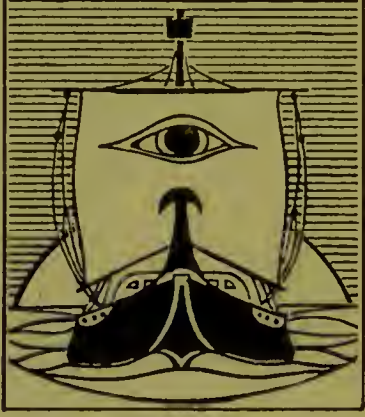




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SOME ACCOUNT

62

OF THE LAST

YELLOW FEVER EPIDEMIC

OF

BRITISH GUIANA :

BY

DANIEL BLAIR, M.D.

SURGEON GENERAL OF BRITISH GUIANA.

EDITED BY

JOHN DAVY, M.D. F.R.S. LOND. & EDIN.

INSPECTOR GENERAL OF ARMY HOSPITALS, ETC.

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PATERNOSTER-ROW.

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W. D. Keisk

TO

HIS EXCELLENCY

SIR HENRY LIGHT, K.C.B.,

LATE GOVERNOR OF BRITISH GUIANA,

DURING WHOSE ADMINISTRATION THE DEMERARA HOSPITAL FOR SICK
SEAMEN WAS FOUNDED,

AND THE GENERAL COLONIAL HOSPITAL ESTABLISHMENT
EFFICIENTLY REMODELLED,

THIS MEMOIR OF THE LATE EPIDEMIC

IS RESPECTFULLY INSCRIBED BY

THE AUTHOR.



EDITOR'S PREFACE.

THE Author's distant residence in British Guiana is sufficient to account for some aid being required in conducting his Work through the press. Having had when employed on service in the West Indies the pleasure of making Dr. Blair's acquaintance, and having from intercourse with him, both in conversation and writing, formed a high opinion of his opportunities for, and power of, observing, I felt confident that a monograph by him, embodying the results of his experience on Yellow Fever, as it occurred in Georgetown, British Guiana, between 1837 and 1842, could not fail to be valuable;—a conviction which was confirmed by even a partial perusal of the MS. This persuasion induced me to offer my assistance to my friend to superintend the printing of his work. He accepted the offer, with the request that I would, whenever occasion permitted, give any information I might be able to supply in addition in the form of notes or comments,—a request which I did not think it right to decline. These additions are denoted by being placed within brackets.

✓ In proof that I have not adverted groundlessly to the Author's opportunities for observation, I may mention some circumstances which I have learnt from him, communicated in a letter regarding his treatise,—viz., that he has been in full practice in the colony of British Guiana since the year 1835, and that he has had there the superintendence of the public hospitals, comprising the Colonial General Hospital, the Demerara Seaman's Hospital, the Small Pox Hospital, and Lunatic Asylum, since February, 1842, with absolute medical direction of them, he himself prescribing for every case, and performing every capital operation required, aided in the duties by two resident medical assistants.

The number of in-door patients, and of cases of fever amongst these, will give some idea of the magnitude and importance of the establishments. In the Colonial General Hospital, from the 1st February, 1842, to the 30th June, 1848, exclusive of six months when the author was on leave of absence, he informs me, that 22,036 cases were under treatment, of which 11,420 were of idiopathic fever, using the term in contradistinction to fever of the sympathetic kind, such as arises from the phlog-masiæ and exanthemata; and that in the Seaman's Hospital during the same period, with the same exception as to time mentioned, and other six months, the report of which was not at hand for reference, the admissions were 6,295, of which 1,439 were instances of idiopathic fever. The Lunatic Asylum and the Small Pox Hospital are merely small auxiliary institutions; in the former the admissions were 197, in the latter 150. The reports on these hospitals, published at half-yearly periods, are exemplary documents, and in themselves afford strong proof of the zeal and ability engaged in the service.

That the Author himself experienced the disease, may be mentioned as another circumstance in favour of his undertaking. He may truly say, with the great historian of the plague at Athens*: "Having myself had the distemper, and having seen others suffering under it, I will state what it actually was, and will indicate, in addition, such other matters as will furnish any man who lays them to heart with the knowledge and the means of calculating beforehand, in case the same misfortune should ever again occur."

In an Appendix some additions have been made bearing on the subject of the treatise, the most important of which are the papers on the use of quinine in the treatment of the fevers of the West Indies. Of these, those by the Author he favoured me with when I had charge of the medical department in the West Indies. They were circulated widely at the time amongst the medical officers of the Command; were thus instrumental

* Thucyd. ii. 48. —

in making better known and in bringing into use this powerful remedial means; and they are now published at my suggestion, with the hope of making them more extensively useful.

In conclusion I would observe, how very desirable it is that some principles should be established as practical rules on the emergency of an outbreak of Yellow Fever, so that those concerned, whether medical officers, or general officers, or civil authorities, may be prepared to act with as much confidence and decision as possible when the disease appears. I am not without hope that this work may promote the desideratum by tending to prove, —

1st. That the disease is of local origin, and not infectious or contagious.

2ndly. That its exciting cause, whatever it may be, is limited as to space of action, and may be avoided by change of place; and further, that though removal to a short distance, even if the ground be apparently similar, may often be sufficient, it is safest to make the change to a spot altogether different in its character from that where the outbreak took place.

3rdly. That the newly arrived from a cool or cold climate are most liable to be attacked by it, and ought therefore as much as possible to avoid the localities where the disease is prevalent; and accordingly, that bodies of men employed in the public service, on arrival in the West Indies, unless the exigencies of the service absolutely require it, should be kept from such spots.

4thly. That the natives of the African race, and of the mixed coloured races, though not always exempt from the disease, are comparatively little liable to contract it; generally they may be considered safe from it, as well as from an attack of remittent fever; and consequently that men of the West India regiments, all of whom are Africans, should be preferred for service in unhealthy situations and seasons.

5thly. That the tendency to contract the disease in the instance of whites is less in those coming from warm climates, as

the South of Europe, than from cold, as the North of Europe and North America; consequently that troops ought not to be brought from England and Canada to the West Indies, but rather from the Mediterranean stations or the Cape of Good Hope.

6thly. That the disease commonly does not recur in the same person; and, consequently, those who have had the disease are best fitted to act as nurses and attendants on the sick, if treated where the disease originated.

7thly. That Yellow Fever, it would appear from its past history, has been variously modified, subject to many complications of a perplexing kind, which ought to influence the treatment, and which require to be studied, and, as far as possible, determined, to fix the mode of treatment likely to be most successful in each epidemic.

8thly. That though it has invaded bodies of men occupying apparently healthy quarters, and under circumstances favourable seemingly to health, yet most commonly it has broken out in situations of a different character, where the drainage has been defective, where there has been crowding and neglect of cleanliness, — in brief, a complication of circumstances, more or less of an unwholesome kind, such as are likely to promote the action of a specific exciting cause; consequently, that all measures of a sanatory kind cannot be too sedulously attended to with a view to the prevention of the disease.

9thly. That the disease hitherto has been of periodical recurrence, not yet calculable, its cause being unknown, — and that though occurring oftenest in the coolest season, not invariably so, and that no uniform kind of weather, as far as observations hitherto extend, has been connected with its appearance; and, consequently, there can be no certainty at any particular time as to its non-recurrence.

J. D.

PREFACE.

WHEN the late epidemic Yellow Fever commenced, the medical gentlemen of Georgetown then in practice were without personal knowledge of the disease; for those who had seen the epidemic of 1819 had retired from practice or were dead, and had left no record of its local peculiarities and treatment behind them. In some measure to prevent the inconvenience of a similar blank in the medical history of the colony, the Author undertook to write the present memoir. The materials of it are derived from his clinical notes of private cases, from analyses of the registers and case books of the hospitals under his charge, and from a fresh recollection of the general circumstances of the late epidemic.

The subject is capable of a much more minute and extensive dissertation; and the Author hopes that the present contribution may be the means of eliciting, in a similar manner, and for a similar end, the views of several of his professional brethren of the colony. The value of such contributions would not be of local importance only. From the discrepancies of medical writers on some of the most prominent facts regarding Yellow Fever, there is no doubt that the disease is subject to many modifications, the whole of them probably arising from differences of climate (taking the word in its extensive signification) within the Yellow Fever zone.* It is likely that the

* [That Yellow Fever is subject to variation, connected with season and

Demerara type would represent a large area on a chart of the disease; so that the collective information which can be furnished from the late epidemic may not have to lie useless till our next visitation, but be immediately applicable to the relief of human suffering and the elucidation of disease elsewhere.

The pathological drawings are chiefly the work of a young sailor who was admitted to treatment in the Seaman's Hospital.* After he recovered from his attack of the prevailing epidemic, his talents were discovered, and, for a considerable period, he continued to be employed by me as draughtsman for the hospital. It is scarcely necessary to state that the drawings are *bonâ fide* representations; and though several are somewhat coarse, their verisimilitude is striking.

For assistance in the analysis of the case-books and register, I am much indebted to Dr. Fowler, the present chief resident surgeon of the Seaman's and Colonial Hospitals.

The preliminary remarks are intended to show (in botanical language) the *habitat* of our type of Yellow Fever, and further to identify it by pointing out some of the *ordinary* influences which the locality and climate seem to exercise over the population.

locality, and with obscure circumstances that at present cannot well be appreciated, is proved by extensive experience. The fever of one season, or place, may be far more malignant, — that is with greater tendency to fatal termination, — than of another season, or of another place; in one epidemic or endemic, the lancet may be used cautiously with advantage, or even boldly; in another not without the greatest risk of bad effect. These remarks apply to epidemic diseases generally. We are informed, by Sydenham, how difficult he found it, on the breaking out of an epidemic, to determine on the best mode of treatment to be employed in it, — and how he came to a decision only after “*ingenti adhibita cautela intentisque animi nervis;*” an example well deserving of being followed. A series of monographs exhibiting distinctly the varieties of Yellow Fever, in its several complications, could they be written by one observer free from the bias of hypothesis, would be invaluable for practical purposes; but, I fear the absence of such a bias with the possession of every other qualification, is too much to expect.] — ED.

* [Of the drawings which accompanied the MS. only a select number have been published, — some of the most characteristic, — the Editor, to whom a discretionary power was allowed, not considering it right with a view to just economy to insert the whole. He has pleasure in adding that the remainder have been presented by the Author to the Museum of Pathological Anatomy of the Army Medical Departments, where they can be consulted by inquirers interested in the subject.] — ED.

The plan of the "account" is, in the first division, to treat of the late pestilence in its general and epidemic character: in the second division, of its peculiarities as an individual disease, and its treatment: in the third division, the meteorological and other phenomena attending the disappearance of the disease from the colony: the fourth division consists chiefly of pictorial illustrations of the preceding divisions.

As the treatise is no doubt to be read chiefly in this country, and as the facts are intimately associated with names and individuals in the Author's mind, less care has been taken to free the narrative from merely local references than would have been desirable in a work more cosmopolitan.

The Author has been reserved in forming general conclusions, as he intends the treatise to be a mere contribution of materials to the subject of Yellow Fever — fragments of the history of our late epidemic, to which additions may be made at some future day.

Georgetown, Demerara,
31st December, 1847.

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ERRATA.

- Page 70. line 23. for "dosing" read "dozing."
" 108. " 11. for "ḫiii." read "ḫii."
" 107. " 13. for "Mendererius," read "Mindererus."

THE LAST
YELLOW FEVER EPIDEMIC
OF
BRITISH GUIANA.

PRELIMINARY REMARKS.

BRITISH GUIANA, in its colonised portion, is chiefly distinguished by its flatness, by its lowness of level, which is below that of the sea at high water of spring tides, and by the argillaceous nature of its soil, which is nearly destitute of lime, and is charged more or less with oxide of iron and sea salt. Its entire surface is distinguished by the never-fading luxuriance of its vegetation. Its inhabitants reside chiefly on the skirts of the sea-shore and at the mouths of its majestic rivers. As its level is below that of the sea, the cultivated lands require embankments on every side; sluices in those embankments at suitable times of tide give vent to the surface drainage of the land. The ordinary rise and fall of spring tides is nine feet. Numerous drainage and navigable canals intersect the country. Within the city of Georgetown, in 1837, besides the private drains, there belonged to the public thirty-one miles of open trenches, varying in width from two to ten feet, communicating by sixty-two tunnels, and these required to discharge the surface water of the city alone.

The colony is a tropical Holland. Behind the empoldered lands, extends an almost endless succession of creeks, savannahs, and forests; and in front fringed with a thicket of aquatic trees, quicksand and mud banks (the alluvial elements of the country) stretch out far into the muddy sea.

The colony, circumstanced as above described, and lying between the sixth and eighth parallels of north latitude, is remarkable for its uniformity of temperature and its humidity. Its

façade, extending nearly east and west, has the advantage of being cooled and dried during the greater part of the year by the Trade Winds.

