TRANSACTIONS

OF THE

# AMERICAN CLIMATOLOGICAL ASSOCIATION.

FOR THE YEAR 1907.

VOLUME XXIII.

"The object of this Association shall be the study of Climatology and Hydrology and of Diseases of the Respiratory and Circulatory Organs."—*Constitution.*



PHILADELPHIA:
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1907.

NOTICE.

The Association assumes no responsibility for the statements and opinions expressed in the papers read at its meetings.

*Copies may be had of the Secretary.*

Vol. XXII contains a complete index of the 22 volumes.

## OFFICERS OF THE ASSOCIATION, 1907.

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REPRESENTATIVE TO THE EXECUTIVE COMMITTEE OF THE CONGRESS OF AMERICAN PHYSICIANS AND SURGEONS.

FREDERICK I. KNIGHT, M.D., BOSTON.
ROLAND G. CURTIN, M.D., PHILADELPHIA, *Alternate.*

COMMITTEE OF ARRANGEMENTS.

DR. W. F. R. PHILLIPS, CHAIRMAN, WASHINGTON, D. C.

## OFFICERS OF THE ASSOCIATION,

1908.

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PRESIDENT.

THOMAS D. COLEMAN, M.D., AUGUSTA, GA.

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E. L. SHURLY, M.D., DETROIT,
THOMAS DARLINGTON, M.D., NEW YORK CITY.

REPRESENTATIVE ON THE COMMITTEE OF ARRANGEMENTS OF THE CONGRESS OF PHYSICIANS AND SURGEONS, 1910.

FREDERICK I. KNIGHT, M.D., BOSTON.
ROLAND G. CURTIN, M.D., PHILADELPHIA, *Alternate.*

CHAIRMAN COMMITTEE OF ARRANGEMENTS FOR THE MEETING IN 1908.

FREDERICK I. KNIGHT, M.D., BOSTON.

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# LIST OF OFFICERS.

*Presidents.*

| NAME. | YEAR. |
|---|---|
| A. L. Loomis | 1884–5. |
| William Pepper | 1886. |
| Frank Donaldson | 1887. |
| A. L. Loomis | 1888. |
| V. Y. Bowditch | 1889. |
| Charles Denison | 1890. |
| F. I. Knight | 1891. |
| W. E. Ford | 1892. |
| R. G. Curtin | 1893. |
| A. H. Smith | 1894. |
| S. E. Solly | 1895. |
| J. B. Walker | 1896. |
| E. Fletcher Ingals | 1897. |
| E. O. Otis | 1898. |
| Beverley Robinson | 1899. |
| Abraham Jacobi | 1900. |
| Robert H. Babcock | 1901. |
| Samuel A. Fisk | 1902. |
| Norman Bridge | 1903. |
| James C. Wilson | 1904. |
| W. F. R. Phillips | 1905. |
| E. L. Shurly | 1906. |
| Thomas Darlington | 1907. |
| Thomas D. Coleman | 1908. |

*Vice-Presidents.*

| | |
|---|---|
| F. I. Knight, W. H. Geddings | 1884–5. |
| Frank Donaldson, Beverley Robinson | 1886. |
| V. Y. Bowditch, R. G. Curtin | 1887. |
| A. Y. P. Garnett, J. T. Whittaker | 1888. |
| J. R. Leaming, E. T. Bruen | 1889. |
| A. L. Gihon, H. B. Baker | 1890. |
| E. L. Trudeau, T. S. Hopkins | 1891. |

E. Fletcher Ingals, Beverley Robinson . 1892.
A. H. Smith, E. O. Otis . . . . . . 1893.
I. Hull Platt, E. L. Trudeau . . . . . 1894.
John H. Musser, G. R. Butler . . . 1895.
Charles E. Quimby, James A. Hart . . . 1896.
S. A. Fisk, John C. Munro . . . . 1897.
Beverley Robinson, C. F. McGahan . . 1898.
James A. Hart, R. C. Newton . . . 1899.
R. H. Babcock, J. W. Brannan . . . . 1900.
Albert C. Peale, S. W. Langmaid . . . . 1901.
Norman Bridge, W. F. R. Phillips . . . . 1902.
James C. Wilson, H. S. Orme . . . . . 1903.
Thomas Darlington, Thomas D. Coleman . . 1904.
S. G. Bonney, S. D. Risley . . . . . 1905.
A. D. Blackader, Henry Sewall . . . . 1906.
Frank Fremont-Smith, C. L. Minor . . . . 1907.
Judson Daland, Charles Fox Gardiner . . . 1908.

*Secretaries and Treasurers.*

James B. Walker . . . . . . . 1884–95.
Guy Hinsdale . . . . . . . . 1895–

# LIST OF MEMBERS

## Honorary Members.

ELECTED

1905. Bell, A. N., 337 Clinton Street, Brooklyn, New York.
O. M. Schauffler, Edward W., Kansas City, Missouri.
1907. Smith, Andrew H., Geneva, New York.
1906. Trudeau, Edward L., Saranac Lake, New York.
O. M. Tyndale, J. Hilgard, Richards Block, Lincoln, Nebraska.
1897. Weber, Sir Hermann, 10 Grosvenor Street, W., London, England.
1906. Weber, Leonard, 25 West 46th Street, New York.
1897. Williams, Charles Theodore, 2 Upper Brook Street, W., London, England.

## Corresponding Members.

1906. Colombo, Carlo, via Plinio, Rome, Italy.
1898. Eyre, G. G., Claremont, Cape Town, South Africa.
1898. Liceaga, Eduardo, 4 San Andres Street, Mexico.
1898. Orvananos, Domingo, 25 Chavarri Street, Mexico.
1904. Sandwith, Fleming Mant, 31 Cavendish Square, London.
1898. Sunderland, Septimus, 11 Cavendish Place, Cavendish Square, W., London.
1902. Weber, F. Parkes, 19 Harley Street, W., London.
1907. Wellman, F. Creighton, Benguella, W. Africa.
1907. Williams, Leonard, 8 York Street, Portman Square, W. London.

## Active Members.

ELECTED

1888. Abbot, Griffith E., Leominster, Mass.
1897. Alton, Charles D., 86 Farmington Avenue, Hartford, Connecticut.
1898. Anders, Howard S., 1900 Chestnut Street, Philadelphia.
1899. Anders, James M., 1605 Walnut Street, Philadelphia.
1890. Anderson, B. P., 106 N. Cascade Avenue, Colorado Springs, Colorado.
1900. Arnold, Horace D., 427 Beacon Street, Boston.

1893. Babcock, R. H., 92 State Street, Chicago.
1898. Baldwin, Edward R., Saranac Lake, N. Y.
1901. Barlow, W. Jarvis, Security Building, Los Angeles, California.
1907. Barnes, Harry Lee, Wallum Lake, R. I.
1898. Battle, S. Westray, Asheville, N. C.
1902. Bergtold, William H., 1460 Clayton Street, 610 California Building, Denver, Col.
1905. Biggs, Hermann M., 113 West 57th Street, New York City.
1906. Billings, John S., Jr., 32 East 53d Street, New York City.
1897. Blackader, Alexander D., 236 Mountain Street, Montreal, Canada.
1895. Boardman, W. S., 63 Mt. Vernon Street, Boston.
1897. Bonney, S. G., Stedman Building, Denver, Col.
O. M. Bosworth, Francke H., 41 Park Ave., New York City.
1885. Bowditch, V. Y., 506 Beacon Street, Boston.
1901. Bracken, Henry Martyn, 1010 Fourth Street, Minneapolis, Minn.
1891. Brannan, John W., 11 West 12th Street, New York City.
1894. Bridge, Norman, 217 South Broadway, Los Angeles, Cal.
1903. Brown, Lawrason, Saranac Lake, New York.
1903. Brown, Philip King, 2527 Fillmore Street, San Francisco, California.
1897. Brown, Sanger, Reliance Building, Chicago.
1907. Browning, Charles C., Monrovia, Cal.
1890. Buckley, J. J., Missoula, Mont.
1886. Butler, G. R., 229 Gates Avenue, Brooklyn.

ELECTED

1896. Campbell, W. A., 424 N. Nevada Ave., Colorado Springs, Colorado.
1898. Casselberry, W. E., 34 Washington Street, Chicago, Ill.
1898. Chappell, Walter F., 7 East 55th Street, New York.
1906. Claytor, Thomas A., 1315 New Hampshire Avenue, Washington, D. C.
1898. Cleemann, Richard A., 2135 Spruce Street, Philadelphia.
1901. Cobb, J. O., U. S. M. H. S., Cairo, Ills.
1894. Coleman, Thomas D., 505 Greene Street, Augusta, Ga.
1901. Collins, Charles Farnham, 50 West 55th Street, New York City.
1889. Coolidge, A., Jr., 613 Beacon Street, Boston.
1902. Craig, R. W., Phœnix, Arizona.
1885. Curtin, R. G., 22 South 18th Street, Philadelphia.

1907. DaCosta, John C., Jr., 1022 Spruce Street, Philadelphia.
1892. Daland, Judson, 317 South 18th Street, Philadelphia.
1890. Darlington, Thomas, Cor. 55th Street and Sixth Ave., New York City.
1907. Darnall, Wm. Edgar, 1704 Pacific Ave., Atlantic City.
1897. Davis, N. S., Jr., 65 Randolph Street, Chicago.
1906. Dawson, John L., Charleston, S. C.
O. M. Denison, Charles, 823 14th S reet, Denver, Col.
1902. Duffield, William, 426 Auditorium Building, Los Angeles, California.
1905. Dunn, William LeRoy, Asheville, N. C.

1897. Edson, Carroll E., McPhee Building, Denver, Col.
1903. Edwards, William A., Security Building, Los Angeles, Cal.
1903. Elliott, J. H., 611 Spadina Ave., Toronto, Canada.
1892. Elsner, H. L., Fayette Park, Syracuse, N. Y.

1887. Fisk, Samuel A., Brimfield, Mass.
1885. Ford, Willis E., 266 Genesee Street, Utica, N. Y.
1897. Futterer, Gustav, 34 Washington Street, Chicago.

1896. Gardiner, C. Fox, 818 North Cascade Avenue, Colorado Springs, Col.
1886. Garnett, A. S., Hot Springs, Ark.
1898. Getchell, Albert C., 6 Linden Street, Worcester, Massachusetts.

ELECTED

1892. Gibson, William M., 260 Genesee Street, Utica, N. Y.
1907. Griffin, Walter Alden, Sharon, Mass.
1901. Guthrie, George W., 109 South Franklin Street, Wilkes-barre, Pa.

1907. Hall, J. N., Jackson Building, Denver, Col.
1893. Hance, I. H., Lakewood, N. J.
1891. Hart, James A., Geneva, New York.
1900. Harvey, Thomas W., 463 Main Street, Orange, N. J.
1896. Heffron, John L., 528 South Salina Street, Syracuse, N. Y.
1893. Hinsdale, Guy, Hot Springs, Va.
1902. Hoagland, Henry W., 327 North Nevada Avenue, Colorado Springs, Col.
1905. Huddleston, John H., 126 West 85th Street, New York City.

O. M. Ingals, E. Fletcher, 34 Washington Street, Chicago.

1889. Jacobi, A., 19 East 47th Street, New York.
1904. Jacobs, Henry Barton, 11 Mt. Vernon Place, W., Baltimore.
1888. Jayne, W. A., 416 McPhee Building, Denver, Col.
1901. Jennings, Charles Godwin, 457 Jefferson Street, Detroit, Michigan.
1897. Johnson, Frank S., 2521 Prairie Avenue, Chicago.

1904. King, Herbert Maxon, Liberty, New York.
1907. Kinghorn, Hugh M., 14 Church Street, Saranac Lake, New York.
1899. Klebs, Arnold C., 100 State Street, Chicago.
O. M. Knight, Frederick I., 195 Beacon Street, Boston.
1903. Kyle, D. Braden, 1517 Walnut Street, Philadelphia.

1887. Langmaid, S. W., 71 Newbury Street, Boston.
1899. Le Fevre, Egbert, 52 West 56th Street, New York.
1903. Lindley, Walter, 1414 South Hope Street, Los Angeles, California.
1904. Little, Wilbur T., Canon City, Col.
1896. Loomis, Henry P., 58 East 34th Street, New York.
1904. Lowman, John H., 141 Prospect Street, Cleveland, O.
1902. Lyle, B. F., 19 W. 7th Street, Cincinnati, O.
1907. Lyman, David Russell, Wallingford, Conn.

ELECTED

1902. McBride, James H., Pasadena, Cal.
1894. McGahan, C. F., Aiken, S. C., and Bethlehem, N. H.
1906. Manges, Morris, 72 East 79th Street, New York.
1902. Marvel, Philip, 1616 Pacific Avenue, Atlantic City, N. J.
1887. Mays, Thomas J., 1829 Spruce Street, Philadelphia.
1905. Miller, James Alexander, 550 Park Ave., New York.
1899. Minor, Charles L., Asheville, N. C.
1886. Musser, John H., 1927 Chestnut Street, Philadelphia.

1900. Nammack, Charles E., 42 East 29th Street, New York.
1895. Newton, R. C., 42 Church Street, Montclair, N. J.
1907. Nichols, Estes, Y. M. C. A. Building, Portland, Maine.
1907. Nichols, John B., 1321 Rhode Island Ave., N. W., Washington, D. C.
1899. Norrie, V. H., 21 West 37th Street, New York.
1888. Nunn, Richard J., 5 York Street, E., Savannah, Ga.

O. M. Orme, H. S., 214 Douglas Building, Los Angeles, Cal.
1888. Otis, E. O., 381 Beacon Street, Boston.

1887. Peale, A. C., 605 12th Street, N. W., Washington, D. C.
1906. Perkins, Jay, 106 Waterman Street, Providence, R. I.
1895. Phillips, W. F. R., 1607 16th Street, N. W., Washington, D. C.
1887. Platt, Walter B., 802 Cathedral Street, Baltimore.
1902. Pottenger, F. M., O. T. Johnson Building, Los Angeles, California.
1905. Pratt, Joseph H., 143 Newbury Street, Boston.
1905. Pryor, John H., 26 Linwood Ave., Buffalo, New York.

1891. Quimby, Charles E., 44 West 36th Street, New York.

1891. Ransom, C. C., 66 W. 49th Street, New York.
O. M. Reed, Boardman, Auditorium Building, Los Angeles, California.
1885. Rice, C. C., 123 East 19th Street, New York.
1901. Richardson, Charles W., 1317 Connecticut Avenue, Washington, D. C.
1904. Richer, A. J., 87 Union Avenue, Montreal, Canada.
1893. Risley, S. D., 1728 Chestnut Street, Philadelphia.
1899. Rives, William C., 1702 Rhode Island Ave., Washington, D. C.

ELECTED

O. M. Robinson, Beverley, 42 West 37th Street, New York.
1890. Robinson, W. D., 2012 Mount Vernon Street, Philadelphia.
1902. Rochester, Delancey, 469 Franklin Street, Buffalo, N. Y.
1892. Roe, John O., 28 North Clinton Street, Rochester, N. Y.
1890. Rogers, E. J. A., 222 Colfax Avenue, Denver, Col.
1889. Ruck, Carl von, Asheville, N. C.

1905. Schauffler, William Gray, 400 Madison Ave., Lakewood, New Jersey.
1901. Sewall, Henry, 433-4 Majestic Building, Denver, Col.
O. M. Shurly, E. L., 32 Adams Avenue, W., Detroit, Mich.
1890. Smith, A. Alexander, 18 West 51st Street, New York.
1887. Smith, Frank Fremont, 1808 Massachusetts Ave., Washington, D. C.
1900. Stengel, Alfred, 1811 Spruce Street, Philadelphia.
1904. Stone, Arthur K., 543 Boylston Street, Boston, Mass.
1898. Stubbert, J. Edward, 56 West 46th Street, New York.
1901. Swan, Will Howard, 706 North Nevada Avenue, Colorado Springs, Col.

1892. Taylor, H. Longstreet, 75 Lowry Arcade, St. Paul, Minn.
1907. Taylor, J. Gurney, 6041 Drexel Road, Philadelphia.
1896. Taylor, J. Madison, 1504 Pine Street, Philadelphia.

O. M. Walker, James B., 1617 Green Street, Philadelphia.
1891. Watson, E. W., 131 North 20th Street, Philadelphia.
1897. Whitcomb, H. H., Norristown, Pa.
1898. Whitney, Herbert B., 320 Temple Court, Denver, Col.
1904. Wilder, John Archibald, Stedman Building, Denver, Colorado.
1898. Williams, Francis H., 505 Beacon Street, Boston.
1885. Williams, H. F., 197 Gates Avenue, Brooklyn.
1898. Williams, Harold, 528 Beacon Street, Boston.
O. M. Wilson, James C., 1509 Walnut Street, Philadelphia.
1901. Wyman, Walter, Surgeon-General, U. S. Public Health and Marine Hospital Service, Washington, D. C.

O. M., Original Member.

Total, 147 active members.

## MINUTES.

The Twenty-fourth Annual meeting of the American Climatological Association was called to order by the President, Dr. Thomas Darlington, of New York, at the New Willard Hotel, Washington, D. C., on May 7, 1907, at 11 A.M.

The following members were present during the meeting:

H. S. Anders,
J. M. Anders,
H. D. Arnold,
R. H. Babcock,
E. R. Baldwin,
W. J. Barlow,
W. H. Bergtold,
A. D. Blackader,
V. Y. Bowditch,
J. W. Brannan,
Lawrason Brown,
P. K. Brown,
W. A. Campbell,
W. E. Casselberry,
W. F. Chappell,
T. A. Claytor,
T. D. Coleman,
R. G. Curtin,
Judson Daland,
T. Darlington,
J. L. Dawson,
C. Denison,
C. E. Edson,
J. H. Elliott,
H. L. Elsner,
S. A. Fisk,
W. M. Gibson,
G. W. Guthrie,
I. H. Hance,
J. A. Hart,
T. W. Harvey,
J. L. Heffron,
G. Hinsdale,
E. F. Ingals,
A. Jacobi,
C. G. Jennings,
H. M. King,
H. M. Kinghorn,
A. C. Klebs,
F. I. Knight,
D. B. Kyle,
W. T. Little,
H. P. Loomis,
J. H. Lowman,
C. F. McGahan,
M. Manges,
P. Marvel,
C. L. Minor,
J. H. Musser,
C. E. Nammack,
R. C. Newton,
V. H. Norrie,
E. O. Otis,
A. C. Peale,

Jay Perkins,
W. F. R. Phillips,
W. B. Platt,
F. M. Pottenger,
J. H. Pratt,
C. E. Quimby,
C. C. Rice,
C. W. Richardson,
S. D. Risley,
W. C. Rives,
B. Robinson,
W. D. Robinson,
De L. Rochester,
J. O. Roe,
W. G. Schauffler.
H. Sewall,
A. A. Smith,
Fremont Smith,
A. Stengel,
A. K. Stone,
J. E. Stubbert,
H. L. Taylor,
J. M. Taylor,
J. B. Walker,
H. H. Whitcomb,
J. A. Wilder,
F. H. Williams,
H. Williams,
J. C. Wilson,
Walter Wyman.

Guests: Surgeon Paul M. Carrington, representing the Public Health and Marine Hospital Service, U. S.; Dr. Woods Hutchinson, New York City; Dr. A. S. Ruland, Syracuse; Dr. J. P. C. Foster, New Haven; P. Y. Eisenberg, Norristown, Pa. At the Annual dinner, His Excellency Sir Chen Tung Liang Cheng, the Chinese Minister.

### Tuesday, May 7.—Morning Session.

The President delivered his annual address.

Dr. Samuel A. Fisk, of Brimfield, Mass., presented a paper, which was read by Mrs. Fisk, entitled "The Search for a Suitable Climate." The paper was discussed by Drs. Delancey Rochester of Buffalo; W. Jarvis Barlow, Los Angeles; Charles Denison, Denver; F. I. Knight, Boston; J. Edward Stubbert, New York; William C. Rives, Washington, D. C.; Vincent Y. Bowditch, Boston; R. H. Babcock, Chicago; James A. Hart, Geneva, N. Y.; and closed by Dr. Fisk.

Dr. Judson Daland read a paper on "Observations on the Leishman-Donovan Disease, or Assam Fever." This was discussed by Dr. Fremont-Smith, of Washington, D. C., and closed by Dr. Daland.

Dr. Fremont-Smith read a paper entitled "The Effect of the Florida Climate upon Acute and Chronic Disease."

Dr. E. O. Otis, of Boston, read a paper entitled "The Blood Pressure as a Guide in the Treatment of Hemoptysis." This paper was

W. C. GLASGOW, M.D.

discussed by Drs. Delancey Rochester, Samuel A. Fisk, and Thomas A. Claytor.

### Executive Session.

Calling of the Roll of Members, by the Secretary.

Introduction of new members.

Reading of Minutes. Upon announcement that the Minutes had been printed in the Transactions the reading of the Minutes was omitted.

The Secretary announced the death of three members: Drs. Alden, Glasgow, and Solly, and stated that memorials of Drs. Alden and Solly would be read.

### *Reports of the Secretary and Treasurer.*

The Association has lost three members by death: Dr. Charles H. Alden, U. S. A., Dr. S. E. Solly, and Dr. W. C. Glasgow. Memorials of Dr. Alden and Dr. Solly have been read. Dr. Glasgow died on March 22, of the present year, quite suddenly from heart disease. He was one of the few remaining founders of this Association and always attended its meetings when physically able to do so. When unable to attend, as at our last session, he nevertheless sent his paper, and it is included in the last volume of the Transactions.

Dr. W. C. Glasgow was graduated from the St. Louis Medical College and also from the University of Vienna. He held the chairs of Clinical Medicine and Laryngology at Washington University, and had also been consulting physician to the City Hospital of St. Louis and the Martha Parsons Hospital for Children. Dr. Glasgow took a great interest in the American Laryngological Association, and was its President in 1890. Dr. Glasgow was very highly regarded in St. Louis for his high personal character and courteous manner, as well as for his professional attainments.

As a scholar and as a man, Dr. Glasgow represented the highest and best type of American physician. Through his character, breeding, and temperament his high social standing was everywhere assured. As a physician he was devoted to the welfare of all classes needing his aid. He was enthusiastic in his love for the scientific side of his calling. Personally, with unusual temptations to the contrary, he possessed a singular modesty of disposition and a large appreciation of the good work of other men. Notoriety of any kind was especially repugnant to him. Easily the first authority in his department in a section of the United States geographically larger than that occupied by any of his contemporaries living in other cities, he held the field without the semblance of a rival from the beginning to the end of his long and useful career. He was a delightful companion, an ideal physician, and a widely appreciated and dearly loved friend.

Dr. Glasgow was in his sixty-third year, and leaves a widow, four sons and a daughter.

The following members have resigned: Dr. W. H. Flint, Dr. Andrew H. Smith, and Dr. Isaac Hull Platt.

The Council has placed Dr. Andrew H. Smith, an Ex-President of the Association, now retired, in nomination for Honorary Membership.

The council has also nominated for Corresponding membership Dr. Leonard Williams, of London, and Dr. F. Creighton Wellman, of Benguella, West Africa. Dr. Wellman has forwarded for our TRANSACTIONS a paper on the Meteorology of Angola. Dr. Leonard Williams is an Ex-President of the British Balneological Climatological Society and an editor of its journal. Eleven candidates for active membership have been approved by the Council. There are now thirteen vacancies in the list of active members.

The last volume of TRANSACTIONS was printed in London at a moderate cost, and affords an opportunity for many of our papers to appear in the *Journal of Balneology and Climatology*, the best journal of the kind in the English language.

The earlier volumes of our TRANSACTIONS are very hard to obtain, but of the later volumes we have a very good supply. During the last three years the Secretary has sent to each new member five or six of the last volumes issued. We have now a complimentary list including about 100 libraries and medical journals in this country and abroad. All foreign copies are forwarded through the Bureau of International Exchanges free of expense from Washington.

The Council at its last meeting decided that extensive changes made by members in the proofs of papers, such as additions, corrections, cancellations, etc., should be paid for by authors. The Society has, in most cases, borne the expense of illustrations, and always pays for tabular matter, which is often much more expensive than illustrations. We find that the method adopted of printing the body of the volume in England is the least expensive, but involves several months' delay.

*Financial Statement.*

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|---|---|
| Receipts: | |
| Balance on hand May 12, 1906 | $219 03 |
| Received from dues | 982 50 |
| Total | $1201 53 |
| Expenses: | |
| Stenographer | $60 00 |
| Printing | 595 05 |
| Express, freight, etc. | 19 18 |
| Other expenses | 170 90 |
| Balance May 4, 1907 | 356 40 |
| Total | $1201 53 |

The President appointed Drs. William Gray Schauffler, of Lakewood, N. J., and W. F. R. Phillips, of Washington, D. C., to serve as Auditing Committee.

The Nominating Committee for next year was appointed as follows: Dr. Frederick I. Knight, Boston; Dr. Charles L. Minor, Asheville, N. C.; Dr. Roland G. Curtin, Philadelphia; Dr. R. H. Babcock, Chicago; Dr. Frank Fremont-Smith, Washington, D. C.

The memorial of Dr. Alden was read by Dr. Roland G. Curtin.

The memorial of Dr. S. E. Solly was read by Dr. James A. Hart.

Dr. Babcock moved that a Committee be appointed by the Chair to draft resolutions, and that copies of the same be sent to the families of the deceased members. This was carried by unanimous vote and the President stated that he would appoint the Committee later.

The Auditing Committee reported that it had examined and found correct the Treasurer's report.

### Wednesday, May 8.—Morning Session.

The meeting was called to order at 9.45 A.M., by the President.

Dr. F. M. Pottenger, of Los Angeles, California, read a paper entitled "Relative Value of High and Low Altitude in the Treatment of Pulmonary Tuberculosis."

Dr. W. Jarvis Barlow, of Los Angeles, California, read a paper on a "Report of Two Hundred Charity Cases of Pulmonary Tuberculosis under Sanatorium Treatment at Los Angeles (1903 to 1907)."

Dr. Vincent Y. Bowditch, of Boston, and Dr. Walter A. Griffin, of

Sharon, Mass., contributed a paper entitled "The Subsequent Histories of Cases of Pulmonary Disease Treated at the Sharon Sanatorium, during Fifteen Years since 1891." The paper was read by Dr. Bowditch.

Dr. Frederick I. Knight, of Boston, read a paper on "Importance of Supervision of Patients after Leaving Sanatoria Apparently Cured of Tuberculosis."

A paper by Dr. S. G. Bonney, of Denver, on "Clinical Observations on the Use of Bacterial Vaccines in Connection with the Opsonic Index," was read by title.

Dr. Arthur K. Stone, of Boston, read a paper entitled "Daily Care of Consumptives at a General Hospital as an Aid in Solving Local Tuberculosis Problems."

Dr. Charles Denison, of Denver, read a paper on "A Sleeping Canopy Designed to Afford Outdoor Tent Advantages Indoors."

Dr. Richard D. Newton, of Montclair, N. J., read a paper entitled "Hygiene in the Prophylaxis and Treatment of Consumption."

The above papers were discussed by the following gentlemen: Drs. Roland G. Curtin, Philadelphia; Charles L. Minor, Asheville; James M. Anders, Philadelphia; Delancey Rochester, Buffalo; E. O. Otis, Boston; Thomas W. Harvey, Orange, N. J.; Leonard Weber, New York City; and Drs. Pottenger, Bowditch, and Denison spoke in closing.

Dr. John W. Brannan, of New York City, read a paper on "Some Notes on Aix-les-Bains."

Dr. James M. Anders, of Philadelphia, read a paper on "Hemoptysis due to Tuberculosis."

Dr Philip Marvel, of Atlantic City, read a paper entitled "A Case of Paroxysmal Tachycardia." The paper was discussed by Dr. Wm. G. Schauffler, of Lakewood, N. J.

## Executive Session.

The Nominating Committee presented the following ticket for officers of the Association for the coming year:

*President*—Dr. Thomas D. Coleman, of Augusta, Ga.

*Vice-Presidents*—Dr. Judson Daland, of Philadelphia, and Dr. C. Fox Gardiner, of Colorado Springs.

*Secretary and Treasurer*—Dr. Guy Hinsdale, of Hot Springs, Va.

*Member of Council*—Dr. Thomas Darlington, of New York.

Boston was named as the place of next meeting; the time to be left to some future action of the Council in order not to conflict with the meeting of the American Medical Association, but to be some time in June.

Dr. Frederick I. Knight, of Boston, was nominated as Representative on the Executive Committee of the next Triennial Congress, and Dr. R. G. Curtin, of Philadelphia, Alternate.

It was moved that this nomination be included in the Report of the Nominating Committee and voted upon at the same time.

The Secretary was instructed to cast the ballot, and the gentlemen were elected unanimously.

*Election of Members.*

Dr. W. F. R. Phillips, of Washington, D. C., and Dr. C. F. McGahan were appointed Tellers.

The President announced that twenty-five ballots had been cast and that the following had been elected:

*Honorary Membership.*

Dr. Andrew H. Smith, of New York City.

*Corresponding Membership.*

Dr. F. Creighton Wellman, of Benguella, West Africa.
Dr. Leonard Williams, of London.

*Active Membership.*

Dr. Harry Lee Barnes, of Wallum Lake, Rhode Island.
Dr. Charles C. Browning, of Monrovia, California.
Dr. John C. Da Costa, Jr., of Philadelphia.
Dr. William Edgar Darnall, of Atlantic City, N. J.
Dr. Walter Alden Griffin, of Sharon Sanatorium, Sharon, Mass.
Dr. Joseph N. Hall, of Denver, Colorado.
Dr. Hugh M. Kinghorn, of Saranac Lake, New York.
Dr. David Russell Lyman, of Wallingford, Connecticut.
Dr. John Benjamin Nichols, of Washington, D. C.
Dr. Estes Nichols, of Portland, Maine.
Dr. J. Gurney Taylor, of Philadelphia.

The Society passed a resolution endorsing the movement for the National Control and Regulation of the Public Health in the United

States, and decreed a copy to be sent to Professor Irving Fisher, of Yale College.

### Thursday, May 9.—Morning Session.

The meeting was called to order about 10 A.M. by the President.

Dr. J. Edward Stubbert, of New York, presented a paper on Sanitary Conditions at Panama, Canal Zone; illustrated by stereopticon views.

Dr. Roland G. Curtin, of Philadelphia, and Dr. Carroll E. Edson, of Denver, spoke in discussion, and Dr. Stubbert spoke in closing.

Dr. Guy Hinsdale, of Hot Springs, Virginia, gave a presentation of the "Use of Lantern Slides in Teaching Meteorology and Climatology."

It was ruled by the Chair that all discussion of papers be deferred to the end of the Session, to be taken up if time permitted.

Dr. Beverley Robinson, of New York City, presented a paper on "Heart Clot in Pneumonia."

Dr. J. Madison Taylor, of Philadelphia, read a paper entitled "Role of Vasomotor System in the Processes of Repair."

Dr. Roland G. Curtin, of Philadelphia, contributed two short papers entitled "Substernal Remittent Cardiac Sequal," and "Death from Angina Pectoris."

Dr. Charles E. Quimby, of New York City, read a paper on "Some Manifestations of Arterial Tension."

Dr. Horace D. Arnold, of Boston, read a paper on "The Importance of the Early Detection of Aneurysm of the Aorta."

Dr. Jay Perkins, of Providence, Rhode Island, contributed a paper on "Carcinoma of the Mediastinum Simulating Aneurysm."

Dr. Howard S. Anders, of Philadelphia, contributed a paper entitled "Influenza and Weather Instability." This paper was read by title.

Dr. Thomas A. Claytor, of Washington, D. C., read a paper on "Dilatation of the Heart."

There was no discussion of the above papers, and the President declared the Scientific Session of the Twenty-fourth Annual Meeting closed.

#### EXECUTIVE SESSION.

The President presented the matter of enlarging the membership of the Association to two hundred. A motion that the membership be limited to two hundred was seconded. After some discussion it was moved and seconded "That the matter of increasing the membership of the Association lie over for one year, to be brought up at the first business session of the next Annual Meeting, and that notice of the resolution be sent to all the members." Unanimously carried.

The President read a communication from Professor Irving Fisher, of Yale, upon which action was taken endorsing the movement. Unanimously carried.

Dr. W. F. R. Phillips, of Washington, D. C., moved that a resolution of thanks be presented to the management of the New Willard Hotel for courtesies extended, and that the resolution be forwarded by the Secretary. Carried.

Dr. Coleman moved that a vote of thanks be extended to the Local Committee of Arrangements. Seconded and carried.

Dr. E. O. Otis moved that the Association extend its sincere thanks to the President for the admirable way in which he had conducted the sessions. Seconded and carried.

After the introduction of the newly elected President, the retiring President declared the session closed.

SAMUEL EDWIN SOLLY, M.D., M.R.C.S.
(President, 1895)

# IN MEMORIAM.

## SAMUEL EDWIN SOLLY, M.D., M.R.C.S.

Dr. Samuel Edwin Solly was born in London, England, May 5, 1845. His father, Dr. Samuel Solly, was a distinguished London Surgeon and Fellow of the Royal Society—also an author of numerous scientific articles. Dr. Solly acquired his early education at Rugby, and his medical training at St. Thomas Hospital Medical College. He was graduated in 1867 from the Royal College of Surgeons, London. He began the study of climatic treatment of pulmonary diseases at the early age of eighteen, when he was forced by a break in health to travel in Egypt, the Riviera, and Switzerland. Since that time he has visited nearly every important health resort in Europe and America, personally inspecting most of the public and private Sanatoria for the treatment of tuberculosis. His intimate acquaintance with specialists on tuberculosis, who held him in high esteem, was unusually large. Through association with his father he had unusual opportunities of coming in touch with the leading laryngologists and specialists of the day in England. At the age of thirty, owing to another breakdown in health, he came to America and, in 1874, established himself in Colorado Springs, where he immediately continued his investigations as a Climatologist. His researches in this branch are well known to the profession generally, not only in this country but also in Europe.

His articles embrace "Tuberculous Laryngitis," "Temperament," "Relation of Nasal Disease to Pulmonary Tuberculosis," "The Influence of Altitude upon the Blood," and numerous medical essays which have been presented to the various societies of which he was a member.

After years of careful, personal investigation and travel he published the *Hand-book of Medical Climatology*. This work is familiar to all members of this Society and is considered an authority by the profession generally. Dr. Solly was a Fellow of the Royal Medico-Chirurgical Society, of London; Ex-President of the American Climatological Association, of the American Laryngological, Rhinological, and Otological Society, Colorado State Medical Society, and the El Paso County Medical Society. He received the honorary degree of Doctor of Medicine from the University of Denver. He was a director of the National Society for the Study and Prevention of Tuberculosis, a member of the Social Science Association, a Fellow of the Washington Academy of Sciences, and a Member of the American Medical Association. At the time of his death he was the Treasurer of the Colorado State Society. He had been a number of times President of the El Paso County Medical Society and was one of its founders. Dr. Solly was an early member of the American Climatological Association, served many years in its Council, and was President in 1895. It was in this Society that he took the greatest pride. During his membership he never missed a meeting unless absent from the country or detained by illness. He always had something of interest to present, and his remarks were interspersed with the humor that was so natural to him. As he loved our Society, so did we love him. My own relations with him were of such an intimate nature that the presenting of this inadequate notice is to me peculiarly difficult. When I went to Colorado Springs in 1876, an entire stranger and broken down in health, he was one of the first to meet me and extend that hospitality for which he was so noted. Our friendship was of such a nature that it was my privilege to have opportunities of knowing of numerous acts of charity which he was constantly engaged in. Never did he neglect to show the same delicate attention to his impecunious patients that he showed to the more fortunate. He was always the true Christian gentleman.

Dr. Solly was a worker not only in his profession, but in every enterprise requiring public spirit. He became interested in Colorado Springs as a health resort at once upon his arrival there, and from that time was identified with every important event of State or City. He was foremost in the promotion of the Antlers Hotel, and was also a founder, and for many years President, of the El Paso Club. He was senior warden of St. Stephen's Episcopal Church from the time of its organization.

Undoubtedly Dr. Solly's life was shortened by his devotion to what he called his "pet scheme," that of establishing a sanatorium for the treatment of tuberculosis in Colorado Springs. This had for many years been his hobby. Although he did not live to see his ideal realized, he did see the establishment of the Cragmor Sanatorium in successful operation before his death.

Regarding Dr. Solly's private life, I can probably offer no better tribute than to quote from the Colorado Springs Gazette: "In private life Dr. Solly was one of the most delightful companions. Well informed on an exceedingly wide range of subjects, fluent in conversation, quick in apprehension, witty in his terms of speech, he was many times the life of the company in which he sat. As an after-dinner speaker and as a toast master he had few equals, and one reason why his more solid addresses were so well received was because they were illuminated with humor. The state of his health for a few years prevented him from taking a prominent part in social life, but up to that time he was one of the most delightful of guests and the most charming of hosts."

By his death our Association has lost one of its most active and distinguished members, a loss not only to the Society but to each individual member.

James A. Hart.

The Transactions of this Association, for a great many years, will show, I think, that our friend Solly was one of its most devoted members. By devoted I mean not only constant in attendance, but aiding by discussion and contribution to its success. Doing what he could to make it of full stature. It is natural, therefore, that we should miss him unusually at this time, and that we should wish to record our sense of loss.

Solly was one of those men who deserved well of his Fellows for his fine, manly living. He made two blades of grass grow where only one grew before. He enriched the world by his living. There is not a long string of degrees affixed to his name to show this, but he lived, quietly, into a big work. He was preëminently, and on all occasions, the gentleman; not in manner alone, but in fact as well. He was a Christian gentleman, not of the namby-pamby type, but forceful. Every good work that came before him commanded his hearty support. He was a valuable citizen, giving of his time and energies to the public. He was artistic; many a building in Colorado Springs owes its attractive appearance to him. To few is it given, as it seems to have been to him, to leave his stamp so strongly on the face of things. He was closely identified with the growth of his town and State. But this is not all. This, of itself would be enough of glory for any one of us, but with him there was more. He came a stranger to a strange land, a foreigner to another country, and was quick to see its strong points; to throw himself heart and soul into its life; to identify himself, to the point of absorption, with its growth, and to herald these qualties so long and so loud, that he compelled others to hear. What Colorado Springs owes to S. Edwin Solly it is difficult to estimate. No more can we compute the debt of the "country of his adoption," to the life of this one man. He left a strong impression for good on a virgin country. He fought a good fight and has left a record that we all may do well to emulate. But above all this, and greater than any admiration, was the deep affection we had for the man himself. His kindly humor won us. We all loved Solly.

S. A. F.

CHARLES H. ALDEN, M.D.
(Brigadier-General, U. S. A., Retd.)

## BRIGADIER-GENERAL CHARLES H. ALDEN, M.D., U.S.A.

I HAVE been requested by our President to write a short review of the late CHARLES HENRY ALDEN, at one time Assistant Surgeon General, U. S. A., and during the Spanish-American War Acting Surgeon General of the United States. He became a member of the American Climatological Association in 1897, and contributed two papers to the TRANSACTIONS of the Society, entitled "Climatology of Porto Rico" and "Some Southern California Health Resorts."

In 1896, when on my way back from the Second Pan-American Medical Congress, which was held in the City of Mexico, several of the delegates were discussing the merits of the medical schools from which they had graduated. Looking at Dr. Alden, I saw a tear trembling on his eyelid. I asked him what was the cause of his sadness, and he answered: "Your allusions to your medical schools make me feel sad, for I have no alma mater. I graduated from the old Pennsylvania Medical College, which closed its doors during the Civil War." I said to him: "Doctor, don't feel bad. I think you will have an alma mater at some future time." When I reached home I spoke to Dr. S. Weir Mitchell, a member of the Board of Trustees of the University of Pennsylvania, and told him of the conversation in Mexico. He said: "I am greatly interested, as Dr. Alden was my chief during the Civil War at the old Turner's Lane General Hospital in Philadelphia; and a better equipped medical officer or a more genial gentleman I have never met. Why, of course we will get the degree for him. In June, 1901, the honorary degree of Doctor of Medicine (honoris causa) was conferred upon him by the Board of Trustees of the University of Pennsylvania. Only twenty-one persons had received this degree from the University previously, and nearly half of these were French Surgeons who had accompanied General Lafayette to this country during the Revolutionary War.

General Alden was the son of Rev. Charles H. Alden, Chaplain, U. S. N., and was born at Philadelphia, Pa., April 28, 1836. He was graduated at Brown University in 1856, with the degree of A.M.

As previously stated, he received his degree of M.D. from the Pennsylvania Medical College in 1858. He entered the Medical Corps of the Army in 1859, serving during that year in New Mexico. In 1860, he was commissioned First Lieutenant and Assistant Surgeon. In 1861, after an engagement with the Confederates near Las Cruces, N. M., he was taken prisoner with Major Lynde's command of the Seventh Infantry. After having been paroled, he went to Fort Leavenworth, Kan., Jefferson Barracks, Mo., and Rouse's Point, N. Y.

In 1862, while on duty at the Surgeon General's office in Washington, D. C., he organized the Georgetown College Hospital, and the same year, after having been released from parole, he was assigned to service with the Army of the Potomac, and was in charge of the transportation of the wounded during the Battle of Fredericksburg. In 1863, he assumed charge of Turner's Lane General Hospital, Philadelphia, and was Recorder of the Army Examining Board. During this year and the next he was on duty in connection with the drafts in Pennsylvania, and in 1864 became Assistant Medical Director, Department of Pennsylvania.

In 1865 he became Assistant Medical Purveyor, was promoted to the rank of Captain, and was brevetted Major and Lieutenant Colonel for faithful and meritorious services during the war. In 1866 he was promoted to the rank of Major and Surgeon. He served during this year against the Indians in Wyoming.

From 1870 to 1877 he served successively in Michigan, New York, Washington Territory, and Oregon. He took part in campaign against the Nez Perces Indians, participating in the Battle of Clearwater and the skirmish at Kamiah, Idaho.

In the fall of 1877 he was made Recorder of the Army Medical Examining Board at New York City, with which he remained connected until 1883, and of which he was frequently the President. During this period, he saw the need of changes in the method of examining applicants. His suggestions were adopted by the Surgeon General in 1888, and greatly simplified the work of the Board. Instead of sitting for an indefinite length of time examining applicants singly, the Board met on certain dates and examined the candidates in classes of convenient size. General Alden also advocated establishing a school for instructing the recently appointed officers in those branches in which military medicine differed from civil medicine. Such a school he was empowered to organize in 1893, and became its first President.

In 1890 he was sent to Berlin to represent the U. S. Army at the Tenth International Medical Congress. In 1893 he was made Principal Assistant to the Surgeon General at Washington, and placed in charge of the Hospital Corps and Supply Division, the position he held during the Spanish-American War. While in this position he devised a litter several pounds lighter and more compact than the old one. This litter was officially adopted. He also advocated and brought about another change. Formerly all that became ruptured in the service were discharged, but he had this system changed so that if those suffering with herniæ would submit to a radical operation, they could return to the service after the cure had been effected. In this way much expense and many valuable men have been saved to the Army.

In order to interest and instruct medical officers of the National Guard in military medicine, and to stimulate the medical officers of the Army by contact with doctors in civil life, he was largely instrumental in forming the Association of Military Surgeons, serving as its President one year. He was also the first President of the Army Medical School, holding the position of Lecturer on "Duties of Medical Officers." In 1893 and 1894 he was President of the Army Medical Examining Board at Washington, D. C.

As I have already mentioned, he was a delegate to the Pan-American Medical Congress held in the City of Mexico in 1896. In 1899 he was an official delegate to the Convention of the Association of Military Surgeons in Kansas City, where he was elected President of the Association.

On April 28, 1900, he was retired from active service on account of age, and became a resident of Newtonville, Mass., where he remained until compelled by ill health to remove to Southern California, in 1903. In 1904 he was promoted to Brigadier General on the Retired List by Act of Congress. He died at Pasadena, June 7, 1906, of pulmonary tuberculosis. His body was cremated there, and his ashes were later interred at Arlington Cemetery, near Washington.

Dr. Alden was a man of charming personality, being one of the most popular and most efficient officers of the army. His love and enthusiasm for his profession, military medicine, were exhibited all his life. He took great interest in improving the condition of the soldier and in instilling his own enthusiasm into the younger members of the

Medical Corps with whom he came in contact in the Army Medical School, and his efforts to simplify and improve the executive part of the Medical Department have already been mentioned. He was a member of the Protestant Episcopal Church, being active in mission work, particularly in the West. He was also a member of the following organizations: The American Medical Association, the American Climatological Association, the National Society for the Study and Prevention of Tuberculosis, the Old Colony Historical Society, the National Geographic Society, Brown University Alumni Association, the General Alumni Society of the University of Pennsylvania, the Military Order of the Loyal Legion of the United States (Massachusetts Commandery), the Massachusetts Society of Mayflower Descendants, the Naval and Military Order of the Spanish-American War (Commandery of Massachusetts), the Order of Indian Wars, and the University Club of Boston.

He married, in October, 1864, Katherine R. Lincoln, of Philadelphia. He is survived by three children: Alice Wight; Charles H., Jr., an architect living in San Francisco; and Eliot, a surgeon now practising in Pasadena, California.

Roland G. Curtin.

# CONSTITUTION AND BYE-LAWS.

## CONSTITUTION.

### Article I.—Name.

This Society shall be known as the American Climatological Association.

### Article II.—Object.

The object of this Association shall be the study of *Climatology and Hydrology and of Diseases of the Respiratory and Circulatory Organs.*

### Article III.—Membership.

*Section* 1.—This Association shall consist of *active*, *corresponding*, and *honorary* members, the latter not to exceed ten.

*Section* 2.—Names of candidates for active membership, whose applications shall have been indorsed by *two* (2) active members. shall be sent to the Secretary at least thirty (30) days before the annual meeting. On approval of the Council, the applicant shall be balloted for at the annual meeting. Three (3) black balls shall be sufficient to reject a candidate. The Council shall have power to nominate active members.

*Section* 3.—The power of nominating honorary and corresponding members shall be vested in the Council. The election shall be conducted in the same manner as that for active members. Honorary members shall enjoy all the privileges of active members, but shall not be allowed to hold any office or cast any vote.

*Section* 4.—Any member of the Association absent from the meetings, in person or by contributed paper, for three (3) consecutive years, without sufficient cause, may be dropped from the list of members by vote of the Council.

### Article IV.—Officers.

*Section* 1.—The officers of this Association shall consist of a *President*, two *Vice-Presidents*, a *Secretary and Treasurer*, who, with five other members, shall constitute the *Council* of the Association.

*Section* 2.—*Nominations.* The officers, including the Council, shall be nominated by a committee of five (5) members, which committee shall be nominated by the President at the first session of each annual meeting and shall report at the business meeting.

*Section* 3.—*Elections.* The election of officers shall take place at the business meeting. A majority of votes cast shall constitute an election.

*Section* 4.—The President, Vice-Presidents, Secretary and Treasurer shall enter upon their duties at the close of the annual meeting at which they are elected, and shall hold office until the close of the next annual meeting, or until their successors are elected.

*Section* 5.—Members of the Council, other than the President. Vice-Presidents, Secretary and Treasurer, shall hold office for five (5) years.

*Section* 6.—*Vacancies.* Any vacancy occurring among the officers of the Association during the year may be filled by the Council.

## Article V.—Duties of Officers.

### *President and Vice-Presidents.*

The President and Vice-Presidents shall discharge the duties usually devolving upon such officers. The President shall be *ex-officio* Chairman of the Council.

### *Secretary and Treasurer.*

As Secretary, he shall attend and keep a record of all the meetings of the Association and of the Council, of which latter he shall be *ex-officio* Clerk. At each annual meeting he shall announce the names of all who have ceased to be members since the last report. He shall superintend the publication of the Transactions, under the direction of the Council. He shall notify candidates of their election to membership. He shall send a preliminary notification of the annual meeting two (2) months previous thereto, and the programme for the annual meeting at least two (2) weeks previous to its assembly, to all the members of the Association. He shall also send notification of the meetings of the Council to the members thereof. At each annual meeting of the Association he shall read the minutes of the previous meeting and of all the meetings of the Council that have been held during the current year.

As Treasurer, he shall receive all moneys due, and pay all debts therewith. He shall render an account thereof at the annual meeting, at which time an auditing committee shall be appointed to report.

### Article VI.—Council.

The Council shall meet as often as the interests of the Association may require.

Four (4) members shall constitute a quorum.

It shall have the management of the affairs of the Association, subject to the action of the Association at its annual meetings.

It shall consider the claims of candidates recommended to it for admission to membership.

It shall not have the power to make the Association liable for any debts exceeding in total one hundred dollars ($100), in the course of any one year, unless specially authorised by a vote of the Association.

It shall have the entire control of the publications of the Association, with the power to reject such papers or discussions as it may deem best.

It shall have power to nominate active members at the annual meeting.

The Council shall have power to invite any gentleman, not a member, to read a paper at the annual meeting, on any subject within the scope of the objects of this Association.

The Council shall determine questions by vote, or—if demanded—by ballot, the President having a casting vote.

The Council shall constitute a Board of Trial for all offences against the Constitution and Bye-laws, or for unbecoming conduct, and shall have the sole power of moving the expulsion of any member.

The President, or any two members, may call a meeting, notice of which will be transmitted to every member two (2) weeks previous to the meeting.

### Article VII.—Papers.

*Section* 1.—The titles of all papers to be read at any annual meeting shall be forwarded to the Secretary not later than one (1) month before the first day of the meeting, in order to appear on the printed programme.

*Section* 2.—No paper shall be read before the Association which has already been printed or been read before another body.

### Article VIII.—Quorum.

A quorum for business purposes shall be ten (10) members.

### Article IX.—Amendments.

This Constitution may be amended by a four-fifths ($\frac{4}{5}$) vote of all the members present at an annual meeting, provided that notice of the proposed amendment has been printed in the notification of the meeting at which the vote is to be taken.

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## BYE-LAWS.

(1) Meetings of the Association shall be held annually.

(2) The time and place of the meetings shall be determined by the Council.

(3) The dues of active members shall consist of an annual assessment not to exceed seven and a half ($7.50) dollars. Members in arrears shall not be entitled to vote. Those in arrears for two (2) years may be dropped from membership by recommendation of the Council.

(4) Order of business meeting.

First day :—

Calling the roll of members.
Minutes of previous meeting.
Secretary's and Treasurer's reports.
Appointment of auditing committee.
Appointment of nominating committee.
Report of Council on recommendations for membership.

Second day, Morning session :—

Reports of nominating committee and auditing committee.
Election of officers.
Election of members.
Report of committee on health resorts.
Miscellaneous business.
Adjournment of business meeting.

# PRESIDENT'S ADDRESS.

BY THOMAS DARLINGTON, M.D.
NEW YORK CITY.

IT is with a deep and sincere appreciation of the honour you have conferred upon me that I speak to you to-day. The record of this Association is an honourable one. The work you have accomplished is a sufficient guarantee of your earnestness of purpose, and it has been your privilege and pleasure to contribute in no small measure to the alleviation of the physical ills of mankind. The duties of this position are a welcome change from the pressure of political life, and I render to you all my most grateful thanks in selecting me for a position held by so many worthy men.

It is therefore in no spirit of criticism that I venture to bring before you suggestions for future achievements, but rather with the purpose of appealing to that spirit of progress which is such a fundamental verity of our profession, and which has characterised the efforts of those whom we delight to honour.

As an Association, are we not drifting toward specialisation in our work? Our tendency has been to focus a large share of our attention upon pulmonary tuberculosis; worthy and important as that subject is, let us not forget that there is other work to be done.

Times and manners are not immutable, but it behoves us to occasionally glance backward and refresh our minds with the calm philosophy of the ancients. Socrates quotes the eminent physicians of his time as saying that "they cannot cure the eyes by themselves, but that if the eyes are to be cured, the head must be treated," and then again that "to think of curing the head alone, and not the rest of the body also, is the height of folly. And arguing in this way, they apply their methods to the whole body, and try to treat and heal the whole and the part together."

Metaphorically, may we not apply this to ourselves? The object of our Association as stated in the Constitution, limits us in the letter only; not in the spirit. We have a wide range of subjects for consideration. The profession as a whole is making rapid strides and even since our last meeting there has been a marked change of thought in regard to the climatic treatment of tuberculosis, and in what is perhaps of greater purport, the studies made in reference to serum therapy and the opsonins.

This Association has contributed more toward the elimination of tuberculosis than any other Society. In all probability the results of home treatment and of Sanatoria located in cities would never have been attained but for your efforts in bringing out the facts relating to the rational and hygienic methods of the treatment of the disease.

There is a growing tendency to promote the virtues of hygienic home methods in the treatment of tuberculosis at the expense of climatic treatment; the latter still has an important place, but other methods are pushing to the front and must be considered.

The fresh air treatment of tuberculosis is now a formidable rival to the purely climatic cure. Without decrying my own city, it must be admitted that New York has a variable and most trying climate, yet we have a sanatorium for consumptives situated on North Brother Island. This Island stands at the junction of the East River and long Island Sound, near that region very properly called Hell Gate. The climatic conditions at this point are distinctly unfavourable, and the patients received are mostly those afflicted with an advanced type of the disease. They are recruited from a class in whom good hygienic surroundings are at a discount; in fact, from the lowest strata of the "submerged tenth," yet the systematic routine of hospital existence, the outdoor life and good food, give us results that are most encouraging. Apparently hopeless cases are being cured, and this is taking place despite climate, not with its aid.

The advantage of curing patients in the climate in which they must afterwards live, and the elimination of that most dreaded complication "nostalgia," are results of prime importance. No climate, however favourable, can avail much if home-sickness developes and the questions of the financial status of the patient and his future life are of too great significance to be overlooked. A contented mind is a therapeutic adjunct of the utmost value, as we have all had abundant opportunity to observe. I wish again to quote Socrates: "That as you ought not to attempt to cure the eyes without the head, or the head without the eyes, so neither ought you to attempt to cure the body without the soul."

Another instance, worthy of mention, is the remarkable results attained in the treatment of bone tuberculosis by the same methods. The Sea Breeze Home at Coney Island and the Junior Home on the Bank of the East River, almost in the heart of New York City, have shown wonderful results.

Here I shall digress for a few moments to speak of the need of more work along the line of the mode of infection of pulmonary tuberculosis. The point I wish particularly to emphasise is the question of intestinal infection caused by the ingestion of infected food. The questions of infected milk, meat and other food, have received a large share of attention, but less stress has been laid on the possibility of food becoming accidentally infected from contaminated hands. The wide distribution of the tuberculosis bacilli and the number of people suffering from the disease, render it extremely probable that direct hand to hand contact with other people, as well as the handling of any articles which may be infected, give us a potential source of infection of the food we handle and eat. If typhoid may be carried this way why not tuberculosis? For the purpose of showing the evident possibilities of infection in this manner I wish to present a report of an interesting case which has recently come under my observation.

In making an investigation as to the cause of several simultaneous cases of typhoid fever occurring in one family in New York City, Dr. George D. Soper elicited the information that the cook employed by this family had lived in four different families during the period from 1902 to 1907, and in each instance it was discovered that from three to four weeks after the cook had entered upon her duties, practically all the members of each household were stricken with typhoid fever. In all twenty-eight cases of the disease were traceable to this source. The Board of Health removed the cook to the Reception Hospital for observation. She denied having ever had the disease. Examination of the blood and urine was negative, but the bowel discharges were found to furnish practically pure cultures of the typhoid bacillus. The woman has now been under observation about six weeks. At intervals of a day or two the faeces are clear, but this intermission is invariably followed by discharge containing the bacilli in practically unlimited quantity. We do not know for how long a period this condition has persisted nor how many other cases of the disease may have emanated from this source. The mode of infection is clearly indicated by the woman's occupation, and is a sad commentary upon her personal habits of cleanliness. The lesson is one which should be heeded.

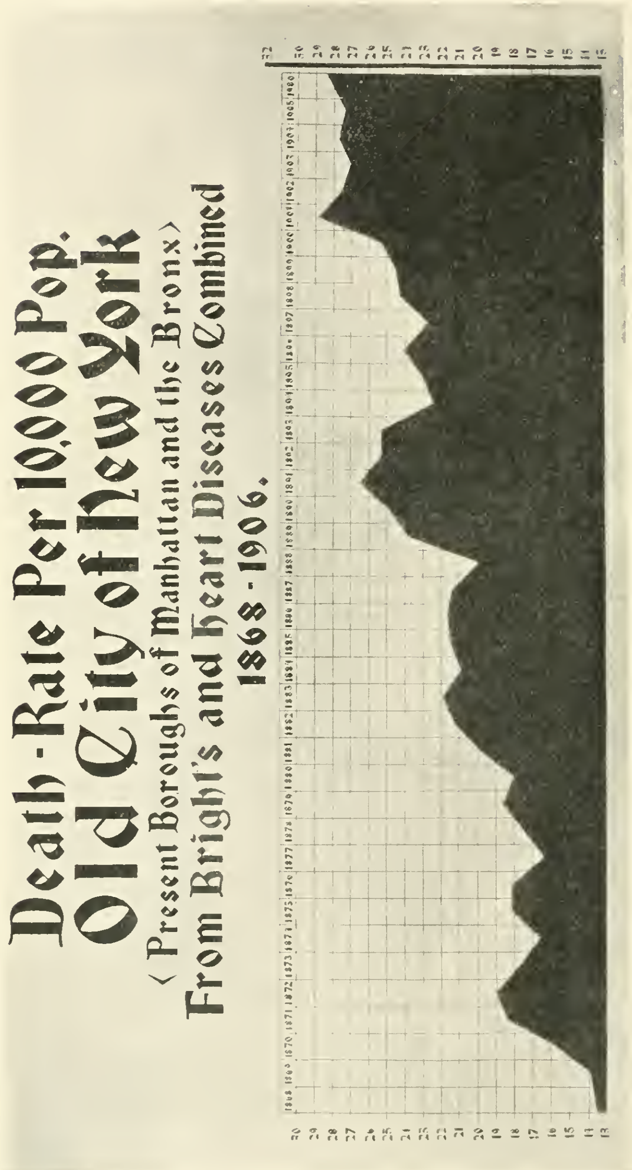
Is it not a fact that the tubercle bacillus has the power not only to penetrate the intact epithelium but also the entire wall of the gut, all without leaving a recognisable trace of its passage? The acidity of the gastric juice may impair the vitality of the bacilli, but this is offset by the alkalinity of the intestinal secretions. The bacilli are then taken into the lymph channels, the various groups of glands may become affected, and the bacilli find their way into the thoracic duct and so directly into the pulmonary circulation. The frequency of the sites of tubercular lesions is pertinent. In regular order we find the lungs, liver and brain the most prominent sites of the lesions. Macfayden and MacConkey, in their researches, speak of the intestines of children as a more important mode of entry for the tubercle bacilli than the tonsils or adenoids.

When the probable frequency of this mode of infection is considered, we may well take cognisance of the accidental food contamination from infected hands.

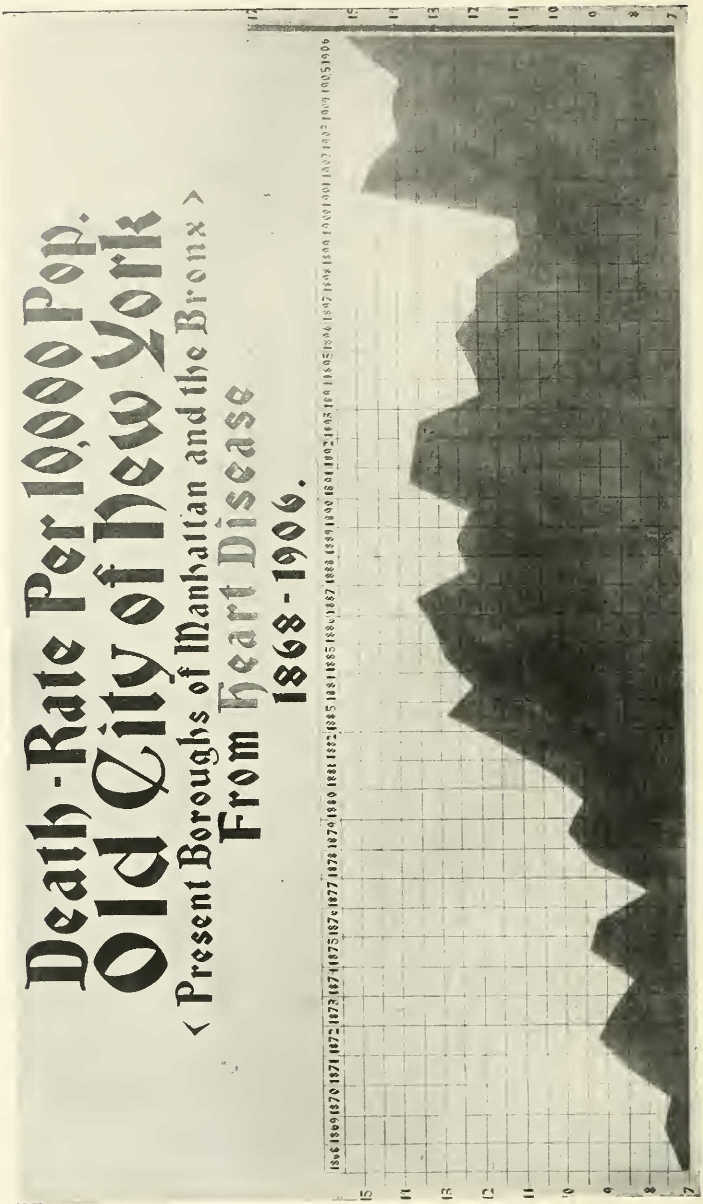
We have but just begun our fight with this plague, and with these new weapons of warfare our chances of success are brightening, but in our efforts for victory in this line we must not be unmindful of the other enemies that assail us.

The questions of climate, fresh air and proper environment in their relation to other diseases of the thorax, are insistently demanding an answer, and the correlated circulatory diseases need further study and elucidation. I wish briefly to call your attention to the existing conditions and the potential possibilities of this Association in research along these lines. The problems are for you to solve; my efforts are merely directed towards suggestions for future work.

We are confronted with the increased mortality from heart and kidney diseases. This increase is particularly noticeable in our cities, and the diseases are mentioned together because of their intimate etiological relation. These charts show most graphically this increase in New York City, and a mere glance


Death-Rate Per 10,000 Pop.
Old City of New York
( Present Boroughs of Manhattan and the Bronx )
From Bright's and Heart Diseases Combined
1868-1906.


Death-Rate Per 10,000 Pop.
Old City of New York
< Present Boroughs of Manhattan and the Bronx >
From Bright's Disease
1868-1906.


Death-Rate Per 10,000 Pop.
Old City of New York
‹ Present Boroughs of Manhattan and the Bronx ›
From Heart Disease
1868-1906.

at them should bring us to a realising sense of its importance.

Without considering the actual number of deaths, I wish to call your attention to the death-rates in a number of cities of the United States. The figures given are for the death-rate per 10,000 population. It has been found practically impossible to obtain statistics covering the same lengths of time in all cities, but the tables presented are sufficiently comprehensive to prove the truth of the contention.

HEART AND BRIGHT'S DISEASE.

| | Heart Disease. | Bright's Disease. | Combined Death-rate. |
|---|---|---|---|
| Boston, Mass. | | | |
| 1880 | 11·71 | 6·23 | 17·94 |
| 1905 | 18·17 | 9·54 | 27·71 |
| New York, N.Y. | | | |
| 1880 | 9·54 | 8·51 | 18·05 |
| 1905 | 13·90 | 13·37 | 27·27 |
| Chicago, Ill. | | | |
| 1880 | 6·20 | 3·55 | 9·75 |
| 1905 | 10·60 | 10·13 | 20·73 |
| New Orleans, La. | | | |
| 1881 | 16·48 | 5·21 | 21·69 |
| 1905 | 21·95 | 17·30 | 39·25 |
| Washington, D.C. | | | |
| 1896 | 14·20 | 6·68 | 20·88 |
| 1904 | 18·26 | 11·91 | 30·17 |
| Philadelphia, Pa. | | | |
| 1898 | 11·24 | 8·34 | 19·58 |
| 1905 | 13·59 | 13·73 | 27·32 |
| St. Louis, Mo. | | | |
| 1895 | 9·07 | 5·21 | 14·28 |
| 1900 | 9·61 | 6·51 | 16·12 |
| Milwaukee, Wis. | | | |
| 1894 | 5·93 | 3·19 | 9·12 |
| 1905 | 10·81 | 5·67 | 16·48 |
| Cincinnati, O. | | | |
| 1882 | 7·51 | 2·37 | 9·88 |
| 1889 | 8·72 | 2·73 | 11·45 |
| Denver, Col. | | | |
| 1895 | 6·00 | 4·21 | 10·21 |
| 1898 | 8·86 | 5·27 | 14·13 |

| | Heart Disease. | Bright's Disease. | Combined Death-rate. |
|---|---|---|---|
| Atlanta, Ga. | | | |
| 1893 | 7·95 | 1·93 | 9·88 |
| 1900 | 6·34 | 2·44 | 8·78 |
| Macon, Ga. | | | |
| 1892 | 4·64 | 3·22 | 7·86 |
| 1894 | 4·29 | 3·57 | 7·86 |
| Omaha, Neb. | | | |
| 1893 | 4·40 | 1·61 | 6·01 |
| 1897 | 3·80 | 1·80 | 5·60 |
| Sacramento, Cal. | | | |
| 1895 | 9·33 | 2·00 | 11·33 |
| 1897 | 9·50 | 1·50 | 11·00 |

The most marked increase is shown in Boston, Mass., where the rate from heart disease was 11·71 in 1880 and 18·17 in 1905, while New Orleans, La., gives the greatest increase in the mortality due to Bright's. The rate in this city was 5·21 in 1881, and 17·30 in 1905. While Atlanta and Macon, Georgia and Omaha, Nebraska, show a slight decrease in the death-rate from heart disease for the short periods of time in which statistics are available, it is worthy of note that in every city investigated, except Sacramento, the rate from Bright's has shown an increase.

One cannot fail to be impressed with the import of these figures. In giving them even a casual consideration, three factors are worthy of note. First, the persistently high death-rate and increase in heart disease in New Orleans, and the great increase in the mortality rate from kidney disease in the same city; second, the decrease in the heart death-rate in the Georgia cities; and third, the great general increase in the combined death-rate in the two diseases. Using the complete tables, from which these figures were taken, as a basis, it is evident that the death-rate from these diseases in the cities of Boston, New York and Chicago, has nearly doubled in the twenty-five year period, while the general death-rate has shown a decided decrease. In these same three cities, the actual number of deaths from these diseases was 3,287 in 1880 and 12,243 in 1905.

The mortality statistics of the Census Bureau for the five-year period from 1901 to 1905, inclusive, covering the States of Connecticut, Indiana, Maine, Massachusetts, Michigan, New Hampshire, New Jersey, New York, Rhode Island and Vermont, show an average general increase in the death-rate from heart disease of 2·05 per 10,000 population, and an average general increase in the death-rate from Bright's disease of 1·31 per 10,000 population. The increase has been general throughout all of these States; New Hampshire showing the greatest combined increase, with Massachusetts a close second. The highest death-rate from heart disease is shown by Massachusetts, with a rate of 18·47, while New Hampshire has a rate of 18·25. Indiana has the lowest rate from both diseases—10·26 in heart disease and 5·73 in Bright's.

A study of the causative factors of this alarming increase naturally suggests the part played by the many so-called features of city life, and one of the most important factors in the relation of mental strain to the production of functional, followed by organic lesions of the heart and, subsequently, the kidneys. The high wrought, over-nervous activity of the modern city business man and the equally strenuous social whirl of the city woman; the mad rush of competition; the bustle, confusion, noise and unrest, so striking in comparison with the *dolce far niente* of the business and social life of a century ago; crowds and hurry; elevated stairs and "rapid fire" elevators; mental strain and physical bankruptcy; all seem so essential. They have come to be considered a striking characteristic of our national life, yet they are so deadly to our individual life that they furnish us with food for deep and earnest thought.

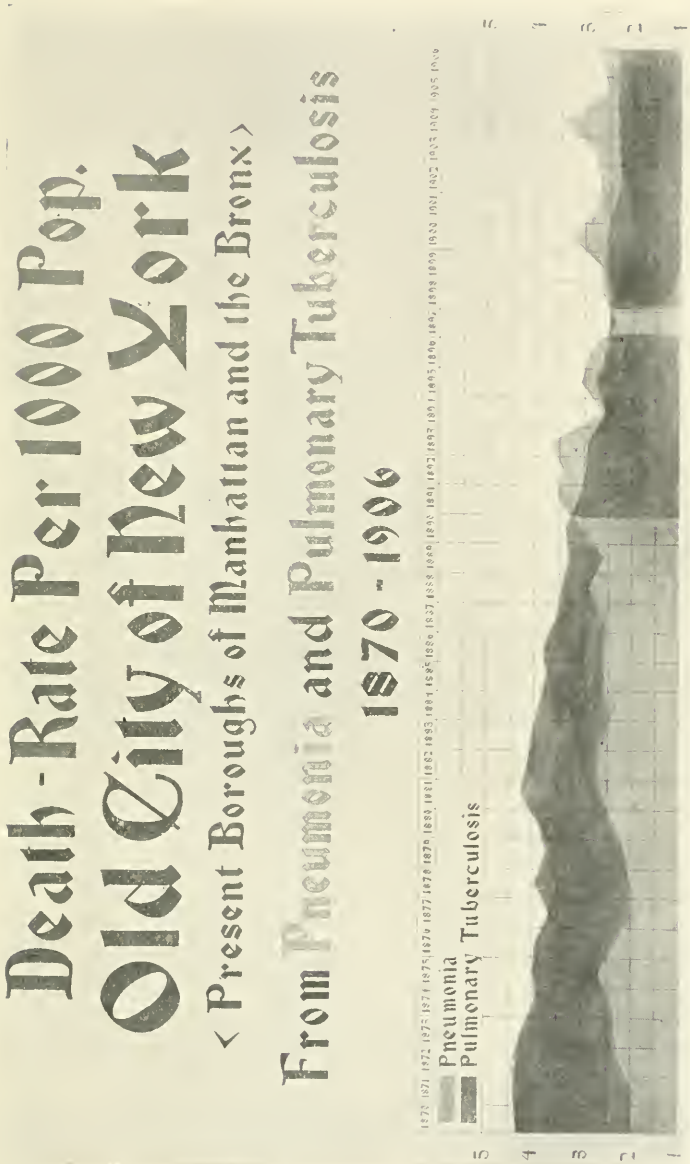
As a people, we are mad with the lust of success and money getting, and individually suicidal in our craze for material advancement. The spirit which prompts 11 p.m. editions of the daily papers to be on sale at 11 a.m. is clearly indicative of sufficient cause for the appalling increase in deaths from heart disease.

The vice of hard drinking is less prevalent than it was in the days gone by ; we cannot lay the blame for our chronic Bright's and hypertrophied heart cases wholly upon its over-burdened shoulders. Drunkenness is less common, but stimulation is on the increase.

The quiet and calm of sylvan life is within the grasp of few of us, but rational right living, hygienic precepts and the law of physical and mental repose are doctrines which must be forcibly brought home in order to cope with this menace. Proper climate may be a chimera, but fresh air is always available ; country life may be a glittering will-o'-the-wisp, but physical and mental calm are within our reach. The strenuous life brings in its train deadly consequences. As Gladstone says : "Medicine must more and more come to be not an art only, but also a philosophy." Let us then preach the doctrine of the restful life, the doctrine of individual self-poise and mental and physical well-being.

In our self-constituted task of decreasing the death-rate from germ diseases we have admirably succeeded ; but are we not tending to narrowness in our efforts ? Our knowledge of the physiology of the heart and kidneys ; our methods of physical diagnosis in ascertaining their deviation from the normal and our efforts in the line of prophylaxis of disease in other directions. The relation of influenza to the causation of cardiac difficulties should be investigated. Here is a vast and almost untilled field before us. The plough of scientific inspiration is needed and the seed of demonstrable results should be planted. It is a chance for the highest endeavour and for the accomplishment of a boon to mankind.

Among the infectious diseases, pneumonia demands attention. The problem is not quite so serious a one as in the case of heart and Bright's diseases. Our knowledge of the etiology


Death-Rate Per 1000 Pop.
Old City of New York
(Present Boroughs of Manhattan and the Bronx)
From Pneumonia and Pulmonary Tuberculosis
1870 - 1906
Pneumonia
Pulmonary Tuberculosis

of pneumonia has greatly advanced, yet we have only recently made any progress in our attempts at its alleviation and cure. Drug treatment *per se*, is assuming less and less importance, and we are doing little else than assist Nature in the treatment of this disease. Our hope of specific medication seems to lie with our collaborators in the field of serum therapy. In the meantime, are we not too quiescent in our attitude towards general prophylaxis and the methods tending to eradicate the disease?

Pneumonia as a cause of death has been second only to pulmonary tuberculosis. Now it has outranked even that "Captain of the Men of Death," and this chart shows the situation as it exists in New York City.

Computations based upon the latest census reports indicate that there were almost 140,000 deaths from pneumonia in the United States during 1905. If we allow a case mortality rate of 20 per cent., we may assume that there were 700,000 cases of this disease during the year.

During the five-year period, from 1896 to 1900, the death-rates from pneumonia and bronchitis, collected in various countries and cities, are given in the following table:—

Pneumonia and Bronchitis.

| | Rate per 10,000 of Population. |
|---|---|
| England and Wales | 22·70 |
| Scotland | 27·40 |
| Stockholm | 26·70 |
| London | 31·20 |
| Berlin | 16·10 |
| Vienna | 39·70 |
| Christiania | 21·30 |
| Boston | 30·60 |
| Chicago | 24·20 |
| Philadelphia | 25·10 |
| New York | 36·60 |

During the period from 1881 to 1904, pneumonia increased or remained stationary in all of these places except Stockholm and Berlin.

In this country, in the ten States where vital statistics are accurately recorded, there was a general increase in the number of cases during the period from 1900 to 1904. In 1905 the number of deaths markedly decreased, while in 1906 an upward tendency in the death-rate has again been apparent.

In all of these States, the death-rate in the cities has been, and is, persistently higher than in the rural regions. This condition is not peculiar to this country, for the Registrar-General's report of 1902 states that in England and Wales the city rates were in excess by between 80 and 90 per cent. The etiological factors I have mentioned in connection with heart and Bright's disease are of equal importance here, and, in addition, the importance of the constant inhalation of dust, smoke and other irritating foreign particles, merits attention. We must all recognise the value of pure, fresh air in the treatment of pneumonia, but have we sufficiently studied the value of pure, fresh air in its prevention ?

The question of climate in its relation to the prevalence of this disease should receive more attention than it has so far. It would be of vast interest to know the exact climatic conditions, temperature, humidity, altitude, and state of the soil in those fortunate localities where pneumonia is practically non-existent.

You may remember that the Esquimaux brought back by Commander Peary from the Arctic regions in 1898, practically all succumbed to pneumonia soon after reaching New York, yet the disease is unknown in their home climate.

During a recent lecture, Peary made the statement that during his last trip to the far north, none of his party suffered from coughs or colds, yet they lived for many months in a temperature of from 25 to 75 degrees below zero. Since their return to this country they have all suffered from respiratory troubles.

The Medical Commission appointed by the Board of

Health of New York City in 1904 for the purpose of investigating the causes of the acute respiratory diseases, was composed of eminent men. Much time and scientific effort was expended in the study of these diseases, particularly pneumonia. The scope of the work was extensive and comprehensive and much valuable information was obtained. The problem, however, was found so intricate that no ultimate conclusions were reached. Much remains to be done to supplement this work, for we are yet only on the threshold of achievement.

These problems are urgent. We would be but following the object of our Association if we devoted more time to this consideration. It is essential that we keep clear of stereotyped methods if we are to fulfil our highest aim and purposes.

In this short outline I have been able to briefly call your attention to a few vital needs of the times. If I have succeeded in impressing you with the need of renewed efforts along these lines, I shall feel that much has been accomplished, for the record of the American Climatological Association is inspiringly indicative of what the future holds in store.

# REPORT ON THE CLIMATE, NATURAL HISTORY, AND DISEASE INCIDENCE OF THE ANGOLA HIGHLANDS.

By F. CREIGHTON WELLMAN, M.D.

BENGUELLA, WEST AFRICA.

Introduction.
Geographical Position of the Region Studied.
Geology.
Meteorology.
Flora.
Fauna.
Anthropology.
Endemic Diseases.
Effect on Caucasians of Residence in the District.
Conclusions.

## Introduction.

In discussing a region of the earth's surface which is as yet practically a scientific *terra incognita*, the writer finds it necessary to enter rather more into technical detail than would be necessary or advisable in dealing with a district which had already been studied by others. This is especially the case in sketching the flora and fauna of the region, the which constitute (and I do not need to emphasise this point before an audience of climatologists) a very important and unmistakable index of the meteorological conditions obtaining therein —an index more accurate and sensitive than any array of routine observations of the weather. For it is the subtle *ensemble* of temperature, moisture, winds, light, altitude, &c., &c., that fixes the status of a climate for the purposes of the physician, and the effect of this *ensemble* is most readily appreciated (in a country little experimented with clinically) through observation of its plant and animal life. It is by means of such data, too, that a new district can be most readily compared with other better known districts. I hope, therefore, to escape the charge of tediousness on the plea of the relevancy of my evidence, and trust that your patience may be rewarded when you learn (possibly with some surprise) that there exists in Tropical West Africa a climate admirably suited to the treatment of several diseases of the respiratory system.

The part of Angola familiar to me, and which forms the subject of this report, lies about latitude 12° S. and longitude 16° E., and is about 150 English miles square, having as its centre a point 12° 13′ 30″ S. × 16° E., where the meteorological observations given later were made. The altitude averages about 5,000 feet (English) above sea level. At the central point just mentioned it is 4,761 feet. The region is—most of it—a high plateau partly covered with hills and mountains. This plateau is drained by the head-waters of the Kwanza, Keve, Balombo, Katumbela, Kunene and Kubango rivers and their affluents. Politically it is part of Portuguese West Africa.

## Geology.

The district just outlined is a small part of a vast primary system, consisting of various metamorphic rocks, chiefly granitite, granular quartzite, sandstone, diorites, and a few schists. Iron ore occurs in immense beds in one or two localities, and graphite occasionally in seams. Tin, mica, and a very impure limestone are also found in a few places.

Gold, copper, and manganese have recently been discovered in some of the mountains. Conglomerate, breccia-like masses, and quartz and hornblende crystals may be picked up, the latter, with the schists, probably belonging to an overlying unconformable series. As would be expected in primary formations, the soil is generally a red clay. This alternates with a sandy loam running into sandstone. In such regions the indecomposable quartzite often sticks up through the soil. Of course, there is a great mixture of soils in the lowlands and valleys. Huge boulders of disintegration are sometimes seen. Kaolin abounds in the streams, indicating the decomposition of feld-spar.

## Meteorology.

Although lying within the tropics the district has only a sub-tropical climate, as the high altitude ensures a cold season during the months of May, June, and July. The range of the thermometer between the coldest night (usually in July) and the hottest day (in September) is from about 30° to 90° F. Common thermometers may register lower or higher than these extremes. The range, of course, varies with different years. For one year (September to September) the temperature has been carefully observed. The lowest reading has been 39° F., the highest 88°. The year was an exceptionally equable one, and the average range would be greater than these figures.

There are occasionally exceptionally cold nights. Sometimes even hardy plants are killed, and that at some distance from the streams. Ice has been seen more than one-fourth of an inch thick, and the thermometer has registered as low as 27° F. The damp air near streams always feels much colder than that in the bush. In coming away from a stream on a cool evening one passes from a cold stratum of air into one perceptibly warmer.

