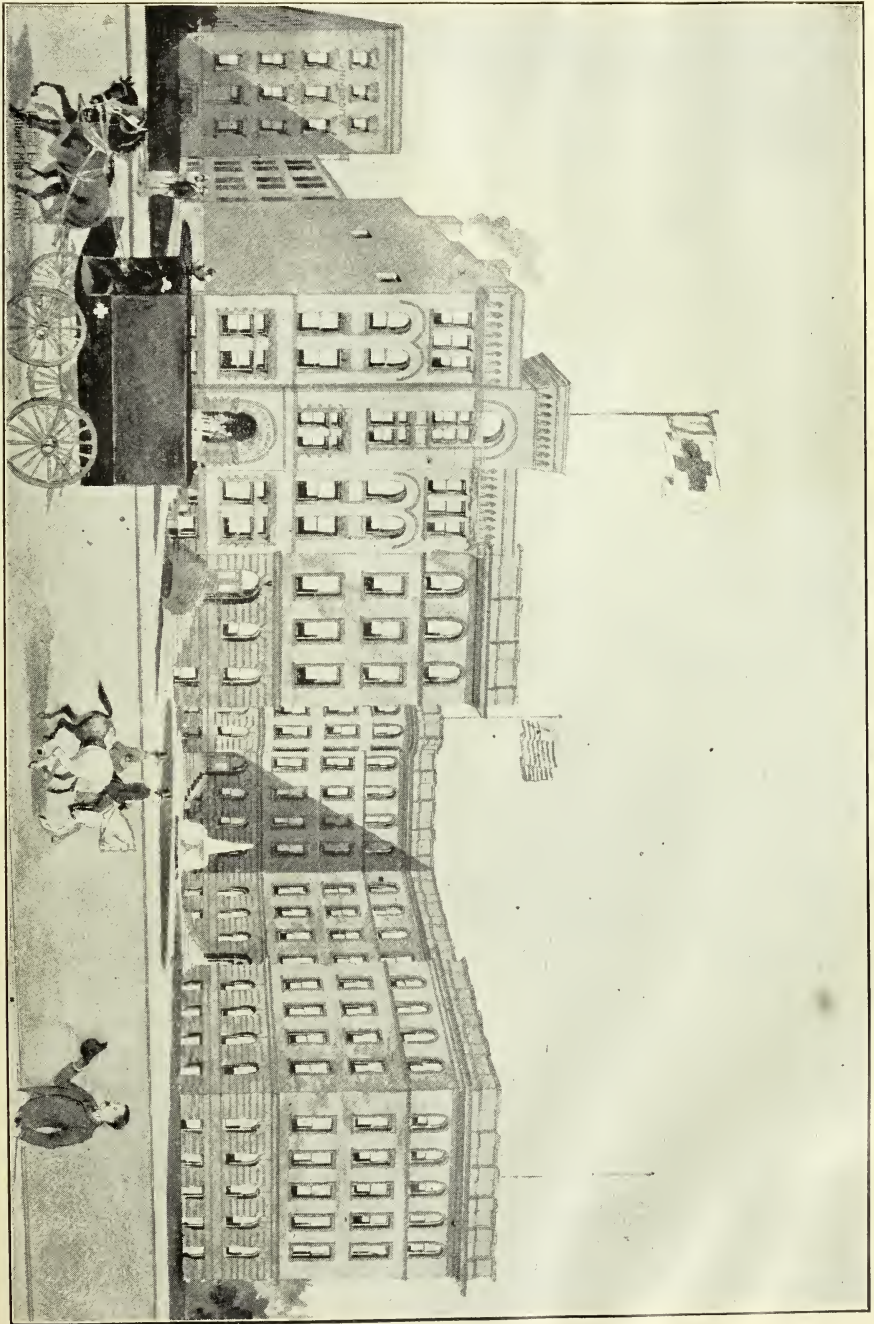
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