At about the centre of the sea façade of British Guiana, at the mouth of the Demerara River, stands the capital of the colony, Georgetown, having Essequibo on the extreme west, or leeward of the coast, and Berbice (with its chief town and sea port, New Amsterdam,) on its extreme east, or windward of the coast. Georgetown is laid out in rectangular streets of great width generally, and is composed chiefly of wooden houses, stilted several feet from the surface of the ground on pillars, and separated from each other by gardens with flowering shrubs, and fruit and ornamental trees. The houses, with their open windows, jalousies, and galleries, may be considered as having the functions of huge umbrellas, and intended to keep off the sun and rain only. At the time of the late epidemic, when Georgetown contained less than 20,000 inhabitants, it covered an area of nearly two miles. The prevention of extensive fires, the open exposed nature of the habitations, and a proper regard for ventilation, required this roominess of the city. Two portions of Georgetown, however, were and are exceptions to this general description, viz. the mercantile parts, Water Street and Robb's Town. There the houses are nearly in contact, and instead of a construction of open pillars, or uninhabited cellars, the ground-floors are used and occupied during the day as shops or stores. It was in this portion of the city that the yellow fever epidemic of 1837 was most prevalent, as it was in America Street (the then mercantile part of the town) that the epidemic chiefly prevailed in 1819. "Robb's Town" has no peculiarity, except that of the houses being huddled together, but Water Street has others. Its highway is formed by the embankment that prevents the overflow of the river-tide, and one side of the street, comprehending stores, dwellings, kitchens, stables, &c. &c., is built on the bed of the river itself, supported above the level of the water by piles and platforms. This side of the street is designated the "Mud Lots" of Water Street. To almost every "mud lot" there is also attached a "stelling," or landing wharf, composed of piles with a platform from four to seven feet broad, and extending beyond the buildings into the shelving clay bed of the river. Seven public stelling, at several intervals, keep up a free communication between the city and the

shipping. Across Water Street six sluices discharge the drainage and sewerage past the stellings into the river. At the angle formed by the river and ocean embankments, and to the north of the city, are situated the Military Grounds. To leeward of the city, and out in the river-stream at prescribed lines of distance from the shore, lie the mercantile shipping. Robb's Town, Water Street, Eve Leary Barracks, and the shipping, were the grand seats of the epidemic, and hence a few further details of their topography will be necessary.*

It will be perceived that by the system of stellings over the mud-lots of Water Street, the current of the river for about two miles in length is subjected to a kind of coarse filtering, and that bulky materials of any kind floating among the piles are necessarily entangled and detained below the stellings. A short time prior to 1837, an economical custom, commenced with the public stellings (Robb's Stelling first), and extended to those of some private individuals, of filling up a portion of the stelling with earthy materials, and thus converting the stellings to a certain extent into a solid quay. These erections have converted the line of water side into a succession of bays, from which the descending force of the river in ebb has little effect in clearing away the carrion, &c., drifted in by the flood tide and drainage of the town, or the rotten salt fish, damaged onions, potatoes, and rubbish of all kinds, thrown by the merchants in large quantities over the stellings. Over some of the stellings, where the water is quiescent, the most offensive smells arise, and the white paint of the wooden houses is speedily reduced to metallic lead. The inner row of houses in Water Street is lower generally in level than the water-side row, being built within the embankment, and on the natural level of the country, and over what was the trench of the dam. This difference of level between the two sides is less apparent now than it was in 1837, for the trench is now every where, but in the Kingston district, filled up, the streets elevated, and the inner level has in most places been artificially raised. Yet, however, at spring tides the river frequently rises below the stellings, streams across the street, and, carrying a warp as rich as that of the Humber, settles on the low ground of the inner row of

* For relative position, see map of Georgetown.

houses. Regent Street, the southern boundary of Robb's Town, has by the Vlissingen Canal a similar river frontage to Water Street.

Ships from North America and the West Indies, and those whose lay-days are few, generally lie alongside of some private stelling. But the British merchant ships lie out at moorings in lines 50, 100, and 150 fathoms or upwards from the shore, and there discharge and load by the assistance of boats. Thus the vast majority of the ships' crews are as perfectly isolated from each other as if each ship was in quarantine. The river is rapid and dangerous, and infested with sharks, and no communication can take place between the ships except by the ships' boats. The amount of trade to this port may be ascertained by the following table of the number of seamen who have arrived monthly since 1835; and as the arrivals and departures nearly balance each other, a constant (say) of 200 to represent the number of remaining at the 31st of December, 1844, and added to the arrivals of each month, will give a close approximation to the total number of seamen which form the river or harbour population. It will be seen that the arrivals are pretty uniform throughout the year, as Guiana, unlike the West India Islands, grows and manufactures sugar (the great staple) in all seasons indiscriminately:—

MONTHLY ARRIVAL OF SEAMEN IN DEMERARA RIVER.

| Years. | Jan. | Feb. | March. | April. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. | Total. |
|--------|-------|-------|--------|--------|-------|-------|-------|-------|-------|-------|-------|-------|--------|
| 1835 | 256 | 216 | 246 | 270 | 316 | 318 | 255 | 360 | 260 | 306 | 433 | 517 | 3,753 |
| 1836 | 338 | 183 | 343 | 327 | 319 | 334 | 280 | 516 | 365 | 380 | 505 | 217 | 4,107 |
| 1837 | 365 | 292 | 373 | 332 | 384 | 199 | 341 | 285 | 363 | 200 | 622 | 460 | 4,216 |
| 1838 | 385 | 515 | 257 | 425 | 318 | 402 | 376 | 371 | 387 | 562 | 285 | 419 | 4,702 |
| 1839 | 291 | 345 | 272 | 319 | 272 | 415 | 381 | 208 | 416 | 473 | 419 | 346 | 4,157 |
| 1840 | 385 | 263 | 307 | 544 | 245 | 405 | 501 | 484 | 363 | 440 | 588 | 338 | 4,863 |
| 1841 | 658 | 202 | 667 | 271 | 365 | 417 | 398 | 322 | 345 | 337 | 336 | 352 | 4,670 |
| 1842 | 378 | 417 | 370 | 276 | 380 | 242 | 298 | 341 | 415 | 217 | 583 | 292 | 4,209 |
| 1843 | 278 | 177 | 413 | 249 | 381 | 288 | 383 | 271 | 276 | 467 | 459 | 308 | 3,950 |
| 1844 | 297 | 411 | 266 | 301 | 308 | 201 | 332 | 194 | 434 | 533 | 401 | 459 | 4,137 |
| 1845 | 273 | 358 | 372 | 387 | 376 | 431 | 477 | 511 | 460 | 230 | 507 | 471 | 4,853 |
| 1846 | 430 | 447 | 518 | 466 | 466 | 345 | 369 | 444 | 297 | 499 | 384 | 517 | 5,182 |
| | 4,334 | 3,826 | 4,404 | 4,167 | 4,120 | 3,997 | 4,391 | 4,307 | 4,379 | 4,644 | 5,522 | 4,696 | 52,799 |

The harbour for some time previous to the outbreak of Yellow Fever, in 1837, had a high character for healthiness. But after the epidemic had continued one or two years, seamen could

scarcely be induced on any terms to ship for Demerara, and of these many described themselves as having been grossly deceived, not a few who were shipped as for Norway finding themselves moored in the Demerara river. With what justice this change of character obtained, the following Table of deaths among the seamen will show :—

ABSOLUTE MORTALITY AMONGST SEAMEN FROM THE 1ST JANUARY, 1835, TO THE 31ST DECEMBER, 1846, ON BOARD SHIP ABOUT GEORGETOWN, DEMERARA, AND IN THE SEAMEN'S HOSPITAL, INCLUSIVE.

| Year. | Jan. | Feb. | March. | April. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. | Total. |
|-------|------|------|--------|--------|------|-------|-------|------|-------|------|------|------|--------|
| 1835 | 1 | -- | -- | 1 | -- | -- | -- | -- | -- | -- | -- | -- | 2 |
| 1836 | 1 | 1 | 3 | 3 | 2 | -- | 2 | -- | -- | -- | -- | -- | 12 |
| 1837 | -- | 1 | 1 | 1 | 7 | 39 | 45 | 29 | 37 | 44 | 23 | 30 | 257 |
| 1838 | 43 | 37 | 25 | 10 | 15 | 38 | 44 | 30 | 27 | 20 | 20 | 17 | 326 |
| 1839 | 7 | 6 | 4 | 3 | 4 | 2 | 4 | 9 | 22 | 23 | 49 | 24 | 157 |
| 1840 | 24 | 17 | 4 | 2 | 3 | 5 | 2 | 3 | -- | 3 | 3 | 10 | 76 |
| 1841 | 16 | 17 | 6 | 1 | 2 | 2 | 5 | 19 | 43 | 11 | 13 | 18 | 153 |
| 1842 | 13 | 8 | 10 | 2 | 2 | 11 | 9 | 13 | 15 | 32 | 12 | 8 | 135 |
| 1843 | 3 | -- | -- | 1 | -- | 1 | 1 | 2 | 2 | 1 | 2 | 8 | 21 |
| 1844 | -- | 4 | -- | -- | 1 | 2 | -- | 3 | -- | 1 | 1 | 1 | 13 |
| 1845 | 1 | -- | -- | 1 | 1 | 1 | 2 | 1 | -- | 1 | 3 | -- | 11 |
| 1846 | -- | 3 | 1 | -- | 1 | 1 | 1 | -- | 1 | -- | 1 | -- | 9 |

To the east and north-east of the Military Grounds, and on the front lands of Plantation Thomas and Kitty, there were many hundred acres of jungle, forming a well sheltered swamp. To the north during the time of the epidemic there also existed a naked marsh of about 250 acres. During each high spring tide the sea covered the surface of the marsh. The soil was composed of the usual constituents of our fore-shores, viz. clay, a fine sand known by the name of "caddy,"* and a mixture of light fat earthy and vegetable matter known by the name of "drift mud."† The surface was jagged by a vast number of

* [The sand, so called, is nearly purely siliceous. The specimens of it which I have examined consist almost entirely of water-worn grains of quartz, variously coloured. The remains of infusoria are occasionally found intermixed.]—ED.

† [The drift mud is analogous to the clays forming the greater portion of the soils and subsoils of British Guiana, and, like them, consists chiefly of the finer part of the detritus of the primitive rocks of the interior, with an admixture of a very little vegetable matter. The particles forming the caddy are coarse in comparison with those forming the clays. In the latter a large proportion are so minute as to be hardly visible individually under the microscope using a high power.]—ED.

half-rotten stems and roots, probably the vestiges of some previous cultivation projecting several feet above the level of the swamp. On its sea margin a forest of young "corrudas," (*Avicennia nitida et tormentosa*) and other trees which delight in a brackish humid soil, was springing up. The marsh was tufted with a coarse grass, under whose half-withered leaves myriads of insects were sheltered. Innumerable crabs burrowed throughout.* Fragments of drift wood, bones, dead spawn, dried mollusca, and small fish left by the retreat of the tide, were scattered profusely over the surface. Near to the public road were small gullies, communicating apparently with the jungle, lined with cryptogamic plants, and containing frothy putrid-looking water. † Within the trenches aquatic larvæ and exuviæ abounded, and over them clouds of mosquitos and sand flies. Such was the condition of the neighbourhood of the Military Grounds during the epidemic. These particulars were noted by the author more especially in 1840, in consequence of a reference being made to him by his Excellency the Governor, with a view to reply to a dispatch from the Right Honourable the Secretary at War, regarding the question why in a few months sixty-nine per cent. of all the white troops had perished. In close proximity and to leeward of the marsh stood the Military Hospital. It is said that almost every case admitted to this hospital during the epidemic became yellow fever, no matter what the ailment on admission; and it ultimately became such a terror to the soldiers, that the utmost difficulty was experienced in persuading them to enter it when sick. ‡

WEATHER OF BRITISH GUIANA.

The two most important meteorological elements here are the wind and the rain. The inhabited sea-coast lying nearly N. E.

* ["A species common throughout the West Indies, in loose sandy soils, bordering on the sea-shore." (*Cancer Ruricola* Lin., *Gecareinus Ruricola*? Lat.)]—ED.

† [Perhaps this appearance was deceptive; commonly in such situations the air disengaged, producing the froth, is oxygen, from the decomposition of carbonic acid by the cryptogamia under the influence of light.]—ED.

‡ [In illustration of the above remark it may be mentioned that Dr. Hackett, now Deputy Inspector General of Hospitals, then on duty in Georgetown, when attacked by the prevailing fever, heroically had himself removed from his house and family to the Military Hospital, with the hope of overcoming the dread towards it entertained by the soldiers.]—ED.

and S. W. the trade winds impinge the whole line. As the land lies in a more or less favourable angle for receiving the full force of the trade winds, *ceteris paribus*, it is in ordinary seasons more or less healthy.

In a hygienic point of view we have only two winds—the land wind and sea breeze. A line drawn through the compass E. S. E. to N. N. W. would mark off the domains of each wind; and in proportion as it blows northerly or southerly of this line, so is the weather comfortable or uncomfortable to the colonists. The north and east are arrayed against the south and west. Though the day and night exercise a modifying influence on these winds, the sun's position is the supreme power. The following table will show the quantities of wind blowing over the colony in an average year, as ascertained in inches of Whewel's anemometer.

COLONIAL HOSPITAL, DEMERARA. VELOCITY OF WIND REDUCED TO EACH OF THE CARDINAL POINTS OF THE COMPASS.

| Year. | For previous 12 hours. | | | | | | | | |
|--------------------|------------------------|-------|------|-----|---------|--------|-------|-----|------------------|
| | 6 A. M. | | | | 6 P. M. | | | | |
| | N. | E. | S. | W. | N. | E. | S. | W. | |
| 1844. | | | | | | | | | |
| January - | 1·74 | 12·30 | ·30 | ·03 | 4·54 | 13·41 | ·68 | ·14 | |
| February - | 5·17 | 14·31 | ·66 | ·02 | 7·13 | 30·58 | 1·85 | ·03 | |
| March - | 2·50 | 11·34 | ·18 | | 7·50 | 28·38 | 1·09 | | |
| April - - | ·80 | 8·00 | 1·08 | ·03 | 2·00 | 20·92 | 3·36 | | |
| May - - | ·58 | 5·01 | 1·54 | | 1·55 | 14·99 | 5·44 | | |
| June - - | ·33 | 2·82 | 1·25 | | 1·02 | 11·02 | 4·61 | | |
| July - - | ·14 | 1·33 | ·30 | | 1·19 | 8·57 | ·34 | | |
| August - | ·39 | 1·97 | ·19 | | 2·24 | 12·21 | ·43 | ·10 | |
| September - | ·27 | 3·10 | ·50 | | 3·68 | 16·39 | ·60 | | |
| October - | ·24 | 7·20 | 2·10 | | 1·00 | 16·36 | 2·90 | | |
| November - | ·97 | 4·66 | ·51 | | 3·16 | 17·39 | ·97 | | |
| December - | 1·22 | 7·98 | ·60 | | 3·67 | 20·18 | 2·82 | | |
| Total Night Winds. | 14·35 | 50·02 | 9·21 | 0·8 | 38·82 | 210·40 | 25·09 | ·27 | Total day winds. |

Totals of the Cardinal Points.

| N. | E. | S. | W. |
|-------|--------|-------|-----|
| 53·17 | 260·42 | 34·30 | ·35 |

Respective Powers of Land and Sea Breezes.