TABLE.—TEMPERATURE OF THE AIR.

*Observations for One Year, made at Bailundu, lat.* 12° 13′ 30″ *S., long.* 16° *E. Height above Sea Level,* 4,761 *ft.* (*English*).

Mean temperature of the year, 65·85° F.

Annual range of temperature by difference, the mean hottest and coldest, 17·75° F.

Annual range of temperature by difference between the hottest and coldest observed, 48·88° F.

*Observations by Months.*

| Month | Mean highest and lowest temperature of each month | | Mean temperature of each month | Mean daily range | Monthly range by hottest and coldest observed in that month | | |
|---|---|---|---|---|---|---|---|
| | Highest | Lowest | | | Highest | Lowest | Range |
| October ... ... | 77·83 | 63·36 | 70·59 | 14·47 | 82·72 | 55·78 | 26·94 |
| November ... | 76·1 | 60·75 | 68·43 | 15·35 | 82·72 | 57·78 | 24·94 |
| December ... | 78 | 60·29 | 69·14 | 17·71 | 79·7 | 54·84 | 24.86 |
| January ... ... | 75·73 | 60·02 | 67·87 | 15·71 | 79·7 | 49·92 | 29·78 |
| February ... | 76·14 | 60·03 | 68·08 | 16·11 | 83·23 | 52·88 | 30·35 |
| March ... ... | 75·8 | 65·37 | 70·58 | 10·43 | 79·7 | 59·76 | 19·94 |
| April ... ... | 72·44 | 61·5 | 66·97 | 10·94 | 77·9 | 55·82 | 22·08 |
| May ... ... | 65·5 | 46·9 | 66·25 | 18·6 | 76·7 | 43·98 | 32·72 |
| June .. ... | 66·1 | 47·23 | 56·66 | 18·87 | 69·7 | 44·97 | 24·73 |
| July ... ... | 73·28 | 46·89 | 60·98 | 26·39 | 77·9 | 39 | 38·9 |
| August ... ... | 79·55 | 52·76 | 66·15 | 26·79 | 84·86 | 43·48 | 41·38 |
| September ... | 79·49 | 57·6 | 68·54 | 21·89 | 87·88 | 43·45 | 44·43 |

NOTE.—The temperatures above given are according to the Fahrenheit scale, and are, of course, for the shade. In the sun in the hottest season the thermometer will often register over 110°.

The wet season begins with one or two showers in August, followed by two weeks or a month of dry weather. The rains then begin to fall nearly every day. Very seldom is there observed a week without rain. In January usually comes a break consisting of one to three weeks of dry weather. The heaviest rainfall comes in December, February, and March. The usual time for the end of the wet season is at the end of April, but showers occasionally persist until the end of May. Hail sometimes falls with the rain, heavy dews occur all the year round. The amount of rainfall for the year observed was 3 ft. 9 in. (Eng.) but there have been years showing considerably over 4 ft.

With May the dry season begins and quickly brings cold weather (June to July). In August it passes into the warm season again, which persists until the rains come to moderate the hot weather.

One of the prominent features of the dry season is the trade wind, which blows for the greater part of each day from about S.E. The rains come on again only when the wind changes about to nearly N.W. The prevailing dry season wind is usually a fresh breeze to a strong breeze. The rainy season prevailing wind is more moderate, except when it precedes a storm.

During the dry season the sky is almost uniformly cloudless. Towards the beginning of the rains, heavy cumulus clouds form on the horizon. During the rains the clouds are low and thick, ranging from light fleecy to heavy grey. Storms are usually preceded by a strong gale. When the rain begins to fall this decreases to a strong breeze and then to a fresh one.

## Flora.

The flora of Angola is of a type midway between those of Senegambia and the Cape. In the district under discussion the great altitude results in a striking mixture of tropical and temperate forms, the general aspect of which would remind one of European landscapes, were his attention not directed to the fact that he is in the tropics by the presence of myriads of Apocynaceæ, Combretaceæ, Melastomaceæ, &c., all around him. After the grasses, sedges, &c., the Leguminosæ form the bulk of our plant life, the phytogeography of the region in this and several other regards recalling that of Abyssinia. Some members of this last family, such as *Berlinia paniculata* Benth. (native name "Omanda"), *B. angelensis* Welw. ("Omue") and several *Brachystegiæ* form fine groves and "bush," while others, such as the "Onjilasonde" (*Pterocarpus erinaceus*), "Okapilingau" (*Burkea africana*), &c., furnish fine and hard wood. A number of the cultivated food-plants, too, belong to this order. Of Ranunculaceæ some very beautiful erect species of *Clematis* (*e.g.*, *C. villosa*) possess foliage, flowers and fruit, which add much to the aspect of the country, as do a large number of Ampelidæ, some of which (like *Cissus pruriens* Welw.) bear fruit which, if eaten, intensely sting the fauces. The so-called "cedar" (*Tamarix articulata* Vahl.) is often found in large clumps in and near small grassy plains. The fine "Usia" tree (*Parinarium mobola* Oliv.) which is the largest of the Rosaceæ and the fruit of which is called the "gingerbread plum," adds much to the larger aspects of the landscape, as does the order Malvaceæ (*Hibiscus*, *Gossypium*, *Malva*, &c.) to the smaller reaches. Several species of this family (*e.g.*, *Malache hirsuta*) are armed with hairs which sting terribly. Among Burseraceæ the "Ungolo" tree (*Balsemea mulelame*) is prominent in damp localities, often near streams. It is a striking tree, furnishing a fine-grained, hard, yellow wood. Mints abound. One of the most luxuriant and strongest smelling is the Ondembi (*Aeolanthus suavis*) which often overgrows old village sites. Other striking trees, shrubs and plants, representative of the different natural orders commonest here are as follows: the "Chermolia" (*Anona reticulata* L.), "Sapsap" (*A. muricata* L.), and other custard apples of the littoral are replaced in our district by the "Eyolo" (*A. senegalensis*). This dwarf species bears a fruit about the size of a peach, and its flavour recalls the American "paw-paw" (*Asimina triloba*) with which many of us were acquainted in the days of boyhood. A large *Podophyllum* is also found. It has the classic May apple scent and taste. Cabbages are grown by natives and colonists, and a charming watercress abounds in some districts. A lot of delicate Violaceæ decorate the feldt in the wet season. Among Polygalaceæ the handsome "Utata" bush (*Securidaca longipedunculata*) is violently poisonous, being used by the natives in their poison ordeals, and also to commit suicide. Several species of *Portulaca* are used for pot herbs. Okra (called here "Ohingombo") is planted. The giant baobab, or bottle tree (*Adansonia digitata*) one of the most wonderful of African plants, is found on the edge of the district we are studying. Native cotton (*Gossypium spp.*) grows both wild and is occasionally cultivated on a small scale by the blacks. The commodity could be produced on a large scale, I believe, under proper management. Coming now to Sterculiaceæ I must mention the delicious loquot called by the colonists "nespera" and the Kola nut (*Sterculia acuminata*) which is chewed by the blacks in some districts, somewhat as the betel-nut is in other tropical countries. There are some delightful yellow and pink flowering species of *Oxalis*, one of which is very sensitive, the whole plant closing upward around the crown till it looks like a green ball. Oranges, limes, lemons and citrons are cultivated by the whites. I have never eaten finer seedling oranges than are grown here. A large number of wild grapes are found. One of the best tasting is *Vitis heracleifolia*. Beans, peas, indigo, pea-nuts, the ground pea (*Voandzeia subterranea*), the catjang bean (*Vigna sinensis*) and the pigeon pea (*Cajanus indicus*), to mention only a few members of the Leguminosæ, are all cultivated. The beer plant called "Ombundi" (*Eriosema muxiria*) is used in brewing. The fish poison plant (*Tephrosia vogelii*), which the natives call "Okalembe," must not be forgotten. It is cultivated in mealie fields. The pulse family is, as I have said, liberally represented, and I cannot include even bare mention of the most interesting species. Before leaving the order, however, I will call attention to the plant called "Eyumbi" (*Stizolobium pruriens*). If a worse stinging plant exists, I do not know it, and every collector and sportsman has met with this unpopular shrub. Roses and rosaceous fruits (strawberries, apples, &c.), are only seen on plantations and mission stations. In the abundant swamps are some charming little sun dews (*Drosera spp.*). The pomegranate is occasionally grown by Europeans. Guavas, both cultivated and sporadic, are common. Gum trees (*Eucalyptus*) are often planted. The "Ochimama" (*Papaya vulgaris*) is a popular fruit, and one occasionally sees the handsome vines and fruit of *Passiflora edulis*, the "Grenadilla" of the Portuguese. Among the Cucurbitaceæ we find a number of cultivated plants. Some of these are: gourds (*Lagenaria vulgaris*), the big squash (*Cucurbita maxima*), "Asonya" (*Citrullus vulgaris*) and the spiny cucumber (*Acanthosicyus horrida*). Coffee (common in the lowlands) is little cultivated in the highlands. A beautiful *Gardenia* (*G. jovis-tonantis*) is very common; it is a small tree with a peculiar habit, something like that of the "Umbrella tree" of California. Mints are, as I have said, common. One of the most widely distributed belongs to the *Nepeteæ* and is near *Dracocephalum*. Several verbenas may be seen. To the same order belongs the "Usilusilu" (*Vitex umbrosa*) a shrub somewhat resembling the coffee tree. There are myriads of Compositæ on all hands. The "Ochisekua" tree, esteemed for its fragrant bark, is of this order (the species is *Tarchonanthus camphoratus* L.) "Sunflowers," *Calendula* and many others are often seen near villages. Several Lobelias may be found on the mountain-sides. *Plumbago zeylanica*, the "Nakanganga" plant, is used by the blacks as a violent purge and an escharotic. Different species of *Strophanthus* abound, and were formerly employed as arrow poisons by the blacks. Among Asclepiads I can only mention *Chlorocodon*, the "wild licorice" or "Alcaçuz" of the colonists. Several species of non-poisonous *Strychnos*, variously called "Epole," "Emui," &c., bear edible fruit which is sometimes spoken of as the wild orange. The most useful species of Convolvulaceæ is the sweet potato. There are many members of this order represented. Morning glories, dodders, and a fine erect convolvulus which has immense flowers and resembles a mallow in habit, are perhaps the most striking. The Solanaceæ are a fine and valuable family. Egg plants, potatoes, "Cape gooseberries," tobacco, red peppers and the fine flavoured *Solanum tinctorium* are all grown. A large number of wild species (*Atropa*, &c.), are also found. A very useful food plant is the "Utolo" (sesame). It is largely cultivated and the species is the same as that grown in oriental countries (*Sesamum indicum*, DC.). *Amarantus* is commonly eaten like spinach. We must now speak of *Chenopodium ambrosioides*. This plant is the native panacea for all ills to which flesh is heir. It is called "Etiambulu" by the blacks and "Herva de Santa Maria" by the Portuguese. Next follows the Euphorbia family. To this order belongs the most valuable African food plant. I refer to the manioc plant (*Manihot utilissima* Pohl.) The bitter manioc (*M. aipii*) which is poison when raw, is cultivated. Castor oil plants are also grown. A *Euphorbia* (*E. arborescens*) was formerly employed by the bushmen in the southern part of the colony, as an arrow poison. *Jatropha curcas*, the native purge plant, called by them "Opulukua" and the "Osoma" bush (*Euphorbia rhipsaloides*) from which a valuable gum is manufactured, are two other interesting members of this order. *Cannabis sativa*, or hashish (called by the blacks "Epangue"), is smoked by many natives, and is a very injurious habit. Last among the angiosperms I will mention the fig family, to which belong some of the noblest trees in Africa. The "Ulemba" tree (*Ficus psilopoga*), the "Ungili" (*F. lucanda*) and the "Ukuyu" (*F. mucuso*) all attain great size and are planted in native kraals, making them conspicuous points for miles around. Finally, the only gymnosperm I have ever seen in the country is the Mlange cedar (*Widdringtonia whytei*) which is, by the way, not indigenous, but was introduced by the missionaries from Rhodesia. Of the monocotyledons the grasses are, of course, by far the most numerous. I shall first name a few food-producing species. Indian corn, "paddy" rice, wheat (introduced), sugar cane. "Asangu" or millet (*Pennisetum typhoideum*), "Ovasa" or "Kaffir corn" (*Sorghum vulgare* var. *cernuum*), and "Oluku" (*Eleusine coracana*) are the most important. Of the wild kinds, my specimens have generally turned out to be species of *Eragrostis, Trichopteryx, Setaria, Panicum, Paspalum* and *Sporobolus.* Coming now to the sedges, one must mention *Papyrus*, which is common in swamps. A lot of other smaller species, among which are many referable to *Lipocarpha* and *Cyperus*, abound on every hand. There are some fine spiderworts. Cat tails, Aloes (which add much to the landscape), wild asparagus (*A. racemosus* and *A. africanus* chiefly), Callas (*Richardia africana*) and myriads of other related monocotyledons can only be alluded to. Palms come next. Oil palms (*Elaeis guinensis* Jacq.), "Ochisome" (*Metroxylon sp.*), and the "Etome" palm (*Raphia sp.*) are the most useful. The only palm that grows right up into the high altitudes is the wild date (*Phœnix spinosa* Schum. et Thon.). The big yam (*Discorea sativa*) called "Ochisiakala" is cultivated. Under the Amaryllis family must be mentioned the deadly *Hæmanthus toxicaria*, formerly much employed as an arrow poison. There are a number of very interesting orchids, but time fails to even mention species. Some charming small ones have been determined as species of *Disa* and *Disperis.* Under Bromeliaceæ I mention the pineapple and the giant "wild bananas" (*Amomum* and *Costus spp.*). The true banana is extensively cultivated. Cannas, Eddos, and other relations of the arrowroot group are found. Of the cryptogams I can say little, as I have collected comparatively few specimens. Ferns abound. Among the Polypodiaceæ are some fine species of *Polypodium.* A handsome tree fern (*Cyathea*) is common near streams, and Ophioglossaceæ (among which is a fine stag horn, *Platycerium*, and some charming maidenhairs, *Adiantum*) are abundant; indeed, a brake (*Pteris sp.*) is one of the commonest plants in the country. My mosses have not yet been reported on. I must not enter into the discussion of fungi, lichens, algæ (there are some lovely charas and spirogyras), nor indeed any microscopic forms, or my paper will grow to an intolerable length.

## Fauna.

As in sketching the flora of the region, so here I must omit all microscopic species, and I shall furthermore begin my hasty review of the more striking forms of animal life which one sees about him while studying other subjects, by striking out all forms of macroscopic animals lower than the Arthropods. This must be done in order to even include bare mention of the commonest forms of those remaining. Beginning with tracheata, mites are amazingly common. They are free-living and predatory (like, for instance, the big red "velvet spider" *Trombidium grandissimum*), parasitic upon plants or upon animals. Of this latter class, one species is parasitic upon mosquitoes (*Tæniorhynchus* and *Mansonia*). Another lives on the ventral surface of beetles (*e.g.*, on *Gymnopleurus thalassinus*). A third (belonging to the genus *Greenia*) lives in a peculiar abdominal pouch with which certain large bees (*Xylocopidæ*) are furnished. The itch mite is, of course, ubiquitous. The ticks are also an important family. The best known of these is the "Ochihopis" (*Ornithodoros moubata*), which lives in kraals, and bites the inmates at night. This tick is the carrier of the spirochæte of tick fever. *Amblyomma variegatum* (called "Etengi") and *Rhipicephalus decoloratus* ("Ohupa") are other common species. Among spiders a tarantula and a large cylindrical-bodied spider (*Nephila sp.*), which spins a golden web, are prominent. Myriads of smaller forms may be seen on every hand. On a still day in the forest the number of Lycosidæ (runners) and Attidæ (jumpers) is something wonderful. A pedipalp and a true scorpion (both called "Enyenya" by the natives) are greatly feared. An astonish-ingly large group of myriapods are also to be seen. Several Chilopod species are venomous. I mention here a very peculiar fact, which is, so far as I know, new. There are here two genera of Julidæ (*Spirostreptus* and *Odontopyge*), which, of course, do not bite, but which are greatly feared on account of the intense smarting and burning which they leave in their wake if they crawl over the surface of the body. The track left looks like a burn from a hot iron. The poisonous secretion is probably from the *foramina repugnatoria*, which are at the sides of the segments. Coming to insects, Thysanura are abundant in rubbish. Some species are predatory. Orthoptera are amazingly common, and very interesting. The most remarkable is probably the famous *Schistocera peregrinatoria*, the so-called travelling locust. It sometimes appears in such clouds as to literally darken the sun. Their ravages are enormous. They are in turn eaten by the blacks for meat. Several large grasshoppers (*Phymateus*, *Pamphagus*, &c.) defend themselves by emitting an evil smelling mephitic gas. A weird insect is the giant cricket, *Brachytrypus membranaceus*, which is eaten by the blacks. Earwigs (*Karschiella*, *Apachys*, &c.—some of these large exotic species can draw blood with their pincers), Mantidæ (some of which mimic flower heads, and others of which are friends of man, and eat mosquitoes) and other families of Orthoptera are too numerous to discuss here. The termites next deserve special mention. The ravages of some of these (*e.g.*, *Termes bellicosus*) are almost inconceivable. Others (like *T. fatale*) build mounds ten or fifteen feet high. May flies and dragon flies must be passed by with bare mention. I am a friend to two species of the latter, which destroy mosquitoes. Among Neuroptera the ant lions are conspicuous. Of the Hemiptera lice first call for notice. They are to be found on the heads, clothing, &c., of nearly all natives. One form (*Pthirius pubis*) has not been seen. The Coccidæ are to be seen on many plants, as well as are Aphides.

Cicadidæ make the night resonant with their stridulating. There are some huge water scorpions. One smaller species does good work by catching the larvæ of mosquitoes. The ordinary bed bug (*Clinocoris lectularius*) is common. One of the Reduviidæ (*Phonergates bicoloripes* Stål.) habitually preys on *O. moubata* (*vide supra*).

Coming now to Diptera, the only example of the Pupipara yet seen is a species of *Hippobosca* (*rufipes* Th.). Under the Brachycera the ordinary housefly, *Pycnosoma chloropyga*, a new species of *Lucilia*, Sarcophagidæ (*e.g.*, *Sarcophaga africa*, *S. albofasciata*, &c.), *Hylemyiæ* (*e.g. H. fasciata*), *Mydæa*, *Anthomyæ* (*e.g. A. desjardensii* and others have been collected. Several species of *Stomoxys* bite severely. The only Tsetse-fly of the district (*Glossina palpalis wellmani*, Aust.) deserves mention. It is the southern representative of the type, and is found south of 10° to a point as far as 30° east, and possibly further. A large number of Tabanidæ are seen, and felt. The genus *Tabanus* is common. *J. socius*, Wlk., and two species probably new (one near *rubricundus* Wlk. and the other near *latipes* Macq.) are the most often encountered. I must mention, too, eight or ten new species of *Hæmatopota* which will soon be described, as well as a couple of new species of *Chrysops*. One or two species of Similium which bite terribly and plenty of *Tipulæ* appear in the wet season. Midges abound, *Chironomus pulcher* Wied., haunts gardens. Another species bites man, and a third I have seen mulcting caterpillars. *Tanypi* swarm in the woods. Taking up mosquitoes, I have made a large collection of these. Only the commonest and most striking can be mentioned. As to Anophelines, the names of *Anopheles welcomei* Theob., *Myzomyia funesta* Giles (our worst malaria distributor), *Pyrolophorus austeni* Theob. (*nov.*), *Cellia pharœnsis* Theob., *C. squamosa* Theob., *Myzorhynchus mauritianus* Grandp., and *Nyssorhynchus maculipes* Giles will suffice, Of Culicines, *Mucidus africanus*, several *Stegomyiæ*, *Culex hirsuti* *palpis*, *C. viridis*, several *Tæniorhynchi*, *Mansonia uniformis*, *Danielsia wellmani* (Theob.), *Lasioconops poicilipes* and *Heptaphlebomyia simplex* are the best known. Fleas abound. *Pulex irritans* (not common), *Ceratophyllus fasciatus* and *P. cheopis* may be recorded. The "Jigger" *Sarcopsylla penetrans* is a great pest. Lepidoptera, as would be expected, afford an immense number of striking forms. I can hardly refer to my collection at this time. Some diurnals are very rare (*e.g.*) *Papilio mackinnoni*, others afford good collecting (*e.g. Mylothris agathina*, *Acræa acrita*, *Sphingomorpha salpyle*, &c.) while others (Lycænidæ, *e.g. Lampides telicanus*) are a positive drug. Two of the largest and handsomest nocturnal moths are *Antherea arata* Westw. and *Tana pretiosa* Auriv. The larvæ of a number of Lepidoptera defend themselves by means of stinging hairs and bristles. The worst of these belong to three different families, *viz.*, Limacodidæ (Macros), Arctiidæ (Micros), and Liparidæ (resembles larvæ of some Tortricidæ). I have studied the Coleoptera of the colony more exhaustively than any other class of insects. Following are the families figuring most largely in my collections, with a few species (some of them new) illustrative of each. Chrysomelidæ (*Hoplionota wellmani*, Weise, *Leferrea inordinata*, *Melitonoma wellmani*, Weise, *Aspidomorpha*—many species—*Euryope*, *Monolepta*, &c. Cerambycidæ (*Callichroma conforme*, *Clytus semiruber*, *Amphidesmus apicalis*, *Zographus ferox*—eaten by the blacks—*Ceratophorus tirticorne*, *Pinacosterna nachtigalli*, *Philogathes wahlbergi*, *Arubis*, *Monchammus*, *Ceroplesis*—many species, &c., &c.). Anthribidæ (*Polycorynus compressicornis*, *Aneurhinus nigrosinuatus*, &c.). Curculionidæ (*Stasiastes glabratus*, *Siderodactylus* spp., &c.). Tenebrionidæ (*Metallonotus denticollis*, *Macropoda maculicollis*, *Endostomus grandicollis*, *Strongylium muata*, &c.). Bostrychidæ (*Bostrychopsis cephalotes*—destroys timbers and planks—*Xylopertha aduste*, &c.). Malacodermata (*Ceroctis interna*, *Mylabris trifusca*, *Lycus palliatus*, *Lampyris*, spp., &c.). The larva of one of these beetles,

*? Drilus* sp., is armed with piercing and stinging bristles, and is extraordinarily painful if stepped on with the bare foot. Cleridæ (*Phæocyclotomus graniger, Cardiostichus mechowii, Gyponyx tricolor*, &c.). Elateridæ (*Tetralobus mechowi*, many small species). Buprestidæ (*Sternocera feldspathica, Psiloptera wellmani*, Kerr., *Steraspis amplipennis, Chrysobothris fatalis*, &c., &c.). Lamellicornia (*Gymnopleurus thalassinus*—tumble-bug—*Scarabæus paganus*, and many species of *Anomala, Camenta, Trochalus, Pseudotrochalus*, &c.). Coccinellidæ (*Cydonia lunata, Ortalic* spp., &c.). Erotylidæ (*Episcaphula picturata, Palæolylas coccinelloides*, &c.). Paussidæ (*Paussus wellmani*, Wasm., *P. vollenhoveni* and various species of *Paussus*). Carabidæ (*Anthia calida, Scarites fatalis, Chalnius gorgi, Orthogonius impunctipennis, Galerita*, spp., &c.). Cicindelidæ (*Mantichora congænsis, Cicindela mechowi, C. villosa, C. angusticollis, C. wellmani*, W. Horn, *Ophryodera rufomarginata, Cicindela exigua, C. infuscata, C. putzeysi, C. flavipes, C. lutaria, C. osmema auropunctata*, &c.). This list is of course far from exhaustive, but only illustrative. I have been a little more detailed than usual here, because the geographical distribution of beetles is a most valuable climatic index. Several local varieties are not indicated in this list. My collection is in the Deutsches Entomologisches National Museum, and information regarding it can be had from the director of that institution. Under Hymenoptera, ants, mutillas, bees and wasps are all well represented. Many of these are venomous—*e.g.*, *Camponotus meinerti* and *Polyrachis militaris* (ants), *Odontomutilla thymele* and *Barymutilla pythia* (Mutillidæ), *Pelopæus spirifex* and *Synagris cornuta* (wasps, &c.)—and have habits of great interest, but must be passed over. One would like to speak of the driver ant (*Annoma arceus*), the giant wasp and half a hundred other species. The newcomer's attention is always first attracted to two very large carpenter bees (*Mesotrichia mixta* and *Xylocopa tarsata wellmani*, Ckll.).

Leaving the insects now, we find among Mollusca that one curious snail exudes a poisonous secretion. Fishes (which are mostly Siluridæ, with some Siluroids and Cyprinids) can only be mentioned. A new species is *Doumea angolensis*. The commonest fish in the small streams is a barbel (*Barbus kessleri*). Toads and frogs come next. Some common species are: *Rana tuberculosa, Rappia nasuta, Breviceps mossambicus* and *Bufo regularis*.

There is a considerable group of viperine snakes, chief of which is the deadly puff adder (*Clotho arietans*). There are many colubrines; two very peculiar little species are *Glauconia scutifrons* and *Dasypeltis scabea*.

The avifauna of South-West Africa is better known than most of what has been discussed in the preceding survey. Francolins, guinea-fowl, bustards, &c., are fine game birds, as well as are the splendid group of water-fowl of the district. The very large group of birds of prey are interesting; perhaps the snake-killing Secretary-bird is the most remarkable indigenous species. I have collected a number of the smaller fry (which alone promise novelties to naturalists), but time fails to discuss them here. Mammals, too, have been more fully studied than many other classes; I shall, therefore, pass by the noble group of big game animals (Eland, Kudu, Brindled-Gnu, Roan-Antelope, Oribi, Duyker, Speke's Tragelaph, Water-Buck, the lesser Reed-Buck, &c.), and only mention lions, leopards, hippopotami, &c., as typical of the region. It is really among the small mammals that one can hope for rare and new species; I have collected some of these. Dormice (*Graphiurus angolensis* is a characteristic one), shrews (different species of *Crocidura*) and bats (*e.g., Nycteris thebaica*) I have found to be common and to afford interest to the collector. Perhaps as remarkable animals—from the naturalists' standpoint—as we have are the highly aberrant Angolan *Otomys* (*O. anchietæ*) and the "coney" (*Hyrax*).

I close this hasty survey, which I have restricted to the consideration of only the most interesting parts of my own collections, with a reference to two monkeys (*Cercopithecus* and *Cynocephalus*) which, with the "Ochimbundu" Bantu, or native black, are the local representatives of the primates.

## Anthropology.

I present the following brief notes on the type of native which has been evolved by the environment I have tried to describe in the preceding pages. The "Ovimbundu" are Bantus of good physique as compared with other contiguous tribes. They present the general dolichocephalic and prognathous features of the African with the peculiar points that separate the true Bantu type from the pure negro. I give here anthropometric measurements of one hundred normal adults (fifty men and fifty women).

## Endemic Diseases.

I have on two different occasions discussed *in extenso* the endemic diseases of this colony (*vide New York Medical Journal* for August 12, 19, 26, and September 2, 1905, and the files of the *Journal of Tropical Medicine* for 1904-6) and must refer my readers to those discussions for details. The diseases I have found endemic in the highlands under consideration are the following: sub-tertian and quartan malaria, filariasis, ankylostomiasis, cestode infection, bilharziosis, "vomits" (sternodynia neuralis endemica), leprosy, akatama (a tropical neurosis), milk pox, chicken pox, mumps, epilepsy, gonorrhœa, syphilis, yaws, black-water fever, "Tick Fever," climatic buboes, tropical phagedæna, myasis, goitre (only in some districts), trypanosomiasis, ascariasis, and a number of minor ailments. A number of diseases are not endemic such as typhoid fever, tuberculosis, beri-beri, dysentery, &c., only sporadic cases being from time to time introduced. Other diseases such as typhus fever, scarlet fever, measles, rubella, diphtheria, erysipelas, rheumatic fever, cholera, yellow fever, plague, Malta fever, pellagra, scurvy, anthrax, glanders, arthritis deformans, and gout are positively unknown. Were it not for the presence of malaria, the country would be one of the healthiest in the world.

TABLE.

| Sex | Age | Head | | | | | Nose | | Cubital | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Greatest span from gabella to occipital protuberance | Tape measure from gabella to occipital protuberance | Greatest width of head | Tape measure over vertex from zygomata | Span of cheek bones | Length | Breadth of nostrils | Length from olecranon to tip of middle finger | Span from tip to tip of middle finger |
| Males ... | 31·7 | 18·8 | 32·8 | 14·8 | 34·88 | 13·09 | 5·4 | 4·05 | 47·88 | 175·86 |
| Females ... | 32·04 | 18·18 | 32·2 | 13·87 | 32·88 | 12·8 | 5·06 | 4·04 | 44·6 | 162·1 |
| Average ... | — | 18·49 | 32·5 | 14·33 | 33·88 | 12·94 | 5·23 | 4·045 | 46·24 | 168·98 |

| Sex | Arm | | Leg | | Chest | Waist | Hips | Height | |
|---|---|---|---|---|---|---|---|---|---|
| | Around biceps | Greatest size of forearm | Greatest size (thigh) | Greatest size of calf | Not expanded | Natural | At widest (circumference) | Sitting | Standing |
| Males ... | 24·74 | 23·8 | 46·5 | 31·5 | 82·6 | 73·28 | 82·34 | 83·7 | 168·4 |
| Females ... | 23·5 | 22·2 | 45·4 | 32·1 | 81·6 | 76·7 | 81·93 | 81·97 | 155·96 |
| Average ... | 24·12 | 23·0 | 45·9 | 31·8 | 82·1 | 74·99 | 82·13 | 82·83 | 162·15 |

These people number between 200,000 and 400,000.

## EFFECT ON CAUCASIANS OF RESIDENCE IN THE DISTRICT.

The altitude, equable temperature, large amount of sunshine, freedom from dust, &c., render the Angola Highlands an ideal climate for certain classes of persons with irritable air passages. Asthmatics often do well. Nasal catarrhs are greatly benefited and often cured. The effects on chronic bronchitis are marvellously good. As to pulmonary tuberculosis, the existence of malaria (which, however, is of course much less than at the littoral) must be borne in mind. I have known cases to do so well that they refused to leave the country. On the other hand I have known the vitality to be lowered by malaria and acute miliary tuberculosis to supervene. The heart, too, must be considered in view of the altitude. I should hesitate to generalize on the subject, but should reserve my opinion for individual cases. It is, however, certainly safe to say that the region described by me in this report is the healthiest part of tropical Africa. I have seen missionaries in the best of health who have lived here over twenty-five years. Regarded as a place to send delicate men who wish to proceed to the tropics I should certainly prefer the interior of Angola to any other place known to me. Of course I exclude from this statement South Africa, the Canaries and other such regions which are really not tropical, but, strictly speaking, sub-tropical.

## Conclusions.

Summing up what has been said in the preceding pages we have, then, in the interior of Portuguese south-west Africa a high, well-drained plateau with a pleasant, equable climate, a flora somewhat resembling that of Abyssinia, but partaking also of the features of the west coast and of the Cape, and a quite peculiar fauna including many novelties, the result of the combination of a tropical sun and a high altitude. This climate has evolved a fine native race and is suitable for white colonists. Excepting malaria (which is mild compared with most of Africa), the disease incidence is light, and the climate is recommended therapeutically for nasal catarrhs, asthma, bronchitis and other irritable conditions of the air passages.

# A SEARCH FOR A SUITABLE CLIMATE.

BY SAMUEL A. FISK, A.M., M.D.

(FORMERLY OF DENVER, COLO.).

## PART I.

BORN in Massachusetts, I spent six of the first seven years of my life, in St. Paul, Minnesota, where I had "lung-fever," in consequence of a servant, whom I was teasing, throwing a pail of water over me. This simple thing has influenced my whole life, for, from that time, my lungs have been my weak spot.

In the spring of 1880, while a student at the Harvard Medical School, I was confined to my bed constantly, for four weeks, with what was then called "acute lobular pneumonia." It was before the days that we hunted for bacilli, but they were probably there. The character of the attack, and the care and skill of the physicians who passed their opinion upon the nature of the disease, warrant the belief that I had consumption of the florid type. On leaving my room, I went immediately to an outdoor life and a splendid table, in western Massachusetts. Seven weeks of this and two weeks of examinations and worry, filled in the time to my going to the Rangeley Lakes, which I found awfully hot. I then went into the White Mountains, where I stayed until September 1. On November 2, I was in Denver. After ten days I went to Colorado Springs, and in a month's time I was located on a ranche, a mile out of town. April 1, 1881, saw me in a small frontier town, Poncha Springs, one of the toughest places in this country, trying to practice medicine. I took a thoroughly unexpected trip back to Massachusetts that fall, and was gone six or seven weeks. The summer of 1882 found me the resident physician at Estes Park, Colorado. That fall and winter I spent in western Massachusetts, where I had strong hopes of remaining. However, an opening, with a fellow classmate, took me to St. Paul, Minnesota. Desirous as I was of staying there, the melting snow, the penetrating chill of the air, the fur overcoats of the old-timers, worn on April 1, and finally a chill, made it apparent that this was no place for me, and so I went back to Colorado. I shall not soon forget the grateful warmth and dryness of the air on the plains, west of Omaha. This has been an oft repeated experience. I wish now to record a trip to Salt Lake City, over the freshly completed branch of the Denver and Rio Grande, R.R. May 1, 1883, I opened offices in Denver, Colorado, and my experience there covers a period of fifteen years, during which time I was in very active work, and handled, as my fellows of this Association know, hundreds upon hundreds of cases of consumption. Six months after opening offices in Denver, I was attacked with inflammatory rheumatism, and coincidentally with a diabetes insipidus, or at least a polyuria, which has lasted, ever since. The record shows that on leaving college, I weighed 151 lbs. I ran down under this attack to 124 lbs. and to-day I tip the scales at 187 lbs. The cough and muco-purulent expectoration were present, and the fever and sweats were slight, so far as I recall. Since going to Colorado there have been at least two other attacks of pneumonia, a spontaneous fracture of a rib, another attack of rheumatism, the passage of tænia, colds and sore-throats. It must be remembered, too, that I was a stranger in a strange land, working hard all the time. "A workman is known by his chips." Time and time again, as I have been about my work, and more especially at night, I have thanked my lucky fate, that my lines were cast in Colorado. I did not spare myself, but went at all times and everywhere. For years I walked, while others rode; and I always endeavoured to keep warm, and I invariably had a good appetite. My digestion was good, and was considered, although I aimed not to be finical or over-nice. Finally, the American Medical Association came to Denver. I was active in the work of that time, being the chairman of the section of medicine, the chairman of the finance committee, the vice-chairman of the committee-of-arrangements, &c., &c. In all I held seven positions, and when that meeting was over, I went to bed, had a masseur, and I have not practised my profession since. Many thought that I had "progressive paralysis." I certainly have had a form of ataxia, probably of a circulatory nature.

Since then, for six years and a half, I was a wanderer, living in steamer trunks. I spent several months, in the spring of 1901, in California, and was there with this body again in 1902. One winter I was in Nassau, Bahama Islands. I have been in the British Isles four times in all. One summer I was in Nantucket for several months consecutively. Once I was as far east as Sydney, Prince Edward Island, the Provinces, &c., I have been, repeatedly, at certain points of the Maine coast. I have wintered and summered in the hills of New England, and now have my home there. I have been to my old home, in Colorado, time and again. The cities and the country have seen me; and all the time I have endeavoured to lead the "simple life." I have walked hundreds upon hundreds of miles, slept hours upon hours; and have eaten well, but simply.

My reason for wearying you with this long, personal, narration, is that it must furnish the basis for what I have to say. The figures can and must be looked for elsewhere.

When the trouble with my lungs attacked me, I was supplied with money, not lavishly, but in amounts sufficient to take me, and care for me within reason. I thus came under the class that has been wisely spoken of elsewhere, that could do as seemed best. The class whose pocket-books are not masters of the situation. From the time that I began to work, in 1881, I have practically paid my way.

The problem that presented, in 1880, was that of a man, unmarried, aged 24, having a college and medical-school education, and a moderate purse, quite moderate ; broken down with consumption. There were not, nor have there ever been hæmorrhages, and there was a good digestion, and a disposition, on the part of the system, to repair. I was sent to Colorado, and to Colorado I went, as thoughtlessly as any young man ; my medical training did not cut any figure with me. I was sent and I went. In those days Colorado was not the Mecca for the consumptive that it has since become. I regard the choice as in every way a wise one. Why ?

*Colorado* is pre-eminently a land of outdoor life. The constant sunshine invites and it is hard not to yield. This factor of constant sunshine is one on which too great stress cannot be laid. We all know what it means to get out of bed into a flood of brilliant cheer, and it is a great thing to have that cheer stay with one all day long, and day after day, week in and week out. The lack of it is very noticeable to one coming away from Colorado. It is a good deal like getting up at a hotel into a room on the court, one never knows what sort of a day it is. It affects one's spirits all day long. The air of Colorado is remarkably pure and dry. A collection of human beings always affects the quality of the air, and Colorado is wide. The dryness holds most anywhere in the State. It is a rare air, of an elevated region, and the barometric pressure is small. There is a moderate, very moderate, annual precipitation, and the drainage, and the character of the soil, favour soil dryness. There are about two hours of sunshine at Denver, on the first day of January, to one at

Davos. Figures on all of these points have been presented to the profession again and again ; they are accessible to any-one, but the facts cannot be emphasised too often, in my opinion. Are these simple figures to be juggled with, as one turns a kaleidoscope ? or do they hold a vital truth ? There are those who say that in the cure of phthisis pulmonalis, climate does not cut any figure, that change of climate is the thing ; or rather that change of climate combined with suitable diet and regimen. These latter factors can be had most anywhere, and undoubtedly do play a strong part in obtaining an arrest or cure of the disease, but one cannot get them all on the Atlantic coast, or on the Pacific coast, either ; or on the lakes, or in most places. The Colorado air does not come bottled up like a table water, and if one wants it he will have to go after it. Beef-juice, eggs and milk, diet, drugs, brick buildings, &c., &c., are to be had almost everywhere, but the peculiar combination of climatic factors, of which we have just spoken, has to be sought out, and I for one, think that they are well worth the search.

It is possible to get some of them, separate from the others, at some other places. For instance, one can have sunshine, a dry soil and a pure air (when the wind is north, or north-east, right off the water), for some of the winter months, at Nassau. But with it comes the additional facts that Nassau is far south, only a little over 25° north of the equator, that it is tropical in its climate ; that it is depressing in its effects, and when the wind blows from the points to the south, and over the island, as it frequently does, it blows in a perfect horde of mosquitoes ; that the water is cistern water, for Nassau is on a coral reef and the well-water is full of lime ; and that the air may be pure, but it is frightfully humid. One would only go there, at the best, for a few months in the winter, to get away from the rigors of the winter further north, and instead of furs one would be wearing muslins, and be thoroughly uncomfortable at that; Nassau is depressing and does not tend to build one up. It is not the place at all, for one looking for an arrest of this disease. Why bother about it? Some cases of fatty heart; some cases of Bright's disease; some with enfeebled circulation, from any cause; persons somewhat advanced in life, looking for equability of temperature and a moist skin find Nassau, with its malachite sea and tropical foliage, very attractive. But for a young person looking for an arrest of consumption it is not to be considered for a moment.

A semi-tropical climate is that of southern California. It is neither as depressing as Nassau, nor nearly as invigorating as Colorado. The extreme south is about as far south as Charleston on the Atlantic coast. The climate partakes more nearly of that of the tropics. The palms, the eucalyptus, the pepper trees are the chief foliage. In southern California proper, one does not run across the verdure to which we of the temperate zone are accustomed. An occasional beech is to be found in some of the canons around Ventura. I well remember how grateful it was to me, to find the large cluster of elms, in front of the hotel at San Jose. Sitting in front of a blazing fire in the hills of Massachusetts, or trudging through the deep snows of a New York town, a winter spent amongst the roses or orange trees of southern California, seems Elysium. It certainly is unaccustomed. But it must be remembered, for our purpose, that these luxuries are accompanied by *fogs*, dense and wet fogs, and that moisture of the air is very bad for the consumptive.

No one attempts to sit out of doors, after sundown, in southern California, and they do that in Nassau. It is not an unusual thing to find the asphalt around the hotel at Coronado, quite black, in the morning, from the moisture precipitated over night. In the morning the fog comes rolling in from the ocean, and it is frequently eleven o'clock, before this bank of fog is cleared away so that the sun really shines. I recall that on our visit there, in 1902, one of our ex-presidents went round with an umbrella in his hand, prepared for rain. The old-timers did not carry theirs, they knew better.

We are told, in an article in our TRANSACTIONS for 1904, that the writer witnessed a foggy spell of seventeen days duration, at Santa Barbara, in May and June of 1903, but he adds: "The fogs, being high, do not cause the deposit of so much moisture as one would expect from an eastern fog, or 'sea-turn.'" The writer on climate, in that charming little book, "Two Health Seekers in Southern California," says: (p. 142) "Other consumptive patients find Southern California entirely unsuited to their particular malady." As he has already, practically eliminated hæmorrhagic cases, the so-called catarrhal forms of pulmonary disease, the catarrhal phthisis of the older writers, the phthisis florida and the laryngeal phthisis, it does not leave much else for his group called "Other consumptive patients." These two writers are residents of Southern California. They are careful observers, and are telling what they see. Figures, too, show that there are over twice as many grains of moisture to the cubic foot of air in Southern California as there are in Colorado. It is really a moist climate, and as such it is not suited to the consumptive in search of a cure.[1] It can be used, and used wisely, too, for so many other conditions than consumption, that it should be given its just place, by this Association. The roses are perfectly delightful; the climate is soft and soothing; the oranges we all know, but not in an orange-grove; it will stick in one's memory to sit by the gentle Pacific and hear the waves come in. Southern California is so charming, in so many ways that there is no need of her claiming to be a panacea for everything.

[1] Sir Hermann Weber, says: "Another idea, that equable climates are the best in the treatments of phthisis, should likewise (in addition to a warm climate) be much restricted."

It is claimed that the air of mid-ocean is remarkably pure, and one can sail the ocean blue, in search of health. Having crossed the ocean between here and the British Isles, eight times, I can speak on that score, too. I am particularly fond of the water, and have had the good fortune to escape sea-sickness, so far. I have experienced some pretty rough weather, too, and I have always enjoyed it. But however pure the air may be, I have found the vessel to seem cramped, and after a few days, have longed to stretch my legs on shore. I have missed the babbling brook, the green meadows, and the trees. I have wearied of looking over the rail at the gull, or the porpoise. The milk and eggs do not seem altogether fresh. In one way or another I get tired of a vessel, and am glad to get ashore. It seems to me that this feeling would be intensified if one felt that he had to stay there, and moreover, the ship diet would be a serious obstacle. The hills of New England are unnecessarily severe for the invalid, and do not offer the inducements that one can get elsewhere. I cannot understand how the hills of New York can be much better.

It is argued against Colorado, that it is not an all year round resort, that it is too severe there in winter; and to meet this objection, very largely, it has become the thing, of late, to send one's patients into New Mexico, or Arizona for the winter months. This custom, it seems to me is to be deprecated very much. I have rarely seen much good come of it. These are not the places in which the doctor, at home, wishes to put his patient; if for no other reason than that it is too hot by summer. In making the change back and forth, something amiss is likely to happen to the invalid, and one such fatal mistake costs so much.

Colorado is an all year round resort. That is just what it is. The arrest and cure of consumption is not a plant of hasty growth, in many cases it takes years. That State offers abundant opportunity for all the energies that any man can put forth. The danger is that the temptation may be too great. The temperature is not equable, I will admit. I have thought this a point in Colorado's favour, rather than against her. This freshness of the air is invigorating, it is stimulating, and the person seeking a cure is not seeking an opiate as well. This brings up the point I wish to speak of and in such a manner as to emphasise what I have to say. The arrest and cure of consumption requires courage, bold. Is it an easy matter for the invalid to sleep out of doors, in the east, during our coldest winter weather? If the patient is not willing to make an effort to help himself, the attending physician has an almost hopeless task ahead. It is like a drowning man saying "I will drown, and nobody shall help me."

Another objection that is raised is not supported by figures. Colorado is frequently spoken of as being "windy." A careful investigation of statistics, furnished by the Weather Bureau, shows that the average daily velocity of the wind, in Denver, for a period of ten years, was much less than that of Philadelphia or New York, and that it was 85 miles less than that of Chicago, and 101 less than that of Boston for the same time. The question of atmospheric electricity I do not understand. I do know, however, that the air of Colorado is charged with this electricity, and that in the winter time it is very much in evidence. The clothing will snap, at night, as though one had rubbed across the carpet, in order to produce it.

Solly says that the tendency to hæmorrhage is lessened in a high climate. Be that as it may, Reed, of Colorado Springs, pointed out to the Colorado State Medical Society that hæmorrhagic cases did well in the high altitude of Colorado. My own experience, and that of others, would tend to confirm this statement, very decidedly; *i.e.*, altitude *per se* is not a producer of hæmorrhage of the lungs.

Quite a number of cases of laryngeal phthisis have been known to have been arrested. I had them in my own practice, and others did in theirs. Of course the ulcer left a cicatrix on the cord and the voice was affected. But the ulcer was healed, and loud and sustained speech was the rule. I have known this recovery, if it can be called a recovery, to last for years.

In regard to a return East to live, after a recovery obtained in Colorado, many persons fear, or say that they fear, that if they go to Colorado at all they will always have to stay there. "Once in Colorado, always in Colorado," they say. Even if that were so, which it is not, many a worse thing might happen. As has frequently been pointed out, Colorado will fully occupy any energy that one may see fit to give her, and she is capable of giving large return on all such ventures. Our Dr. Knight, for whom we hold the deepest affection, and whose judgment is so universally admired, put himself on record, on this point, way back in 1891, when he said before this Association : "I feel sure that patients cured in Colorado need not all remain there." My own belief is shown by my action. This principle is well established now, by many and indisputable cases. They occur in practice after practice. It is a good plan, however, not to swap horses while crossing a stream, and to make reasonably sure before trying any experiments.

This brings me face to face with a consideration of the so-called "Home Treatment." There is not one of us, I think, but would put himself in the best condition possible to overcome this disease, if he felt certain that he had it. He would take the best steps he could, all things being considered, and that right away. He would not fondle the disease. He would not play with the fire, but would take the most active steps to put it out. The best would be none too good for him. Why should he not do the same by his patients ? Early diagnosis, and fresh air, combined with food, can do wonders, even at home. It seems wise to me to take every step, and that early and not as a last resort. The alternative is death—

of a horrible kind. Why play with it? The question of what to do after recovery, can wait. First secure the recovery. Do not ponder about getting there before the doors are closed, but go. Colorado may rule you out, instead of your ruling her out, and her help is needed.

This means, of course, that Colorado climate must be used properly. It is not enough to simply get there, and then, metaphorically, draw a razor over one's throat by doing all sorts of imprudent things which would not be entertained for a moment at home. But the climate, rationally used, is a great aid to the arrest and cure of most forms of phthisis. Experience has shown this to be true, in thousands upon thousands of cases. It is not every case that even then secures a recovery. Many die. Just so with antitoxin, the mortality is greatly diminished under its proper use, but patients still die of diphtheria. If you have *phthisis pulmonalis* you will, if you are wise, take every step you can to stamp it out, to make your own calling and election sure.

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## DISCUSSION.

Dr. W. Jarvis Barlow: I would not be true to my adopted country if I did not speak in regard to the fogs of Southern California. The statement made in the paper I think applies only to the coast where we have heavy fogs three or four months of the year, especially in the spring time. Seventy-five miles inwards, at Redlands and Riverside, we seldom, if ever, get fogs. I want to make that impression strong, because the author of the paper led us to think that there were fogs everywhere, but if we go back far enough from the coast we get beyond the fog region. Granted that fogs are harmful to lung cases, which I doubt, there are other places in Southern California free from fogs. The fog has the advantage as well of making the weather cooler during the time of the very hot weather, and lung cases do better in cool weather than in warm. Colorado and California men are always talking about their climate. The two climates are similar only in that they have so much sunshine. I believe that the kidney and heart cases do better in Southern California than the lung cases.

Dr. Charles Denison: I want to call attention to the great value of the personality of the author of this paper bearing upon his excellent gift to us in the paper itself. There is, sometimes an implied, if not expressed criticism, that we who talk about Colorado's advantages are personally interested in the locality we represent. My point is brought to mind by remembering that in the Climatological Department of the World's Fair at Chicago, there were reports from all sections of the country, and each physician had the best argument in favour of his own section. Here we have the most authoritative statement that we could get from this Association's membership, from one who has had ample experience in Colorado and who is not now a resident of the State. There are I believe, nine members of this Congress here in Washington, delegated from Colorado ; all but one, I think, could voice an experience similar to that of Dr. Fisk. We all went there for our health, though we have to explain it now, since we are so well. The personal experience of members of this Association is sufficiently ample to prove the value of the climatic conditions, but we have not had so good a chance of expressing it as is done in Dr. Fisk's valuable paper.

Dr. F. I. KNIGHT: I wish to say a word not in regard to the climate of Colorado, as every one here knows what I think of that, but I would like to express my appreciation of the beautiful manner in which Dr. Fisk's "partner" read his paper.

Dr. DE LANCEY ROCHESTER: I am much interested in this matter of sending patients to different climates, and from my experience I have come to realise that there are two places to which we may with advantage send them: Colorado and North Carolina. If I cannot send them to either of these two places, I do the next best thing in substituting the mountains around about my home and in the Adirondacks. My last resort is to employ the home treatment in Buffalo. We ought not to try to substitute the home treatment of tuberculosis for the climatic treatment when we find such excellent results from the latter treatment.

Dr. J. EDWARD STUBBERT: This seems to be in one sense an experience meeting, and, while I have never been in Colorado, I am extremely interested in Dr. Fisk's paper from my own personal experience. I, also, was born in Massachusetts, near Boston, I also developed tuberculosis when seventeen. I was not sent to Colorado, was not sent across the Atlantic, but was sent to sea in the tropics. I came back with the disease, apparently, thoroughly arrested. Four years afterwards I redeveloped it in New York City. The late Professor Loomis gave me three months to live. I spent short times in Lakewood, Atlantic City and the Berkshires. I then went to China where I stayed two years. There I lived in a climate where the sun shone five minutes in twenty-eight days. I came back from China and went South where I stayed for a few months. I came back to New York City and then went to Central America where I remained for five years. We all know that the climate of Central America is, showers from morning to night with the sunshine in between. I then weighed 131 lbs, and now 186 lbs. Dr. Fisk and I, therefore, have two parallel cases, yet one went to Colorado and the other did not. One stayed at home and took short trips, and the other took trips and went to Colorado. I have applied this rule to the treatment of many cases of tuberculosis who had the means to travel, and almost always with good results. Regarding a sea trip, I have crossed the North Atlantic many times, but would not send a patient there because of the necessity of being cooped up on a steamer. In almost every instance of what we call incipient tuberculosis where I have sent patients to the south on a sea trip, they have recovered for they could live and even sleep on deck. It seems to me that for our patients we should prescribe out of door life and change rather than any specific climate.

Dr. WM. C. RIVES: Those who deny the influence of climate upon tuberculosis might as well deny the influence of climate altogether. We all know the enervating effect experienced in going to a southern climate. I recall the effect upon myself of high altitudes in Switzerland, in enabling me to undergo greater exertion, and in giving me an increased appetite, to an extent not observed in our ordinary climates. Therefore, it seems to me, that if climate has this effect upon a person in ordinary health, there is every reason to suppose that in a disease like tuberculosis, which is pre-eminently a disease of malnutrition, the appropriate climate ought likewise to have a beneficial effect. While we may at one time, have overestimated the value of climate, the pendulum is now swinging too far the other way.

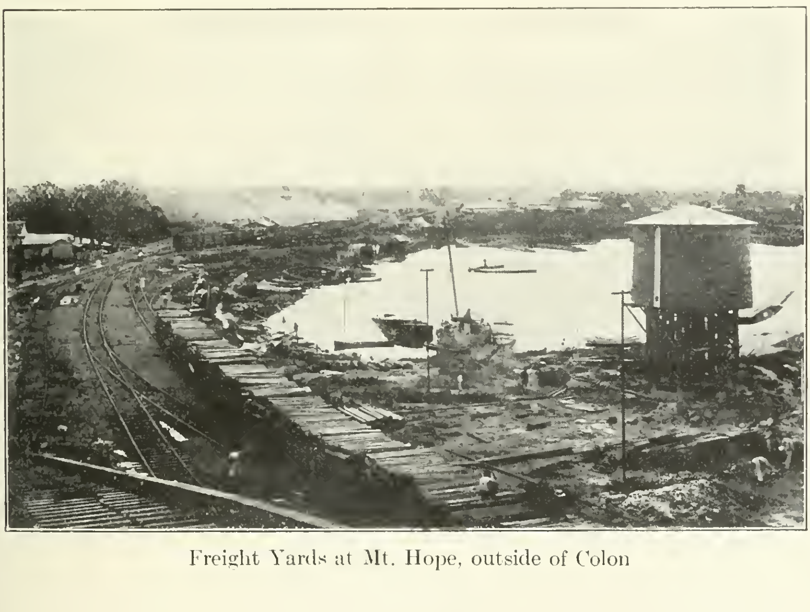
Dr. VINCENT Y. BOWRDITCH: I desire to give my tribute of respect to the paper of Dr. Fisk and also to the method in which it was presented to us to-day. In 1890 at the meeting of this society in Denver, I said that if I were threatened with tuberculosis, I would make my way to Colorado as quickly as possible, and I have had no reason to change that opinion since unless it be, possibly that with lapse of years, I preferred to die earlier at home. I desire now merely to put myself on record to this effect in conjunction with the discussion. In my paper to-morrow I shall have more to say upon the subject. The fact remains that however much we have advanced in successful methods of home treatment, for a large number of cases, I still believe that under certain conditions the more radical change is much the wiser method. Every case must be judged by itself and not placed immediately in a certain class to be treated all in the same way.

Dr. JAMES A. HART: I would like to speak in endorsement of Colorado being the most superior all the year round climate, in its favourable influence upon tubercular cases.

Dr. FISK: I do not want to take issue with Dr. Barlow, except to say that when we were in Southern California in 1902, one night at Redlands I hung my clothes near an open window, and they were so damp the next morning that I thought that I would take cold.

ote.—The following eight illustrations are kindly loaned by the Franklin Institute, d were used to illustrate an article in its *Journal* by Fullerton H. Waldo, F.R.G.S.]

Flood at Panama Railroad at Paraiso, 1907



Freight Yards at Mt. Hope, outside of Colon

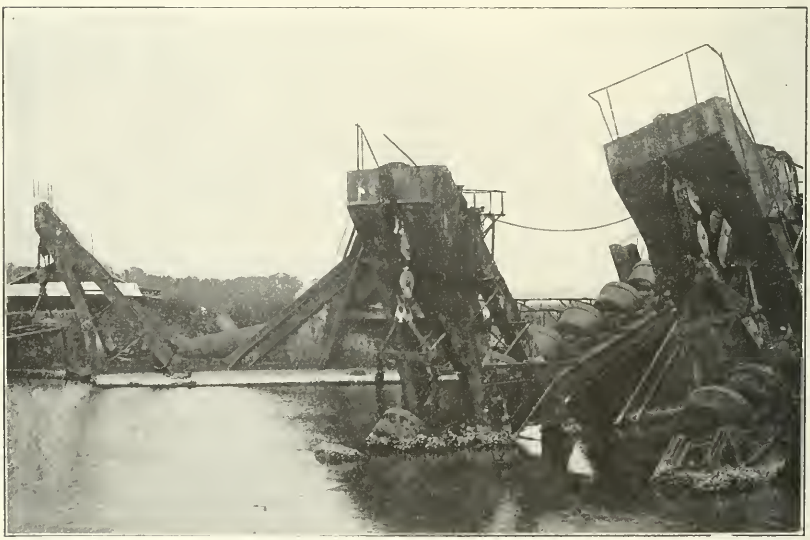
Native Village of Gatun

Rock Cut at Bas Obispo, Culebra Cut

Hospital at Colon

Paving Panama

Bachelor's Quarters, Culebra



Old French Bucket Dredges, Colon

# SANITATION IN PANAMA.

BY J. EDWARD STUBBERT, M.D.
NEW YORK.

WHEN the Nicaragua Canal Company inaugurated its work in 1889, so great was the fear of a high death rate among its employés that extraordinary efforts were put forth in the way of prophylaxis. Nor was this fear unjustifiable. The experience encountered on the Isthmus of Panama, where every railway tie represented a death, the demoralising death rate from yellow fever, pernicious remittent malaria, smallpox, &c., not only among canal employés, but the foreign colonists of Panama and Colon, furnished sufficient grounds for apprehension, and yet the death rate along the line of the canal work from climatic diseases was only seven-tenths of 1 per cent., a percentage so small as to stagger those who believed that the diseases of the tropics are far more fatal than those with which they are familiar at home. This low mortality was almost entirely due to the policy of the Canal Company, which placed sanitation in the preliminary stages of the work ahead of all other considerations. Very different was the record established on the Panama route during the French occupation. According to Wallis, smallpox, yellow fever and paludal fevers in their infinite varieties and forms are never absent from this entertropical region, where they are truly endemic. Nelson, after an experience of five years at Panama, gives his approval of the statement long made with reference to the Isthmus, that it is the grave of the European. It has also been known as the pest house of the tropics and Bigelow says that "here truly life dies and death lives."

In the contracts let by the old Panama Canal Company, it was necessary to import labour from abroad, and in the effort to supply the demand, many labourers were brought from the Island of Jamaica, from the British Antilles and Carthagena, and even from the Mississippi Valley. The sickness and loss of life among these men engaged at work have been variously stated. Of 7,000 men, the Company reckoned that about

FIG. 1.—THATCHED HUTS OF NATIVES OF PANAMA.

1,000 were always in the hospital. From other sources we learn that the sickness and death-rate among the labourers were very high. In Panama and its vicinity, thirty-seven engineers out of less than 100 are said to have died during the months of March and April, 1882. There was not one single French engineer, who had been able to attend to the work beyond one year and a half, although the contract called for two years. In September, 1884, it is said, the Canal Company buried 664 officers and men. The health conditions, as officially reported by the French authorities, do not show the high mortality from diseases due from climatic causes that had been indicated by travellers and other independent observers, but Heffenger declares that it was impossible for him to obtain access to the health records of the Panama Canal Company, and that the impression gained by him, after investigating the matter privately was that the public reports were garbled and incorrect; but again it is stated that he was informed by leading physicians of Panama that in the first eleven months, during which preliminary work in the canal was under way,

Fig. 2.—View from Ancon Hospital.

65 officers and 800 men died of disease. Of labourers brought from the United States during this time, before the end of the second month one-half was on the sick-list, or enfeebled by sickness already sustained. Those of us familiar with the Panama of olden days can well remember the morning and evening death train to famous Monkey Hill, and the foregoing statements as to the fatality of the climate along the Panama route are not at all exaggerated. It has been roughly estimated that in the construction of the Panama Railway, every cross tie represented a human life. So thoroughly was the pro-

fessional mind of America and Europe imbued with these ideas as to the lack of healthfulness of the Panama route that when the first Annual Report of the Medical Department of the Nicaragua Canal was published, a secret commission was sent over from England representing the Colonial Department, and certain large contractors to investigate its truthfulness, and before leaving Nicaragua they called upon the writer, disclosed the purpose of their mission and complimented the Company

FIG. 3.—PRESIDENTIAL PALACE AND HOME OF PRESIDENT AMADOR, PANAMA.

upon the results of its thorough sanitation. The comparative results of the death-rate at Nicaragua of seven-tenths of 1 per cent. as against a 67 per cent. death-rate at Panama was naturally startling.

Then came our experience in Cuba where Colonel Gorgas, the present efficient head of the Panama Road wiped out yellow fever and made Havana a health resort instead of a pest hole. These two experiences of the American people had now thoroughly demonstrated the fact that the tropical zones are not necessarily unhealthy nor are their diseases fatal to

Europeans. The local conditions at Panama first encountered by the American Government were, of course, the same as existed during the French *régime*, that is the reason that so much money and time and labour have been spent in sanitary work on the Isthmus. One cause of disease was the utter lack of rigid quarantine service; therefore the Marine Hospital Service established quarantine stations at Colon and Panama, thereby preventing the importation of yellow fever, smallpox

Fig. 4.—Part of the Barracks at Empire.

and the bubonic plague. These marine officers were all placed under the direction of Colonel Gorgas.

Another cause of the great sickness that existed during the French *régime* was the condition of filth and rank vegetation that covered the Isthmus from one end of the line to the other. City health board laws were unknown, or poorly practised, in both Panama and Colon. The situation of Colon was so low as not to permit of drainage. The so-called Front Street was paved with boards, and back of this stagnant pools of water filled with filth unmentionable festered under the tropical sun. The mosquito was king of all he surveyed and in his indus-

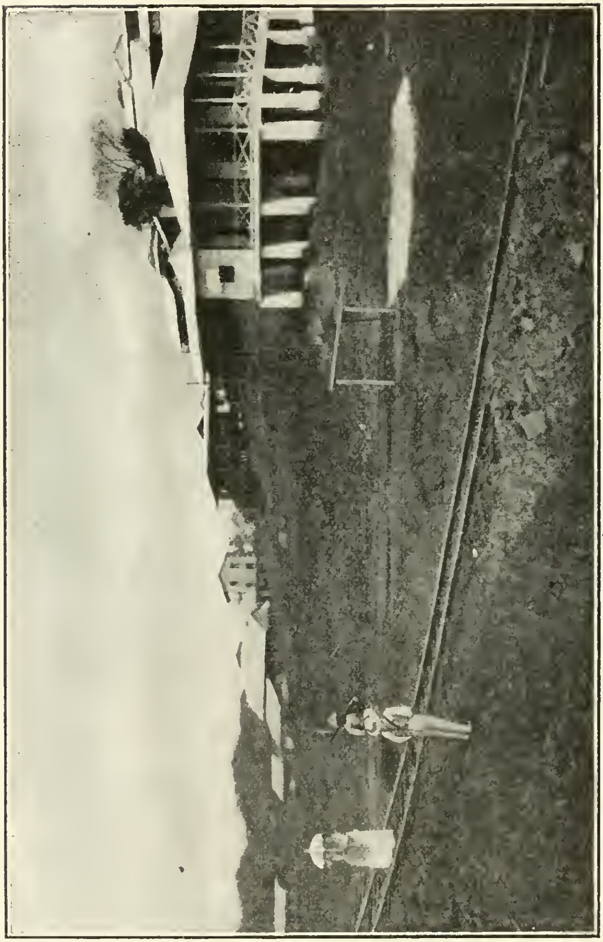


Fig. 5.—The Marine Barracks at Empire.

FIG. 6.—LABOURERS' BARRACKS LEFT BY THE FRENCH COMPANY.

trious manner inoculated one individual after another. The streets of Colon and Panama were in many places impassable and in all places unsanitary ; sewerage was an unknown factor and the tremendous fall of tide at Panama, showing an average of 26 feet twice daily, left bare for some distance from the old walls of Panama the coral reefs at very low tide.

Then again, the methods of living of the employés were conducive to ill-health. They were mostly paid stated wages and allowed to buy their own food and live as they pleased. It can be readily understood how under such conditions a small percentage of their money was spent on food and proper lodgings while the larger part was wasted on drink, women and gambling. Enlistment on the sick or hospital roll was not compulsory, and therefore various diseases had a thorough hold on the patients before they came under treatment. This was the condition of affairs which confronted Colonel Gorgas when he assumed control of the sanitary work on the Isthmus of Panama. Truly it was an enormous work that he had to undertake.

At Colon, Front Street was paved, and the streets at Cristobal and on the beach were improved. Houses of labourers in the back streets of Colon were inspected and in many instances reconstructed. In Panama a complete sewage system was installed and the streets throughout the city torn up and repaved. The main sewer discharge was carried out some distance from the city and discharged beyond the Coral Reef in the Bay. In Colon some of the lower streets had been raised a few inches from the level so as to give proper drainage. A street cleaning and garbage cleaning corps was organised, streets were sprinkled, rats were exterminated as far as possible from the city, sanitary inspectors inspected frequently the yards and the rears of houses, native houses were entered, cleaned and whitewashed, mosquito brigades were formed and continued their warfare until the mosquito is now almost a thing of the past; disinfection brigades, much to the disgust of the natives, entered the houses and cleansed them after the presence of infectious disease, and a sick inspection corps patrolled the city discovering the sick and sending them, whether willing or unwilling, to the hospital.

Then was taken up the inspection of water tanks and water supply. In the old days open water tanks abounded and became breeding spots for mosquitoes. The Comacho and Mount Hope reservoirs were built, and to-day the water supply of both Panama and Cristobal is unsurpassed anywhere in the world. During the year 1906, 809 vessels were inspected and passed at the ports of Ancon, Panama, Colon and Cristobal. Ancon and Panama are on the Pacific side and Colon and Cristobal are on the Caribbean. The very commodious hospital of Ancon, which is beautifully located outside of Panama, was thoroughly overhauled and supplied with mosquito netting for the windows and for the verandahs. On Colon Beach the Colon Hospital was renovated and greatly enlarged, and also protected from mosquitoes. Subsidiary hospitals have been established along the line of work, notably at Miraflores, Bas O Bisko, Empire, Paraiso, Las Cascadas and Gorgona. An ambulance corps service between these receiving hospitals and the main ones at the end of the line has been established on the railway and makes daily trips. In the Island of Toboga, situated well down on the Gulf of Panama, the old French Sanatarium has been remodelled and refurnished and is used as a retreat for convalescents. We all remember the recent criticism in the newspapers of the treatment of Uncle Joe Cannon by Colonel Gorgas, but as physicians we should all take our hats off to him for enforcing, even among the favoured, his just, although strict, sanitary rules in the quarantine service. This somewhat apparent severity exercised by him and his efficient subordinates in every line of sanitary work herein mentioned has borne its fruit, and to-day the

Fig. 7.—Colon. Esplanade on the Old Sea Wall looking out on the Bay.

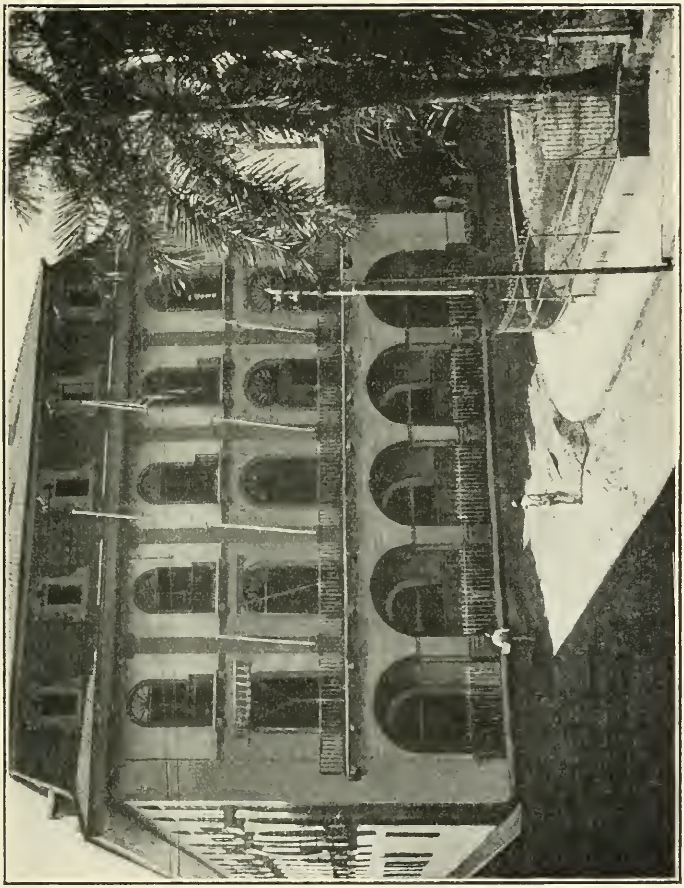


Fig. 8.—Canal Building at Panama. Department Offices.

American people can truly point with pride to the wonderful work accomplished in so short a time, whereby Panama has been made a safe and healthful resort and abiding place, not only for its natives and those of the West Indies, but even for the Anglo-Saxon. Yellow fever is now apparently a thing of the past in this region. Malarial fever in its various manifestations, while still present, is so in a much less marked degree than formerly. Tropical and amœbic dysentery under the improved sanitary conditions and water supply should be rarely met with in the future. An incorrect idea prevails in the States regarding the fatality of the different forms of malarial fever met with in the tropics, and it may astonish many of you when I state that the average duration of an attack of remittent malarial fever was in Nicaragua four and a half days, and in Panama about seven and a half days, in contradistinction to its fourteen days run under similar treatment in the United States. Labourers along the Panama route are subject to all diseases, outside of the infectious class, that they may contract in construction work in our own country, but the bugbear of yellow fever, bubonic plague, smallpox and pernicious malaria have been, we believe, successfully eradicated. Many unauthorised statements are made from time to time by travellers who fly across the Isthmus, fleeing from imaginary disease as a saint would from the devil, and are printed throughout the country as statements of actual facts. I well remember one steamer load of representatives who made a so-called inspection tour of the Isthmus, but carefully got on board their ship before sundown and slipped out each night to sea lest some of these hobgoblins should catch them. I have been told that one of the former high officers of the Government started one day from Panama to Colon, intending to remain there five days and then take a steamer to New York, but on the train crossing the Isthmus he met a fellow passenger, who told him that pernicious malarial

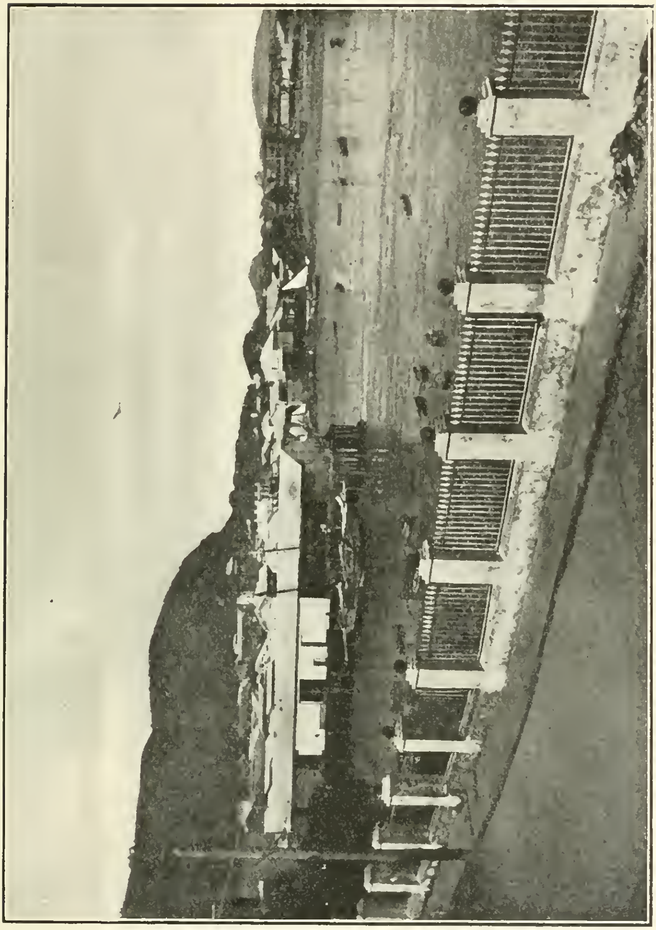


Fig. 9.—View of Harbour and Part of the City of Panama.

fever was much more dangerous to the patient than yellow fever, whereupon he held the steamer that was to sail that day, some five or six hours, transacted his business and fled for New York. You all remember a noted writer who spent about eighteen or twenty hours on the Isthmus and then wrote a scathing article regarding its sanitary conditions. I will show you in a few moments a picture of the reservoir supply-

FIG. 10.—THE GREAT CANAL EXCAVATION AT CULEBRA.

ing Colon, which he said did not exist, but which was there at the time of his visit.

In spite of these unqualified denouncements of the sanitary policy of the government and untruths regarding the healthfulness of the Isthmus which we must admit were based upon historical facts of the past, I have no hesitation in stating that to-day America has made of Panama an abiding place for its citizens far more healthy than many of the Southern States and equally so with New York and our other large cities.

The old travellers to the Isthmus of Panama have vivid and burning recollections of the discomforts of the Grand Central Hotel and one or two other hostelries of smaller size and less repute. Comfortable living quarters for foreigners were unobtainable, or, if at all, in small numbers. There was a tendency for the people to crowd themselves into the termini of the Canal line. The Government has created new towns

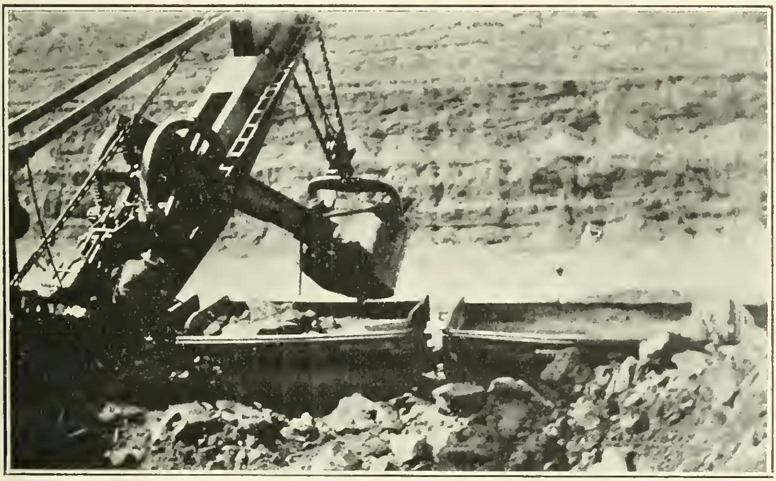
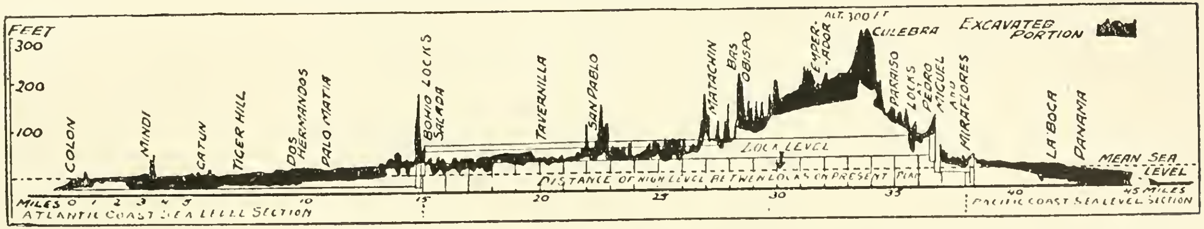


FIG. 11.—STEAM SHOVEL AT WORK AT CULEBRA.

along the line of work. They have erected hotels, and at Ancon can be found the Tivoli, of which I will show you pictures, which is as comfortable as any seaside hotel in the United States. These towns have been laid out under sanitary inspection, and the hotels and the additional quarters for married and single men have also been built under strict inspection. They are all screened, as are the hospitals. They are located as far as possible on high ground so that at all

# SECTIONAL VIEW OF THE PANAMA CANAL




According to present plans, ships were to be elevated at Pedro Miguel and Miraflores on the Pacific end and at Bohio on the Atlantic end, by great locks, making the level of the water between the locks as shown above and the elevations would have to be excavated to that level. The dotted line shows the line of a sea level canal, which Chief Engineer John F. Wallace seems to favor, and which would require much more excavating and entail much greater expenditure.

times the inmates are in a comparatively cool atmosphere and enjoy the breezes which blow across the Isthmus. Large store houses have been established at Ancon and Cristobal. Cold storage cars have been installed on the railway line, and therefore healthy and palatable food is supplied at a low figure to the consumers.

Finally, so greatly had the conditions been improved by the sanitary methods in vogue that in 1906 only 28 per 1,000 were on the sick list. The ratio of deaths per 1,000 was 41. The highest mortality was among the blacks, in all probability attributable to their low vital resistance. Yellow fever has been apparently exterminated, but of course sporadic cases may slip through the quarantine. (The last case of yellow fever on the Isthmus occurred during the month of May, 1906.) Practically all the quarters of employees, officers and hospitals have been permanently screened. The average number of men employed in the Sanitary Department for the year 1905 was 1,842, for 1906, 2,373. The total number of physicians in the Sanitary Department in February, 1907, were 87. The total number of male nurses, 26, the total number of female nurses, 103. There are at present nine hospitals and one sanitorium in existence. The average daily per capita cost for patients is $33\frac{1}{3}$ cents gold

## DISCUSSION.

Dr. Roland G. Curtin: Dr. Stubbert alluded to the report of Mr. Bigelow, the correspondent. When the politics of such men are understood it is not hard to fathom their motives. As soon as the Canal is built across the Isthmus the Transcontinental Railroads are going to lose almost all the heavy traffic. Hence the fight between President Roosevelt and the Transcontinental roads as shown by the trouble with the engineer. It is important for us to uphold the hands of the President because it is a commercial necessity to the whole world to have this great Canal built. Earthquakes on the Panama route are very slight and infrequent. The arch shown in one of the views shown by Dr. Stubbert is 26 feet across and almost perfectly flat. This arch has been there for two or three hundred years, and yet there has not been sufficient earthquake shock to dislodge it. If it had been on the "Nicaraugua route" it would have been done long ago. The "Panama route" is not located up in the "earthquake belt." An old man who has lived at Colon for over forty years, told me that the story that a person died for every tie laid on the Panama railroad was an exaggeration. Being there so long he could say positively that it was not true like many of the other stories told by correspondents and travellers. While I was in Panama city the U.S. liner "Boston" was off the city, and just after I left eight cases of yellow fever broke out on the vessel. It could not be understood how the fever got on the "Boston" because so much care was exercised on shipboard. I got up one morning to go on an excursion to Tabanna Park, a little way outside of the city of Panama and I saw a lot of the sailors from the "Boston" in bare legs and arms wandering around in the Chinese quarters which was just the place where most of the yellow fever was contracted.

Dr. STUBBERT: In reference to the report of the death rate on the Isthmus, I would like to say that I kept very careful records of the Nicaraguan, Cuban and Panama death rates. The official death rate of Panama has never been tabulated. The death rate on the Isthmus was enormous during the French *régime*. At Nicaragua it was .7 of 1 per cent.

# THE CLIMATE OF NEW MEXICO.—NATURE'S SANATORIUM FOR CONSUMPTIVES.

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## INTRODUCTORY.

MANY inquiries are received from physicians and others concerning the climatic and other conditions in New Mexico, and the literature on the subject is so voluminous, and there being, so far as I know, no single publication of moderate dimensions covering all the points upon which information is asked, I thought it might not be amiss to collect and publish in a convenient and condensed form authentic and unprejudiced observations on the subject covered by this paper, to meet the demands for information above referred to.

New Mexico alone is treated of in this article, partly for the reason that it is the only portion of the "Arid South-west" with which I am personally acquainted, and because the conditions prevailing in New Mexico are in a large measure typical of the entire region; I speak not only from a study of the official records and reports, but also after a residence at Fort Stanton in Central New Mexico of about six and a half years.

## GEOGRAPHY.

Geographically, New Mexico lies south of Colorado, east of Arizona, west of Texas and north of Texas and Mexico. It extends from the 37° of north latitude to the 32° of north latitude, with its south-western corner going as far south as

31·3°. The 103rd meridian west of Greenwich forms its eastern border, and the 109th its western border. New Mexico is a portion of that region known as the "Arid South-west," which is composed of Colorado, Western Texas, New Mexico, Arizona, and Southern California; the climatic conditions prevailing in this entire section possess the same general characteristics, although in various degrees, as modified by latitude, altitude and topography.