Land, 34·65. Sea, 313·59.

The sea-breeze is exhilarating, but the land wind induces a

feeling of chilliness and discomfort (not satisfactorily accounted for by the mere meteorological changes), and, in many, a feeling of nausea. The land winds are universally believed to be unwholesome. They are of weak dynamic power, and frequently perceived when not indicated by the wind gauge. A low total velocity of the wind gauge is an indication of their prevalence. Clouds of smoke from the tall chimney-shafts of the sugar works, or the ensigns of the merchant ships stretched towards the mouth of the river, and the feelings, best give notice of the presence of these winds. Sometimes the smoke-cloud is bent down towards the earth, as if the land wind was merely a cold stratum descending from the immediate neighbourhood; at others the smoke-cloud is stretched out into a long train, as if by a horizontal stratum proceeding slowly from the interior wilderness. The south-east land wind at the *end* of the great rainy season feels chilly, from the evaporation from the surface of the body which it causes by its extreme dryness, while the sun is unclouded and fervidly hot. This is unhealthy weather. Continued fevers are then prevalent.

The following table exhibits some meteorological observations made at the Colonial Hospital on land winds.

METEOROLOGICAL OBSERVATIONS DURING LAND WINDS, 1843.

| Date, 1843. | | Temperature. | | | Dew Point. | Weight of Atmo- sphere. | Elasti- city of Vapour. | Ratio of Humi- dity. | Direction of Wind. | Velo- city. | Plu- viom- eter. |
|-------------------|-------|--------------|------|-------|---------------|----------------------------------|-------------------------------|----------------------------|-----------------------|----------------|------------------------|
| | | Dry. | Wet. | Diff. | | | | | | | |
| A. M. 1st July | h. m. | | | | | | | | | | |
| | 10 55 | 85·2 | 77·5 | 7·7 | 74·4 | 30·300 | ·838 | 70 | E.N.E. | | |
| | 10 58 | 85·7 | 78·0 | 7·7 | 75·0 | 30·312 | ·854 | 71 | E.N.E. | - - | ·014 |
| | 11 55 | 84·8 | 77·0 | 7·8 | 73·8 | 30·300 | ·822 | 70 | S.S.E. | | |
| | 12 0 | 83·0 | 77·0 | 6·0 | 74·7 | 30·312 | ·843 | 76 | S.S.E. | | |
| | 12 5 | 83·0 | 77·0 | 6·0 | 74·7 | 30·312 | ·843 | 76 | S.S.E. | | |
| | 12 10 | 82·7 | 77·2 | 5·5 | 75·0 | 30·312 | ·854 | 78 | E.S.E. | | |
| | 12 15 | 83·0 | 77·2 | 5·8 | 74·9 | 80·300 | ·851 | 77 | N. | | |
| | 1 15 | 84·2 | 78·0 | 6·2 | 75·6 | 30·237 | ·871 | 76 | N.E. | | |
| 1 20 | 84·2 | 78·0 | 6·2 | 75·6 | 30·237 | ·871 | 76 | N.E. | - - | ·014 | |
| A. M. 5th July | 6 40 | 77·0 | 74·7 | 2·3 | 73·8 | 30·275 | ·819 | 90 | S.W. | | |
| | 6 45 | 77·0 | 74·7 | 2·3 | 73·8 | 30·275 | ·819 | 90 | S.W. | | |
| | 6 50 | 77·0 | 74·7 | 2·3 | 73·8 | 30·275 | ·819 | 90 | S.W. | | |
| | 6 55 | 77·0 | 74·7 | 2·3 | 73·8 | 30·275 | ·819 | 90 | S.W. | | |
| | 7 0 | 77·7 | 74·2 | 3·5 | 72·7 | 30·275 | ·791 | 85 | S.W. | | |
| | 7 5 | 77·7 | 74·2 | 3·5 | 72·7 | 30·275 | ·791 | 85 | S.W. | | |
| | 7 20 | 77·2 | 74·7 | 2·5 | 73·7 | 30·287 | ·817 | 89 | S.W. | | |
| | 7 30 | 77·2 | 74·7 | 2·5 | 73·7 | 30·287 | ·817 | 89 | S.W. | | |
| | 7 45 | 77·2 | 74·7 | 2·5 | 73·7 | 30·287 | ·817 | 89 | S. | | |
| | 7 50 | 77·2 | 74·7 | 2·5 | 73·7 | 30·287 | ·817 | 89 | E.S.E. | | |
| | 7 52 | 77·2 | 74·7 | 2·5 | 73·7 | 30·287 | ·817 | 89 | S. | | |
| | 7 55 | 77·2 | 74·7 | 2·5 | 73·7 | 30·287 | ·817 | 89 | S. | | |

METEOROLOGICAL OBSERVATIONS — (continued).

| Date, 1843. | | Temperature. | | | Dew Point. | Weight of Atmo- sphere. | Elasti- city of Vapour. | Ratio of Humi- dity. | Direction of Wind. | Velo- city. | Plu- viom- eter. |
|-------------------------------|-------|--------------|------|-------|---------------|----------------------------------|-------------------------------|----------------------------|-----------------------|----------------|------------------------|
| | | Dry. | Wet. | Diff. | | | | | | | |
| A. M. 5th July. | h. m. | | | | | | | | | | |
| | 8 0 | 77·7 | 75·0 | 2·7 | 73·9 | 30·300 | ·823 | 89 | S. | - - | ·136 |
| | 8 5 | 77·5 | 75·0 | 2·5 | 74·0 | 30·300 | ·826 | 90 | S. | | |
| | 8 10 | 77·5 | 75·0 | 2·5 | 74·0 | 30·300 | ·826 | 89 | S. | | |
| | 8 15 | 77·5 | 75·0 | 2·5 | 74·0 | 30·300 | ·826 | 89 | S. | | |
| | 8 20 | 77·5 | 75·0 | 2·5 | 74·0 | 30·300 | ·826 | 89 | S. | | |
| | 8 40 | 77·5 | 75·0 | 2·5 | 74·0 | 30·300 | ·826 | 89 | S. S. W. | | |
| | 8 45 | 77·5 | 75·0 | 2·5 | 74·0 | 30·300 | ·826 | 89 | S. S. W. | | |
| | 8 50 | 77·7 | 75·0 | 2·7 | 73·9 | 30·300 | ·823 | 89 | S. S. W. | | |
| | 9 15 | 77·7 | 75·0 | 2·7 | 73·9 | 30·300 | ·823 | 89 | Varia. | | |
| | 10 20 | 77·7 | 75·0 | 2·7 | 73·9 | 30·300 | ·823 | 89 | Calm | | |
| | 10 25 | 78·7 | 76·0 | 2·0 | 75·2 | 30·300 | ·859 | 90 | S. | | |
| | 1 45 | 82·5 | 77·0 | 5·5 | 74·8 | 30·225 | ·848 | 78 | S. | | |
| | 1 50 | 81·2 | 76·0 | 5·2 | 73·9 | 30·250 | ·823 | 79 | S. S. E. | | |
| | 2 0 | 81·0 | 76·2 | 4·8 | 74·3 | 30·237 | ·833 | 80 | S. | | |
| | 2 15 | 81·2 | 76·2 | 5·0 | 74·2 | 30·237 | ·831 | 80 | Calm | | |
| | 2 20 | 81·2 | 76·5 | 4·7 | 74·6 | 30·225 | ·843 | 81 | E. | | |
| 2 25 | 81·2 | 76·5 | 4·7 | 74·6 | 30·225 | ·843 | 81 | E. | | | |
| P. M. 3rd Aug. | 2 15 | 86·5 | 78·0 | 8·5 | 74·7 | 30·275 | ·845 | 68 | S. | | |
| | 2 25 | 86·5 | 78·0 | 8·5 | 74·7 | 30·275 | ·845 | 68 | S. | | |
| | 2 35 | 85·0 | 79·0 | 6·0 | 76·8 | 30·275 | ·905 | 77 | S. W. | | |
| | 2 45 | 85·0 | 79·0 | 6·0 | 76·8 | 30·275 | ·905 | 77 | S. W. | | |
| | 2 55 | 86·0 | 79·0 | 7·0 | 76·4 | 30·265 | ·893 | 73 | S. W. | | |
| | 3 0 | 86·0 | 78·7 | 7·3 | 76·0 | 30·250 | ·881 | 72 | Calm | | |
| | 3 10 | 86·0 | 79·5 | 8·5 | 74·5 | 30·275 | ·839 | 69 | E. | | |
| P. M. 4th Aug. | 1 20 | 85·7 | 77·5 | 8·2 | 74·3 | 30·300 | ·833 | 69 | S. | | |
| | 1 30 | 85·7 | 77·5 | 8·2 | 74·3 | 30·350 | ·833 | 69 | Calm | | |
| NOON 6th Aug. 15th Aug. | 12 0 | 80·7 | 77·0 | 3·7 | 75·4 | 30·325 | ·869 | 84 | S. | - - | ·580 |
| | 12 0 | 86·0 | 78·0 | 8·0 | 74·9 | 30·200 | ·851 | 70 | S. | | |
| | 12 25 | 86·7 | 78·0 | 8·7 | 74·6 | 30·300 | ·843 | 68 | S. | | |
| | 1 15 | 85·5 | 77·2 | 8·3 | 73·9 | 30·275 | ·823 | 69 | S. | | |
| | 1 20 | 85·2 | 77·2 | 8·0 | 74·0 | 30·275 | ·826 | 69 | S. | | |
| | 1 25 | 85·2 | 77·2 | 8·0 | 74·0 | 30·275 | ·826 | 69 | S. | | |
| | 1 30 | 85·0 | 77·0 | 8·0 | 73·8 | 30·275 | ·820 | 70 | S. W. | | |
| | 1 35 | 84·2 | 78·5 | 5·7 | 76·3 | 30·262 | ·892 | 78 | S. W. | | |
| | 1 40 | 83·7 | 77·2 | 6·5 | 74·6 | 30·275 | ·843 | 74 | S. W. | - - | ·358 |
| | 1 45 | 83·7 | 78·0 | 5·0 | 76·1 | 30·275 | ·885 | 78 | S. W. | | |
| | 1 50 | 84·0 | 77·0 | 7·0 | 74·2 | 30·275 | ·831 | 73 | S. W. | | |
| | 1 55 | 84·0 | 77·2 | 6·8 | 74·5 | 30·275 | ·840 | 74 | Calm | - - | ·097 |
| | 2 0 | 84·0 | 77·2 | 6·8 | 74·5 | 30·275 | ·840 | 74 | S. W. | | |
| | 2 5 | 85·5 | 77·5 | 8·0 | 74·3 | 30·300 | ·835 | 70 | S. W. | | |
| | 2 10 | 83·0 | 77·0 | 6·0 | 74·8 | 30·275 | ·849 | 76 | S. W. | - - | ·011 |
| | 2 15 | 82·0 | 76·0 | 6·0 | 73·6 | 30·275 | ·814 | 76 | S. | | |
| | 2 20 | 82·2 | 76·0 | 6·2 | 73·5 | 30·275 | ·811 | 75 | S. W. | | |
| | 2 25 | 82·2 | 76·0 | 6·2 | 73·5 | 30·275 | ·811 | 75 | S. W. | | |
| | 2 30 | 82·0 | 76·2 | 5·8 | 73·7 | 30·275 | ·822 | 77 | S. W. | | |
| | 2 35 | 82·0 | 77·0 | 5·0 | 75·0 | 30·275 | ·854 | 80 | S. W. | | |
| | 2 40 | 82·0 | 77·0 | 5·0 | 75·0 | 30·275 | ·854 | 80 | S. W. | | |
| | 2 45 | 82·0 | 77·0 | 5·0 | 75·0 | 30·275 | ·854 | 80 | Calm | - - | ·394 |
| | 2 50 | 82·0 | 77·0 | 5·0 | 75·0 | 30·275 | ·854 | 80 | Do. | | |
| | 2 55 | 82·2 | 77·0 | 5·2 | 74·9 | 30·250 | ·852 | 79 | E. | | |
| | 3 0 | 82·7 | 77·5 | 5·2 | 75·5 | 30·250 | ·867 | 79 | S. W. | | |
| | 3 5 | 82·7 | 77·5 | 5·2 | 75·5 | 30·250 | ·867 | 79 | E. | | |

The rainy season is the prevailing period of the land winds, and during the night and morning of that season chiefly. Sometimes during the heavy rainy season the trade winds from the sea are not felt till two or three o'clock, p. m. But in the end and early part of the year, while the sun is still in the southern tropic, the sea breeze blows day and night. After he has again crossed our zenith, the wind becomes lighter, and veers round towards the south by east. A dazzling glare arising from the roads, — clouds of dust whirled upwards by ascending strata of heated air, — light, sultry, and variable winds, and dark discolourations of the sky towards the south (up the rivers), precede the opening of the rainy season. These threatenings are now and then renewed ere the rains thoroughly set in, a heavy shower occasionally, in the interval, restoring the equilibrium of the atmosphere. Old planters complain that the seasons have changed, and that the date of the commencement and termination of the two rainy seasons cannot now be ascertained or prognosticated with the former precision. The little rainy season, however, generally begins in the latter end of November, and lasts till the latter end of January. The great rainy season commences in the middle of April, and lasts till the end of July, with showers in August. June is the rainiest month of the year. As the dry seasons have often rainy days, so there are frequent breaks of fine weather in the rainy season. During the little rainy season, the rains are light, and frequently from the north and east, accompanied by the pleasant sea-breeze.

It is supposed here, that the transition from one season to the other is the sickliest period of the year. But this can apply only to the transition at the autumnal equinox, when the rain clouds have disappeared and the sun is fervidly hot, and the trade winds have not yet been thoroughly established. The vernal equinox and the succeeding two or three months are the healthiest portions of the year. The inflammatory diathesis is most prevalent during the dry, and the congestive and adynamic during the rainy season.

Extreme seasons modify not only the type of disease, but also the effects of treatment. In the depth of the great rainy season of 1846, which followed nearly nine months of continued dry weather, the adynamic and congestive type of fever became so marked and prevalent, that the usual emetico-purgative saline

mixture of the Colonial Hospital was found too depressing and violent for the patients, and had to be disused. When the ratio of humidity is high, drastic purgatives should be avoided, and at such times mercurial preparations should be used with caution, from their unusual liability to induce ptyalism. During such weather, diminished thirst and increased secretion of the kidneys are observed, and if it persist long, local congestions, indicated by headaches, drowsiness, and sopor or coma, or watery alvine secretions, become complications among hospital patients. "New Rain," as the first showers of the season are often called, is liable to induce Bronchitis, with sibilant rhœni, Pleuritis, Ædemitis, and Diarrhœas. Ædemitis ("Rose") is chiefly of the lower extremities, and affects, for the most part, the bare-footed. The diarrhœas (frequently with gripes) are supposed to arise chiefly from the internal use of the rain water, which is medicated by the washings of the roofs and the lead-work of the houses.* In the depth of the great rainy season, when the air is close, the skin macerated, and the clothing saturated with condensed and unevaporated perspiration — the depurating functions become embarrassed. These effects are very evident in the large and crowded Colonial Hospital. There, the ulcers also become dark and *aguish* in appearance, and the moaning of the sick is distressingly increased. If, after a day or two of such weather, a clear sky, hot sun, and strong breeze supervene, the ulcers become again florid, — but intermittents, with a well-marked first stage, become numerous among the hospital inmates, and relapses, even after cinchonism†, are met with.

As already referred to, the transition out of the great rainy season is attended with *continued* fevers, and frequently with typhoid symptoms. There is a difference in the *quality* of the rain, in regard to the comfort of the colonists. Some showers, from the union of immense masses of cumuli, descend in large heavy drops, leaving the sky clear and blue, and the air dry and pleasant; other showers, descending in small elongated drops,

* [The unwholesome effects may be owing to infusoria. Pond water — that is, stagnant water, — in Barbados and other of the West India islands, is considered very deleterious, and even poisonous, after heavy rain, when a greenish scum appears on the surface. Under the microscope this scum I have found to be composed of extremely minute infusoria.] — ED.

† [A term brought into use in British Guiana, to denote the specific effects of quinine used medicinally. (See Appendix.)] — ED.

may pour down the same quantity of rain, but the air feels damp and foggy afterwards. The former probably come from a high and cool altitude,—the latter from the nearest vapours. The daily fall of rain for two years, with the quantity reabsorbed by the air, from a plain impermeable surface, will be found in the Tables of the third division.

The coolest and hottest weather *follow* the sun's position; the former being generally in February and the latter in July and August. The intense heat which should arise from the sun's double path over our zenith between the months of March and September is mitigated by the canopy of thick clouds and by the rains at the middle period of the year, as well as by the favourable aspect of our seaboard.

Though the climate, in regard to heat, is very uniform, small differences of temperature in the weather produce a marked effect on the comfort of the colonists. Coldness and chilliness of the wind is sometimes complained of, and the complainant is jocosely recommended to emigrate further south. A thermal and chiemal curve (if the latter be possible here), and a curve of diurnal variations, may be formed from the meteorological observations recorded in the third division. To show, however, the mild gradations of temperature during the day, and the maxima and minima of some other meteorological elements in the climate of British Guiana at Georgetown, I here subjoin a day of quarter-hourly observations (although imperfect) on the thermometer, and the result of four days of hourly observations on the barometer, thermometer, and hygrometer.

[See Tables, pp. 13, 14.]

QUARTER-HOURLY OBSERVATIONS ON THE THERMOMETER,
21st June, 1843.

| | | | | | | | | | | | |
|-----------------|---|---|------|-----------------|---|---|------|-----------------|---|---|------|
| 6 a.m | - | - | 78·2 | $2\frac{1}{2}$ | - | - | 84· | 11 | - | - | 79·5 |
| $6\frac{1}{4}$ | - | - | 78·2 | $2\frac{3}{4}$ | - | - | 84· | $11\frac{1}{4}$ | - | - | 79·7 |
| $6\frac{1}{2}$ | - | - | 78·2 | 3 | - | - | 84· | $11\frac{1}{2}$ | - | - | 79·5 |
| $6\frac{3}{4}$ | - | - | 78·2 | $3\frac{1}{4}$ | - | - | 84· | $11\frac{3}{4}$ | - | - | 79· |
| 7 | - | - | 78·2 | $3\frac{1}{2}$ | - | - | 83·7 | 12 Midnight | - | - | 79·2 |
| $7\frac{1}{4}$ | - | - | 78·2 | $3\frac{3}{4}$ | - | - | 83·5 | $12\frac{1}{4}$ | - | - | 79·5 |
| $7\frac{1}{2}$ | - | - | 78·2 | 4 | - | - | 83·5 | $12\frac{1}{2}$ | - | - | 79·5 |
| $7\frac{3}{4}$ | - | - | 79· | $4\frac{1}{4}$ | - | - | 83·5 | $12\frac{3}{4}$ | - | - | 79·2 |
| 8 | - | - | 79·2 | $4\frac{1}{2}$ | - | - | 83·2 | 1 a.m. | - | - | 79· |
| $8\frac{1}{4}$ | - | - | 79·7 | $4\frac{3}{4}$ | - | - | 83· | $1\frac{1}{4}$ | - | - | 79· |
| $8\frac{1}{2}$ | - | - | 79·7 | 5 | - | - | 82·5 | $1\frac{1}{2}$ | - | - | 78·5 |
| $8\frac{3}{4}$ | - | - | 80· | $5\frac{1}{4}$ | - | - | 82·7 | $1\frac{3}{4}$ | - | - | 78·7 |
| 9 | - | - | 80·5 | $5\frac{1}{2}$ | - | - | 82·7 | 2 | - | - | 78·7 |
| $9\frac{1}{4}$ | - | - | 81·7 | $5\frac{3}{4}$ | - | - | 82·5 | $2\frac{1}{4}$ | - | - | 78·7 |
| $9\frac{1}{2}$ | - | - | 82· | 6 | - | - | 82· | $2\frac{1}{2}$ | - | - | 78·5 |
| $9\frac{3}{4}$ | - | - | 82·2 | $6\frac{1}{4}$ | - | - | 81·7 | $2\frac{3}{4}$ | - | - | 78·5 |
| 10 | - | - | 82·2 | $6\frac{1}{2}$ | - | - | - | 3 | - | - | 78·5 |
| $10\frac{1}{4}$ | - | - | 82·7 | $6\frac{3}{4}$ | - | - | - | $3\frac{1}{4}$ | - | - | 78·5 |
| $10\frac{1}{2}$ | - | - | 82·7 | 7 | - | - | - | $3\frac{1}{2}$ | - | - | 78·5 |
| $10\frac{3}{4}$ | - | - | 82·7 | $7\frac{1}{4}$ | - | - | - | $3\frac{3}{4}$ | - | - | 78·5 |
| 11 | - | - | 82·7 | $7\frac{1}{2}$ | - | - | - | 4 | - | - | 78·2 |
| $11\frac{1}{4}$ | - | - | 82·7 | $7\frac{3}{4}$ | - | - | - | $4\frac{1}{4}$ | - | - | 78· |
| $11\frac{1}{2}$ | - | - | 83· | 8 | - | - | - | $4\frac{1}{2}$ | - | - | 78· |
| $11\frac{3}{4}$ | - | - | 82·7 | $8\frac{1}{4}$ | - | - | - | $4\frac{3}{4}$ | - | - | 78· |
| 12 Noon | - | - | 83·5 | $8\frac{1}{2}$ | - | - | 80·5 | 5 | - | - | 78· |
| $12\frac{1}{4}$ | - | - | 83·5 | $8\frac{3}{4}$ | - | - | 80·2 | $5\frac{1}{4}$ | - | - | 78· |
| $12\frac{1}{2}$ | - | - | 83·7 | 9 | - | - | 80· | $5\frac{1}{2}$ | - | - | 78· |
| $12\frac{3}{4}$ | - | - | 83·7 | $9\frac{1}{4}$ | - | - | 80·2 | $5\frac{3}{4}$ | - | - | 78· |
| 1 p.m. | - | - | 84· | $9\frac{1}{2}$ | - | - | 80· | 6 | - | - | 78· |
| $1\frac{1}{4}$ | - | - | 84· | $9\frac{3}{4}$ | - | - | 79·7 | $6\frac{1}{4}$ | - | - | 78· |
| $1\frac{1}{2}$ | - | - | 84· | 10 | - | - | 79·7 | $6\frac{1}{2}$ | - | - | 78 |
| $1\frac{3}{4}$ | - | - | 84· | $10\frac{1}{4}$ | - | - | 79·7 | $6\frac{3}{4}$ | - | - | 78 |
| 2 | - | - | 84· | $10\frac{1}{2}$ | - | - | 79·7 | | | | |
| $2\frac{1}{4}$ | - | - | 84·2 | $10\frac{3}{4}$ | - | - | 79·7 | | | | |

DIURNAL VARIATIONS OF THE BAROMETER, THERMOMETER, AND HYGROMETER (WET AND DRY BULB), ON 17TH MARCH, 21ST JUNE, 21ST SEPTEMBER, 21ST DECEMBER, 1843, AND THE 21ST MARCH, 1844, AT THE GEORGETOWN COLONIAL HOSPITAL; TAKEN FROM THE HOURLY OBSERVATION SHEETS.

| 17th March, 1843. | 21st June, 1843. | 21st September, 1843. | 21st December, 1843. | 21st March, 1844. |
|---|--|---|--|--|
| <p>BAROMETER.</p> <p>Max. 30.250 at 10 & 11 a.m. Min. 30.100 " 5 p.m. Max. 30.225 " 8 and 9 a.m., noon, and 1 p.m. Min. 30.125 at 4 and 5 a.m.</p> | <p>BAROMETER.</p> <p>Max. 30.325 at 10 a.m. Min. 30.225 " 4, 5, 6, & 9 p.m. Max. 30.312 " 8 a.m. Min. 30.250 " 2, 3, 7, 8, 10, 11, and 12 p.m. Mem. 2nd min. also at 1, 4, 5, and 6 a.m.</p> | <p>BAROMETER.</p> <p>Max. 30.350 at 11 a.m. Min. 30.212 " 5 p.m. Max. 30.337 " 9 a.m. Min. 30.225 " 2 a.m. and at 4, 7, and 10 p.m.</p> | <p>BAROMETER.</p> <p>Max. 30.350 at 9, 10, 11, and noon. Min. 30.225 " 6 and 7 a.m. Max. 30.325 " 10 p.m. Min. 30.237 " 4 a.m.</p> | <p>BAROMETER.</p> <p>Max. 30.350 at 9 and 11 a.m. Min. 30.225 " 3, 4, & 5 p.m. Max. 30.300 " 6, 7, & 8 p.m. Min. 30.250 " 1, 2, 3, 4, 5, and 6 a.m.</p> |
| <p>THERMOMETER.</p> <p>Max. 85° at 1 p.m. Min. 77°25 at 7 a.m. Mean, 81°125. Hours nearest mean, 6 and 7 p.m., 81°250.</p> | <p>THERMOMETER.</p> <p>Max. 84°25 at 2½ p.m. Min. 78° at 5 and 6 a.m. Mean, 81°125. Hours nearest mean, 7 p.m. 81°, 9 a.m. & 8 p.m. 80°50.</p> | <p>THERMOMETER.</p> <p>Max. 86°75 at 2 p.m. Min. 78° at midnight. Mean, 82°375. Hours nearest mean, 9 a.m. and 7 p.m. 81°75.</p> | <p>THERMOMETER.</p> <p>Max. 85° at 2 p.m. Min. 79°75 at 4 a.m. Mean, 82°375. Hours nearest mean, 9 a.m. and 7 p.m. 81°75.</p> | <p>THERMOMETER.</p> <p>Max. 83° at 2 p.m. Min. 78° " 6 a.m. Mean, 80°50. Hours nearest mean, 8 a.m. and 6 and 7 p.m. 80°.</p> |
| <p>HYGROMETER.</p> <p>Max. diff. 9°25 at 11 a.m. Min. " 2° at 7 a.m. Mean diff. 5°60. Hours nearest mean diff. a.m., 5°25.</p> | <p>HYGROMETER.</p> <p>Max. diff. 6°75 at 4 p.m. Min. " 2°25 " 7 a.m. Mean diff. 4°50. Hours nearest mean diff. 9 and 11 a.m. 4°25, and 8 and 9 p.m. 4°25.</p> | <p>HYGROMETER.</p> <p>Max. diff. 10°75 at 1 p.m. Min. " 3°50 at 5 a.m. and 11 p.m. Mean diff. 7°125. Hours nearest mean, 9 a.m. and 6 p.m. 7°.</p> | <p>HYGROMETER.</p> <p>Max. diff. 6° at 10 and 11 a.m. and 1 p.m. Min. " 2° at 6 a.m. Mean diff. 4°. Hours nearest mean, 9 and 11 p.m. 4°.</p> | <p>HYGROMETER.</p> <p>Max. diff. 6° at 10 and 11 a.m. and 1 p.m. Min. " 1°25 at 4 a.m. Mean diff. 3°625. Hours nearest mean diff. 6 p.m. 3°75, and 7 p.m. 3°50, and at 6 a.m. 4°.</p> |

I possess no instrumental observations on terrestrial radiation in British Guiana. The dews, however, are known to be heaviest as we proceed into the interior of the colonised territory. In regard to solar radiation, the times fit for observation with the actinometer are so uncertain, and the manipulation of the instrument requires so much practice, that, unless in regularly equipped observatories, few observations of it can be obtained. I can, therefore, offer the following only, made on the 21st March, 1844, and at about the warmest hour of the day.