## Topography.

Generally speaking, New Mexico is mountainous, with here and there elevated table lands. The mountains are portions of the Rocky Mountain range, and extend in a general north and south direction from its most northerly to its extreme southerly boundary. The mountains and foot hills extend to its most easterly border on the north, and its plains and low altitudes are found in the south-eastern corner; but even here the altitude exceeds 3,000 feet above sea-level. The mountains of greatest altitude are found in North-west and South Central New Mexico; the Truchas peaks in Santa Fé County are the highest in the territory, rising to an altitude of 13,275, 13,140 and 13,060 feet respectively. Here and there in various portions of the territory are to be found numerous mountain valleys, varying in width from a few hundred yards to several miles, and surrounded on all sides by high mountains, and in many instances traversed by beautiful streams of cold, clear, pure water, which have their origin in the surrounding mountains. The tendency of these streams to sink into the ground upon reaching the plateaus, and the scarcity of fuel in those regions, where the roots of the mosquito bush are used as fuel, have led to the localism, which originally applied to the stakes plains of West Texas, being also applied to a portion of New Mexico: "The land where one must climb for water, dig for wood, and spell 'hickory' with a 'J'"; this last clause, of course, referring to the pronunciation by the Spanish of the letter "J." The mountainous and hilly character of the topography of New Mexico has a most important bearing on its climatic conditions, as I shall attempt to show later on. No portion of the territory of New Mexico has, so far as I have been able to ascertain, an altitude of less than 3,000 feet, and the greater portion of it is more than 5,000 feet. The altitude also modifies very materially its climatic conditions, especially with regard to temperature.

## Climate.

(*a*) Climate has been defined to be the condition of a place in relation to the various phenomena, as temperature, moisture, &c., especially as they affect animal and vegetable life.

(*b*) The sum of atmospheric conditions as recorded for a long period of time; or, in other words, it is the totality of weather, while weather is the physical condition of the atmosphere at a given time, or during a limited period.

"The climate of a place is ascertained by a study of its continuous weather records for a long period of years; the atmospheric pressure, the temperature, the rainfall, the snowfall, the time and frequency of frost, the extremes of heat and cold, the direction and velocity of the wind, the amount of air that flows from different points of the compass, the amount and intensity of sunshine, the humidity and transparency of the atmosphere, and its electrification." (Professor Willis L. Moore.)

Professor Moore also says: "Climate affects the health, happiness and well-being of people more than any other condition that goes to make up their environment. Within the broad confines of the United States there are many, but not all, shades and varieties of climate. One of the questions most frequently asked is, 'Where shall I find a climate possessing both dryness and equability of temperature?' To this interrogatory reply must be made that the ideal climate, as regards equability of temperature and absence of moisture, does not exist in the United States, but that the nearest approach to it will be found in the great south-west."

"The temperature of the south-west is not equable, in the sense of having an extremely small *daily* range, but it possesses the quality of annual uniformity in a greater degree than will generally be found elsewhere, except on the sea-coast, and there the humidity is great."

The above testimony from such an eminent authority should be convincing as to the climate of the great South-west, as the conclusions of Prof. Moore must, by reason of his official position, have been based upon a long period of scientific observations.

The climatic conditions prevailing in New Mexico are practically the same in general features as are to be found in the entire region included under the term "Arid South-west," the difference being in degree rather than kind. In general terms it may be said that the climate of this region is characterised by a large percentage of possible sunshine, a low degree of relative humidity with low temperatures at night and a low percentage of soil moisture; these conditions being modified to a greater or less extent by the topography of the particular locality under consideration, as well as by its altitude and latitude. Much more than half the yearly rain falls in July and August—usually in the afternoon—when it is most needed by growing vegetation and for cooling the atmosphere. Average temperatures for the "Arid South-west" in general, even for the Territory of New Mexico, would be valueless, because of the wide difference between North and South New Mexico. There is a difference of more than 5° latitude, which alone would have considerable influence on the temperature of the northern portion as compared with the southern. Then there is the effect of altitude, as well as the topography, to be taken into consideration. There is usually in all this region a very considerable daily range of temperature, running as much at times as 50° or 60°, and averaging about 30° to 40°. The low temperatures, of course, occur at night, and therefore do not detract from the attractiveness of the climate as a whole even in winter, while in summer the low night temperatures make it possible to sleep in comfort, and in most localities the use of blankets at night is necessary for comfort, even in summer. Even during the hottest days in summer when the thermometer frequently registers from 80° to 90°, and in some localities even more, the heat is never oppressive on account of the low relative humidity, and sun-stroke, so common in the cities of the East, is practically unknown in the "Arid South-west," and while a man may perspire pretty freely if actively exercising in the sun he is quickly relieved upon seeking the shade where the perspiration evaporates almost instantly. On the other hand, the coldest days in winter are comfortable if the sun is shining, and it usually is. Overcoats are rarely worn on sunshiny days, and it is a common occurrence at the Fort Stanton Sanatorium to see patients during mid-winter lounging or playing croquet in their shirt sleeves with the thermometer showing a temperature of from 30° to 50° F.

That feature of the climate of New Mexico which detracts more generally than any other from its general excellence, is the occurrence of high winds in the late winter or early spring months. These winds prevail with variable frequency during the season mentioned, throughout the Territory, being more severe in the less mountainous regions. They are also referred to as "sand" or "dust storms." Their direction is usually from the west, south-west, or north-west, and they frequently prevail from two to three days at a time. After the wind has been blowing from twelve to twenty-four hours, a greater or less quantity of fine dust becomes apparent and is extremely annoying. The amount of dust is governed not only by the topography of the locality—the wind and dust both being less severe in localities protected by high mountains than on the plateaus—but also by the amount of rain and snow fall in the preceding months. During the past four years the rain and snow fall have been above the normal, and during these years wind storms have been very rare with scarcely any dust at all. During the years from 1901 to 1903, inclusive, when the entire precipitation was less than ten inches at Fort Stanton, and generally low throughout the Territory, "three-day" wind storms prevailed at frequent intervals throughout February, March and April. The velocity of the wind during these storms is from thirty to fifty miles. The wind usually blows steadily, reaching its maximum intensity within a few hours, and continues with the exception of a lull about sun-down for the usual full period of three days. Such storms have an undoubted effect on the nervous system of patients, most of whom become irritable and cross on the second day and almost unbearable on the third. When the storm subsides the fact is clearly recorded on the smiling and cheerful faces of every one.

The second objectionable feature of the New Mexico climate is a wind which we occasionally have during the winter and spring months. It blows out of the east or south-east, and like the wind just treated of these storms usually last two or three days. After the first fifteen to twenty hours clouds appear and if the winds continue there is usually fog, rain or snow, according to the season. It is extremely rare that these storms continue for more than three days at a time, but in a residence of more than six years in New Mexico I have seen one period of east winds with alternating fog, rain and snow, which prevailed for sixteen days, with two intervals of one day each during which the sun shone beautifully.

Beyond these two winds the climate of New Mexico is pretty nearly perfect; we do have, it is true, very low temperatures at times, and in some localties, as the Pecos Valley, where the north wind has a long sweep, occasional blizzards occur, but our low temperatures almost always occur at night when every one is comfortably tucked in with plenty of blankets, and during such times our sunshiny days and dry atmosphere make life a delight.

These few objectionable features have been included along with the excellencies of the climate in an effort to be perfectly fair, and avoid disappointing those who come to New Mexico expecting to find it literally a land of perpetual sunshine and balmy breezes.

To put it otherwise, while the climate is always superb we occasionally have bad weather; and no amount of description, no multitude of statistical tables, can give an adequate idea of the delightful, invigorating climate of New Mexico, which must be experienced to be fully appreciated. The warm, sunny days of winter, no less than the cool, shady days of summer, invite the invalid and the robust to the out-door life.

I have perhaps conveyed an erroneous impression regarding the frequency of the so-called three-day winds—as a matter of fact the typical storm described is rather rare—more frequently the wind ceases after blowing twelve to forty-eight hours.

## Soil Moisture and Evaporation.

The effect of soil moisture upon the health of a locality is well recognised, and a low percentage always makes for salubrity of climate. A study of soil moisture undertaken by Professor Weinzirl and others at the Hadley Climatological

Laboratory of the University of New Mexico at Albuquerque shows the following results :—

TABLE SHOWING MOISTURE CONTENT OF SOIL.

| Date | Place | Character of Soil | Depth, Inches | Moisture, per cent. |
|---|---|---|---|---|
| December 28, 1899 | River Bottoms ... | Sandy ... | 8 | 30·9 |
| ,, ,, ,, | Highlands ... | ,, ... | 8 | 1·9 |
| ,, ,, ,, | Mesa .. ... | Clay ... | 8 | 3·9 |
| December 10, 1901 | ,, ... ... | ,, ... | 4 | 8·5 |
| ,, ,, ,, | ,, ... ... | ,, ... | 10 | 10·2 |
| ,, ,, ,, | ,, ... ... | ,, ... | 36 | 4·6 |
| May 2, 1902 ... | ,, ... ... | ,, ... | 4 | 5·4 |
| ,, ,, ... | ,, ... ... | ,, ... | 10 | 7·2 |
| ,, ,, ... | ,, ... ... | ,, ... | 36 | 4·8 |

From this table it will be seen that aside from the sandy river bottoms where the moisture was 30·9 per cent. at a depth of 8 inches, the highest percentage was 10·2, which, when compared with the ordinary percentage found in arable land of from 20 to 40 per cent., shows the soil of New Mexico to be very dry indeed. Even the heavy summer rains only penetrate the ground 12 or 15 inches at most, and this moisture is quickly returned to the atmosphere by evaporation.

The annual evaporation of water at Albquerque—a tank 2 feet square by 1 foot deep, made of wood and lined with heavy zinc sheeting being used—showed the evaporation to be something more than 80 inches as against about 40 inches at Boston.

These tests were also conducted at the Hadley Laboratory, the purpose being to determine in a practical way the dryness of the New Mexico climate.

## LOCALITIES.

The following places have been selected as fair examples of the various portions of the territory of New Mexico :—

Alamogordo, Albuquerque, Carlsbad, Deming, Fort Bayard, Fort Stanton, Las Cruces, Las Vegas, Roswell and Santa Fé. These localities vary in altitude from 3,122 feet at Carlsbad to

7,012 at Santa Fé. Some are located in close proximity to the mountains and others on the plains. The list might be enlarged very greatly, but the number given is sufficient to illustrate fairly well the various climatic conditions to be found within the borders of New Mexico.

*Alamogordo.*—In Otero County, elevation 4,500 feet, is located on the main line of the El Paso-Rock Island route, eighty-six miles north of El Paso, and only a few miles west of the foot hills of the Sacramento Mountains, which rise to an elevation of about 9,000 feet. It is a town of about 4,000 inhabitants, electric lighted and supplied with an abundance of pure water, which is piped from springs in the mountains some fourteen miles distant. This town, less than ten years ago, was a desert, but since the advent of the railroad, and by means of irrigation, great numbers of shade and fruit trees have been grown, and it is now one of the most attractive towns in the south central portion of New Mexico. A large sanatorium is now in course of erection just out of the town toward the mountains. One very desirable feature of this locality is the availability of any desired altitude from a little over 4,000 feet to as much as 9,000 feet within a few miles. The mountains afford protection from the severe winds, and while the summers are warm, the temperature having reached as high as 109° during the past five years, the winters are very delightful ; the lowest temperature recorded for the same period has been 8° above zero. The greatest number of cloudy days recorded in any one year since 1902 was 27, and the number of absolutely clear days has ranged well above 225 ; 109° seems in figures a very high temperature, but when the absence of humidity is remembered it will be easily understood that such a temperature is by no means attended with any considerable discomfort. For the same reason comparatively low temperatures are experienced without suffering. The minimum temperature occurs about 3 or

4 o'clock, a.m., and the temperature will rise quickly 20 or 30°, or even more, shortly after sunrise. The average precipitation, except during the past two years, was about 8 inches, and while I have no exact data as to humidity it is unquestionably very low.

*Albuquerque*, in Bernillo County, central New Mexico, is the most considerable town in the Territory. It is situated on the main line of the Santa Fé Railway, in the Rio Grande Valley, at an altitude of 5,200 feet. The valley of the Rio Grande at Albuquerque is quite wide, and the town has, therefore, less protection from the winds than some others, although the Weather Bureau does not furnish accurate observations on this point. It has long enjoyed an enviable reputation as a resort favourable to consumptives, and the hotel accommodations are good. Malarial fever prevails to some extent in parts of the town lying in close proximity to the river. The population is perhaps 15,000, and there are such modern conveniences as street cars, electric lights, water works, gas and sewers. The annual rainfall is between 7 and 8 inches, and the mean annual temperature is 55·7. Within twenty-five miles there are the mountain resorts of Whitcomb Springs, Coyote Spring and Devil Canon, the last being a popular camping ground.

*Carlsbad*.—A growing and prosperous town in the Pecos Valley, has an altitude of 3,122 feet. All this region is developing rapidly, mainly by reason of the excellent supply of artesian water, which is extensively used for irrigation. The winters are warm and pleasant, the mean minimum temperature of 43° occurring in December and January, while the mean annual temperature is 63°. The mean annual precipitation is about 12 inches. The climate of Carlsbad, while excellent in winter, is rather too warm for consumptives in summer. Carlsbad is on the Pecos Valley and North Eastern Railway, a branch of the Santa Fé system, and derives its name from springs having essentially the same

Fort Stanton—Bird's-Eye View.

mineral constituents as the celebrated German springs of that name.

*Deming.*—The town of Deming in South-western New Mexico is one of our moderately high altitude locations, and is situated on a plateau some forty by fifty miles in area, west of the Rio Grande Valley, and is the junction point of the Southern Pacific and Santa Fé railroads. Its altitude is 4,331 feet, and the mean temperature arrived at, from a period of twelve years'

BUILDING NO. 1, FORT STANTON, N.M.
Quarters of the Commanding Officer.

observations, is 70·2, and the annual rain fall is 8·79 inches. Deming has a very favourable winter climate for tuberculous patients, and its water supply has long been famous. The principal hotels and restaurants in El Paso, Texas, until recently, offered the use of Deming water as an attraction. Owing to the situation of Deming on a plateau, with the surrounding mountains some twenty miles distant, the prevalence of winds and sand storms during the spring months is to be expected, but as a winter resort for consumptives its reputation is well deserved.

*Fort Stanton.*—The reservation of Fort Stanton embraces nearly forty-five square miles, through the centre of which, from west to east, flows the Rio Bonito. The buildings are located on the south bank of the Bonito, almost exactly in the centre of the Reservation, at an altitude of 6,231 feet. Five miles to the east are the Capitan Mountains between 9,000 and 10,000 feet above sea level, while to the westward rise the foot hills of the White Mountains, culminating in White Mountain Peak

BUILDING NO. 9, FORT STANTON, N.M.
Containing Library, Reading Rooms, Post-Office and Store.

which has an altitude of 11,976·5 feet above sea level. On the north and south the Sanatorium buildings are sheltered, at a distance of about one-half mile, by hills which rise from 3 to 600 feet above the level of the parade ground, around which the buildings are clustered, so that the Sanatorium proper is very much protected against high winds and sand storms; this protection by the surrounding hills is very noticeable when on a windy day one rides across the hills to the neighbouring towns.

A Row of Six Tent-Houses at Fort Stanton, N.M.

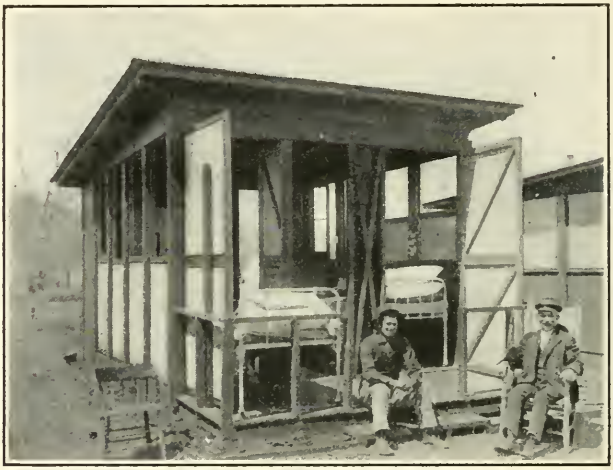
The Rio Bonito furnishes the station with an ample supply of very excellent water, both for domestic purposes and irrigation during the greater portion of the year; when the river supply fails, water of good quality and very soft is pumped from deep wells.

The average number of clear days annually is 173, partly cloudy 140, and cloudy 52, using the nomenclature of the Weather Bureau. Precipitation occurs on an average of

EXECUTIVE BUILDING, FORT STANTON, N.M.
Containing Offices, Examining Rooms, Nose and Throat Clinic Laboratory, Dispensary and X-Ray Room.

seventy days in a year, and the annual precipitation is about 17 inches. The average relative humidity is 53 per cent., the mean maximum temperature 65°, the mean minimum 38°, and the annual mean is 52°. The highest temperature recorded during a period of twenty-eight years was 95°, and the lowest temperature recorded in the same length of time was ·18, which occurred on December 22, 1887. The average hourly wind velocity is 6·6 miles, and the highest velocity ever recorded was sixty-three miles, which occurred during the month of May. The average annual snow fall is 22·3 inches, which, of course, is included in the total average precipitation. The average date of killing frost in spring is May 6, and the average date in the autumn is October 5.

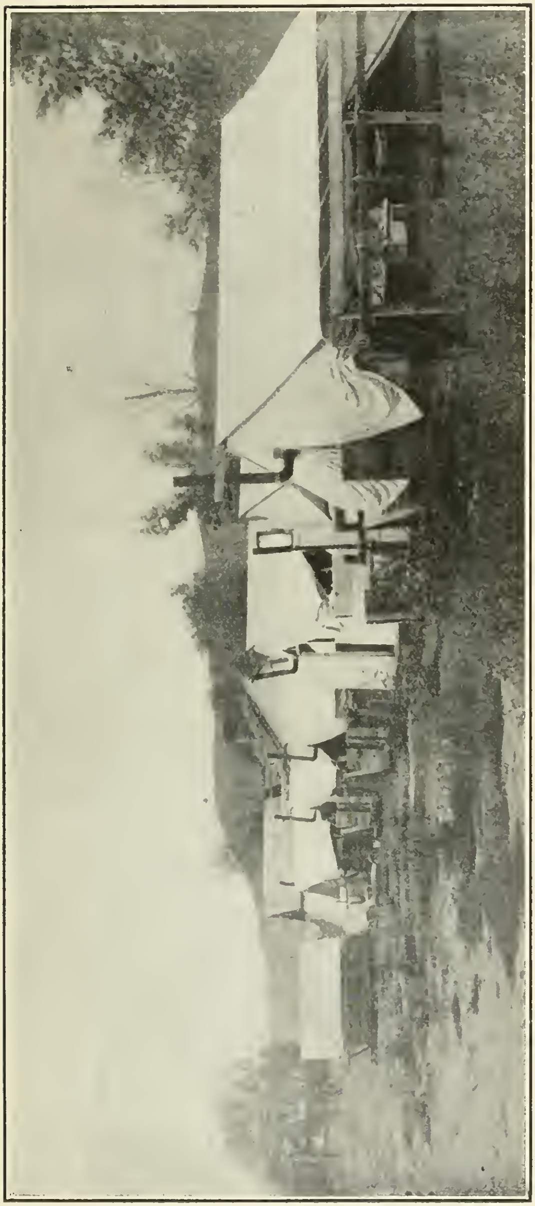
These statistics are taken from the records made during the occupancy of Fort Stanton as an army post. My own observations during the past six years indicate a larger number



TENT-HOUSE, FORT STANTON, N.M.
Occupied by two Consumptive Sea-Captains.

of clear days and fewer cloudy days, as well as rather less precipitation, but as these observations were made by an amateur, and cover a shorter period, they are probably less reliable than those supplied me by the Weather Bureau. The occurrence of temperature below zero is very rare, and equally rare is the maximum summer temperature.

Fort Stanton is not a town, but solely a Government Sanatorium maintained for the reception of tuberculous patients, who are beneficiaries of the Public Health and



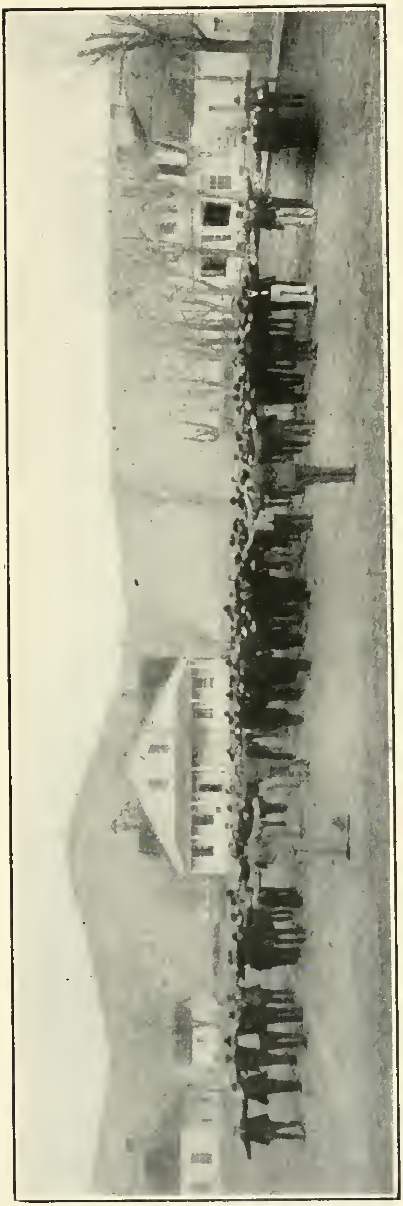
"Easy Street," Fort Stanton, N.M.
Showing Tent occupied by Consumptive Employees.

Marine Hospital Service, but about ten miles distant is the quaint old town of Lincoln, the county seat of Lincoln county, and having a population of about 700 people. Here one of my former assistants, himself a recovered consumptive, has located on a fruit farm where he has established a private sanatorium, and he has an increasing number of patients whose favourable progress is most gratifying.

*Fort Bayard*, in south-western New Mexico is too well known as the location of the Army General Hospital for the treatment of tuberculosis to require more than passing notice. It is situated about nine miles from Silver City at an altitude of about 6,100 feet. The climate of Fort Bayard is practically the same as that of Fort Stanton ; the temperature is slightly higher, while the winds and other climatic data register about the same. Silver City profits by the advertisement of the proximity of Fort Bayard, and has established two or three sanatoria for the treatment of consumptives. The town of Silver City has a population of about 4,000 or 5,000, and is reached by a branch of the Santa Fé, and located in the midst of an active mining country, is a growing and attractive point to which invalids may resort.

Fort Bayard is not open to the general public, being maintained exclusively for the reception of tuberculous officers and men of the army, but there are three sanatoria maintained in the near by town of Silver City, where the climatic conditions are the same as at Fort Bayard.

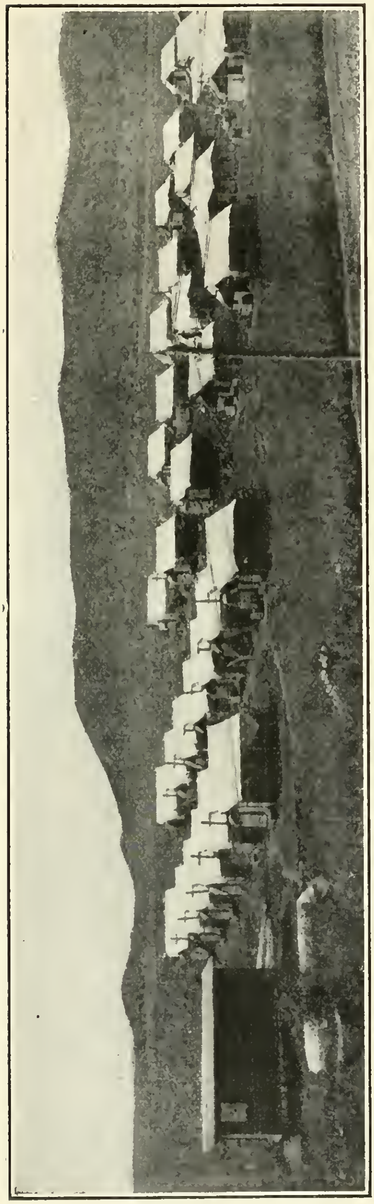
*Las Cruces*, Dona Ana County, in Southern New Mexico, is located on the main line of the Santa Fé Railway in the Mesilla Valley, a name given that portion of the Rio Grande Valley extending from the Selden Mountains on the north to within a few miles of El Paso, Texas, where the river flows through a range of mountains. The entire length of the Mesilla Valley is about fifty miles, and the average width is about five. The Organ Mountains, about ten miles East of



AMBULANT SICK CALL, FORT STANTON, N.M
Patients taking Breathing Exercises.

Las Cruces, rise to an altitude of from 7,000 to 9,000 feet above sea-level. The observations for Las Cruces are taken at Mesilla Park, about two and a-half miles south-east of the town, this being the location of the experiment station, as well as one of the territorial colleges. Its altitude is 3,868 feet. The mean maximum temperature is 76·8 and the mean minimum 41·4, while the annual mean is 61·6. The highest recorded temperature is 106°, and the lowest 1° below zero. The average annual precipitation is slightly under 9 inches, and the mean annual relative humidity is 51 per cent. The average number of clear days is 225, partly cloudy 91, and cloudy 49. The mean annual average wind movement is 6·7 miles per hour. Owing to the considerable distance of this valley from the mountains on the west, the wind storms in spring are of greater frequency and severity than in the more mountainous parts of the territory. Winds reaching a velocity of seventy-five miles per hour have been recorded, but like other portions of New Mexico, storms of a cyclonic nature are unknown. The prevailing direction of nearly all the high winds is from the west, and such winds usually carry considerable quantities of sand and dust. There are occasional high winds from the south, which, when they prevail for two or three days, are usually accompanied by cloudiness and often rain. Las Cruces and the Mesilla Valley have a delightful winter climate, and it is chiefly during this season that it is especially adapted to the needs of the consumptive.

*Las Vegas*, San Miguel county, North Central New Mexico, about forty-five miles east and ten miles south of Santa Fé, is one of the most beautiful and attractive cities in New Mexico. It is located on Gallinas Creek in a rolling, hilly country at the base of the Gallinas Mountains, and is on the main line of the Santa Fé railway. Its altitude is 6,384 feet. A few miles up the valley from Las Vegas are the celebrated Gallinas Hot Springs. On the west and north-west the



TENT VILLAGE, FORT STANTON, N.M.
Showing Toilet-House on extreme left.

mountains rise to an altitude of 9,500 feet and afford protection from the prevailing winds. Las Vagas has an excellent water supply, good natural drainage, and all the modern municipal conveniences. Its refined social life, and the natural beauty of the surrounding country, as well as its superior climate, attract many tourists and invalids.

The number of clear days annually is very large, 227 being the average; partly cloudy, 115; and cloudy only 23. Precipitation occurs on an average of 67 days, with an annual average of about 19 inches, and a relative humidity of 50 per cent. only. The mean maximum temperature is 65° F., the mean minimum 36°, and the annual mean 50°. The highest temperature recorded for a period of nineteen years was 98° in June, 1902, and the lowest 31° below zero in February, 1905. It will be observed that the climate of Las Vegas is colder in winter than that of either Santa Fé or Fort Stanton.

The data as to winds are not at hand, but the location of Las Vegas with reference to the mountains indicate comparative freedom from winds of great velocity.

*Roswell*, the principal town in the Pecos Valley, is located on the Pecos River, in South-eastern New Mexico, at an altitude of 3,570 feet. It is a town of about 7,000 people, and is the site of the New Mexico Military Institute.

Roswell and the Pecos Valley generally, are celebrated for artesian wells, and this region is one of the finest agricultural and fruit-growing sections of the south-west.

Being located in a wide valley, which stretches far to the north as well as to the south, Roswell is exposed to high winds, and being of comparatively low altitude, its summers are hot, while the winters are usually mild, although an occasional norther brings heavy snow and low temperature.

A maximum temperature of 101° is recorded, and a minimum of ·31°, the annual for the year is a little over 59°, and the average precipitation about 16 inches.

Roswell is only seventy-five miles from Fort Stanton. Its numerous lagoons and streams are the resorts in winter of thousands of ducks, while fishing is good the year round, and, like Carlsbad, it has an excellent winter climate for consumptives. Many invalids spend the winter in the Pecos Valley, and during the summer make camping trips to the White Mountain region, near Fort Stanton.

An Irrigating Ditch near Roswell, N.M.

*Santa Fé*, the Capitol of the Territory, and perhaps the oldest town in the south-west, is situated in the mountainous region of North Central New Mexico. Its altitude is 7,013 feet, and it is protected on all sides by mountains, and possesses one of the very best high altitude climates in New Mexico.

Santa Fe possesses considerable interest for the tourist, and it was here, in the ancient Governor's Palace, that General Lew Wallace wrote "Ben Hur." The climatological data of Santa Fe, kindly furnished me by Mr. C. E. Linney, Section Director, U.S. Weather Service, are very complete, as well as interesting and valuable, and will be added to this article in their entirety as an appendix. They show a very large number of clear and partly cloudy days, and an average precipitation of less than 15 inches; average humidity of 45 per cent., and an average hourly wind velocity of 6·9 miles, with the highest hourly velocity of fifty-three miles, which was recorded in October, 1905. The percentage of sunshine annually is 76 out of a possible 100. In order that you may more thoroughly

SPRING RIVER, TWO MILES FROM ORIGIN, HERE 50 FEET WIDE AND MANY FEET DEEP.

appreciate the meaning of this percentage, I may say that Boston has 55 per cent.; Buffalo, 49; New York City, 56; Pittsburg, 44; Philadelphia and Washington, 57; Detroit, 52; St. Louis, Jacksonville and Des Moines, each 60; Cincinnati, 38; while Atlanta, Ga., the highest of which I have secured any record, has but 61.

Santa Fé has a population of about 10,000, and not only is the city itself picturesque and attractive to the tourist and invalid, but the surrounding country abounds in scenic, prehistoric and historic attractions, among which is the cave-dwellers' region in Pajarito Park, only a day's journey distant overland. Three railroads enter the city, the Santa Fé System, the Denver and Rio Grande, and the Santa Fé Central. A tent city sanatorium is maintained near the town.

*El Paso, Texas*, although located within the Commonwealth of Texas, is situated in that part of the State which is naturally a portion of New Mexico.

It is the gateway to New Mexico from all the Gulf States as well as from California. Its altitude is 3,767 feet, with a climate very much the same as that of Las Cruces.

Great numbers of tourists and invalids resort there in the winter months, and many of its most prominent citizens, who came from all parts of the United States, first came to El Paso as health seekers.

El Paso is a wide-awake modern and rapidly growing city of about 50,000 people, and is a convenient and attractive resting place for invalids *en route* to New Mexico.

## A Word of Advice to Patients intending to Resort to the South-West.

A word as to the character of cases for which the climate of New Mexico is best suited may not be amiss; this may be better expressed by enumerating those who should not seek it.

First, consumptives should not come to New Mexico without sufficient means to procure the necessities, and even the luxuries of life, chiefly because most of them are not fit to engage in the struggle for a living, and secondly, because there are many more applicants for work than places. As a rule, consumptives need rest, and then more rest, while undue exercise has caused many deaths which have been attributed to altitude.

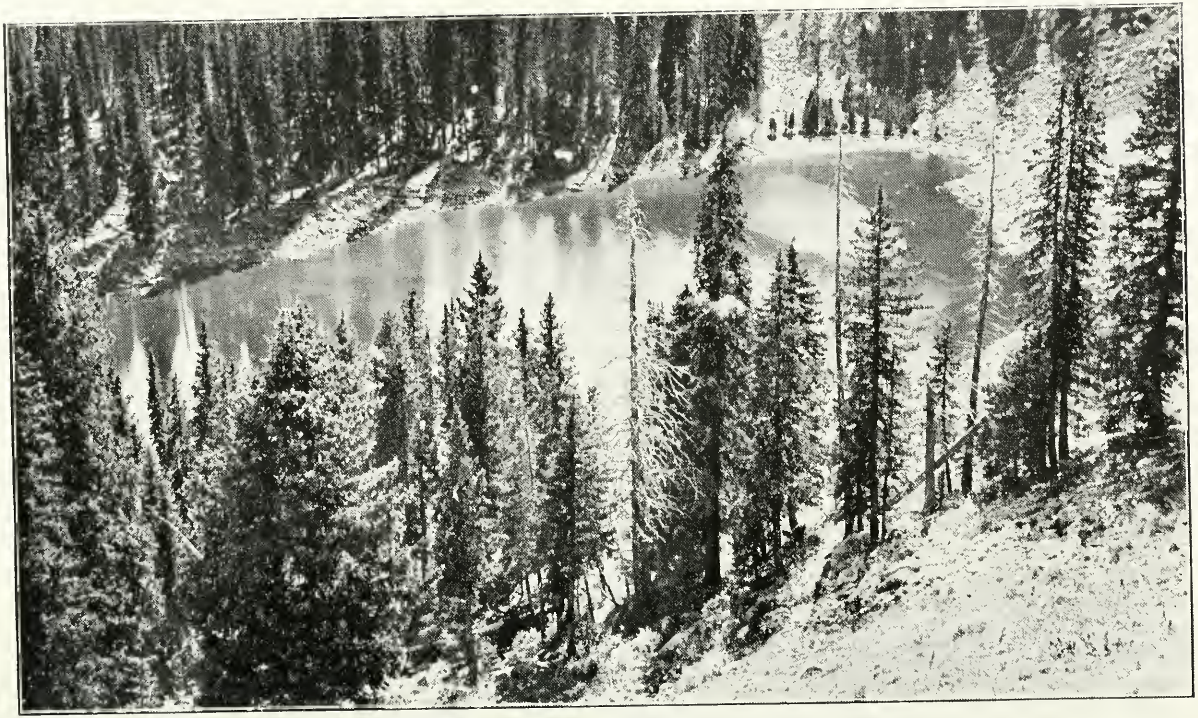
Patients with advanced valvular heart disease do not do well in high altitudes, and those who by reason of the great extent of lung tissue involved, or for other reasons, have a low vital capacity as shown by small chest expansion, would do better to reach a high altitude by gradual stages, or before coming, increase their breathing capacity by appropriate chest expansion exercises, although the earlier the diagnosis is made, and the more prompt the resort to appropriate climate, the greater the probability of cure, still, far advanced cases, especially if with no serious complications, frequently do well. I have just discharged a half dozen such cases "apparently cured," which have been under treatment three to seven years, and one of these had also a very heavy albuminuria, which likewise cleared up. A tendency to hæmorrhage is not a bar to residence in high altitudes; indeed, the statistics of the Fort Stanton Sanatorium show that there is less probability of hæmorrhage at 6,000 feet than at sea-level, and many cases of laryngeal tuberculosis recover perfectly.

## Summary.

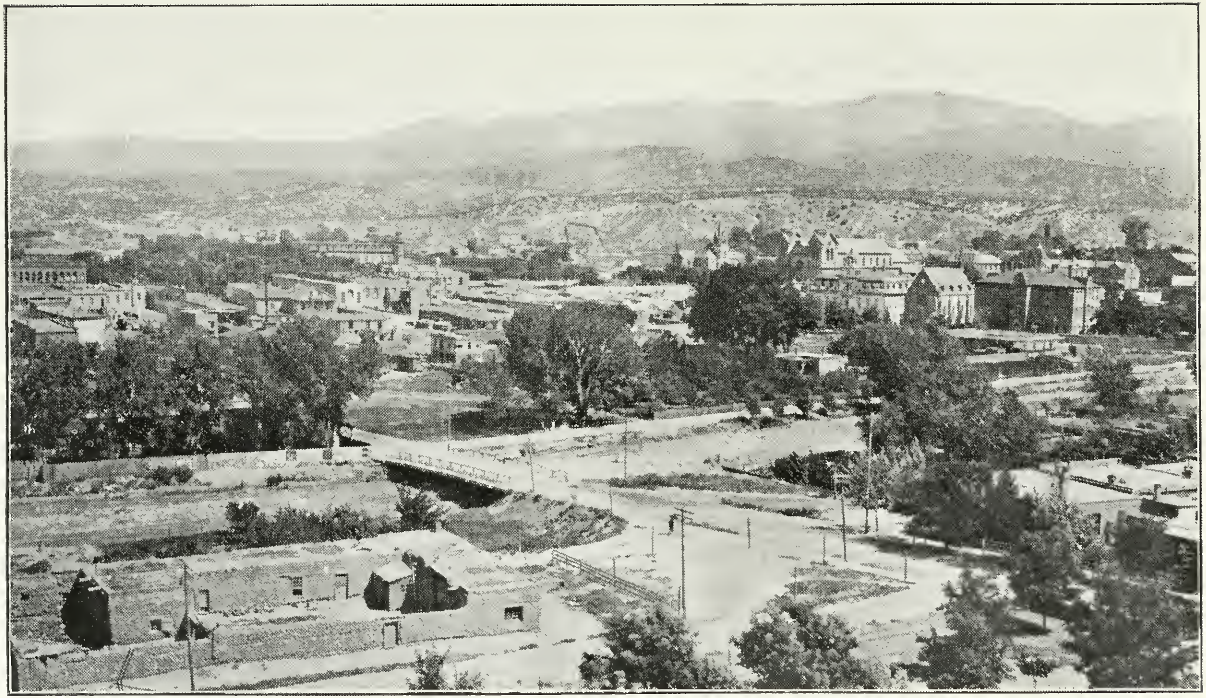
To summarise, New Mexico, as a resort for consumptives, has the following advantages: (*a*) Altitude; (*b*) low relative humidity; (*c*) large percentage of sunshine, advantageously distributed as to season; (*d*) cold or cool nights; (*e*) moderate wind movement; (*f*) small precipitation; (*g*) rarity of fog; (*h*) pure air; (*i*) well-drained soil with low percentage of soil moisture.

In conclusion, I quote from "Climatology of the United States," Bulletin "Q" of Department of Agriculture, by Professor Henry: "In general, the climate (of New Mexico) is such as to permit outdoor work and outdoor life the year around under conditions that are comparatively comfortable and pleasant. The windstorms that prevail during February, March and April are the only serious drawback to the climate, which otherwise presents comfortable and healthy conditions the year around."

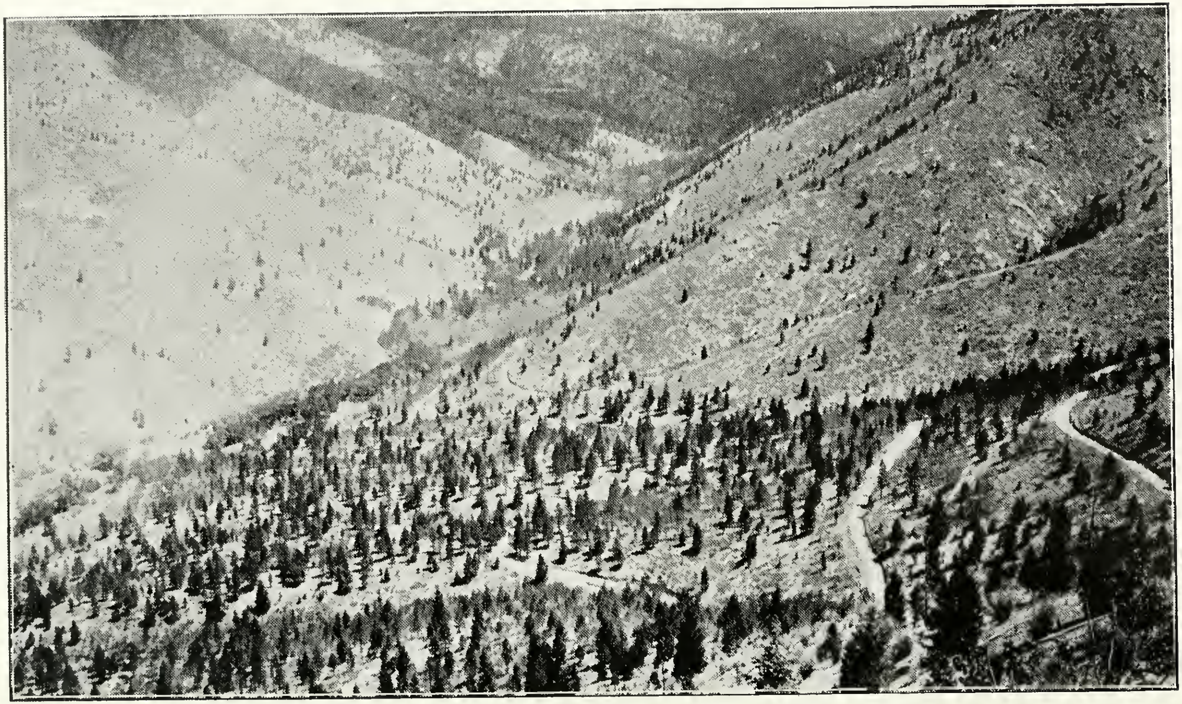
The Scenic Highway, near Santa Fé.



Holy Ghost Lake, near Santa Fé.

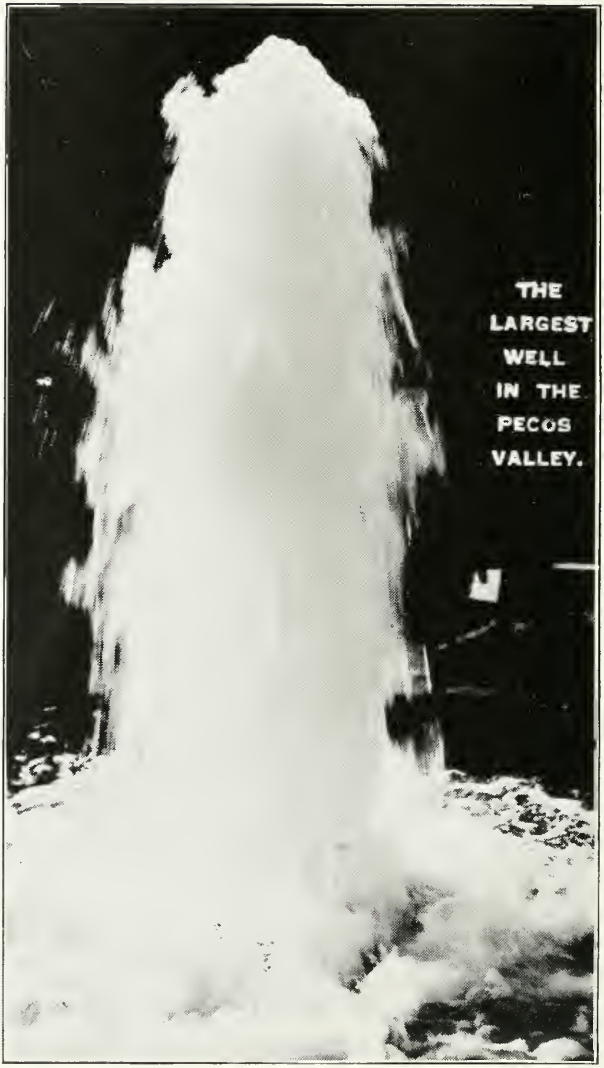


View from the Capitol at Santa Fé, New Mexico.

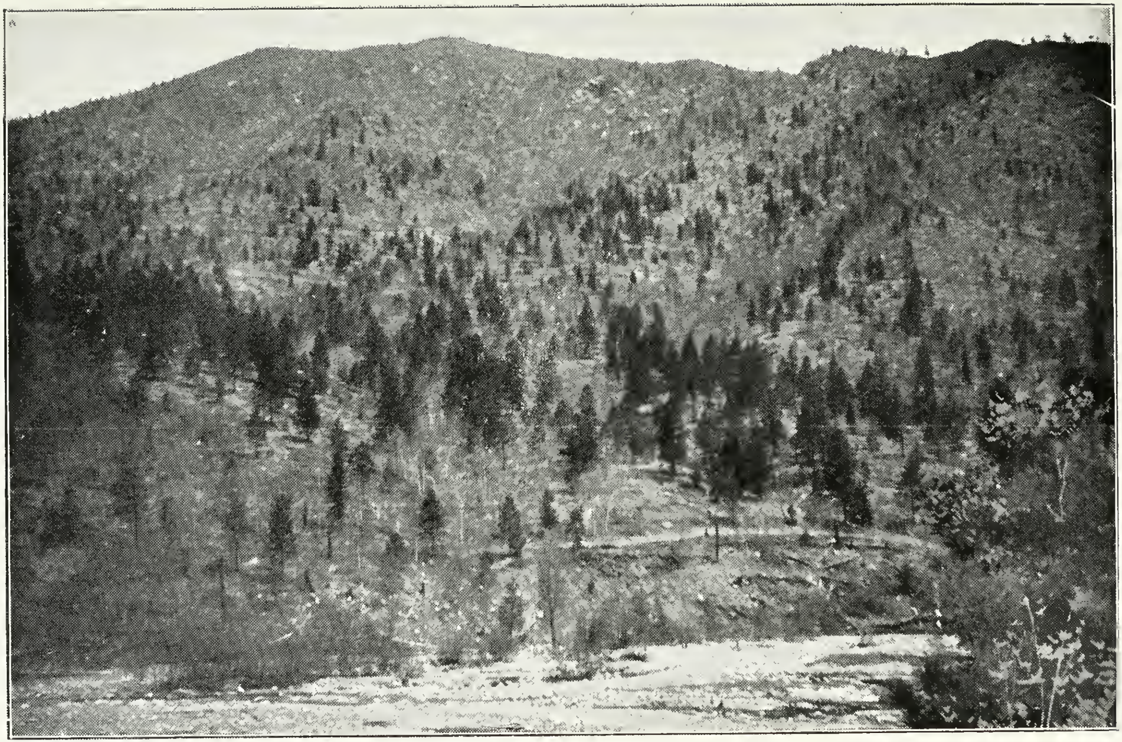


A View of the Switchbacks on the Dalton Divide.

Falls at Nambe, North of Santa Fé.

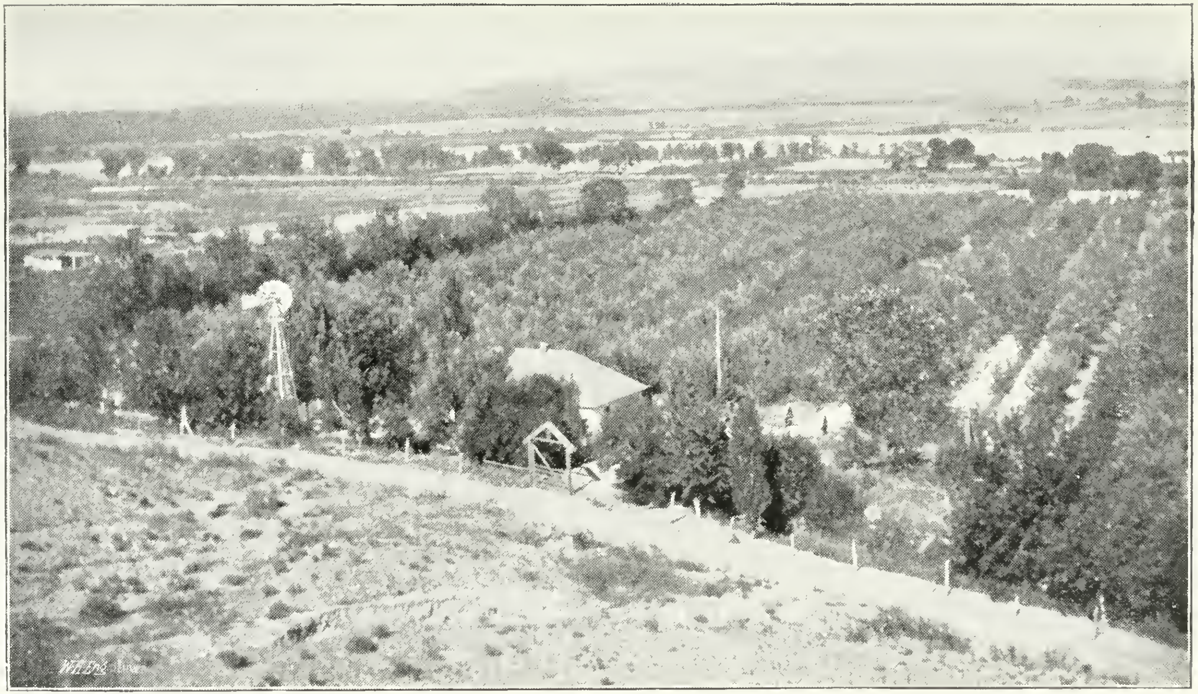



The Largest Well in the Pecos Valley.



The Dalton Divide, over which the Scenic Road winds for eight miles.

New Mexico Capitol Building at Santa Fé.



Sunshine Orchard at Española.

## Meteorological Data for Santa Fé, New Mexico.

*Average Number of Days.*

| | January | February | March | April | May | June | July | August | September | October | November | December | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ear ... | 18 | 14 | 16 | 14 | 15 | 16 | 11 | 11 | 17 | 20 | 19 | 18 | 189 |
| rtly oudy | 9 | 9 | 11 | 12 | 13 | 12 | 16 | 16 | 10 | 8 | 8 | 9 | 133 |
| oudy | 4 | 5 | 4 | 4 | 3 | 2 | 4 | 4 | 3 | 3 | 3 | 4 | 43 |
| ith pre- itation | 5 | 7 | 6 | 5 | 7 | 6 | 13 | 9 | 7 | 5 | 4 | 5 | 79 |

*Average Monthly Precipitation.*

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| years | 0·60 | 0·76 | 0·74 | 0·79 | 1·13 | 1·06 | 2·68 | 2·38 | 1·64 | 1·05 | 0·77 | 0·71 | 14·31 |

*Average Monthly Snowfall.*

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| — | 4·7 | 6·6 | 4·5 | 3·1 | 0·2 | 0 | 0 | 0 | 0 | 0·4 | 2·8 | 6·1 | 28·4 |

*Average Monthly Relative Humidity.*

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| — | 54 | 54 | 42 | 34 | 36 | 33 | 46 | 47 | 46 | 46 | 48 | 54 | 45 |

*Mean Maximum Temperature.*

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| — | 39 | 43 | 54 | 60 | 70 | 79 | 82 | 80 | 74 | 63 | 50 | 43 | 61 |

*Mean Minimum Temperature.*

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| — | 19 | 22 | 29 | 34 | 43 | 52 | 57 | 56 | 48 | 38 | 27 | 21 | 38 |

*Mean Temperature.*

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| years | 29 | 33 | 40 | 47 | 56 | 66 | 69 | 68 | 61 | 50 | 39 | 31 | 49 |

*Highest Monthly Temperature.*

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| — | 76 | 75 | 82 | 84 | 86 | 92 | 96 | 97 | 90 | 85 | 77 | 65 | 97 on Aug. 9, 1878 |

*Lowest Monthly Temperature.*

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| — | −13 | −11 | 0 | 11 | 24 | 33 | 43 | 40 | 27 | 13 | −11 | −13 | −13 on Jan. 21, 1883 and Dec. 25, 1879 |

*Average Hourly Wind Velocity.*

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| — | 6·3 | 7·2 | 7·9 | 8·3 | 7·9 | 7·2 | 6·5 | 5·9 | 5·8 | 6·2 | 6·3 | 6·3 | 6·9 |

*Highest Velocity.*

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| — | 38 | 46 | 50 | 44 | 51 | 48 | 45 | 40 | 46 | 53 | 51 | 40 | 53 in October, 1906 |

*Percentage of Sunshine.*

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| — | 74 | 73 | 75 | 78 | 76 | 79 | 69 | 72 | 76 | 80 | 78 | 76 | 76 |

*Prevailing Wind Direction.*

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| — | N.E. | N.E. | S.W. | S.W. | S.W. | S.W. | S.E. | S.E. | S.E. | S.E. | N.E. | N.E. | S.E. |

| | | |
|---|---|---|
| — | Average number of days each year with minimum temperature below 32° ... | 129 |
| — | ,, ,, ,, ,, ,, maximum ,, above 90° ... | 2 |
| — | ,, date of last killing frost in spring ... ... ... ... ... | April 15 |
| — | ,, ,, first ,, ,, fall ... ... ... ... ... ... | Oct. 19 |
| — | ,, number of days with fog (annual) ... ... ... ... ... | 2 |
| — | ,, ,, ,, ,, hail ,, ... ... ... ... .. | 4 |
| — | ,, ,, ,, ,, snow ,, ... ... ... ... ... | 27 |
| — | ,, ,, ,, ,, thunderstorms (annual)... ... ... ... | 25 |

METEOROLOGICAL DATA FOR LAS VEGAS, NEW MEXICO.

| — | January | February | March | April | May | June | July | August | September | October | November | December | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Average Number of Days.* | | | | | | | | | | | | | |
| Clear ... | 23 | 17 | 21 | 20 | 17 | 15 | 15 | 17 | 18 | 21 | 20 | 23 | 227 |
| Partly cloudy | 7 | 8 | 8 | 8 | 13 | 12 | 14 | 13 | 10 | 8 | 8 | 6 | 115 |
| Cloudy... | 1 | 3 | 2 | 2 | 1 | 3 | 2 | 1 | 2 | 2 | 2 | 2 | 23 |
| With precipitation | 2 | 3 | 3 | 4 | 8 | 9 | 11 | 10 | 8 | 3 | 3 | 3 | 67 |
| *Average Monthly Precipitation.* | | | | | | | | | | | | | |
| 19 years | 0·46 | 1·00 | 0·67 | 0·89 | 2·11 | 1·86 | 3·99 | 2·94 | 2·52 | 1·04 | 0·85 | 0·66 | 18·99 |
| *Average Monthly Relative Humidity.* | | | | | | | | | | | | | |
| — | 48 | 46 | 43 | 42 | 51 | 52 | 56 | 56 | 53 | 52 | 51 | 50 | 50 % |
| *Mean Maximum Temperature.* | | | | | | | | | | | | | |
| — | 47 | 48 | 57 | 65 | 73 | 81 | 83 | 82 | 74 | 64 | 56 | 47 | 65 |
| *Mean Minimum Temperature.* | | | | | | | | | | | | | |
| — | 19 | 21 | 28 | 34 | 43 | 50 | 55 | 54 | 47 | 36 | 27 | 19 | 36 |
| *Mean Temperature.* | | | | | | | | | | | | | |
| 19 years | 33 | 34 | 41 | 50 | 58 | 66 | 69 | 68 | 61 | 50 | 41 | 33 | 50 |
| *Highest Monthly Maximum.* | | | | | | | | | | | | | |
| — | 69 | 71 | 76 | 82 | 90 | 98 | 96 | 97 | 93 | 82 | 76 | 70 | 98 in 1902 |
| *Lowest Monthly Minimum.* | | | | | | | | | | | | | |
| — | −9 | −31 | −11 | 12 | 26 | 34 | 40 | 44 | 32 | 15 | 2 | −9 | −31 in 1905 |

METEOROLOGICAL DATA FOR FORT STANTON, NEW MEXICO.

*Average Number of Days.*

| — | January | February | March | April | May | June | July | August | September | October | November | December | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Clear ... | 16 | 14 | 13 | 15 | 16 | 13 | 10 | 11 | 13 | 20 | 16 | 16 | 173 |
| Partly cloudy | 11 | 10 | 13 | 12 | 12 | 13 | 15 | 15 | 11 | 7 | 9 | 12 | 140 |
| Cloudy... | 4 | 4 | 5 | 3 | 3 | 4 | 6 | 5 | 6 | 4 | 5 | 3 | 52 |
| With precipitation | 4 | 5 | 5 | 3 | 4 | 7 | 11 | 11 | 8 | 4 | 4 | 4 | 70 |
| *Average Monthly Precipitation.* | | | | | | | | | | | | | |
| 28 years | 0·64 | 0·72 | 0·86 | 0·64 | 0·89 | 1·76 | 3·16 | 3·44 | 2·30 | 1·45 | 0·67 | 0·88 | 17·41 |
| *Average Monthly Relative Humidity.* | | | | | | | | | | | | | |
| 7 years | 60 | 55 | 47 | 37 | 34 | 41 | 55 | 57 | 59 | 56 | 59 | 61 | 52 % |
| *Mean Maximum Temperature.* | | | | | | | | | | | | | |
| 7 years | 47 | 52 | 56 | 65 | 72 | 81 | 83 | 80 | 74 | 66 | 55 | 49 | 65 |
| *Mean Minimum Temperature.* | | | | | | | | | | | | | |
| 7 years | 21 | 27 | 29 | 36 | 44 | 50 | 56 | 54 | 48 | 37 | 28 | 24 | 38 |
| *Mean Temperature.* | | | | | | | | | | | | | |
| 28 years | 35 | 38 | 44 | 51 | 60 | 67 | 69 | 67 | 61 | 52 | 42 | 36 | 52 |
| *Highest Monthly Temperature.* | | | | | | | | | | | | | |
| — | 69 | 76 | 73 | 78 | 85 | 94 | 95 | 92 | 86 | 80 | 72 | 68 | 95, July |
| *Lowest Monthly Temperature.* | | | | | | | | | | | | | |
| — | -6 | -3 | 6 | 14 | 29 | 34 | 46 | 44 | 31 | 22 | 7 | -18 | -18, Dec. 22, 1887 |
| *Average Hourly Wind Velocity.* | | | | | | | | | | | | | |
| — | 8·0 | 9·2 | 8·4 | 8·2 | 7·5 | 6·0 | 4·5 | 4·7 | 4·4 | 5·2 | 6·1 | 6·8 | 6·6 |
| *Highest Velocity.* | | | | | | | | | | | | | |
| — | 51 | 54 | 60 | 60 | 63 | 42 | 44 | 36 | 30 | 42 | 44 | 50 | 63 in May |
| *Monthly Average Snowfall.* | | | | | | | | | | | | | |
| — | 1·6 | 2·1 | 8·2 | T. | 0 | 0 | 0 | 0 | 0 | T. | 4·2 | 6·2 | 22·3 |

| | |
|---|---|
| Average date of last killing frost in spring ... ... ... ... ... | May 6 |
| Average date of first killing frost in autumn ... ... ... ... ... | Oct. 5 |

METEOROLOGICAL DATA FOR LAS CRUCES, NEW MEXICO.

| | January | February | March | April | May | June | July | August | September | October | November | December | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *Average Number of Days.* | | | | | | | | | | | | |
| Clear | 19 | 17 | 19 | 20 | 20 | 20 | 14 | 14 | 18 | 22 | 22 | 20 | 225 |
| Partly cloudy | 7 | 7 | 8 | 7 | 9 | 8 | 10 | 12 | 7 | 6 | 4 | 6 | 91 |
| Cloudy | 5 | 5 | 4 | 3 | 2 | 2 | 7 | 4 | 5 | 3 | 4 | 5 | 49 |
| | *Average Monthly Precipitation.* | | | | | | | | | | | | |
| — | 0·32 | 0·50 | 0·28 | 0·17 | 0·25 | 0·58 | 1·84 | 1·71 | 1·45 | 0·76 | 0·57 | 0·44 | 8·82 |
| | *Average Monthly Relative Humidity.* | | | | | | | | | | | | |
| — | 52 | 52 | 46 | 42 | 40 | 42 | 54 | 58 | 59 | 56 | 55 | 53 | 51 |
| | *Mean Maximum Temperature.* | | | | | | | | | | | | |
| — | 58 | 61 | 69 | 77 | 85 | 94 | 93 | 92 | 87 | 77 | 67 | 57 | 76 |
| | *Mean Minimum Temperature.* | | | | | | | | | | | | |
| — | 23 | 26 | 32 | 39 | 46 | 56 | 62 | 61 | 54 | 41 | 29 | 23 | 41 |
| | *Mean Temperature.* | | | | | | | | | | | | |
| — | 42 | 46 | 53 | 61 | 70 | 78 | 80 | 79 | 73 | 62 | 49 | 42 | 61 |
| | *Highest Monthly Temperature.* | | | | | | | | | | | | |
| — | 70 | 76 | 82 | 88 | 95 | 102 | 102 | 99 | 96 | 88 | 78 | 71 | |
| | *Lowest Monthly Temperature.* | | | | | | | | | | | | |
| — | 10 | 12 | 18 | 28 | 34 | 44 | 54 | 54 | 42 | 28 | 18 | 12 | |
| | *Average Hourly Wind Velocity.* | | | | | | | | | | | | |
| — | 5·8 | 7·2 | 8·8 | 8·7 | 8·0 | 7·0 | 6·4 | 5·7 | 5·8 | 5·7 | 5·5 | 5·6 | 6·7 |

# SOMES NOTES ON AIX-LES-BAINS.

BY JOHN W. BRANNAN, M.D.

NEW YORK CITY.

It is not my purpose to describe in detail all the methods of treatment at Aix, nor to enumerate the various affections which are favourably influenced by its waters, but simply to give some personal impressions of the place, with a brief reference to our own Virginia Hot Springs. Several members of this Association have visited Aix, and others, perhaps all, have sent patients there for treatment, and I hope that a discussion of its merits may not be without interest.

Aix-les-Bains is in Savoy, not far from the Italian and Swiss frontiers, and can be reached comfortably by express train from Paris in from eight to ten hours. Its situation is very picturesque, with beautiful views of the surrounding country. There are charming drives in all directions, and many interesting places to visit. The hotels are excellent, and there are two clubs which provide visitors with a first-class theatre and other entertainments. The season is from May to October. In midsummer it is hot. I was there from the latter part of August to the middle of September, and found it quite warm enough to discourage any exertion. This is considered an advantage, my physician advising me "to laze and to loaf."

The water is chiefly remarkable for its constant high temperature, 44° C. (111° F.), and its abundance, averaging over six million litres (1,250,000 gallons) a day, delivered under very high pressure. Analysis shows it to contain a slight amount of sulphur, but the colour is scarcely

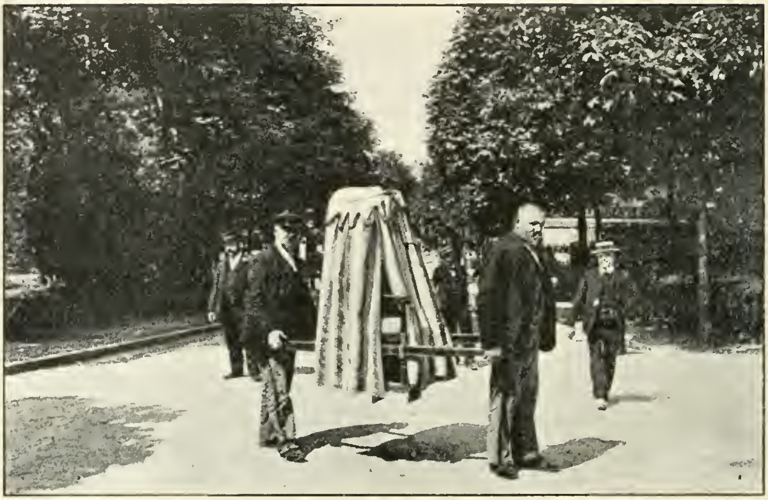


FIG. 1.—Going to the Baths, Aix-les-Bains.

FIG. 2.—"Etablissement Thermal," Aix-les-Bains.

perceptible, and it has no taste nor colour whatever. In addition to the sulphur, it contains minute quantities of the carbonates and sulphates of lime, soda and magnesium, but the mineral character of the water is considered of only

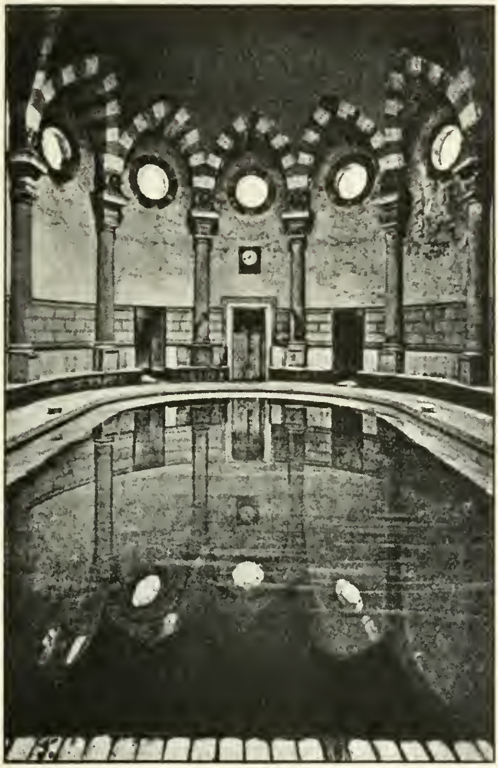


FIG. 3.—Bathing Pool, Aix-les-Bains.

secondary importance. An organic constituent called barégine, is, however, believed to be of considerable value, as it gives a soft, lubricating quality to the water, thus facilitating massage.

The water of Aix is used in various ways, in douches, plunge baths, vapour baths, needle baths, in inhalations, and as a beverage, but the speciality of Aix, that which gives it its reputation, is the douche combined with massage. This calls for a somewhat detailed description, which I shall give from my personal experience.

The usual course of treatment covers three weeks, during which a daily douche is given at a fixed hour, omitting every fourth or fifth day, so that about sixteen or seventeen douches are taken by the patient. On the days when the douche is omitted, you are privileged to take a plunge and swim in the piscine, a large tank filled with the same kind of mineral water that is used in the douches, but maintained at a uniform temperature of 37° C., or body temperature. The plunge is followed by a quick shower of ordinary cold water, with which the bathing establishment is abundantly supplied. I went every morning to the baths at 10 o'clock, having walked or driven there from my hotel, a quarter of a mile away. After removing my clothing I was taken in charge by two doucheurs, and seated comfortably upon a little wooden chair, the treatment was begun.

The bathing room is equipped with two kinds of hose, carrying water tempered to the desired degree. In one the water is under very high pressure and is used for douching the extremities, in the other it is under slight pressure and is applied to the back of the body. One doucheur is placed in front, the other behind the patient, each provided with a flexible hose, discharging great volumes of water. The man in front stands in a stooping position and carries the hose upon first one thigh and then upon the other, in such a way that he can at will direct the water under high pressure upon the different extremities of the patient, leaving both hands free for simultaneous massage of the muscles and joints (fig. 4). The man placed behind the patient stands with his right foot upon the chair so that with his flexed thigh he can direct the water under low pressure upon the back of the neck, the shoulders and the back of the body, leaving the hands free for massage of the muscles. After a few minutes the patient rises from the chair, and leaning forward with the hands upon the side of the chair, the gluteal region and the posterior surface

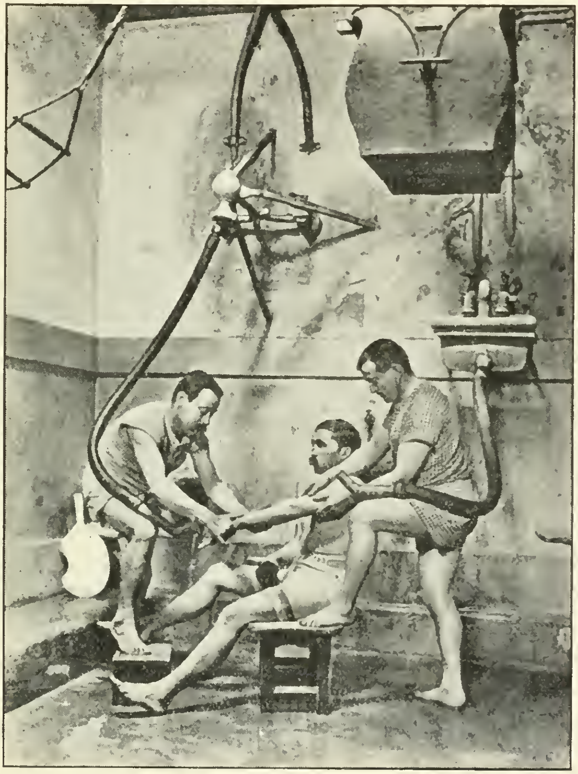


FIG. 4.—Douche-Massage, Aix-les-Bains.

of the thighs and legs are massaged and douched. The above douche-massage lasts from eight to ten minutes, and is followed by a short douche under high pressure of the whole body. The temperature of the water varies from 35° to 42° in different cases, according to the orders of the physician. The patient is then wrapped in warm sheets and blankets and carried in a closed sedan chair (fig. 5) to his room in the hotel and placed in bed, where he is expected to remain for an hour or two. In my own case three hours, from 10 to 1 o'clock, were occupied by the whole process, leaving the afternoon for such diversions as driving, excursions on Lake Bourget, or to the points of interest in the neighbourhood. The hot baths, together with the warm enervating air, give one little inclination

Fig. 5.—Leaving the Baths, Aix-les-Bains

for walking, and the local physicians discourage it. An after-cure is advised at some of the elevated points in Savoy or in Switzerland. I found myself in much need of a more stimulating climate, and it was some two weeks or more before I cared to make much exertion. I had sought relief at Aix for a sciatica of six years' standing, and for several months afterwards I was entirely free from pain or other discomfort. In time, under stress of work the old symptoms returned, but they have not been as severe nor as constant as before the treatment. I feel inclined to think that another year or two would have effected a cure in my own case. Experience has shown that several seasons are needed, as a rule, to bring about a complete cure, although great benefit, and sometimes even a cure, are obtained in one year. I made the acquaintance of a number of patients and practically all were satisfied that they had been helped by the treatment. They comprised sufferers from all forms of rheumatic affections of the joints, and nerves and muscles, as well as some instances of well-marked gout. Not much stress is laid upon a restricted diet by the local physicians, except in the case of the gouty. They seem to rely almost entirely upon the physiological effects of the douche-massage.

Among the contraindications to the treatment at Aix, the chief are organic disease of the kidneys or liver, and valvular disease of the heart with imperfect compensation. According to Françon, young persons with rheumatic endocarditis, and subject to frequent attacks of subacute rheumatism, may take the cure with advantage, in the expectation of preventing further rheumatic attacks and consequent extension of the heart lesion.

While at Aix I heard occasional references to the Virginia Hot Springs. Dr. Blanc, who has visited this country, was quoted as saying that we had as valuable waters at the Hot Springs as at Aix, but that we would not learn how to use them in a hundred years. Judging by what I saw during a few days' visit to Virginia last winter, I think that perhaps what Blanc did say was that we *had* not learned to use the waters in a hundred years. There was certainly no such personal care or supervision exercised as at Aix. At Aix you are never left alone, and something is being done for you every moment until you are put safely to bed. At the Hot Springs I was left practically to my own devices except when an attendant appeared and said that it was time to move on to the next stage. In thirty-five minutes I had undressed, taken a hot tub-bath with superficial massage, douched myself with a stream of hot water issuing from a spout under great pressure, had a wet pack, and was dressed and on my way on foot back to the hotel. I had a feeling of being hurried through to make way for others, although, as it was out of season, the hotel was not one-third full. A medical friend with me had the same experience and made the same criticisms. Perhaps the fact that we were physicians accounted in part for the lack of supervision. But the absence of facilities for carrying patients to their rooms struck me as especially to be condemned. There is, probably, always some fatigue caused by the bath, even though the bather may not be aware of it. On the second day, after being hurried through a Baruch bath and Scotch douche, &c., I strolled over to the Palm room of the hotel, had a cup of tea, and smoked a cigarette leisurely, and then started upstairs to dress for dinner. As I stepped into the elevator, entirely unconscious of any fatigue, the negro boy in charge said to me, "I guess you must have been doing a good deal, you look tired." That boy had a keener eye than the attendant at the bath.

I have been told that there is some provision for resting in the bathing pavilion itself, such as we find in Turkish baths, but my attention was not called to it. I have sent a few patients to the Hot Springs, and all, except the most robust, complained of the exhaustion caused by what they called the heroic treatment. It is probable that we shall never get the same personal service in this country that is customary on the Continent.

Before closing, I should add that the one local physician I met at the Springs told me that all the medical men there appreciate the shortcomings to which I have referred, and have made repeated representations to the management, but without avail. Perhaps if our efforts were added to theirs we might succeed in securing for this American spa the same thorough attention to detail that characterises the European resorts.

# HOT SPRINGS, VIRGINIA.

BY GUY HINSDALE, A.M., M.D.

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An account of the Hot Springs of Virginia was published in 1804 by Rev. Dr. Ashbel Green in the *Philadelphia Medical and Surgical Journal*. Dr. Green says: "These springs are chiefly useful in the cure of rheumatism and gout and other local affections of the nervous system. They are also highly useful in a number of cutaneous eruptions, and are frequently beneficial to persons of a bilious temperament. The cures they have effected in the gout and rheumatism are almost incredible." Dr. Green gives the history of two cases which were cured of rheumatism and gout in a few weeks, although the disease had existed in one case for fourteen years. He notes a fact commonly observed at the present day in treating cases at the Hot Springs, viz., that patients experience temporarily, while under treatment, an aggravation of their symptoms. In one of the cases it is stated: "He used the waters . . . . and for nearly two weeks he complained that he rather grew worse than better. At length, however, his pains left him so suddenly that he could scarcely believe they were gone. The pains did not return and the patient went away well." This is a common experience of the present day, and it is also a remarkable fact that Dr. Green's records of temperature of the "boiler spring" made 107 years ago correspond precisely with the present temperature, 106·5° F.

The present condition of Hot Springs, Virginia, the superb surroundings and equipment are in strong contrast to that of one hundred years ago. Now the patient is transported in fifteen hours from New York in a through Pullman car directly to the springs. He is provided with quarters in one of the best appointed hotels in the United States. Whether he comes for "the cure" or whether he returns, as many do, for the accessory pleasures of a watering place, he finds much to enjoy. The mountains remain as they were, but the valley is changed. He can travel miles upon the links; he rides over well kept roads; he meets congenial spirits from the centres of fashion all over the world, and, if need be, he can converse with those at home at almost a moment's notice.

It is told of the celebrated Dr. Abernethy that he once insisted that one of his patients, an Englishman, who was a victim of gout brought on by high living, should go to Carlsbad. He described to him the boiling waters, the mud baths and the rigorous course of self denial. "Why, sir," exclaimed the sufferer, "it will be like a passage through purgatory." "True enough," replied the doctor, "but it will surely be your escape from hell." However that may have been in Abernethy's time the modern watering place does not impress one as the abode of invalidism or distress. At the Virginia Hot Springs there is an air of gaiety and cheerfulness; the sound of music and the dance dispels the old impress of asceticism; nevertheless, the quiet and seclusion which the invalid desires can be had without imposing any restrictions on those who seek diversion.

While gout and rheumatism are conspicuous among the various ailments treated, there are many nervous affections especially the so-called functional diseases, that are quite as amenable to treatment. The measures instituted are chiefly corrective and restorative. The sheet anchor of treatment is the full, free and abundant action of the skin, to which, in general practice, too little attention is paid. The great natural supply of hot water makes it possible to give the bather eight or nine hundred gallons for his bath. The temperature and

FIG. 1.—The Bath House, Virginia Hot Springs, showing, on the left, one of the springs and the covered passage-way leading to the hotel. 36,000 baths were given during the past year.

FIG. 2.—General View of The Homestead Hotel, Virginia Hot Springs.

duration of these baths must be determined by a physician who has knowledge of the physical condition of the patient, and who has frequent opportunities to observe him. In the height of the season there are a sufficient number of bathing attendants to give, if necessary, three hundred baths a day. None are given in the evening. Besides the tub bath, which may have a temperature not exceeding 104° F., there is provided in every bath-room a spout delivering water at 104°, and at a pressure of from 14 to 18 pounds. The effect of this is strongly stimulating, and, in many cases, is employed directly before the full bath. Following this the customary procedure is a hot pack in a hot sheet and flannel blankets, followed by cool sponging or a cold douche and an alcohol rub.[1] The entire process occupies from half an hour to three-quarters, and is succeeded by rest in the recumbent position for half an hour or more. The best time to take these baths is before breakfast or during the forenoon, although many prefer the late afternoon, experience showing that perspiration is then more free. Massage may or may not be added to the treatment. There is usually some massage or manipulation in the flowing water in the tub.

In addition to the type of bath which has been mentioned there are two marble douche tables after designs by Dr. Baruch, which provide douches having a wide range of pressures and temperatures in the various forms of circular, jet, Scotch, rain and fan douches in conjunction with hot air baths.[2] This form of apparatus has been greatly perfected and makes it possible to give a more tonic method of treatment than the ordinary full tub bath affords. The douche table has come to be an essential feature of large medical institutions in the United States as well as abroad and is invaluable in a wide range of chronic affections. Modern works on hydrotherapy, like those of Matthes, Schweinburg and Winternitz, as well as the admirable American work of Baruch, reveal a broad field

[1] See Figure 3.
[2] See Figure 4.

FIG. 3.—The hot sheet and blankets are supplied after the tub bath. The patient lies in the dry pack for ten or fifteen minutes after the bath, and is then sponged and rubbed.

FIG 4.—Hot-air Cabinet Bath. Temperature about 160° F. Through the glass windows the skin can be watched. The head is covered with a cloth wet in cold water. On the right the interior of the cabinet is shown. The circular, jet and Scotch douches follow this bath.

of usefulness such as the ordinary student and practitioner little dreams of. The Germans and Austrians are easily first in their acceptation of these measures. The American practitioner shows a commendable attitude towards physiologic therapeutics and is rapidly following the German lead in that respect.

Besides the baths there are valuable waters at Hot Springs for internal use. They are all calcareous waters and diuretic in their effects. Their principle constituents are carbonates of calcium and magnesium and are acceptable to the stomach. The abundant use of these waters is decidedly depurative, especially as regards the kidney secretion, and in this way the action of the baths is supplemented.

Accessory measures, such as diet and suitable exercises are valuable aids in the restoration of health, and it is a matter of common observation that patients realise the need for dietetic regulations and follow prescribed exercises when they have made the journey to a particular health resort with some definite purpose in view. They will more readily cut off their alcohol and check their immoderate eating during the period of probation and generally find that it is better to forego the indulgences that have upset their brains, their stomachs and livers. So it is that these Springs exert a most salutary influence on those who take their treatment seriously and deserve the popularity they have maintained for over a century.

It must be admitted that American spas are not so superbly appointed as are those European spas which are under Government ownership or control. The watering places of Europe which have been frequented by royalty and supported and directed by governmental authority, afford luxuries and appointments which we shall probably never see on this side of the Atlantic. Possibly the foreign methods of dealing with patients are best suited to the temperament of the cosmopolitan class that constitutes the patronage. These methods have been developed during ages and are not readily copied, or incorporated into the ways of American communities. In this country we prefer to walk whenever possible rather than to be carried by two men in a Sedan chair. Atlantic City, with its broad walk five miles long, is an ideal place for rolling chairs. These are large enough for one, two, or three persons and are a necessity for patients who go long distances and need protection from strong sea breezes. The average patient, as I have observed him at Hot Springs, Virginia, dislikes to use even the rolling chair though always accessible ; if found to be necessary at first, it is usually soon dispensed with. Perhaps, even in the best resorts of this country, a fair criticism would be that the prime necessity of maintaining the prestige and appointments of the baths and the strictly therapeutic features upon which the reputation of the spa is built tend to be lost sight of by the management. Tournaments and sports of various kinds and the amusements of the well should never be allowed to supersede the provisions made for the treatment and the comfort of the sick.

Dr. Brannan has referred to his visit to Hot Springs,[1] and he has given me the opportunity of making some comments. I am sorry I was not there during his visit, which occupied two days during January, 1906. He did not have any medical advice or direction as to taking his bath. I think this was unfortunate as even physicians are liable to make mistakes in prescribing for themselves. At the Hot Springs patients who come for treatment are expected to have a physician to guide them as to the use of all hydrotherapeutic measures. This has been found by experience to be the safer plan and is what the doctor himself employed when visiting Aix-les-Bains. Bathing procedures should be undertaken gradually, like athletic exercises, in order to avoid undue fatigue and

[1] See p. 108.

attain some satisfactory result. When patients are willing to stay three or four weeks and to abide by advice which is founded on experience of the measures to be adopted as well as a thorough knowledge of the individual requirements, benefit will undoubtedly accrue. It is needless to say that the experience of a single bath is worse than none at all.

Then again there is always a favourite time for visiting any watering-place. There are many more visitors to Hot Springs in the autumn and spring than in mid-winter, or mid-summer when climatic conditions are not so agreeable.

# THE EFFECT OF FLORIDA CLIMATE UPON ACUTE AND CHRONIC DISEASE.

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WASHINGTON, D.C.

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THE winter climate of Florida is more varied in its different parts than might be anticipated in a location so far to the southward. Excursions of the frost line, changing with each year, determine the variations both of temperature and vegetation.

Until recent years the southern portion of the State has been practically unknown, northern and central Florida alone having been enjoyed as a winter resort.

The climate of the Northern Atlantic coast of Florida is represented by St. Augustine and Ormond. In the former the winters vary with successive seasons, but there are many bright, beautiful and sunny days during the least salubrious months, January and February. This northern region, however, is subject to occasional passages of cold waves, which, coming from the north-west, sweep over Texas and across the Gulf, and point their central force towards this part of the State. In recent years these attacks of cold and frost have been more severe than for many previous decades. During such attacks warm clothing is required, and hotels are supplied with steam heat and comfortable accommodations. These waves of cold usually continue for three days, followed by fair, sunny weather. The climate of St. Augustine and Ormond is not dry, nor is that of Florida in any part. It is classified as of medium humidity. Both localities are surrounded by salt water, and fresh water is not to be found in their vicinity. Neither has suffered from malaria, and the drainage of the hotels and large boarding houses in both of these resorts is as perfect as science and careful engineering can make them.

St. Augustine stands upon a neck of land surrounded by the water of the sea; to the eastward stretches the Atlantic; to the west rise high sand ridges covered with a growth of healthy pine. It is separated from the sea by a narrow island, many miles in length, forming its harbour.

St. Augustine has an ancient renown for healthfulness. Bernard Romans in the "Natural History of East and West Florida," 1775, writes: "I do not think that on all the continents there is a more healthy spot." Wm. Darby, "History of Florida," 1821, says: "The remarkable healthfulness of the situation will render it the Montpelier of the Atlantic Coast." James Grant Forbes, "Sketches of Florida," 1821, adds: "Accounts from all quarters correspond in representing the capital (St. Augustine) as the Montpelier of North America, to which the healthy repair for refreshment, the invalid for health."

In "Observations upon the Floridas," by Chas. Vignoles, 1815, is written: "The undeviating salubrity of the St. Augustine climate is almost one continued spring."

In 1837 John Lee Williams in "The Territory of Florida," says: "The situation is peculiarly serene, healthy and pleasant."

George R. Fairbanks, "History of St. Augustine," 1858, confirms these statements, viz.: "The Spanish settlement of St. Augustine has remained for nearly three hundred years where it was originally planted, and the health of its inhabitants has for this long period given it a deserved reputation for salubrity and exemption from disease," "a situation combining more local advantages for salubrity could hardly be imagined."

This history of remarkable healthfulness continued until the spring of 1902, when an outbreak of typhoid fever occurred embracing but a very small proportion of the large number who visited the city that season, but all attacked were persons of prominence, and their names were widely spoken.

Of these cases Dr. John S. Billings, who the same season made a thorough official investigation, reports : "It is probable that two or three of them were not typhoid at all ; that two of them were ill on the day of their arrival, which illness became well-marked typhoid five days later and, therefore, was not contracted at St. Augustine ; and that of all the cases at the above mentioned hotels (Ponce de Leon, and Cordova, and Alcagar) there were among the guests but three which it would seem must have been contracted during their stay in St. Augustine. The four servants affected with typhoid probably had the specific cause introduced into their bodies through contact with a fever case or cases, or with soiled linen from such case."

"Every educated physician will understand from the above figures the extreme improbability that so few cases (13) scattered over a period of two months, and given a ratio of less than one to a thousand people exposed, could have been due to anything in the structure of the buildings, the general water supply, or the food, milk or ice, and the detailed investigation of all these things makes it practically certain that no case of typhoid was due to any of them."

Later history has borne out the correctness of Dr. Billings' opinion ; during subsequent winters, in my own experience until 1898, and since that time, in the experience of Dr. M. W. Seagears, physician to these hotels, rarely has a case of typhoid appeared at St. Augustine. This northern region of Florida has, however, suffered for short periods in recent years more than the southern part of the State from mild influenza. This disease, which attacked Florida but slightly during its earlier invasion of this country, came during the winter of 1900 with the onset of cold north-western waves, in an active form. It was delayed until early March and persisted for two weeks. It was not accompanied by serious complications, but was characteristically epidemic. Scarcely a season since has northern Florida been free from some definite signs of its presence.

The exanthemata are rarely observed, but when imported, have, in my experience, run an extremely mild course. In May, 1893, a mild epidemic of scarlatina occurred among the resident people, after the winter visitors had departed, but it was so indefinite that it was with difficulty recognised. No children suffered complications, none were kept in bed, and it was not until desquamation defined the diagnosis that the physicians then remaining in the city were able to give a positive opinion.

March and April at St. Augustine are most perfect months; bright, sunny days, with temperature rising 70° to 75° and without evening chill, are almost continuous. This agreeable condition is equally true of Ormond and Daytona, and the choice of winter location may be determined by the fancy and pleasure of the patient, rather than by any large differences in climatic conditions.

Of the more tropical portions of Florida, Palm Beach and Miami are the representatives on the eastern coast; on the west or Gulf coast, and in the interior, numerous points of comfort with proper appointments for health have developed.

Palm Beach is situated at the most eastern point on the Florida coast, is bathed by the waters of the Gulf Stream, and is free from contamination of fresh or brackish water. The vegetation, though rich and beautiful, is not dense. Both Palm Beach and Miami are usually below the frost line. In 1899 the temperature fell once at the former to 33°.

once in 1906 to 25°, and in 1907 to 28°. This region feels the effects of waves of cold borne down from the north-west much more mildly and for shorter periods than the higher latitudes of the state, yet there are days in January and February when an overcoat is necessary, and when hotels turn on the steam heat. During each season there are at least three or four cold waves, as shown in the accompanying tabulation, sufficiently severe to render warm clothing and careful protection of the delicate imperative.

These attacks of cold break usually on the middle of the third day, and the normally mild climatic conditions are restored the moment rude Boreas ceases his attack.

The prevailing winds in Southern Florida are south-east, directly off the ocean ; a gentle, steady breeze during the entire day and lasting through the night.

Perhaps the most favourable feature for the delicate is the absence of evening chill. With the setting of the sun comes no appreciable fall in temperature, and in this the climate has an advantage over Southern California, the upper Nile and the Riviera.

Sparks, writing of the Riviera, says : "The chief drawback to the climate is the occasional occurrence of high winds, cold from the north-east and east, very dry from the west and north-west, and of periodic draughts."

At Nice, San Remo and Mentone, it is the custom of physicians, during the winter months, to recommend both well and ill to remain indoors after 3 o'clock in the afternoon until the setting of the sun, in order to avoid the chill damp which rolls down the lofty mountains, at whose base they lie.

The best test of the climate is the healthfulness of the employées of hotels and grounds. These are imported persons, they work hard and take plain food, their habits are careless and they are constantly out in the night air. Were there malaria it should manifest itself first among these employées. Of more than a thousand under my care at Palm Beach during each of six years, I can say that in only a single instance have I seen a chill from any cause, nor have I seen a case of dysentery in any of them for that period. Among guests I saw an annual average of one case of dysentery.

I saw, in 1899, one case of malaria among guests, a Yale student in reduced health. Under the usual medication the symptom never recurred; he spent his days at golf and sailing, recovered health, vigor and strength, and gained eleven pounds during his six weeks stay. In the winters 1900-1904 my experience with employées was exactly similar, neither malaria or dysentery manifested themselves in any form; among guests two cases of malaria in persons bearing a history of infection occurred, a chill in each once, and not repeated. No case of dysentery occurred in this period.

Among a very large number of children spending a part or the whole of the winter at Palm Beach, I had little occasion for practice. They were all, barring minor complaints, in good health during these winters. My largest number of consecutive calls upon any child for acute causes was four, and these were for mild colds. The climate and sanitation of Miami is similar to that of Palm Beach. The choice will depend upon social and economic reasons, rather than upon any considerable differences which may exist in climate.

In this connection I may say one word of the Island of Nassau, easily reached from Miami. I can speak of it with favour because of the uniform verdict of many friends and patients who have had long experience there. Cold waves are scarcely noticed. Temperatures are more uniform than in any part of the mainland, drainage and sanitation are perfect, and the inviting atmosphere of the place, its unique and peculiar native life, its attractive sailing grounds, and its excellent hotel and boarding accommodations, render it charming to the tourist and health seeker. The objections for invalids, to which my attention have been called, are occasional rough voyages, rather persistent stiff breezes, which blow across the island with a velocity greater than at any Florida resort, and the glare from the white rock used in the construction of buildings and road beds. Throughout Florida acute digestive derangements occur rather frequently in recent arrivals, partly by reason of the radical change from winter to summer, made in the interval of twenty-four to forty-eight hours, unlike nature's birds of passage, producing a state equivalent to the spring lassitude or so-called biliousness of northern May and June; in part also on account of dietetic indiscretions incident to a hotel table. Persistent diarrhœas, excepting occasionally with the very aged, I have rarely seen. Acute intestinal disturbances, as the season advances to the warmer days of March, are not uncommon. Repeated investigation of food and water supplies have convinced me that these are not the cause. Attacks of mild diarrhœa supervene hot waves, just as they appear in the New England mountains and along the Atlantic sea-coast in later summer and early autumn. Colitis attacks are extremely rare, vastly less so than on the Maine coast in early autumn.

In 1897 I made a report before this Society on pneumonia in Florida, for a period of five years. Among about 400,000 white and coloured inhabitants, the average annual number of deaths from pneumonia was 165·4 or ·42 per 1,000 inhabitants. In the east coast counties from St. Augustine southward the mortality was 1 to each 3,576 or ·27 per 1,000 inhabitants. That this remarkably low mortality from pneumonia in Florida must be credited to favourable local climate, is more readily appreciated when we reflect that the average mortality is 1·5 per 1,000 in northern and temperate latitudes of Europe and America; that Greece, Italy and Turkey suffer severely; that the disease is often epidemic in sub-tropical and tropical countries like the Soudan, the west coast of Africa, and the upper Nile, and that in the West Indies and South American countries the natives have a very heavy death rate from this disease.

It is manifest from the foregoing that there need be little fear of serious acute illness by winter residents of Florida. The improving effects of Florida climate upon chronic disease is greater than that of sea level summer in the north, by reason of almost continuous sunshine, absence of evening chill and the slighter diurnal temperature variations. Diseases of the circulatory and excretory systems find here specially favourable conditions, particularly those forms dependent upon arterio-sclerosis, local or general. Cardiac excitement is relieved and arterial-hypertension receives some reduction. I have not infrequently seen cases of albuminuria greatly benefited by prolonged residence in Florida and occasionally incipient subjects have returned to perfectly normal conditions.

Functional nervous diseases, whether dependent upon presenile sclerosis of blood vessels or upon the stress and strain of modern life are favourable subjects for this sedative climate. The stimulus to mental activity is removed and even persons in perfect health note a decided soporific influence. Patients with respiratory diseases, if catarrhal, or delayed convalescents from pneumonia or bronchitis, as well as patients with tuberculosis in the inactive fibroid stage, can find no more advantageous winter home.

In the acute stages of pulmonary tuberculosis patients do not receive, in my experience, the advantage which might be anticipated from the out of door treatment in this climate. I have in many instances known of great improvement or recovery in persons whom I have directed from Florida to the more invigorating climates of mountain regions or to Southern California, other conditions remaining practically unchanged.

Gouty and rheumatic subjects, with incident neuralgias or neurites, have frequently and rapidly improved under my observation in this greatly eliminative atmosphere.

To what extent our families, sent to Florida, are exposed to acute and climatic diseases, twenty years of personal experience make it possible for me to state with reasonable accuracy. That this sub-tropical sea climate has also definite influence in delaying the progress of already established chronic disease, I cannot doubt, and in certain border line cases, as in albuminuria, definite cures have been accomplished. The objections to winter residence in Florida which should be noted are hotel and boarding house life and food, which can rarely be equal to home surroundings and table, absence of sustained diversion for such as do not take up golf or tennis, and who are indifferent to sailing and fishing. Sitting out of doors and wheel chair or carriage driving soon cease to be an amusement to the average restless American mind. One other objection which to a small proportion is an important one, is the relaxation, the so-called enervating effect of the climate. In some persons, well or ill, this becomes a positive torpidity, physical and mental, with painful languor and lassitude, stimulating illness; to such the climate is not adapted and they should return to the bracing influence of northern chill.

The advantages of easy accessibility for residents of the eastern half of our Continent, of freedom from the dangers of acute and climatic illness, as I have pointed out, and the toning down of the overworked and overwrought nerves of the average American, associated with its tendency to stimulate nature's restorative processes, are all that should be claimed for Florida's influence upon health and disease.

CLIMATE OF PALM BEACH, FLORIDA.

| Temperature | Jan. | Feb. | March | |
|---|---|---|---|---|
| Average for 18 years ... | 65·7 | 67·1 | 67·8° | Jupiter 17 miles north of Palm Beach. T. D. Coleman, TRANS. AMER. CLIMAT. ASSN., vol. xxii., p. 51. |
| ,, daily range for 18 years | 14·3 | 13·3 | 13·5 | |
| Mean of warmest for 18 years | 72·2 | 71·6 | 73·7 | |
| ,, coldest for 18 years... | 60·0 | 58·4 | 64·8 | |
| Highest of maximum for 18 years | 83·0 | 87·0 | 89·0 | |
| Lowest of minimum for 18 years | 24·0 | 27·0 | 33·0 | |
| Average date of lowest for 18 years: Dec. 19. | | | | |
| Humidity relative for 18 years | 82·0 | 80·0 | 79·0 | |
| Precipitation: | | | | |
| Average in inches 18 years | 3·81 | 2·78 | 5·20 | |
| Wind—average velocity in miles per hour | 10·2 | 10·9 | 11·2 | |
| Average number cloudy days 18 years | 6 | 5 | 5 | |
| Largest ,, ,, ,, | 15 | 13 | 12 | |
| Smallest ,, ,, ,, | 0 | 2 | 0 | |
| Average number rainy days ,, | 10 | 9 | 7 | |
| Smallest ,, ,, ,, | 4 | 3 | 5 | |

1898, January 9 to March 26:

| | |
|---|---|
| Minimum temperature (once) | 50° |
| Highest temperature (once) | 88° |
| At or above 80° in January | 10 days. |
| ,, ,, February | 7 ,, |
| ,, ,, March ... | 14 ,, |
| ,, 70° January | 14 ,, |
| ,, ,, February | 20 ,, |
| ,, ,, March ... | 26 ,, |
| At or below 60° January | 0 ,, |
| ,, ,, February | 14 ,, |
| ,, ,, March ... | 0 ,, |

1899, January 9 to April 3:

| | |
|---|---|
| At or above 80° in January | 6 ,, |
| ,, ,, February | 16 ,, |
| ,, ,, March ... | 25 ,, |
| At or below 60° January | 6 ,, |
| ,, ,, February | 6 ,, |
| ,, ,, March ... | 4 ,, |

1898 (51 days): Number of days with temperature range between 60° and 80° = 51.
1899 (84 days): ,, ,, ,, ,, ,, ,, ,, = 42.

# HÆMOPTYSIS DUE TO TUBERCULOSIS—A PRELIMINARY STUDY.

BY J. M. ANDERS, M.D., LL.D.
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THE pathologic etiology should naturally engage our attention first and foremost in a discussion of the subject of hemoptysis dependent upon tuberculosis.

Broadly speaking, we may sub-divide the cases into those occasioned by (*a*) congestion of the bronchial mucosa and lung-texture, and (*b*) ulceration or erosion of vessels, or rupture of miliary aneurisms.

(*a*) *Bleeding due to Pulmonary Congestion.*—When hæmorrhage takes place before gross lesions are detectable by means of the physical signs or the X-rays in tuberculosis, we ascribe them off-hand to congestion of the bronchial mucous membrane and of the lung-texture. The earliest pathologic changes in this disease are not directly connected with blood-vessels, although the adjacent tissues are the seat of inflammatory processes which may manifest a hæmorrhagic tendency. The query is pertinent, Can we ascribe the principal hæmorrhages of the earlier stages to congestion? It may be reasonably questioned, as pointed out by Garland, whether in point of intensity the hyperemia of early pulmonary tuberculosis is equal to that of many other acute and chronic diseases of the lungs in which the tendency to free bleeding is decidedly less marked. It is probable that minute areas of necrosis are already in evidence and responsible for these early hæmorrhages. At all events, in cases in which hæmoptysis appears before the occurrence of any other initial symptoms of pulmonary tuberculosis, the X-rays show the presence of the characteristic opacities, and tubercle bacilli can often be isolated from the sputa during and after the hæmorrhage. That a high grade of congestion is a factor, however, is seen from the significant influence exerted by violent or prolonged physical exercise in the production of hæmoptysis both in tuberculous and non-tuberculous subjects.

This brings us at once to a realisation of the fact that the heart can not be omitted from consideration in the pathogenesis of hæmoptysis due to tuberculosis. As elsewhere remarked,[1] the cases of lung tuberculosis that are associated with chronic valvulitis affecting the mitra lsegments, manifest symptomatic hæmoptysis more commonly than the ordinary, uncombined type of the disease, thus showing apparently the effects of marked hyperemia. In the congestive bronchitis that attends chronic valvulitis and also that of the collateral septic processes in phthisis, the lumen of the vessels and capillaries is enlarged and this may lead to small hæmorrhages, but the usual source is undoubtedly the pulmonary vessels (*vide infra*). The current opinion that the earlier bleedings in the course of pulmonary tuberculosis are dependent on congestion of the bronchial mucous membrane, does not rest on secure pathologic grounds. It is to be recollected, however, that high tension in the pulmonary circuit leads inevitably to vascular sclerosis of the pulmonary vessels, so that deficient nutrition at length favours leakage and consequent hæmoptysis. Now, it is known that the walls of blood-vessels are early affected, *i.e.*, weakened by endarteritis, in pulmonary tuberculosis; and, "while there are as yet few proteins and the living bacillus plays the chief rôle, the healthy wall of the smaller pulmonary vessels is apt to become invaded and

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[1] *Edinburgh Medical Journal*, 1868.

eroded, giving rise to a hæmorrhage" (G. Cornet). It is not improbable that hæmorrhage may at times proceed from poorly supported capillaries, or a want of outside pressure.

(*b*) Hæmoptysis due to ulceration or erosion of vessels, and rupture of aneurysms in pulmonary vessels.

Rasmussen[1] first showed that fatal pulmonary hæmorrhage is probably always caused by rupture of an aneurysm in a lung-vessel. Brown[2] has also emphasised that few, if any, "well authenticated cases of fatal hæmoptysis have occurred from rupture of the pulmonary vein or bronchial artery."

The method of growth of the tuberculous granulomata into the calibre of vessels explains satisfactorily how rupture of their walls with ensuing hæmorrhage may occur, even at a comparatively early stage of the disease. The less frequent occurrence of pulmonary hæmorrhage during the advanced stage of tuberculosis is ascribable to endarteritis which is slowly developed, with resulting thickening of the vascular walls, hence offering increased resistance to the invading forces.

R. E. Thompson[3] has long since pointed out that no case of profuse hæmorrhage proceeds solely from the bronchial artery. It must be remembered, however, that where there is a general tendency to hæmorrhage, a portion of the blood may come from the bronchial mucous membrane.

It is especially true in cases that pursue a rapid course, or those in which the processes of softening and liquefaction progress rather acutely, that bleeding from eroded vessels is most apt to arise. In these instances the vascular walls are not the seat of endarteritis, owing to the short duration of the tuberculous process. In the more serious and fatal hæmor-

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[1] *American Jour. Med. Sciences*, Jan., 1902, by the writer.

[2] *American Jour. Med. Sciences*, Aug., 1906.

[3] "Causes and Results of Pulmonary Hæmorrhage," Smith, Elder and Co., 1879.

rhages we may infer the existence of rupture of vessels due to pathologic changes in their walls, leading, as a rule, to aneurysmal dilatation before the accident occurs. The development of the latter condition is favoured by the removal of the tissues which serve as an external support to the vascular walls.

Finally, the dislodgment from quiescent or healed cavities of calcareous masses may be followed by slight hæmorrhage, most probably occasioned by the rupture of capillaries.

*Exciting Factors.*—It is undoubted that in a considerable percentage of cases of pulmonary tuberculosis there is a hæmorrhagic tendency, and in such a veritable hæmoptysis may be induced by increased pressure in the pulmonary circuit. That hæmoptysis may manifest dependence on an hereditary taint is a matter of personal observation; this is especially true of families that show hæmorrhagic proclivities. In several cases under my observation, early pulmonary bleedings (*i.e.*, before the physical signs and the X-rays gave indications of pathologic changes), were associated with hæmorrhage from other mucous outlets as the stomach and nose. Hæmoptysis may have, as its exciting factor, an aggravation of the cough. Dobell found that not less than 76 out of a total of 90 cases of hæmoptysis were excited by this symptom.

In my cases muscular exertion, more especially if long-continued or combined with fits of passion or mental excitement, has preceded the occurrence of symptomatic hæmoptysis in a considerable percentage of cases, and it deserves to rank higher as an exciting factor than is generally believed. In these instances we may attribute the leakage to congestion, with rupture of diseased vascular walls, provoked by exertion. Indeed, in one of my cases a fatal hæmorrhage occurred in a female patient, aged 25 years, after a hurried walk to church about a mile distant. Although no *post-mortem* examination was permitted to furnish positive proof, the existence of a small cavity in the apical region of the right lung explained the pathologic cause of the accident. Franz Stricker made a statistical study of this symptom in relation to tuberculosis covering a period of five years (1890-95) in the Prussian army. The total number of cases admitted to the hospital was 900. In 480 cases the hæmorrhage developed without recognisable cause, and of these 417 cases, 86 per cent., were certainly or probably tuberculous. Stricker draws the following, among other, conclusions, namely, "that soldiers attacked with hæmoptysis without special cause are in at least 86·8 per cent. tuberculous. In the cases in which the hæmoptysis follows the special exercises, &c., of military service at least 74·4 per cent. are tuberculous. In the cases which come on during swimming, or as a consequence of direct injury to the thorax, about one-half are not associated with tuberculosis.[1] As pointed out by Flick, "So long as a tuberculous subject has not spat blood, he is able to persuade himself that he has not consumption, but after he has spat blood he takes it for granted that he has the disease." He continues: "There is really more reason for this popular verdict than we would at first sight think. Blood-spitting is undoubtedly, in some cases at least, due to mixed infection, and frequently occurs with the breaking down of tissue." Flick, Ravenel, and others hold that hæmoptysis is generally caused by a secondary infection with the pneumococcus.

In many cases, however, exciting factors, if any be at work, are not obvious.

*Incidence.*—Hæmoptysis is universally held to be a frequent symptom in tuberculosis. According to a table given in the Second Annual Report of the Henry Phipp's Institute it was present at one time or another in 1,130 out of 2,344 cases. In proof of the extreme frequency of the occurrence of

[1] Osler, "Text-book of Medicine, p. 326.

hæmoptysis, I desire to present certain statistics which include 214 cases from my private case records, 300 from the out-patient department of the Medico-Chirurgical Hospital (covering a period of six years), and 78 from the practice of Dr. S. A. Loewenberg, who is in charge of the dispensary service, making a totality of 589 cases, of these 169 or 28·7 per cent. manifested blood-spitting. These cases, however, were not all followed until death or recovery, hence the percentage in which hæmoptysis occurs at some period throughout the entire course of the disease must be much higher. For example, if we consider only the cases from private practice, numbering 289, the percentage rises immediately from 28·7 to 41·8, but it is to be recollected that even these were under observation less than half of their duration; hence, I feel strongly that Osler is probably not far wrong in stating that it is a feature in from 60 to 80 per cent. of all cases of tuberculosis.

*Age and Sex.*—Of 1,084 cases of tuberculosis studied by Thompson, the female sex was found to show greater liability to hæmoptysis than the male "in the relation of 65 to 62 per

TABLE I.—AGES BY DECADES AT WHICH TUBERCULOSIS OCCURRED.

| | 0—10 | 10—20 | 20—30 | 30—40 | 40—50 | 50—60 | 60—70 | 70—80 |
|---|---|---|---|---|---|---|---|---|
| Males ... | 1 | 32 | 154 | 106 | 45 | 12 | 6 | 0 |
| Females ... | 4 | 32 | 87 | 61 | 25 | 9 | 2 | 0 |
| Total ... | 5 | 64 | 241 | 167 | 70 | 21 | 8 | 0 |

cent." Of the total number in which the sex was given (589 cases) my figures show the following: (1) That the liability to tuberculosis is shown at an earlier period of life in the female than the male in the proportion of 10 to 6 before the twentieth year, and 7 to 1 prior to the tenth year (*vide* Table No. I.); (2) that hæmoptysis is manifested earlier in life, probably dependent upon increased incidence in the female sex during the first two decades, as compared with the male, as indicated by the accompanying table (No. II.).

TABLE II.—AGES BY DECADES AT WHICH HEMOPTYSIS OCCURRED.

| | 0—10 | 10—20 | 20—30 | 30—40 | 40—50 | 50—60 | 60—70 | 70—80 |
|---|---|---|---|---|---|---|---|---|
| Males ... | 0 | 7 | 53 | 40 | 15 | 3 | 2 | 0 |
| Females .. | 0 | 11 | 30 | 22 | 10 | 4 | 0 | 0 |
| Total ... | 0 | 18 | 83 | 62 | 25 | 7 | 2 | 0 |

My observation and statistical studies go to show that profuse and fatal hæmorrhages are somewhat less common in the female than the male sex, although the sexual difference in this respect are less pronounced than certain writers would lead us to believe.

*Seasonal Influence.*—The occurrence of hæmoptysis considered in relation to the seasons, has been the subject of statistical study. My own figures, as tabulated below, give a summary of 197 cases, for each month of the year.

TABLE III.—SHOWING SEASONAL INFLUENCE.

| Jan. | Feb. | March | April | May | June | July | August | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 11 | 9 | 14 | 19 | 13 | 16 | 14 | 16 | 16 | 8 | 11 | 10 |

A glance at the above figures cannot fail to show a seasonal influence upon the prevalence of pulmonary hæmorrhage. It will be observed that the spring and summer months give the highest incidence, and this is in consonance with accepted opinion regarding the relaxing and enervating effects of heat as well as the influence of the marked oscillations of temperature and humidity during the spring months as causative factors. Sudden, extreme changes of weather bring about intercurrent acute bronchitis and an aggravation of the cough, which tends to excite bleeding.

Conversely, the months exhibiting a steady, stimulating cold—December, January and February—have a preventive influence, as shown by their smaller numbers. I should add that the above figures, concerning the influence of the seasons upon pulmonary hæmorrhage, strongly corroborate the points brought out by Thompson in his statistical inquiry in England, although the latter were not confined to hæmoptysis in the course of tuberculosis.

The strong tendency to recurrences of the hæmorrhage is shown by my statistical inquiries. Thus of the totality of cases, 589, a second outburst occurred in 292, or about 50 per cent.

Considered with regard to the stage of the tuberculous process my figures indicate that in 75 per cent. of the instances, hæmoptysis appeared in the first and early part of the second stage or that of softening. In this respect, our collective investigations support the views expressed above on the subject of the pathogenesis of the condition.

*Clinical Peculiarities.*—We must look upon hæmoptysis as being the resultant of existing tuberculosis, although neither symptoms nor physical signs may betray the presence of the latter disease prior to the occurrence of the blood-spitting. This dictum was originally advanced by Laennec and Louis, and later by Traube. Many of these patients have no recurrence and subsequent symptoms of tuberculosis do not develop; such may be regarded as instances of spontaneous arrest, or even cure of the affection. Again, hæmoptysis is commonly followed by the characteristic evidences of chronic phthisis, or it may be after the lapse of months and even years, that the rational symptoms and physical signs of lung disease first appear.

Wilson Fox[1] made the interesting observation, since con-

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[1] "Temperature of Phthisis," *Medico-Chir. Trans.*, lvi., 399.

firmed by the writer and others, that hæmoptysis, even when considerable in amount, does not seem to exert any influence on the reduction of temperature, in the majority of cases at least. Advanced cases sometimes show a fall of some extent, which may last for a period of several days. Now, whilst in some instances no variations of temperature occur and in a few a slight lowering, it is a well-known thermometric observation that fever, and oft times decided pyrexia, develops during and immediately after the blood-spitting. Moreover, a moderate depression of temperature, may be promptly followed by a notable rise lasting a number of days.

The explanation of these elevations of temperature offers notable difficulties. When of brief duration they may be occasioned by alarm and demoralisation of the patient as shown by cardiac palpitation, mental agitation and other nervous concomitants. In the case of large hæmorrhages which induce marked symptomatic anæmia, the ensuing restlessness and febrile disturbance have, as an added causative factor, the anæmia. These traditional explanations for the occurrence of fever, however, need to be further investigated. But the query arises, What new theory can be advanced on rational clinical and pathological grounds? May not fever, when a sequel of hæmoptysis be symptomatic of a fresh area of tuberculous inflammation occasioned by the liberation of infective material, which is conveyed partly by gravity, but chiefly by aspiration to the surrounding bronchiole and air-cells? The daily exacerbations of temperature, sometimes observed for days or even weeks after a hæmorrhage, may also, it seems to me, be attributable to localised strictural alterations, which permit of the absorption of toxic substances, at the seat of the ulceration or erosion. As before stated, the majority of the bleedings occur after secondary infection with the streptococcus has occurred.

I hold it to be exceedingly difficult to determine the source of the blood in a minority of the cases of pulmonary hæmorrhage and in a case seen recently the blood was thought for a time to come from the stomach.

The points of detection to be found in text-book literature are—a tickling about the fauces, a saline taste, blood brought into the mouth by the act of coughing, a bright red colour appearance, frothy and mixed with mucous. The character of the blood expectorated may not give unfailing proof of its origin, however, and this is especially true of a sudden, copious, pulmonary hæmorrhage. In these cases, the colour of the blood may be dark, not having been exposed to the air in the lungs long enough to be changed to arterial brightness. In dubious cases of bleeding of moderate grade, rigid search is to be made for bits of mucus, from which either bacilli or elastic tissue may be isolated. A blood-tinged sputum during the subsequent few days—a common sequel—is a point of great support in hæmoptysis and the same is equally true of evidence of pre-existing lung disease.

According to personal observation, it is beyond doubt that there is a form of hæmoptysis, which recurs at long and regular intervals of time; this might appropriately be termed recurrent, or since all cases tend to recur, *periodic hæmoptysis.* Although far from common, brief reference should be made to it for prophylactic and therapeutic reasons. It is clear that unusual watchfulness at the time of the expected hæmorrhage would be effectual in preventing recurrences. Whether this clinical variety is separated from the usual type, either etiologically, or pathologically, I am unprepared to state. In the cases observed, the intervals between attacks have been one year, as a rule, and the most favoured season spring. The physical signs of adhesive pleuritis at the base were found in association in two of these cases and the pulmonary lesions slight and practically non-progressive. Indeed, the rather free bleedings were invariably followed by decided improvement which lasted for months together.

*Résumé of Treatment.*—A retrospective view of the various methods of treatment employed during a comparatively brief period of time indicate clearly a notable diversity of opinion on the subject. It must be admitted also that certain well-founded principles and facts are but dimly recognised by the present generation of physicians. For example, the bleeding from a hyperæmic lung-texture affords decided relief to the local pathologic condition, but more than this symptomatic improvement lasting weeks, and even months, may be a secondary result. Again, the profession has, it seems to me, an imperfect notion of the therapeutic value of absolute rest in this condition, as well as of appropriately restricted feeding, with light, unwarmed articles of diet.

Prophylactic measures of signal importance to the sufferer from hæmoptysis are, I fear, systematically and inexcusably neglected by the mass of the profession. The avoidance of undue muscular exertion, of the free use of stimulants, and strong mental excitement is to be strenuously enjoined. Certain climatic elements exercise a favouring influence and these are to be adversely considered in making a selection of a suitable habitat for the individual patient. Curtin long since pointed out before this Society, that a residence far removed from the seacoast is best for patients suffering from hæmoptysis, and further, "that a rarified, but also a cold, dry, aseptic air, would be most useful."

The remedial treatment is unsatisfactory and unpromising in view of the fact that while numerous medicinal agents have been recommended, but few have given reliable evidence of their efficacy. It is in order that we put into force the few whose curative virtues have been proven. Unless there be obvious danger of inundation of the uninvolved lung-tissue, as in cases of profuse hæmorrhage, the cough should be arrested by the use of codeine or, if troublesome, by morphine administered hypodermatically. It is necessary to stop disturbance of the bleeding point by coughing in order to give opportunity for the formation of a clot—Nature's own method of arresting hæmorrhage. Hot drinks and alcoholic stimulants, if previously taken, must be intermitted. My own best results during the early active stage of hæmoptysis have been obtained from the strict enforcement of absolute recumbency and quiet, the patient not being allowed to speak aloud nor to put forth any muscular exertion, and an arrest of the cough by codeine in the milder forms, and morphine hypodermatically in the severer cases. The single contraindication to the use of opium has been pointed out, and if we except the small class of cases in which it obtains, morphine or opium in some form, rightly administered, is the most serviceable single remedy at our command; its signal virtue, I repeat, being ascribable to the remarkable enhancement of a coagulum at the seat of bleeding. I feel confident that the perils, near and remote, incident to copious or otherwise protracted bleedings, can be most successfully obviated by its judicious employment. My earnest plea is for a wider use and closer attention to the practical application of this sovereign agent. The importance of controlling the cough receives striking confirmation from the investigation of Dobell, previously mentioned. J. B. Walker[1] also emphasised the value of opium in the treatment of hæmoptysis in a paper read before this Society in 1889.

During the first twenty-four or forty-eight hours according to the size of the hæmorrhage the patient should be kept well under its influence, the object being to stop the cough. Meanwhile, the thorax must be carefully and frequently auscultated and should abundant, moist or bubbling râles be audible over the previously uninvolved portions of the lung—

[1] "Treatment, other than Climatic, of Hæmoptysis in Chronic Pulmonary Disease," by J. B. Walker. *Transactions of the American Climatological Association*, 1889.

a rare event except in case of rupture of a miliary aneurism—it is to be regarded as a signal for the withdrawal of the opiate.

While the arterial pressure in the lesser circulation is less than in the greater or the arterial system, it is subject to decided variations. The hypertrophy of the right ventricle which develops in the course of pulmonary tuberculosis it is fair to assume maintains an abnormally high degree of pressure in the cardio-pulmonary arc. This increased pressure may also be brought about by remedies that produce vaso-constriction in the peripheral vessels such as ergot, and it is most probably accentuated by the forcible action of the heart in consequence of nervous excitation occasioned by hæmorrhage. It is clear that a pure cardiac sedative, *e.g.*, aconite, by lowering the temperature in the lung-vessels must meet an important indication, and it may be prescribed with much confidence in its efficacy. I have found aconite to be highly serviceable in 1-drop doses every third hour; it is especially useful in cases presenting fever. Lawrason Brown[2] suggests "that the blood-pressure be frequently observed, that morphine be used when necessary to quiet the patient and so equalize the blood-pressure, that sodium nitrite be exhibited to reduce, when necessary, the blood-pressure, and that in case of a sudden hæmoptysis amyl nitrite be administered at once when possible, to produce a marked fall in the blood-pressure and so aid in a temporary cessation, at least, of the hæmoptysis."

N. A. Johnson[3] states that, in his experience, atropin in doses of grain $\frac{1}{50}$, repeated every twelve hours, has stopped hæmorrhage when all other remedies have been of no avail. R. H. Babcock gives an immediate injection of atropin sulphate (grain $\frac{1}{50}$-$\frac{1}{25}$). when hæmorrhage occurs from a cavity.

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[2] *American Journal of the Medical Sciences*, August, 1906.

[3] *Denver Medical Times and Utah Medical Journal*, June, 1906.

Successful treatment of the case in question must always be preceded by its reference to one of two categories previously mentioned, to wit : (*a*) in which the hæmoptysis is due to congestion or erosion of the smaller pulmonary vessels (most common), and (*b*) in which there is profuse hæmorrhage due to erosion of the larger pulmonary vessels or rupture of a small aneurysm (comparatively rare).

The differentiation is greatly aided by remembering that class (*a*) is composed principally of the early-appearing cases, while class (*b*) represents the cases which, in addition to showing profuse hæmorrhage, occur at an advanced stage of the disease, as a rule. As stated in other connections in this article, the point of highest importance in the treatment of hæmoptysis according to the nature of the lesion producing it, is that in profuse hæmorrhage proceeding from one of the larger vessels or a ruptured aneurysm, the cough is to be encouraged rather than stopped. Opiates are contraindicated.

# THE BLOOD PRESSURE AS A GUIDE IN THE TREATMENT OF HÆMOPTYSIS.

BY EDWARD O. OTIS, M.D.

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In the treatment of no symptom or complication of disease does that old aphorism of Hippocrates, "Experience is fallacious and judgment difficult," seem so true as in that of hæmoptysis. Consider the differing opinions and experience of so many and keen observers from almost time immemorial to the present day, and still the treatment continues to be largely empirical. More particularly does this Hippocratic maxim seem true with regard to the use of ergot. Were such experienced clinicians and careful observers as Wilson Fox, West, Ransom, Cornet, and many others, entirely deceived in their opinion and experience as to the value of ergot, or as I am inclined to believe, did they not meet with apparent success sufficient to warrant their conclusions? Still we must admit, as Fowler observes, that "in the great majority of cases of hæmoptysis with a limited area of disease the bleeding ceases spontaneously provided the patient keeps absolutely quiet and observes the ordinary rules which prudence suggests," and therefore, he continues, "it is obvious that under such circumstances any remedy which is given sufficiently often may obtain an undeserved reputation." And this may be as true of the nitrites, now a popular remedy through the writings of Hare and others, as of ergot.

Hæmoptysis is a symptom dependent upon many and varying conditions—conditions difficult, if not impossible, to determine in every case. We have the underlying cause, the local process, its activity, degree of softening, and the state of the blood vessels in the diseased area; we have the individual diathesis; we have the various exciting causes—the activity of the circulation or blood pressure, the state of the nervous system, exercise, metabolic activity, mental excitement, causes dependent upon the sexual system, cough, and doubtless many others. It is, therefore, obviously extremely difficult to judge of the effect of any remedy, or to administer it with precision; and, indeed, one despairs of ever arriving at any great accuracy in the treatment of this symptom, and congratulates himself that in so many cases it ceases without treatment.

In what I have to say in these notes regarding hæmoptysis I do not include those cases of overwhelming and fatal hæmorrhages, obviously due to the rupture of an aneurysm in a pulmonary vein, for no treatment in such catastrophes is of avail. I refer rather to the less severe cases occurring generally in the earlier stages of the disease, and particularly to those which are recurrent or persistent.

Of late years, since the sphygmomanometer has come into use, the blood pressure as a causative factor in hæmoptysis has been receiving renewed attention, although the older writers were not unmindful of this factor, as witness Flint, who says: "There is a marked difference in different cases with regard to the activity of the circulation, or, to speak more definitely, of the heart as represented by the character of the pulse." And Wilson Fox who says, in referring to the use of ergotine: "It is a remedy which should be used in severe and intractable cases attended by a *soft* and *rapid* pulse," or, as we should say now, a low blood pressure.

Lawrason Brown read last year a very suggestive paper before the National Association for Study and Prevention of

Tuberculosis upon "The Treatment of Hæmoptysis by the Nitrites, Based on Observations of Blood Pressure," and Hare,[1] of Australia, in various papers, speaks enthusiastically of his success, and that of others, with nitrite of amyl in hæmoptysis based on the well-known action of this drug in producing a marked and rapid fall of blood pressure.

Hare evidently assumes that every case of hæmoptysis results from a comparatively increased blood pressure, and reports sixty cases from his own practice and that of others in which nitrite of amyl was used, and in which, with one partial exception, he says: "The bleeding ceased or became reduced to a mere staining of the sputa immediately—that is, within a minute or so."

From our experience at the Massachusetts State Sanatorium, I think we can offer other exceptions to accompany this single lonesome one of Hare's. Inspired by these reports, as well as actuated by the desire to see if we could obtain further light upon the value or worthlessness of ergot in hæmoptysis, we began about a year ago to take the blood pressure in cases of hæmoptysis occurring at the Sanatorium, and so far as we were able, guide our treatment by the indication thus given.

A Janeway's sphygmomanometer with the wide cuff was employed and the nurses instructed in its use.

As hæmoptysis is such an alarming symptom, and so often occurs without warning, our first effort was to stop the hæmorrhage, and our blood pressure observations had, necessarily, to be more or less of a secondary matter. Furthermore, the majority of cases occurred in the night or early morning when the physician was not on hand to make or verify the observations or direct the treatment, so that the nurse at the inception of the hæmorrhage followed the

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[1] *The British Journal of Tuberculosis*, vol. i., No. 1, 55.

routine treatment consisting of cracked ice, a small or large dose of morphia and atropine hypodermically according to the urgency of the case, and the inhalation of nitrite of amyl if it seemed to be indicated. Occasionally only cracked ice was given as a placebo.

I have, however, eighteen cases, mostly recurrent, to report in which the blood tension was taken at or as soon as possible after the hæmorrhage began. In most of them, besides the immediate routine treatment above mentioned, if that did not suffice, either the nitrates or ergot was employed, depending upon the blood pressure; if this was comparatively high the former was given, and if low the latter, whose physiological action, as we know, is an "increase of blood pressure in the aortic system by a contraction of the arterioles through stimulation of the vaso-motor nerves" (Babcock, Kobert H.); and also as Jacobi (quoted by Cushny) has shown, by direct action on the muscular wall of the vessels.

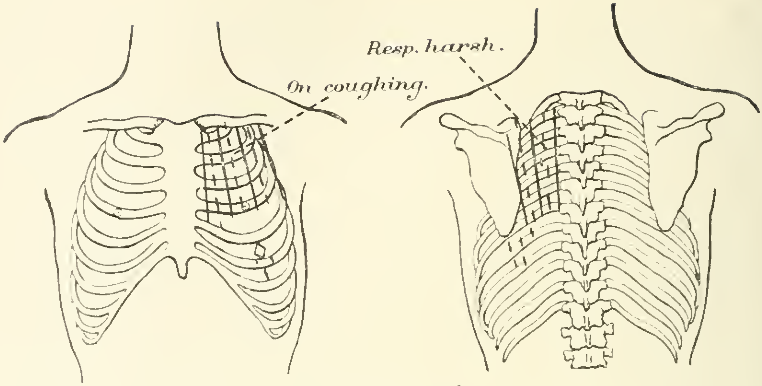
Hence if ergot is of value, it would seem to be obviously so in a condition of lowered blood pressure when the hæmorrhage might be considered to be more of a passive than an active one; and Babcock ("Diseases of the Lungs"), though he decries the use of this drug, very logically says: "If hæmoptysis were in every instance due to relaxation and transudation, ergot might do good." Our reasoning was that if the blood pressure will enable us to determine these exceptional cases in which the hæmoptysis is due to relaxation, why may not ergot be a rational indication in continued and recurrent hæmorrhage (for the action of ergot is too slow to produce immediate results), and may not the success attributed to its use have occurred in just such cases? In a number of cases, whatever the blood pressure, if the indicated drug (by the blood pressure) appeared to exercise no beneficial influence upon the hæmorrhage we tried that contra-indicated by the blood pressure, and apparently sometimes with success.

In order to obtain what might be considered a standard of blood pressure among tuberculous individuals, it was taken in 320 cases in the Sanatorium, and the average was found to be 124 M.M., Hg. Of the men it was 128 and of the women 115. Of 42 male patients the average blood pressure was 126, the highest 140, and the lowest 100. Of 43 female patients the average was 120, the highest 132, and the lowest 98. We, therefore, considered 126 M.M. as the average blood pressure in tuberculous persons.

It must be remembered that the ordinary method we have of measuring the arterial blood pressure is not of precise accuracy, and apparently slight influences, such as mental excitement, physical exertion, the process of digestion, &c., cause it to vary considerably within certain limits. In the cases herewith given, for example, this variation is seen to be quite extensive. It is well to take the pressure several times at intervals in order to obtain a fair approximation of the real tension.

In the eighteen cases of hæmoptysis with the blood pressure herewith given, it is seen that the majority of them are below our average blood tension 126—some of them markedly so. The highest was 145 and the lowest 74; the average was from 109 to 119.

In nearly all the cases, when any treatment was considered necessary, the routine one, before mentioned, was at first employed, namely, ice, morphia combined with atropin, or heroin, with or without nitrate of amyl, depending upon the rapidity and amount of the hæmorrhage. On the recurrence or persistence of the bleeding, either ergot or the nitrates, in the form of nitrate of sodium or nitroglycerine, were then tried, depending upon the blood pressure. If one of these two drugs did not appear to produce results, given according to the indication of the blood pressure, the other was exhibited, whatever the blood tension might be. Both in certain cases seemed apparently effective, and both in others ineffective.

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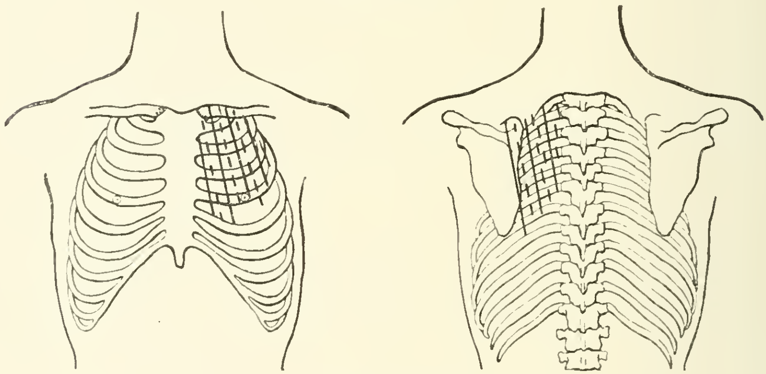
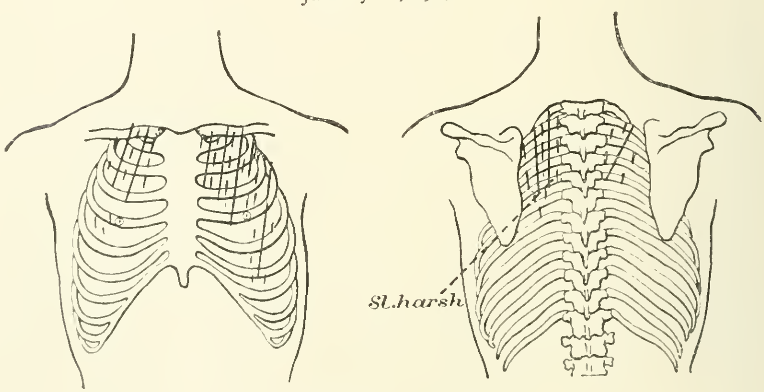


January 10, 1907.

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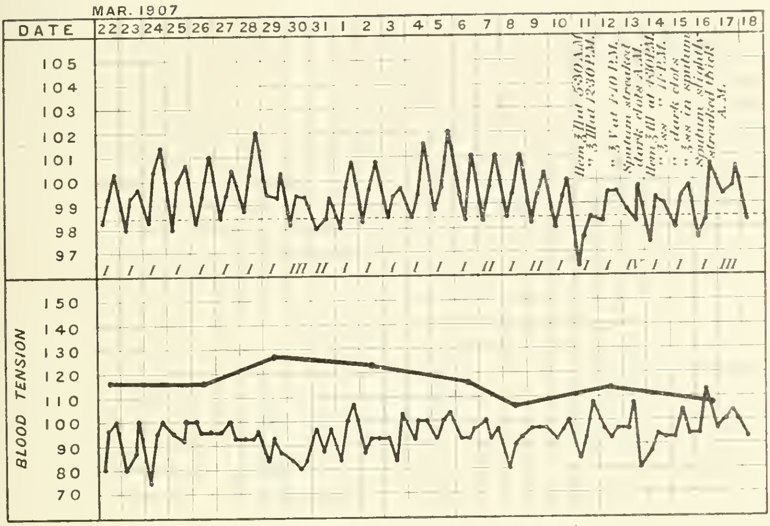
MAR. 1907
DATE
22 23 24 25 26 27 28 29 30 31 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18
105
104
103
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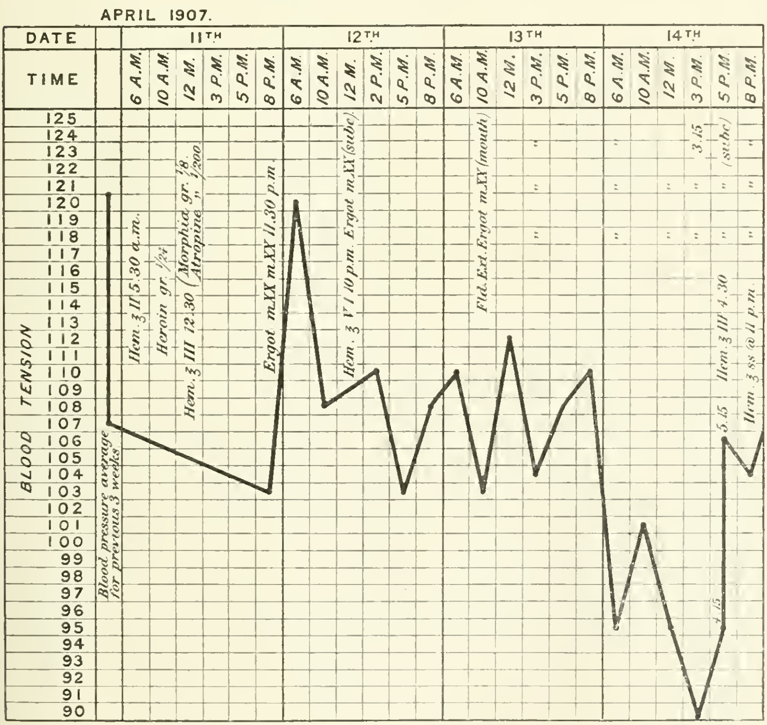
97
BLOOD TENSION
150
140
130
120
110
100
90
80
70


APRIL 1907.
DATE
11TH
12TH
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14TH
TIME
6 A.M.
10 A.M.
12 M.
3 P.M.
5 P.M.
8 P.M.
BLOOD TENSION
125
124
123
122
121
120
119
118
117
116
115
114
113
112
111
110
109
108
107
106
105
104
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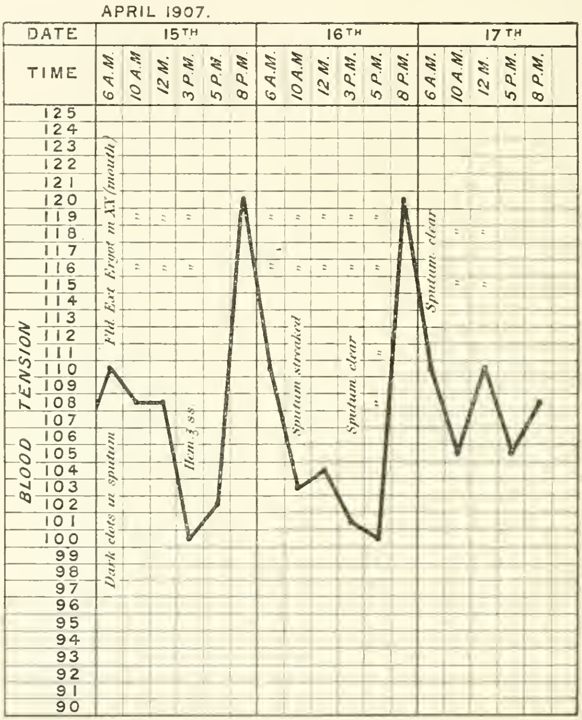
102
101
100
99
98
97
96
95
94
93
92
91
90
Blood pressure average for previous 3 weeks
Hem. ℨ II 5.30 a.m.
Heroin gr. 1/24
Hem. ℨ III 12.30 (Morphia gr. 1/8 Atropine " 1/200)
Ergot mXX mXX 11.30 p.m.
Hem. ℨ V 1 10 p.m. Ergot m.XX (subc)
Fld. Ext. Ergot m.XX (mouth)
Hem. ℨ III 4.30
Hem. ℨ ss @ 11 p.m.
3.15
(subc)
5.15
4.15

The histories and charts of individual cases herewith presented illustrate the varying treatment based upon the blood pressure, and the apparent results of the same. They also show how extremely difficult it is to estimate the effect of any one drug given for a symptom-complex caused by so




Fld. ext. ergot (Wyeth's) purified for hypodermatic use. Only ergot used.

many and varying conditions, and they would also seem to indicate that the blood pressure, though of value as a guide, is by no means an infallible one; a conclusion which we should expect, for the tension is only one of the factors in this complex symptom.

These observations are not, I am aware perfect, and may seem conflicting; they are but suggestive. I trust, however, that they may throw some light upon the subject and indicate a little more definitely the path of treatment. I would suggest that the blood pressure should be taken of every sanatorium patient, since it can so readily be done in an institution as a part of the routine. We would then have this observation already at hand as a guide whenever a hæmorrhage did occur. In one of the histories presented it will be seen that this was done. It will be noticed in this case that a fall in tension preceded the first hæmorrhage. One can draw his own conclusion as to the effect of ergot (which was used in this case continuously for several days), upon the blood pressure and upon the hæmorrhage, and the relation of the one to the other.

I have referred to our experience, which is similar to that of others, that in the majority of cases the hæmoptysis occurs at night, or in the early morning hours. In eleven out of sixteen of the reported cases it will be seen that this happened. This fact throws some light upon the cause of the hæmorrhage, and at the same time gives us a hint as to treatment. It would appear to indicate that the blood pressure and sudden variations in pressure were a causative factor. Lawrason Brown thinks that Howell's theory of sleep offers an explanation of this; Howell's theory being, in brief, that sleep is due to the fatigue of the vaso-constrictor centre, and in consequence, there is a dilatation of the peripheral vessels, when, in the early morning hours the vaso-constrictor centre is regaining its lost tone, variations in blood pressure result. To prevent this variation and equalise the blood pressure, Brown gives morphia and sodium nitrate between midnight and 2 a.m. It will be noticed that calcium lactate or the chloride was employed in several cases, on the coagulation theory. The cases are too few, however, to draw any definite conclusions, but my feeling is that this treatment is of small value.

Epsom salts are frequently used in our service and with apparent benefit, probably, as Babcock says, on account of the favourable effect of a laxative upon the "pulmonary circulation through stimulation of the splanchinic nerves which are known to regulate blood pressure throughout the body."

Aconite has also been employed, but I need further experience to judge of its value.

In conclusion: From the experience in these reported cases and from our general experience I would suggest a plan of treatment of hæmoptysis somewhat as follows—provided of course, that any active treatment seems indicated. First a knowledge of the blood pressure of the patient from previous observations. On the occurrence of the hæmorrhage, ice, morphia and atropine subcutaneously, and, depending upon the amount and rapidity of the hæmorrhage, the inhalation of nitrite of amyl. A laxative dose of sulphate of magnesia, and, if the bleeding persists or is recurrent, nitrite of sodium or nitro-glycerine if blood pressure is high for the individual, or, if low, ergot or ergotine subcutaneously.

I am quite well aware that when I suggest the use of ergot I am preaching heretical doctrine, but in our experience it has apparently proved itself of value in at least a few cases when other remedies have failed.

I have to express my obligations to my resident physicians at the sanatorium, Drs. Dunham and Crane, who have conducted the detail of these observations and to whose experience and suggestions I am greatly indebted.

CASES OF HÆMOPTYSIS AT MASSACHUSETTS STATE SANATORIUM.

| Time of occurrence | Amount | Blood pressure | Treatment | Results |
|---|---|---|---|---|
| (1) 3 a.m. ... | ʒiii., later ʒii. or ʒiii. | 110 mm. hg. | No treatment at first; calcium lactate subsequently | First hæmorrhage ceased; small hæmorrhage later and streaked sputum. |
| (2) Night ... | ʒii. first day, ʒiii. second day | 116 at first; later period 102 to 122 | No treatment... | Two small hæmorrhages only on two successive days. |
| (3) 2.15 a.m.... | ʒiii.ss. ... | 104 at 10 a.m.; 112 at 6.15 on the next day | Heroin and cracked ice | Apparently ceased. |
| (4) About 4 p.m. and in night | ʒi. twice two successive days and clots | 100 to 120... | Morphia or heroin during hæmorrhage; ergot later | Clots continued about 12 days; *no increase* of blood pressure under ergot. |
| (5) Not given... | ʒss. to ʒv. on two successive days | 112 to 154... | Nitrites, calcium chloride, codeia | Apparently ceased on second day. |
| (6) Early morning and during day | From Nov. 25 to Dec. 11, ʒxliii. | 94 ... | Morphia, atropine, nitrites, ergot for several days | Ergot appeared to stop the hæmorrhage (see chart). |
| (7) 9 a.m. and 8.45 p.m. | ʒiii. and ʒi. ... | 126 following day; in 6 days later 88 | Morphia, atropine, heroin, ice, magnesia sulphates | Apparently ceased. |
| (8) Not recorded | ʒii. to ʒiii. on two succeeding days, streaks | 112 to 120... | Not recorded... | Not recorded. |
| (9) Early a.m. and p.m. | ʒx. to ʒviii., various days | 85 to 98 ... | Heroin, morphia, atropine, nitrites, ergot | Ceased, then recurred. Advanced case; died from sepsis. |
| (10) 1.30 a.m. ... | ʒss. to ʒii., recurrent | 74 to 98 ... | Ergot, ice ... | Raised blood almost daily for 19 days. |
| (11) a.m. and p.m. | ʒi. to ʒiv., recurrent | 110 to 120... | Morphia, atropine, nitrite of amyl | Apparently ceased; slight spitting subsequently. |
| (12) 4 a.m. and 3 p.m. | ʒiii. and ʒiv., recurrent over many days | 130 ... | Morphia, atropine, Epsom salts, nitrites, ergot | Recurrent for days (see chart). |
| (13) Night and p.m. | ʒss. to ʒii.ss., recurrent | 120 to 130.. | Heroin, Epsom salts | Ceased in a few moments, followed by clots. |
| (14) 9.20 p.m.... | ʒss. ... ... | 119 ... | Heroin ... | Ceased at once, followed by clots. |
| (15) p.m. ... | ʒi. to ʒss., recurrent | 130 ... | Nothing at first, ergot later | At once; recurred at once. |

CASES OF HÆMOPTYSIS.—*Continued.*

| Time of occurrence | Amount | Blood pressure | Treatment | Results |
|---|---|---|---|---|
| (16) Early a.m. and p.m. | ℥ii. to ℥xv., over many days | 120 to 135 before nitrites, 115 after | Morphia, atropine, ice, nitrites, calcium, chloride, aconite, salts | Ceased after nitrites and aconite (see chart). |
| (17) a.m. and p.m. | ℥ss. to ℥iv., recurrent and persistent, streaks | 113 to 145... | Morphia, nitrites, finally ergot continued | Gradually ceased after ergot (see chart). |
| (18) Early p.m. | ℥ss. to ℥iii., recurrent, streaks | 90 to 125... | Morphia, atropine, ergot | Apparently ceased after ergot, until blood pressure fell again. |

## DISCUSSION.

Dr. DeLancey Rochester: From observations which we have been making upon blood pressure I am convinced of the very slight effect of drugs of any sort in reducing blood pressure and of the very temporary effect of any of them. We have had cases of diseases of the kidney and of advanced arterio-sclerosis in which there was high blood-pressure. In one case the blood pressure rose to 255 and then the instrument broke; how much higher it would have registered I do not know. No drug used in that case had any effect, and in a number of other cases nothing but the nitroglycerine in solution made any impression upon the blood pressure. The effect of this was only for ten minutes when there would be a fall of from twenty to thirty points, and then it would rise again. The nitroglycerine in tablet had no effect. The amyl and various other nitrites were of no use at all. Sweating induced by hot air and steam baths and by hot foot baths and the regulation of diet and use of purgatives were of some value.

Dr. Fisk: I desire to express my appreciation of Dr. Otis' paper, and to suggest the beneficial effect of fresh air in coagulating the blood and of calomel in diminishing blood pressure.

Dr. Thomas A. Claytor: I want to substantiate what Dr. Rochester has said about drugs having no effect in the reduction of blood pressure. Nitroglycerine and the nitrites have been of little value in my hands. Potassium iodide given over long periods has had rather more effect. Rest, diet, and purgation have been about the only satisfactory methods in my hands of reducing blood pressure.

Dr. Fremont-Smith: The value of the nitrites seems to lie principally in releasing the local spasm of blood vessels in which high tension exists.

The nitrite of sodium and nitroglycerine in the neuralgias of various types dependent apparently upon local spasm of sclerosed blood vessels are of great value, as in certain headaches and in angina pectoris.

Dr. K. H. BABCOCK : This paper is extremely interesting and suggestive. I was very much struck with the fact that the average blood pressure in these cases was moderately high, 126 with the Janeway instrument. Most of us have had the impression that blood pressure in tuberculous patients is usually toward the lower reading. I agree that the nitrites and remedies of that sort do not materially lower blood pressure. I should suggest that if in any case of hæmoptysis the blood pressure were high, the measures to reduce it in addition to rest would be such measures as quiet heart action, because patients with hæmoptysis are more or less excited or disturbed by reason of the symptom and an excitement on the part of the heart raises the systolic blood pressure. Therefore, such measures as rest, morphine and gentle purgation would certainly be indicated in these cases. Where blood pressure is extremely low I should question the effect of ergot, believing that measures such as abdominal pressure or ligation of the extremities would really be more efficacious than the administration of ergot. I believe, indeed, that even digitalis would be of great benefit. Dr. Otis will see that I am still unconvinced as to the advantage of ergot in cases of pulmonary hæmoptysis.

Dr. CHARLES DENISON : If we have not control over the blood pressure by drugs, is there not a better method in the use of mechanical means by which we can obtain this control ? I have used ergot—which I used to trust to in my early days—with morphine hypodermically only once in my last fifteen to twenty cases of pulmonary hæmorrhage. Invariably, I succeed with the method of strapping the chest to partially immobilise one half of the thorax, which I showed before our meeting in Detroit. We have complete control then over the pressure condition in the chest and if we know where the hæmorrhage comes from we can immobilise that part and stop it.

Dr. JUDSON DALAND : My experience is expressed practically by what Dr. Rochester has said, and I also think that the remarks made by Dr. Babcock in reference to the quieting of the heart's action are exceedingly valuable. I recollect one case in which the breaking of a piece of crockery had an influence upon the blood pressure. Therefore, we see the importance of the use of morphine. I feel with Dr. Babcock that ergot has not yet established itself as a specific in the treatment of hæmoptysis. My views have been somewhat influenced by my observation of a case of hematuria in acute Bright's disease in which ergot was given for a few days and in which the hæmoptysis ceased as soon as the ergot was removed. I think it is of doubtful advantage and is probably detrimental.

Dr. POTTENGER : My mental attitude concerning hæmorrhage is illustrated by the fact that it has been my experience that hæmorrhage is not so severe in sanatoria as on the outside. When practising on the outside the hæmorrhage, as a rule, is much more severe when the physician reaches it than with patients in sanatoria. It is only a few minutes until the physician is at the bedside. I rarely give anything in the way of quieting the patient, except to tell the patient that everything is all right, and they know you are there to help them. I scarcely if ever give morphia and then only in small doses not more than a sixteenth of a grain. In trying to lower blood pressure I first give nitroglycerine and tonics. By the combination of nitroglycerine and veratrum viride we have felt that the blood pressure could be reduced and kept at a lower point. By giving the veratrum viride at about the time the blood pressure is rising again we will get the effect which will continue for about an hour. It has a good effect in quieting the heart, and I believe, this is a rational method of treatment.

Dr. THOMAS DARLINGTON : Not bearing directly upon the question of blood pressure, but upon the matter of nitroglycerine I would like to say that within the last year the Department of Health made many analyses of tablets of nitroglycerine and in many instances the amount present in the tablets was so small as to be practically useless. Another point in connection with nitroglycerine and of which I made some investigation over twenty years years ago is that in cases of poisoning by nitroglycerine it was found that ammonia immediately restores colour to nitrite poisoned blood ; that is, ammonia with nitroglycerine is incompatible.

Dr. OTIS closes : One of my objects in presenting these observations was to compare our experience with that of others, so as to obtain further light upon the relation of blood pressure to hæmoptysis, and thus perhaps arrive at something more definite and precise in the treatment of this symptom which becomes a very important question in a large sanatorium where hæmoptysis is not an uncommon occurrence, often persistent and recurrent, I earnestly hope that others who are in the way of seeing many such cases in sanatoria, hospital, or private practice, will observe the relation between blood pressure and hæmorrhage and report their result. We may find that ergot still has its place in the treatment of hæmoptysis.

# THE RELATIVE VALUE OF HIGH AND LOW ALTITUDE IN THE TREATMENT OF TUBERCULOSIS.

By F. M. POTTENGER, A.M., M.D.
MONROVIA, CALIFORNIA.

I HAVE entered upon the consideration of this question that I might present a few observations which I have made, and a few conclusions which I have drawn from these observations that bear upon the relative value of high and low altitude in the treatment of tuberculosis. While I recognise that our ideas are more or less influenced by our surroundings, and that men who practise at high altitude are apt to favour it in treatment, while those practising at low altitude are apt to think it best, yet we must divorce ourselves from such influences and discuss the question in an impartial manner, if we wish to arrive at the truth. The fact that one observer sees tuberculous patients do well at a high altitude does not prove that high altitude is the most advantageous place to treat tuberculosis; nor does the fact that another observer sees tuberculous patients do well at low elevations prove that such elevations are the best for tuberculous patients. These observations simply point to the fact that some tuberculous patients do well at high and others at low elevations; or, as it might be stated broadly, patients suffering from tuberculosis can get well at various altitudes. It remains, then, for us to discuss impartially, if such is possible, the conditions accompanying both high and low altitude, and then attempt to suit these conditions to the patient and his disease.

A few years ago it was thought that there was a specific climate for tuberculosis. Individuals suffering from the disease were led to believe that if they could only leave home and go to one of these favoured places that they could be cured. And they also felt that if they were to remain at home it was almost certain death. So strongly has this idea taken hold of the people that they are led to do many foolish things. They leave home without any idea of where they are going, or what they are going to do when they arrive at their destination. The thing that they have uppermost in their minds is reaching this favoured clime. All else is secondary. But the time comes when the "favoured climate" is secondary, and meeting the conditions of life and adapting themselves to the climatic change are primary. These difficulties and annoyances could be largely eliminated by carefully advising patients before they leave home.

The task of choosing a climate for an individual suffering from a disease is one of great importance, for unless it is properly suited it is capable of doing harm. The idea is prevalent that any one can make a change of climate. So they can, but it is not everyone that can make an intelligent change. To prescribe climate requires as much skill as to prescribe drugs. In prescribing a climate for one suffering from tuberculosis, the disease and the individual must both be kept in mind.

The principles underlying climato-therapy are not so difficult, if only one stops long enough to understand them. The beneficial effect of a change upon nutrition is well known, even if the change be one only of surroundings, and not of climatic conditions. The effect of going to a less favourable climate than that in which one lives is often beneficial. How much more beneficial, then, should a change be which is carefully suited to the patient and his disease.

The primary effect of climatic treatment is upon metabolism. Its fundamental effect is upon tissue change, and its effect depends upon its powers of abstracting heat. The heat abstracting power of a climate depends upon the temperature, humidity and the movement of the air. A cold climate, with much wind, makes the greatest demands upon the system for heat; a warm, humid climate, with absence of wind, should make the least. A dry, warm climate cannot be equable because the air does not hold heat well, and as soon as the sunshine ceases, or as soon as the shade is entered, the air becomes cool. The wide diurnal variation in dry climates is due to this fact.

A climate which makes great demands for tissue change requires a hardy man to endure it. It would be unwise to send one who has low vitality and who endures cold badly to such a climate with the expectation of his deriving benefit from the change, for his forces would be overtaxed in supplying the normal waste incident to such rigorous conditions. On the other hand, such a patient would doubtless improve in strength and weight very materially if surrounded by such climatic conditions as would allow of the body cells keeping up the natural tissue change, and still having some power in reserve to apply to the building up of a stronger constitution. Cold climates are stimulating, while warm humid climates are enervating. Between these we have all grades, and so if we form a correct opinion of our patient we can find a suitable climate for him.

It must be remembered that climatic conditions change with the seasons. Thus the climate of the Rocky Mountain regions, at an altitude of 5,000 feet, is cold and rigorous in the winter but temperate in the summer. Many people who might not be able to endure the winter might profitably spend the summer months there.

One suited to life in cold, rigorous climate or at high altitude should belong to the hardier type of men, with good circulatory, digestive and assimilating powers. The young and robust are particularly suited to such conditions, while those in advancing years should be spared the excessive demand for tissue change.

The first point, then, that should be considered in choosing a climate for a tuberculous patient is his ability to respond to the demand for tissue change which will be made by such climatic change. This point must be determined upon regardless of the question as to the adaptability of high altitude to the treatment of tuberculosis.

For many years high altitude was considered to be an essential in the treatment of tuberculosis. This opinion was due largely to the statements of Dr. Archibald Smith, who wrote in 1840 that in the Peruvian Andes immunity from tuberculosis was commonly observed at an elevation of 7,500 to 8,500 feet. This was very evident because in the cities at lower altitudes and at the base of the mountains tuberculosis was rife. This same apparent immunity was noted in the Rocky Mountains and also in the Alps. The natural conclusion is that high altitude confers immunity. This was honestly believed for many years.

Other observations, however, were made, which cast some doubt upon the supposed immunity being due to the altitude *per se*. It was found that the steppes of Tartary, some portions of which are below sea-level, and the great desert of the southwest in America, portions of which are also below sea-level, likewise share this apparent immunity from tuberculosis. This forced the conclusion that it is not altitude *per se* but certain conditions which exist in common between high altitude and these great desert regions which causes this apparent immunity.

If we stop to enquire what these conditions are, we note that both have : (1) A sparse population ; (2) a great amount of sunshine ; (3) a pure air with low bacterial content.

When we consider that these are the conditions which are favourable to the prevention of the spread of tuberculosis, we can readily explain why tuberculosis does not exist to any extent in such regions. Tuberculosis is a disease which is most rife where overcrowding exists. It is particularly a disease of cities, and especially prevalent among the poor. Sunlight is the greatest enemy of the bacilli and our most reliable prophylactic, consequently we would not expect tuberculosis to spread very rapidly in these sparsely populated districts, which have a maximum of sunshine.

The votaries of high altitude have endeavoured to explain its benefits in the treatment of tuberculosis as being due to things which are not found in common with low altitude, and they have almost invariably used the damp lowland climates in the comparison. Consequently, they claim that the value of high altitude is due to lowered atmospheric pressure, a greater diathermacy, an increased electric tension, dryness of the atmosphere, and a great amount of sunshine. Granting that these are the elements of value, they are all present, except the first, in the low altitudes possessing dryness of atmosphere; consequently this supposed advantage must be due either to lowered atmospheric pressure or to some new reason not yet made known, or we must accept the conclusion that high altitude is not an essential to the treatment of tuberculosis.

Now let us examine the other side of the ledger and see if there are any reasons why high altitude is contraindicated in the treatment of tuberculosis.

In the first place, high altitude treatment is contrary to the principle of rest in inflammations in general and in tuberculosis in particular. The accepted principle of treatment in tuberculosis is rest, and it is employed whenever possible, so it is well to stop and enquire whether or not we should make an exception in case of the lung, and, if so, why so?

That high altitude causes greater activity on the part of the lungs and throws great strain on the heart which is already severely taxed is an accepted fact, and one which cannot be ignored in the discussion of this subject.

That rest is the better method of treatment of pulmonary tuberculosis is also suggested by the observation which I have made repeatedly with reference to that portion of the lung which immediately surrounds the heart. When this part becomes seriously affected, especially on the left side where it receives the greatest impulse of the heart-beat, it is very slow at healing. I believe that the proper explanation of this fact is associated with the constant motion of the part owing to the action of the heart.

Another point relative to the employment of high altitude is the condition of the patient. It seems unreasonable to place an individual who is deprived of a portion of his ærating surface under conditions where he is subjected to a natural demand for more respiratory effort, and one whose heart is undergoing an extra strain under circumstances where it will be subjected to more strain. It also seems unreasonable to place one who is suffering from the severe bodily drain incident to tuberculosis, whose vitality is lowered, and whose bodily functions are interfered with, in such conditions as to be called upon for an exaggerated tissue change, such as is required to meet the demand which is made by a high altitude. This consideration calls in question the advisability of sending those who have advanced lesions to a high altitude, and suggests that if a high altitude is the best place for treating tuberculosis, only those who have slight lesions should be chosen for such treatment. Further consideration would also suggest another important limitation, that is, of early cases, only those should be sent who are able to meet the extra demand made upon them by the climatic conditions found.

Another important point in the treatment of tuberculosis is the after-result. It has long been noted that patients who secure an arrestment of their trouble at high altitude must remain there afterwards. It seems to me that the explanation of this might be suggested by another observation which is common to men who see many cases of tuberculosis, that is, that tuberculosis is common among athletes. It seems to me that the reason for this lies in the overstraining. Athletes are subjected to more or less constant strain. Their heart and lungs over-develop to meet the extra burden thrown upon them. They become larger than is necessary to carry on the usual work associated with the ordinary duties of life. When they leave the athletic field and settle down to the usual routine of life they are at a disadvantage. They have more lungs and heart than they need. Nature attempts an adjustment. A retrograde process supervenes, the organs become more or less flabby and become less resistant. That this is probable we may infer from our observations on muscles which have been over-developed and then subjected to disuse.

When one becomes adjusted to a high altitude the heart and lungs increase in size just as those of the athlete, and when he returns to the low altitude his heart and lungs must undergo a readjustment—a retrograde process must take place. In the case of tuberculosis it is probable that during this time the tissues are not so resistant as usual, and that the patient, unless his process has attained complete healing, is prone to have renewed activity in the old process.

From these observations I am led to the conclusion that high altitude is not an essential in the treatment of tuberculosis, and that the great majority of cases can be treated to best advantage at low elevations.

# REPORT ON TWO HUNDRED CHARITY CASES OF PULMONARY TUBERCULOSIS, UNDER SANATORIUM TREATMENT AT LOS ANGELES (1903-1907).

BY W. JARVIS BARLOW.

LOS ANGELES, CAL.

In reporting these two hundred cases of tuberculosis, emphasis must be laid upon the fact that the sanatorium in Los Angeles, where these cases were treated, has taken patients in all stages of the disease, and the deductions drawn from the records show that 92 per cent. were beyond the first stage. Much has been shown this Association of what can be done with the early or incipient cases; the purpose of this report is to bring again to your notice what can be done with advanced cases. It must be remembered that the cases are taken from the poorer walks of life, yet the majority of them refined people, the greater number single men and women on small salaries, with indoor occupation, having come to California in search of health, with funds exhausted and facing the impossible task of supporting themselves.

It is evident and has not been too often said that the best results are obtained by putting patients under sanatorium treatment at the earliest signs of disease. But another fact is that good results may be sometimes obtained by properly caring for those advanced in the disease. One is often astonished at the remarkable improvement that an advanced case, given up, makes when conditions have been made favourable. We must always remember, too, that in the fight against tuberculosis, it is the advanced cases in poor housing which are the greatest source of danger to others. It is difficult to

TABLE I.