BRITISH GUIANA COLONIAL HOSPITAL.

ACTINOMETRICAL OBSERVATIONS, TAKEN ON 21ST MARCH, 1844.
INSTRUMENT MADE BY WATKINS AND HILL, LONDON.

1 DIVISION 5·34 ACTINES.

| Hour. | | | Hour. | | | Exposure. | A. | | B. | | |
|------------|------|------|------------|------|------|-----------|----------|-------|-----------|--|--------------------------------|
| Mean Time. | | | Mean Time. | | | | — | | — | | |
| Initial. | | | Terminal. | | | | Initial. | | Terminal. | | |
| hr. | min. | sec. | hr. | min. | sec. | | | | | | |
| 1 | 48 | 0 | 1 | 49 | 0 | ⊙ | 5·50 | 40·00 | | | |
| 1 | 49 | 30 | 1 | 50 | 30 | × | 44·50 | 51·00 | | | |
| 1 | 51 | 0 | 1 | 52 | 0 | ⊙ | 65·00 | 94·00 | | | Haze coming on. |
| 3 | 10 | 0 | 3 | 11 | 0 | ⊙ | 3·75 | 28·50 | | | |
| 3 | 11 | 30 | 3 | 12 | 30 | × | 27·00 | 21·75 | | | |
| 3 | 13 | 0 | 3 | 14 | 0 | ⊙ | 34·00 | 59·50 | | | |
| 3 | 14 | 30 | 3 | 15 | 30 | × | 57·25 | 52·75 | | | |
| 3 | 16 | 0 | 3 | 17 | 0 | ⊙ | 65·00 | 90·00 | | | Zero withdrawn. |
| 3 | 17 | 30 | 3 | 18 | 30 | × | 1·75 | 5·00 | | | |
| 3 | 19 | 0 | 3 | 20 | 0 | ⊙ | 8·00 | 33·75 | | | |
| 3 | 20 | 30 | 3 | 21 | 30 | × | 32·00 | 26·75 | | | |
| 3 | 22 | 0 | 3 | 23 | 0 | ⊙ | 37·75 | 62·25 | | | |
| 3 | 23 | 30 | 3 | 24 | 30 | × | 60·25 | 54·75 | | | |
| 3 | 25 | 0 | 3 | 26 | 0 | ⊙ | 65·50 | 90·00 | | | |
| 3 | 26 | 30 | 3 | 27 | 30 | × | 87·50 | 81·75 | | | Zero withdrawn. |
| 3 | 28 | 0 | 3 | 29 | 0 | ⊙ | 3·00 | 26·00 | | | |
| 3 | 29 | 30 | 3 | 30 | 30 | × | 23·00 | 16·00 | | | |
| 3 | 31 | 0 | 3 | 32 | 0 | ⊙ | 27·00 | 51·00 | | | |
| 3 | 32 | 30 | 3 | 33 | 30 | × | 47·50 | 41·00 | | | |
| 3 | 34 | 0 | 3 | 35 | 0 | ⊙ | 52·75 | 75·00 | | | |
| 3 | 35 | 30 | 3 | 36 | 30 | × | 73·00 | 65·00 | | | |
| 3 | 37 | 0 | 3 | 38 | 0 | ⊙ | 76·00 | 97·50 | | | |
| 3 | 38 | 30 | 3 | 39 | 30 | × | 94·00 | 85·75 | | | Zero withdrawn. |
| 3 | 40 | 0 | 3 | 41 | 0 | ⊙ | 3·00 | 24·50 | | | |
| 3 | 41 | 30 | 3 | 42 | 30 | × | 21·50 | 12·50 | | | |
| 3 | 43 | 0 | 3 | 44 | 0 | ⊙ | 21·00 | 41·00 | | | |
| 3 | 44 | 30 | 3 | 45 | 30 | × | 37·00 | 27·00 | | | |
| 3 | 46 | 0 | 3 | 47 | 0 | ⊙ | 34·25 | 53·50 | | | Cirri partially obscuring Sun. |

The population of the colony is of a motley description. Almost every nation of Europe is represented therein. Creoles of the West India Islands, and North Americans also, are numerous. The Coolie of Madras and Calcutta, and the Negro of the various slave-dealing nations of Africa, and the aboriginal Indian, form the dark races. Pure specimens of these races are numerous, and creole (or native) descendants of them. There is, however, a large class of mixed races, chiefly between the white and negro, in various proportions, and these again have creole descendants of a mixed race; for, as far as the experience of this colony goes, the notion of the infertility of mixed races is entirely unfounded. The migratory population in the merchant shipping is composed almost exclusively of the white races of the various nations of Europe, and states and colonies of North America, with a very few of the Negro race, who, when employed, act chiefly in the capacity of cook on board, and form a very small fraction of the river or shipping population. They are also generally natives of North America, or have been accustomed to extropical climates.

As has been already stated, the population and cultivation is chiefly confined to the shores and the mouths of the rivers. A few wood cutters inhabit the creeks and banks of the rivers a considerable way into the interior, and in the country of primæval rock formation. The pure Indians still shun the towns; and, true to the forests, make their transitory visits to the frontier or plantations only for the purpose of petty barter or very temporary employment.

The most important distinctions of the population, however, for the purpose of this treatise, are made by dividing them into the newly-arrived and the long-resident; the former including all the inhabitants within one or two years of arrival, and the latter the creoles or natives, and the strangers who have settled and remained in the colony upwards of two years.

The clerks in the merchant stores, the overseers on plantations, and the sailors in the river shipping, form the bulk of the first class, and the flower of the population for vigorous health and fresh untired activity. The white troops may also be included. Another classification of the population, but of minor importance, would be the distinction between the white and dark races generally.

The inhabitants of the colony are well fed; clothing is to many an encumbrance only; elevation from the ground, and shelter from the sun and rain, is all that is necessary in house architecture. In the forest, a man may erect a comfortable dwelling unaided but with an axe and cutlass, within twenty-four hours, that will endure for several years. The earth teems with fertility, and the waters and forests abound in fish and game. Ground provisions, and pulse, are grown in large quantities by the settled peasantry, and hogs and poultry raised in vast numbers; but the favourite vegetable food of the colonists, and particularly those engaged in the most laborious occupations, is the plantain, and the favourite and constant accompaniment of it is the salted cod fish of North America.*

The plantain is cultivated by planters on a large scale, and the colony is supplied within itself. Much animal food, particularly pork (both native and imported), is consumed; and though the custom of the colony allows only two chief meals daily, these meals are of the most substantial description. The appetite for food is on a par with the appetite for drink, and is most markedly noted in new comers, who, at first, often feel as if the meal hours would never arrive. This strong appetite for food among the newly arrived has been especially observed among the Portuguese immigrants †; their appetite for substantial food is notoriously ravenous. Some idea of the tastes and requirements of the inhabitants may be found by the subjoined information, which I have extracted from the Tables of Exports and Imports of the Colony for ten years, from 1835 inclusive, published by the Royal Agricultural Society, and the records of the clerk of the Georgetown market, for ten years, from 1838 inclusive. The average of the former has been taken, and

* During slavery, the adult allowance of provisions to the slaves was, two bunches of plantains and 4lbs. of salt fish, weekly. The average weight of the two bunches would be about 70lbs. gross, or about 35lbs. of net plantain core. Twice or thrice a-year, a small donation of salt pork (a few pounds) was made to each slave; any other food that could be obtained was merely as condiment.

This, then, was the amount and quality of food which sustained the most muscular men and women, perhaps, in the world.

If any substitute, such as rice, happened to be given for the plantain, a brawl or tumult was likely to be the consequence.

† [Perhaps owing to a scanty allowance of food during the voyage, and that of indifferent quality.]—ED.

divided by the number of population of Demerara and Essequibo at the last census, 1841, and the latter by the population of Georgetown, also at the term of the last census.

This statement will partly show the strong inclination for *salted* provisions among the inhabitants, and the partiality for fish, which here supplies in a great measure the place of the roast beef of Old England: salt fish, indeed, appears on every breakfast table, from the Governor's downwards.

Although a great deal of "drinking" is indulged in in this colony, and no movement of teetotalism has made much impression, still drunkenness and drunken men are scarcely ever seen. It must be confessed, however, that the requirements of the climate are frequently grossly overstepped, and many a European dying here from *delirium tremens* has been reported at home as a victim to fever. The meat-eating of Georgetown is not fully represented by the market returns; for many animals are slaughtered in the suburbs, and clandestinely brought to town, and many also are slaughtered for private use. The country districts, however, do not use so much meat as the town proportionally; and, therefore, in extending the ascertained sum of the market records to Demerara and Essequibo, a fair average will be obtained.*

Average consumption of *each individual* in Demerara and Essequibo per annum.

| | | | | | | |
|---|---|---|---|---|---|-----------------------------|
| Beef (fresh) | - | - | - | - | - | 50 lbs. 7 $\frac{1}{2}$ oz. |
| Veal | - | - | - | - | - | 0 " 15 $\frac{3}{4}$ " |
| Mutton | - | - | - | - | - | 3 " 2 $\frac{1}{2}$ " |
| Pork | - | - | - | - | - | 7 " 12 " |
| Salted meat, including beef, pork, hams | - | - | - | - | - | 26 $\frac{1}{3}$ " |
| Dried salt fish | - | - | - | - | - | 78 $\frac{1}{3}$ " |
| Maekerel, herring, and salmon | - | - | - | - | - | 9 $\frac{3}{4}$ " |
| Butter and lard | - | - | - | - | - | 3 $\frac{1}{2}$ " |
| Distilled liquors, brandy, gin, rum, liqueurs | - | - | - | - | - | 4 gallons. |
| Malt liquor | - | - | - | - | - | 2 galls. 2 pts. |
| Wine (chiefly Madeira) | - | - | - | - | - | 7 pints. |

* For the information of graziers and improvers of breeds, it may be stated that the following are the average weights of cattle, &c. slaughtered:

| | | | | | | |
|-------------------------------------|---|---|---|---|---|----------------|
| From 1838 to 1842 inclusive, cattle | - | - | - | - | - | 275 lbs. each. |
| " 1843 to 1844 | " | " | " | " | " | 370 " " |
| " 1845 to 1846 | " | " | " | " | " | 425 " " |

Calves, 80 lbs. each; Sheep, 43 lbs.; Hogs, 75 lbs.

| | | | | | |
|--------------------------|---|---|---|---|----------|
| Biscuit, and wheat flour | - | - | - | - | 67½ lbs. |
| Cheese | - | - | - | - | 2½ lbs. |
| Tea | - | - | - | - | 1½ lbs. |
| Cocoa and chocolate | - | - | - | - | 5¾ oz. |

As a rule, the sick diet requires to be high and generous. In the Colonial Hospital there is no mode of restraint or punishment for keeping disorderly patients in check but the threat of being put on "spoon diet,"* and it is found sufficient for discipline in almost all cases. But so severely is the privation of substantial food felt here, that the punishment is awarded by my own sentence only, and its continuance for even a few days requires the closest circumspection.† *Substantiality* in food is much craved. A few months ago, a negro, who had been admitted for fracture of the jaw, left the hospital in disgust on the second or third day for being confined to soft food. He had got, and consumed, among his day's provision of "spoon diet," twenty-eight pints of arrow-root pap, with fifty-six ounces of sugar, and the due proportion of milk on the day before he left. The Portuguese immigrants detest pap.‡ In the above enumeration of articles of food consumed by the colonists, coffee and sugar are omitted, because the quantity cannot be ascertained with any precision. A large draught of coffee, however, early in the morning, is drunk by every inhabitant of the colony, and the same frequently crowns the aliment of the whole day; 2½ lbs. of refined sugar is the average annual consumption of each individual, but including Muscovado sugar, and sweets in the form of molasses and cane juice, probably there is an average of fifty pounds of sugar consumed by each individual annually in British Guiana.

It is astonishing how soon all new settlers become accustomed to, and fond of, the peculiarities of the colony diet, in the statement of which the free use of peppers and bitter tonics is not to be omitted. In "pepper pot," fat pork, and the luscious flesh of the "Labba," are consumed with a northern zest.§

* The spoon diet of the Colonial Hospital is the following:—Bread, 4 oz.; tea, ½ oz.; sugar, 4 oz.; barley, 2 oz.; milk, 3 oz.

† [In our military hospitals no punishment of this kind is permitted, nor indeed any punishment, whilst a patient is under treatment.] — ED.

‡ [This feeling is in accordance with the low nutritive power of arrow-root, — a substance into the composition of which no azotised matter enters.] — ED.

§ [The author informs me that the Labba is a small, and, as he believes,

The water in general use is rain water, collected in vats, tanks, and cisterns, from the roofs of houses. It shows a slight impregnation of marine salt. Artesian well water is used by the poor in droughts. It is highly chalybeate, and very unpleasant till it has deposited its iron.* In the country districts the negro population frequently drink trench water, or the rain water which is collected in ponds. All such water the agricultural chemist of the Colony, Dr. Shier, has found to have an alkaline reaction. In times of extreme drought, and in cases where the artesian well water is disliked, creek or river water, taken beyond the influence of the tide, is sometimes used. The sailors frequently carry home with them a supply from this source. The woodcutters of the rivers and creeks use this water; it is used also by the inhabitants of the penal settlement on the banks of the Cayuni (Essequibo). It is black, like bog water, from the large amount of vegetable extractive it contains, and always purges those unaccustomed to its use. After being used some time it is liked. As there is no limestone rock in British Guiana, and scarcely a trace of lime in the alluvial soil except here and there where a shell bank occurs on the fore shores, there is none of this earth in the water drunk by any of its inhabitants.

The diseases from which the colonists are entirely free, are contagious or infectious fevers (except the exanthemata), calculus, diabetes, rabies: those from which they are nearly exempt,

a frugivorous wild quadruped, much prized for the fatness and delicacy of its flesh. The author's remarks on diet would seem to imply that the appetite is as keen, and that as much food is required to satisfy it and support the organic waste, in British Guiana, as in a cool or cold climate. This, however, I believe, is not the case: according to the best information I could obtain in the West Indies, the proportion of nourishment essential to health there is decidedly less than in England and more northern regions. It must be kept in mind that the food most in use within the tropics is of low nourishing power, such as arrow-root, cassava, and the other farinaceous articles; whence, perhaps, the craving, especially for solid food, and the fondness for salt fish.] — ED.

* [In the water of the artesian well at Port Mahaica, Demerara, I have found common salt in minute proportion, with a trace of sulphate of lime and of sulphate of magnesia. It moreover contained, suspended in it, subsiding on rest, a very little peroxide of iron, attached to delicate fibres of mucor: a high power of the microscope was required to exhibit these. The author informs me that alkaline carbonates are commonly found in the water of these wells and carbonate of iron, the latter dissolved by carbonic acid, a gas usually abounding in it before exposure to the atmosphere.] — ED.

are tubercle*, dyspepsia, aneurism, and malignant tumours; those which are mild and of rare occurrence are the exanthemata and whooping cough: morbus Brightii, [albuminous urine] when it occurs, is a curable symptom: chronic bronchitis, in a tubercular diathesis, rapidly recovers after arrival here. The air is so bland that the knee or other joints are unhesitatingly opened if required for the escape of inflammatory or hydropic secretions; the *subcutaneous* operation is unnecessary. Compound fractures, such as in other countries would be looked upon as hopeless, generally do well here: flesh wounds heal readily by the first intention. On the other hand, the countries of Demerara and Essequibo require about 3000 ounces of quinine for annual use, or nearly a scruple for every individual.† Gout and rheumatism are not uncommon, and the tetanic irritation is easily set up, particularly in the negro race. Inflammation of the external lymphatics and lymphatic glands is also common, and its sequel (when neglected) elephantiasis. Painter's colic, though rarer now, and less fatal and less invaliding since the disuse of drugged claret, is still frequently met with; disease of liver is not common, though met with. Pneumonia and pleuritis occur chiefly from reckless exposure, or in anæmics; and dysentery, though formerly acute and epidemic, is now chiefly met with as a sequel of intermit-

* [That tubercular disease, especially of the lungs, is rare in British Guiana, seems to be proved by the records of the Colonial General Hospital. Of 224 fatal cases which occurred from July 1. to Dec. 31. 1846, and of which there was a *post-mortem* examination, 28 only are noticed in which tubercles in the lungs were detected; and of 819 cases which occurred and were examined from Jan. 1. to Dec. 31. 1847, a still smaller proportional number of instances of the detection of tubercles so situated is recorded, viz., 24. The inmates of this hospital, as regards race and country, like the population of British Guiana, as described by the author, are very miscellaneous, but, notwithstanding, are chiefly the natives of hot climates; and thus tending to show, what I believe is true, that high atmospheric temperature, *cæteris paribus*, is not favourable to the production of tubercles. The inquiry is one of great importance: the large proportional mortality from tubercular phthisis in some of our regiments, especially in the West Indies, has led to the partial adoption of the contrary inference,—but I believe not on good ground; for when the cases are examined into, they generally bear out the conclusion that the tubercles had existed before arrival in the West Indies—latent, impassive before, there brought into action as irritants, with acceleration of softening.] — ED.

† [Owing to the prevalency of intermittent and remittent fever amongst the inhabitants not of African origin. The proportion of fever cases admitted into the General Colonial Hospital affords strong proof of this. (See p. 22.)] — ED.

tent fever; and though accompanied by extensive ulcerations of the large intestines, has more the symptoms of diarrhœa than of dysentery. Fever and febricula, as a consequence of gastric and encephalic irritation or inflammation, frequently arise from errors of diet, insolation and suppressed perspiration, and particularly among newly arrived who are intemperate or indulge in laborious exercises. But the great endemics of the country are malarial fever and ulcer. The basis of all our malarial fever is the intermittent. Quartans are met with, and oftener tertians, but the ordinary type among the highly susceptible and exposed is the quotidian. Unusual susceptibility in the constitution, or an unusual intensity of the pathogenic influence from meteorological or other causes, or an inflammatory complication, will shorten the intermissions still more, until the disease becomes remittent or even continued. The danger is least where the intermission is longest, and inversely. These fevers differ *toto cœlo* from the yellow fever; but no doubt the more intense grades of the *continuous* intermittent have often been confounded with it; and the treatment which has been successful in such cases has been called successful treatment of yellow fever.* The intermittent malaria-fever is so powerful here, that the yellow fever epidemic could not entirely supersede it, and we found it sometimes engrafting itself on the weakened convalescents from yellow fever; and, in a few cases, it seemed to dispute possession of the victim; and, in some, modified the procession of symptoms. Of 6395 admissions into the Colonial Hospital for the twelve months from June, 1846, till June, 1847, 2938 were cases of intermittent and remittent fever, and 1873 were cases of ulcers. The prevalence of intermittent malaria-fever here would be even underrated by supposing its influence limited to the production of 2938 out of 6395 hospital cases, for many of the balance, such as those of anæmia, dropsy, splenalgia, and dysentery, were sequelæ of the neglected cases of the same disease. Ulcers are of various kinds. Among many of the negroes they are large with indurated edges — produce not the

* [This is a remark very deserving of attention. Those practitioners in the West Indies who boast that a case of fever—even of yellow fever—rarely terminates fatally under their treatment, consider yellow fever merely a severer form of the common remittent, and have never had to contend with the malignant yellow fever endemic.] — ED.

slightest inconvenience except in the trouble of dressing them — are called chronic and constitutional, and no attempt is made to heal them; indeed, bad consequences have resulted from healing up such ulcers. Among the immigrants, particularly the Portuguese and the Coolies, the ulcer is generally sloughy, phagedænie, bleeding, and sometimes a perfect sphacelus without even surrounding or previous erythema. The malaria of the Colony, and the small wounds of insects and serrated grasses, are predisposing and exciting causes in the production of these ulcers of the immigrants. The ulcers chiefly affect the lower extremities, but the fingers are sometimes affected, and even the lips and cheeks. Two species of malaria seem to be endemic, as elicited particularly by observing the diseases of the thousands of immigrant settlers lately arrived here, and who present themselves for treatment at the Colonial Hospital. There seems to be both an *anæmiating** and a *septic* malaria. The former pervades the colony, so that a rosy cheek is no where to be found after a year's residence; but it least affects the seashore. Its intensity increases as we proceed into the interior up the narrow creeks and muddy rivers. There the complexion becomes perfectly etiolated, even without an attack of intermittent; the spleen gets enlarged, the cellular tissue infiltrated, and dyspnœa and palpitations supervene from mere whiteness (loss of the red particles) and thinness of blood. An anæmiated immigrant Portuguese residing eight or ten miles up the river may get an ulcer, but although the granulations are pale, and the progress of cure is slow, the sore will heal kindly; there seems to be no *virus* present. Another immigrant Portuguese of equal residence, but with a still tolerably healthy appearance, will show himself at the hospital with a gangrenous phagedæna speedily destroying the soft and solid parts, and if amputation be necessary from the irrecoverable condition of the limb, gangrene will probably attack the stump within twenty-four hours. Both patients have been subject to intermittent fever,

* [An influence such as that above referred to seems to be common in the West Indies: it is strongly marked by the pale, sallow, sickly hue of the white creoles, especially in Barbados. There, if they have any colour, it is most frequently reddish; whence the labourers of this class have been called "red legs." One rarely witnesses that bronzing of the exposed skin in the West, which is the almost constant effect of exposure to the sun's rays in the East, Indies and in the South of Europe.] — ED.

but the former might have been pronounced at once a labourer from some of the river estates, and the latter most likely from the islands of Wakenaam Leguan, or some of the coast estates. It has often occurred to me that there would be a probability in the supposition of this septie modification of the malaria (which shows itself in the bleeding gangrenous ulcer) being some imperfect development of the yellow fever poison.*

In regard to the endemic influencces generally, it may be said that their effects are very much confined to the labouring classes, and of them to the whites, and to those chiefly who do not supply themselves with a sufficiency of nutrition, or who are much exposed to the weather and night air, or who use no clothing for their feet and legs. The white man is no doubt an exotic here, but when taken care of, like many exotics, he thrives well. There is no deterioration in the race of whites, either in the long resident or his native children, where their circumstances are easy. On the contrary, the finest physical white men of the colony are to be found among the Creoles, and extreme old age is not infrequent. † There is no doubt of there being a greater amount of *sickness* here than in England ‡, but much of it is of an ephemeral nature, and among the middle and upper classes of society the expectation of life is as good as in any part of Europe. The climate of Demerara has obtained

* [I am disposed to believe that there is some truth in the above remark. In Barbados, amongst the white natives, who are almost exempt from yellow fever, the mucous membranes especially of the primæ viæ, and the skin, are very prone to diseased action of a kind bearing some resemblance to what is witnessed in yellow fever;—for instance, the chapping of the lips, with ulceration and bleeding; an aphthous, or slightly ulcerated state of fauces, and probably of the gullet and stomach; the yellowish sallowness of skin, with tendency to ulceration. I may add, that, during the absence of yellow fever amongst the troops, a disposition to purpura hæmorrhagica is occasionally witnessed.]—ED.

† [This, I believe, holds good in the West Indies generally. As an exotic, the white man in the West Indies, for the preservation of health and vigour, requires unusual care; and, having the advantage of such care, he flourishes not unlike a tropical plant cultivated in a stove or hot-house in England. The white creole of the upper class—the educated gentleman compared with the labourer of the same colour—presents a remarkable contrast, and that both in mind and body. The signs of degeneracy in the one are as well marked as the absence of them in the other.]—ED.

‡ [In the healthiest of the West India islands, especially in those longest settled and best cultivated,—as Barbados, St. Vincent, Antigua, St. Christopher,—the proportion of sickness is less than in England; the most common complaints at home—colds, and the various lighter affections of the throat and respiratory organs—being comparatively rare.]—ED.

its ill-repute chiefly from the ravages of its yellow fever epidemics. During their prevalence, the *newly arrived* certainly incurs tremendous risk, but at other times, and to the old settler in all times, there is little to apprehend. Those who suffer most from the winters at home, the narrow and weak-chested, and scrofulous, enjoy excellent health in this colony. With reference to the effect of climate here on the lower animals, it may be mentioned, that horses quite done up for service from rheumatism or founder in cold climates, regain their health and become serviceable here. It is not to be concealed, however, that the never-varying warmth and luxuriousness of the climate induces inaction and apathy among the inhabitants*, and that some endemic diseases (such as painters' colic and obstinate intermittent, and the anæmic cachexy), in individual cases, require a temporary and sometimes a permanent, removal from the colony.†

* [Accordingly, stronger motives seem to be required in these regions—tropical regions generally—for exertion, whether bodily or mental, than in colder climates; but the motives to exertion in the former are commonly less than in the latter. It is not surprising, therefore, that indolence should have become there a habit, and that the *dolce far niente* can be appreciated more fully in the West Indies even than in Italy, where, when powerful motives have operated,—as also in Greece,—the greatest of human energies have been developed.] — ED.

† For much interesting information on the peculiarities of British Guiana, the reader is referred to Sir Robert Schomburgk's description, Major Tullock's Army Statistics, Dr. Shier's Report on Thorough Drainage, and the First Report of the Demerara Railway Company.

DIVISION I.

CHAPTER I.

BEGINNING OF THE EPIDEMIC.

ON Sunday Morning, I believe the 8th day of April, 1837, Dr. Alleyne and I were conversing in my house on the health of the town. He stated to me, that he had had some cases that terminated fatally at the time when the severity of the symptoms had ceased, and when he supposed the patient convalescent; that he had been quite taken aback by the suddenness and unexpectedness of the deaths. I, in return, stated to him, that I had at that moment a case which I believed to be *yellow fever*, and proposed that we should see it together. On our way to see my patient, Dr. Alleyne suggested that we should first go to the house of Rankin, druggist, at the corner of Robb's Stelling, Water Street, where he had a case similar to those referred to as having ended fatally. On being seen, we agreed that this was a case of yellow fever. I now forget what were the chief symptoms present, but the patient died next morning. His name was Rainey.

On proceeding to my patient, we met Dr. Hutson, and, he joining us, we examined the case. The symptoms we considered were certainly those of yellow fever, as far as our book-knowledge enabled us to decide.