## Comparison of Weather Conditions at Los Angeles and at the Sanatorium.

| September to September | YEAR 1904 | | YEAR 1905 | | YEAR 1906 | |
|---|---|---|---|---|---|---|
| | At Sanatorium | At Los Angeles | At Sanatorium | At Los Angeles | At Sanatorium | At Los Angeles |
| Mean Temperature of the Year | | 63.9° | 65° | 62.6° | 64.3° | 62.9° |
| Average Maximum Temperature of the year | | 74.6° | 69° | 72.3° | 67° | 72.7° |
| Average Minimum Temperature of the year | | 53.2° | 57.7° | 52.9° | 56.4° | 53° |
| Highest Maximum Temperature of the Year and and date | | 97° Sept. 4, '04 | 101° Aug. 29, '05 | 101° Aug. 29, '05 | 97° June 18, '06 | 99° June 18, '06 |
| Lowest Minimum Temperature of the Year and and Date | | 45° Jan. 19, '04 | 34° Feb. 13, '05 | 33° Dec. 23, '05 | 29° Dec. 23, '05 | 34° Jan. 2, '06 |

Sept. 1905—Sept. 1906

Clear days in year .......... 264
Part-cloudy days in year .......... 52
Cloudy days in year .......... 49
Days in year, with rain part of day .......... 18
Days in year with rain all day .......... 12
WEATHER AVERAGE IN 3 YEARS—Clear, cloudless days, 212—cloudy or part foggy, 101—rain part or all day, 34

Table II. Summary of Results for 200 Indigent Consumptives Under Sanatorium Treatment at Los Angeles, California. Years 1903-1907.* Illustrating paper of Dr W. Ja[illegible] Ba[illegible]

| | Age | Sex: Male | Sex: Female | Nativity | How Long in California | Social Condition: Single | Social Condition: Married | Occupation | Religion | Family History | Prior Duration of Disease | Height |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Ave. | % | % | % | Average | % | % | % | % | % | Ave | Ave |
| First 100 Patients | 32 years [illegible] months | 51 | 46 | Americans 64<br>Foreigners 36 | 4 years<br>10 mos. | 61 | 39 | Indoor 90<br>Outdoor 8<br>No Record 2 | 64 Prot.<br>30 Cath.<br>5 Jews<br>1 Theos | 39 Tbc.<br>61 Neg | 2 yrs., 4 mos. 21 days | 5 ft. 5 8-10 inches |
| Second 100 Patients | [illegible] years 8½ months | 60 | 40 | Americans 56<br>Foreigners 44 | 5 years<br>10 mos. | 54 | 46 | Indoor 75<br>Outdoor 25 | 67 Prot<br>18 Cath<br>14 Jews<br>1 N. R | 29 Tbc.<br>71 Neg. | 1 year 11½ months | 5 ft. 4 and 3-10 inch. |
| [illegible] Patients | 31 yrs 7 [illegible] 20 d[illegible] | [illegible] | [illegible] | Americans 60<br>Foreigners 40 | 5 years<br>1 mos.<br>26 days | 57½ | 42½ | Indoor 82<br>Outdoor 16<br>N. R. 2 | 65½ Prot<br>24 Cath<br>9½ Jews<br>1 N. R. | 34 Tbc<br>66 Neg | 2 yrs. 2 mos. 5 days | 5 ft. 5 and 3-10 inch |

| | Weight: Normal Weight in Health | Weight: On Admission | Weight: On Discharge | Weight: Difference | Pulse: On Admission | Pulse: On Discharge | Temperature: On Admission | Temperature: On Discharge | Respiration: On Admission | Respiration: On Discharge | Bacilli |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Ave. | Ave. | Ave. | Ave | Ave. | Ave | Ave. | Ave | Ave | Ave | % |
| First 100 Patients | 137½ lbs. | 110 lbs. | 112 lbs | Gain of those who gained, 6½ lbs Loss of those who lost, 6½ lbs. | 94 | 96 | 100.9° | 99.° | 28 | 26 | 6 N.R.<br>11 Neg<br>83+ |
| Second 100 Patients | 125.9 lbs. | 115.4 lbs. | 120.6 lbs. | Gain of those who gained 7½ lbs. Loss of those who lost 5 2-10 lbs. | 108 | 91 | 97.5° | 99.° | 28 | 24 | 1 N. R<br>20 Neg.<br>79+ |
| [illegible] Patients | 131.7 lbs. | 112.7 lbs. | 116.3 lbs. | Gain of those who gained 7 lbs. Loss of those who lost 5 9-10 lbs. | 101 | 97 | 99.2° | 99.5° | 28 | 25 | 3½ N.R<br>15½ Ng<br>81+ |

| | Clinical Condition* when Admitted: Incipient | Clinical Condition* when Admitted: Moderately Advanced | Clinical Condition* when Admitted: Far Advanced | Anatomical Condition* when Admitted: 1st | Anatomical Condition* when Admitted: 2nd | Anatomical Condition* when Admitted: 3rd | Duration of Treatment | Clinical Condition when Discharged*: Improved | Arrested | Apparently Cured | Cured | No Improvement or Progressive | Died at B. S. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | % | % | % | % | % | % | Ave | % | % | % | % | % | % |
| First 100 Patients | 4 | 12 | 81 | 4 | 12 | 81 | 106 days | 33 | 5 | 1 | 0 | 29 | 29 |
| Second 100 Patients | 9 | 22 | 69 | 9 | 21 | 70 | 90 days | 46 | 7 | 6 | 0 | [illegible] | [illegible] |
| [illegible] Patients | 6½ | 17 | 75 | 6½ | 16½ | 75½ | 98 days | 39½ | [illegible] | [illegible] | 0 | 27½ | [illegible] |

Treatment at Los

| E | TEMPERATURE | | RESPIRATION | |
|---|---|---|---|---|
| On Discharge | On Admission | On Discharge | On Admission | On |
| 80 | 98.4 | 98.6 | . . . | 3 |
| 118 | 99.8 | 98.6 | 26 | 2 |
| 88 | 98 | 100. | 25 | 2 |
| 104 | 97.8 | 97.4 | 20 | 3 |
| 110 | 100.2 | 99 | 27 | 3 |
| 100 | 99.6 | 99 | 32 | 2 |
| 88 | 100 | 97.6 | N R. | 2 |
| 110 | 101.8 | 96 | 32 | 4 |
| . R. | N. R. | N. R. | N R. | N |
| 90 | 101.8 | 98 | 42 | 2 |
| 90 | 98 | 98 | 26 | 2 |
| 92 | 99.8 | 97 | 22 | 3 |
| 100 | 102 | 97 | 30 | 2 |
| 100 | 97 | 96 | 28 | 2 |
| 80 | 98 | 96 | 34 | 2 |
| 100 | 100 | 96 | 23 | 2 |
| 120 | 100 | 100 | 26 | 3 |
| 140 | 102.4 | 102 | 32 | 3 |
| 80 | 98.8 | 98 | 22 | 2 |
| 80 | 99.4 | 97 | 26 | 1 |
| 80 | 98.4 | 97 | 30 | 2 |
| 90 | 102.6 | 101 | 44 | 2 |
| 140 | 101 | 100 | 46 | 3 |
| 80 | 99.4 | 98.6 | 20 | 2 |
| 100 | 100.6 | 96 | 34 | 2 |
| 100 | 101 | 98.6 | 26 | 3 |
| 90 | 100 | 99 | 20 | 2 |
| 130 | 103 | 99 | 27 | 4 |
| 120 | 100 | 98.6 | 25 | 3 |
| 120 | 102 | 100 | 44 | 3 |
| 100 | 101 | 100 | 40 | 3 |
| 110 | 100 | 98 | 32 | 2 |
| 110 | 100 | 100 | 20 | 3 |
| 90 | 99.2 | 98.6 | 24 | 2 |
| 90 | 99.2 | 99.8 | 36 | 3 |
| 100 | 99.5 | 98.6 | 30 | 2 |
| 100 | 103 | 101 | 30 | 3 |
| 100 | 101.8 | 99 | 42 | 3 |
| . R. | 90 | N. R. | 24 | 2 |
| . R. | 99.2 | N. R. | 32 | 3 |
| 90 | 99 | 99 | 28 | 2 |
| . R. | 102.6 | 98.6 | 30 | . . |
| 120 | 101.2 | 100 | 36 | 3 |
| 100 | 98 | 99 | 24 | . |
| 100 | 101.6 | 101 | 26 | 2 |
| . R. | 98.6 | 99 | 20 | 2 |
| 85 | 101.4 | 99 | 28 | 2 |
| 80 | 99.6 | 98 | 24 | 2 |
| 110 | 101.2 | 100 | 24 | 3 |
| 110 | 100 | 98 | 34 | 3 |

Table III. Data and Results for First 50 Indigent Consumptives Under Sanatorium Treatment at Los Angeles, California. Years 1903-1907.*

| No. of Patient | Initials of Patients | Age | Sex: Male | Sex: Female | Nativity | How Long in California | Social Condition: Single | Social Condition: Married | Occupation | Religion | Family History | Prior Duration of Disease | Height | Weight: Normal Weight in Health | Weight: On Admission | Weight: On Discharge | Weight: Difference | Pulse: On Admission | Pulse: On Discharge | Temperature: On Admission | Temperature: On Discharge | Respiration: On Admission | Respiration: On Discharge | Bacilli | Clinical Condition* When Admitted: Incipient | Moderately Advanced | Far Advanced | Anatomical Condition* When Admitted: 1st | 2nd | 3rd | Duration of Treatment | Clinical Condition When Discharged*: Improved | Arrested | Apparently Cured | Cured | No Improvement or Progressive | Died at B. S. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | A. W. | 42 | | F | Minnesota | 2 yrs. | | M | Upholsterer | Cath. | Neg. | 2 yrs. | 5' 4" | 115 | 100 | 111¼ | +11¼ | 98 | 80 | 98.4 | 98.6 | | 38 | + | | | + | | | 3 | 365 days | + | | | | | |
| 2 | M. S. | 35 | M | | Ohio | 10 yrs. | S | | Druggist | Prot. | In family | 12 yrs | N. R. | 130 | 103 | 91 | -12 | 114 | 118 | 99.8 | 98.6 | 26 | 20 | + | | | + | | | 3 | 1063 days | | | | | | - |
| 3 | N. E. | 19 | | F | Arkansas | 8 mos | S | | Waitress | Prot. | In family | 3 yrs. | 5' 3¼" | 88 | 90 | 82 | -8 | 90 | 88 | 98 | 100 | 25 | 25 | + | | | + | | | 3 | 266 days | | | | | - | |
| 4 | M. H. | 38 | M | | Austria | 11 mos | S | | Laborer | Cath. | In family | 1 yr. | 5' 9" | 185 | 165¼ | N. R. | N. R. | 80 | 104 | 97.8 | 97.4 | 20 | 35 | + | | | + | | | 3 | 139 days | | | | | + | |
| 5 | E. H. | 41 | M | | Scotland | 1 yr. 7 mos | | M | Stone-cutter | Cath. | Neg. | 1½ yrs. | N. R. | 145 | 107 | N. R. | N. R. | 124 | 110 | 100.2 | 99 | 27 | 30 | + | | | + | | | 3 | 44 days | | | | | | + |
| 6 | H. T. | 36 | M | | Ohio | 4 yrs. 1 mo | | M | Merchant | Prot. | In family | 4½ yrs | 5' 6½" | 128 | 108 | 117 | +9 | 120 | 100 | 99.6 | 99 | 32 | 25 | + | | | + | | | 3 | 267 days | + | | | | | |
| 7 | B. T. | 24 | | F | Minnesota | 2 yrs. | S | | Laundry | Prot. | Neg | 1 yr | 5' 9¾" | 145 | 124½ | N. R. | N. R. | 80 | 88 | 100 | 97.6 | N. R. | 22 | + | | | + | | | 3 | 1 days | | | | | - | |
| 8 | G. W. | 24 | | F | Massachusetts | 6 mos. | | M | Housework | Prot. | In family. | 2 yrs | N. R. | N. R. | 96 | 90 | -6 | 116 | 110 | 101.8 | 96 | 32 | 10 | + | | | + | | | 3 | 130 day | | | | | | - |
| 9 | M. V. | 50 | | F | No record | 20 yrs. | S | | Dressmaker | Prot. | Neg | N. R. | N. R. | N. R. | 121½ | N. R. | N. R. | N. R. | N. R. | N. R. | N. R. | N. R. | N. R. | O | | | + | | | 3 | 5 days | N. R. | | | | | |
| 10 | M. C. | 21 | | F | Russia | No record | S | | No record | Jewish. | Neg. | 3 yrs | 5' 7⅛" | N. R. | 99¼ | N. R. | N. R. | 120 | 90 | 101.8 | 98 | 42 | 25 | + | | | + | | | 3 | 17 days | | | | | - | |
| 11 | A. P. | 31 | M | | Germany | 1 mo. | S | | Clerk | Cath. | In family | 5 yrs | 5' 9½" | 172 | 125 | N. R. | N. R. | 94 | 90 | 98 | 98 | 26 | 20 | + | | + | | | 2 | | 20 days | + | | | | + | |
| 12 | M. H. | 62 | | F | New York | 8 wks | | W | Housework | Prot. | In family. | 5 yrs | No rec | N. R. | 72¾ | 76¼ | +3½ | 80 | 92 | 99.8 | 97 | 22 | 30 | O | | | + | | | 3 | 5 days | + | | | | | |
| 13 | K. P. | 33 | M | | New York | 3 mos | S | | No record | Prot. | Neg. | 1 yr. | No rec | N. R. | 122 | N. R. | N. R. | 118 | 100 | 102 | 97 | 30 | 25 | + | | | + | | | 3 | 15 days | | | | | | + |
| 14 | K. B. | 30 | | F | Italy | 1 yr. 9 mos | S | | Trained Nurse. | Prot. | Neg. | 3 yrs | 5' 5" | N. R. | 95 | N. R. | N. R. | 96 | 100 | 97 | 96 | 28 | 20 | O | | | + | | | 3 | 17 days | | | | | | + |
| 15 | L. R. D. | 42 | M | | Pennsylvania | 2½ yrs | S | | Clergyman | Prot. | In family. | 2 yrs. | No rec. | N. R. | 116 | N. R. | N. R. | 88 | 80 | 98 | 96 | 34 | 20 | + | | | + | | | 3 | [illegible] days | | | | | | - |
| 16 | G. C. | 26 | | F | Kentucky | 5 mos. | S | | Hair Dresser | Prot. | In family | 2 yrs. | 5' 5" | 138 | 88 | N. R. | N. R. | 98 | 100 | 100 | 96 | 23 | 20 | + | | | + | | | 3 | 22 days | + | | | | | |
| 17 | M. C. | 32 | | F | England. | 3 mos. | S | | Waitress | Cath. | Neg. | 4 mos. | 5' 8" | 142 | 142 | 128½ | -13¾ | 88 | 120 | 100 | 100 | 26 | 38 | + | | + | | | 2 | | 172 days | | | | | | |
| 18 | G. B. | 26 | | F | England | 14 days | S | | Hair Dresser. | Prot. | In family | 2 yrs | No rec | 125 | N. R. | N. R. | N. R. | 128 | 140 | 102.4 | 102 | 32 | 30 | + | | | + | | | 3 | 14 day | | | | | | - |
| 19 | J. T. D. | 25 | | F | Ireland. | 3½ mos. | | M | Housework | Prot. | In family. | 2 yrs | 5' 2" | 120 | 105 | 106 | +1 | 86 | 80 | 98.8 | 98 | 22 | 20 | O | | + | | 1 | | | 60 days | + | | | | | |
| 20 | I. G. F. C. | 42 | M | | District of Columbia | 8 mos. | | M | Jeweler | Cath. | In family | 8 yrs. | 5' 7⅛" | 118 | 103 | 107½ | +4½ | 90 | 80 | 99.4 | 97 | 26 | 15 | + | | | + | | | 3 | 80 days | | + | | | | |
| 21 | C. A. F. | 27 | M | | No record. | 11 mos | S | | Clerk | Prot. | In family. | 5 yrs | 5' 10¼" | 150 | 131½ | 132½ | +1 | 96 | 80 | 98.4 | 97 | 30 | 25 | + | | | + | | | 3 | 100 days | | | | | - | |
| 22 | M. A. Y. | 21 | M | | Ohio | 10 yrs | S | | Jeweler. | Cath. | In family. | 6 mos. | 5' 8" | 150 | 93 | 93 | 0 | 130 | 90 | 102.6 | 101 | 44 | 25 | + | | | + | | | 3 | [illegible] days | | | | | + | |
| 23 | C. F. | 25 | M | | Iowa | 7 yrs | S | | Printer | Prot. | Neg | 1 yr. | N. R. | 145 | N. R. | N. R. | N. R. | 120 | 140 | 101 | 100 | 46 | 35 | + | | | + | | | 3 | 9 days | | | | | | - |
| 24 | E. H. | 38 | M | | Massachusetts | 8 mos. | S | | Harness Maker. | Prot. | Neg | 10 yrs. | 5' 8¼" | 156 | 144 | 138½ | -5½ | 100 | 80 | 99.4 | 98.6 | 20 | 20 | O | | | + | | | 3 | 175 days | | + | | | | |
| 25 | C. M. W. | 27 | M | | Mississippi | 2 days | S | | Printer | Prot. | In family | 2 yrs. | 5' 7⅛" | 160 | 120 | 117 | -3 | 106 | 100 | 100.6 | 96 | 34 | 25 | + | | | + | | | 3 | 75 days | + | | | | | |
| 26 | H. E. H. | 19 | | F | Iowa | 4 mos | S | | School Girl | Prot. | In family | 1 yr. | 5' 9" | 130 | 118 | 102¼ | -15¾ | 108 | 100 | 101 | 98.6 | 26 | 35 | + | | | + | | | 3 | [illegible] days | | | | | + | |
| 27 | G. W. Y. | 40 | | F | Illinois | 2 days | | M | Housework | Prot. | Neg | 1 yr. | 5' 3" | 110 | 106 | 104½ | -1½ | 96 | 90 | 100 | 99 | 20 | 20 | + | | | + | | | 3 | [illegible] days | | | | | + | |
| 28 | M. H. | 33 | | F | Germany | 10 yrs | | M | Housework | Theosphist | In family | 3 yrs | 5' ½" | 115 | 83 | 75 | -8 | 96 | 130 | 103 | 99 | 27 | 40 | + | | | + | | | 3 | [illegible] days | | | | | | - |
| 29 | [illegible] N. | [illegible] | M | | Denmark | 9 mos | | M | Waiter | Prot. | Neg | 3 yrs. | 5' 6¾" | 138 | 110 | 104½ | -5½ | 110 | 120 | 100 | 98.6 | 25 | 30 | + | | | + | | | 3 | [illegible] days | | | | | | - |
| 30 | I. O'N. | 31 | M | | Massachusetts | 13 mos | S | | Clerk | Cath | Neg | 1 yr. | 5' 4½" | 125 | 91½ | 84½ | -7 | 120 | 120 | 102 | 100 | 44 | 30 | + | | | + | | | 3 | [illegible] days | | | | | | + |
| 31 | W. I. | 29 | | F | Germany | 5 yrs | S | | Nurse | Prot. | Neg | 5 yrs | 5' 3½" | 130 | 106⅓ | 102⅔ | -4 | 106 | 100 | 101 | 100 | 40 | 35 | + | | | + | | | 3 | [illegible] days | | | | | - | |
| 32 | S. I. M. | 48 | M | | Ohio | 10 yrs | | W'r | Clerk | Prot. | In family | 5 yrs. | 6' 2" | 135 | 118½ | 115 | -3½ | 94 | 110 | 100 | 98 | 32 | 25 | + | | | + | | | 3 | [illegible] days | | | | | | - |
| 33 | W. S. | 15 | M | | Pennsylvania | 2½ yrs | S | | Clerk | Prot. | Neg | 2 yrs. | 5' 5½" | 120 | 109 | 109 | 0 | 78 | 110 | 100 | 100 | 20 | 35 | + | | | + | | | 3 | [illegible] days | | | | | + | |
| 34 | [illegible] | [illegible] | M | | Massachusetts | 29 yrs | | M | Clerk | Cath. | Neg | 2 yrs. | 5' 7" | 127 | 107½ | 106⅝ | -1 | 74 | 90 | 99.2 | 98.6 | 24 | 25 | + | | + | | | 2 | | [illegible] days | + | | | | | |
| 35 | J. B. H. | [illegible] | M | | Michigan | 3½ yrs | S | | Actor | Prot. | Neg | 8 yrs. | 5' 8½" | 155 | 112½ | 118¾ | +6 | 108 | 90 | 99.2 | 99.8 | 36 | 30 | + | | | + | | | 3 | [illegible] days | | | | | | - |
| 36 | [illegible] | [illegible] | M | | Pennsylvania | 16 mos | | M | Doctor | No record | Neg | 3 yrs. | 5' 10½" | N. R. | 106 | N. R. | N. R. | 108 | 100 | 99.5 | 98.6 | 30 | 25 | + | | | + | | | 3 | [illegible] days | | | | | + | |
| 37 | [illegible] | 17 | M | | New York | 3 wks | S | | School | Cath. | Neg | 1½ yrs. | 5' 8¼" | 131 | 128 | 136½ | +8½ | 128 | 100 | 103 | 101 | 30 | 30 | + | | | + | | | 3 | [illegible] days | + | | | | | |
| 38 | [illegible] M. | [illegible] | | F | Illinois | 6 mos | S | | Housework | Cath. | In family. | 1 yr. | 5' 2½" | 138 | 95¾ | 88 | -7¾ | 122 | 100 | 101.8 | 99 | 42 | 30 | + | | | + | | | 3 | [illegible] days | | | | | | + |
| 39 | H. M. | [illegible] | M | | New Jersey | 6 yrs | S | | Artist | Cath. | In family | 5 yrs. | 5' 6⅞" | 138 | 100⅞ | N. R. | N. R. | 84 | N. R. | 90 | N. R. | 24 | 26 | O | | + | | | 2 | | [illegible] days | | | | | - | |
| 40 | F. M. W. | [illegible] | | F | California | 26 yrs | S | | Tel. Operator | Prot | Neg. | 1 yr. | 5' 4½" | 88 | 82¾ | N. R. | N. R. | 92 | N. R. | 99.2 | N. R. | 32 | 36 | + | | + | | | 2 | | 2 days | | | | | | - |
| 41 | I. C. D. | [illegible] | M | | Ireland | 28 yrs | S | | Miner | Cath. | Neg | 5 yrs. | 6' 3" | 195 | 145⅝ | 158 | +12 | 114 | 90 | 99 | 99 | 28 | 25 | + | | | + | | | 3 | [illegible] days | + | | | | | |
| 42 | M. I. M. | 30 | | F | [illegible] | 20 yrs | | M | Housework | Prot. | In family | 2 mos. | 5' 2" | 133 | 114¼ | 114¼ | 0 | 112 | N. R. | 102.6 | 98.6 | 30 | . | N. R. | | | + | | | 3 | 7 days | | | | | + | |
| 43 | W. I. L. | [illegible] | M | | [illegible] | 1 mo | S | | Clerk | Cath. | In family | 1 yr. | 5' 10" | 136 | 95 | N. R. | N. R. | 112 | 120 | 101.2 | 100 | 36 | 35 | + | | | + | | | 3 | 11 days | | | | | | + |
| 44 | [illegible] | [illegible] | M | | [illegible] | [illegible] | S | | Clerk | Prot | In family | 10 mos | 5' 10" | 150 | 131 | 119 | -12 | 84 | 100 | 98 | 99 | 24 | | + | | | + | | | 3 | [illegible] days | | | | | | + |
| 45 | [illegible] | [illegible] | M | | Illinois | [illegible] | | M | Conductor | Cath | Neg. | 4 yrs. | 5' 8¼" | 143 | 110 | 109 | -1 | 124 | 100 | 101.6 | 101 | 26 | 20 | + | | | + | | | 3 | 201 days | | | | | | |
| 46 | [illegible] | [illegible] | M | | [illegible] | [illegible] | | M | Clerk | Prot. | Neg. | 5 yrs | 5' 8½" | 145 | 102¾ | 127 | +24 | 84 | N. R. | 98.6 | 99 | 20 | 25 | + | | + | | | 2 | | 61 days | · | | | | | - |
| 47 | [illegible] M. | [illegible] | | F | [illegible] | [illegible] | S | | Dressmaker | Prot | Neg. | 2 yrs. | No rec. | 130 | 81¼ | N. R. | N. R. | 90 | 85 | 101.4 | 99 | 28 | 25 | + | | | + | | | 3 | [illegible] days | | | | | | |
| 48 | [illegible] | [illegible] | M | | [illegible] | [illegible] | | M | Engraver | Prot | Neg. | 2 yrs. | 5' 8" | 180 | 148 | 152 | +6 | 98 | 80 | 99.6 | 98 | 24 | 25 | + | | | + | | | 3 | [illegible] days | · | | | | | - |
| 49 | [illegible] | [illegible] | M | | Minnesota | [illegible] | S | | Clerk | Cath | Neg. | 1 yr | 5' 8" | 150 | 121 | 108 | -13 | 116 | 110 | 101.2 | 100 | 24 | 35 | + | | | + | | | 3 | 87 days | | | | | | |
| 50 | [illegible] | [illegible] | | F | [illegible] | 10 yrs | S | | Nurse | Prot | Neg | 1 yr. | 5' 3½" | 145 | 108½ | 107¼ | -1¼ | 120 | 110 | 100 | 98 | 34 | 30 | + | | | + | | | 3 | [illegible] days | + | | | | | |

*[illegible]

na

| Diffepence |
|---|
| R |
| +4 |
| +1¼ |
| R |
| 0 |
| R |
| -2 |
| R. |
| -4¾ |
| 13 |
| -1¼ |
| -9 |
| -1 |
| -1 |
| -6 |
| -8 |
| -1½ |
| -8 |
| R. |
| 24 |
| -4½ |
| R. |
| R. |
| -2 |
| -5½ |
| 0 |
| -4¼ |
| -5½ |
| -7½ |
| -1 |
| -2 |
| -1½ |
| -5½ |
| -2 |
| -5½ |
| -1½ |
| -1 |
| -3 |
| +½ |
| 0 |
| -6½ |
| -10 |
| 10½ |
| R. |
| -6 |
| +3 |
| +1¾ |
| R. |
| -1 |
| 9¾ |

Table IV. Data and Results for Second 50 Indigent Consumptives Under Sanatorium Treatment at Los Angeles, California. Years 1903-1907.*

| No. of Patient | Initials of Patients | Age | Sex: Male | Sex: Female | Nativity | How Long in California | Social Condition: Single | Social Condition: Married | Occupation | Religion | Family History | Prior Duration of Disease | Height | Weight: Normal Weight in Health | Weight: On Admission | Weight: On Discharge | Weight: Difference | Pulse: On Admission | Pulse: On Discharge | Temperature: On Admission | Temperature: On Discharge | Respiration: On Admission | Respiration: On Discharge | Bacilli | Clinical Condition* when Admitted: Incipient | Moderately Advanced | Far Advanced | Anatomical Condition* when Admitted: 1st | 2nd | 3rd | Duration of Treatment | Clinical Condition when Discharged*: Improved | Arrested | Apparently Cured | Cured | No Improvement or Progressive | Died at B. S. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 51 | D. I. | 27 | M | | Illinois | 6 yrs | S | | Traveling Man | Cath | In family | 1 yr. | 5' 4" | 120 | 89½ | N. R. | N. R. | 128 | 120 | 101 | 103 | 38 | 38 | + | | | + | | | 3 | 6 days | + | | | | - | |
| 52 | M. R. | 18 | | F | [illegible] | 8 yrs | S | | Clerk | Prot. | In family | 2 yrs | 5' 3½" | 100 | 89 | 93 | +4 | 136 | 110 | 102 2 | 99 | 48 | 30 | | | | + | | | 3 | 105 days | | | | | | + |
| 53 | D. J. C. | 27 | | F | Missouri | 2 yrs | | M | Housework. | Prot. | Neg. | 1 yrs | 5' 2" | 115 | 78 | 79¼ | +1¼ | 100 | 110 | 96 | 100 | 28 | 40 | + | | | + | | | 3 | 67 days | | | | | | + |
| 54 | B. S. | 42 | M | | Russia | 10 yrs | | M | Laborer | Jewish. | Neg. | 10 yrs | 5' 8" | 115 | 95¼ | N. R. | N. R. | 108 | 90 | 100 4 | 98 | 28 | 25 | + | | | + | | | 3 | 40 days | + | | | | | |
| 55 | M. O'C. | 23 | | F | Illinois | 11 mos. | S | | Stenographer | Cath | Neg. | 5 yrs | 5' 7" | 120 | 112 | 112 | 0 | 100 | 100 | 99 6 | 98 6 | 28 | 25 | + | | | + | | | 3 | 64 days | | | | | + | |
| 56 | A. M. | 38 | | F | Illinois | 9 mos | S | | Nurse | Cath | In family. | 6 yrs | 5' 5" | 125 | 97 | N. R. | N. R. | 100 | 112 | 99 | 98 6 | 32 | 36 | N. R. | | | N. R. | | | N. R. | 3 days | | | | | | |
| 57 | J. F. A. | 30 | M | | Ohio | 13 mos | | M | Tailor | Prot. | Neg. | 1 yr | 5' 10" | 160 | 122½ | 120½ | -2 | 124 | 90 | 100 | 99 | 32 | 30 | + | | | + | | | 3 | 54 days | | | | | - | |
| 58 | E. S. | 31 | | F | England | 10 yrs. | | M | Housework | Prot. | In family | 1 yr | No rec. | 125 | 100 | N. R. | N. R. | 84 | 90 | 98 2 | 98 | 24 | 30 | N. R. | | | N. R. | | | N. R. | 3 days | | | | | | |
| 59 | I. S. | 20 | M | | Missouri | 2 yrs. | S | | Carpenter | Prot. | Neg. | 1 yr | 5' 7½" | 144 | 109¼ | 105 | -4¼ | 120 | 120 | 98 2 | 102 | 30 | 30 | + | | | + | | | 3 | 29 days | + | | | | | |
| 60 | I. B. | 25 | M | | Ireland | 3 wks | S | | Fireman | Cath | Neg. | 1 yr. | 5' 10½" | 165 | 152½ | 165 | +13 | 104 | 100 | 100 | 98 | 20 | | + | | | + | | | 3 | 272 days | + | | | | | |
| 61 | W. S. | 24 | M | | Wisconsin | 18 yrs | S | | Farmer | Cath. | Neg. | 5 mos. | 5' 7¼" | 160 | 119 | 117¼ | -1¾ | 128 | 110 | 99 2 | 97 6 | 32 | 46 | + | | | + | | | 3 | 47 days | | | | | + | |
| 62 | I. L. | 28 | | F | Oregon | 6 yrs | | M | Housework | Prot. | In family | 9 mos. | 5' 6¼" | 145 | 105 | 96 | -9 | 112 | 110 | 100 | 98 | 36 | 36 | + | | | + | | | 3 | 45 days | | | | | - | |
| 63 | C. W. T. | 22 | M | | Montana | 6 mos | S | | Stenographer. | Cath. | Neg | 1 yr. | 5' 9¼" | 145 | 130 | 129 | -1 | 120 | 100 | 97 | 101 | 26 | 25 | | | | + | | | 3 | 64 days | + | | | | | |
| 64 | A. B. F. | 58 | M | | Ireland | 12 yrs. | S | | Laborer | Prot. | Neg | 1 yr. | 5' | 140 | 110 | 111 | +1 | 60 | 70 | 98 6 | 100 | 26 | 20 | + | | | + | | | 3 | 84 days | | + | | | | |
| 65 | S. J. | 33 | | F | Wisconsin | 5 mos | | M | Housework. | Prot. | In family | 2 yrs | 5' ¼" | 130 | 108 | 114 | +6 | 60 | 70 | 98 | 98 | 24 | 20 | N. R. | + | | | 1 | | | 95 days | + | | | | | |
| 66 | H. I. C. | 31 | M | | Michigan | 2 yrs | | M | Printer. | Prot. | Neg | 4 yrs | 5' 7¼" | 150 | 129 | 121 | -8 | 72 | 70 | 99 | 98 4 | 24 | 24 | + | | | + | | | 3 | 445 days | + | | | | | |
| 67 | E. W. | 26 | | F | Canada | 3 wks | | M | Housework | Prot. | In family | 6 mos. | 5' 7" | 140 | 99¾ | 98 | -1¾ | 110 | 80 | 101¼ | 101 | 28 | 22 | + | | | + | | | 3 | 80 days | + | | | | | |
| 68 | C. J. | 52 | M | | Ohio | [illegible] mos | | M | Carpenter | Prot. | Neg. | 3 yrs | 5' 11" | 156 | 116¼ | 125¼ | +8 | 70 | 70 | 101 | 98 6 | 20 | 20 | + | | | + | | | 3 | 101 days | | | | | + | |
| 69 | M. G. | [illegible] | | F | Russia | 4 yrs | | M | Clerk | Jewess. | In family | 4 yrs | 5' 1½" | 100 | 72½ | N. R. | N. R. | 128 | 110 | 101 | 102 | 28 | 25 | + | | | + | | | 3 | 51 days | | | + | | | |
| 70 | M. G. | 43 | | F | Illinois | [illegible] yrs | | M | Housework | Prot. | In family | 2 yrs | 5' 8" | 133 | 121 | 145 | +24 | 180 | 60 | 97 2 | 98 6 | 24 | 20 | + | | + | | | | | 276 days | + | | | | | |
| 71 | S. K. | 19 | M | | Ohio | 12 yrs | S | | Clerk | Jew | In family | 3 yrs | 5' | 100 | 95¼ | 91 | 4¼ | 100 | 90 | 101½ | 102 | 32 | 20 | + | | | + | | | 3 | 76 days | | | | | - | |
| 72 | A. A. | 32 | | F | Sweden | [illegible] yrs | S | | Housework. | Prot. | Neg. | 1 yr. | 5' 9" | 150 | 135½ | N. R. | N. R. | 84 | 70 | 98 | 98 6 | 20 | 20 | none | + | | | 1 | | | 7 days | | | | | | - |
| 73 | A. E. | 36 | | F | Germany | [illegible] yrs | | M | Weaver | Prot. | Neg. | 2 yrs. | No rec. | 150 | N. R. | N. R. | N. R. | 120 | 120 | 103 | 103 | 38 | 35 | + | | | + | | | 3 | 15 days | | | | | - | |
| 74 | H. S. | 28 | | F | Sweden | [illegible] yrs | S | | Housework | Prot. | Neg. | 3 yrs | 5' 2" | 130 | 104 | 106 | +2 | 120 | 110 | 103 | 102 | 38 | 24 | + | | | + | | | 3 | 17 days | | | | | | - |
| 75 | A. A. | 19 | | F | Sweden | 1½ yrs | S | | Housework | Prot. | Neg | 1½ yrs | 5' 6" | 125 | 98½ | 93 | 5½ | 118 | 120 | 101 8 | 103 | 20 | 30 | + | | | + | | | 3 | 162 days | + | | | | | |
| 76 | I. McK. | [illegible] | | F | [illegible] | [illegible] yrs | | M | Dressmaker | Prot. | Neg. | 4 yrs | 5' 4½" | 153 | 99 | 99 | 0 | 72 | 70 | 99 | 98 6 | 26 | 20 | none | | + | | | | 2 | 30 days | | | | | | + |
| 77 | G. B. | 33 | M | | [illegible] | 1 mo | | M | Clerk | Prot | Neg | 4 yrs | 5' 7¼" | 190 | 138¼ | 134 | -4¼ | 106 | 130 | 98 1 | 101 | 28 | 40 | + | | | + | | | 3 | 78 days | + | | | | | |
| 78 | C. I. I. | 18 | M | | Scotland | [illegible] yrs | S | | Painter | Prot | Neg. | 4 yrs | 5' 1" | 98 | 94¼ | 110 | +5¾ | 82 | 70 | 99 2 | 98 6 | 28 | 20 | + | | | + | | | 3 | 114 days | | | | | - | |
| 79 | H. H. | 22 | M | | Ohio | [illegible] mos | S | | Clerk | Prot | In family | 1 yr. | 5' 9¼" | 139 | 114½ | 107 | -7½ | 118 | 90 | 103 | 103 | 28 | 20 | + | | | + | | | 3 | 125 days | | | | | + | |
| 80 | C. [illegible] L. | 30 | M | | [illegible] | 10 yrs | | M | Bookkeeper | Cath | Neg. | 3 yrs | 5' 8½" | 163 | 116 | 115 | 1 | 120 | 100 | 100 | 99 | 26 | 25 | + | | | + | | | 3 | 52 days | + | | | | | |
| 81 | I. M. W. | 34 | | F | Massachusetts | [illegible] | S | | Box Packer | Prot | In family | 1 yr. | 5' 2" | 110 | 103 | 105 | +2 | 80 | 90 | 99 | 98 6 | 24 | 25 | none | | + | | | | | 23 days | + | | | | | |
| 82 | [illegible] A. | 41 | M | | Massachusetts | 10 mos | | M | Butcher | Prot | In family | 1 yr | 6' 1" | 169 | 153½ | 152 | -1½ | 86 | 70 | 99 6 | 100 | 28 | 20 | + | | | + | | | 3 | 115 days | | | | | - | |
| 83 | J. A. L. | 41 | M | | Canada | [illegible] mos | | M | Machinist | Cath | Neg | 2 yrs | 5' ¼" | 136 | 99½ | 94 | 5½ | 100 | 70 | 98 4 | 99 | 24 | 20 | + | | | + | | | 3 | 200 days | + | | | | | |
| 84 | [illegible] M. | 44 | M | | England | 11 mos | | M | Actor | Prot | Neg | 5 yrs | 5' 8" | 115 | 101 | 103 | +2 | 98 | 80 | 98 2 | 98 6 | 26 | 20 | + | | | + | | | 3 | 103 days | | | | | + | |
| 85 | [illegible] I. | 24 | | F | Ireland | 1 yr | S | | Housework | Cath | Neg | 1 yr. | 5' 3¼" | 130 | 108½ | 103 | 5½ | 120 | 100 | 98 8 | 97 | 26 | 25 | + | | | + | | | 3 | 87 days | | | | | + | |
| 86 | C. D. M. | 45 | M | | [illegible] | 17 yrs | S | | Miner | Prot | Neg | 8 yrs. | 5' 8¼" | 165 | 128½ | 130 | +1½ | 81 | 70 | 99 2 | 99 | 24 | 20 | + | | | + | | | 3 | 8 days | + | | | | | |
| 87 | A. [illegible] | 22 | | F | [illegible] | 3 wks | S | | Nurse | Cath | In family | 2 yrs. | No rec. | 120 | 91 | 90 | 1 | 90 | 110 | 99 2 | 99 | 26 | 24 | + | | + | | | | | 45 days | | | | | | - |
| 88 | A. [illegible] | 31 | | F | Illinois | 2 yrs | S | | Stenographer | Prot. | Neg | 5 yrs | 5' 6¼" | 118 | 87 | 84 | 3 | 116 | 110 | 101 | 101 | 40 | 30 | + | | | + | | | 3 | 54 days | N. T. | | | | | |
| 89 | [illegible] H. | 41 | M | | [illegible] | 2 yrs | S | | [illegible] | Prot | In family | 5 yrs | 5' 7" | 165 | 119½ | 120 | +½ | 84 | 80 | 97 6 | 98 6 | 32 | 25 | none | | | N. T. | | | N. T. | 14 days | | | | | | + |
| 90 | [illegible] | 36 | | F | [illegible] | [illegible] | S | | Actor | Prot | Neg | 1 yr | 5' 2½" | 125 | 105 | 105 | 0 | 100 | 100 | 98 6 | 99 | 30 | 20 | + | | | + | | | 3 | 154 days | + | | | | | |
| 91 | H. [illegible] I. | 40 | | F | [illegible] | [illegible] | | M | Housework | Prot | In family | 2 yrs | 5' 6½" | 138 | 116¾ | 123 | +6¼ | 95 | 100 | 99 | 100 | 24 | 24 | + | | | + | | | 3 | 211 days | + | | | | | |
| 92 | [illegible] | [illegible] | | F | [illegible] | [illegible] | | M | Waitress | Cath | In family | 1 yr | 5' 6¼" | 140 | 121½ | 131½ | +10 | 112 | 80 | 102 | 100 | 28 | 20 | + | | | + | | | 3 | 260 days | + | | | | | |
| 93 | [illegible] | 24 | M | | [illegible] | [illegible] | S | | Jeweler | Cath | Neg | 1 yr | 5' 10" | 140 | 128½ | 139 | +10½ | 108 | 90 | 100 | 98 2 | 28 | 20 | + | | | + | | | 3 | 171 days | | | | | + | |
| 94 | [illegible] | [illegible] | [illegible] | | [illegible] | [illegible] | S | | Machinist | Cath | Neg | 1 yr | 6' | 160 | 145 | N. R. | N. R. | 130 | 110 | 98 6 | 98 6 | 28 | 20 | + | | | + | | | 3 | 2 days | | | | | + | |
| 95 | [illegible] | [illegible] | [illegible] | | [illegible] | [illegible] | | M | Barber | Prot | Neg | 4 yrs | 5' 10" | 148 | 126 | 132 | +6 | 100 | 90 | 99 | 99 2 | 20 | 25 | + | | | + | | | 3 | 105 days | | + | | | | |
| 96 | [illegible] | [illegible] | [illegible] | | [illegible] | [illegible] | S | | Jeweler | Jewish | Neg | 5 yrs | 5' 5½" | 130 | 106¾ | 120 | +13 | 80 | 70 | 99 2 | 98 6 | 22 | 20 | + | | | + | | | 3 | 91 days | | | | | + | |
| 97 | [illegible] | [illegible] | | F | Scotland | [illegible] | S | | Housework | Prot | Neg | 1 yr | 5' 3" | 147 | 110¼ | 109 | -1¼ | 86 | 90 | 100 6 | 102 | 24 | 25 | + | | | + | | | 3 | 147 days | | | | | + | |
| 98 | [illegible] | [illegible] | [illegible] | | [illegible] | [illegible] | S | | Clerk | Prot | Neg | 1 yr. | 5' 4¼" | 138 | 113½ | N. R. | N. R. | 100 | 90 | 101 | 100 | 30 | 25 | none | + | | | 1 | | | 7 days | | + | | | | |
| 99 | [illegible] | [illegible] | | F | [illegible] | [illegible] | S | | Housework | Prot | Neg | 1 yr | 5' 9" | 150 | 141 | 142 | 1 | 98 | 90 | 99 4 | 99 | 24 | 20 | + | | + | | | | | 196 days | + | | | | | |
| 100 | M. [illegible] | [illegible] | | F | [illegible] | [illegible] | | M | Housework | Cath | Neg | 1 yr | 5' 2" | 110 | 106¼ | 116 | -9¾ | 100 | 90 | 100 2 | 98 2 | 26 | 20 | + | | + | | | | | 47 days | | | | | | |

*[illegible]

Treatm

| E | TEMP |
|---|---|
| On Discharge | On Admission |
| 80 | 97 |
| 80 | 97 |
| 80 | 99 |
| 90 | 100. |
| 90 | 98. |
| 90 | 97 |
| 80 | 98 |
| — | 99 |
| 110 | 97 |
| — | 100 |
| 110 | 100 |
| 90 | 100. |
| 100 | 101. |
| 130 | 101 |
| 90 | 99 |
| 120 | 99. |
| — | 103 |
| 100 | 101. |
| 130 | 102. |
| 120 | 102 |
| 80 | 99 |
| 90 | 99 |
| 80 | 97 |
| 90 | 100. |
| 90 | — |
| 60 | 99 |
| 89 | 99 |
| — | 98. |
| 130 | 103 |
| 80 | 99 |
| 60 | 98. |
| 90 | 97. |
| 90 | 99. |
| 100 | 97. |
| 90 | 99 |
| 70 | 98 |
| — | 99. |
| 90 | 99 |
| 30 | 98. |
| 120 | 100 |
| 120 | 99 |
| 100 | 102 |
| 80 | 99 |
| 80 | 102. |
| 100 | 100. |
| 110 | 100 |
| 90 | 98. |
| 80 | 97 |
| — | 100. |
| 120 | 100. |

Table V. Data and Results for Third 50 Indigent Consumptives Under Sanatorium Treatment at Los Angeles, California. Years 1903-1907.*

| No. of Patient | Initials of Patients | Age | Sex: Male | Sex: Female | Nativity | How Long in California | Social Condition: Single | Social Condition: Married | Occupation | Religion | Family History | Prior Duration of Disease | Height | Weight: Normal Weight in Health | Weight: On Admission | Weight: On Discharge | Weight: Difference | Pulse: On Admission | Pulse: On Discharge | Temperature: On Admission | Temperature: On Discharge | Respiration: On Admission | Respiration: On Discharge | Bacilli | Clinical Condition* When Admitted: Incipient | Moderately Advanced | Far Advanced | Anatomical Condition* When Admitted: 1st | 2nd | 3rd | Duration of Treatment | Clinical Condition When Discharged*: Improved | Arrested | Apparently Cured | Cured | No Improvement or Progressive | Died at B S |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 101 | I. W. M | 32 | M | | Pennsylvania | 1 mo.. | | M | Bookkeeper | Prot. | In family | 6 yrs. | 5' 9¼" | 132 | 131¼ | 146 | +15¼ | 84 | 80 | 97 | 98 6 | 18 | 18 | O | + | | | 1 | | | 125 days | | | + | | | |
| 102 | P. H. S | 32 | M | | Rhode Island | 2 mos. | S | | Solicitor.. | Cath. | In family | 2 yrs. | 5' 8¼" | 138 | 113¾ | 123 | +9¼ | 124 | 80 | 97 | 99 | 36 | 25 | + | | | + | | | 3 | 127 days | | + | | | | |
| 103 | M | 24 | M | | Japan | 3 yrs. | | M | No record | Prot | Neg | 5 yrs | 5' 5" | 128 | 116¾ | 117 | +¼ | 88 | 80 | 99 1 | 98 | 18 | 20 | + | + | | | 1 | | | 101 days | | | + | | | |
| 104 | T. R. T | 26 | M | | Missouri | " | | M | Waiter | Prot. | Neg. | 7 mos | 5' 6" | 130 | 120 | 140 | +20 | 100 | 90 | 100 4 | 98 | 24 | 20 | + | | + | | | 2 | | 120 days | | + | | | | |
| 105 | W. G. | 49 | M | | Canada | 2½ yrs | | Wr | Missionary | Prot | In family | 3 yrs | 5' 8½" | 135 | 117 | 120 | +3 | 106 | 90 | 98 4 | 99 | 24 | 24 | + | | | + | | | 3 | 166 days | + | | | | | |
| 106 | W. B | 32 | M | | Iowa | 22 yrs | | M | Motorman | Prot. | Neg. | 1 yr | 5' 11¾" | 180 | 174½ | 190 | +15½ | 110 | 90 | 97 | 99 | 20 | 15 | + | | | + | | | 3 | 102 days | + | | | | | |
| 107 | M. M | 28 | M | | Europe.. | [illegible] mos | | M | Tailor.. | Jew.. | Neg. | 1½ yrs. | 5' 3¾" | | 124½ | 137½ | +13 | 88 | 80 | 98 6 | 98 6 | 22 | 20 | . | | + | | | 2 | | 81 days | + | | | | | |
| 108 | D. H | 25 | M | | Armenia | 1 mo | S | | Mechanic. | Cath. | Neg. | 11 mos | 5' 5" | 125 | 123 | 118 | −5 | 108 | – | 99 8 | | 24 | | + | | | + | | | 3 | 112 days | | | | | + | |
| 109 | J. B. | 37 | M | | S. Carolina. | 15 yrs | S | | Bartender | Prot.. | In family | 6 mos | 5' 11½" | 198 | 147 | 136 | −11 | 110 | 110 | 97 | 102 | 26 | 25 | + | | | + | | | 3 | 74 days | | | | | | + |
| 110 | H. A. M | 22 | M | | Germany | 4 mos. | S | | Druggist | Jewish... | Neg. | 5 mos | 5' 6¾" | 138 | 128½ | --- | N. R | 96 | | 100 | | 26 | | + | | + | | | 2 | | 85 days | | + | | | | |
| 111 | B. M | 32 | | F | Tennessee | 18 yrs | | M | Housewife | Prot | Neg | 2 yrs | 5' 1" | 150 | 105½ | 105 | ½ | 108 | 110 | 100 | 103 | 24 | 30 | + | | | + | | | 3 | 33 days | | | | | + | |
| 112 | C. J. J | 25 | M | | Indiana | 2½ yrs | | Wr | Soda Bottler | Prot.. | In family | 6 mos | 5' 10½" | 165 | 152½ | 166 | +13½ | 108 | 90 | 100 4 | 99 | 24 | 20 | + | | | + | | | 3 | 75 days | | + | | | | |
| 113 | D. G. Y | 25 | | F | Pennsylvania | 3 yrs | | M | Housewife | Prot.. | Neg. | 3 mos | 5' 5½" | 135 | 103½ | 106 | +2½ | 140 | 100 | 101 6 | 100 | 36 | 30 | + | + | | | 1 | | | 51 days | | | | | + | |
| 114 | G. H | 30 | | F | Ohio | 7 yrs. | | W | Housewife | Prot.. | In family | | ——— | 105 | —— | —— | N. R | 116 | 130 | 101 | 97 | 40 | 25 | + | | | + | | | 3 | 83 days | | | | | | + |
| 115 | M. M | 21 | | F | N. Dakota | 8 yrs | S | | Office Work | Prot. | Neg. | 8 mos | 5' 4" | 124 | 117¼ | 124 | +6¾ | 100 | 90 | 99 | 99 | 24 | 20 | + | + | | | 1 | | | 91 days | | + | | | | |
| 116 | M. S | 33 | | F | Missouri | 2½ yrs | S | | Housework | Prot. | Neg. | 3 yrs | 5' 5" | 150 | 106¼ | 110 | +3¾ | 124 | 120 | 99 4 | 99 | 26 | 25 | + | | | + | | | 3 | 22 days | + | | | | | |
| 117 | I. A | 27 | M | | Illinois | 2 yrs | S | | Oiler.. | Prot | Neg. | 3 yrs. | 5' 10½" | 155 | 139 | 148 | +11 | 110 | – | 103 | -- | 28 | | + | | + | | | 2 | | 37 days | + | | | | | |
| 118 | N. N | 45 | | F | California | 15 yrs | | M | Housewife | Cath | In family | 3 yrs. | 5' 4½" | 138 | 99¼ | 109 | +9¾ | 130 | 100 | 101 6 | 99 | 28 | 25 | + | | | + | | | 3 | 162 days | + | | | | | |
| 119 | C. S | 25 | | F | N. Carolina | 3½ yrs | | M | Housewife | Prot | Neg. | 2 yrs | ——— | 105 | – | – | N. R | 136 | 130 | 102 6 | 101 | 40 | 30 | + | | | + | | | 3 | 51 days | | | | | | + |
| 120 | S. P | 32 | | F | New Hampshire | 1½ yrs | S | | Housewife | Prot | Neg. | 3 yrs | 5' 6" | 125 | 93½ | – | N. R | 150 | 120 | 102 | 101 | 28 | 20 | + | | | + | | | 3 | 32 days | + | | | | | |
| 121 | H. M. R. | 36 | M | | Hungary | 3 yrs | | M | Cigar Salesman | Jew. | Neg. | 4 yrs | 5' 7" | 148 | 128½ | 127 | −1½ | 84 | 80 | 99 | 99 | 22 | 18 | + | | | + | | | 3 | 14 days | | | | | + | |
| 122 | G. M | 22 | M | | Massachusetts | 7 mos | S | | Clerk.... | Prot. | Neg | 2 yrs | 5' 5½" | 115 | 93¾ | 104 | +10¼ | 94 | 90 | 99 | 98 6 | 28 | 20 | O | | + | | | 2 | | 133 days | + | | | | | |
| 123 | I. R | 33 | | F | Norway | 5 mos | | M | Housewife | Prot | In family | 2 yrs. | 5' 3½" | 125 | 94¼ | 104 | +9¾ | 100 | 80 | 97 | 98 6 | 24 | 20 | O | | | + | | | 3 | 74 days | | + | | | | |
| 124 | D. M | 44 | M | | Massachusetts | 7 yrs | S | | Bookkeeper | Prot. | In family | 3 yrs | 5' 8" | 126 | 107 | 114 | +7 | 104 | 90 | 100 2 | 98 6 | 26 | 20 | + | | | + | | | 3 | 98 days | + | | | | | |
| 125 | S. E. S | 57 | M | | Ohio | [illegible] yrs | | M | Laborer. | Prot.. | In family | 18 yrs | 5' 7½" | 135 | 89 | 122 | +33 | 84 | 90 | | 98 6 | 26 | 30 | O | + | | | 1 | | | 192 days | + | | | | | |
| 126 | C. K | 41 | M | | Austria | 6 yrs | | M | Soldier | Prot. | Neg. | 2 yrs | 5' 8½" | 130 | 117¾ | 128 | +10¼ | 64 | 60 | 99 | 99 | 22 | 15 | O | | + | | | 2 | | 66 days | | + | | | | |
| 127 | J. H. H | 37 | M | | Germany | 3 yrs | | M | Photographer | Prot | Neg | 1 yr | 5' 7" | 136 | 107 | 95 | −12 | 100 | 89 | 99 | 99 | 22 | 15 | + | | | + | | | 3 | 53 days | | | | | | + |
| 128 | . R | 21 | | F | Indiana | 11 yrs | | M | Clerk | Prot.. | In family | 6 mos | 5' 6" | 130 | 99 | 102 | +3 | 100 | — | 98 8 | — | 24 | | O | | | + | | | 3 | 72 days | | | | | + | |
| 129 | M. W | 39 | M | | Austria | [illegible] mos | | M | Woodworker | Cath. | Neg | 4 yrs | — | 132 | – | — | N. R | 152 | 130 | 103 | 99 | 40 | 30 | + | | | + | | | 3 | 10 days | | | | | + | |
| 130 | H. B | 30 | | F | England | 8 yrs | | W | Actress. | Prot | In family | 2 yrs | 5' 5½" | 148 | 108 | 107 | −1 | 64 | 80 | 99 | 101 | 26 | 20 | + | | + | | | 2 | | 65 days | | | | | | + |
| 131 | A. D. P | 52 | M | | Canada | 15 yrs | | Wr | Sailor | Prot | In family | 16 yrs | 5' 2" | 142 | 111½ | 111 | +2½ | 72 | 60 | 98 4 | 98 6 | 22 | 20 | + | | | + | | | 3 | 21 days | | | | | | + |
| 132 | L. W. D | [illegible] | M | | New York | 8 mos | S | | Physician | Prot | Neg. | 6 yrs | 5' 9" | 145 | 115 | 127 | +17 | 76 | 90 | 97 6 | 99 | 26 | 20 | + | | | + | | | 3 | 51 days | + | | | | | |
| 133 | L. L. | [illegible] | M | | Ireland | [illegible] mos | S | | Nurse | Cath | Neg. | 2 yrs | 5' 11" | 175 | 143 | 140 | 3 | 120 | 90 | 99 4 | 99 | 26 | 25 | + | | | + | | | 3 | 92 days | + | | | | | |
| 134 | G. C. C | 27 | M | | Virginia | 2 yrs | S | | Solicitor | Prot. | Neg. | 3 yrs | 6' 3½" | 200 | 136 | 134 | −2 | 92 | 100 | 97 8 | 101 | 24 | 25 | + | | | + | | | 3 | 22 days | + | | | | | |
| 135 | I. S | [illegible] | | F | Ohio | 3 mos | | M | Housewife | Prot.. | In family | 10 mos | 5' 6½" | 145 | 102¼ | 119 | +16 | 104 | 90 | 99 | 99 | 24 | 20 | O | | | + | | | 3 | 85 days | + | | | | | |
| 136 | M. C | 40 | | F | Canada | 9 mos | S | | Housework | Cath | Neg | 6 mos | 5' 2½" | 120 | 96¼ | 101 | +4¾ | 76 | 70 | 98 | 98 | 22 | 20 | O | | + | | | 2 | | 133 days | + | | | | | |
| 137 | M. H | 27 | | F | Ohio | 7 mos | S | | Housework | Prot | Neg. | 2 yrs | 5' 4" | 120 | 106 | 107½ | +1½ | 104 | | 99 4 | | 24 | | + | | | + | | | 3 | 96 days | + | | | | | |
| 138 | M. G | 23 | M | | Ireland | 8 mos | S | | Tailor.. | Cath | Neg | 1 yr. | 5' 8½" | 154 | 138 | 135 | 3 | 108 | 90 | 99 | 100 | 20 | 20 | + | | | + | | | 3 | 77 days | | | | | + | |
| 139 | S. B | 28 | | F | Indiana | 7 mos | | M | Housewife | Prot | In family | 2 yrs | | 122 | – | | N. R | 108 | 30 | 98 6 | 99 | 21 | 40 | O | | | + | | | 3 | 5 days | | | | | | + |
| 140 | M. K | 18 | | F | Arizona | 11 yrs | S | | Laundress | Cath | In family | 3 mos | 5' 11" | 150 | 129 | 135 | +6 | 136 | 120 | 100 | 99 | 28 | 25 | O | | + | | | 2 | | 141 days | + | | | | | |
| 141 | A. B | 21 | | F | Norway | 2 yrs | S | | Housework | Prot | Neg | 1 yr | 5' 6" | 135 | 93 | 79½ | −13½ | 106 | 120 | 99 | 101 | 24 | 30 | + | | | + | | | 3 | 149 days | | | | | + | |
| 142 | I. O. S | 24 | M | | Tennessee | 2 yrs | S | | Carpenter | Prot. | In family | 6 mos | 5' 6" | 160 | 136¼ | 140 | +3¾ | 120 | 100 | 102 | 98 6 | 36 | 25 | + | | | + | | | 3 | 22 days | | | | | + | |
| 143 | A. K | 51 | M | | Ohio | 18 yrs | | Wr | Telegrapher | Prot | Neg | 1 yr. | 5' 8½" | 115 | 115½ | 106 | 9½ | 86 | 80 | 99 | 100 | 30 | 25 | + | | | + | | | 3 | 79 days | | | | | | + |
| 144 | A. K | 57 | M | | Germany | 5 yrs | | M | Plasterer | Prot | Neg | 8 yrs. | 5' 2½" | 150 | 107¼ | 110¼ | +3 | 122 | 80 | 102 8 | 99 | 34 | 22 | + | | | + | | | 3 | 81 days | + | | | | | |
| 145 | B. A | [illegible] | | F | [illegible] | [illegible] yrs | S | | Housework | Prot. | Neg | 5 mos | 5' 3½" | 125 | 100 | 105 | +5 | 116 | 100 | 100 4 | 99 | 40 | 25 | + | | | + | | | 3 | 197 days | + | | | | | |
| 146 | . A | [illegible] | | F | [illegible] | 10 yrs | | W | Teacher | Prot | Neg | 2 yrs | 5' 1" | 125 | 108½ | 83 | 25½ | 72 | 110 | 100 | 100 | 20 | 30 | + | | | + | | | 3 | 157 days | | | | | + | |
| 147 | M. G | 20 | | F | [illegible] | 3 yrs | | M | Housewife | Cath | In family | 3 mos | 5' 2" | 115 | 98¾ | 102 | +3¼ | 96 | 90 | 98 8 | 99 | 24 | 20 | + | | + | | | 2 | | 54 days | + | | | | | |
| 148 | M. W | 30 | M | | Ireland | [illegible] mos | S | | Laborer | Cath | Neg | 1 yr | 6' 1" | 175 | 156½ | 161 | +4½ | 112 | 80 | 97 | 98 | 26 | 20 | + | | | + | | | 3 | 49 days | + | | | | | |
| 149 | A. A | 50 | M | | [illegible] | 31 yrs | S | | Sailor | Prot | Neg | 1 yr | 5' 11" | 175 | 125 | 119 | 6 | 110 | | 100 6 | — | 30 | | + | | | + | | | 3 | 111 days | | | | | | + |
| 151 | M. K | 38 | | F | [illegible] | [illegible] | | M | Housewife | Prot | Neg | 2 yrs | 5' 2" | 112 | 86¼ | 100 | +13¾ | 130 | 120 | 100 6 | 99 | 38 | 25 | + | | | + | | | 3 | 175 days | + | | | | | |

*Illustrating paper of [illegible]

## Table VI. Data and Results for Fourth 50 Indigent Consumptives Under Sanatorium Treatment at Los Angeles, California. Years 1903-1907.*

| No. of Patient | Initials of Patients | Age | Sex: Male | Sex: Female | Nativity | How Long in California | Social Condition: Single | Social Condition: Married | Occupation | Religion | Family History | Prior Duration of Disease | Height |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 152 | H. H. R | 29 | M | | Germany | 5 yrs. | | M | Chemist | Cath. | Neg. | 6 mos | 5' 10¼" |
| 153 | G. D. | 28 | | F | Massachusetts. | 3 yrs. | S | | Housework.. | Prot | Neg. | 9 mos | 5' 2" |
| 154 | N. W. | 29 | | F | Missouri.. | 10 yrs. | | M | Telephone Oper. | Prot. | Neg. | 1 yr. | 5' 3" |
| 156 | G. D | 16 | | F | Ohio. | 3 yrs.. | S | | Laundress.. | Prot. | Neg. | 6 mos | 5' 8½" |
| 157 | M. M | 18 | M | | New York.. | 18 yrs. | S | | Clerk.. | Jewish.. | Neg. | 1 yr. | 5' 5½" |
| 158 | I. T. | 29 | M | | Russia.... | 1 yr... | | M | Laborer. | Jewish.. | Neg. | 1 yr. | 5' 7" |
| 159 | I. S. | 43 | M | | Russia... | 1 yr... | | M | 2nd hand dealer | Jewish... | Neg. | 1 yr. | 5' 8" |
| 162 | B. W. S | 35 | M | | Virginia | 6 yrs.. | S | | Solicitor. | Prot. | Neg. | 1 yr. | 5' 9½" |
| 163 | N. S. | 21 | | F | Russia.... | 3 yrs.. | | M | Housewife | Jewish. | Neg. | 6 wks | 5' |
| 165 | C. P. | 32 | | F | Kansas | 5 yrs.. | | M | Housewife | Prot.. | Neg. | 6 mos | 5' 1½" |
| 167 | O. S.. | 42 | M | | Canada.. | 18 mos. | | M | Carpenter. | Prot | Neg. | 5 yrs. | 5' 11½" |
| 169 | I. B.. | 33 | M | | Russia. | 2½ yrs.. | | M | Shoemaker... | Jewish.. | Neg | 6 mos | 5' 4¼" |
| 170 | [illegible] H | 33 | | F | Illinois | 14 mos. | S | | Stenographer. | Prot.. | Neg. | 9 mos | 5' 6½" |
| 171 | [illegible] S | 27 | M | | Kentucky | 4 yrs... | S | | Mechanic. | Prot. | Neg. | 3 mos | 5' ½" |
| 172 | K. M | 27 | M | | Japan | 3½ yrs. | S | | Laundryman. | Prot. | Neg. | 1 Mo. | 5' 2¾" |
| 173 | P. S | 26 | M | | Michigan | 5 yrs.. | S | | Waiter | Prot.. | Neg. | 6 yrs. | 5' 9¼" |
| 175 | M. M | 25 | M | | Russia | 3 yrs.. | S | | Laborer | Jew | In family | 4 yrs | 5' 4" |
| 177 | C. Z | 27 | M | | Ohio. | 5 yrs. | S | | Clerk. | Prot | In family | 8 yrs | 5' 9¾" |
| 180 | J. C. | 62 | M | | England | 14 yrs. | | W'r | Bookkeeper | Prot.. | In family | 3 wks | 5' 8" |
| 196 | C. A. C | 28 | M | | Indiana.. | 3 yrs | S | | Laborer | Prot | In family | 7 mos | 5' 9½ |
| 150 | J. P | 26 | | F | Iowa. | 9 mos | S | | Teacher | Prot.. | Neg. | 2 yrs | 5' 3" |
| 155 | A. B | 23 | | F | Illinois | 9 yrs | | | Housework | Cath | Neg. | 1½ yrs | 5' 8" |
| 160 | B. P | 24 | M | | Ireland | 12 mos | S | M | Shoemaker | Cath | In family | 3 yrs | 5' 6" |
| 161 | L. H | 26 | M | | Sweden | 2 yrs | S | | Laborer | Prot. | Neg. | 9 mos | 5' 7" |
| 164 | O. O | 48 | M | | England | 5 yrs. | S | | Tailor. | Prot.. | Neg. | 1 yr. | 5' 9" |
| 166 | D. M | 31 | M | | Pennsylvania. | 3 yrs. | S | | Chemist | Cath | Neg. | 6 wks | 5' 8" |
| 168 | Z. S | [illegible] | | F | Illinois | 1 yrs | | W | Waitress | Prot | In family | 1 yr. | 5' 4½' |
| 174 | D. G. | [illegible] | | F | Alabama. | 1 yr... | S | | Housework | Prot | Neg. | 3 yrs. | 5' 2½" |
| 176 | [illegible] D | 18 | M | | New York | 2 mos. | S | | Actor.. | Prot | Neg | 1½ yrs | 5' 9" |
| 178 | M. S | 30 | | F | Vermont | 3 yrs | S | | Housework | Prot. | Neg. | 11 mos | 5' 1" |
| 179 | L. K | [illegible] | M | | Russia | 3 yrs.. | S | | Merchant | Jewish | Neg | 3 yrs | 5' 3" |
| 181 | M. B | [illegible] | M | | Indiana | 4 yrs. | | W | Housework | Prot. | In family | 5 mos | 5' 4½' |
| 182 | H. L | 26 | M | | France | 21 yrs | | M | Merchant | Cath | Neg. | 1 yr | 5' 7" |
| 183 | D. A | 18 | | F | England | 11 mos | S | | Tel. Operator | Prot. | Neg. | 3 mos | 5' 1" |
| 184 | G. M | 33 | | F | Wisconsin | 9 mos | S | | Milliner | Cath. | Neg. | 11 mos | 5' 4½" |
| 185 | W. F | 18 | | F | Canada | 5 yrs. | S | | Student | Prot. | Neg. | 10 mos | 5' 4" |
| 186 | H. R | 33 | | F | Miss. | 2½ yrs | | M | Housewife | Jew | Neg. | 2 yrs | 5' 6½" |
| 187 | G. W | [illegible] | M | | England | 11 yrs | | M | Saloon Keeper | Prot | Neg | 11 mos | 5' 6" |
| 188 | F. A | [illegible] | M | | England | 30 yrs | | M | Machinist | Prot | Neg. | 1½ yrs | 5' 9" |
| 189 | M. T | 20 | | F | California | 20 yrs | S | | Housewife | Cath | In family | 1 yr | 5' 1" |
| 190 | F. O | 17 | M | | California | 17 yrs | S | | Tailor.. | Cath | Neg. | 2 mos | 5' 3½" |
| 191 | E. L | [illegible] | M | | Hungary | 3 yrs | S | | Salesman | Jewish | Neg. | 2 yrs. | 5' 9½" |
| 192 | I. I | 23 | M | | [illegible] | 3 wks | S | | Printer | Jewish | Neg. | 8 mos | 5' 5" |
| 193 | S. F | [illegible] | | F | Wisconsin | 2 yrs | | M | Housewife | Prot. | In family | 7 mos | 5' 5" |
| 194 | S. S. A | 24 | M | | Asia | 5 yrs | S | | Fruit Sal[illegible] | Prot | Neg | 1 yr | 5' 9" |
| 195 | I. W | 30 | M | | [illegible] | 5 mos | S | | Tailor. | Jewish. | Neg | 5 yrs | 5' 4½' |
| 197 | L. S | [illegible] | | F | [illegible] | 4 yrs | S | | Stenogra[illegible] | Prot | In family | 2 mos | 5' 1½' |
| 198 | I. L. S | [illegible] | | F | [illegible] | 29 yrs | S | | Nurse | Prot | Neg | 4 mos | 5' 7½' |
| 199 | O. O | [illegible] | M | | [illegible] | 1½ yrs | S | | Miller | Prot | Neg | 2 yrs | 5' 8½' |
| 200 | I. C. B | [illegible] | M | | Germany | 4 yrs | | M | Machinist | Prot | In family | 1½ yrs | 5' 10" |

| No. of Patient | Weight: Normal Weight in Health | Weight: On Admission | Weight: On Discharge | Weight: Difference | Pulse: On Admission | Pulse: On Discharge | Temperature: On Admission | Temperature: On Discharge | Respiration: On Admission | Respiration: On Discharge | Bacilli | Clinical Condition When Admitted: Incipient | Moderately Advanced | Far Advanced | Anatomical Condition When Admitted: 1st | 2nd | 3rd | Duration of Treatment | Clinical Condition When Discharged: Improved | Arrested | Apparently Cured | Cured | No Improvement or Progressive | Died at B S |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 152 | 175 | 105 | 102 | -3 | 130 | 126 | 100 | 99 | 26 | 25 | + | | | + | | | 3 | 27 days | | | | | + | |
| 153 | 98 | 93¼ | — | N. R. | 108 | - | 98 8 | | 26 | — | O | | + | | | 2 | | 2 days | | | | | + | |
| 154 | 115 | 97 | 100 | +3 | 100 | 90 | 102 | 100 | 24 | 25 | + | | | + | | | 3 | 97 days | | | | | + | |
| 156 | 145 | 107¼ | 106 | -1¼ | 100 | 120 | 100 | 99 | 22 | 30 | + | | | + | | | 3 | 31 days | | | | | | + |
| 157 | 103 | 98 | — | N. R. | 120 | 110 | 99 6 | 99 | 26 | 25 | + | | | + | | | 3 | 7 days | | | | | + | |
| 158 | 150 | 128¼ | 127¾ | -½ | 96 | 120 | 97 | 99 | 28 | 30 | O | | | + | | | 3 | 62 days | + | | | | | |
| 159 | 135 | 125 | 126 | +1 | 100 | 110 | 98 6 | 99 | 24 | 35 | + | | | + | | | 3 | 47 days | | | | | + | |
| 162 | 150 | 110 | 100 | -10 | 96 | 120 | 99 4 | 99 | 24 | 35 | + | | | + | | | 3 | 80 days | | | | | | + |
| 163 | 118 | 97¾ | 112 | +14¼ | 120 | 100 | 99 4 | 98 6 | 26 | 20 | + | | + | | | 2 | | 135 days | + | | | | | |
| 165 | 112 | 102 | 101 | -1 | 90 | 110 | 98 6 | 99 | 22 | 25 | O | | | + | | | 3 | 9 days | | | | | + | |
| 167 | 175 | 127 | 124 | -3 | 100 | 100 | 100 | 100 | 28 | 45 | + | | | + | | | 3 | 13 days | | | | | + | |
| 169 | 124 | 106 | 113 | +7 | 112 | 100 | 100 6 | 99 | 48 | 30 | + | | | + | | | 3 | 23 days | + | | | | | |
| 170 | 120 | 91 | 94 | +3 | 128 | 120 | 101 | 100 | 32 | 30 | O | | | + | | | 3 | 22 days | + | | | | | |
| 171 | 126 | 112 | 114 | +2 | 120 | 130 | 99 6 | 96 | 24 | 40 | O | | | + | | | 3 | 19 days | | | | | | + |
| 172 | 136 | 121 | 127 | +6 | 76 | 100 | 99 | 98.6 | 20 | 25 | + | | + | | | 2 | | 98 days | + | | | | | |
| 173 | 152 | 139 | 145 | +6 | 96 | 100 | 98 | 98 | 28 | 25 | + | | | + | | | 3 | 98 days | + | | | | | |
| 175 | 135 | 113 | 114 | +1 | 136 | 100 | 102 | 101 | 28 | 30 | + | | | + | | | 3 | 77 days | | | | | + | |
| 177 | 160 | 128 | 139 | +11 | 124 | 120 | 94 6 | 99 | 30 | 25 | + | | | + | | | 3 | 88 days | + | | | | | |
| 180 | 154 | 154 | 158 | +4 | 98 | 90 | 96 6 | 99 | 50 | 30 | + | | + | | | 2 | | 9 days | | | | | + | |
| 196 | 170 | 146¼ | | . | 84 | 100 | 99 4 | 98 | 26 | 25 | + | | | + | | | 3 | 9 days | | | | | + | |
| 150 | 95 | 91 | 97 | +6 | 132 | | 99 2 | | 28 | | + | | | + | | | 3 | 203 days | + | | | | | |
| 155 | 122 | 91 | 89 | -2 | 110 | 120 | 100 | 100 | 28 | | + | | | + | | | 3 | 174 days | + | | | | | |
| 160 | 144 | 132¾ | 138 | +6 | 104 | 102 | 98 | 98 6 | 20 | 28 | + | | + | | | | 3 | 140 days | + | | | | | |
| 161 | 160 | 144 | 135 | -9 | 104 | | 99 | | 24 | | | | + | | | 2 | | 163 days | + | | | | | |
| 164 | 157 | 117 | 120 | +3 | 136 | 120 | 98 6 | 99 | 40 | 30 | + | | | + | | | 3 | 152 days | | | | | + | |
| 166 | 130 | 113 | 115 | +2 | 132 | 120 | 101 | 99 | 40 | 30 | + | | | + | | | 3 | 146 days | + | | | | | |
| 168 | 125 | 94 | 91 | -3 | 90 | 100 | 100 4 | 100 | 20 | 25 | + | | | + | | | 3 | 142 days | | | | | | + |
| 174 | 110 | 92 | 99 | +7 | 130 | 130 | 100 | 100 | 38 | 38 | + | | | + | | | 3 | 132 days | + | | | | | |
| 176 | 170 | 115 | 123 | +8 | 120 | 100 | 97 | 99 | 40 | 30 | + | | | + | | | 3 | 126 days | + | | | | | |
| 178 | 97 | 88¾ | 91 | +2¼ | 112 | 100 | 97 | 97 | 30 | 25 | + | | | + | | | | 120 days | | | | | | |
| 179 | 130 | 119 | 122 | +3 | 80 | 80 | 98 2 | 97 | 20 | 20 | + | | | + | | | 3 | 117 days | | | + | | | |
| 181 | 140 | 105 | 117 | +12 | 100 | 100 | 102 | 99 | 32 | 25 | + | | + | | | 2 | | 113 days | + | | | | | |
| 182 | 160 | 116 | 120 | +4 | 120 | 120 | 100 8 | 99 | 28 | 30 | + | | | + | | | 3 | 113 days | | | | | + | |
| 183 | 105 | 97½ | 99 | +1½ | 96 | 100 | 98 | 99 | 26 | 28 | O | + | | | 1 | | | 106 days | + | | | | | |
| 184 | 123 | 111 | 115 | +4 | 112 | 100 | 99 2 | 98.6 | 32 | 30 | + | | | + | | | 3 | 105 days | + | | + | | | |
| 185 | 128 | 114 | 112 | -2 | 124 | 130 | 101 | 101 | 52 | 35 | + | | | + | | | 3 | 136 days | | | | | | + |
| 186 | 135 | 110½ | 114½ | | 100 | 110 | 97 | 98 | 26 | 24 | + | | + | | | 2 | | 21 days | + | | | | | |
| 187 | 142 | 127 | 132 | +5 | 112 | 110 | 98 | 99 | 18 | 25 | + | | | + | | | 3 | 125 days | + | | | | | |
| 188 | 156 | 109½ | | | 95 | 90 | 96 | 98 | 20 | 36 | + | | | + | | | 3 | 8 days | | | | | + | |
| 189 | 90 | 88¾ | 92 | +3¼ | 96 | 96 | 99 4 | 98 | 24 | 24 | O | | + | | | 2 | | 81 days | | | | | + | |
| 190 | 120 | 107½ | 111 | +3½ | 88 | 90 | 95 | 96 | 24 | 24 | O | + | | | 1 | | | 75 days | | | + | | | |
| 191 | 155 | 128¾ | 122 | -6¾ | 100 | 110 | 99 | 101 | 32 | 35 | + | | | + | | | 3 | 73 days | | | | | + | |
| 192 | 130 | 122½ | 134 | +11½ | 84 | | 98 2 | | 24 | | + | | + | | | 2 | | 72 days | + | | | | | |
| 193 | 130 | 105 | 103 | +18 | 76 | | 98 2 | | 26 | | O | + | | | 1 | | | 72 days | | | + | | | |
| 194 | 147 | 133¼ | 133¼ | 0 | 104 | | 98 6 | | 24 | | + | | + | | | 2 | | 54 days | + | | | | | |
| 195 | 130 | 113¼ | 112 | -1¼ | 78 | | 98 1 | | 20 | | + | | | + | | | 3 | 52 days | | | | | + | |
| 197 | 139 | 131½ | 126 | 5¼ | 112 | | 99 | | 26 | | O | + | | | 1 | | | 11 days | + | | | | | |
| 198 | 183 | 178 | 179 | +1 | 104 | | 99 4 | | 26 | | + | + | + | | | 2 | | 38 days | + | | | | | |
| 199 | 150 | 123 | 127 | +4 | 120 | | 101 2 | | 28 | | + | | | + | | | 3 | 37 days | + | | | | | |
| 200 | 175 | 148 | 147 | -1 | 104 | | 100 4 | | 24 | | + | | | + | | | 3 | 35 days | | | | | | + |

*Illustrating paper of Dr. W. [illegible] estimate the lives that may be saved by isolating these poor, advanced cases, who are shut out from most of the charitable sanatoria.

The majority of the cases discharged as improved have again become wage earners, and in daily life must carry the gospel of right living to others.

The plan working best is not to take the poor absolutely free, but make a charge of 5 dollars, which includes everything, even the washing and mending—often clothes. This 5 dollars is usually given by other charitable funds, societies, unions or brotherhoods, from which the case is referred.

For some account of the management and care of these cases, it is a pleasure to refer to the paper presented you last year by Dr. Bonney on "The Care of Advanced Cases." Our method has been much the same through the three and a half years covering the treatment of these two hundred cases. The matter of feeding has varied in individual cases, digestive disturbances treated with selected diet; in general, raw eggs and olive oil are given to each patient immediately after each meal, beef juice between meals. The olive oil might stand in the place of cream recommended, and to us has the advantage of being less expensive. Eggs and milk between meals are only given to those who cannot for some reason take the ordinary meals.

In regard to comfort, Dr. Bonney strikes a keynote. We have also been impressed with the necessity for making these cases absolutely comfortable physically, and contented mentally; the surroundings attractive to ear and eye, giving some form of entertainment. Two phonographs are kept in constant use, and often the piano. Musicales are given by local and Eastern artists interested in this work.

*Outdoor Treatment.*—The same principle of comfort applies to sleeping out doors, and in Los Angeles there is no night too cold that, when properly protected, patients may not with comfort sleep in the screened room or porch. No tents have been used for any of the patients. The arrangement and detailed measurements of the cottages used are here shown. Although there is nothing new in the plan, these cottages are so arranged for fresh air that the patients who show improvement are practically in the open the whole twenty-four hours. The climate throughout the year is such that no heat in the cottages is required. There is no heat provided, and such is the training derived from the older patients that never has one asked for any heat in the sleeping rooms. A separate building, the infirmary, used for the progressive cases, is of course provided with heat, as well as the detached dining room and baths. The cottages each contain two rooms for two patients, each room 12 by 14, with a porch on three sides 5 feet wide ; two sides of screen to each room, screen under the eaves and a ventilator in the ceiling. There are so few rainy days throughout the year that another objection to the small cottage plan is overcome, and the expense not increased. The average number of days that it rained each year for the past three years was thirty-four—September, 1905 to 1906 showed only thirty days; next year's report will be higher. The average number of clear, cloudless days in three years was 212. The past year to September, 1906 was 264 days; the average number of cloudy or part fog days was 101. The porches are so arranged that patients can either be in the sun or shade the entire day, depending upon his own comfort. It is a satisfaction to feel that others of this Association are opposed to keeping patients exposed to the rays of the sun when this produces discomfort to the patient.

The 200 cases are individually recorded under separate headings, the classification of cases and results used is that in connection with Turban's scheme, and that proposed by the Committee on Nomenclature of the National Association.

Time will not be taken to discuss this, but the cumbersome details will be published for those interested. Remarks will be confined to the averages for the first and second hundred shown by the table given you.

On the whole average there are more males than females. There is room for an equal number of men and women at the Sanatorium. Many more men than women make applications; 57 per cent. of the 200 admitted were men, but the 43 per cent. of women really means that the greater percentage of women applicants were admitted, since there is no place provided for these cases other than the County Hospital, to which very few women will go.

From the 60 per cent. that were American born, 3 per cent. were Californians.

There is a large proportion of foreigners, 40 per cent. of the total number, the average time for residence in Los Angeles being five years. All kinds of occupations are represented, the greater number clerks on small salaries; professional people not a few; physicians, clergymen, missionaries, artists and actors to butcher, shoemaker and stonecutter. Mark that 82 per cent. of these cases had followed indoor occupation; only 16 per cent. outdoor employment, under which list were put sailors, labourers, painters, soldier, physicians, &c. Where it seemed in a few instances doubtful as to in or outdoor occupation, the cases were placed on the outdoor list.

It is interesting to note that about 66 per cent. showed no family history of tuberculosis; in each group of fifty the greatest per cent. showed no family history. Part of this may be explained by the fact that a few of the patients could give no satisfactory family history.

The prior duration of the disease has been shown to be a little more than two years, but it must be remembered that this has been compiled from the patients' statements, and it has so often been found that the patients were unaware of the existence of the disease until it had reached an advanced stage, that it would seem that this two years duration is surely under rather than over estimated. It is a significant fact that the average gain in weight in all patients was 7 lbs., while the average loss was $5\frac{9}{10}$ths lbs., but the tables show that the weight on discharge is only about $4\frac{1}{2}$ lbs. gain, because these include the patients that died at the Sanatorium. The best gain in three months of a far advanced case was $22\frac{3}{4}$ lbs.; another far advanced case gained 20 lbs. in two months. Although the pulse, temperature and respiration do not show marked change between admission and discharge, it must be remembered that the worst cases are included in this summary.

The average duration of treatment for the total number has been somewhat over three months. This is, of course, a smaller average than would be if one simply reported on the early cases, or even those that do well, for the latter cases are kept six months or more, so that the total average of duration of treatment is reduced on account of the bad cases, many dying after a few weeks' time, or even less.

The plan carried out in regard to the advanced cases has been to give each a trial of three months, and if the case showed progression, arrangements have been made to send the patients to a place where family or friends could care for them until the end came. Many of these cases have been sent to their homes in eastern or foreign parts. The sanatorium is not yet in the financial condition to care for such cases indefinitely. Those that the sanatorium has been obliged to keep to the end are cared for in a separate building called the infirmary, isolated from the more favourable cases. The advanced cases which make a marked improvement and begin running normal temperatures are placed in the cottages above referred to, so that irrespective of the stage, there is no difference made in the cases doing well.