The name of my patient was Ineh, one of two brothers, young Irishmen, who had arrived in the colony two or three months previously and acted as plantation overseers for a short time. One or two weeks before his illness, he and his brother had hired a ground floor of a house in Water Street, in the inner side of the street immediately opposite the premises of Messrs. Conyers and Harvey, and which was in no way raised off the ground, and commenced there a small shop, in which they sold porter, plantains, salt fish, tobacco, and such miscellaneous wares

as are to be found in hucksters' shops. All these articles were in great confusion, few of them being on shelves, and the rest without order covering the floor. The room was very small, about 8 x 20 feet, being merely the centre gateway of the house partitioned off, and certainly not one-third of the ground-floor of the building. The rest of the ground-floor was occupied as a store for paints and oils by a house-painter named M'Farlane. M'Farlane (a European not long in the Colony) with his wife and child (whites) and a little dirty white girl as servant, lived in the second story of the house. Inch lived in the same little room which formed his shop, and slept there in a hammock which he unslung during the day. I well remember when I made my first visit to him, how my nose was offended by the sickening smell of rotten salt fish, tobacco, damp, and dirt. I attended him during two or three days in this filthy hole. But on the day before Drs. Alleyne and Hutson saw him with me, I had him removed to a side building in the same yard on the second floor, the roof of which was so low that I could not stand erect in it. It was clean, however, and not so warm as might have been expected in so confined a place, in consequence of the roof being of shingles, and the room being the most windward of all the buildings. The day on which Drs. Alleyne and Hutson saw Inch with me he was yellow, his gums oozing black blood, and also a sore which was on his leg. The heat of surface was moderate. In the evening he had black vomit. This patient, notwithstanding the severity of his symptoms, recovered.* M'Farlane's family were never attacked. The next case was that of the brother, who, although not residing in the same shop before the outbreak of the disease (but at Mr. Burford's, about 150 yards further north on the same side of the same street), was incessant in his attention by day and night to his sick brother. He sickened during his brother's convalescence, and died on the fifth day with black vomit, and with yellow skin and purple patches after death. These brothers Inch were muscular, blond, of sober habits, and between twenty-one and twenty-five years old. The next case was that of Mr. Cocy, on the same side of Water Street, and about 150

* He died in Leguan about 1st February, 1847, of the effects of intemperance.

yards south of Ineh's shop, or midway between that shop and Rankin's. It was upwards of ten years since he had first arrived in the Colony, but he had lately returned from a visit to his native country, Ireland. He recovered. The previous cases which Dr. Alleyne had attended were a few yards further south, at Messrs. Parker and Garrett's at the corner of Regent and Water Street, the inner side; and at Richard's (the baker) in Regent Street, on its water side, about midway between Water Street and Vlissingen Sluice. Such, and in the healthiest month of the year, was the beginning of an epidemic disease, of which the oldest practitioner of the town had no previous personal knowledge, and which for years spread death among the new settlers, sailors, and soldiers, till Demerara became a byeword.

There is a tradition of two similar, though not so long continued, epidemics, one beginning in 1793, about nineteen years after the founding of Stabroek (now Georgetown), and another in 1819, which was exceedingly virulent, but which seemed to be suddenly stopped after about nine months' devastations. The epidemic of 1819 commenced at the stores of Mr. Simpson and Mr. Kernon, in America Street. Of one hundred whites (merchants and clerks) who inhabited America Street and neighbouring parts of Water Street alone, thirty-three died.

CHAP. II.

PROGRESS AND HABITS OF THE EPIDEMIC.

THE epidemic of 1837, which thus first appeared in Regent Street and Water Street, the centre of which space is Robb's Stelling, soon spread itself along the length of the city. Water Street, or its immediate vicinity, was always the portion chiefly affected, although a few straggling cases were to be met with in the baek parts of the town, and one case (that of the late Mrs. D.) even as far baek as at the manager's house of Plantation Vlissingen.

After the appearanee of the disease in the city it was noticed in the mereantile shipping, as will be illustrated by reference to the table of mortality among the sailors. Cases then made their appearanee in the Essequibo coasts and islands, and in New Amsterdam, Berbiee. The troops suffered most in 1839, but what retarding circumstance (perhaps that of unsuitable subjects) acted in their case, I have no means of ascertaining.*

* The manner in which the troops escaped at times and at times suffered from yellow fever in British Guiana, and in some of the other stations of the Windward and Leeward Island Command, between 1837 and 1841, is instructive and worthy of note. The following particulars are from the Inspector General's Reports,—the officer in charge of the medical department in the West Indies:—

“In the quarter ending on the 30th of June, 1837,” [when yellow fever prevailed, as described by the author in Georgetown, Demerara,] “the troops there and at the outposts were exceedingly healthy. In July the disease began to appear amongst the officers of the garrison and their families; and, by the end of August, scarcely one had escaped an attack. Five officers died: the women and children suffered in proportion. About the end of August the fever began to appear amongst the non-commissioned officers and privates: out of 32 attacked, 15 died. Intermittent fever was at the same time very prevalent: 1,435 cases came under treatment.

“In St. Vincent, in 1837, the troops are reported to have been healthy, although the coloured and black population suffered much from ‘fever of the typhoid type.’ The disease was suddenly arrested on the setting in of the rainy season with unusual violence.

“In Trinidad, early in May, 1838, fever occurred among the troops at St. James and St. Joseph's: 15 died out of 109 treated: a draft of young Irishmen, just then arrived, suffered most. The mortality amongst the inhabitants of Port of Spain was even, proportionally, greater than amongst the military.

“In Dominica, this year, during the quarter ending the 30th of June, out

The first cases in Berbice were those of the Reverends Messrs. Wray and Howes (fatal) in May 1837, the Reverend Mr. Ketley (recovered) 16th June, a young man recently from Demerara (recovered) clerk of Messrs. Foderingham, Mr.

of 65 cases of yellow fever admitted into hospital, 21 died. Nearly all the officers had the disease and died. In this endemic, hæmorrhage from the gums and throat was common; black vomit set in about thirteen hours before death; there was comparatively little irritability of stomach.

"In the same year, during the quarter ending the 30th September, the troops in British Guiana were all healthy, whilst yellow fever was prevailing in Georgetown.

"In Trinidad, in July of this year, at St. Josephs, 19 men of the detachment there died of fever. So healthy had it been in former years, that it had been used as a convalescent station. It is noticed, as a remarkable circumstance, that coincident with the outbreak of fever, all the wells became more or less offensive,—“in some degree putrid,”—so that it was necessary to get water from the river. The whole of Trinidad at the time was considered unhealthy.

"Granada about the same time was severely visited by fever. At Fort Frederick, out of 14 men of the Royal Artillery, 11 were attacked, of whom 6 died. At Richmond Hill, out of 207 of the 70th Regiment, 61 were attacked, 14 died. The fever raged amongst the civil population, both white and black; even the acclimated by no means escaped; the crews of the shipping suffered severely.

"In Barbados, in this year, in November and the early part of December, yellow fever prevailed amongst the inhabitants of Bridgetown, and proved very fatal. The troops then were healthy. In the beginning of January, 1839, the disease appeared in the 52nd Regiment, which in the November preceding had arrived from Gibraltar: of 37 admitted into hospital, 6 died. The officers of the regiment suffered in a greater proportion; of 10 attacked, 3 died; 12 were the whole number in barracks. It is remarkable that every individual who had any duty to perform requiring his presence in the orderly room, which was in the officers' barrack (previously considered healthy), was attacked with fever; and also that few escaped, who occupied the adjoining lower rooms: thus of 24 persons connected with this part of the building, only 2 females and 4 young children escaped the disease. The building was vacated, the floor taken up,—nothing offensive was found underneath." [It is worthy of remark, that in the recent outbreak of yellow fever in the garrison of St. Ann, Barbados, the first fatal case of yellow fever that occurred in the 72nd Regiment, occupying the brick barracks, was in an officer who slept in the room mentioned.]

"In the quarter ending the 30th June, 1839, there were, out of 123 cases of fever amongst the troops in Georgetown, an average of 39 deaths. The inhabitants at the time were reported healthy, as also the seamen and the troops in Berbice and at the out-stations. The weather was described as particularly fine. In the beginning of September, when the fever had ceased amongst the troops, it began among the towns-people and in the shipping on the river, and proved very fatal.

"In St. Vincent, in the same quarter (that ending the 30th June), yellow fever was very destructive amongst the troops; out of 310 (the total strength of the white troops), 240 cases occurred, 54 died; out of 18 officers, the whole in the garrison, nine were attacked, four died.

"In St. Lucia, from the middle of August to the end of September, the troops at Morne Fortunè suffered from fever; out of 134 white troops, 93

Parish, schoolmaster of the London Missionary Society on 4th July (fatal). After these five cases the disease began to appear among the sailors, and continued to rage among them till November, when it suddenly disappeared. The disease also

were attacked, 20 died. The inhabitants suffered even more; amongst them the disease appeared in the early part of July. The weather was unusually dry and hot. The disease ceased on the occurrence of boisterous weather with heavy rains.

“ About the same time fever was severe and destructive amongst the inhabitants of St. John’s, Antigua. The troops in the island escaped the disease.

“ In the quarter ending the 31st December, 1839, fever prevailed amongst the troops in Barbados; it was fatal to 33: it chiefly prevailed in the brick barracks. It first appeared amongst the respectable inhabitants, in the early part of October, and about the end of the month became prevalent in the garrison. The hospital sergeant and orderlies of the 52nd Regiment were amongst the first taken ill; then the families of the married men; then the troops in barracks. None of the men who had fever the preceding year were attacked now. The stone barracks, it is specially mentioned, both this year and last, were out of the line of infection. The disease broke out amongst the crews of the ships of war in Carlisle Bay; it was not brought by them: of 73 cases treated in the Military Hospital, 10 died, — of 8 officers attacked, 2 died.

“ In Trinidad, during this quarter, the troops suffered from fever, whilst the officers and inhabitants remained healthy.

“ In St. Lucia, at Morne Fortunè, in the first fortnight of October, not a single case of fever occurred; shortly after, in the course of ten days, 12 severe cases were admitted into hospital. The detachment at Pigeon Island was then healthy. The disease ceased at the Morne with the 12 cases, and as suddenly broke out at Pigeon Island: 5 out of 10 cases there proved fatal.

“ In Trinidad, during the quarter ending the 31st March, 1846, fever was prevalent amongst the troops: 402 cases occurred, 13 died.

“ In Tobago, during the same quarter, 62 were attacked with fever out of 71; 8 died.

“ In St. Kitts, at this time, out of 8 attacked with yellow fever, 4 died.

“ In the quarter ending the 30th June of the same year, 7 fatal cases of fever occurred amongst the troops in Berbice; 5 in Trinidad; 24 in St. Kitts, out of 90 attacked.

“ In the following quarter 14 died of fever out of 85 attacked; at St. Kitt’s, 14 out of 39.

“ In the quarter following of 1840, at St. Kitts, there were 10 deaths from fever in the garrison out of 33 attacked: the civil inhabitants suffered as well as the troops. During the twelve months ending the 31st March, 1841, the deaths from fever at Brimston Hill, St. Kitts, were 49, which was a large proportion of the white force stationed there.”

These notices may help to give some tolerable ideas of the irregular manner in which fever breaks out in the West Indies, and the uncertainty, consequently, of any station continuing permanently healthy,—and to show the propriety of adopting all sanatory measures likely to have a preventive influence. They might be extended from notes I have by me, further; but such extension seems unnecessary, the events of the later years being very like repetitions of the former. In the appendix an account will be given of the last outbreak of the disease amongst the troops in Barbados.

broke out in the Canje garrison about the same time as among the shipping. Few cases occurred in the rural districts, and those chiefly after a visit to New Amsterdam. In four out of the five first cases, the patients had been three days previous to the attack in Georgetown, Demerara. The disease in Berbice did not spread *immediately* after the death of any of the fatal cases; and there was a long interval between the last case on shore and the first among the seamen. For information on the spread of the disease in Berbice, I am indebted to the kindness of Dr. Cameron. The following is an extract of a letter from Dr. Fraser, of Essequibo, dated Hoff Van Auriëk House, 16th Dec. 1838:—“With the exception to be mentioned, in all the cases of yellow fever that have occurred in my practice, the sufferers had been recently in Georgetown. The disease most commonly showed itself immediately on, or a few days after, their arrival on this coast. In a late fatal case of Mr. Howes, the disease did not appear for a fortnight after he left town. I know of no other instance in which the attack was so long suspended. The exception to the remark that Demerara was the source of the disease to all my patients occurred in this house. In August, 1837, there resided here Mr. and Mrs. Bratt, Mr. and Mrs. Fowler, and a white servant boy of the latter. Mrs. Bratt, *without* having been in Demerara, was seized with yellow fever, had black vomit, and died. Mr. and Mrs. Fowler were much alarmed, feared contagion, and left the house just before the death of Mrs. Bratt. Their servant boy had been unwell for some days, but in the general alarm his case was overlooked the more readily as he had managed to discharge his usual duties. When his master left the house, the boy was too ill to be removed, and I was called to him. I found him very ill, his mouth filled with black vomit, he was delirious, and the pulse hardly perceptible.” The boy recovered. After stating the remedies applied, Dr. Fraser proceeds:—“There was another victim required: Mr. Bratt, after suffering excessive grief for the loss of his wife, at the end of a week got likewise the disease, and died of black vomit in two days. The grounds around his house were last year, as now, ill drained.”

Many cases of fatal yellow fever occurred at the sand hills, about thirty-five miles up the Demerara river, the first elevated land, composed of little else than snowy white sand, which,

however, bears a variety of forest trees, the chief of which have long since been cut down. These cases, however, only occurred in vessels which, *after waiting* in vain for cargo in *Georgetown*, proceeded up to the sand hills for ballast. During the epidemic, many ships, knowing the difficulty of procuring freight of sugar after the slave emancipation, and finding the hard woods of the colony in demand for ship-building in Europe, proceeded into the interior by the Essequibo river, and remained there for weeks cutting timber on the sand hills of that region, during which time the crews were exposed to all the vicissitudes of weather, using tremendous exertions in felling and hauling the heavy logs, and often working with half the body immersed in water, and the whole force of the sun acting upon them while engaged in the laborious occupation of heaving the logs aboard; yet the yellow fever never visited them there, and they remained healthy, while the ships' crews in the mouth of the Demerara river were losing one third or one half of their men.