Out of the first 100 cases, 93 showed on admission the second and third stages, $62\frac{2}{5}$ per cent. of which showed progression or died; of these 92 cases $37\frac{3}{5}$ per cent. improved.

Out of the second 100, cases 91 were admitted in second and third stages, 45 per cent. showed progression, or died; 55 per cent. improved.

To sum up the total 200 cases, $46\frac{1}{5}$ per cent. of the second and third stages showed a marked improvement. Many of these cases discharged improved became wage-earners immediately. The few cases that were admitted in the first or incipient stage, that is, 13, or $6\frac{1}{2}$ per cent., were all discharged as arrested or apparently cured, as well as 3 per cent. of those admitted beyond the first stage.

## Summary.

Running a sanatorium in the way above stated does not make as favourable a report as a statement made from one where only early cases are admitted; but from the humanitarian standpoint and in view of the campaign against the spread of tuberculosis this report will, to its favour, bear critical investigation. That $46\frac{1}{5}$ per cent. of the advanced and far advanced clinically recorded, or second and third stages anatomically, could, after being entirely incapacitated, so improve as to go home, resume their duties, and many become wage-earners, is worthy of recognition. The subsequent history of these will be interesting for a later day. Many are known to have become worse and died, some are living in tents in the country, others after six to twelve months are still doing light work for an existence.

The great difficulty lies in the fact that many of these patients must necessarily return to their wretched surroundings and life of privation. If, on the other hand, this difficulty could be removed and the same patients kept under proper supervision with sufficient means for their care, many could go on and reach an arrested condition.

If financial conditions and housing capacity enabled us to give these patients indefinite sanatorium treatment the ultimate results seem to justify the care of these undesirable cases.

# SUBSEQUENT HISTORIES OF ONE HUNDRED AND SIXTY "ARRESTED CASES" OF PULMONARY TUBERCULOSIS TREATED AT THE SHARON SANATORIUM, 1891-1906.

BY VINCENT Y. BOWDITCH, M.D.
BOSTON, MASS., AND
WALTER A. GRIFFIN, M.D.
SHARON, MASS.

It must be remembered that in certain respects as far as climate, altitude, and proximity to the sea and a large city are concerned, the Sharon Sanatorium was for several years unique. The results of treatment, therefore, should be kept before you that you may judge whether that which was begun sixteen years ago as an experiment has proved a success or otherwise.

You will notice by the title of the paper that I still adhere to the term "arrested" in speaking of cases in which the most important symptoms (chiefly cough, expectoration and fever) have disappeared during a long or short stay at the sanatorium, the general appearance being one of good health. This is chiefly done for the sake of uniformity with previous records given to this Society,[1] although in the annual reports of the institution the nomenclature recommended by the National

[1] "Subsequent Histories of Arrested Cases of Phthisis treated at the Sharon Sanatorium," *Boston Medical and Surgical Journal*, June 22, 1899, and *Transactions of the American Climatological Association*, 1899.

"Subsequent Histories of Seventy-nine Arrested Cases of Phthisis treated at the Sharon Sanatorium from 1891 to 1902," *Journal of the American Medical Association*, November 14, 1903, vol. xli., and *Transactions of the American Climatological Association*, 1903.

Association for the Study and Prevention of Tuberculosis has been added to the older method. A feeling of conservatism, moreover, and a desire to counteract the harmful effect of claiming too much at first in the treatment of a disease as uncertain and treacherous as tuberculosis, are additional reasons, I confess, for not having made use even of the term "apparently cured" when the patients leave the sanatorium, in spite of the fact that the subsequent histories in very many cases would seem to amply justify the less conservative term.

Up to the autumn of 1900 there was a capacity of nine beds only, but since that time the addition of a large wing has increased the number of beds to twenty-two.

Since the opening of the institution in February, 1891, up to one year ago (January, 1906), we have discharged 362 patients, among whom thirty-five either remained too short a time (less than one month) or proved to be non-tubercular, and so were not considered in the results. The remainder only (327) are taken into consideration. Of these, 160 were classed as "arrested" cases. In reporting the subsequent histories of these cases we have divided them into two series, viz.: (1) those who were included in my last paper, entitled, "Histories of Seventy-nine Arrested Cases of Phthisis, &c., 1891 to 1902," the last one of these having been discharged in February, 1902, over five years ago; (2) those who have been discharged as "arrested" cases since that date up to one year ago (January, 1906).

In my last paper I gave brief subsequent histories of the arrested cases in patients who had died after varying periods of a cessation of all symptoms. It was interesting to note that a large percentage of these had signs of more or less advanced disease, in which arrest of the morbid process was hardly to have been expected. In others, hard work and a return to unhygienic conditions of life seemed the chief reasons for their subsequent relapse after several years of good health. The details of these published cases can be easily referred to by those interested to know the exact facts.

Since the publication of my last paper in 1903, six more of the cases then reported have relapsed and died. I have tabulated them as follows :—

CASE 129.—(L. B. W.) Incipient case. Died January, 1906, five and a half years after discharge. In January, 1903, two years or more after discharge, was *at work in a factory* and at that time health was reported "good."

CASE 136.—(F. A. L.) Incipient case, well marked. Died about five years after discharge ; details unknown.

CASE 149.—(E. C. C.) Advanced phthisis in both lungs. Died December, 1904, three and a half years after discharge. Two and a half years after discharge health was reported as "good."

CASE 153.—(A. J. F.) Incipient case. Died one and a half years after discharge. No other details obtainable.

CASE 174.—(L. G. W.) Incipient case. Died one and a half years after discharge. Left Sanatorium against urgent advice after only seven weeks stay.

CASE 181. — (M. A. McK.) Advanced phthisis. Died about three years after discharge.

In looking through these six cases it will be seen that two had advanced disease and in whom arrest of the process was unexpected, and yet both of them lived for three years after discharge. One entered a factory, the usual conditions of which we know to be unfavourable to health. One left the sanatorium far too early to accomplish the best results and against advice. Of the other two no satisfactory data can be learned as to the subsequent methods of life or cause of death. These six cases added to the twelve recorded in my last paper make eighteen who have died out of the first series, or the seventy-nine cases discharged as arrested up to 1902, 25 + per cent.

Three of the cases in the first series, of whom up to the time of writing no recent report could be obtained, are tabulated as follows :—

CASE 49.—(H. Q.) Discharged October, 1894, was four years ago perfectly well; in robust health working as a domestic nine years after discharge, and although we have no present record, we have no reason to believe her dead.

CASE 122.—(A. D.) Discharged October, 1900. Perfectly well at last report about one year ago, six years after discharge. Working at curtain stitching.

CASE 179.—(L. C. K.) Discharged December, 1901. "Health good," January, 1903. Not traced since.

SUMMARY OF THE FIRST SERIES.

| | |
|---|---|
| Still living, and most of them housekeepers or wage-earners and apparently in good health ... ... ... ... ... | 70+ per cent. |
| Not heard of recently ... ... ... | 4 ,, ,, |
| (Two at least of these cases when last heard of had been in robust health for several years after leaving the sanatorium.) | |
| Died ... ... ... ... ... ... | 25+ ,, ,, |

Among the cases of the second series, which includes those discharged from April, 1902, to January 1, 1906, we have the following record :

| | | |
|---|---|---|
| 81 | were discharged as "arrested." Of these, | |
| 77 | are alive and apparently well, most of them house-keepers or wage-earners; about . . ... ... ... ... | 95 per cent. |
| 3 | have died, about ... ... .. ... | 3·7 ,, ,, |
| 1 | has sent no recent report and thus far has not been traced, about ... ... | 1·4 ,, ,, |

Of the three who have died, one was in an advanced stage, who, following a remarkable condition of arrest for some months, finally succumbed after a return to hard work in a convent. One had incipient disease, but remained only one month at the Sanatorium and died of "paralysis" at the Massachusetts General Hospital two years later, and no mention made of phthisis. The third was one with advanced disease who was discharged as "arrested," but after hard work relapsed and died. In summing up the total number of arrested cases, therefore, we have the following results:—

From the year 1891 to 1906.

| | | |
|---|---|---|
| Total number "arrested" ... ... | 160 | |
| Number still living and well, most of them housekeepers or wage-earners ... ... .. ... | 133 | = 83+ per cent. |
| Number who have not recently been heard of, but who at last accounts were doing well, many of them in robust health .. ... ... | 6 | = 3·7 " " |
| Number who have since relapsed and died ... ... ... ... | 21 | = 13+ " " |

Owing to the bulk of such material we have not attempted to print the tabulation of these cases in detail as we did when we gave the last report. All of them were evidently of tubercular nature, as proved either by the presence of bacilli in the sputa, the tuberculin test, or such marked signs in the chest combined with the history as to make the diagnosis undoubted. It should be added that several cases were given the tuberculin test simply as a matter of corroboration of a previous diagnosis and as an additional means of convincing others who might be sceptical.

A few cases are appended as examples of the kind which are admitted to the sanatorium.

Case 207.—(H. H. H.), aged 31. Housewife. Incipient. Arrested. Length of stay five and a-half months. Family History: No tuberculosis. Previous History: Frequent "colds" in last three years. Previous Illness: Cough four and a-half months. In bed two months. Tubercle bacilli, twice before entrance. Previous examination (April). Dulness in both tops with + respiration and + tactile fremitus. Dulness lower right back with bronchial respiration, bronchophony and numerous fine râles. No sputa after entrance. Was kept in bed for a week and then gradually allowed about. The chest condition steadily improved till in October nothing abnormal could be found. No cough. Keeping house and indoors eight to nine hours a day; windows open at night.

CASE 265.—E. M. S., aged 30. Housewife. Advanced. Arrested. Length of stay, five months. Family History: Mother's mother died of consumption. Personal History: "Catarrhal trouble" several years. Previous Illness: Run down eight months. Cough four months. Physical Examination: Dulness both tops, but especially left. Respiration b. v., right top and + left top. Numerous fine râles upper two-thirds left lung. Cough and sputa rapidly stopped. Tubercle bacilli found on two occasions. Chest signs improved much in degree although about same areas involved. Now three years after discharge has no cough. Is keeping house and stays indoors most of the time.

CASE 270.—M. E. McG., aged 24. Incipient. Arrested. Length of stay three months. Family History: One sister died of phthisis. Personal History: Typhoid eight years before. Previous Illness: "Bronchitis" eighteen months before and some cough since. Physical Examination: Slight dulness both tops with + voice and fine râles both sides at apices front and back. Tubercle bacilli found in sputa: Signs nearly all cleared up, very little at apices in back. No cough, no sputa at discharge. Has continued in good health three years and has had two children.

CASE 319.—A. D. P., aged 25. Shoe factory worker. Advanced. Arrested. Length of stay six months. Family

History: negative. Personal History: negative: Previous Illness: cough two months: Physical Examination: thin, pale. Temperature up to 102 and 103 (gradually coming to normal after a month). Marked dulness right top with harsh respiration and fine râles in back. Also dulness lower right back with rather coarser râles. Little dulness, left top with b. v. respiration and fine râles in back. Numerous tubercle bacilli. Patient was kept in bed and not allowed company for weeks, but during six months stay she gained 39 lbs., lost all cough, and showed in the chest only very slight signs at right base. Feels perfectly well after two years; no cough.

Just here I feel that I should state my own opinion, which I know is shared by many, that the presence of tubercle bacilli in the sputa is the only absolute test of the presence of pulmonary tuberculosis, although I naturally believe that many cases can be diagnosed without even the presence of bacilli. The tuberculin test, although I believe it to be helpful often as an adjunct in determining the true nature of a case, I cannot regard as infallible and I deprecate absolute reliance upon it. I should add also that I have never seen a case which I thought harmed by its judicious use, although it is not a thing to be employed indiscriminately or carelessly.

A few words should be said about our experience at Sharon with tuberculin used therapeutically. Having been very conservative in its adoption, we have finally during the past few years carefully used it in selected cases when we had found that the ordinary hygienic methods, faithfully tried for a period of weeks or months, had failed to arrest the disease, and the patients remained in *statu quo*. Recently we have been encouraged to begin its use earlier during the patients' stay. Through the courtesy and kindness of those in control of the Saranac laboratory, chiefly Dr. Trudeau and Dr. E. R. Baldwin, in supplying us we have the advantage of using a tuberculin from a reliable source, and have confined ourselves almost entirely to their products. The cases are necessarily but few in number, and it would be impossible for us to make absolute statements as to the efficacy of this specific treatment. That we have been impressed by the results in certain cases in which the disease before had seemed to remain practically unchanged is perfectly true, for some of the patients have been discharged after a treatment of several months without cough or sputa, and have continued at last accounts to do well in their homes, this having been accomplished after a period of discouragement with the ordinary sanatorium methods. Our experience has led us to test the treatment carefully still further without fear of possible injury. Thus far, barring an occasional rise of temperature after a somewhat larger dose than usual, no lasting ill effects have been noticed. In one case only have we discontinued the treatment because of the apparently unfavorable effect upon the patient. Whether this is to be the method of the future, time and the study of many cases alone can tell. At present our position is that of one who is impressed if not absolutely convinced of its efficacy. We still believe that in the majority of cases the fresh air treatment is the chief factor in restoring people to health.

Two cases which were treated with tuberculin and afterwards were discharged as "arrested" are hereby appended as reported by Dr. Griffin in a paper read by him in 1906.[1]

CASE 243.—"Admitted first, April 20, 1903. There were well marked signs all over the left side of the chest and at the top of the right. The sputa contained many tubercle bacilli. With ordinary sanatorium treatment the cough and expectoration ceased and the weight increased 42 lbs. She was discharged at the end of eight months. June 11, 1904, she was

[1] "Tuberculin in Treatment of Pulmonary Tuberculosis." *Boston Medical and Surgical Journal*, vol. civ., No. 1, p. 6-8, July 5, 1906.

re-admitted for renewed cough and expectoration. For five months the physical signs and general condition remained about the same. Bacilli could be demonstrated in the sputa at any time. Finally, since, there had been no appreciable change since entrance, Dr. Bowditch decided to try tuberculin. Twenty-seven injections were given over a period of five months ranging from ·0005 gm. to ·600 gm. In all 2·1 gm. were given. Soon after the treatment was begun the cough increased, and at this time the bacilli were more numerous in the sputum in this case than in that of any other patient in the sanatorium ; but this condition rapidly improved and for more than a month before discharge the cough and expectoration were *nil*, while the signs in the chest were likewise much improved, and I understand that she has remained in good health since, April, 1907."

Case 342.—"This patient came with a history of a cough for five months. There were well-marked signs over the upper two-thirds of the left chest, and tubercle bacilli were present in the sputum. Soon after the cough and expectoration increased and there was slight temperature in the afternoon. From this time there were numerous upsets, and after the patient had been in the sanatorium three and a-half months the signs had increased so as to be nearly all over the left side and with slight signs on the right. The voice was also husky and the larynx showed redness and swelling about the arytenoids and redness of the vocal bands. At this time treatment was begun with tuberculin. At first there was a little fever after nearly every injection. The cough increased also and there were more bacilli in the sputum. Gradually all the signs and symptoms improved until at discharge there had been no cough or expectoration for some time and the signs in the chest had cleared up to a marked degree. Treatment was continued for a period of seven and one-half months. In all there were 58 injections, the last one being

·580 gm. By a recent report (January, 1907), the cough and expectoration had not returned and the patient was feeling well."

In giving these results we feel that we have been conservative in our claims, many cases having been put aside as non-tuberculous or only as suspected cases in which further ymptoms did not develop when under close observation. We have, moreover, not placed in the list of arrested cases certain ones who were discharged only as "much improved," and have since apparently ceased to have abnormal symptoms under favourable conditions. Neither have we touched upon the fact that many patients who have been discharged as "improved," merely have returned to their homes well enough to be able to resume home duties while keeping up the treatment of which they have learned by experience to know the value, at the same time acting as missionaries in the communities in which they live.

When one looks back not more than twenty years, and remembers the hopelessness we felt in our endeavours to check the disease by ordinary methods, surely we can say that we were justified in our hopes that much more could be done than was formerly thought possible in the treatment of consumption. Unfortunately the extraordinary and oftentimes ill-judged enthusiasm which has spread of late years so rapidly through the medical profession and the laity, has had a slight reaction recently, simply because too much was claimed by the over-zealous in many cases. Those who have been more cautious in making claims have viewed this extravagance with regret, knowing that it would bring harm to the cause for which they were working. I believe that we are now entering a healthier phase of the question, however, and that while we know that we have not yet found the panacea for the cure of consumption, we can at least claim that a great step forward has been made, with still greater hope for the future.

Too much cannot be said of the educational effect of these institutions, which not only help the individuals afflicted but teach others how to resist disease and to keep well. If nothing more than this were accomplished it would be of infinite service to future generations and well worth the time and money expended. The more recent movements for home treatment through dispensaries or otherwise, the establishment of hospitals for the hopelessly ill, have all their important place, and mark still another important step towards controlling the ravages of this dreadful disease.

In conclusion it may be well for me to express my opinion as to the relative value of the so-called "home," and "climatic" treatment. Briefly stated, it is this: We know now that an immense deal of good has been and still can be accomplished by the methods which are being adopted more and more near the homes of patients suffering from tuberculosis. It has been satisfactorily proved that much more has been done in these ways than was thought possible fifteen years or even a decade ago. I cannot sympathise, however, with what I feel to be the extreme views of some observers, who, because of the success of these less radical measures in a large number of cases, maintain the opinion that there is not the slightest use in ever sending a phthisical patient away from home to a distant climate. Such an opinion is inconsistent with my own experience in certain cases which I have seen improve by such a change after a discouraging attempt to improve near home.

The relapse of certain patients, moreover, upon a return to these regions after a successful sojourn elsewhere is another proof to me of the incorrectness of view of those who argue against the necessity of radical change in any case. When we all know from experience the tonic effect upon ourselves, even when in health, of a change to a mountainous region or to a different ocean climate, how can we deny the possibility of an equally beneficial effect upon a tuberculous patient, a change which may be a marked factor in his improvement and his power to resist the disease ?

That certain cases, however, do better in their home climate than elsewhere is also to be noted. In advocating the wisdom of a radical change for some patients, it would seem almost unnecessary to add that I refer only to those who can adopt such measures with comparative ease when pecuniary considerations need not be weighed, and when the attitude of mind is favourable. That I strongly deprecate the not infrequent instances of urging patients with far-advanced disease to leave their homes in search of health, it would also seem to be unnecessary to state. To judge of these conditions and make the final decision in each case is the crucial test of the skill of the physician in charge.

[NOTE.—For discussion of this and subsequent papers see pp. 194—199.]

# IMPORTANCE OF SUPERVISION OF PATIENTS AFTER LEAVING SANATORIA APPARENTLY CURED OF TUBERCULOSIS.

BY FREDERICK I. KNIGHT, M.D.
BOSTON.

THE proper and satisfactory control of tuberculosis in the future will involve a continued knowledge on the part of some authority not only of the individuals infected, but of their families and all surroundings.

In my opinion this duty should be assigned not to local boards of health, who would not have the time to devote to it, and sometimes not the interest to do the work thoroughly, but to special local boards, who should gain the desired results with as little publicity as possible. These local boards should be composed of persons really interested in the subject, who should work cautiously and be sufficiently discreet not to create a panic in the local neighbourhoods.

One of the functions of such a board should be to supervise the patients, returning home from treatment at sanatoria or elsewhere, apparently cured.

The better class of patients will usually consult their physicians after leaving the cure, and arrange some hygienic mode of life for the immediate future; but the poorer class are sent out with some good general advice as to outdoor life, employment, &c., but with no idea how to obtain them. It is this class that need to be received at once and guided. In the first place it should be made sure that they do not go back to an infected house or shop, nor, if it can be avoided, to any unhygienic conditions. This, of course, will include not only the conditions of the home and shop, but also the character and hours of their occupation. Another very important point to be attended to is that they should have proper food, and without guidance and sometimes help, they may fail to obtain this.

Patients with arrested disease often have a little morning cough and tubercle bacilli in the sputum. These should be warned to maintain the same care with this which they have learned in the sanatorium, both on account of the danger to others, and also to themselves from reinfection.

Though they may be free from cough and expectoration and have no physical signs in the lungs, they may have tuberculous lymph glands, bronchial or elsewhere, which on the occurence of acute affection, or as soon as the vitality of the system is depressed, will reinfect the lungs.

One of the most promising ways of helping to maintain the health of those restored at sanatoria is by the establishment of labour or farm colonies, where gardening, farming, raising of chickens, keeping of bees, cultivation of flowers, &c., can be carried on, with gradually increasing hours and severity of work, under medical supervision. This can be done at some of the sanatoria where they have land enough, or at special farms devoted to the purpose, like convalescent homes. In fact, many patients could and would be better for doing some work of this kind during a part, or in some cases all, of their time at the sanatoria, provided there are grounds enough to set up such *régime* at the institution.

Woodcock,[1] of Leeds, dwells on the injury to patients from idleness, and gives an account of his investigation of the possibilities of labour colonies. He reports that at Kelling,

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[1] Congrès International de la Tuberculose, 1905.

in Norfolk, at Dr. Fanning's Sanatorium, which is practically a farm, all patients work; even those unable to leave the shelters carve wood and make mats, and their work is sold. Seven hours is the maximum for work, and three the average. The colony does a large business in eggs and poultry, and the carpenter is kept busy all day making egg boxes. At Kelling they have an "after care" committee, which concerns itself with getting suitable situations for discharged patients. Dr. Fanning spoke enthusiastically of his results. He considers that patients who work five hours a day bring in a profit to the institution of 4s. per week. He had been very successful in obtaining employment for his patients, and sends a circular to employers offering to take back at once any patients who relapse whilst in employment. He is not against suitable indoor work. Dr. Fanning believes that idleness is the worse curse to the consumptives.

Boucard, of Cannes, at the same Congress, insisted that a part of the millions appropriated for the erection of sanatoria be used in establishing farm colonies, and that while, as Dr. Panwitz says, nine-tenths of the patients refuse to do the ordinary chores about a sanatorium, they would be glad to learn the care of bees, raising poultry, &c., which would give them suitable occupation when they leave the institution.

[NOTE.—For the discussion of this and subsequent papers see pp. 194—199.]

# THE SLEEPING CANOPY.

## Designed to Afford Tent Advantages Indoors, with Brief Remarks on the Need of such Means of Ventilation.

By CHARLES DENISON, M.D.

DENVER, COLORADO.

The prominence now given to the outdoor treatment of tuberculosis, and the great need of reform in the ventilation of our houses, fundamental, I believe, to the success of the present tuberculosis crusade, are reasons sufficient for my presenting this kind of paper to the American Climatological Association.

The object of this experimenting with bed canopies has been to devise a substitute for the sleeping tent which can be easily and cheaply made, by the invalid himself if need be, and which will furnish practically out-door sleeping, yet in a warmed house or bed room.

The invalid may thus, tentatively, experiment with more and more air; the window may be partly or wholly opened. The sleeper when he arises in the morning, or, if he has to get up at night, comes from his tent into a warm room. If economy in room space is a desideratum, the canopy, when not in use, can be pulled up by its frame to overlay the casing of the window and there remain until it is again needed. If the bright sunshine in the morning needs to be shut out, so as to prevent waking the sleeper, or greater privacy from the neighbours is desired; or if the invalid wants to have the great advantage of sun baths, with or without oil rubbings, at suitable times during the day, a dark window shade may be provided to unroll from near the window sill and to stop at any height desired, as in most physicians' offices. The canopy curtains can be made large and long enough to encircle the

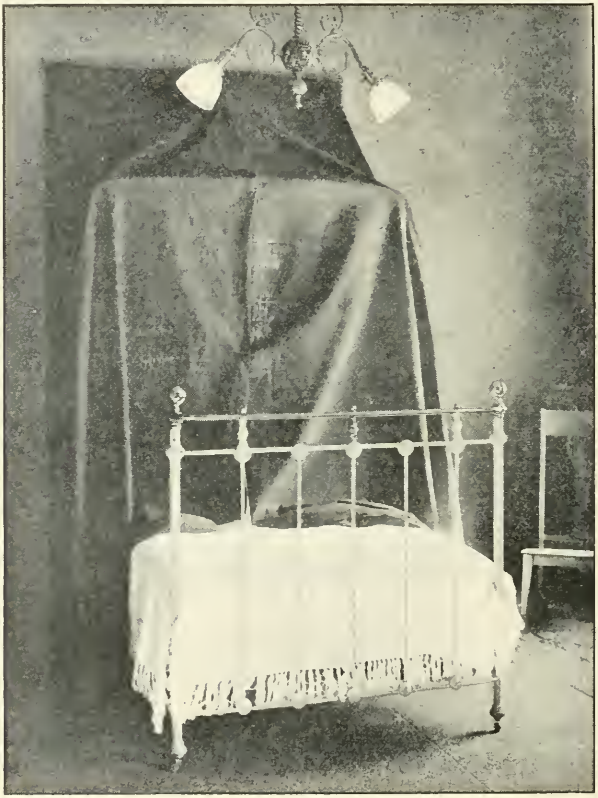


FIG. 1.—THE SLEEPING CANOPY.
Curtains closed in over head of bed, same as when in use at night.

exposed sides of the bed, reaching to the floor, and in front be buttoned or be fastened to each other with hooks and eyes or safety pins; also, they can be tucked under the mattress, so as to shut out all violent draughts or winds.

The curtains are tacked to the outer rim of the inside window casing under and close to which the bed is moved either parallel to the window sill, or *head on*, as shown in the

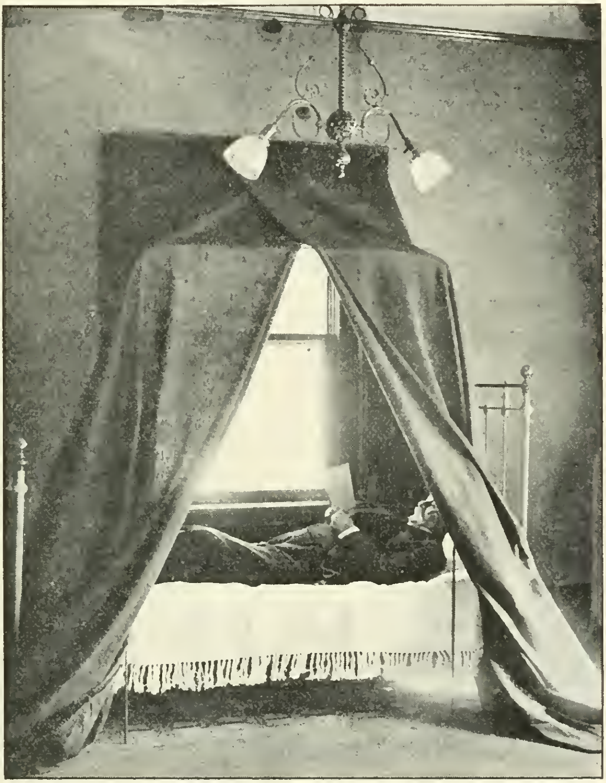


FIG. 2.—THE SLEEPING CANOPY.

Curtains draped over iron wire frame extending out past the side of the bed, which is made up lengthwise under the window. At night, curtains are tucked under ends of mattress and fastened together in front, enclosing occupant free from draughts.

accompanying pictures. These illustrations show here how easily the arrangement can be made to fit a 4-foot wide window frame, and reach over and enclose an ordinary single brass bedstead 41 or 42 inches wide. For double beds or wider windows its dimensions will require but little changing. Such an ordinary window, say 3 feet wide, when only half closed,

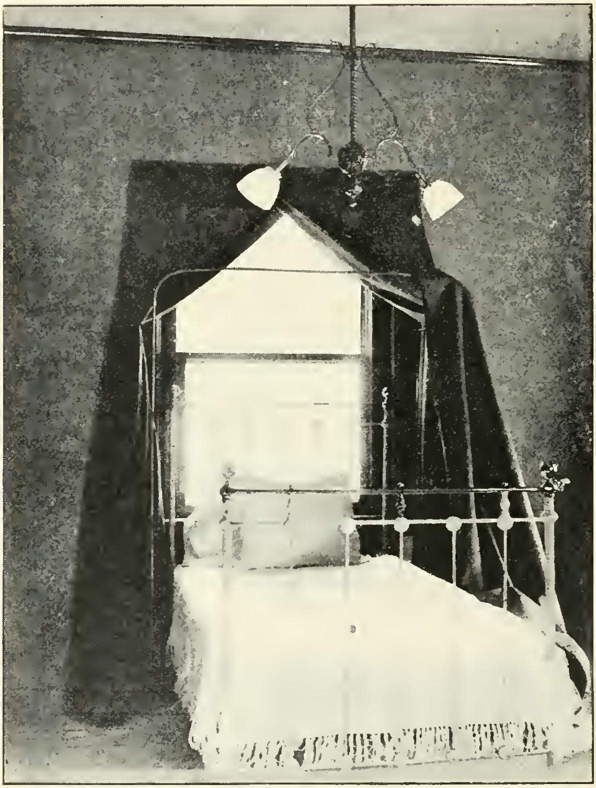


FIG. 3.—THE SLEEPING CANOPY.

Curtains thrown back from over head of the bed to show iron frame in position and top sash of window down beyond.

with the sleeper so near the opening, will give as much as, or more ventilation than a tent with one-half the front fly thrown back, and if a storm or wind comes up, the ventilation, if excessive, can be regulated to suit. It may thus serve as an educator or coaxer to induce invalids to appreciate and like out-door sleeping.

The freshness of the out-door air is almost as apparent as when sleeping on an open porch, so near to the occupant's

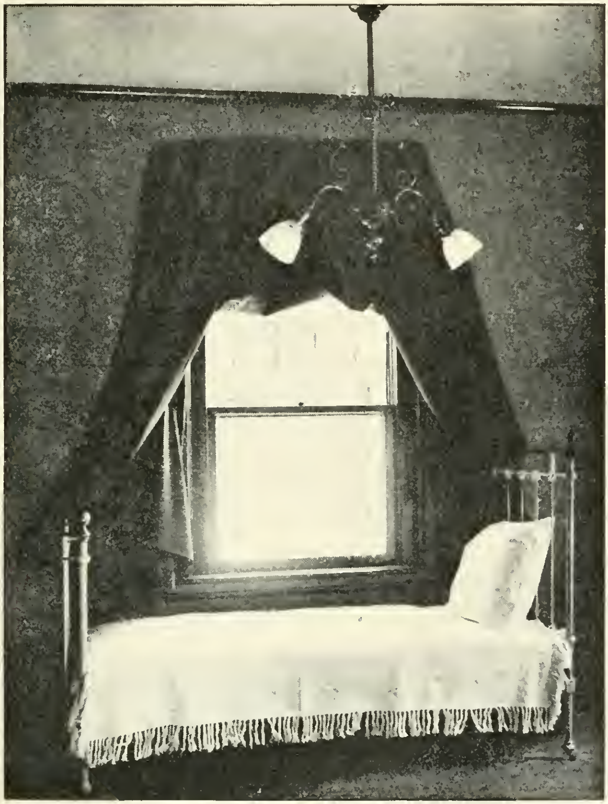


FIG. 4.—THE SLEEPING CANOPY.

Curtains over iron wire frame drawn up against the wall by strong cord extending through ring or pulley fastened to picture railing.

face is the ever changing atmosphere. The same exhilaration is felt on awakening in the morning, as when arising from a cot in an open tent.

Why is not out-door sleeping more popular?

Why should not a delicate person, an invalid, or convalescent, take kindly to and adopt such a provision for his or her sleeping hours? Two reasons suggest themselves :—

(1) Because of the unreasonable or exaggerated fear of a draught.

(2) Ignorance of its suitableness for his special needs.

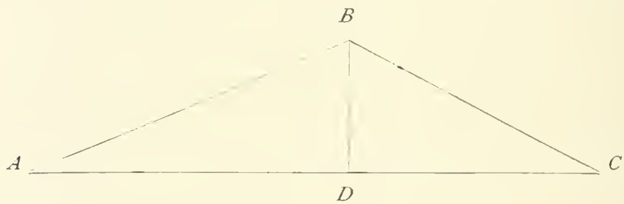
First, as to this draught question. It is not the *draught* element, the same as I think it is not the germ caused in tuberculosis, we ought to think about, as much as it is the *susceptibility* of the individual. A camper in the Rocky Mountains can get so inured to the draughty air, that he can sleep on the ground with the wind blowing twenty to forty miles an hour, and not think of "catching cold." The habit of exposure at night in a room with the windows all open, has many times stopped night sweats which drug remedies alone had not been able to control. So, here a sleeper, by having warm enough coverings on the bed and a thick woollen hood on the head in winter, or a light, soft night cap in mild weather, can so temper the air movement (for one will, of course, feel it coming down on his face) that no danger of "catching cold" will result.

As to the second reason, lack of appreciation or ignorance, we ought to have a rule of *space per capita* for sleeping purposes that would be so advocated and enforced (by legal enactment if necessary) that no one could plead ignorance, or be charged with it, as an excuse for unappreciation of the relation of *air space to health.* This rule should, of course, carry with it the condition of renewal per hour, as a compensation or compromise for lessened space. For instance, if Parke's conclusions ("Practical Hygiene") in favour of "3,000 cubic feet space per person, renewal once per hour" be taken as the rule, then a sleeping room with one-tenth that space should be renewed ten times as often. Our sleeping canopy with one-thirtieth that space, namely about 100 cubic feet, roughly estimated, should have a renewal capacity thirty times as often, or once in two minutes. It probably exceeds twenty times this, or once in five seconds, and is surely on the safe side of the strictest rule for health that any one, even the most exacting, would suggest.

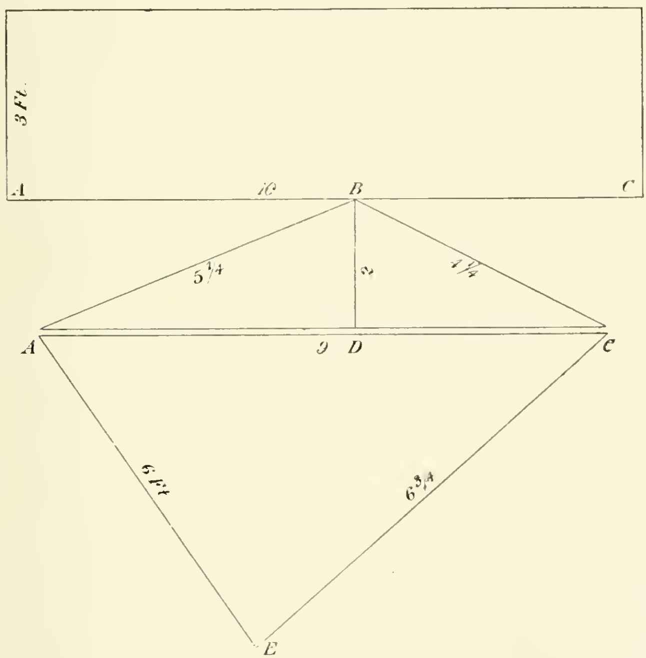
This question of the necessity of sufficient air space, especially during the probably more susceptible sleeping hours, is, in my judgment, the most vital one to consider in connection with the present tuberculosis crusade, not second in preventative importance to the quality of air in that space, nor to the infective germ of tuberculosis. I believe it is a mistake to hold (as was done in a recent discussion of the question) that tuberculosis is a "house disease" because of the concentration (*i.e.*, the increased opportunity for infection) of germs therein, rather than because of the cramped and limited air supply. If this germ explanation is to prevail, there will be small hope of eliminating tuberculosis with all the restricted measures you can muster. There is a natural, perhaps I ought to say, yet undiscovered law of ventilation, which will then continue to be broken. There is the limitation to lessened air space in sleeping and living rooms, beyond which unhealthfulness commences, and this will remain unchanged. There is a point of departure in environment where susceptibility and predisposition to this disease find their conception and birth. Tuberculosis is the outgrowth of this faulty environment, and on this *post hoc* microbic explanation of its house relation the disease will continue to thrive. We might as well try to eradicate the mould and moss from a Louisiana swamp jungle, without letting the sunlight and plenty of dry air in there, as to try to prevent tuberculosis, without changing the environment of its origination. I am, therefore, opposed to this germ explanation, this prevailing disinfectant idea, as the sole battle cry against tuberculosis, because it is wrong. It is misleading, luring us away from knowing the value of perfect ventilation.

I will try to describe this canopy, so that anyone, by following these directions, can make it to suit his own individual conditions.

*First.*—As to material. Yard wide "Denim," because it is closely enough woven to stop the wind, resembling tent cloth or duck in this respect, and because it comes in various colours and designs, has seemed to me the preferable material. Besides, it is less expensive than good duck cloth. In determining the amount of cloth needed, from 1 to 2 ft. (according to the width of the bed and the height of the top of the window frame) should be added to the distance from the top of the window casing down to the floor, and let this sum be the length of the front facing of each curtain. Supposing the height of the window casing from the floor is $8\frac{1}{2}$ ft., and



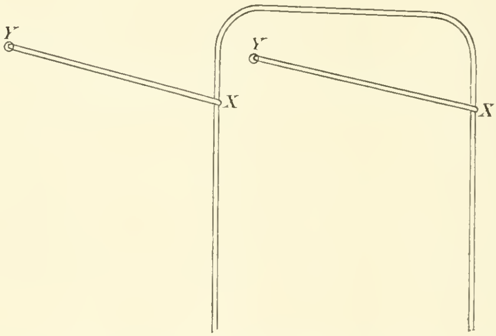
the width of the window casing 4 ft., then the height of wire frame is $5\frac{1}{2}$ ft., and width 4 ft., the two front pieces of the curtains being 10 ft. long and 3 ft. wide. Cut out two strips as follows, and A B C = 10 ft., A D C being a straight edge, and B D being 3 or 4 ins. more than one-half the distance of the wire frame from the wall. This makes B D., say, 2 ft., and A C 9 ft., A B, representing the height of the frame from the floor C, will come to the top of the canopy. Sew A B C to outer edge of each front 10 foot strip, and to A D C sew a triangular strip A C E made of half a rectangle, the hypotenuse of a triangular half of which is equal in length to A D C and the ends of which rectangle are $2\frac{1}{2}$ ft. more than the width of the bed. This enables the curtain to reach around the mattress and lap over the opposite curtain in front. This will make the square mentioned 6 by $6\frac{3}{4}$ ft., which is to be cut through diagonally from corner to corner the long way. Then we have the following three pieces of which to make each curtain. About where needed in this curtain, there will be a bulge or pocket for the corner of the supporting frame.




Allowances can be made for seams and hems, as well as for wider, narrower, or taller window casings, as well as for a double bed.

(*Note.*—If one doesn't mind about the curtains not fitting the frame exactly, the making of the sides (after the front lengths are cut off) can be very easily done by next making a square, the hypotenuse of a triangular half of which equals the length of a front piece. Sew the long sides of these two halves to the sides of the front lengths to make the two curtains).

As a cheap substitute for the wire supporting frame used in these illustrations, a frame can be made of inch square pine slats, say, $5\frac{1}{2}$ ft. tall, and separated about 4 ft. by a cross slat at the top, and this frame held out parallel to the window by two thin slats loosely screwed at their ends to the sides of the window casing. A better plan, however, is to have a blacksmith or a wire screen company make a frame like that shown in these illustrations, namely, of $\frac{5}{16}$ in. iron rods, taking about 15 ft. for a 4 foot wide window frame. The side arms,




Wire frame, hinged at *X X*, and perforated for screws at *Y Y*.

of same sized wire, to be, say, 2 in. longer than the bed is wide. These are hinged on the uprights near their curved tops and flattened for the reception of a screw when fastened to the outside jamb of the window casing.

This form of awning is not expensive. It can be made for from six to twelve dollars, according to the size and the material used. It is recommended because of its simplicity and its adjustability to the varying house and weather conditions which obtain in every invalid's home. It may find a place among the many other substitutes proposed for outdoor sleeping tents, and especially the "window tent" of Dr. S. A.

Knopf, described with others in his excellent paper read before the National Association for the "Study and Prevention of Tuberculosis," at Washington, in May, 1905.

In closing, I wish to suggest what appears to me an ideal arrangement for such a sleeping canopy as this; the same to be incorporated into the building plan of a house. The plan is suggested with the belief that something of the kind ought to be quite generally used in hospitals, dormitories, tenements and homes, since this principle of spending all the sleeping hours practically in the open air, probably affords the best adaptable means of preventing, not to say the cure of, tuberculosis. The architect's plan should either represent his own intelligent forethought, or the owner's demand for adequate ventilating possibilities; then such complete ventilation as is here sought, can always be easily and cheaply provided. It will not be very much more expensive to substitute this possible wide open window method, shown in the bird's eye view diagram, for the ordinary sash plan everywhere in vogue.

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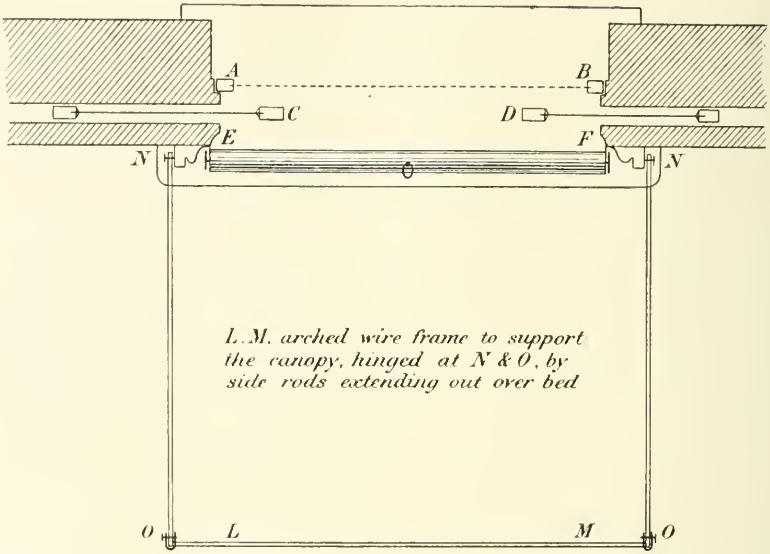
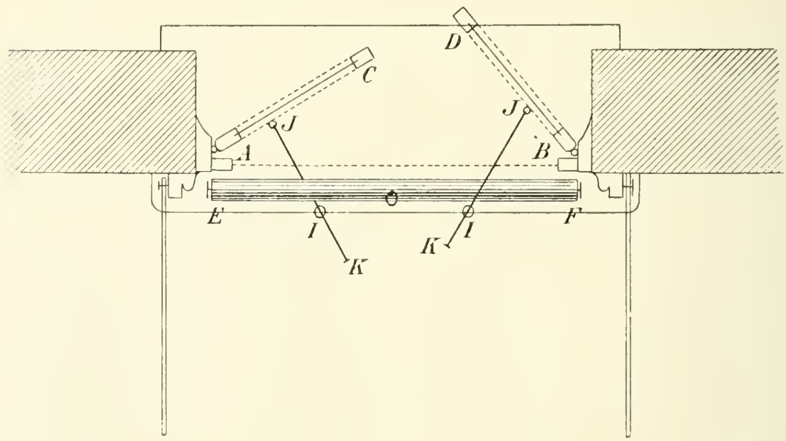
## DISCUSSION OF THE PAPERS OF DR. BARLOW, DR. OTIS, AND DR. KNIGHT.

Dr. ROLAND G. CURTIN: I am glad to hear that Dr. Bowditch still has faith in the climate treatment of tuberculosis, for we have just passed through a period when this treatment has been very much vilified by those who are interested in the "home treatment." Although tuberculosis has been said to be most common in overcrowded localities, yet it is known that even in the most healthful localities tuberculosis occasionally occurs. Owing to conditions present, "home treatment" is the only way we can treat some cases. About twenty years ago, in a paper read before this Society upon the climatic treatment of tuberculosis, I said that homesickness would nullify the best climate in the world, and I still adhere to that belief. This great crusade in favour of home treatment seems to me, however, to be at times a disadvantage, since many cases are now told they can get well at home as well as away, and remain at home too long, and getting worse, they go away for a change of climate too late, without any prospect of cure. There is such a thing as keeping a person at home too long, and sometimes it seems almost as if they were kept at home for mercenary purposes. The profession should, I think, be careful not to go to extremes in regard to the home treatment of tuberculosis.




SUGGESTED CROSS-SECTION PLANS (looking down on window-sill) of improvements in window openings built with this method of ventilation in view. *A B*, screen outside of window (as above), inside (see below); *C D*, window sash sliding on rollers into wall, in lower cut hinged to open outward; *E F*, window shade unrolling from below; *J K*, sliding rods through pivoted stops *I I* to hold windows in place.



CHARLES L. MINOR: I was deeply interested in Dr. Knight's remarks. Patients in clerical positions with moderate salaries present great difficulty in the question of their care after returning from sanatoriums. They are unable to stay as long as the more well-to-do patients, and we therefore have to send them home before they have reached that condition of arrest which will enable them to resume their work safely. The question of changing their work is an extremely difficult one for them. I have now a case in mind of a young fellow with an insurance company in New York. He is in a well-ventilated office, but the hours are long, and, as in almost all these cases, it is difficult for the patients to get proper nourishment in between times, and they go for long periods on practically empty stomachs. They breakfast at seven and come to the office, and work all day long with only a snack of some kind for lunch. Thus their nourishment suffers, their vitality fails, and relapses occur. Such conditions form one of the greatest causes of relapse in this class of patients after their return home. We should therefore take every care to see that such patients carry with them or get proper nourishment, and do not go for long periods on empty stomachs. With the correction of the conditions relapse will be much less frequent. I tell all such cases that their going home to take up the same business is something in the nature of an experiment, and that they may have to take a new occupation; that if they can live in the suburbs, having an open-air life and get proper nourishment while at their work, a large number will do very well. If, on the contrary, they return to their usual work, with unfavourable conditions, a large number will relapse. Such patients are most in need of help, because their disability cuts down the number of workers, and puts a large number upon the charities of the city.

Dr. E. O. OTIS: With reference to Dr. Knight's paper. It seems to me that the subsequent career of sanatorium patients who are discharged with their disease "arrested" is a serious question and deserves careful consideration. With the increase of sanatoria throughout the country and the consequent increase of discharged patients the problem of what to do with them so that they may remain "cured" and be capable of remunerative work becomes insistent. The "Farm Colony" such as Dr. Knight has proposed is one solution of the problem and offers many possibilities. Such a colony might naturally become an annex to the sanatorium: and discharged patients could here become hardened and "the cure" made more permanent, so that subsequently, they could return to their occupations in the city under favourable conditions of work and living, or obtain positions in the country where they could lead an outdoor life. I am pleased to learn that such a Colony is about to be inaugurated in connection with the "Stony Wold" Sanatorium under the supervision of its founder, Mrs. James E. Newcomb, the first one of the kind, so far as I am aware, in this country.

Dr. J. M. ANDERS: I was glad to hear Dr. Barlow speak in favour of the treatment of advanced cases of pulmonary tuberculosis. I think there is too much inclination to abandon active measures in this class of cases whilst, as a matter of fact, they are occasionally saveable. In 1900, I read a paper before this Association in which I took the position that the tuberculin test was absolutely reliable as a diagnostic measure. I am not surprised to hear Dr. Bowditch say that finding the tubercle bacillus is, perhaps, after all the only reliable diagnostic test. In 1900 the consensus of opinion seemed to be in favour of the opinion before mentioned. Since that time, however, I have had occasion to change my mind a bit in regard to this question because I find that while we get typical and unmistakeable reactions as a rule in rare cases we cannot eliminate intervening conditions, and their subsequent course of two of my cases proved them to be something else than tuberculosis. The tuberculin test, however, is an almost absolute sign of the existence of tuberculosis. The question of a close observation of cases after returning home from sanatoria, is one of the greatest practical importance, especially to the general practitioner. I fear that the latter is too much inclined to either discharge these patients when they return from sanatoria apparently cured or allow them to use their own judgment as to whether they need further treatment or not. No fact is better established, and this was brought forward in the papers read here this morning, than that temporary arrest and even apparent cure is often followed by fresh exacerbations without obviously existing cause. It seems to be a part of the natural history or course of the disease. We fail in our plain duty when we fail to keep in touch with these patients after their return from sanatoria. In all cases in which I have been able to keep them under supervision, the necessity for such a course soon became apparent. As stated by Dr. Knight when they return to their home environment resistance becomes lowered and they are especially susceptible to intercurrent attacks of bronchitis and influenza, and more than this, if the latter is not properly handled, it will lead to a relapse of the original disease. The same fact is recognised with reference to case of pleuro-effusion that are apparently cured ; they often merge into pulmonary tuberculosis, subsequently. These convalescents also require close supervision being for the most part tuberculous subjects, and I think it is a reproach to the medical profession that so many cases of apparently healed pleuro-effusion are allowed to develop into pulmonary tuberculosis. If there were maintained in a state of high physical health and efficiency, this sequel would be, to a large extent prevented.

Dr. De Lancey Rochester : I desire to enter my protest against the position of Dr. Bowditch and Dr. Anders that the tubercle bacilli are absolutely necessary for the diagnosis of tuberculosis or that the presence of the bacilli is the only ultimate test of the presence of tuberculosis. I feel that we can diagnose tuberculosis of the lungs and be sure of it without the presence of the bacilli and without the tuberculin test. It is not necessary to go into details as to methods, but I am perfectly sure, however, that we can make an absolutely sure diagnosis without this method. With reference to Dr. Stone's statement that their patients were supplied with cloth bags in which were rubber bags supplied with paper napkins, and that the bag could be disinfected after the napkins were destroyed, some one has suggested that the bags be of paper. They could be bought for a few cents and could be destroyed every day. I think in the matter of nourishment between meals Dr. Minor's point is very well taken. I instruct my patients in business to have milk delivered to them at the the office, or to take it from home with two or three eggs mixed with it before leaving home.

Dr. THOMAS W. HARVEY: I think that the literature which we have been receiving on tuberculosis, while it allows of the influence of the bacillus as a cause, gives much evidence of the prevalence in the minds of many medical men that the principal reason for the continuance of the disease is the presence of the general practitioner. He does not recognise the disease early enough, wants to keep it under his care, or sends it to the wrong place or sends it at the wrong time. The problem of the advice to be given concerning the immediate treatment of early cases of tuberculosis is almost as important as the question of their care after treatment in sanatoria. There are several elements in this question which I have seldom seen discussed. First, in choosing between treatment away from home and treatment at home, the question of sex is most important. Of the tuberculous patients whom I have had to advise in the early course of the disease, I have found that the women can be taken care of very often at home, but I have yet to see the man whom I have been able to take care of at home. That is due particularly, I think, to the fact that he is the money earner. Even among the well-to-do the women can be taken care of better at home than can the men in a percentage of ten to one. Second, the question of temperament. There are some men who will not submit to the discipline of sanatoria, and have gone off by themselves and succeeded better. While the discipline received at sanatoria is most valuable to themselves, to their families and to the community, there are individuals upon whom it seems to have an antagonistic effect.

Dr. LEONARD WEBER: I believe if there is any disease common to man the development of which depends on social conditions, it is tuberculosis, particularly tuberculosis of the lungs. It is true that by sanatorium treatment, public and private, by home treatment and by hygienic measures, much has been accomplished, but few cases of permanent cure of pulmonary tuberculosis occur, and we shall stay far from curing until we find a specific remedy. We are accustomed to look at the tuberculosis man only, tell him what he should and should not do, and to the working man how to live in order not to get tuberculosis; but I think this society must also look at the other man who is responsible to a very large extent. I mean by that, those men who run factories over time, who employ child labour, organise and run sweat shops; who build miserable tenement houses, get high rents and give little air and sunshine for it, together with all the other unhealthful conditions which lay the foundation for tubercular disease, not only in the feeble but in the rugged. The employer of labour, the builder of tenements, and the owner of houses in unsanitary conditions ought to be looked after. They often need admonition and instruction and restraint, in order to prevent infection and spread of tubercular disease.

Dr. POTTENGER: I am very glad to hear the plea made for the advanced tuberculosis patients. The talk about the early patients is usually found to be by the Eastern men. The talk concerning the advanced cases is usually found to be by the man in health resorts. We do not see early tuberculosis. Over 70 per cent. of those I handle are in the third stage. Out of sixty-six cases I reported a year ago thirty-five run temperatures above 101° during their stay in the sanatorium. Over twenty-five had temperatures over 101° when they came in. The advanced cases are not all hopeless. We cannot cure a large percentage, but we can give them a chance for life. We can increase their number of years, and many will live useful lives for a great number of years. Dr. Barlow's report differs from those of sanatoria in the east, in that nearly all his cases were advanced. He is doing good work. We are doing good work in the treatment of advanced cases, in taking away sources of infection and in educating the people, who will return to their homes and impart this knowledge. A short time ago I was told by a nurse at Los Angeles of a patient in Dr. Barlow's sanatorium who could not be cured, but who went back home and did so much in the education of the persons round about, that the improvement in that section was marked.

When a person comes to the dispensary, the first thing I do is to tell him what kind of food to eat and instruct him to buy eggs and milk rather than to go to the restaurants. They can secure more nourishment for the money than in any other way. In this way I can save them money and secure better results. It is important to tell these patients that if they do not get well right away that their case is not hopeless; or, that if they break down they are not hopeless. Many such could return to sanatoria and have a new course of treatment and be cured. I believe that men dealing with tuberculosis extensively should be able to say that the diagnosis can be made without the bacillus, and to a moral certainty satisfy themselves in a large majority of cases even without the tuberculin test. Our ears ought to be sufficiently acute to recognise tuberculin without these other measures. I believe that the great majority of cases can be recognised in that way. To wait for the bacilli is the greatest mistake we make in the diagnosis of tuberculosis. Regarding the tuberculin test, those of us who have used tuberculin for many years rely not so much on fever reaction as upon local reaction, for if the local reaction is obtained there is as much certainty as in the fever reaction. It is not necessary to have rise in temperature. There are other phenomena that go with the tuberculin test that one learns to recognise if he has given a great deal of tuberculin. Reaction shows in the pulse.

Dr. BOWDITCH: I am very glad that Dr. Rochester has brought up the question of diagnosis without the presence of tubercle bacilli in the sputum. It only shows that when one has a distinct impression in his own mind he often fails to impart it to others. I have been criticised (very courteously) in the publication of my last paper upon the same subject, because some of the cases failed to show bacilli in their sputa, and yet were classed as tubercular. Now, in those very cases, I would have been willing to stake whatever reputation I may have had upon the truth of my diagnosis, simply from the history and the physical signs alone.

What I intended to say in my paper was that the tuberculin test had been given in certain cases in which bacilli were not found, simply as an additional proof of a previous diagnosis, in order to convince the "doubting Thomases" that tubercular disease was present. At the same time, I meant to state that the final convincing proof of the presence of tuberculosis is shown in the appearance of bacilli in the sputa.

Dr. DENISON closes: Dr. Pottenger has voiced my feeling in regard to the question of diagnosis. It has been my custom, when by physical signs I could not come to a definite conclusion, to find the tuberculin test entirely satisfactory in my hands. I have kept a record of those cases in which I trusted to this test, and in fifty-four cases in which no bacilli were found, mostly because there was no expectoration to examine, there were forty-seven in which the test proved positive as afterward shown by the course of the disease. The sociological aspect of tuberculosis has been brought out prominently, but the question of over-crowding has not been especially enough emphasised. I have here the statistics of an investigation by Dr. Chalmers of Glasgow, which seems to me to be very important upon this point. He made some investigations showing in the city of Glasgow the relation of tuberculosis to poverty, giving the statistics of tubercular mortality represented in the families of school children living in houses containing from one to three persons to the room. Where there was one person to the room the mortality was 3·4 per cent.; two persons to the room 5·9 per cent.; three persons to the room, 8·3 per cent.; showing a tuberculosis mortality of more than twice as much where there were three persons to the room as where there was only one. These statistics were used to show the relation of poverty to tuberculosis, but to my mind it shows, as claimed in my paper, the importance of a needed rule for so much space per capita, especially in sleeping rooms. That the air space was deficient in those places of habitation seems to be quite apparent; and that that deficiency had more to do with the increased tuberculosis mortality than did poverty otherwise considered, I do not think can be successfully questioned.

# PERSONAL HYGIENE IN THE PROPHYLAXIS AND TREATMENT OF CONSUMPTION.

BY RICHARD COLE NEWTON, M.D.

MONTCLAIR, N.J.

"Without hygiene climate is sounding brass and a tinkling cymbal."—*Solly.*

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We have been familiar with the spread of tuberculosis among the coloured people in this country, and realise that it seems at present to be settling the negro question for all time. In the same way certain tribes of the North American Indians will, unless the ravages of tuberculosis be arrested, be in a few score years as nearly extinct as the buffalo. It is seldom that anything more graphic has appeared in health literature than an account of the spread of consumption amongst the Sioux Indians, by Dr. Robinson, Superintendent and ex-officio Secretary of the South Dakota State Board of Health. He says in part, "In the old wild life, the Sioux were a healthful people. They were probably not wholly free from tuberculosis in some form; if however, the infection was present, it was not general. In 1863 began the reservation system among the Sioux of the Missouri. There are about 25,000 of them making fine progress in civilisation, living in houses, wearing citizen's clothing, the children being educated, the families generally professing christianity, the able-bodied engaged in some form of manual labour, by which they earn the means of subsistence."

For fifteen years subsequent to 1863, during which time the wild buffalo had been destroyed, and all of the Western

Sioux had been brought under agency influences, the annual reports of the several agents were optimistic in relation to the health of their people, reiterating the statement that the Indians were now living under more healthful conditions, coming under civilising influences, dwelling in better houses and accepting the attendance of the agency physicians. The first mention of consumption in these reports was in 1878. In 1880 one agency reports that 5·26 per cent. of the deaths resulted from tubercular troubles. In 1881, consumption is generally mentioned in the reports, and in 1884, it was said, "Consumption has a firm hold upon them."

Yearly, since 1886, the agents' reports have more and more teemed with fearsome tales of the ravages of the scourge. In 1880 there were in four of the leading bands 293 births and 208 deaths. Last year in the same bands the deaths equalled the births. A noticeable feature of the present condition of these unfortunates is the increasing percentage of tubercular affections amongst the children. Dr. Robinson says, fully 60 per cent. of the younger generation have some form of tuberculosis and that fully 50 per cent. of these over the age of puberty die of the disease.

In a paper read before the Sociological Section of the National Association for the Study and Prevention of Tuberculosis, Dr. Walker, of Pine Ridge, South Dakota, says, "there is no inherent peculiarity of the Indian which renders him more liable to infection with tuberculosis than is a white man under like circumstances." Their average strength, endurance and vitality appear to be about the same as those of the white man, and yet there is a much larger percentage of them affected with tuberculosis. Dr. Walker thinks that tuberculosis had existed among them before they came into contact with the whites, but there were relatively few cases until after they had given up their nomadic life and settled down to life in houses. They were filthy when they lived in tepees, and filthy after they became house-dwellers. It was demonstrated by statistics, that the most cleanly among them were the most healthful, but it was never shown that the filth in which they lived caused tuberculosis at any time.

In their primitive life, their principal food was flesh. In times of plenty, they would surfeit themselves on raw or poorly cooked meat ; at other times they would go hungry. They had no regular meal times. When they began to live in houses the government supplied them with an abundance of food, and in much greater variety than they had been accustomed to. They were also supplied with cooking stoves and utensils, so that their food was better cooked than when they lived in tepees.

During their savage life the clothing of these Indians was of skins fashioned in a primitive style, the same all the year round, except that in the winter they wore a robe. Their garments were never laundered or changed for reasons of cleanliness. They were often exposed to inclement weather with a scanty amount of clothing, and slept sometimes in tepees, sometimes in the open-air, with probably little covering. After they had settled down in houses, they were supplied with better clothing in sufficient quantities and with blankets and bedding. They built their houses small and low with tight dirt roof and a ground floor. They daubed every crack and crevice with mud or other material to prevent any ventilation. They imitated their pale-faced brother in their abhorrence of drafts. A heating and a cooking stove was provided for every house, and in cool weather these were both fired at once, and the Indians would crowd into these super-heated cabins and swelter there. They threw their slops about the door, as they did when living in tepees, but they did not move their cabin every few days as they had moved the tepees, so that the surroundings of the former soon became noisome with filth. They had begun the use of intoxicating liquor before they had adopted our civilisation in its entirety, so that nothing was wanting to induce the scourge and rectifier of outraged nature, tuberculosis, to settle amongst them. The lesson is but too plain, and he who runs may read it if he will.

The history above detailed is the history of our feeble attempts to civilise the Indian in many parts of the United States. Tuberculosis has been for years prevalent amongst the Indians in Western posts that have been especially salubrious for the Whites, as, for instance, Surgeons Chase and Barker, of the United States Army, reported from the Washington Territory, that of 219 cases of sickness occurring in the military post there, in the four years 1870-1874, there was only one of phthisis among the white soldiers or their families. Not a case of the disease had originated there, "but two or more cases which were imported had improved rapidly under treatment. Phthisis, however, is very prevalent and very fatal among the Indians." This report was made nearly forty years ago. The Indian was filthy, idle and intemperate then, as he is now, and those in the Washington territory had given up the war path and their nomadic life long before the Sioux began to adopt our civilisation and acquire our diseases, consequently phthisis had made its appearance among them before we hear of it among the Sioux.

A study of the conditions among the negroes in this country shows that phthisis has increased among them in nearly the same relentless ratio that it has devastated the Indian reservations. In slavery days the negro was comparatively free from tuberculosis. He was not, however, immune, as is so often stated, but suffered from the disease only slightly less than the white man. In Charleston, South Carolina, for instance, from 1841-1848 the death rates from tuberculosis of the white and coloured people were the same, 2.8 per 1,000. Since, however, civilisation, alleged political freedom and a chance for education have overtaken the sons of Ham, they have become more and more tuberculous, until in 1900 in Charleston, their mortality from this disease reached the astonishing figure of 7 per 1,000. In other parts of the South the negro mortality is not so high, and it appears never to have reached a high figure in the rural districts.

As Dr. Jones sententiously remarked, in a paper before the Tuberculosis Congress last year, "no individual or society has yet studied the case of the negro sufficiently to say whether the racial element plays any part as a cause of this disease." The influence of environment is so tremendously in favour of tuberculosis among this people that it has been practically impossible to eliminate it sufficiently to discover the racial predisposition, if any there be. "Few of us realise the great difficulties under which this race struggles. A third of the race is yet living in one-room cabins. The possible danger of such an existence is indicated by a fact which I discovered last year, in a so-called two-roomed cabin. Two-thirds of the space in one room was filled by a stove and a table; one-half of the other room was filled by a bed. In this house thirteen children had been born since the war, and twelve of the thirteen had died when they were children."

"The unusual and heroic struggle for an education under adverse conditions is often a potent cause of consumption among coloured students."

It is not only in his liability to consumption that the negro in the United States shows his non-adaptibility to his present environment. His death rate is high in almost all diseases, and his general death rate is higher than that of the whites in almost the same proportion as is his death rate in tuberculosis. During the War of the Rebellion it was observed that 10 per cent. of the negroes who were reported sick from heat stroke died, while of the whites similarly afflicted only 4 per cent. died. This is a good comparison, as far as it goes, because at the time the individual members of the two races were living under practically the same environment and because the negro is naturally less susceptible to heat stroke than the Caucassian. That the coloured man has less vitality than the white is unquestionably true, but to assert that he so frequently contracts tuberculosis by reason of an especial or racial predisposition is to beg the question.

It is impossible not to observe many analogies between the present condition of the negroes and that of the Indians. Both races have within a comparatively few years entirely altered their manner of living and have evinced conspicuous non-adaptibility to their present environment.

And so it is with the Irish race in America. I will not weary you with the figures. Suffice to say that the Irish American is almost as liable to tuberculosis as the negro, and that the Irishman born in America is twice or three times as liable to die of the disease as the Irish emigrant. "Americanisation" is said to be beating down the splendid immunity of the Jew to tuberculosis. What does it all mean? Americans themselves are gradually becoming less tubercular, while the peoples who are trying to live like them, and live with them, are becoming more so. The explanation is by no means easy. If so good an observer as Dr. Salmon confesses that the means of arresting the disease amongst cattle are not as yet understood, does it seem unreasonable that the problem of handling the disease in the greatly more complicated life of man should be so intricate?

Talcott Williams has said that every case of consumption is a confessed failure of civilization. It is no more so than is a case of drunkenness, of syphilis, or of typhoid fever. Nor is it as much so, because while we know the remedy to apply to each of the last-named conditions; for one reason or another its application seems impracticable. But in tuberculosis we do not really know the remedy or remedies. We are trying to discover them. It is idle to say that infection is the sole cause of consumption. We are all exposed, and practically all have the disease, so the pathologists tell us, and yet nine-tenths of us escape without any tangible symptoms. Why does the submerged tenth suffer?

There is no question about the predisposing effect of many occupations. There is no need to remind you that stone-cutters, knife-grinders and cigar-makers are especially liable to consumption; and that a difference at first blush so slight as changing the grinding from dry to wet adds years to the grinder's life. The latest statistics from Paris show that the upper tenements in that city have a smaller percentage of tuberculosis than the lower floors in the same buildings, although their inmates are poorer and more crowded together, the first named lodgings being more exposed to the light and air and being further from the ground. So in New York City it has been demonstrated that there is more sickness from pulmonary and bronchitic disease on the north sides of the street than on the south where the house gets more sunlight.

In Paris it has been found that fewer illegitimate children die from bronchitis and pneumonia in the first year or two of life than legitimate — the direct opposite from what we should expect. The very fact that they are less carefully tended, and presumably less luxuriously clothed and fed, seems to add distinctly to their power of resistance to pulmonary diseases. Pampered and overfed cattle, like the notorious herd of Jerseys of Queen Victoria, are especially prone to tuberculosis; pampered and overfed children are not so liable now as they were once, since the habit of battening down the windows and piling on the flannels for fear the child would take cold is not so fashionable as it used to be. Over feeding would appear to be inimical to the progress of tubercular disease under some, but not all, conditions.

The Actuarial Society of America published an elaborate report in 1903, according to which the 20,000 dollar "risks" had turned out specially badly, only living out, I believe, about half of their "expectation." Luxury, it seems, is getting in its perfect work. Heretofore, however, we have been unaccustomed to consider it a cause of tuberculosis.

An interesting fact to be learned from this report is, that the commercial traveller is an unexpectedly good "risk" compared to men of the same age in other occupations. This can only be explained on the hypothesis that travel of itself is wholesome. Man was originally a nomad, hunting about for his food like other wild animals, and as he developed further, he was a shepherd and led his flocks about. And the wandering propensity (Wanderlust) is still a part of the normal man's disposition, and like other inborn traits, should be heeded.

Change of locality is of itself beneficial to the health in many instances. Perhaps the Irish in America illustrate this, the emigrants, as has been said, showing much better life histories than their children, born in this country. No really satisfactory explanation of the great prevalence of phthisis among the Irish-Americans has been advanced. From considerable study of the problem, the writer believes that the diet of these people has not received sufficient attention. The Irish seem to be intensely carnivorous, eating largely of meat with some of the coarser vegetables, such as potatoes, turnips and cabbage, none of which affords a large percentage of energy. They do not seem to eat a due proportion of good carbo-hydrate food ; at all events, they subsist largely on baker's bread, which is about as nearly without nutriment as bread well can be.

The fine commercial instinct which pervades everything in America has led to the production of loaves of baker's bread of immense size and little weight. They are puffed out like wind bags by, it is alleged, the use of alum or some other chemical. The bread, if soaked in milk or tea, becomes as soft as pap, and can be washed down without chewing. An American mode of eating, by the way.

It states in the life of Count Rumford, that this excellent observer and truly scientific man was greatly impressed by the vigorous health of the Bavarian soldiers, who subsisted on food which they bought out of their pay of four cents a day, or less, and which consisted largely of soup with such vegetables as beans. The Government, in addition, however, supplied each man with about 2 lbs. of good rye bread. Such a menu affords almost the ideal diet.

The Count seemed to lose sight of the effect upon the nourishment of the body which will follow the consumption of good, substantial bread, requiring much mastication. He was disposed to think that in some way, water prepared in soup developed some nutritive qualities. Whether this is so or not, enough is known of dietetics to establish the fact that the consumption of good, hard, bread crusts and drinking plenty of water, either hot or cold, should be the foundation of a working-man's diet.

I firmly believe that if bread were sold by weight it would do more to arrest tuberculosis than the strict enforcement of the anti-spitting ordinances, important as I acknowledge these laws to be. I have seen young Irish-American children come home from school and proceed at once to the cupboard and abstract sweet cakes bought at the bakery and made solely to attract the eye, and I presume tickle the palate of this class of customers. After eating of these dainties, the future American citizen, with his decayed teeth, so rotten perhaps that he could not chew wholesome food ; his neck probably adorned with scrofulous nodes and his posterior nares stuffed with adenoids, would perhaps, ignoring entirely the family dinner of corned beef and cabbage and liberal potations of tea, retire to smoke the manly cigarette, spend his evenings on the street corners, or, if a little older, in the saloon, or some more questionable resort, and finally, retires to sleep in some small and ill-ventilated room with an assortment of bed-fellows, relatives and otherwise, with, however, the never failing precaution that the windows were carefully battened down. The child, or young man, would probably be muffled in woollen garments, wear heavy woollen underclothes, and perhaps sleep beneath a feather bed, if not in one. In Ireland, poverty had kept the foolish parents from any such indulgence of their offspring, but in this free country, with the greater variety of food, higher wages and more general education (*sic*), the children are too much indulged to the injury of their health and their morals.

We are told that wearing the white men's clothes is a principal cause of consumption among the Indians, and that animals and plants will sicken and die when their cutaneous respiration is interfered with. I am anxious to learn more of the truth of this alleged cause of tuberculosis amongst the savages. I can remember distinctly making a campaign during my army life with Indian scouts and some regular troops, in which the Indians coughed almost incessantly. The soldiers and officers had no colds. I was told that the Indians might have contracted theirs from taking sweat-baths, but, as they were living under the same conditions as we were, wearing soldier's clothes and eating soldier's rations, there seemed to be no reason for their greater susceptibility to colds. I was told by experienced officers that the red man is gradually becoming weaker and more prone to sickness. Personally, I am disposed to agree with Dr. Page and others who believe that much sickness, and especially consumption, may be caused by covering the body with raiment. So far as can be learned, Indians and negroes never suffered from consumption to any appreciable extent, until they began wearing our clothes. To be sure, they began at the same time to lead more idle and effeminate lives, get more bake-shop trash, baker's bread and impure milk for food, drink more whiskey, use more tobacco and herd closer together, and they began also the interminable struggle for an education ; the students being especially liable to consumption. I think that enough has been said to show that tuberculosis is a disease following maladaptation to the environment, improper habits and defiance of Nature's laws. Nothing will stop its ravages entirely except to force every man and woman to live by the physical conscience, and to devote a large share of life to preventing themselves and their neighbours from contracting the disease and from spreading it.

It took, as we have seen, fifteen years of so-called civilising influences to thoroughly infect the Sioux Indians of the Upper Missouri. Bad as those influences are, they would not have taken the same hold on people like the poor Jews of Eastern Europe, who have for generations been accustomed to foul, contracted dwellings, modern woollen clothes, overcrowding, over work and wretchedness.

The tendency to consumption is born in everyone. Flexner, and other good pathologists, tell us that at least 90 per cent. of human beings have at some time been infected. And we observe constantly that any sudden change of environment or *régime*, not by any means invariably to a lower social condition, may result in the development of this disease. Too much sexual intercourse, whether legitimate or not, an improper diet, the strain of too much study, the use of intoxicants, or inhaling smoke and dust—in short, anything that permanently weakens vitality and destroys or impairs the resistance of the body cells is an invitation to the development of consumption in man or animals. And lastly, want of proper development of the lungs, the muscles and the vital organs is an important contributary cause, too little thought of.

If dairy cattle were exercised more, and never confined in stables, so that their bodily activity would promote normal metabolism, they would, in all probability, not suffer from consumption, just as horses are practically immune and sheep and goats nearly so. So if negroes and Indians should go back to the life to which centuries of evolution had fitted them, the disease would probably disappear from among them in a generation.

They are now paying the penalty of a sudden change from what was to them a hygienic mode of life to an unhygienic one, and those of them that escape the devastation of the plague will have become comparatively immune, able to resist a higher degree of infection, and to remain free from phthsis under conditions which they can not withstand now.

The infection plays a secondary part in the production of consumption, and so does heredity; the principal cause is a man's life habits and environment. As the Imperial Board of Health of Germany has said, " It is impossible to extirpate all tubercle-bacilli ; therefore, it is indispensable to so strengthen and harden the body that the absorbed germs cannot take hold upon it."

# THE DAILY CARE OF CONSUMPTIVES AT A GENERAL HOSPITAL AS AN AID TO SOLVING LOCAL TUBERCULOSIS PROBLEMS.

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BOSTON.

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In January, 1905, Dr. Joslin and myself, in our annual report, made the following recommendation to the Board of Managers of the House of the Good Samaritan who were expecting in the near future to build a new hospital building.

"It is hoped that means will be found whereby women and children will be encouraged to come to the House of the Good Samaritan and spend the day in the open air, receiving a mid-day meal, encouragement and advice and return to their homes late in the afternoon in time to prepare the evening meal."

At this time neither Dr. Joslin or myself had any knowledge of a somewhat similar experiment being tried in the day-camps for tuberculosis in Berlin. From long experience in out-patient work at the Massachusetts General Hospital and the Boston City Hospital we had become dissatisfied with the inadequacy of such treatment as could be offered many ambulatory patients, and I had already urged upon the administration of the Massachusetts General Hospital, the development of a roof garden that should be conducted along lines similar to those outlined above. As yet the necessary funds to carry out these plans at the Massachusetts General Hospital have not been forthcoming.

May 1906, the Managers of the House of the Good Samaritan undertook the experiment suggested in the above recommendation, and appointed Dr. Cleaveland Floyd to have charge of the out-patients under the direction of the Medical Staff. It is the story of the year's work at the House of the Good Samaritan which I wish to present to you.

Before beginning upon the detail of the work I will say a word as to the hospital. The House of the Good Samaritan is an endowed institution, managed by a Board of Trustees, who are largely made up of the personal friends and relatives of the founder, Miss Anne S. Robbins, who devoted her long life to the management of the institution, living and dying within its walls. Her example and enthusiasm are shared by those who now carry on the work. The new building is the first of the group of hospitals which will eventually surround the beautiful new buildings of the Harvard Medical School. There is about an acre of land around the House of the Good Samaritan. The hospital was open to patients more than a year before the opening of the new Medical School buildings, and daily clinics were held there. The hospital has accommodations for forty-three patients. Twelve beds are devoted to children's orthopædic cases. The remainder of the beds are divided between cases of advanced phthisis and general chronic conditions. The House of the Good Samaritan is in no sense a "home" but a hospital for the treatment of chronic disorders. The members of the Medical Staff make daily visits. There is a teaching laboratory and a graduate house-officer in attendance, a Baruch hydro-therapeutic apparatus has been installed, and the solarium and balconies provide an abundance of fresh air.

The wards for the tuberculous patients and the non-tuberculous are separated from each other by single rooms, dining-rooms, bathrooms, &c., &c., so that there is no contact between the two groups. Those who are able, however, eat in the same room, but at different tables and have china of different colours. The china of the tuberculous patients is cleansed and sterilised by boiling in an entirely separate room from the general serving-room where the dishes of the non-tuberculous patients are washed.

In passing I may add that so far as is known during the forty-six years of the hospital's history but a single case of tuberculosis has been acquired by any of the hospital staff; many of the servants have been with the institution over twenty years, and a number of matrons and nurses ten to fifteen years.

The active attention to the care and treatment of advanced cases yields as great satisfaction as do the cases reported by Dr. Bonney last year. Cases are arrested and all traces of bacilli disappear; some improve so much that the State Sanitorium at Rutland is ready to receive them, and others go to pleasant country surroundings among friends. Even those who do not recover, nevertheless, amply repay the care that is bestowed on them by the way that they respond to treatment, so that their last days are days of comparative comfort.

The nurses employed in the wards are all graduate nurses. They are under the direction of the superintendent and her assistant, both graduates of the Boston City Hospital Training School. There are, including two night nurses, ten nurses to look after the patients and the operating-room, &c., the expenses for salaries and wages alone being 7,479·48 dollars.

The heat, light and power are furnished by the power plant of the Harvard Medical School, which is designed to furnish similar service to all the other hospitals and buildings which shall be attracted toward this medical centre.

The expense of running the hospital amounted last year to 10·79 dollars per week for each patient, which is, of course, a large sum, as the care for such cases is usually computed; but considering the care and attention and food that the patients receive the cost is very moderate indeed.

After the new hospital had been in satisfactory running order for the space of six months the medical staff renewed their suggestion that an "out-patient" department should be started. They now had the experience that had been acquired by the successful operation during the previous summer of the Day Camp, conducted by the Boston Society for the Relief and Control of Tuberculosis. It seemed to Dr. Joslin and myself that this expensive plant that was in fine running order, could greatly extend its sphere of usefulness at a very

FIG. 1.—Protection from the high winds.

small additional cost. The managers generously agreed to try the experiment, even though it necessitated some alterations in the new building, to arrange for a dining-room for the new patients, and a separate sink at which their dishes could be washed.

A portable house was purchased, which was put up on the south side of the main building and away from the street. This is screened thoroughly on three sides and can be used if the mosquitoes are too thick for comfort, or in case of a sudden shower or hard storm. But for the most part, it serves as a store-house for chairs and blankets, books and clothes, rather than as a sitting-room. In the stormy days of winter, in case of disagreeable winds, the patients sit upon a cement platform beneath the balcony of the main building, where they are protected on three sides from the weather, but having fresh air and sunshine from the open Southern exposure. Here there is room for twenty-five steamer chairs in a row. Whenever the weather is at all suitable, however, the patients bring their chairs into the open and away from the buildings. During the hot days of the summer the patients move to the eastern end of the buildings for the sake of the shade. Harvard College has also kindly given the use of some unoccupied ground immediately behind the hospital on which there are a few trees. This is very helpful, as in the summer there is an uneasiness among the patients caused by the heat that can only be alleviated by the possibility of a change in location. In the colder months the patients are contented to stay perfectly quiet in their chairs.

In May, 1906, Dr. Floyd started his day camp, with ten patients as the limit. The managers soon allowed him to increase his number to fifteen, and, finding that the expense was not going to be overwhelming, in August allowed him to increase to twenty-five. This is practically the whole number that can be accommodated on the grounds and in the dining-room, or can be cared for effectively by a single nurse. It will be seen that by August, 1906, the capacity of the hospital for good had been increased over 60 per cent., as we shall see later, at a very small additional cost.

The regimen of the patients is as follows: At about 9 a.m., they begin to assemble, coming from their homes in electric cars if they do not live within short walking distance. The nurse is on hand to receive them and hear the report of the night and of affairs at home. She takes and records their temperatures, and helps them, if necessary, with their chairs, wraps, &c. A little after 10 o'clock they go to their dining room where they have all the bread and milk they can eat, and in many instances it is fully 30 to 40 ounces of milk and several slices of bread. Eggs are added to this lunch in less rather than in greater amount according to the time of year and their expense. They then return to their chairs and remain quietly until 12.30, when they re-assemble for their

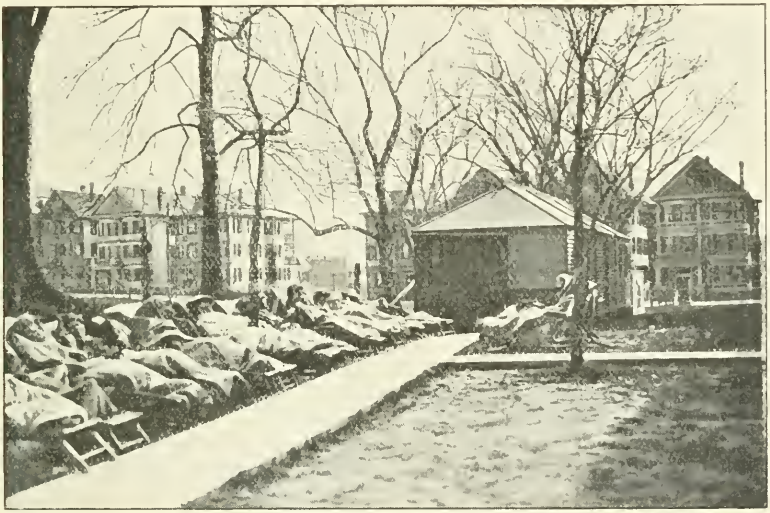

FIG. 2.—The Camp in the Early Spring. Looking West. Boston, Massachusetts.

dinner, which is the regular house dinner, meat or fish, potatoes and other vegetable, and some light pudding, with milk and bread and butter. In some cases an ounce of olive oil is added. For some reason or other the patients cannot be made to enthuse over cotton-seed oil.

Again the patients return to their chairs and wraps, on the grass and shade of the trees. Two hours after dinner is a quiet time and no talking is allowed, so that any may sleep that wish to do so. At 4 p.m. they are again assembled for another lunch of bread, and butter, and milk, and between 5 and 6, according to the time of year, they return to their homes.

It is expected that all the patients, in addition to the food received at the hospital, have a breakfast and supper at home, and for the most part this is done; some, however, we fear, get very little besides what they receive from us.

The nurse is on duty all through the day and oversees the patients at their meals, takes note of those who are not eating well, and later interviews such to see what is the cause. It is part of her business to gain the confidence of the patients, so that they will tell her of their home worries, of their financial difficulties, about their husbands, children or lovers, as the case may be. At the weighing time, which comes for each patient once a week, the nurse is able to inspect the garments of the patients, for they are undressed and weighed in a sheet, and make sure that they are properly clothed. She sees that all who have not bathing facilities at home, are tubbed and scrubbed at least once a week. Further they are taught cleanliness of person, and care and protection of those about them, and especially care of their mouths when coughing. Each patient being a woman and having no pocket, carries on her arm a blue linen bag containing within a smaller waterproof bag, and also some sheets of tissue paper, which are used to protect the mouth when coughing, to receive the sputum, and which is then placed within the waterproof bag. The papers containing the expectoration are burned each night and the inner bags are washed with carbolic acid solution.

On Sundays the patients remain with their friends and families, and the nurse makes visits to the homes, sees where the patients live and sleep, sees the family who are there assembled, and is therefore able to make a report to the physician as to the home conditions. This inspection of the home and families is of great importance, sometimes it is repeated on successive Sundays until conditions are made satisfactory, sometimes the conditions are so good that no further visits are necessary. But it is expected that a visit shall be made on every one about once in six weeks after the routine has been established. It goes without saying that this visiting requires tact on the part of the nurse, and not every one, no matter how skilful in the wards, or in the care of the sick, has the ability to gain the confidence of the patient and become her friend, and that of the family as well. As the result of her visit or visits, the nurse fills out a report which is filled in the records.

The physician calls each day, hears the report of the nurse, talks to the patients, and makes physical examination of one or more as the case may be, so that there shall be proper records of each case, and that he shall have personal knowledge of the pulmonary changes from week to week. Practically all the medication is in the form of rest, food, and fresh air. Heroin or codein is used if the cough is distressing, though in small quantities. Tuberculin is used in a number of cases both for diagnosis and treatment.

The total number of patients treated since we started has been seventy-one, and these have been given 5,900 days of treatment. These patients would be classified as follows :—

| | | |
|---|---|---|
| 1st | Incipient ... ... ... | 8 |
| 2nd | Well-marked... ... ... | 29 |
| 3rd | Advanced ... ... ... | 34 |

Of these there have been discharged :—

Arrested ... ... ... ... 10

Improved ... ... ... ... 4

Who went to Rutland as home surroundings were unfavourable.

Relieved ... ... ... ... 2

Non-tuberculous showing signs of consolidation, but proved to be chronic influenza by sputum and negative tuberculin test.

Unrelieved... ... ... ... 30

Of whom 6 have died.

Under treatment ... ... ... 25

The ten discharged arrested were under treatment for periods of time varying from three to eight months. Of these ten, only one was from the group of incipient cases, and the others from the well-marked group. Since discharge, these patients have been required to report to the Samaritan at least every two weeks in order that there should be no undiscovered relapse. All are doing well and are steadily gaining in weight. Some of them have returned, unfortunately, to their former employment where the disease was contracted, four are taking

FIG. 3.—Camp as seen from the Hospital. Harvard Medical School Buildings in the background.

complete care of their homes, and one or two have returned to school or are remaining at home. Of the four improved cases who left us for Rutland, two are doing well. One of these was from the incipient and the others from the well marked class.

Of the cases unrelieved seven went to other hospitals, three went to Europe having shown no special change, five were discharged for insubordination, five gave up treatment in from one to six days, and four were unable to keep up. The six cases who died, were all very advanced on admission, and the prolongation and comfort of life was all that could be hoped for. Of the twenty-five cases under treatment at present, all but two advanced cases are doing well, and it is expected that four will be discharged arrested before the middle of June.

A few striking cases are worthy of mention : A girl of 22, from a poor home and surroundings, about four miles from the Camp, had well-marked involvement of both apices. The cough was distressing, and expectoration about 3 ozs. daily. She began treatment ten months ago, steadily gained weight from the start, and with the constitutional improvement the process rapidly became quiescent. She gained thirty pounds in six months, lungs became entirely dry, and she was discharged three months ago without a symptom and has remained well since.

A woman of 40 years, showing an advanced process involving both lungs, with occasional night sweats and considerable expectoration came under treatment six months ago. She could not speak aloud on account of a larynx showing marked swelling and infiltration about arytenoids and false cords. She has gained 27 lbs., her cough consists of a slight attack every morning, her lungs are quiescent, and voice has almost completely returned. A few weeks will probably add her to our list of arrested cases.

A woman of about 28 years, with a cavity in the left upper chest, and extensive involvement of the right, after six months treatment has gained 20 lbs., the general condition shows remarkable improvement, the lungs are rapidly drying up and we hope for cavity contraction.

Complications and emergencies have been very few in number. There have been no severe hæmorrhages on the grounds, and only one patient, when at home, has had two moderately severe hæmorrhages, of about one half a pint of blood each time. One other patient had a slight hæmorrhage. Even chills are of rare occurrence, and no cases of pneumothorax have occurred. Diarrhœa in the summer months, and grippe in winter, have been the greatest enemies, and while all have been retarded at times by these complaints, only one or two have been seriously affected.

One patient who had an advanced process with a quiescent tuberculous larynx after five months of treatment gained 20 lbs., cough was dry, and the lungs were almost free from râles. The patient caught a severe cold and the quiescent throat flared up. Swallowing became impossible from pain, and she died in about four weeks, practically from starvation, as the lungs remained quiet. She refused to enter a hospital.

High temperature is not of frequent occurrence and when it persists the case is required to remain at home for a few days in bed, being visited by the nurse in the meantime until the patient is thought fit to report for treatment. Pregnancy has only complicated conditions in one case, and here improvement has been so constant and marked that we hope to escape the almost certain usual termination of this disease following confinement.

Tuberculin has been in constant use both for diagnosis and treatment. We are giving Koch's tuberculin T.R. (imported) in about fifteen cases once or twice a week. We begin with a dose of $\frac{1}{1000}$ of a milligram and steadily increase it, avoiding reactions until we reach 1 mg. The arrested cases receive tuberculin weekly when they report. This treatment is only given to selected cases where cavity, fever and hæmorrhage are absent. We feel confident that this has benefited not a few cases in quieting tubercular laryngitis, and stimulating resistance in cases that improved to a certain point and then remained at a standstill. We have been more ready to allow an arrested case to return to her former employment, because fortified with increased resistance by this means.

All the cases are proven tubercular by tubercle bacilli in sputum, or by the tuberculin reaction. In several cases this latter test has been necessary, and here has been used Koch's old tuberculin in successive doses of $\frac{1}{10}$ to 1 and 10 mg. at intervals of four days. In only two cases have we failed to get a positive reaction where it was required for diagnosis, and these have proved to be cases of chronic influenza.

The results of the experiment have been very satisfactory from the clinical side, and it seems that the treatment presents these distinct advantages.

The daily removal from their homes gives the patients a decided mental shake up. They have the companionship of others, some of whom are worse off than themselves ; they are distinctly doing something to make themselves well—taking the cure in the fresh air—and they are free for the time from the depressing influences and petty annoyances of home environment. The constant presence of the nurse in whom they can confide and talk over their family difficulties is of great assistance and, at the same time, she deters them from conversation about their symptoms. The daily visits of the doctor to whom trivial, but to the patient important and perplexing, questions can be referred, all tend to keep up the general *morale* of the patients. The responsibility for their own actual condition is shifted to the shoulders of the nurse and doctor, and not carried in doubt by themselves. On the other hand, the constant supervision of the nurse enables the detection of unfavourable symptoms to be made early, as well as wrong doing and recklessness. With the wards of the hospital always at hand to help out in cases of emergency, such as the appearance of a sudden rise of temperature, hæmorrhage or other unexpected event, there is a sense of security not otherwise felt.

To those who still believe that temperature taking and the daily booking of symptoms are not desirable things for the majority of patients to do, this form of treatment must appeal; while those who think that it is a desirable feature in treatment can add it to the routine.

Many patients cannot be removed from home and have even a small sum paid for their board without great discomfort to the whole family. In order that the mother may go to a sanatorium, children often have to be put away in "homes" or boarded. By our method the home is kept intact, and as soon as possible the patient allowed to participate in the light home work during the mornings and evenings, often to the great advantage of all concerned. The daily education at the hospital is carried back to the homes with the result, we believe, that the other members of the family will lead a much more hygienic life than they otherwise would. The one disadvantage that we can see is that connected with the going to and coming from the hospital. There is necessarily a certain amount of wear and tear upon the patients during this time that is undesirable. To obviate this we are trying to have our patients, as far as possible, from the district immediately about the hospital. When this is accomplished, as it will be in the course of time, the House of the Good Samaritan will become a centre for this particular portion of the city, and the ease of administration on the part of the nurse, and the one disadvantage to be urged against the scheme will be reduced to a minimum.

As to discipline there is very little to say. There are so many applicants that if a patient is neglectful and does not come regularly and punctually they are warned that if they persist they will be dropped from the rolls and their places filled by another. Naturally there are a number who come and do not like the restraint and discipline, and quickly give up. Some are soon found to be too weak really to undertake the daily journey, but beg to be allowed to try, and in a short time have to remain at their homes or enter other institutions for care and treatment. Most of the cases are, however, selected from patients presenting themselves at the general medical clinic of the Massachusetts General Hospital, where Dr. Floyd is also on duty; and it is here that he is able to make his selection of patients living in the vicinity of the hospital.

Incidentally, I may say that our experiment has aroused no interest from the doctors in the vicinity. When we started

Fig. 4.—The Camp in Winter.

our experiment we invited all the doctors of the neighbourhood to a tea at the hospital to explain to them our purpose and ask their co-operation, but no one came excepting one or two who were specially identified with the tuberculous crusade, and had no need to be present, knowing well all about the work beforehand.

At the end of the year it is well to look over our books and consider whether in reality the experiment has been an economic success.

The first cost of the experiment was defrayed by special gift to the hospital for this purpose and nearly $1,000 was spent. With this money the portable house outside was purchased and set up for $324·00, and the necessary changes in the hospital were made, to provide a new dining-room for the hospital help, and to provide water installation for separate dish washing in the old dining-room that was to be used by the out-patients. Fencing and grading had to be done. In addition, chairs, blankets, comforters, and hot water bottles had to be purchased. These latter are not expensive and can be used for some time without renewal. These changes are in the way of permanent investment, and should not therefore be put into the general cost of maintenance, for the necessary changes in any other hospital would be entirely different and would depend on the local conditions. The cost of blankets, chairs, &c., depends on the quality. We have used the Allen Camp Chair costing $1·75. It is light, easily handed and comfortable. Grey blankets have cost $4·00 per pair. Comforters are also useful in the winter and cost less than $1·00. Stone water bottles costing about 25 cents apiece are used as they keep the heat longer than the rubber ones, and do not leak if pricked with a pin.

At the beginning of the experiment it was not found necessary to employ a special nurse for this service, but as the numbers increased the whole time of one nurse has been required. An additional maid was employed from the first to care for the dishes in the dining-room and assist the cook to serve the meals. These have been the only additions to the administrative staff of the hospital that has been required to care for the twenty-five patients. The remainder of the expense has been incurred for their food. It is impossible to estimate exactly the cost of this food as a certain part is bought with the general supplies of the hospital—milk, butter, eggs, and flour, the principal items, can be told exactly, but vegetables, meats, &c., can only be approximately estimated by comparison with the previous monthly expenses of the hospital. Milk costs a trifle less than 7 cents per quart. Eggs vary from 50 to 20 cents. and are used accordingly. Butter, costs on the average 28 cents. Flour has been $5·50 to $6·00 per barrel. The total cost of the experiment for extra service and food for the year has amounted to $1,966. For this amount there has been given 5,900 days of treatment, making a cost of 33 cents per day for each patient.

In the beginning, when there were only six to ten patients, the actual cost of the total hospital expenses was less than it had been during the preceding year when the hospital was first opened. This was due to economies that had been introduced during the year. This is only mentioned as it was a great encouragement to the managers to find that the hospital bills rather decreased than increased during the trial period of expansion.

In conclusion, all that remains to be said is that the House of the Good Samaritan has apparently made an experiment which can be adopted by many communities to assist them in solving their local tuberculosis problem. Many towns and cities have small hospitals, whose beds, cannot from the the nature of things, be used to care for all the cases of tuberculosis of the town or city. In the smaller places practically all the physicians are interested in these hospitals and therefore can co-operate in having a large portion of the tuberculous patients who come under their care congregate at the hospital. This real knowledge of the patients and their home surroundings by the physicians themselves is an advantage that the physician of the large city does not possess, and for the most part has to learn second hand through the eyes of his visiting nurse. The experiment has been successful in the cold of winter and the heat of summer, and in the damp and disagreeable days of the spring. The patients have attended equally well at all seasons of the year.

It is perfectly possible for ways to be devised so that each patient shall return to his or her own physician for treatment or advice, or the work can be delegated to a visiting man as may be deemed wisest. Those who support the hospital by their contributions can be educated to the need of such a day-sanitorium by lectures and the organisation of a committee on tuberculosis and thus still greater interest in the hospital aroused in the community. Such patients as can should pay a small fee for their care at the hospital. It may be possible later either to get a special pavilion built for the care of the very advanced cases of tuberculosis or to get the city authorities to take action and provide beds to which the stigma of pauper is not attached for this much deserving class of sufferers. To the community having a hospital in active operation that will attempt to follow this experiment we feel that more can be done to help the sufferers from phthisis, and at a much less relative cost and trouble than by any other means yet suggested to fight tuberculosis.

Report to be filled by the Nurse after her visit to a Patient.

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|---|---|---|---|---|
| Nurse's Report. | | | History No. | |
| Name. | Address. | Age. | Place and Date of Application. | |
| House. | Stories. | Number of Rooms. | Occupies. | Flat roof. |
| Balcony. | Yard. | Locality. | Dust. | Sunlight. |
| Sanitary conditions. | | Length of time in present location. | Record of other cases. | |
| Patient's room. | | Bathroom. | Number in family. | |
| Financial condition. | | Occupation. | Habits. | |
| Disposal of sputum | | Intelligence of patient. | Diet, with amount of milk taken. | |
| Family history | | Personal history. | | |
| Date of joining class. | | Date of Nurse's first visit. | Time spent. | |
| Remarks. | | Improvements suggested. | | |

# INFLUENZA AND WEATHER INSTABILITY.

BY HOWARD S. ANDERS, A.M., M.D.

PHILADELPHIA.

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FROM the days of antiquity to quite recent times weather conditions and changes have been mystically and mysteriously related to disease by priests, prophets and people. This is true especially of epidemic diseases, and those of unknown, obscure, or uncertain causation. Since the scientific development of meteorology in the past generation, however, and the concomitant development of a more rational epidemiology, an approach has been made in the direction of indicating, with some probability, if not certainty, the relative value and qualitative character of the atmospheric influences operating upon the human body in health, and as predisposing factors in some of the communicable diseases of bacteriologic and toxic origin.

Primal instinct ingrained in the human mind has advanced to a scientific scrutiny of the atmosphere which surrounds us, because of the basal belief that a fish in the sea is not more, if as much, subject to physical changes of its medium, than is a man to those of his; that the element in which we live and think, study and plan, labor and love, play and progress, aspire or degenerate, do good or evil, cheer up or get gloomy, must needs have some real, perhaps measurable, modifying influence upon health, mentality, morality, achievement.[1] In

[1] See Dexter's "Weather Influence."

short, as alchemy has given place to chemistry, and astrology to astronomy, so has historic and ethnic awe, superstition and variegated guesswork about weather and climate, been followed by keener and wider perception (aided by instrumental precision) and a more penetrating and practical interpretation. So we are witnessing the rapid, robust awakening and growth of meteorology. To be convinced of the phenomenal growth of this adolescent science and of the expanding and deepening value and applicability of its data and inferences, one needs but to study the *Monthly Weather Review*, issued by the Weather Bureau at Washington.

We are not directly concerned with climatology here, because that has a wider scope and different relation to the topic under consideration: it represents the sum total of the atmospheric and solar and electric influences not only, but the various telluric, aquatic, topographic and geographic conditions, also. The study of climate, too, involves a greater sweep of observation, such as the annual and monthly averages, than is appropriate to the subject at hand: the day-by-day meteorologic states and variations are more to the point in considering their possible relation to the inception and course of such a comparatively short visitation as recurrent epidemic, or endemic, influenza usually makes.

With this differentiation before us, it may be asserted that, strictly speaking, until within a recent decade or two, no systematic meteorologic observations in relation to disease have been made, and these very few and limited in scope. Indeed, the United States Weather Bureau was inaugurated hardly more than a generation ago; and its wealth of data have just been digested in an assimilable form, in the large volume issued a few months ago. Except that there were good grounds for believing that "coughs, colds, corns and consumption" were influenced by weather conditions and changes, practically nothing was accomplished, even down to several years ago, to solve the diagnostic, prognostic, or remedial relations of atmospheric phenomena; whether certain diseases gave *prima facie* probability of such relations existing or not.

Although climatology has been studied most generally and carefully in connection with the prevalence, virulence and management of tuberculosis, meteorologic observations have simply been accumulated partially and analysed more or less cursorily. Tonsillitis, erysipelas, pneumonia, influenza especially, and just lately malarial attacks, have met with earnest systematic research, and some significant value of the first results. Meanwhile, much help has been derived from the independent development of meteorology, from the time of the appearance of the text-book by Loomis, of Yale, to those of Davis, of Harvard, and Hann, of Germany.

The very name—influenza—given to this disease by the Italians in the fourteenth century was an appropriate indication of its unescapable, penetrating, aërially permeating and diffusing characteristics. Although it is tempting to quote the ideas of the many writers upon epidemic influenza since Schönbein (who attributed it to the ozone in the atmosphere), it must suffice to refer to the author's paper before this Association in 1899,[2] in which it was noted that several observers had admitted that certain atmospheric states, or movements, make for an epidemic; and that meteorologic influences may operate either in the direction of lessening one's resistance to influenzal invasion, or, in ways yet unknown, but not improbable, of favoring the propagation and dissemination of the Pfeiffer bacilli, or, quite likely, both.

Passing by such opinions as were expressed in the earlier epidemiologic history of influenza, from the time of Thomas Short, in 1557, of Sydenham, Hufeland, Hagen and others, down to the great pandemic of 1889-90, we find the same

[2] "The Relation of Local Meteorologic Conditions to the Influenza Epidemic in Philadelphia, Winter of 1898-99."

trend of theorising just indicated applied to the "grip" in the early nineties. The recent observers, however, based their conclusions rather upon measured data and did not advance such hypotheses or mere guess-sos, as any alert sailor or wise farmer might propound equally, if not superiorly well. Thus, Assman, in Germany, Dignat, in France, and the writer, have made direct attempts at arriving at some definite inferences from weather observations taken and recorded instrumentally and officially in connection with the years of influenza prevalence, from 1889 to 1901.

Assman noticed that the great pandemic of November and December, 1889, was characterised by a very unusual drought in Eastern and Central Europe, by the absence of a protecting covering of snow, and by high barometer and low-lying clouds.

As the result of a study of the meteorologic conditions concomitant to influenza from 1895 to 1898, Dignat considered the following to be the chief factors preceding epidemics of *la grippe:* abnormal increase of barometric pressure; abnormal temperature ranges; abnormal predominance of north winds; weakening of the actinometric degree (or sunshine percentage).

Early in 1899 the writer began his preliminary investigations, and set forth the problems involved in his paper just referred to. A limited comparative analysis of both antecedent and associated phenomena was made, and tentative conclusions offered, as follows: (1) Abnormal increase of the atmospheric pressure, and of the absolute range between the highest and lowest pressures for the epidemic months; (2) sudden, frequent and extreme alternations of abnormally high and low temperature ranges; (3) comparatively lower relative humidity (data too variable to be satisfactory, however); (4) diminished precipitation, but short periods of unusual fogginess and calmness, alternating with periods of clear, windy weather; (5) predominance of relatively clear (fair or partly cloudy) and sunshiny days during exacerbations of influenzal attack, these periods having invariably been preceded by sudden thaws and warm, damp, cloudy, muggy weather, and suffocative atmosphere, especially from the times of sunset to sunrise. This summary was based mainly upon the monthly averages.

The first seriatim study of a single meteorologic phenomenon was made in 1901, on "The Relation of Sunshine to the Prevalence of Influenza"[3]; the second in 1902, on "Atmospheric Pressure and Epidemic Influenza in Philadelphia."[4] The conclusion from the first study of the figures for twelve years preceding and following the pandemic of 1889-90—that is, from a comparison of the data for a group of non-epidemic with those of decidedly epidemic years—showed that whilst the average sunshine percentage was slightly lower for the principal epidemic months of December, January and February, than for the same months of non-epidemic years, there was not the direct causal relation between the absence of sunshine and influenzal epidemicity that Ruhemann, of Berlin, was led to infer. Naturally, the few hours of sunshine prevailing during the short days near the winter solstice would lead one to think that somehow, nevertheless, influenza likes the darkness better than the light, and hence its greater epidemicity during the winter months.

The second seriatim study, pertaining to atmospheric pressure, showed practically nothing definite as regards the mean monthly barometric readings, the monthly means of maxima and minima, and of greatest barometric ranges, for the sporadic years of 1877-88, and the epidemic years of 1889-1901. In other words, as in the case of sunshine percentages, the behaviour of atmospheric pressure in relation to influenza

[3] *The Medical News*, November 9, 1901.

[4] *The Phila. Med. Journ.*, January 24, 1903.

is characteristic only in the marked lack of equability; in the absolute daily (sometimes almost hourly) extremes, and not in the monthly or yearly averages or means. This is borne out in the fact that the average greatest twelve-hour barometric changes during the epidemic months of 1890-1900 were uniformly greater than those of the same months for the years 1879-1889.

The recent recurrence of moderately severe influenza, beginning late in December, 1906, afforded me another opportunity of noting the daily meteorologic phenomena in relation to the local epidemiologic development, and to certain clinical characteristics of the disease.

Without, at this time, burdening the paper and its readers with the recitation of tables of figures and paragraphic detailed analyses of the same, permit me just to mention the conclusions from my observations, as they simply corroborate those of my earlier papers, namely: That whatever causal relation meteorologic conditions bear to the onset, prevalence and virulence of epidemic influenza will be found almost exclusively in quotidian, tertian or quartan exacerbations, variations, and alternations of weather states; in other words, in the sudden, frequent, extreme and rapid changes in pressure, temperature, humidity, clearness or cloudiness, and wind pressure and direction; in short, *instability* or *nonequability* of weather phenomena to an *abnormal degree*.

*Relations to Clinical Incidence.*—In many of the epidemics it was observed that apparently strong and sturdy, as well as less robust persons were stricken suddenly and violently with influenza during what was ordinarily called fine, crisp, bracing winter weather; these patients were usually those who worked or spent considerable time outdoors. On the other hand, those who were more or less confined to houses seemed to succumb mostly during the warmer, foggy, damp, dark and cloudy days. It has seemed to me that the latter weather conditions were conducive to susceptibility to influenza in all classes, the added depression of indoor life leading also to the rapid development of the disease ; while in stronger individuals the attacks were held off apparently until some chilling of the skin or sufficiently prolonged external cold damming back the blood from the periphery enabled the influenzal bacilli or toxins to overcome the hematic resistance ; or, it is not improbable that during dry, dusty, windy periods immunity in the best of us was overwhelmed by large doses of actively potential and penetrating bacilli spread about under such favorable atmospheric states.

The unstable weather conditions throughout the central parts of Europe were noted particularly this past winter to have had a most depressing, deleterious effect upon the health of the population in general, and to have been associated with an increased morbidity due to influenza.

My notes of the weather records, and of the cases of influenza from the middle of December, 1906, to the middle of March, 1907, bear out the preceding statements almost perfectly.

Thus it may be written that the muggy weather conditions of midwinter usually accompanying low barometer are related to influenzal predisposition, as a high barometer and the associated dry, cold, windy phenomena to influenzal propagation ; the former pertaining to the body, the latter to the bacilli ; the one to susceptibility and incubation, the other to invasion and pathologic activity.

Finally, it may be reiterated that monthly or yearly averages or summaries of meteorologic data, barometric, thermometric, hygrometric, &c., are of small value in estimating the etiology of epidemic influenza from this view point. Instability of weather conditions, however, embracing the frequency, sudden celerity, and marked extremity of changes within short periods of time, must be blamed and branded as of credible though more or less subtle causative agency.

# THE USE OF LANTERN SLIDES IN TEACHING CLIMATOLOGY.

BY GUY HINSDALE, M.D.
HOT SPRINGS, VIRGINIA.

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Dr. Hinsdale said that anyone who is interested in teaching climatology will find a valuable aid in the use of lantern slides. Over three hundred different slides illustrating meteorology are now obtainable through the Geographic Society of Chicago at a very moderate price, and in this way students can see representations of the standard government instruments and records. The slides also show charts relating to air pressure and circulation temperature, sunshine and cloud, humidity and precipitation, thunderstorms and tornadoes, the effect of lightning and floods and some typical localities. In this way it is possible to illustrate the subjects quickly and' engage the eye as well as the ear.

A series of sixty slides was then shown on the screen. Dr. E. O. Otis stated that on Dr. Hinsdale's suggestion he was using a similar set in his lectures at Tufts Medical College. To Profersor J. Paul Goode of the University of Chicago belongs the credit of making this series available, and the university has published a descriptive catalogue from which selections can readily be made.

# HEART CLOT IN PNEUMONIA.

BY BEVERLEY ROBINSON, M.D.
OF NEW YORK.

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THE question of cardiac thrombosis in pneumonia is still interesting and somewhat undetermined despite much work and very many observations. Clinicians and pathologists of former years admitted its frequency, as we know, and numerous deaths were attributed to it. To-day pathologists, especially, recognise it as occurring very rarely, and, therefore, causing death only occasionally. Indeed, *post-mortem* records of some large city hospitals (City Hospital and Bellevue of New York) among several hundreds of cases will not show a single instance in which the clot in the heart is particularly described, or any evident importance attached to it as being instrumental in bringing about a fatal termination.

Charles Norris,[1] pathologist to Bellevue Hospital, New York, states : " Since I have been in charge of the laboratory, beginning October, 1904, we have autopsied 130 cases of lobar pneumonia, and we have no records of a single case of cardiac thrombosis." Harlow Brooks[2] states : " In a series of 84 consecutive autopsies on my pneumonia patients, I have found but three cases of pulmonary embolism or thrombosis, and one of cardiac thrombosis. These cases do not, of course, include those cases where thrombosis was a generalised process, as it not infrequently is in truly septic cases." H. T.

[1] Personal letter, June 22, 1906.

[2] Personal letter, Jannary 20, 1906.

Brooks[3] writes me from the pathological laboratory of New York Post-Graduate Hospital, that during the year 1905 "there were no records of cases of either cardiac or pulmonary thrombosis" in lobar pneumonia. I. Adler[4] writes that during 1905 (at the German Hospital, New York City) "we have had only nineteen deaths. Only eight autopsies are on record, in none of which the autopsy notes mention either cardiac or pulmonary thrombosis or embolism. In those cases that died and no autopsy was obtained, the clinical symptoms never pointed to cardiac or pulmonary thrombosis or embolism." John S. Thacher[5] states: "We have not been able to find any records of cardiac thrombosis in acute lobar pneumonia during 1905." (Presbyterian Hospital, New York City.) "The firm clots found at autopsies often in pneumonia, were not recorded as the departure from the normal and its degree are so difficult to judge of."

On the other hand, F. C. Wood[6] affirms: "Clots which are formed in the heart are easily distinguished from those formed after death, by the fact that they are light in colour and largely composed of fibrin and white corpuscles. In judging of the time of formation we have to consider whether the clot is adherent to the walls of the ventricles or auricles, and whether its texture is hard or soft." William H. Welch[7] writes: "Genuine ante-mortem clots are not common in the hearts of patients dead of pneumonia, although they occasionally occur. The age of cardiac thrombi can be determined with some degree of probability by careful examination." And yet clinical observers, even now, do not always share these beliefs. Several to whom I have spoken or written state

[3] Personal letter, February 14, 1906.
[4] Personal letter, January 18, 1906.
[5] Personal letter, May 8, 1906.
[6] Personal letter, June 9, 1906.
[7] Personal letter, June 2, 1906.

frankly that they believe ante-mortem clots in pneumonia occur many times in fatal cases, and are much to be dreaded. Henry Jackson,[8] of Boston, Massachusetts, writes: "I do think that ante-mortem heart clot is a frequent cause of death" in pneumonia, "as suggested at times by sudden death when the general condition does not seem to warrant it."

Bond Stow states[9] "cardiac thrombosis in cases of pneumonia is a very interesting and important subject." S. S. Cohen[10] is also of that opinion, as the following shows: "I am aware that modern pathologists discard the old theories of death from ante-mortem clot, but admitting the alterations in the constitution of the blood and realising the fact that the circulation in the pulmonary artery and its branches is obstructed, delayed, and in some places brought to a standstill, the mechanobiologic conditions are present for the formation of thrombi and the suddenness with which death sometimes occurs in patients whose other symptoms have given no intimation of the imminence of cardiac, vascular, or respiratory failure, or of general exhaustion, seems to point to the actuality of such occurrences. Measures to maintain the fluidity of the blood are therefore wise."

H. A. Hare[11] believes that thrombosis in croupous pneumonia "is very much more common than Osler thinks."

A. C. Morgan[12] states: "Cardiac clot is said to occur frequently in fatal cases, but whether this is the cause of death or part of the closing scene is not settled."[13] The late Austin

[8] Personal letter, June 5, 1906.

[9] Personal letter, June 28, 1906.

[10] *Jour. Amer. Med. Assoc.*, December 10, 1904.

[11] Personal letter, December 18, 1905.

[12] *New York Med. Jour.*, October 13, 1906, p. 743.

[13] It should be borne in mind that acute dilatation of the heart is sometimes the cause of death in pneumonia among adults, and even among infants, in which at the autopsy no ante-mortem clot is found. See *Medical News*, June 3, 1905, p. 1032.

Flint, as we know, was a firm believer in the existence of ante-mortem heart clot as a frequent cause of death in pneumonia. Certainly, in view of the greatly increased amount of fibrin factors in the blood of pneumonia patients, these clinical statements are, at least, much to be relied on, and yet it is only fair to add that "venous thrombosis" is an exceedingly rare complication of pneumonia. Steiner[14] could find only thirty-eight cases recorded, and reports "three of his own." Why then believe, it may be argued, in the frequency of cardiac thrombosis which is no more probable? How is this difference of opinion to be explained? From the pathological point of view, ante-mortem clots which have formed a few days preceding death, terminal clots, or those which are formed during the agony do not differ materially and always from clots which unquestionably are formed after death. In both instances they may be largely formed of red-blood globules and present simply the appearance of currant jelly. Or again, they may have the aspect of chicken fat throughout a portion of the coagulum and the rest of the clot be a mixture of red blood and fibrin with a predominance of the former. In neither case are they very intimately associated with the trabeculæ of the heart, or at all attached to the heart wall with any degree of firmness. The clots are not of themselves hard, nor do they show any appreciable stratification. We do find, however, in pneumonia, and quite as often, coagula, which are almost entirely fibrinous, do adhere intimately to the heart wall, and are bound up with, and intimately attached to, heart valves. These clots may be, and usually are, distinctly firmer than the others, and now and then show separate layers which could not be formed at the same time. When these fibrinous clots are present they have commonly the print of the aortic or pulmonary cusps obviously shown upon that portion of the

[14] "Hare's Practice," 1905, p. 161; also see original paper in *Johns Hopkins Hosp. Bull.*, 1902, p. 130.

clot which extends into the aorta or the pulmonary artery. Sometimes, indeed, "discoid masses formed usually almost exclusively of fibrin, fill the cavities of the cusps and are moulded to their surface. To this, great importance has been attached as indicating the formation of the coagula prior to death. In fact, Poullet has endeavoured to prove by experiments upon animals, that in all cases in which these masses were present the clot had been formed quite a length of time during life."[15]

These facts indicate clearly to me that such clots may be found before death. Moreover, this judgment has been experimentally confirmed, as stated, on animals during life, and if analogy has value, must prove equally true as regards man. The pathologists state that this is not admissible because such clots occur in diseases other than pneumonia, although less frequently, and when they do occur they give rise to no special signs or symptoms, and if that be true, how can it be otherwise in pneumonia ?

Clinicians answer that these clots may occur in other diseases, notably in diphtheria, but not as often as in pneumonia, and when they occur, owing to the gravity of the disease, with many and alarming symptoms due to pulmonary and other structural changes and also to the profound toxæmia they are not clearly made out. Even in diphtheria, whenever, fibrinous clots are found in the heart, in the great number of cases, there is a complicating pneumonia present, and this pneumonia, undoubtedly, is an additional cause of heart clot. There are, moreover, cases of pneumonia in which the grave symptoms which suddenly arise, seem to point to cardiac coagula, and the rapidly fatal termination of the disease shows it almost unerringly. The heart clot may occur during the

[15] "Pepper's System of Medicine," vol. iii., p. 730 and 737. Formerly I was inclined to believe that reasonable doubt might be cast upon Poullet's experiments. At present, I am disposed to sustain their validity.

acute stage of pneumonia, when other symptoms are grave; it may occur just after the crisis, when everything appears hopeful; and it may occur during the convalescence period, when all danger is seemingly passed.

In connection with the heart clot there usually is pulmonary thrombosis, and very exceptionally pulmonary embolism. The latter condition is likely to be present when the embolic plug has come from a vein of the lower limb (saphenous) and been carried through the right heart.

Unfortunately in many cases in which death has occured rapidly or suddenly and in which it is fair to assume that heart clot is present, no autopsy is permitted. This is notably true in private practice. Again, when we have made an autopsy, we find structural changes in the cardiac muscle which to many appear the direct cause of death, and the heart clot merely a result of these changes and of no particular importance. Here, again, I am inclined to believe such statements are misleading, because the heart changes are not, in my judgment, sufficient to cause death. They are no more, probably, than what we find in other cases of pneumonia in which death has not occurred, or in instances in which the death is apparently not due to the condition of the heart, if we can fairly estimate the condition of lungs, kidneys, and nervous system. Likewise, in other acute diseases, and notably typhoid fever, the intramuscular heart changes are greater than in pneumonia and do not cause death so often as it occurs from the heart in pneumonia. I am convinced that in a healthy individual attacked with pneumonia, without previous heart or kidney disorder, the heart will usually hold out sufficiently to preserve life during the acute stage and later, if the blood is kept as far as possible in a condition approximating the normal, namely, if the chlorides are properly replenished and saline beverages taken in such quantity as to keep up diuresis. (Todd.) Cohen,[16] also argues that "the disturbance in chloride excretion

[16] *Jour. Amer. Med. Assoc.*, December 10, 1904.

seems to point to the wisdom of increasing the sodium chloride content of the blood."

H. S. Carter, on the other hand, thinks that the rôle the chlorides in the blood play is small, but fully believes that anything to promote diuresis by large quantities of fluids, saline or otherwise, by mouth, bowel or hypodermoclysis "is of the greatest value." "We thought," writes Carter, "at first that as some of the cases showed rather an increase of chlorides in the blood, we might be able to graduate the percentage of saline solutions given, with a view to bring about a normal average, but as the percentage of blood chlorides, even in the severe cases did not average high, that idea was of little value. What a large series might show I cannot say. However, of sixteen cases, twelve were fatal, so that they should have shown it more regularly, if it were always or even usually an accompaniment of a series or fatal infection. I think, to be on the safe side, in severe cases I should depend much more on the diuretic effect of the fluid itself rather than the percentage of saline in it, and I would give a saline solution of rather less than that which is isotonic with normal blood, 0·9 per cent. I do feel that the nitrogenous products are much the most important to combat, of chemical constituents; that is shown well by this small series depending more on the amount of lung involvement than the apparent severity of the infection. The toxæmia, of course, is always better for dilution, not, however, by intravenous use of the saline, so much as by the other more natural routes." [17]

Of course, if simple endocarditis be present, we could have a condition which would render clotting probable, even though the blood be in relatively good condition. Fortunately, simple acute endocarditis in pneumonia is infrequent. On the other hand, when it occurs, it does so comparatively early,

[17] Personal letter, September 25, 1906.

and unfortunately "the diagnosis is always difficult and often impossible."[18]

To have a good physiological basis for any remedial practice which appeals to us, is always desirable if we can obtain it. In the question of heart clot in pneumonia, I have found nothing which in this direction is more than doubtful, but that much at least permits honest empirical trials. "It is not believed that there is a normal definite chemical in the blood which prevents clotting in the vessels in the normal state. The present view is that the "fibrin ferment" is formed first when blood comes in contact with anything except the lining of the vessels, and that perhaps even the formation of said ferment is due to something else, which is formed first, probably, out of disintegrating blood plates, or leucocytes, or both. Once formed thus, the ferment converts a proteid of the blood plasma, fibrinogen, into fibrin." Why, inasmuch as blood plates and leucocytes disintegrate "in the system" in health, they do not, by liberating ferment, cause clotting—nobody knows. Whatever they give rise to may be at once consumed by the cells of the vascular wall, or these cells, or some cells, may give out something unknown which may neutralise the nascent ferment."[19] From a pathological point of view we have to do less with mere conjecture.

Intense reaction in pneumonia consists of cellular metabolism which tends to reduce the alkalinity of the blood. The reduction of alkaline salts in the blood brings a tendency to precipitation of fibrin, and increase of toxins entails cardiac arrest. With the continuance of pneumonia the alkaline salts are more and more reduced and are not replaced by the ordinary restricted dietary, hence the vital defences are continuously diminished, and finally life ceases.

When a proper specific gravity and alkalinity of the blood

[18] Edward F. Wells, *Jour. Amer. Med. Assoc.*, October 18, 1902.

[19] Personal letter from John G. Curtis, March 8, 1906.

are maintained, the crisis of the disease is precipitated by the continuance of a high temperature which tends to destroy the pneumococcus. With this view of biology, Todd[20] first treated pneumonia patients with salines. The views of Todd are also held essentially by F. P. Henry, and by Cohen. The latter believes in them particularly, because he thinks that the pneumotoxin creates a marked tendency to "coagulative processes." Todd prescribes from the inception of the disease $2\frac{1}{2}$ grains of sodium chloride and 1 grain of potassium bicarbonate to an ounce of water, and 6 to 8 ounces of this fluid should be taken every two hours. The addition of lemon juice makes the drink more palatable. The character and quantity of the urine is the best test of the efficacy of the treatment. If in large quantity and light, it shows the specific gravity of the blood is normal ; a different condition of the urine, viz., when high coloured and in small quantity, indicates that more alkaline drink should be taken.

John B. Todd[21] writes : "My experience this past winter has confirmed my belief in the usefulness of the saline beverages in pneumonia. I believe the early and continuous use of salines does prevent, in a measure, the tendency to fibrin formation ; it washes out the toxin and keeps the blood and tissue serum to maximum quantity, and in that way favours the leucocytosis, and at the same time the diuresis tends to temperature reduction." J. Madison Taylor,[22] in the "Symposium on Pneumonia" before the Medical Association of the Greater City of New York, December 11, 1905, practically endorsed the views of Todd. I commend it as a further and valuable contribution to "the rôle of saline solution in the treatment of pneumonia."

It is probable that the addition of lemon juice to the saline

[20] *New York Med. Jour.*, March 20, 1905, p. 1004.
[21] Personal letter, April 17, 1906.
[22] *Medical Record*, January 13, 1906.

beverages is really useful in view of the researches of Professor Wright, who has found that the giving of citric acid decalcifies the blood and thus lessens its tendency to coagulation. According to W. Haward, C. J. N. Longridge has made similar observations. Haward[23] thinks, therefore, that citric acid should certainly be given as a curative measure when thrombosis has occurred, and also as a preventive agent in all those instances in which this complication is likely to occur. Wright[24] and Haward[25] believe that 20 to 40 grains of sodium citrate to every pint of milk is indicated, because it produces a partial decalcification of the milk and thus restricts the intake of lime salts. It also renders the milk more digestible. This it does by lessening the amount and density of the curd.[26] A similar amount of citrate of sodium may be added to every pint of saline solution when administered by the rectum. If increase of coagulability of the blood depends upon excess of lime salts in the blood, and not upon the increase in the albuminous elements of the fibrin, Wright's[27] view appears eminently reasonable. We know, indeed, that "cows' milk contains 1 part in 600 of CaO as compared with 1 part in 800 contained in lime-water."

In view of the foregoing it seems that we should give citric acid in the form of lemon juice, properly diluted and slightly sweetened,[28] far more frequently than we do at present, not

[23] *Lancet*, March 17, 1906, p. 741.

[24] *Medico-Chirug. Trans.*, 1903, vol. lxxxvi.

[25] *Loc. cit.*

[26] *Wynn*, *Birmingham Med. Review*, April, 1906. Poynton and Shaw, *Archives of Pediatrics*, March, 1906, also corrobrates this view.

[27] Wright has suggested, also, that a possible cause for the frequency of phlebitis as a complication of typhoid fever lies in the increased coagulability of the blood caused by cow's milk.—*Therap. Gaz.*, May 15, 1906, p. 315.

[28] Sugar is stated to prevent coagulation. *Vide* Article Cœur, Dict. de Med., vol. viii.

merely as an agreeable, refrigerant drink, but also for its notable action in preventing coagulability, whenever there is reason to anticipate or dread it, and this is specially true in all cases of pneumonia.

On the other hand, Augustus Wadsworth[29] writes: "The calcium salts are only part of the subtle equilibrium by which the coagulability of the blood is controlled. Furthermore, the relationship of the coagulability of the blood to the infection and the immunity of the patient, is a field of research not yet explored with any practical results. The French observers, Gilbert and Fournier, "consider the fibrinogenesis in pneumonia, in some subtle way, an all-important factor in bringing about the recovery from the infection. These observers might, therefore, question the advisability of using citrate infusions[30] in the great majority of cases."

The tendency to coagulability of the blood is also diminished, as we know, by oxygen inhalations, alcohol, and diminution in the quantity of food taken. As regards oxygen, we may say "the better the oxygenation of the blood, the more easily it circulates . . . Moreover, the more thoroughly the blood is oxygenated, the less prone is it to coagulation. It has been proved that the inhalation of oxygen gas diminishes the coagulability of the blood."[31]

[29] Personal letter, July 26, 1906.

[30] This letter of Wadsworth was in reply to my asking whether it would not be desirable, in certain urgent cases, to add citrate of sodium to the ordinary saline venous infusions. I had in mind, also, other conditions in which cardiac thrombosis might occur—notably diphtheria, typhoid fever, and following profound surgical shock from accident, or operation. I recognise in this latter condition, with B. H. Caswell, *Boston Med. and Surg. Jour.*, June 28, 1906, that salt solution, when alone, given intravenously, is of little or no benefit as it does not raise the blood pressure. To effect this, adrenalin is the only drug to be used. The proportions of adrenalin are: 1 to 1,000 solution, one part in 200,000 (?) parts of saline solution, or 1 drachm to the pint. (Hare.) I am glad to note that H. A. Hare holds the same views as Caswell. *Vide* Practice of Medicine.

[31] Haward, *loc. cit.*, p. 744.

As the result of Bence's observation, in a large number of cases, he finds that "the viscosity of the blood rises and falls with the quantity of carbonic acid which it contains. . . . By reason of this increased viscosity, blood overloaded with carbonic acid naturally exerts its effect on the heart. If the overloading is the result of cardiac insufficiency, the latter defect will be further increased. In suitable cases, inhalations of oxygen will reduce the viscosity of the blood which contains abnormal quantities of carbonic acid, by favouring the elimination of the latter, and in this manner the cardiac insufficiency may likewise be relieved."[32]

We all know the views of Benjamin Ward Richardson with respect to the effect produced by giving ammonia internally. He states that it made coagulability feeble and slow and also made the blood globules irregular. Bartholow has, also, the belief that ammonia has considerable value in preventing and curing cardiac thrombosis.[33] In a letter from Paul Bartholow, April 15, 1906, he writes me as follows: "My father had had a great deal of experience with the effects of ammonia in those cases where the blood serum was altered by those rather indefinite bodies which we now believe factors in the phenomena of agglutination. In practice, I have twice recently seen good effects from the aromatic spirit of ammonia, which by the way has been recommended by Osler."[34]

S. S. Cohen,[35] also, states: "Ammonium, too, is known to oppose the deposit of fibrin. In the absence of an efficient antitoxin, the old empiric use of ammonium chloride and ammonium carbonate and the modern use of saline infusion seem to have their philosophical justification."[36]

[32] *Med. Record*, February 24, 1906, p. 305; also *Zeit. f. klin. Med.*, vol. lviii, No. 3. Article by J. Bence.

[33] "Therapeutics," twelfth edition, p. 237.

[34] See the chapter on Heart Disease in his Practice.

[35] *Jour. Amer. Med. Assoc.*, December, 10, 1904.

[36] Flint writes as follows: "I have for several years advised the carbonate or muriate of ammonia during the progress of the disease, with a

On the other hand, W. H. Howell, of Johns Hopkins University, writes to me March 26, 1906, as follows: "In regard to the action of ammonia, I do not recall that anyone has seriously believed that ammonia can effect the clotting of the blood, since the old experiments of Richardson in 1856. Richardson abandoned his theory, I believe; certainly it has long since dropped out of physiology."

In a paper read before the Climatological Association,[37] June 4, 1904, I wrote as follows: "I am of the opinion that there is weighty evidence to prove that the solution of ammonia is a preparation, used moderately and continuously in pneumonia, of considerable value. Its value is specially shown not as a stimulant, because in that particular I believe alcohol, as whisky or brandy, to be more desirable, but to keep the blood alkaline and fluid. In this disease, especially in the grave forms and where there is extensive pulmonary consolidation, it is to my mind a very important matter. I have seen many patients in whom, before death and at the autopsy, I have been convinced that heart clot avoided would possibly or probably have meant a life saved. To no one as much as to Benjamin Ward Richardson is the honor due of

view to prevent cardiac thrombosis. Of course it is difficult to obtain clinical proof of the protective efficacy of this or any other remedy against that accident. There can be no objection to the use of this remedy on therapeutical grounds, since it does not in any manner affect unfavourably the progress of the disease. A. Patton, of Indiana, in a paper advocating the free use of this remedy throughout the disease, that is from 5 to 10 grains every three hours, states that of ninety-six cases in which is constituted all the medical treatment, in only two cases was the disease fatal. —*Amer. Jour. Med. Sci.*, October, 1870. Of 207 cases treated chiefly with this remedy, by J. P. Thomas, only three were fatal.—*Vide Va. Med. Monthly*, April, 1880. "It is probable that digitalis given with a view to increase the power of the heart's action is useful in preventing heart clot." —Flint.

[37] *Amer. Jour. Med. Sci.*, December, 1904.

great insistence upon this important fact, too much ignored to-day in medical writings and medical practice.[38]

"In some instances where there was distension of the right heart and jugulars, with great breathlessness, pallor, or almost lividity of lips, face, extremities, and even portions of the trunk, which means *beginning thrombosis*, I have seen temporary good effects produced by a venesection, and occasionally, perhaps, a life saved.

"But many times reducing the bulk of blood will not save life unless we dilute it, and incidentally, perhaps, partially neutralise its contained toxins. Give, therefore, a moderate saline infusion after the venesection, with this hope, and also insist upon beginning immediately or continuing frequently the use of ammonia under form of the strong solution or the aromatic spirit."[39]

Finally, I would cite from a paper of mine read before the Association of American Physicians in 1894: "In one instance which I saw with J. E. Traub, of New York, and in which we bled the patient about 17 or 18 ounces at the third day of the disease, we had at first notable relief to the breathing and circulation, but soon the symptoms of distress and restlessness came back in aggravated form, and the patient suddenly grew worse and died. In this case no murmur could be heard in the cardiac region, and although the sounds were slightly muffled and the action extremely rapid, we only suspected the formation of heart clots, without being able to affirm it. In view of the sudden death of the patient and without other

[38] I am glad to say that the late Austin Flint shared my views.—*Vide* "Practice," sixth edition, p. 172.

[39] The views here expressed are more affirmative that those I stated in an article entitled "Cardiac Thrombosis" which I wrote for "Pepper's System of Medicine," in 1885, vol. iii. pp. 745 and 746. In this article, indeed, H. A. Hare, personal letter, December 18, 1905, finds a statement indicating that I have little faith in this means of preventing this occurrence. Later and wider experience has evidently changed my views considerably.

sufficient causes satisfactory to explain it, I now believe cardiac thrombosis was the immediate cause. I have not infrequently, especially in former years, and when I was an hospital interne, seen many autopsies in which pneumonia undoubtedly occasioned the heart clot which was the direct cause of death."

In those cases in which cardiac thrombosis is threatened, nitro-glycerine is frequently advised. If there be high arterial tension associated with a rapid-acting heart, which is extremely rare, this is good counsel. If there is evident vaso-motor weakness and cardiac failure is suspected, I agree with Le Fevre[40] in strongly condemning the tendency of resorting to it, as "peripheral resistance is already too low on the arterial side, and nitro-glycerin only makes it lower."

Ewart writes[41] emphatically that he opposes the use of calcium salts "in a disease" (pneumonia) "so prone to clottings that one of its common fatal terminations is intracardiac thrombosis" (p. 778). Further, he strongly advocates a defibrinating treatment to forestall consolidation. He regards "clotting in the alveoli" as "the danger special to pneumonia." The aim, writes, Ewart, should be at an *early date* to maintain in the congested areas as much fluidity of blood and lymph as possible, to prevent vascular and lymphatic obstruction, and thereby to promote a *steady rate of elimination of the infecting agents and of their toxins*, thus avoiding or lessening the possible disaster consequent upon their concentration." Ewart advises the *use of leeches*, "of withholding fibrin formers from the fever diet, and of administering the citrate and the sodium of potassium to reduce the viscosity of the blood."

[40] "Some Problems in the Treatment of Pneumonia."—*Med. Record*, February 24, 1906.

[41] "On the Use of Calcium Salts as Cardiac Tonics in Pneumonia and Heart Disease."—London, *Lancet*, March 30, 1907, pp. 778 and 779.

In conclusion, I would affirm :

(1) Heart clot as an immediate cause of death in pneumonia is more frequent than *post-mortem* investigations, as now made, apparently sustain.

(2) Clinical experience seems to justify the statement that the carbonate of ammonium has probably considerable efficacy, when properly given in preventing heart clots.

# STATISTICS OF SIXTY DEATHS FROM ANGINA PECTORIS, WITH NOTES ON THE PROGNOSIS OF THAT DISEASE.

BY ROLAND G. CURTIN, M.D.
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DURING my professional life I have noted down in tabular form some of the major facts in regard to the deaths from angina pectoris that have come under my observation. These cases occurred mostly in private practice, or were seen in consultation; but some were met with in the Philadelphia General and Presbyterian Hospitals, and others were detailed by my friends in the profession. None of these cases have been reported, except three, which were included in a paper that I read before the Society several years ago. As you will see, quite a number, one-fourth of the deaths here recorded, were in physicians. This will make the paper more interesting to you, and will also stamp the cause of these deaths as "The Doctors' Disease."

In 1893 I read before this Association a paper upon "Angina Pectoris and Anginose Symptoms following Heavy Blows and Crushing Injuries on the Precordium, and upon Chronic Inflammation of the Lungs, Pleura, and Pericardium." Some of the cases here tabulated have corroborated the position taken in that paper, that greatly prolonged angina pectoris may be associated with old pericardial or pleuritic adhesions, or with chronic lung disease, the two latter being in close proximity to the heart.

*Sex.*—Of the sixty patients, forty-five were males and fifteen were females. I should say that, taking all the cases together, perhaps the males under observation predominated, but not unduly. The proportion of males does not seem large, but as my practice included more than the usual number of physicians who are usually males, perhaps the proportion is not abnormal, for more males die of it than females. One writer gives the ratio as 11 to 1. In my table it is 3 to 1. This is due largely to the fact that undue mental exertion and bodily activity are exciting causes, although we see many cases in those who are studious and lead sedentary lives, but of course the fundamental causes must be present.

*Social State.*—I find that the tabulation shows this to be as follows :—

| | Females | Males |
|---|---|---|
| Unmarried | 4 | 7 |
| Married | 5 | 25 |
| Widow or widower | 6 | 9 |
| Unknown | | 4 |
| | 15 | 45 |

Of those that died twenty-five were married men ; and among the females, the widows predominated, with six deaths. It is to be presumed that the married men and the widows had to do some extra mental work for themselves and families. One of the unmarried women should be classed as married, as she was a "mistress."

*Age.*—The following table will show the ages of the patients :—

| Age in years | Number of patients | Age in years | Number of patients |
|---|---|---|---|
| 22 | 1 | 55—60 | 6 |
| 23 | 1 | 60—65 | 8 |
| 34 | 1 | 65—70 | 12 |
| 38 | 7 | 70—75 | 7 |
| 39 | 1 | 75—80 | 1 |
| 40—45 | 2 | 80—85 | 1 |
| 45—50 | 5 | 85—90 | 0 |
| 50—55 | 6 | 90—95 | 1 |

Angina pectoris is a rare disease before middle life; so here we find that fifty-four of the sixty deaths occurred from 38 years to 75. At the age of 38, seven deaths were recorded, four being females. This can easily be accounted for; it is an age that women seem to dislike to pass. I have noticed every year that thirty-eight years before must have been a great year for girl babies.

Only three died after the age of 75. This may be explained by the fact that there are fewer persons to die at and after that age, and that then the aggravating mental and physical activity are over. This is seen in the statistics of physicians. Of the fifteen deaths all except one at the age of 53 were in men between 58 and 72 years of age, two at 62, two at 66, and two at 72. As age creeps on the physician his activity is kept up in trying to retain his increasing or waning practice, or endeavouring to carry a load that seemed light at 40, or in yielding to the demands or petitions of his old, faithful and loyal patients. This strain not only brings on predisposing factors, but these factors might remain quiescent if not stirred into action by the teasing labour for which they are unfitted. This causative condition is like the clock that is wound up, but does not start until the pendulum is set in motion. The old doctor's overwork is the push that sets the pendulum moving and starts up the impending angina pectoris.

Of the two youngest cases, one at 22 and another at 23, the former was undoubtedly syphilitic. The first had the history of syphilis, and he also had double aortic disease. The patient that died at 23 years had very suspicious symptoms. Both these cases would have been classed as pseudo-angina pectoris from the symptoms.

The cases between 65 and 70 years numbered thirteen, and those between 60 and 65 were four less or eight. Between 50 and 55, and between 55 and 60 years, there were six each; so that thirty-two of the sixty deaths occurred between the the ages of 50 and 70.

*Complications.*—The following complications were noted :—

| | Cases |
|---|---|
| Mitral regurgitant disease and degenerative change ... ... | 3 |
| Mitral regurgitant disease ... | 3 |
| Mitral regurgitant disease and dropsy ... ... ... ... | 2 |
| Mitral disease ... ... ... | 1 |
| Mitral regurgitant disease and aortic constriction ... ... | 1 |
| Mitral double disease and aortic constriction ... ... ... | 1 |
| Double aortic disease ... ... | 1 |
| Degenerated heart and dropsy ... | 1 |
| Organic disease of the heart ... | 1 |
| Dilated heart ... ... ... | 1 |
| Anæmic necrosis of the left ventricle and locomotor ataxia .. | 1 |
| Rheumatism and weak heart ... | 1 |
| Dilatation of the aorta ... ... | 1 |
| Chronic phthisis following pulmonary influenza ... ... | 1 |
| Chronic phthisis ... ... ... | 1 |
| Chronic lung-disease and disease of heart ... ... ... ... | 1 |
| Chronic pleurisy ... ... ... | 2 |
| Chronic pleurisy and chronic lung-disease ... ... ... ... | 1 |
| Pneumonia at the end ... ... | 1 |
| Hemoptysis six months before ... | 1 |
| Caries of the spine in early life ... | 1 |
| Mild dropsy ... ... ... | 1 |
| Old diabetic cases... ... ... | 2 |
| Old hemiplegic ... ... ... | 1 |
| Gout ... ... ... ... | 2 |
| Chronic diarrhœa ... ... | 2 |
| Dyspeptic and emaciated... ... | 2 |
| Came on with cholera morbus ... | 1 |
| Chronic alcoholism ... ... | 1 |
| Chronic alcoholism and syphilis... | 2 |
| Operated on for appendicitis shortly before attack... ... ... | 1 |
| Ovariotomy performed before first attack ... ... ... ... | 1 |
| Strain of Johnstown flood ... | 1 |
| Hypochondriac ... ... ... | 1 |
| Great smoker ... ... ... | 1 |
| No complication apparent ... | 14 |

Gout was mentioned in only two cases, but I can recall two or three in whom there were undoubted gouty symptoms, and I have good reason for believing that "gouty storms" are frequently the cause of death in anginose cases. Those that had syphilis were four; two of them had chronic alcoholism added. Six had degenerative disease of the heart, but this does not tell the whole truth; as other cases had degenerative disease added to other complications. Eighteen had organic disease, which, with the degenerative cases made twenty-four cases with cardiac changes of an organic character. Eight had lung or pleural disease. One died after having gone through the strain of the Johnstown flood, and another had been ruined financially by a decline in the stock market. Two died after operations, ovariotomy and removal of the appendix. Two died with chronic diabetes, probably gouty saccharinuria.

Two had chronic diarrhœa, and two chronic dyspepsia. All four probably suffered more or less from malnutrition. Only one case is noted as being a great smoker, but others I know did smoke, some more and some less.

*Occupation :—*

| | Cases | | Cases |
|---|---|---|---|
| Physicians ... ... | 15 | Carpenter ... ... | 1 |
| Clergymen ... ... | 5 | Mistress ... ... | 1 |
| Lawyer ... ... | 1 | Tramp ... ... ... | 1 |
| Actor and author ... | 1 | Storekeeper ... ... | 1 |
| Editor ... ... ... | 1 | Gentleman ... ... | 1 |
| Dentist ... ... ... | 1 | Gentlewomen ... ... | 3 |
| Stockbroker ... ... | 1 | Labourers ... ... | 3 |
| Retired army officer ... | 1 | Domestic ... ... | 1 |
| Land-speculator ... | 1 | Contortionist ... ... | 1 |
| Manufacturers ... ... | 2 | Housewives ... ... | 9 |
| Hotel-keeper ... ... | 1 | Unknown ... ... | 5 |
| Janitor ... ... ... | 1 | | |
| Worker ... ... | 1 | | 60 |
| Blacksmith ... ... | 1 | | |

As is shown in this tabulation, twenty-nine out of the sixty deaths occurred in those who had passed the time of mental and bodily activity, which had extended far beyond middle life. Fifteen or one in every four were physicians, and five were clergymen.

*Pain at Time of Death :—*

| | Cases | | Cases |
|---|---|---|---|
| Present ... ... ... | 25 | Stopped a day or two before death ... ... ... | 4 |
| Probably present ... ... | 1 | Fell dead, and pain was not recognised ... ... | 2 |
| Not present ... ... | 9 | Insensible at hour of death | 1 |
| Stopped just before death ... | 3 | | |
| Unknown ... ... ... | 15 | | |

Of the forty-five cases noted, pain was present in twenty-one, and probably in one other. In nine, it was not present; in three, it stopped just before death; and in four, a day or two previously to death. In almost all of those cases in which the pain ceased just before death, the patients died of exhaustion, which was caused by the continued severe pain.

*Manner of Death* :—

| | Cases | | Cases |
|---|---|---|---|
| Died instantly or quite suddenly ... ... ... | 31 | Died in two hours ... .. | 1 |
| Died of internal hæmorrhage | 1 | Had pain for days ... ... | 2 |
| Died of pulmonary congestion with pain ... ... | 1 | Had pain for months ... | 1 |
| Died in half an hour ... | 3 | Died of exhaustion... ... | 16 |
| Died in one hour ... ... | 1 | Unknown ... ... ... | 3 |
| | | | — |
| | | | 60 |

The deaths from exhaustion in the above table number sixteen. In these cases, the prolonged attacks wore out the patients' strength, and the pain usually ceased before the end came.

Thirty-one out of the fifty known cases died instantaneously or unexpectedly. Some of these cases had been sick a long time, but the end came as a surprise to physician and friends.

*Hour of Death* :—

| | Cases | | Cases |
|---|---|---|---|
| 12 a.m.... ... ... | 3 | 11 p.m. ... ... | 4 |
| 1 ,, ... ... ... | 1 | 11.30 ,, ... ... | 1 |
| 4 ,, ... .. ... | 1 | | |
| 7 ,, ... ... ... | 1 | At night ... ... | 3 |
| 2 p.m.... ... ... | 1 | In the evening... ... | 4 |
| 4 ,, ... ... ... | 2 | Early morning... ... | 2 |
| 5 ,, ... ... ... | 1 | Daytime ... ... | 1 |
| 7 ,, ... ... ... | 3 | Afternoon ... ... | 1 |
| 10 ,, ... ... ... | 2 | Unknown ... ... | 29 |

Of the thirty-one noted, the hour of death was generally in the after part of the day and in the night. From 7 p.m. to 7 a.m., twenty-five out of the thirty-one died, leaving six for the hours between 7 a.m. and 7 p.m. This may be explained by the fact that it followed fatigue; and in a number of the cases, the attack came on after a hearty late dinner, and was afterwards followed by death.

*Death after Fatigue* :—

| | Cases |
|---|---|
| Not after fatigue ... ... ... ... | 44 |
| After fatigue and exertion ... ... ... | 12 |
| After great worry ... ... ... ... | 1 |
| Unknown ... ... ... ... ... | 3 |

You will see that twelve cases out of fifty-six noted, died after fatigue and exertion, all in the evening; and several of these men were physicians.

*Death after a Hearty Meal.*—Seven deaths occurred after a hearty meal, associated with fatigue. The great moral of the foregoing is, I think, that physicians should gradually slacken off from work as years advance, rather than add to it; and should not take their heaviest meal in the evening, especially when fatigued.

*Duration of the Disease*:—

| | Cases | | Cases |
|---|---|---|---|
| 3 days ... ... ... | 1 | 3 years . ... ... | 4 |
| 5 ,, . . ... ... | 1 | 5 ,, ... ... ... | 1 |
| 6 ,, ... .. ... | 1 | 6 ,, ... .. ... | 2 |
| 8 ,, ... ... ... | 1 | 10 ,, ... ... ... | 1 |
| 18 ,, ... ... ... | 1 | 12 ,, ... ... ... | 1 |
| 6 weeks .. ... | 2 | 13 ,, ... ... . | 1 |
| 11 ,, ... ... ... | 2 | 14 ,, ... .. ... | 1 |
| 2 months ... ... | 4 | 15 ,, ... ... ... | 1 |
| 2½ ,, ... ... | 2 | 19 ,, ... .. ... | 1 |
| 8 ,, . ... | 1 | No known symptoms of | |
| 18 ,, . ... | 2 | the disease previously | 3 |
| Several ,, ... ... | 5 | Several mild attacks ... | 3 |
| 1 year ... ... ... | 6 | A long time ... ... | 2 |
| 2 years . ... ... | 2 | Not noted ... ... | 7 |
| 2½ ,, ... ... ... | 1 | | |

Thirteen out of fifty-two cases of which we have a note lasted from one to three years, and three died in the first attack.

*Character of Previous Paroxysms*:—

| | Cases |
|---|---|
| Mild ... .. ... ... ... ... | 15 |
| Severe... ... ... ... ... ... | 23 |
| None before death ... ... ... ... | 4 |
| Not noted ... ... ... ... ... | 10 |

As stated in the table, of the forty-one cases noted, in fifteen the symptoms were mild, and in twenty-three severe; and in four, no pain was experienced before the death-attack.

You will observe that almost all of these cases are complicated with other diseases; but in all the angina pectoris seemingly played an important part in exhausting the strength of the patients. The cases with old inflammatory conditions around the heart and inside the pericardium were usually long continued, mild cases that finally died of exhaustion, being teased to death by the long continued pain and anguish. The pain in long-standing cases, if present, was not generally so excruciatingly severe as in the more acute cases. It has been noticed by previous observers, that the most fatal sign was when the pain was in the throat; and from my experience, I should also say that fatality commonly attended the cases in which *the pain was in any unusual location*, as in the back, at the left shoulder-blade, opposite the heart, to the left side of the neck, in the left occiput, or on both sides of the chest, when in the right arm or when both were the seat of pain. Fully half the cases in which the right arm and shoulder, and the chest were affected, ended after a short illness, with severe pain and general depression. In the syphilitic, the prognosis is bad, even in the case of the young.

This tabulation and the experience of the writer would seem to point to the following facts in the *prognosis of angina pectoris* :—

(1) In many of the fatal cases, the pains were unusual as to place; at the base or side of the neck, occiput in the back, on both sides of the chest anteriorly, or in both arms.

(2) Fatality seemed to attend all the prolonged cases that had extended over years.

(3) In almost all the cases in which the breath was greatly embarrassed, or when unconsciousness occurred, the result was death, though not always speedily so.

(4) When the pain is of unusual severity and the length of the intervals decrease, the prognosis is bad.

After careful study, I am convinced that when a mild case that is not hysterical has persisted for a long time, no physician can say positively that it is an instance of pseudo-angina and will not be fatal ; and no one can say that when there is angina pectoris with organic disease of the heart, the patient will die of this disease, as some intercurrent affection may carry the patient off.

One point of interest to physicians as shown by one of the tables, is that they are especially prone in advanced years to speedy death from angina pectoris after a hard day's work followed by a hearty dinner. Five of the fifteen tabulated died in this way, that is within a short time. I should say further that these indications are that old people should not eat hearty meals in the after part of the day, and if they have a tendency to anginose attacks, a period of rest before and after the evening meal would be a safeguard.

# SUBSTERNAL SQUEAL: A HITHERTO UNDESCRIBED ADVENTITIOUS HEART SOUND.

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In examining the hearts of many thousands of patients, I have found over the region of the heart in eight of these cases an adventitious sound that I have not seen recorded in any of the works on cardiac literature, and, wishing to give my observations to the profession, I shall take this opportunity to report them. Of the last five of these eight cases I have kept records. Four of the patients were females, and one a male. The greatest importance of these observations seems to be that a knowledge of the sound, its location, and its character, may explain some of the sounds that frequently puzzle examiners, for it is very evanescent, coming and going without apparent cause. It is not accompanied by any apparent associated symptoms or conditions. It may be intermittent or remittent, changing only with respiration, but not affected by the action of the heart. The fact that it is sometimes remittent shows that it occurs at a point at which the blood is constantly flowing. The fact that it is influenced by respiration proves that it is connected with the respiratory flow of blood. I have never but once heard this piping squeal in a case with other evidence of organic valvular heart-disease and once with angina pectoris. Each time it has been discovered accidentally in patients being routinely examined, who had no special cardiac symptoms. It is apparently present without rhyme or reason, so far as known cases are concerned.

Case 1.—E. McD., aged 35, a dressmaker, had had profuse menstruation for two years, but the last time it was scanty and painful. She went to three prominent gynecologists, who diagnosticated a fibroid tumour of the uterus. She had had a bronchial cough, summer and winter, from the age of 5 to that of 25.

Upon examining her chest, I found that she had a marked piping sound inside the left border of the sternum, opposite the second cartilage. This sound was continuous, but remittent. It was also heard at the right side of the sternum, at the same point, but not so loudly. At a later examination the sound was absent, but a little active exercise started it up, although it was then not nearly so loud as it had been previously, when the patient was not exercising, but remained in a quiescent state. The sound was not intermittent. At a later examination it was found to be intermittent and, during inactivity, faint. Again, it was remittent when loud and strong. There was a marked variation with breathing, the sound diminishing on expiration and increasing on inspiration.

Case 2.—Miss M. T., aged 46, a school-teacher, had for three years had an eye trouble said to be inflammation of the optic nerve. She had come from a remarkably gouty family, and applied to me for relief from rheumatic pains in the right lower extremity. These pains were at first located in the thigh, but for the last few days had existed also in and around the right knee. She was extremely susceptible to the action of belladonna. A doctor had once dropped atropin into her eye, and she was detained in his office for a number of hours, owing to the toxic effects of the drug.

While examining her heart, I discovered the sound, which I call a substernal squeal, stronger on inspiration than on expiration, but continuous. I also heard over the heart a faint systolic sound, which seemed to be mitral. Sixteen days later I failed to hear the before-mentioned sound, as well as the murmur. I have several times since had an opportunity to examine her, and have at subsequent visits noted that there has been no evidence of a return of the sound.

Case 3.—B. J. M., aged 18, a graduate of Girard College, who had always been healthy, vigorous, and robust, came to be examined for the Post Office Service, thinking himself physically well. The heart was a little irritable, and the pulse 72. In the cardiac examination I asked him to breathe deeply, and the first inspiration seemed to start up this piping squeal, which afterwards subsided, only to be reproduced by rapid respiration. The point of greatest intensity of this sound was at mid-sternum, opposite or a little above the third cartilage, and in that immediate neighbourhood. At a later examination this sound failed to be developed by rapid respiration or exercise.

Case 4.—Mrs. K., a widow, aged 44, with no children, whose former husband had been a victim of specific disease and had communicated it to her, had considerable palpitation with reduplication of the sounds. After having attended her many years, I one day discovered this same sound over the body of the heart. The exact location of the most marked sound was not indicated in the history of the case; but it was about mid-sternum, opposite the second cartilage. I have seen the patient almost monthly since that time, and have not heard it again. The sound disappeared during expiration for two or three systoles; and at the end of inspiration it was loudest. The sounds of the heart were markedly reduplicated. The piping sound had disappeared before the next visit, and has never since been noticed.

Case 5.—Mrs. R. K., a childless widow, aged 69, had evidences of old chronic pericardial adhesions and anginose symptoms, the latter of which have continued during the last five years. She has had neuralgic and rheumatic pains at times. The sound in her case was heard about opposite the third cartilages, and was intermittent. It was of the same high-pitched, piping character.

In one case I heard the louder or inspiratory sound with my ear 4 inches from the chest wall, and in another case during held respiration it gradually ceased.

The sound is clearer, lower pitched, harsher, coarser, and much louder than is the "bruit diable," or venous hum of the veins of the neck in extreme anæmia, which hum it seems to resemble more than any other sound. It resembles, to some extent, the hissing squeal or singing of a boiling tea-kettle. It is more like a shrill musical whistling than a humming sound. It is remittent when strong, is loudest on inspiration, and becomes faint or is lost on expiration.

The continuousness of this sound shows that it is not produced at the aortic, pulmonary, or tricuspid orifice; otherwise it would cease when the blood-current is stopped by the shutting of the valves at these orifices. The only places in the heart at which there could be a continuous sound such as the one described would be in the blood flowing into the right or the left auricle, and these two places in the heart are the only ones where the respiration has a perceptible modifying influence upon the flow of blood; but, again, the shutting of the mitral and tricuspid valves has a modifying influence on the current, which would be perceptible in an abnormal sound connected with it. The point of greatest intensity of the sound is a little to the left of the median line of the sternum, at or just below the second cartilage. I therefore locate the sound at or near the upper part of the left auricle, where the pulmonary valves carry the blood to the left auricle.

At first I considered it to be due to a peculiar constriction of a blood-vessel, perhaps a strictured point; and later I am inclined to think it was due to changed conditions of the blood, altering its fluidity. As to the first idea, I reasoned that if it were due to stenosis of a blood-vessel it would be more constant, and that it would, when absent, reappear whenever the current was hastened. Such was not the case, even a short while after the sound had ceased. As to the second supposition, that the sound was due to an alteration of the blood, it would, I think, be more constant and not so changeable ; and, at the same time there was in these cases no evidence of anæmia or other symptoms of changed blood conditions that would lead one to suspect such a condition. I have examined many persons with extreme anæmia and other marked blood disorders, without having heard such a sound ; and in anæmic murmurs the sound is at the other side of the sternum, and is soft and distinctly systolic. The sound in my cases was certainly affected by respiration, as it was frequently faint or lost during expiration and present, at the same examination, on inspiration.

If the murmur were in the auricles, the flow of blood would be more or less influenced by the action of the heart, therefore we may conclude that the heart is not concerned in the production of this sound. Having thus excluded the four orifices and the four valves of the heart, as well as the auricles and ventricles, we must look for the causation in the vessels concerned in the aeration of the blood. In what period of the respiration do we hear this squeal ? It is loudest on and increases with inspiration, at the time when the blood flows into the lung. Now, if this is the case, the sound must be in the pulmonary artery inside of the lung, which carries the blood to the lungs after it has passed through the right side of the heart. After aëration, or during expiration, the arterial blood flows out of the lungs into the pulmonary veins and back to the left auricle. Now, if the sound were loudest on expiration, we should say that the abnormal sound is in the pulmonary veins; but the facts all point to the pulmonary arteries as the source of the sound.

*Description of the Sound.*—It is louder, stronger and coarser (indicating a larger vessel and a more active flow of the blood) than the sound heard at the base of the neck when the jugular is pressed with the stethoscope; but it is of the same general character. Its location under the sternum places it beyond the reach of any pressure. It is not influenced by the action of the heart; that is, one cannot find any change in the sound with the systole or diastole. During inspiration there is a marked change. Just at the commencement of inspiration the sound becomes gradually louder and more pronounced until the beginning of expiration, when it begins to diminish. In some cases it was not audible after the commencement of the act of expiration.

*Conclusions.*—It would seem that the value of a knowledge of this murmur is four-fold: First, that it is evanescent. Hence one observer may hear it and remark upon it; and when the patient seeks the advice of a second physician, the latter, hearing no sound, may charge the first medical adviser with dishonesty or lack of ability.

Second, that it is not an indication of a serious disease.

Third, that no treatment is required.

Fourth, that from the fact that it is dissociated with any apparent symptoms, it is of value to insurance examiners, military examiners, and others engaged in important physical examinations.

# REPORT OF TWO CASES OF PAROXYSMAL TACHYCARDIA WITH BRIEF REFERENCE TO OTHER CASES ALREADY REPORTED, AND TO SOME EXPERIMENTS BY PHYSIOLOGISTS THAT SEEM TO HAVE AN INDIRECT BEARING ON THE SUBJECT UNDER DISCUSSION.

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THE slight physical disability incidental to paroxysmal tachycardia and the promptness with which the slightly disturbed functional forces are again restored, following the arrest of the attack, should the attack be of short duration, contrasted with the marked disability often observed in tachycardia associated with myocardial disease, present two interesting features, and to some degree symptomatically characterise the two types. It is my intention in this brief report and review to do little more than collate some of the recent views advanced as the probable cause of the disturbance under discussion, and point out a probable reason for the absence of great systemic involvement in the former. Until the question of the pathology of this condition is decided it will remain an open and unsettled problem as to whether it is a definite disease or only a symptom complex. Sufficient then is it to state that the weight of opinion is at this time in favour of the theory which explains the etiology on the basis of a neurosis characterised by a neuro-cardiac storm, and this theory is probably the more strongly supported by clinical observation than any other; though recent contributors, *e.g.*, Hoffman, Hirschfelder, and Hewlett are strongly inclined to support the "heart block" theory. In support of the former view is cited the coincidence that in a few cases repeatedly and in others occasionally, so-called "respiratory pressure" treatment applied by the bending forward position and coincident with the close of the inspiratory act, forcibly holding the breath, thus stimulating the vagi, one is able to bring about arrest of the attack. But there may be even a different explanation for this probable coincidence to which I will refer later. In asking your attention to the following reports of two cases I wish particularly to emphasise the coincidence, that the possible reflex *exciting* causes, though operating from entirely different anatomical centres, are found in special organs whose chief offices so far as are known, are concerned in the general metabolism of the body, and especially in the absorption of nutrient, and the elimination of waist products, and both are somewhat closely allied in the anatomical distribution of terminal fibres from the vagi and solar pleuxus.

Before detailing the clinical facts in these reports I wish to acknowledge the assistance given me by Dr. Jay I. Durand, an associate of mine, who saw case No. 1 the greater number of times, and to whom I am indebted for most of the reviews herein noted.

CASE 1.—Mrs. B——, aged 48, housewife, mother of one child, aged 14; family and personal history negative, except in the latter the statement that she had had numerous attacks of "heart trouble." She knew nothing, however, of the nature of her trouble, describing the seizures as attacks of faintness, with a slight feeling of oppression in her chest, coming on at irregular intervals, varying in frequency from once a month to that of six months. When called to see the patient she was suffering from an acute attack of indigestion with severe cramp-like pains in the abdomen, a dysenteric diarrhœa with considerable tenesmus and nausea. She had eaten a hearty mid-day meal, including crabs and oysters, and afterwards remained in the surf almost continuously for two hours.

*Examination.*—Revealed a well-nourished woman, somewhat above average size, face presenting picture of shock; pallor marked, lips almost colourless, pulse 96 and extremely weak (scarcely countable), temperature $97\frac{3}{5}$, heart sounds faintly heard but clear, heart apparently normal size, abdomen relaxed and everywhere sensitive to pressure. After heat was applied externally and stimulation hypodermatically given, emesis was produced, during which time patient fainted and had an involuntary stool, containing blood streaked mucous; enteroclysis was promptly given which apparently revived the patient and improved the pulse, but the pains became griping and more severe, when a hypodermic of morphia and atropine were administered, after which the patient rested easily until morning and looked much better.

At 11 a.m. she drank a cup of tea, which was followed by vomiting at about 12 o'clock, when immediately after vomiting, tachycardia ensued. At 1.30, patient was found lying very still, face expressive of apprehension, though a good colour, pulse 192, regular, but diminished volume. She complained of faintness, a sense of fulness and oppression about the heart, and of a choking or constriction in the throat; the heart sounds were more feeble than before and shortly became fœtal in character, almost impossible to distinguish first from second sound, no murmurs audible, percussion dulness increased slightly to the left and extending an inch beyond the right of the sternal margin in the third interspace. A fleshy chest wall made location of the apex beat impossible; liver dulness extended perceptibly below margin of the ribs. The one-fiftieth of digitalis hypodermatically given, artificial heat renewed, and twenty minutes later, about 2 p.m., following emesis and a bowel movement, the attack abruptly ceased.

When seen at 7 in the evening pulse was 90 and regular and heart sounds normal, dulness at this time did not extend beyond right sternal margin. Patient felt quite well and left town the next morning. At no time during the attack was she conscious of the very rapid heart beat.

Case 2.—Dr. A., a general practitioner of medicine in a large city, aged 55, married, small family, family and personal history negative, except with reference to the latter. As has been true of many, his early medical career was beset with many privations and much anxiety, but of later years Dame Fortune had been more kind to him—relieving him. He was sent to the shore convalescing from "la grippe," and after a sojourn here of about a fortnight, was seized in the middle of the night with an attack of "over-action of the heart," as the disturbance was referred to by him, and whilst the pulse was exceedingly rapid—200 or there about, as near as I could count it—feeble and accompanied by a sense of oppression and a fulness about the cardiac region. Owing to the fact that he had recently gotten over "grippe," even though he had been having occasional so-called attacks of "over-action" for more than three years, but not so severe as this, both of us were deluded into assuming this to be a tachycardia, probably resulting from a slight dilatation, following myocardial changes incident to his recent illness; and no doubt this illness was in part responsible for the severity of some of the symptoms, viz., great apprehension and extreme anxiety evinced over the probable pending outcome of the attack. However, a hypodermic of morphia soon allayed most of his fear, and relieved much of his apprehension, although the heart action continued rapid and very feeble. The attack continued until 7 a.m., when it suddenly ceased and the doctor surprised me by insisting on going out on the broad walk.

He remained in Atlantic City between six and seven weeks longer and had two subsequent attacks, respectively two and five weeks thereafter. Though neither was so severe, nor was the oppression or the alarm so marked as in the previous one.

The third and last attack at the shore was decidedly the most typical, beginning at 8 o'clock in the evening after a quiet game of cards, and continued until between 12 and 1 o'clock, a.m. It was characterised by sudden onset and rapid heart action; pulse 170, quickly increasing to 210, as near as I could count it, slightly increased respiration, area of cardiac dulness increased to the right of the mid-sternal line, and the face, pale and severe, wore an anxious expression. The following morning the cardiac area seemed normal, pulse 85, respiration 22, and his face had lost all evidence of the pallor and anxiety it wore the night before. It was not until this third attack that we felt reasonably sure of our diagnosis, though frequent physical examinations were made with little more than negative findings. The blood was examined, because of a mild anæmia, and the urine repeatedly so, but only on one occasion was there any evidence of pathological *débris*—which was after the attack previous to the last, when a few red and white blood cells, and quite a few pus cells were found, this, however, was transitory and was attributed to some passing genito-urinary irritation.

Two weeks after his return home he was seized with nephritic colic, for which he was operated on and relieved of a large calculus, weighing nearly 3 grammes, which was found largely encysted in the pelvis of the left kidney. The kidney appeared hyperæmic and only slightly enlarged, otherwise normal save for some thickening in the walls of the pelvis.

Convalescence followed within a reasonable time, and there were no subsequent attacks of tachycardia, but unfortunately he died of pneumonia a little more than seven months after the operation, making any deduction as to the calculus being the exciting cause, problematic—but considered from a summary of the report of Case 1, viz., from a reflex peripheral cause (gastro-intestinal irritation) the renal calculus would seem to have been also a likely excitant.

Lainé reports a case in which the paroxysm stopped after passage of renal calculi and Klemper, one due to hyperacidity, while Payne Cotton reports one with a rate of 232 reduced to normal after a discharge of a tapeworm. James Barr, of Liverpool, England, in the *British Medical Journal*, July, 1904, reports a case with a rate of 250 due to an injury received in the epigastrium in a football game, and the larger group of cases yet reported have been shown to have some disorders of the digestive tract, while some have been apparently precipitated by emotional causes such as fright, great excitement, and prolonged over-exertion.

R. Travers Smith has reported a case in which minor epilepsy occurred coincidently with essential tachycardia, and in which major epilepsy subsequently developed. Talamon, Sahli and others hold that it is caused by an epileptoid explosion in the region of the accelerator motor nerves of the heart.

But, after reviewing much of the literature on the subject, I am convinced that the essential cause of the disturbance is not to be looked for in peripheral reflex irritants. At most we can only assume that the undigested food, accompanied by depressed vitality, the result of prolonged exposure in the surf, in the first, and the renal calculus in the second case were mere excitants, possibly precipitating a reflex storm. A glance over the history of paroxysmal tachycardia acquaints us with the fact that this condition was first described by Payne Cotton, an Englishman, in 1867, and the number of cases reported to date does not greatly exceed 100. And, it was not until 1881 that Gerhardt proposed for it the name tachycardia, and seven years thereafter Bouveret called it essential paroxysmal tachycardia. Each succeeding decade has presented a new view point as to the mechanism, origin and regulation of the heart beats, and each change has been equally productive of more advanced ideas as to the etiology of this strange malady. With the discovery of the inhibitory action of the vagus upon the heart, came the suggestion from Tuchzek that the cause lay in the paralysis of this nerve, and this view has since been widely participated in and continues to be by many to-day.

Nothnagel believed it due to irritation of the sympathetic and he has had numerous followers; but more recently the work on the myogenic theory of heart beat, and especially Erlanger's demonstration of heart-block by compression of the bundle of His, has opened up a new field for speculation; and the latest suggestion comes from Hoffman, who believes it due to an increased irritability of the heart, which allows it to respond to every stimulus received, whereas in health it only responds to every second or, perhaps, fourth stimulus.

In 1903 Hoffman noted the doubling of the pulse, since confirmed by recent observations of others. His theory, briefly stated, is: increased irritability of the heart, or sudden occurrence of extra stimuli, *each regular systole*, followed by extra systoles in middle of diastole. He showed tracings in which occasionally occurred small systoles, midway between normal systoles, in the intervals between, as well as during attacks, and assumed the cause to be interpolated ventricular, extra systoles. Mackenzie assumes paroxysmal tachycardia to be due to prolonged series of ventricular *extra systoles*, replacing normal rythm, and exhibits venous tracings showing ventricular type of venous pulse. Hoffman and Hirschfelder's tracings are considered by some as silent witnesses, in a measure supporting the same. Hoffman's second paper notes further doubling of the pulse as 60 to 120, and 240 in one case, and a subsidence by halving the rate equally sudden. And he further claims that it is only during attacks of paroxysmal tachycardia that the heart responds to all impulses. Reil has tracings showing that ventricular systoles are preceded by auricular, and that between attacks the auricle may continue to beat at double rate. If these latter tracings were correctly made they tend to show a heart block, probably in the bundle of His.

Hirschfelder's case showed no evidence of block at bundle of His, but rather at venous junction with auricle. Experiments have shown that when stimuli are sent to the heart too rapidly it only responds to every second one, but if the strength of stimuli be increased sufficiently it may respond to all. Sometimes the auricle responds to all when the ventricle will not; also increasing the percentage of certain inorganic salts in the fluids supplied to the heart it may increase the irritability of the same, so that all stimuli are responded to.

According to Engleman, quoted by Hewlett (*A.M.J.*, 1906, vol. xlvi.) the activity of the heart may be affected in the following ways: (1) The rate of stimulation may change. (2) The irritability of the heart muscle, *i.e.*, its responsiveness to stimuli, may be altered. (3) The conduction of stimuli from the mouth of the great veins to the apex of the heart may be affected. (4) The contractile power of the muscle itself may be altered.

Let us briefly review some of the experiments in physiology used to prove cardio-vascular inhibition, and also, inferentially, possibly broaden our view-point. Waller found that division of the vagus between the ganglion of the root and that of the trunk, a sufficient time intervening for degeneration of the root fibres, annulled and destroyed its inhibitory influence on the heart. Gad and Joseph repeated these experiments, and observed that the vascular supply of the œsophagus was also influenced. Langley repeated the same experiments, and ascertained that, in addition to the heart and œsophagus, the stomach and intestines were similarly involved. Foster, after extensive consideration of the subject, concludes that the vagus, *per se*, is exclusively sensory at its origin, but that reflex inhibition of the heart, through one of the vagus, may be brought about by stimulation of the proximal or central end of the other.

Langley, in a further series of experiments authorises the statement that the bulbar roots of the spinal accessory contain cardio-vascular inhibitory fibres. Kreidl has recently shown that while all of the roots of the spinal accessory do not provoke cardiac inhibition, the effect is obtainable by stimulating the uppermost bundle of fibres of the bulbar roots —this being the shortest tract from the vaso-motor centre to the ganglion of the root—the stimulus passes thence from the bulbar roots through the spinal accessory fibres into the vagus trunk, thereby maintaining by way of the vagus trunk, a vaso-motor tract direct to the heart.

The foregoing deductions from physiological experiments conclusively point to a provisional inhibitory and acceleratory control of the cardio-vascular systems, and to a large degree to the nutritional control of the same. Therefore it occurs to me, that we have in the above experimental deductions, some indirect light thrown upon the problems concerned in the causative nature of the subject under discussion, and incidentally, some suggestions for interesting reflection, and possibly fruitful thought. If we consider the organs and system *most influenced by* stimuli transmitted through the vagus and spinal accessory tracts are the same as those most noticably affected and disturbed in paroxysmal tachycardial storms, viz., the heart, the œsophagus, the lower cervical and thoracic portions (Langley), the stomach, the intestines, and especially the coronary and the capillary circulations, we may at least claim a clinical relation between the anatomical distributions of the terminal fibres of these nerves and the physiochemical disturbances present, and thus it may be permissible to deduce that there probably exists a strong causative factor in the production of paroxysmal tachycardia, in some, yet unknown, interference with the normal equilibrium existing between the vagus and the spinal accessory, and that of the terminal reflex vaso-motor mechanism ; and doubtless we will be nearer the true ætiological reason for this condition, when we are able to brush aside the veil that at present prohibits a more intimate knowledge of the functional importance of these anatomical structures and their physiological relation to each other.

This brings me to conclude by referring to the investigations of Howell, the physiologist, who states that the heart in contracting exerts a force greater than that of the coronary vessels, and that in consequence thereof these vessels are emptied and their lumen partially, if not entirely, obliterated during systole, to be re-injected or refilled during diastole. If this be true, then the amount of blood in the coronary circulation will be governed by the ratio between the intra-ventricular pressure and that of the arteries, modified by the length of the diastole. Therefore, it would seem a logical inference that the rapid diastoles and systoles, and the incidental lowered arterial pressure, with the subsequent intra-auriculo-ventricular pressure, particularly of the right heart, greatly lessens the amount of blood furnished the heart muscle during an attack, and would seem to be the reasonable explanation of the dilatation which ensues if the attack be prolonged, and which disturbed balance in the circulation in the early part of the attack before the heart is too enfeebled, or the staces of the pulmonary venous circulation too pronounced, the so-called "respiratory pressure" treatment, may partially or temporarily re-establish the vasculo-pulmonary equilibrium, to the extent at least of re-establishing the cardio-vascular balance, and the fact, that this balance early in the attack, in spite of the very rapid heart action, is so slightly disturbed, is in my opinion the proper explanation for the absence of marked physical disability, though this invariably follows when the attacks are greatly prolonged. The treatment, so far as I know is purely symptomatic.

## DISCUSSION.

Dr. I. H. Hance (Lakewood): I have a typical case of tachycardia under my care. She has been to different health resorts and has received all sorts of advice. The case is a contrast to that of Dr. Marvel in there being no possible apparent cause for the attacks. These attacks occur on an average of once a month, and last from a minute or two up to thirty-six and thirty-eight hours. To see the woman lying in bed you would think her a perfectly healthy woman, since she presents no symptoms except the rapid heart beats. In the case of a man of seventy years there is also no assignable cause, and he can tell the instant it stops. These two cases have given me a good deal of thought, particularly in reference to the treatment. The woman has been advised to do almost every thing, the only treatment not carried out, being the galvanism of the pneumogastric. I would have looked upon the attacks as cardio-hysteria, except for the running away of the heart action. At the time of undergoing the strain of her daughter's wedding under the use of a little codeia and digitalis she went through the ordeal and did not have an attack for several weeks afterwards.

# SOME MANIFESTATIONS OF ARTERIAL TENSION.

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SIX or eight years ago I asked eighty-two applicants for hospital appointment this question: "What are the first appreciable effects of deficient renal function?" The inability of each and all to give an intelligent answer, supplemented by a reasonably extensive experience with hospital internes, to whom the subject to be considered is absolutely *terra incognita*, has led me to wonder how many physicians recognise that all disease processes are natural, physiological, not pathic; or recognising this, give due consideration, to the mutually dependent relations of the systemic functions, *i.e.*, to the physiology of disease, which is the essential subject of this paper.

For many years I have held and taught that there are no pathic processes; that all the activities of disease are objectively good, and that results only may rightly be called pathic. To him who may argue that, "if results are pathic the process which produces them must be," I shall reply, it does not prove your practice wrong that your patient dies. But whatever may be thought of the statement as an universal law, to my mind it is an inevitable conclusion from the study of disease along biological and evolutionary lines, and forms the only possible basis for a logical system of medicine and rational therapeutics.

Among the many strictly physiological processes that have been so recklessly branded as "pathic," there is none that has suffered more undeserved or deeper opprobrium than "arterial tension."

I appear as its champion, and am prepared, at the proper time, to defend even fibrosis and atheroma as, under the conditions in which they appear, strictly physiological and conservative processes. But my present purpose has to do solely with the arterial tension of vaso-motor contraction, and certain apparently unrelated disease manifestations with which it is invariably associated, and for which it is the ætical index. While the relation of many organic diseases to the high tension of arterial thickening has long been recognised, the significance of vaso-motor high tension associated with functional diseases seems to have been, in a measure, overlooked. Indeed, high tension seems of necessity to imply change in the arterial wall. But I am convinced that a strictly physiological, vaso-motor high tension may be maintained for prolonged periods even to the production of functional disturbances that are properly termed disease, without appreciable change in the arterial walls other than the muscular. My position as to the development of these diseases, their physiological character and relation to arterial tension, may be stated in a nutshell, and is then better illustrated than elaborated.

The regular every day work of the body demands a certain degree of arterial tension for its proper completion, and all the tissues are constructed to meet that strain. The variations and degree of this tension are determined directly by vaso-motor control of the heart and arteries. Every special demand for systemic and, hence, vascular activity, implies an increase of arterial tension absolutely dependent upon vaso-motor action. Thus every case of high tension is primarily a physiological condition which, within certain limits, is met by vascular hypertrophy that prevents tissue injury.

But every increase of tension is felt in all the organs and tissues, not simply those directly concerned in meeting the demands for new work; and thus, beyond certain limits of degree or duration, it does become directly pathic. It is these pathic effects, which, although strictly symptoms, are classed as diseases, and which, although directly consequent to high tension, have a more remote ultimate cause, that we wish to illustrate. As disease manifestations they appear in two forms; First, as functional failures or perversions in organs that for any reason are below par, or peculiarly susceptible; and second, as increase of function to meet some natural systemic requirement; or, apparently, to mitigate the injurious effects of the disturbing tension. It is evident that they may appear in any organ, and it thus happens that the most diverse and, apparently, unrelated conditions may be traced to a common primary cause through their association with high tension, which is never itself primary.

I venture to present the following cases in illustration of some forms of functional disease, in which the results seem to justify the diagnosis made in accordance with the foregoing theory.

The vaso-motor nerves are, of all the organs, the most patient of injury and the most enduring under strain. But when their manifestations of resentment of excessive strain do come they are intense and generally in the form of localised spasm or paralysis. Every one is familiar with those transcient vascular spasms that are indicated by irritable temper and excessive urine, or the vaso-motor paralyses that we term migraine, so common with the high tension of intestinal toxæmia, but the following case shows how peculiar conditions may localise the manifestations.

In October, 1900, Mrs. R., 62, sought relief for persistent roaring sounds in the left ear and irregular attacks of most intense nausea and dizziness, from which she had suffered with no relief for many years. She had recently had a diagnosis of Ménière's disease by competent authority and been pronounced incurable. She complained of only the above symptoms with some indigestion, exhaustion on slight exertion, and insomnia. Physical examination revealed the usual signs of extreme arterial tension and an impacted colon, but nothing more. I admitted ignorance of Ménière's disease but certainty as to toxæmia and tension. Results of treatment :—In less than a week the colon was clear and all roaring had disappeared. She had a mild attack of nausea and dizziness in March and again in May. Since then she has been perfectly well until the present time. Some time after her first visit I learned of an attack suffered many years previously which, I am convinced was an abscess at the base of the brain opening through the nose. The localised manifestations of the attacks of arterial spasm were due, I believe, to the cicatrices from this abscess. This case is, of course, unique; but three cases of asthma afford every-day illustrations of vaso-motor paralysis from high tension. The first came to my dispensary class twenty-two years ago, and for two years baffled all my efforts to give relief. Then the recognition of asthma as a vaso-motor paresis first led me to associate it with arterial tension and to seek for a cause of such tension in this particular case. But the patient complained of nothing except the asthma attacks, and, although arterial tension was evident its cause was not so plain. When finally found, however, a bowl of hot soda water arrested a severe attack and the patient has never had another up to this time. The second case, a young woman, aged 22, had suffered for years from an almost continuous asthmatic condition of mild degree that was made acute by even light exercise. She, too, complained of nothing but the asthma, and examination showed nothing more save the small tense artery. Nevertherless, persistent daily washing of the colon finally gave a relief which lasted only so long as the bowel was kept absolutely free. In the third case, a boy, aged 10, with similarly no symptoms beyond the asthma and artery, the point of irritation was found in the penis and the asthma entirely relieved by circumcision.

Less frequent forms of vaso-motor paresis coming in connection with persistent high tension are seen in the case of a man, aged 70, suffering from all those general discomforts that attend years of high tension and marked arterial fibrosis. When first seen this patient was supposed to be threatened with apoplexy, and the arterial hardness, which was extreme, had been regarded as due purely to fibrosis. Believing, myself, that it was still muscular spasm in part, I began treatment. Three months later, when the vascular tension was much reduced and the patient feeling greatly improved, he began to cough a little one morning. At 2 p.m. there was slight dulness and a few moist râles at the right base. At 7 that evening I was summoned in haste to find that lung nearly solid and full of liquid râles, giving all the signs of acute consolidation and œdema. I confess to such a diagnosis at first. An hour later it was changed to unilateral vaso-motor paresis, and by midnight, after three hypodermics of ergot, the lung was clear and the patient breathing easily. A week or so later he developed a hemiparesis, aphasia and delirium, which were perfectly relieved by the same means. After six months treatment he returned to the country free from all his old troubles, and, as his former physician said, "with very much less atheroma than he had the year before."

The vascular system itself presents some instructive illustrations of heroic devotion to duty under most shamefully abusive treatment. Mr. C., seen some years since in consultation, was a man of 50 odd, short, fat, and with an extremely florid complexion. He was sitting up in bed gasping for breath, and was œdematous to the armpits. His physician stated that he had a mitral regurgitation of many years duration, but that his kidneys had been active until within the previous two weeks, when the urine became scant, with some albumin and casts.

The patient had been seen by two "heart specialists," who had given digitalis, and then, very wisely, a hopeless prognosis. On examination the cardiac lesion was obvious, but the heart-beats were regular, even, strong and snappy. The aortic second was most intense and the arteries were contracted to the minimum size. He was being fed at frequent intervals with "toxicum bovis" and "extracts" to maintain his strength, as he had always been a hearty eater. I ventured to suggest that his vascular system was being abused and advised as treatment castor oil, absolute starvation for forty-eight hours, and practical starvation, on a diet of a tablespoonful of oatmeal and a cup of milk twice a day for a month. Results: In three days he could sleep lying prone; in ten days the œdema was gone, and in two weeks he was out driving as well as usual. The only pathic things in this case were the meat and medication.

We are all familiar with moderate increase of urine associated with high tension, and in these cases more than all others we are apt to assume atheroma and permanent high tension. Two cases may illustrate the functional side of this condition. Ten years ago Mrs. T. came for advice bringing her own diagnosis. She stated that for twenty years she had suffered from diabetes insipidus, or polyuria; that eighteen years before a prominent physician had said that if what he gave her did not stop it, it would become chronic. I agreed. She was passing from four to five quarts of urine in twenty-four hours. Her thirst was tormenting, and she was weak, languid and unable to work. The urine varied from 1·002 to 6, and gave no trace of albumin or sugar. On examination I found only extreme tension and slight fulness along the line of the colon. Treatment was on the theory that the polyuria was physiological for the purpose of removing some toxic element. At the end of a month the urine averaged about two quarts, and had once been as low as three pints. There was no abnormal thirst and the patient was strong and fully able to do her own housework.

Last February, Mr. P. sought help, also bringing his own diagnosis of diabetes insipidus. He passed five quarts of urine a day. It had been developing for nearly a year and had been at its present stage for several months. On first trial I found nothing except the high tension; and no amount of questioning gave me any clue to its cause. The next day I tried again, and finally drew forty-eight ounces of urine from behind an enlarged prostate. In less than a week the amount of urine secreted was entirely normal, and my admiration for the uncomplaining fidelity of his kidneys was greater than for his own intelligence.

In offering illustrations of systemic efforts to mitigate the injurious effects of high tension it must be admitted that conclusions are less certain. But it is sometimes good to guess. Many years ago a dispensary case of goitre was firmly impressed on my memory by the remarkable way in which the exophthalmos and the size of the goitre varied. Whenever either was large the other was small. My knowledge of goitre was *nil*, and for years nothing was remembered except the fact of the change; but with an increasing interest in tension there came a questioning whether there could be any relation between enlargement of the thyroid and tension *per se*. Working on the assumption that all systemic processes are objectively good, this theory worked itself out. Given an excess of arterial tension its injurious effects will be most marked, essentially localised, in those tissues that have a peculiar susceptibility to vascular pressure whether natural or acquired.

The cerebral centres are peculiarly sensitive to variations in circulation and blood pressure, both by reason of their function in controlling circulation and their special anatomical relations. There is nothing unreasonable or absurd, therefore, in the assumption that, under peculiar conditions, the effects of persistent high tension become essentially localised in the cerebrum and excite the vaso-motor centres to some effort to give local relief, when we know so well how quickly these same centres come to the relief of acute tension. The most obvious way of affording such relief from excess of pressure and blood in the cerebral circulation is by diverting a portion of that blood from the carotid through other vessels. This is precisely what enlargement of the thyroid, when such enlargement is vascular, does accomplish, despite the fact that the thyroid artery comes from the external carotid. The familiar observation that enlargement of the gland is attended by decrease in ophthalmos proves this beyond question. Now, as we certainly know that the system does try to protect itself, there is no *a priori* reason why vascular goitres may not be, in some instances, purely physiological processes directed to the relief of cerebral irritation. Whether the theory be true or not, this case presents some interesting points, and at least, suggests that it may be true.

On December 8, 1902, a young man, aged 28, came asking to be referred to a goitre specialist. Not knowing any such person, and recalling my theory, I ventured to assume the *rôle* and offered to play the part myself. Being a simple-minded youth he accepted the offer. He was of Swiss parentage, and his father had suffered from the same trouble. He first noticed swelling of the throat in April, 1901. In May he obtained a diagnosis of diverticulum of the œsophagus, and on a diet of salts and starvation the swelling, which had been small and mostly on the right side, almost disappeared. The surgeon hunted for the diverticulum with a bougie, but somehow missed it. In July the swelling returned, and again he purchased a diagnosis of diverticulum of the trachea, because, "when he held his breath and compressed the chest the swelling increased." He was advised to wait until it was ripe for operation. In January, 1902, the swelling had increased decidedly, and another physician gave him thyroid extract, which made him much worse, causing dyspnœa and palpitation, and increasing the goitre. A little later he saw another surgeon, who said "cut it out." On December 8, examination gave the usual signs of exophthalmic goitre, with a neck measuring 19½ inches. The tumour was soft, the exophthalmos slight, the palpitation frequent and the pulse rate variable. The nervous symptoms were decided and were forcing the man to give up his work as a teacher. The pulse was small and tense, the aortic sound intense, and the heart sounds only fair. He admitted indigestion but denied constipation, and there was no proof that he was wrong. Results of treatment based on theory. In three days his nervous irritability was less ; in a week the goitre was distinctly softer ; and by December 20, twelve days, the neck was an inch smaller. From that time until January 28, over a month, there was no appreciable change in the tumour, though it had varied slightly from time to time ; but on that day was certainly no smaller than a month before. Going to bed that night with his neck unchanged, he woke the next morning to find it, as he said, "reduced two-thirds." Two days later the neck measured 16½ inches. From that time improvement was continuous, and he was soon wearing a 15-inch collar. I have seen the man within a month, and he still remains perfectly well, four years since the last signs of the tumour disappeared. Of course the theory is absurd ; but this and two other cases relieved in similar manner, present, let us say, amusing coincidences,

In brief summary of the points this paper is supposed to present, we say :—

All physical processes are objectively good, and become pathic only by their degree or failure.

When such failures or perversions of function reach the dignity of disease, their cause is to be sought along the lines of normal physiological action, not on the basis of so-called pathology.

Very many such functional diseases are found to be associated with high tension, and such tension is always a precedent, not a co-ordinate development.

Such tension, although the immediate cause of the functional disturbance, is never primary, and therefore never an ultimate cause of any thing; but does point to an ultimate cause in some condition that can develop high tension without other functional disturbance.

High tension is always the sign of systematic activity in self-defence, and is never to receive other than emergency treatment; for its association with apparently utterly unrelated diseases shows their common dependence upon the cause of the tension itself.

No one can appreciate more clearly than myself the uncertainty of theories, and the utterly unscientific nature of the matter here presented. Nevertheless, however uncertain theories, however unscientific guessing may be, as second childhood approaches there is an abiding mental consolation in seeing harmony where has been chaos, in having a reasonable reason for the faith that is in one; and a great peace of conscience for one who is ill content to shoot with closed eyes at the phantom disease.

# THE IMPORTANCE OF THE EARLY DETECTION OF ANEURYSM OF THE AORTA.

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THE attitude of the general practitioner to-day toward thoracic aneurysm may be compared to his attitude a few years ago toward the recognition of pulmonary tuberculosis —he was satisfied to recognise the disease when it was fully developed. It was not altogether his fault, but rather that of the text-books which, in giving a single picture of the whole disease, naturally described the typical or developed cases. These cases must be regarded, in the case of tuberculosis or aneurysm, as in the advanced stages, and as very hopeless from the point of view of treatment.

We have learned our lesson in tuberculosis. We now know the importance of recognising it in its incipient stage, when we can greatly benefit and often cure our patients. This matter has been presented to the profession thoroughly, and the picture of tuberculosis the general practitioner carries in mind *to-day* is of the incipient or early stage of the disease, —not the advanced stage. He is eager to recognise this early stage, and as a result the numbers of "arrested" or "cured" cases are multiplying rapidly.

Aneurysm of the aorta is not as common a disease as tuberculosis, but it is even more hopeless, and it causes great suffering. It is the more hopeless in proportion as it is advanced. Consequently if we are to benefit our patients we must discover it early—the earlier the better. It may be noted in passing that aneurysm of the arch of the aorta is much more common than is generally supposed.

I have drawn a comparison with tuberculosis not because it is as important a disease nor because the two diseases are similar, but because the general practitioner has been taught to do to-day for tuberculosis just what I hope to see him do in the future for aneurysm. He is keeping tuberculosis in mind; he is improving his technique; he makes careful examinations of the chest with the disease in mind; and he realises the importance of its early recognition. It requires no more training or skill to recognise aneurysm early than it does in the case of tuberculosis. Therefore, there is no reason why it should not be detected early if the general practitioner will only keep it in mind and will examine with the same thoroughness as he does for tuberculosis.

Some forms of aneurysm cannot be recognised in their early stages. This is especially true of those situated at the very beginning of the aorta, at or just above the sinuses of valsalva. When small they give no symptoms and cannot be distinguished by physical examination. By the time they get large enough to be so distinguished, they usually rupture into the pericardium, and sudden death is the first evidence of their presence. Aneurysms of the descending arch and the descending thoracic aorta can rarely be recognised in an early stage. This is partly due to their location deep within the chest where they are inaccessible to physical examination, and partly due to the fact that no important structures are pressed upon until the aneurysm has attained a considerable size, and until this point is reached there are no symptoms. Therefore, they are advanced when recognisable clinically.

From a clinical standpoint, then, we are concerned essentially with aneurysms of the ascending arch and of the transverse arch. These are accessible to physical examination, and they can be detected much earlier than is generally supposed.

Moreover, this part of the aorta is the commonest site of aneurysm.

As in the case of most diseases the recognition of the condition will be based partly on symptoms and partly on physical signs. There is a difference between aneurysms of the ascending arch and those of the transverse arch in this respect, as pointed out by Broadbent. In the case of the ascending arch the aneurysm is near the surface and easily accessible to physical examination. It is moreover surrounded by structures that can easily be pushed to one side without serious results. Consequently symptoms from pressure rarely arise until the aneurysm has attained considerable size. In the earlier stages, therefore, we detect these cases by physical signs rather than by symptoms, and Broadbent calls these aneurysms of the ascending arch the "aneurysms of physical signs." In the same way he speaks of the aneurysms of the transverse arch as "aneurysms of symptoms." These latter are more deeply situated, and are less easily detected by physical examination. Before they get large enough to be easily detected by physical signs, they press upon some of the important structures by which the transverse arch is surrounded and thus give rise early to symptoms.

Percussion furnishes the most important of the physical signs of aneurysm of the arch of the aorta in the early stages. When inspection and palpation are of use, the aneurysm must have reached the chest wall, and is already in an advanced stage. I wish to emphasise this point, that it should be our aim to detect aneurysm of the aorta *before* it is visible or palpable, even by the most careful examination. Auscultation is of little value as commonly employed. The physician is too apt to base his decision on the presence or absence of a systolic murmur over the site of the suspected aneurysm. It is frequently absent, even when the aneurysm is large, and one of the few dogmatic statements that can be made about aortic aneurysm is—*never* exclude aneurysm because a murmur is not heard.

The importance of percussion in determining an enlargement of the arch of the aorta is shown by the fact that by practice we can determine the outlines of the right side of the arch fully as accurately as we do the outlines of the left border of the heart. We can do this in a normal individual, and it is naturally easier when an aneurysm is present which brings the vessel-wall nearer to the surface. For this purpose percussion must be extremely light, otherwise the bony structures of this region are thrown widely into vibration, and our note is that of the sternum and ribs backed by the resonating power of the air-filled lung tissue. Very light percussion is all that is necessary, because the aorta lies near the anterior chest wall. Percussion in the interspace is preferable to that over the rib. Before accepting aneurysm as the cause of a change in the percussion outline, we must remember that deformity of the chest or spine may cause displacement of the aorta to the right, or retraction of the lung tissue may leave it uncovered to an abnormal extent.

Under normal conditions the transverse dulness at the level of the manubrium extends 2 or 3 cm. to the right of the median line of the sternum, and $1\frac{1}{2}$ to $2\frac{1}{2}$ cm. to the left of the median line. The total transverse dulness is 4 to 5 cm. We may consider anything above 5 cm. as more or less abnormal, and requiring consideration. On the right we can make out a curved line of dulness in the adult, as characteristic in outline as either border of the heart. If this border of dulness is farther to the right than normal, and if the normal curve is increased, we know we have an abnormal condition of the aorta—probably an enlargement or aneurysm.

The aorta is nearest the anterior chest-wall at the junction of the second right interspace with the sternum. From this point, as it arches over to the left, it also plunges deeper into the thoracic cavity, and soon gets beyond the reach of percussion. Consequently dulness does not extend normally as far to the left of the median line as it does to the right. It is usually about a centimeter less. Neither is the boundary of dulness as definitely shaped on the left. It can easily be understood that any enlargement of the transverse arch may bring its wall nearer to the anterior wall of the chest. The dulness on the left of the manubrium will consequently be increased. If in addition we have a definitely rounded border to the dulness on the left, we may be sure we have some kind of a tumour of the mediastinum. Whether this is an aneurysm or enlarged glands, or a malignant growth, must be determined by other means, but the presence of even a small tumour in the mediastinum can be easily determined by careful percussion. Therefore we can detect by this means a small aneurysm of the transverse arch as well as of the ascending arch.

Clinically we cannot usually distinguish a sacculated aneurysm from a diffuse aneurysm in this region, nor is the distinction of much practical value—at least in the earlier stages. In a majority of the cases, even when the aneurysm is sacculated, there is also a more or less general aneurysmal enlargement of the surrounding parts of the aortic wall. Moreover, the general dilatation is apt to involve both the ascending and transverse parts of the arch rather than to be confined to one part alone. This is especially apt to be true if we find enlargement of the area of dulness extending both to the right and to the left of the sternum. If to the right alone, it suggests the ascending arch; if to the left alone, it probably involves the transverse arch.

If we are to detect cases of aneuryism of the aorta in an early stage, we should make the determination of the width of dulness over the great vessels a routine part of every chest examination, just as we now make the determination of the area of the heart or the examination of the apices of the lungs a matter of routine.

Having determined this area of dulness, we can get important confirmatory evidence of aneurysm by auscultation. A systolic murmur with greatest intensity directly over the dull area is very strong confirmatory evidence, but the absence of a murmur has little significance, and does not exclude aneurysm.

A more important thing to note by auscultation is the transmission of cardiac sounds. The vibrations which correspond to these sounds travel through the column of blood and the arterial wall more readily than they pass to outside structures. The result is that these vibrations reach the whole wall of the aneurysm with their intensity *very* little diminished. Therefore over the area of dulness of an aneurysm we should hear the transmitted heart-sounds louder than at parts of the chest outside of this area. This is what actually takes place. We are less likely to have this occur with glands or tumours, even if they lie against the aorta. Therefore the greater audibility of the heart-sounds over an abnormal area of dulness in the region of the manubrium is very strong evidence that the tumour is an aneurysm.

Another change that may be noted by auscultation in some cases is an accentuated, low-pitched, ringing aortic second sound. Corresponding to this, a diastolic shock is sometimes felt by the hand resting either on the chest-wall or on the bell of the stethoscope. This diastolic shock and the peculiar aortic second sound constitute one of the most characteristic signs of aneurysm of the arch of the aorta. It is usually, however, found in the advanced stages and not in the early stages. However, I have seen it slightly marked in cases of arterio-sclerosis with general dilatation of the aorta, even when the amount of dilatation did not cause symptoms, and was not sufficient to clearly warrant a diagnosis of aneurysm. Therefore, when slightly marked, this sign may suggest an early stage of aneurysm. When well marked, it is one of the most characteristic signs of aneurysm, but then indicates that it is no longer in its early stages. When present, it indicates that the first part of the ascending arch is involved in the dilatation.

Under the head of auscultation we may also consider those signs which may be heard without listening to the chest itself. These signs have to do with the voice and with the respiration. When the aneurysm presses on the recurrent laryngeal nerve we may get certain manifestations due to imperfect action or to paralysis of the corresponding vocal cord. The effect of this upon the voice may vary from mere "weakness" of the voice, through hoarseness or huskiness, to aphonia. The cough may attract our attention by its peculiar barking or clanging quality. The breathing often has a peculiar quality due to the wide glottic opening. Pressure on the trachea or bronchus may give a wheezing character to the breathing not unlike that heard in asthma. Usually this comes with inspiration, but it may be with expiration also. Sometimes it has a musical quality not unlike that of a ronchus râle. Any of these breathing sounds, connected with disturbance of the vocal cords or due to pressure on the air-passages, may occur with an aneurysm that is too small to have reached the surface, and which might not attract attention from the front of the chest.

While considering auscultation as a means to early diagnosis, we have already referred to possible aid from palpation in detection of the diastolic shock. This sign and the detection of a localised or general heaving pulsation at the level of the manubrium belong, generally, however, to more advanced stages. I mention them because they are so often overlooked. In the early stages, however, palpation is useful in other ways. Its chief aid is in the detection of changes in the pulse and in determining the presence or absence of the tracheal tug. The changes in the pulse may consist either in a loss of strength or of a delay in the time of pulsation of one radial artery as compared with the other. Although this is rarely one of the earliest signs of aneurysm of the arch of the aorta, it frequently comes before there are external signs that are noticeable at the front of the chest. Therefore the simultaneous examination of both radial pulses should constitute a part of our routine physical examination of patients. We should remember, however, that the difference in the two radial pulses may be due to irregular distribution of the arteries or to pressure somewhere along the course of one of the arteries, and that it is not necessarily due to changes at the arch of the aorta itself.

Another thing that should be noted as a matter of routine in the examination of every patient is the condition of the arterial walls. If we find arterio-sclerosis of the radial arteries we should examine the region of the aorta very carefully for possible signs of aneurysm, for arterio-sclerosis of the aorta underlies most cases of aneurysm. Particularly should this be done where arterio-sclerosis is found in a middle-aged or young individual, for syphilis is thus suggested.

The tracheal tug is a much more valuable sign in early cases. If the trachea is put on the stretch by elevating the chin, a slight tug can be obtained when the aneurysm is still of quite small size. It is conceivable that a mediastinal tumour could give the same phenomenon by taking up space between a normal aorta and the trachea or the left bronchus, but practically I have met with little confusion from this source. It should be remembered, however, that retraction of the left lung may draw the left bronchus taut so as to produce the tracheal tug, when the chin is elevated and the trachea is put upon the stretch, even though the aorta is not enlarged. Therefore it is of importance to examine the condition of the left lung before we give the tracheal tug its full significance in the diagnosis of aneurysm of the arch.

Inspection is of little importance in detecting the earliest stages of aneurysm, but by careful inspection we may detect the signs of aneurysm at a much earlier stage than is often the case at present. A slight heaving of the chest-wall above the cardiac area is one of the earlier signs. Next to this we are likely to find pulsation in an intercostal space, slight at first, and only to be seen by looking across the chest carefully. We must not forget, however, that visible pulsation to the right of the sternum may be due to displacement of the aorta by deformity of the spine, or to retraction of the lung which leaves the aorta abnormally uncovered.

An interesting case in the service of the writer at the Boston City Hospital during the past winter, shows the importance of the proper interpretation of signs seen on inspection in connection with the diagnosis of aneurysm of the aorta.

Case i.—At the time of the morning visit a man, who had entered the hospital on the previous afternoon, was found sitting up in bed with great distress in breathing and with a marked cough. The breathing was of a distinctly asthmatic type, and it appeared at first sight to be an ordinary case of asthma. It was noted, however, that with each cough there was a protrusion in the second left intercostal space about over the location of the bronchus. This indicated some obstruction to the exit of air between that point and the trachea, and suggested the existence of bronchiectasis beneath the protrusion. In seeking a cause for the obstruction to the exit of air, pressure on the left bronchus was considered, and percussion and other signs at the manubrium showed the existence of an aneurysm of the transverse arch. Understanding the cause for his dyspnœa, an attempt was made to relieve it by lowering the blood-pressure which was decidedly high. Nitroglycerin was used and proved immediately effective, whereas quite large doses of morphia during the night had failed to give satisfactory relief. The diagnosis was later confirmed by X-ray examination.

Pulsation in the episternal notch is another sign that should be looked for on inspection in all cases. We sometimes find in old persons, with wasting of tissues and with slight enlargement of the aorta and great vessels, a pulsation at this place which should not be included under the head of aneurysm. But in other cases any pulsation in the episternal notch needs an explanation and suggests aneurysm. If the pulsation is at the bottom of the notch and its direction is upwards, it is likely to indicate aneurysm of the arch. If, however, the pulsation comes from the one side or the other (and it is more common on the right side where the innominate artery lies) then there is enlargement of one of the great branches of the aorta rather than of the aorta itself. It may be noted in passing that palpation is useful in confirming the evidence of pulsation at the episternal notch which is obtained by inspection. By pressing the finger from the episternal notch down between the manubrium and the trachea, such an aneurysm may sometimes be palpated earlier than its pulsation can be detected by inspection. But such aneurysms should be detected at a still earlier stage by careful percussion. While this pulsation in the episternal notch ordinarily indicates an advanced stage of aneurysm of the aorta rather than an early stage, it has been surprising to me to see the number of cases in which the significance of this pulsation has been overlooked. Therefore it is wise to include this sign when we are considering the detection of aneurysm at an earlier stage.

Of course all cases of aneurysm of the innominate or of the common carotid artery do not mean that there is also an aneurysm of the arch of the aorta. But the association of the two is often over-looked. Usually there are not two separate aneurysms, but the visible aneurysm of the branch is the outlying part of a general aneurysmal dilatation which involves both the arch and its branches.

Among the physical signs associated with aneurysm the text-books generally speak of inequality of the pupils. It seems to me that undue importance has been placed on this sign. When it exists, an aneurysm should be thought of as one of the possible explanations. However, I have seldom found it present except when the diagnosis was evident from other more definite signs: I have often found it absent when I should have expected it to be present; and I recall no case where it was present in the very early stages. It should be recognised as interesting confirmatory evidence of aneurysm, rather than as an essential part of the diagnosis.

Of much more importance in connection with inspection is the detection of evidence of obstruction to the venous circulation. This may involve the superior vena cava or its branches, or the azygos vein. The evidence may consist of localised œdema or of distended veins, or of both. It is suggestive only when confined to the areas of distribution of the above-mentioned veins—namely, the veins of the thorax, upper extremities, neck and head. If the evidence is confined to a limited area, it furnishes a very definite means of locating the point at which pressure is exerted upon the venus trunks. This sign is of especial importance when the direction of growth of the aneurysm is backwards and to the right, and pressure is exerted at about the point where the azygos vein empties into the vena cava superior. A small aneurysm at this point may reveal itself more clearly by such evidence of pressure than by other physical signs. Except in this case, however, signs of obstruction to the venous circulation usually belong to advanced stages of aneurysm.

Before considering what symptoms are suggestive of aneurysm of the arch of the aorta, let us give a moment to the history as furnishing possible clues. The commonest predisposing cause is syphilis. Other etiological factors are alcohol, excessive or sudden strain, renal disease, lead poisoning and gout. With the existence of any of these factors in the history, aneurysm should at least be included among the possible results. We should also remember that while arterio-sclerosis is generally an antecedent condition of aneurysm, the most marked condition of arterio-sclerosis may exist without giving rise to an aneurysm, and that aneurysms are more common in middle life than in later years—or when active physical exertion is combined with an existing arterio-sclerosis. We should remember on the other hand that serious arterio-sclerosis may exist in the aorta, and yet arterio-sclerotic changes in the radial arteries may be extremely slight or may be absent. Therefore do not rule out the possibility of aortic aneurysm because you cannot detect arterio-sclerosis of the radial arteries.

In considering symptoms in relation to the early diagnosis of aneurysm of the aorta, it should be noted that they are all due in one way or another to abnormal pressure which the aneurysm exerts upon surrounding structures. Their character will depend upon the part which is pressed upon and on the amount of pressure exerted. Symptoms from pressure will be of special importance in the early detection of aneurysm where important structures lie normally in close relation with the aorta, and so related that they cannot be readily pushed aside. Under these conditions *slight* enlargement will cause symptoms. This is the reason why symptoms play so important a part in the detection of an aneurysm of the transverse arch, whereas the ascending arch can push surrounding structures quite a distance before the pressure becomes important.

The deep-seated aneurysms of the descending arch or of the descending thoracic aorta should be mentioned in this connection. Pain (from pressure upon nerves) or difficulty in swallowing (from pressure on the œsophagus) may be the first suggestion of the existence of such an aneurysm. In either case the aneurysm will usually have first attained considerable size, and we can hardly say that it is in an *early* stage. However, its deep situation prevents its detection by the ordinary methods of physical examination and these symptoms are apt to be the earliest available clues. It is in cases of this sort that an X-ray examination may give definite information that can be obtained in no other way.

The pain from these deep-seated aneurysms usually comes from pressure backwards upon the spinal nerves or their branches. It is usually confined to the distribution of one or two of these nerves, and often is on one side only. The pain constantly recurs at the same place. It may be dull or sharp. A characteristic sign is that it is increased by exertion, because that causes greater pressure by distending the sac. Such pains are often thought to be due to rheumatism or neuralgia. If they are persistent, remain definitely localised, and are increased by exertion, aneurysm should at least be considered. Pressure from other sources might cause the same symptoms.

Difficulty in swallowing should at least suggest the possibility of an aneurysm as the cause. Pain is usually present at some stage of development of aneurysms of the ascending and transverse arch. It is seldom, however, one of the earliest signs, although it may be the first that has attracted the patient's serious attention. It may be localised at the site of the aneurysm, or it may be referred to some of the spinal nerves, as in the case of pain from cardiac disease. It varies from a discomfort to a severe sharp pain. It may be anginoid in type. It is increased by exertion, it is persistent, and is apt to radiate from the mid-chest. Pain with these characteristics and without a cardiac condition sufficient to explain it strongly suggests aneurysm.

Breathlessness, dyspnœa and sometimes cough are common symptoms, due to pressure on the trachea or a bronchus. As they are increased by exertion, it is a very common error to ascribe them to heart trouble. If accompanied by a history of periods of hoarseness or loss of voice, or even "weakness of voice," pressure on the recurrent laryngeal nerve is suggested and aneurysm should be thought of rather than heart trouble. This is even more so if the cough or the respiratory sounds are of the types characteristic of aneurysm. These symptoms of disturbance of breathing are characteristic of aneurysm of the transverse arch and are often present when the aneurysm is so small as to be made out with difficulty by physical signs.

Of course breathlessness or dyspnœa on exertion is characteristic of heart trouble as well as of aneurysm. In all such cases the heart should be examined. This is usually done, but too often the examination stops with the heart. Aneurysm should be looked for as well in these cases. Furthermore, aneurysm should be very strongly suspected if the cardiac condition does not give an adequate explanation of the dyspnœa on exertion.

It is not uncommon to have more or less serious heart disease and an aneurysm of the aorta in the same person. In such cases it is not always easy to determine which is responsible for the dyspnœa. In many of these cases the physician, finding a cardiac trouble that seems to account for the dyspnœa, goes no further. He overlooks the aneurysm and treats the case, as a case of broken compensation, with cardiac stimulants like digitalis. This increases the pressure and the distension of the aneurysmal sac, and consequently increases the dyspnœa. Then he omits digitalis and tries nitroglycerin with splendid results because it lessons the blood-pressure. Then he tells of "another case where digitalis did not agree with the heart and nitroglycerin acted as a cardiac stimulant. These cases, as well as the high-pressure cardio-renal cases, are the ones that have led the thoughtless physician to look upon nitroglycerin as a cardiac stimulant rather than the vaso-dilator that it is.

Of course we do have cases of cardiac disease with which digitalis does not agree, but in these cases it can usually be taken for some little time before this fact is manifest from the cardiac symptoms. If, however, digitalis clearly makes dyspnœa worse as soon as it begins to act, we should suspect the presence of an aneurysm of the aorta, for it offers the most rational explanation of this phenomenon. In three cases I have made the provisional diagnosis of aortic aneurysm pressing on the trachea or bronchus from exactly this history, to have it confirmed by physical signs when the examination of the chest was made.

Hæmoptysis, caused by the oozing of blood from an aneurysm into the trachea, is not usually regarded as an early sign of aneurysm. Cases of a fatal hæmorrhage of this sort from a relatively small aneurysm are reported, however, and I have recently seen an interesting case where this was the first sign that drew attention to the aneurysm.

Case 2.—A man, aged 54, had been treated by various physicians for heart disease for two or three years, during which he had complained especially of shortness of breath. He did have mitral stenosis and regurgitation. About one week before February 27, 1907, when he was seen by me in consultation, he began to spit blood. This was regarded as a symptom of passive congestion until he brought up thick, bright blood in considerable amounts. Physical examination showed besides the cardiac disease unmistakable signs of aneurysm of the ascending and transverse portions of the arch and of the innominate artery. Dulness over the great vessels extended 4 cm. to right and 6 cm. to left of median line. The omission of cardiac stimulants, and the use of vaso-dilators combined with rest in bed brought prompt relief of the dyspnœa and a gradual cessation of the hæmoptysis. He improved and insisted upon going about. During the first three weeks in April he was about outdoors, sometimes walking over half a mile. Then he over-exerted himself, and had a return of dyspnœa. On April 30, I saw him again in consultation. He was in extreme distress with orthopnœa, passive congestion of lungs, liver and kidneys, and marked œdema of legs. This time the trouble was clearly from broken cardiac compensation and not from the aneurysm. Digitalis was ordered in moderate doses, with an increase of nitroglycerin at frequent intervals in the hope of preventing too great pressure in the aneurysm. Improvement followed.

Before closing the discussion of the diagnosis of these cases, I wish to say a few words about the use of the X-ray as a help to diagnosis. It certainly is of the greatest aid in many cases. Some cases can be discovered by this means that could not otherwise be recognised, especially aneurysms of the descending arch and of the descending aorta. It usually gives more definite information about aneurysms of the ascending and transverse portions of the arch. Where pulsation of the aneurysmal wall can be made out by fluoroscopic examination it clears up the question whether the tumour is aneurysmal or of another character. Where, however, no pulsation is visible it should not be interpreted to exclude aneurysm.

On the other hand the X-ray examination has disappointed me in sometimes failing to show an aneurysm of the innominate that was plainly evident by percussion. In one case the autopsy confirmed the diagnosis and in a second case palpation and inspection clearly showed there must be aneurysm of the innominate. In both cases the fluoroscope alone was used, and apparently the slight increase of shadow due to the small aneurysm was not enough to be recognisable.

A small aneurysm of the transverse arch that gives a shadow little or no wider than that of the spine is extremely difficult to recognise by X-ray. In three cases a careful X-ray examination failed to show such an aneurysm, yet in each the existence of the aneurysm was later demonstrated by one means or another. In each of these cases I felt warranted in holding to the diagnosis of aneurysm in spite of the failure of X-ray to demonstrate it. I believe that in almost all cases a skilful physical examination and a careful consideration of the symptoms will enable the physician to diagnosticate aneurysm of the ascending or the transverse arch even in the early stages without the need of appeal to the X-ray. The X-ray is valuable in these cases, however, as confirmatory evidence, and sometimes in adding definition to the picture. Failure of an X-ray examination to reveal an aneurysm does not in all cases exclude its existence.

It is not the intention of this paper to consider treatment in detail, but a few words should be said on the general principles of treatment as affected by the early discovery of these aneurysms. The regulation treatment of the books, involving rest in bed, diet, &c., is directed toward the treatment of the advanced cases that are described. Such treatment is not only unnecessary in the early stages, but it is positively harmful because it interferes with the maintenance of general good health.

Our problem is essentially the reduction of pressure within the aneurysmal sac. We can do nothing to remove the tissue changes that have already occurred in the arterial wall, and have weakened it. Nature's methods of strengthening this weakened wall are to build up on the outside with connective tissue or to strengthen on the inside with organised blood clot. The latter method is most successful in the sacculated aneurysms with narrow openings from the artery. Relatively few of the aortic aneurysms come under this head, and in as much as most of the aortic aneurysms are essentially diffuse in type, very little can be hoped from the formation of blood clot—especially in the earlier stages. The strengthening of the arterial wall and development of connective tissue support will be more favourably carried on if we can prevent further stretching of the aneurysmal sac.

In order to prevent further stretching of the wall of the sac we must keep the blood pressure within certain bounds. To do this we must limit the force with which the heart drives the blood, and this is best accomplished by regulating the amount of exertion. In addition we may have to further lessen the blood-pressure by securing peripheral dilatation.

The regulation of the amount of exertion is a matter of judgment in the individual case. If there has been, from occupation or other cause, undue muscular strain, that must be prohibited. But rest in bed is unnecessary in the earlier stages. It has seemed to me that those cases in which I have tried rest in bed, have lost by poorer nutrition fully as much as they gained by the avoidance of exertion. I cannot report cures accomplished by the moderate limitation of exertion—I do not believe a "cure" is possible in many of the cases—but by an intelligent limitation of exertion several cases have lived for years in comfort, where their downward course would otherwise have been rapid. One case lived eight years after the diagnosis was made, performing the ordinary duties of her household, and another case lived four years, doing light housework and getting much enjoyment out of life by rather extensive travel.

It is essential that the patient should understand what the trouble is, its nature, and the mechanical principles that underlie treatment. Only in this way can you secure intelligent co-operation on his part, and, after all, the success of treatment depends more on his own regulation of his activities than on anything else. Every patient so far, upon learning the real problems of his case, has chosen, as I should do, to lead a life of regulated activity rather than enforced rest. They have thus secured comfort and moderate enjoyment, even if they did not live quite as long. Undoubtedly, both of the cases above mentioned at times did too much and put an unnecessary strain on the aneurysm, but I am sure neither could have endured greater restriction on the average without an amount of mental unrest that would have defeated the very object of the limitations. We must bear in mind that mental quietude is as important for a tranquil circulation as is limitation of muscular exertion.

Of drugs the vaso-dilators are the most useful. The choice and dosage of these drugs are details hardly within the scope of this paper, but I wish to say a word about the iodide of potash. This drug certainly has won for itself an established place in the treatment of aneurysm, but this has been largely on empirical grounds. It was assumed, but not proved, that this was due to vaso-dilator action. Some tried to test this by the ordinary blood-pressure apparatus, and have argued from their failure that it does not lower the blood-pressure.

The thought has occurred to me that certain cases of aneurysm of the transverse arch furnish fully as delicate a means of detecting an increase or diminution of blood-pressure as is furnished by the apparatus ordinarily employed. In the yielding wall of such an aneurysm we have the weakest point of the arterial system—the one where change of pressure will be best shown by change in size. Some aneurysms press upon the trachea at just such a degree that a very slight increase of that pressure will produce dyspnœa or cough, while an equally slight lowering of the pressure gives relief. This condition has been clearly present at certain stages of some of the cases under my observation. Other drugs have given relief to these cases in a certain way, and it is accepted as vaso-dilator action. Is it not at least suggestive that iodide of potash, though a bit slower, has relieved these cases in exactly the same way? Of course I recognise the possibility that equally as great relief *might* come in some other way than lowered blood-pressure, but so far no one has been able to demonstrate what such a method is. I would claim that the conditions of an aneurysm as given above, offer as delicate and accurate a means of performing a physiological experiment as does much of the laboratory apparatus. If it is objected that we *assume* certain conditions and do not *see* them, I can merely say that the careful, logical consideration of the facts may in some of these cases make the conditions equally as clear and certain as if seen with the eye.

When one can determine his facts well and can think them out well, he can be sure of detecting aneurysm of the aorta in its earlier stages, and then he can do much to benefit his patient. Nothing more remarkable is needed.

## Summary.

We may summarise the important points in connection with the physical examination as follows:—Include in the routine physical examination the determination by percussion of the area of dulness of the great vessels; if you find an abnormal area of dulness, determine carefully the conduction of the heart-sounds in this area; include in the routine physical examination the simultaneous examination of both radial pulses; examine for a tracheal tug in any suspicious case; be especially keen for any evidence by inspection or palpation; and, above all, keep aneurysm in mind and remember to examine carefully by all available methods if there is the slightest suggestion in the history or symptoms, or from any physical sign, that an aneurysm may exist.

Thorough familiarity with the anatomical relations of the aorta to surrounding structures is of very great value.

We may summarise what has been said of symptoms by noting that with the exception of the rare cases where there is trouble with swallowing, the early symptoms of aneurysm, manifested by pressure, are usually either pain or disturbance with the respiratory apparatus. The latter may come either from pressure on the air passages or from pressure on the recurrent laryngeal nerve. The symptoms frequently simulate those of heart disease, and their true meaning is learned partly by not finding a cardiac condition that will explain the symptoms, and partly by looking for and finding evidence of an aneurysm.

The picture of aortic aneurysm in its earlier stages is not a uniform one, but varies widely with the position and size of the aneurysm. There are no pathognomic signs. The most characteristic feature of one case may be entirely lacking in the next one. And yet a careful physical examination, and a careful consideration of the physical signs and symptoms should enable us to detect the existence of an aneurysm of the ascending or tranverse arch at a very early stage. The X-ray examination is of use in the case of aneurysms in these two parts of the aorta as confirmatory evidence, as giving more definite information in some respects, and sometimes (when pulsation is seen) in deciding between an aneurysm and a solid tumor. The X-ray may detect aneurysms of the descending arch and the descending thoracic aorta which cannot be detected by the ordinary methods of physical examination. On the other hand, a negative report of an X-ray examination is not absolutely conclusive proof against the existence of an aneurysm.

The detection of an aneurysm of the arch of the aorta requires no greater skill than does the recognition of incipient tuberculosis. It is therefore within reach of the general practitioner, if he will give this disease equal consideration with tuberculosis. When discovered early, the treatment is not the same as in the advanced stages. Moderate limitation of exertion and mental quietude are essential, but absolute rest in bed is not necessary. While the disease cannot usually be cured, we can prolong life in comfort. The vaso-dilators are the most useful drugs as far as medication is demanded.

# CARCINOMA OF THE MEDIASTINUM SIMULATING ANEURYSM.

BY DR. JAY PERKINS,
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THE following case is reported because of its great interest, *per se*, because of the repeated thorough examinations by able men and the indecision or differences of opinion expressed by them and the ultimate autopsy proof that no one had been able to make a complete diagnosis, the majority of the observers having been of the opinion that the disease present was aneurysm of the aorta and no one seriously considering the presence of tuberculosis.

Mr. Charles O., aged 33, came to me February 13, 1905, with the following history. He had always worked hard in mining, beginning to earn his own living at 8 years of age by working in the mines in England. At 14 years of age he came to California and mined and prospected in the west and southwest. From 1895 to 1897 he was mining in South Africa. From 1897 to 1901 he mined in the Klondike, and since 1901 he had worked in the Klondike, summers, returning to the States, winters. He had had no previous illness, excepting thirteen years ago he had what was diagnosed as soft chancre. He was sure he never had any secondary lesions, as rash, sore throat, &c., but in spite of the diagnosis under medical direction, he took a course of inunctions of mercury and later a series of baths at Hot Springs, Arkansas. He stated that he had had some enlargement of the veins of his legs and body beginning seven or eight years ago, but nothing to attract special attention until June, 1904, at which time, while on the steamer on his way to Alaska, he noticed that his neck was increasing in size, that he could not button his shirt about the throat and was obliged to get collars several sizes larger than usual and felt drowsy and sleepy most of the time. At Cape Nome he consulted a physician who told him that he had strained his heart and must refrain from all active exercise. His neck continued to swell until it measured 20 inches in circumference. He had previously worn a No. 15 collar. He returned to Rhode Island in October, 1904, and during the winter his condition remained about the same. He had some cough and at times raised blood-stained sputum. He stated that he had five hæmorrhages one night and was very sick after them. He called a physician who diagnosed the case as pneumonia and treated it as such. He was sick about two weeks, and some time later he had a second attack of so-called pneumonia and was confined to the house for about three weeks. Following these attacks he continued to raise blood-stained sputum in small amounts, and at times he raised small clots of dark blood. At about this time he began to have pain, shooting in character, in the right shoulder and down the right arm, and was troubled very much by dyspnœa. At this time he came to see me. There was marked swelling of the neck and face, the ears and fingers were cyanotic and the veins were very much dilated over the whole body. There was a large vein, the size of a lead pencil on either side, extending from the pectoral region to the groin, the blood current in these veins being downward. The apex beat was slightly displaced to the left. A double murmur was heard at the aorta, the systolic murmur being most audible over the upper part of the sternum and to the right, the diastolic over the middle of the sternum and to the left. There was no measurable expansion of the right side of the chest. Breath sounds were absent over the right lung except on deep breathing, when they were faint. Vocal resonance and fremitus was less marked on the right side and percussion resonance was but slightly altered. The heart sounds were transmitted quite distinctly to the right as far as the axilla. There were no tubercle bacilli in the sputum. At this time I considered the diagnosis to lie between aneurism and some form of neoplasm most probably syphilitic, and gave him iodid of potash. Under this treatment his condition improved very much, the veins markedly diminished in size, the dyspnœa was much relieved and the breath sounds became audible over the right lung.

In April, being still in doubt as to the diagnosis, I sent him to see Dr. F. C. Shattuck, who did not commit himself to an exact diagnosis, but was inclined to believe some neoplasm to be the cause of his symptoms. Blood examination was negative. An X-ray examination previous to this time showed the heart displaced downward and to the left, with a pulsating mass to the left of the sternum at the arch of the aorta and the whole right lung somewhat darkened. In May, another X-ray examination showed that the heart was not pressed down on the diaphragm as much as previously and was drawn more to the right, the area of cardiac shadow extended more to the right and the whole right lung was more opaque, the pulsating mass to the left of the spine remaining the same. There was flatness and complete absence of breath sounds over the base of the right lung.

At this time he was again seen by Dr. Shattuck, who still considered it a neoplasm, with the possibility of an aneurysm with a laminated clot between the blood current and the chest wall. At this time, though many of the signs and symptoms were improved, his general condition was poorer than when I first saw him.

In June he went to Chicago, and at my request saw Dr. R. H. Babcock, and on the advice of friends there also consulted Dr. John B. Murphy. Both of these physicians considered aneurysm of the aorta to be present and advised his undergoing treatment for the same. He returned to Providence, and entered the private ward of the Rhode Island Hospital, July 7, 1905, where I followed out the treatment suggested because, if it were a new growth, no harm would be done, and if it were an aneurysm, he might be benefited. At this time examination differed from the preceding in that the right side of the chest showed some retraction and the left side some bulging, with a slight curvature of the spine towards the left. There were a few small glands palpable on the right side of the neck and one in the right axilla somewhat flattened and about 2 cm. in diameter. The epitrochlea glands could not be palpated. The inguinal glands were palpable but not suggestive of any trouble. The area of cardiac dulness extended 6 cm. to the left of the sternum, 9 cm. to the right and nearly to the sternal arch. Over the right upper lobe the breath sounds were faint but bronchial in quality. Over the right lower lobe they were absent. Tactile fremitus was absent at the right base and almost absent at the right apex. All sounds were increased over the left lung. There were no râles heard. Blood pressure was 121 mm. X-ray examination differed only in showing increased opacity of the right lung.

The patient was put to bed and kept absolutely quiet, was given Tuffnell's diet, and a galvanic current applied through the chest, large electrodes being used to the point of toleration. Because of stomach symptoms, the diet had to be discontinued, but at no time after this was he able to eat much of anything, nausea being almost constant. Examinations made of the sputum for tubercle bacilli were always negative. He failed rapidly, the only change on examination being a gradual extension upward of the dulness in the right chest. The temperature varied between 98·4 and 99, the pulse between 80 and 100, and the blood pressure was about 120 mm.

He was seen with me by Dr. Shattuck on August 3, who advised giving him greater liberties. The right lung became completely flat, though the breath sounds, bronchial in character, became audible over the lung (evidently transmitted). Emaciation and loss of strength progressed rapidly, and the enlarged gland in the right axilla gradually increased in size. September 1, he began to have severe headaches, and a little later his mental condition became erratic. September 14, persistent hiccoughing began which lasted four days. On September 16, he began voiding urine involuntarily. Examination showed flatness over the right upper lobe with considerable resonance over the right lower lobe, no breath sounds over the upper lobe and large moist râles over the front of the right lower lobe. September 18, the hiccoughing ceased, the patient felt much better and enjoyed his meals, but had difficulty in breathing. Large moist râles were heard over the front of the chest, marked over the right, less marked over the left. September 19 and 20, he felt fairly well until 8 o'clock in the evening of the 20th, when he began to raise a good deal of muco-purulent material having a very foul odour. Both lungs filled up with mucous râles, and his finger tips became blue. This continued until towards midnight, when he grew rapidly worse and died at 2.45 a.m. September 21.

*Autopsy.*—Just to the right of the median line under the clavicle, and adherent to the first rib and the upper part of the cartilages of the first and second ribs, was a very hard mass, 6 by 5 cm., and $2\frac{1}{2}$ cm. thick, firmly attached to the trachea and to the transverse portion of the arch of the aorta. Just below this was another very dense fibrous mass about 2 cm. in diameter, firmly adherent to the descending vena cava and to the right bronchus. The right lung was distended and solidified. In the upper lobe was a large cavity, filled with pus and broken down lung tissue, opening into the right bronchus. There were smaller areas of softening in the right lower lobe. The bronchioles were filled with a creamy material. The lung was so adherent to the chest wall that it could be removed only by tearing it from the chest wall. On the outer surface of the lower lobe was an area 2 by 3 cm. in diameter, where the pleura was nearly 1 cm. thick, yellowish in colour and quite firm.

The kidneys and liver were dark-coloured, slightly congested, but otherwise normal. The left lung was normal. The head was not opened.

*Microscopic Examination.*—Tissues were taken from the lung and mediastinal growth and examined by Dr. Frank T. Fulton, Pathologist to the Rhode Island Hospital, who reported as follows :—

"Sections from the mediastinal tumour are made up of dense fibrous stroma in which are scattered areas of epithelial cells. These areas of cells vary very much in their size and are entirely irregular. They, as a rule, are retracted from the surrounding connective tissue stroma. The cells forming the outer border of these groups of cells are arranged in a fairly definite irregular layer, but the other cells, the cells within, are very irregular in their arrangement, although fairly regular in size. The cells are rather large, and have a pale nucleus and a moderate amount of protoplasm. The nucleoli are fairly prominent. Mitotic figures are fairly abundant. The central part of most of these cell areas is completely necrotic, in some instances, however, the form of the cells being still preserved, but their ability to take the differential stains is lost. In other of the groups are seen areas closely resembling pearly bodies, that is, made up of cells which are slightly cornified. There are, however, no very pronounced pearly bodies. The whole appearance of the growth is such as to lead one to believe that it originated from epithelium of the epidermal form.

"Sections from the lung show the outer surface to be covered by a thick layer of fibrin, in which there are a few scattered groups of leucocytes. The lung itself in the part from which the selections are taken has lost its normal appearance. There are very few alveoli which even approach normal, and these are filled with mononuclear cells and leucocytes. In some places there is a granulation tissue in which are perfectly typical small tubercles showing the necrotic centre with the surrounding lymphoid, epithelioid and giant cells.

"*Anatomical Diagnosis.* — Epidermoid carcinoma; pulmonary tuberculosis."

Thus we had in this case a sudden onset of symptoms in a man who had undergone exertion and privation of almost every sort, including work in the mines when a boy, packing over the Chilkoot Pass, starvation, and making money and losing it again, the chief symptom being a remarkable dilatation of the veins of the whole body, but especially of the head and neck, a double murmur at the aortic orifice, slight displacement of the heart, a pulsating mass to the left of the spine at the arch of the aorta, the expectorating of a moderate amount of blood, and some pain radiating from the heart. These symptoms were certainly in harmony with aneurysm of the aorta. Against this was the lack of any bruit or expansile pulsation, and there was no laryngeal paralysis or tracheal tug. In addition to the absence of bruit and expansile pulsation was the relief given by iodid of potash, the subsequent change in the position of the heart, and the appearance of enlarged glands in the axilla and above the clavicle. I could not at any time consider that an aneurysm accounted for these things.

For a number of weeks before death I believed it to be malignant disease, but believed that the involvement of the right lung was also of cancerous nature, and was very much surprised when the lung was demonstrated to be tuberculous, especially considering the fact that until about forty-eight hours before death his temperature was rarely above 99, and that at no time were tubercle bacilli present in the sputum.

Judging both from the character of the tissues and the symptoms presented, the older of the growths was that pressing on the vena cava. On section, this growth cut almost like pure fibrous tissue. Just when the tuberculosis of the lung started it is hard to say, but it evidently had nothing to do with the symptoms or signs presenting themselves until the latter part of his illness, though the firmness of the pleural adhesions indicated that they were of long standing, and may have been of tuberculous origin, and a latent tuberculosis of the pleura may have developed into an active tuberculosis of the lung as a result of a lessened vitality from non-aëration.

We believed that the signs at the base of the right lung were due to the pressure of some growth upon the right bronchus, and I still believe this to have been the case. That the blood expectorated was due to tuberculosis I do not believe, because no bacilli could be found in the sputum, because the signs were those of a collapsed rather than a consolidated lung, and because the X-ray showed a diffused cloudiness rather than any localised opacity as one would expect if tuberculosis were sufficiently advanced to destroy the walls of the blood vessels.

We have thus a carcinomatous growth occluding by pressure the superior vena cava, passive congestion and dilatation of the veins of the whole body, this dilatation being very marked over the upper half of the body, the rupture of some blood vessel in the lung as a result of the passive congestion, pressure of the carcinomatous growth on the right bronchus, a secondary carcinomatous growth under the upper part of the sternum displacing the aorta to the left, involvement of the right axillary and cervical lymph nodes, infection of the partially aërated lung with tubercle bacilli, gradual extension of the tuberculosis, necrosis of practically the whole lung and the breaking of this necrotic material into a bronchial tube causing death, the whole so closely simulating aneurysm of the arch of the aorta, that but two of the physicians who saw the case were willing to consider it anything except aneurysm.

# DILATATION OF THE HEART.[1]

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It is not my intention to go into a detailed discussion of this wide subject, but only to touch upon some of the important points, more especially as regards etiology and treatment.

Dilatation of the heart is associated with either a thickening or a thinning of its walls, more commonly the former, and may be looked upon as an index of the disproportion between the intracardiac pressure and the resisting power of those walls. One or all of the cavities may be affected.

*Etiology.*—The majority of instances of cardiac dilatation may be said to result from one of the following factors operating either singly or collectively. First an increase in the amount of work to be done by the heart, as in general arterio-sclerosis, chronic nephritis, valvular disease, overstrain, &c.; second, an impairment in the power of the myocardium from degenerative changes, toxic conditions, &c.; and thirdly, failure of the cardiac tone as seen in some instances of severe nervous shock, &c.

Thus we see in arterio-sclerosis and in chronic nephritis hypertrophy and dilatation of the heart due to increased demands upon this organ. In valvular lesions of all varieties there is almost sure to occur more or less dilatation. Usually with hypertrophy. The mechanism of production in the latter class is too well known to require any explanation here.

[1] This subject is somewhat more fully dealt with in the *American Journal of the Medical Sciences*, Nov. 1907.

Examples of over-strain are to be seen in athletes and in those whose occupations require great muscular effort. Oarsmen and long distance runners necessarily tax their hearts to the utmost. The cardiac pulsations are greatly increased in force and frequency to supply the increased demands of the muscular system and to accommodate the rapid return flow of blood to the heart, but this may not be sufficient. Besides the mechanical overfilling of the cardiac chambers which produces a severe strain on the contractility of cardiac muscles there are also the fatigue products which probably have a toxic effect on the muscle fibres. With this combination at work there is small wonder that the heart gives way under the strain, and dilates in some instances. Some observers, however, do not believe that dilatation of the normal heart ever occurs from muscular exertion alone.

Among the more important causes of myocardial degeneration are the acute infectious diseases such as diphtheria, influenza and rheumatism, if we may class the latter as such.

According to Lees (*British Medical Journal*, 1901), myocarditis is far more common in rheumatism than in diphtheria and influenza, but much less dangerous, and the microscope shows much less destruction of the muscle fibres. Not a few deaths result from acute dilatation in diphtheria or shortly after apparent recovery, and many instances of weak heart finally presenting the picture of dilatation are dated back to an attack of epidemic influenza. A number of writers have called attention to dilatation in typhoid fever, notably Louis Andrai, Gunsburg, Wunderlich, and Stokes. The condition may be general or noted on either side of the heart. Romberg[1] found considerable dilatation of the right ventricle and

[1] "Erkrank. d. Herzmuskels bei Scharlach. Diph. u. Typhus." (*Arch. f. Klin. Med.*, xlvii.)

right auricle with a contracted and hard left heart. A typical example of cardiac dilatation in a case of typhoid fever came under my observation last fall developing in the fifth or sixth week of the disease and rapidly ending fatally.

In the more intense forms of anæmia cardiac dilatation is the rule and probably accounts for many of the murmurs which we are wont to call hæmic.

Myocardial degeneration seen in those past middle life is most commonly due to failure of the blood supply of the cardiac muscle resulting from sclerosis of the coronaries.

After considering the many cases of cardiac dilatation in which we can find a definite and tangible cause, there still remains a fairly large class in which we are not able to find any perfectly satisfactory explanation. Here we must fall back on the nervous system and say that the cause is loss of muscular tone and indeed this seems not by any means an improbable solution, in fact it is urged by Colbeck[1] that all forms of cardiac dilatation may be directly traced to loss of muscular tone. By muscular tone we mean that state of tension in which the muscles are held which is dependent on the nerve supply.

It is a well-known fact that severe shocks, joy, grief, or any severe nervous strain may cause a dilatation of the heart and, as Broadbent has said, death may result actually from a broken heart ; immediate death is, however, probably due to cardiac inhibition. I am inclined to believe that small doses of opium which often seem to act so satisfactorily in dilatation produce results largely through the soothing effect upon the nervous system. Cheimisse[2] states that Marmorstein reported two instances of cardiac dilatation from shock during the rioting in Odessa. The patients were neurotic and the sight of murder and pillage was the immediate cause.

[1] *Lancet*, Lond., 1904. [2] *Semaine Méd.*, Paris, No. 9, 1907.

It is quite conceivable that under prolonged severe exertion even the perfectly normal heart might, and we know does, become exhausted and lose temporarily its muscular tone. In the majority of instances this form of dilatation is rather quickly recovered from, but not always. It is a well-known fact that the training which an athlete goes through for a strenuous competition is to give the muscles, and the heart-muscle in particular, a chance to hypertrophy. The young from their mode of life are always more or less in training, hence the violent strains which their hearts are called upon to bear do no specific harm except, I believe, in rare instances, but it is a vastly different matter when a man past 40 who has given up active exercise for some years is called upon for some violent effort, such as a sprint of a couple of squares to catch a car, or who, because of a too irascible temper becomes involved in a bodily conflict. If this happens to one whose heart is under the influence of nicotine or some such toxic agent, or who has a pre-existing heart trouble such as a valvular lesion or a myocardia degeneration, dilatation of a serious nature may quickly develop with all the usual indications.

The exciting cause may be any unusual muscular or mental effort. I recently saw a prominent lawyer who, though well advanced in years, had always been a man of remarkable vigour ; who brought on the symptoms of a dilatation by the preparation of a long and important brief. He had just concluded his arduous task when he was suddenly seized with dyspnœa and oppression in the cardiac region. I found the heart considerably enlarged, acting very irregularly and a mitral systolic murmur present. Whether this murmur was due to a true valvular lesion or to a relative insufficiency from dilatation I am unable to say, as he left for his home in the West as soon as he had partially recovered.

Another gentleman whom I had the opportunity to observe for a number of years, suffered a severe dilatation from over fatigue of body and mind during an active political campaign, and a second very acute attack, which nearly cost him his life, was the immediate result of rather vigorous abdominal massage. In this case there had been for many years completely compensated mitral and aortic insufficiencies, with but little enlargement of the heart.

Again, the symptoms of dilatation may be brought on by an acute illness in those who, though the subjects of valvular lesions or some other disorder of the heart, had acquired perfect compensation. I had such an instance under observation while I was writing this paper. A woman of 40 years who had for a long time shown the physical signs of a mitral stenosis, developed a broncho-pneumonia with a very harrassing cough. After a few days of constant coughing, marked orthopnœa with œdema of the lungs developed. Examination of the heart showed a loud systolic murmur in the tricuspid area in addition to the pre-existing mitral stenotic bruit. Caffeine in liberal doses gave fairly prompt relief, and the wall of the right ventricle so far regained its tone that the systolic murmur was soon scarcely audible.

One of the most recent instances which has come under my observation, was in the case of an old lady who suffered from a myocardial degeneration. One night she got out of bed, slipped on the floor, and in a violent struggle to regain her feet before any one should find her up alone, brought on a marked dilatation, from which she almost died. It is useless to multiply examples of this well-known condition.

*Symptoms and Physical Signs.*—There is usually a complaint of oppression in the præcardial region, seldom actual pain, arrhythmia of the pulse, dyspnœa, cyanosis, œdema of the lungs, and later on there may be general œdema. In short, the symptoms are those of cardiac insufficiency no matter from what cause.

So many of these patients, whose hearts are undergoing gradual dilatation suffer chiefly from gastro-intestinal disturbances; flatulent dyspepsia or nausea due to the congestion of these organs; and there seems to be a marked disinclination on their part to attribute their troubles to the heart. The liver becomes much congested and is painful to pressure even if there is not complaint of heaviness in the right hypochondrium. Congestion of the kidneys results in scanty more or less albuminous urine in which casts are usually to be found.

The apex beat if visible or palpable is displaced to the left in practically all cases, and also downward if the left ventricle is enlarged. If the right heart is dilated, there is usually to be seen an impulse in the epigastrium, and if there is a tricuspid insufficiency of sufficient magnitude, pulsation of the veins of the neck and of the liver. I shall make no mention of the occasional pulsation in other areas. There is often considerable increase in cardiac dulness. There may or may not be endocardial murmurs due to true lesions of the valves, but there is likely to be present the systolic murmur of a relative insufficiency of the mitral or of the tricuspid valve, or of both.

A point which was a surprise to me when I first used the sphygmomanometer in these cases, was the high blood pressure so frequently present in spite of the very evident symptoms of cardiac insufficiency. This elevation falls as the circulation improves, digitalis for instance, apparently lowering the pressure instead of raising it. The fall in pressure is probably due to a readjustment of the circulatory equilibrum.

*Treatment.*—In an endeavour to relieve this condition, it is necessary to bear in mind the two cardinal objects : To lessen the amount of work which is required of the heart, and to increase the power of the heart to do its work. The first may be accomplished by absolute bodily and mental rest ; by a light diet; by active purgation; by relaxing the peripheral vessels; and by bleeding. The second may be accomplished by the administration of cardiac stimulants; by baths; by judicious exercises, &c.

Some of our patients yield promptly to rest in bed, a dose of calomel or blue mass followed by a saline and the administration of a cardiac stimulant such as digitalis, but there are others which prove more refractory. They may even grow worse: cyanosis and dyspnœa increase, nausea develop with extreme restlessness, and the heart's action become more rapid and irregular. Now it is these cases which require more heroic handling, and it is these cases which are often benefited by bleeding. Some prefer wet cups or leeches and they may be very beneficial. Incidentally I might remark that I cannot see why their application over the præcardia in preference to any other area should be of any special advantage, unless they should also act as counter-irritants. My own experience has been with venesection, and hence I prefer the very simple procedure of opening a vein in the forearm and the drawing off of 8 to 16 ozs. of blood. The results are in some instances most gratifying. I have seen the cyanosis improve at once the nausea disappear while the blood was still flowing, and the patient express himself as much more comfortable. This method of relieving the over-distended heart appeals to me as being one of the most rational at our command, and yet I believe that it is but seldom practised. Like so many other so-called old-fashioned remedies it has gone out of use almost entirely, and it is surprising how few physicians of the present day have ever even tried it.

By unloading the venous circulation the over-filled heart is enabled to more completely empty itself, and the over-stretched muscle fibres are once more allowed an opportunity to contract to somewhere near their normal dimensions. After bleeding, cardiac tonics produce results which before they seemed entirely powerless to do.

The field of remedies which dilate the peripheral vessels—the nitrites as represented by nitro-glycerine—is, I think, especially useful in the acute cases of dilatation. I feel that I have seen lives saved by the free use of this drug over short periods. As a rule it should only be used for short periods.

In conclusion, I would call special attention to the use of opium in cardiac dilatation. These patients are often possessed with that spirit of unrest, that condition of general wretchedness which it is hard to describe, but which is perfectly familiar to us all. For this symptom complex there is nothing so useful as small doses of morphine, even as minute as $\frac{1}{32}$ gr. every four to six hours I have found most beneficial; not only does it quiet the nervous system, but it stimulates the heart and, in most instances, does no harm.

# INDEX.

D = indicates remarks in discussion.

*For complete index of all the volumes, see Volumes XXI. and XXII.*