On full inquiry it would seem that, although the mouth of the Demerara river was the chief seat of the pathogenic influence of the epidemic, as well as furnishing, most numerous, susceptible subjects, yet the morbid cause was not confined to that locality, but extended more or less along the whole *coast* of the colony. The focus of disease in this locality seemed to be the Mud Lots of Georgetown and their immediate neighbourhood. Many strange and true predictions of attacks of the epidemic from known exposure occur among my notes—many neglected warnings followed by fatal penalties. Some merchants at last retreated from their dwellings above their stores in Water Street when any unseasoned member of their family rejoined it from Europe. The further retired in town the safer the residence was felt to be. Projects for building a river wall and filling up the Mud Lots were openly discussed, and 100*l.* premium was awarded by the town council for the best plan. Ships were moored and unmoored to get rid of unhealthy positions in the river stream, and men held their breath in passing the stellings.

Till 1842, I had charge of the plantation hospitals of "Lapenitence," "Ruimveld," "Rome and Houston," on which were many Madeira immigrants, and I found that in proportion as these immigrants approached town or coast ward in their

locations the yellow fever predominated, and as they receded the intermittent fever asserted supremacy. "Lapenitence" suffered most from *yellow fever*, and "Rome and Houston" least.

In order to determine the most infected locality of the harbour, after the establishment of the present Seaman's *Hospital*, I had a table constructed, forming the shipping into divisions *lengthways*, as marked by the public stellings. Thus the division from Kingston to Urquhart's was marked A., and from Urquhart's to Holmes's marked B., &c., and these divisions respectively marked 1. 2. 3. as the ship lay alongside the stelling or in the prescribed distances; and the position of each ship was thus recorded in the hospital register. Some practical difficulties having attended the carrying out of this plan, the following table is all the information which can be obtained on the prevalence and virulence of the epidemic in special localities of the harbour. From it, as it will appear, the original site near which the disease first showed itself, maintained its virulence, the general rate of mortality there being 24·15 per cent.; but that, although the virus was diluted, it was most prevalent at the *very mouth of the river*, the moorings most sought after by shipmasters, on account of the advantage of the free open breeze.

THE POSITION IN HARBOUR OF 270 VESSELS WITH REGARD TO DISTANCE FROM MOUTH OF RIVER, AS MARKED BY THE PUBLIC STELLINGS; NUMBER OF CASES OF FEVER, AND ITS TYPE AND VARIETY, FROM VESSELS IN THE RESPECTIVE POSITIONS; COLUMN OF MORTALITY, AND AVERAGE NUMBER ATTACKED FOR EACH VESSEL.

| Stellings. | No. of Vessels. | Total Number of Cases. | 943 Cases of Fever; Type and Variety. | | | | | Deaths. | Rate of Mortality of | | Average Number for each Vessel. | |
|---------------------------|-----------------|------------------------|---------------------------------------|---------|-----------------|---------|----------|---------|----------------------|------------------------|---------------------------------|------------------------|
| | | | Intermit. | Remitt. | Febris Simplex. | Mittor. | Gravior. | | Gravior. | Simp. Mittor. Gravior. | Gravior. | Simp. Mittor. Gravior. |
| Kingston to Urquharts | 43 | 190 | 9 | 4 | 7 | 34 | 136 | 38 | 27·94 | 21·41 | 3·16 | 4·12 |
| Urquharts to Holmes | 88 | 319 | 17 | 2 | 29 | 52 | 219 | 65 | 25·11 | 21·66 | 2·49 | 3·40 |
| Holmes to Robbs | 71 | 217 | 9 | 1 | 25 | 48 | 134 | 50 | 37·31 | 24·15 | 1·89 | 2·92 |
| Robbs to America | 34 | 94 | 4 | - | 17 | 19 | 54 | 15 | 27·77 | 16·66 | 1·59 | 2·65 |
| America to Schomakers | 30 | 119 | 6 | 1 | 7 | 36 | 69 | 18 | 26·08 | 16·07 | 2·30 | 3·73 |
| Schomakers to Charlestown | 4 | 4 | - | - | 1 | 1 | 2 | - | -- | -- | 0·50 | 1·00 |

Formerly Dutch ships traded regularly to this port. The

two last arrivals from Holland moored in the Demerara river when the epidemic had burst over and was ravaging the shipping. They lay higher up the river than any ship enumerated in the above table, and what happened to them was conformable to that which would be expected at present. On board these ships seven persons were attacked with intermittent fever after the ships lay eight weeks, and the cases came on almost simultaneously. One man caught yellow fever and died, his illness having occasioned no alarm till he was almost moribund. The captain of one (Captain Matzin) sickened, but recovered. Thus two cases only occurred on board of these ships high up the river, although several months in moorings during the worst time of the pestilence.

The following table, in reference to the effect of *distance* from the shore or stellings on ships' crews during the epidemic, is constructed on too limited a basis to be much depended on. It is given, however, with the caution that the ships which lie "alongside" are generally North Americans, whose lay-days seldom exceed a week, and therefore less liable to attacks than those lying several weeks or months waiting for cargo. From it it would seem as if the disease increased in *prevalence* with the distance from the shore (a very unexpected result), and that the *safest* position for ships was the middle tier, or 100 fathoms off.

THE POSITION IN HARBOUR OF FORTY-FIVE VESSELS, WITH REGARD TO DISTANCE FROM WHARFS; NUMBER OF CASES OF FEVER, AND ITS TYPE AND VARIETY, FROM VESSELS IN THE RESPECTIVE POSITIONS; COLUMN OF MORTALITY; AND OF AVERAGE NUMBER ATTACKED FOR EACH VESSEL.

| Position as to Distance from Wharf. | No. of Vessels. | | 218 Cases of Fever, Type, and Variety. | | | | | Deaths. | Rate of Mortality. | | Average Number for each Vessel. | |
|-------------------------------------|---------------------------------|----|--|------------|----------------|---------|----------|---------|--------------------|----------------------------|---------------------------------|----------------------------|
| | Total Number of Cases of Fever. | | Intermittent. | Remittent. | Febris Simplex | Mitior. | Gravior. | | Gravior. | Febris Simp. Mitior. Grav. | Gravior. | Febris Simp. Mitior. Grav. |
| Alongside Wharf - | 12 | 28 | 1 | - | 5 | 14 | 8 | 3 | 37.50 | 11.11 | 0.66 | 2.25 |
| 75 fathoms off - | 16 | 79 | 1 | - | 21 | 20 | 37 | 13 | 35.13 | 16.66 | 2.31 | 4.87 |
| 100 fathoms off - | 14 | 82 | 3 | - | 15 | 27 | 37 | 8 | 21.60 | 10.14 | 2.64 | 5.64 |
| 125 fathoms off - | 3 | 29 | - | - | - | 11 | 15 | 9 | 60.00 | 31.03 | 5.00 | 9.66 |

Even within the divisions of the harbour marked from north and south A. B. C. D. E., and from east to west 1. 2. 3., there

were oscillations in the prevalence and intensity of the epidemic. The morbid agency seemed to move in shifting swarms, or vortices, hovering over a vessel here and there; and the removal of the ship a few hundred yards frequently stayed the disease. Thus, in the beginning of 1839, the "Thomas King" lay in the division A., between Kingston and Urquhart's Stellings. In one week she lost four hands. She unmoored, and took her station *outside*, or to leeward of the "Louisa Baillie," the mortality ceased, and the health of the crew became re-established. The "Louisa Baillie," that had been right abreast, and sheltered by the "Thomas King," before the unmooring, and had no deaths, although several cases of fever, which readily yielded to treatment, became now very sickly; she lost four men, after which she shifted her moorings, and the mortality then ceased in her also. On being called on to attend the "Calypso," (of the Clyde, Captain Melville), on account of the ill-success of the preceding medical man, I had her immediately unmoored, and anchored close to the site lately occupied by the Dutch ships. Several fresh cases occurred afterwards, but none died. The effect of change, is, however, not so clear in this case, as seven of the crew had died previous to the removal, which number probably was the *complement of mortality* of that ship. The sparse character of the epidemic, and the shifting of its foci, showed itself very decidedly. While some ships lost half their crew, others, almost within stonethrow, and may be to windward, had no sickness, or were losing none; but positions did not remain permanently healthy, or the reverse; and the difference in mortality was not ascribable to any difference of treatment, as could be easily shown. Indeed, the cases might be looked on, till after the establishment of the present Seaman's Hospital, as untreated, in consequence of the inadequate attendance of the over-worked doctors, and the total want of anything like proper nursing, or of sick comforts on board the merchantmen. The table, preceding the last, shows the *average* prevalence and virulence in the different parts of the harbour among 270 vessels, and the results are not in accordance with many single and partial observations; for, in consequence of the oscillations of the foci, sometimes one site on the river bank was considered the chief seat, and sometimes another. Some time in 1841, the portion of the river opposite

the slaughter house, and in E. division, or close to America Stelling, was supposed to be the main focus. The sparse character of the epidemic was also observed in town; and premises in which, a sea material (*caddy*)* was used to fill up hollows and low levels, were suspected as being peculiarly subject to invasions.

* [See note, p. 5. The siliceous sand bearing the name of *caddy*, may perhaps be called, as above, a sea material, where thrown up by the sea, though derived from the hills of the interior by the process of disintegration, and conveyed into the sea by the rivers.]—ED.

CHAP. III.

PROGRESS OF THE EPIDEMIC CONTINUED.

THE shipping became so infected, and the treatment on board so evidently inefficient and imperfect*, that in August, 1837, a house was hired on Urquhart's Stelling by the Colonial Government as a receptacle for the sick merchant seamen. The building was convenient as to site, but it was necessarily destitute of most medical appliances, and the salubrity of the site was questionable, although not then much suspected. Into this temporary hospital the medical practitioners zealously endeavoured to remove their patients; but a large number of seamen refused to leave their ships when sick. Considering the want of unity in the arrangements (the distracted steward having to attend to the directions and instructions of a dozen medical men), it is questionable if any good resulted from the establishment.

The total admissions and deaths in this temporary hospital, (no doubt some were admitted who did not suffer from the epidemic at all,) were as follows:—

TABLE OF ALL ADMISSIONS, AND ALL DEATHS, WITH CENTESIMAL MORTALITY IN TEMPORARY SEAMAN'S HOSPITAL, 1837.

| | August. | Septem. | October. | Novem. | Decem. |
|-----------------------|---------|---------|----------|--------|--------|
| Admitted - - - | 90 | 49 | 50 | 52 | 28 |
| Died - - - | 19 | 7 | 18 | 16 | 14 |
| Centesimal Mortality- | 21·1 | 14·2 | 36· | 30·7 | 50· |

Note. Fourteen cases left hospital while under treatment during the five months, and the result is unknown. They are included in the above-stated number of admissions.

* It was frequently found, after the death of seamen on board the ship, that all the medicine prescribed was stowed away in some convenient hiding-place, untouched.

Although the virulence of the disease increased, the number of cases was much reduced at the beginning of 1838, and this happened nearly contemporaneously with the sudden cessation of the epidemic in Berbice. At the end of December the temporary hospital was closed, his Honour the High Sheriff having reported to his Excellency the Governor that the last two cases had been discharged on the 26th December.

Again, however, the pestilence increased, and continued among the shipping, and in the town among the late arrivals. And, in December, 1838, the present Demerara Seaman's Hospital was opened, for the admission of all the sick of the mercantile shipping. Till this date the account of the epidemic is chiefly derived from desultory notes and recollections; but, henceforward (if we admit that the disease among the sailors may be a measure of the epidemic generally), the regularly kept records of the Seaman's Hospital furnish materials for ascertaining the pulsations of the epidemic, till its close.*

* [In the late outbreak of yellow fever in the garrison of St. Ann, Barbados, which commenced in December, 1847, the morbid cause, whatever it was, as in British Guiana, seemed to act irregularly; the deaths may be adduced in proof; thus, in December, 1847, they were 3; in January following, 21; February, 2; March, 4; April, 4; May, 1; June, 4; July, 5; August, 6; September, 17; October, 13; November, 43; December, 30; January, 1849, 5; February, 2; exclusive of officers.

The following return for a portion of the same period, showing the admissions and deaths from fevers in the several stations of the West Indian Command, both amongst the white and black troops, admits of inferential applications in various ways; as by comparing — 1st, the two descriptions of forces, the white and the black; 2dly, the troops in the different stations, the 54th, 66th, and 72nd Regiments, recently arrived in the West Indies from the Mediterranean, after crossing the Atlantic, with the other regiments of two or three years' residence; and lastly, the several corps or detachments assembled in Barbados, quartered in the same garrison, within an area hardly exceeding a mile in circumference. It may be pointed out that the terms remittent and continued fever are not applied in the returns, as used by medical officers, with much accuracy, the names of diseases being assigned on admission; all the severer cases, and the majority of all the fevers in the 88th, were instances of the yellow fever endemic.

For continuation of note see next page.

CHAP. IV.

VARIETIES OF THE FEVER, AND THEIR PROGRESS IN CONNEXION
WITH INTERMITTENT FEVER.

THE hospital registers, and case books, record three varieties of the epidemic disease, viz. *Simplex*, *Mitior*, and *Gravior*, and examples of these forms, or grades, are met with contemporaneously. It will be here necessary only to state that the mitior cases were distinguished by a tendency to resolve at the end of the second stage of the disease, and in all the symptoms were less pestilential than those of the gravior form, and that the *simplex* cases terminated with the first stage or period of excitement, and rarely were followed by any contamination or dissolution of the fluids. In this latter variety no death occurred. The *simplex* form was not distinctly recognised till 1841. It is probable, however, that it was present during the entire epidemic; its prevalence, however, is greatest and most manifest at the close. Previous to 1841, and from 24th December, 1838 (the day of opening the Seaman's Hospital), the mild fevers as distinguished from the true yellow fever are as follows:—

| | | | | | | | | |
|------------------------|---|---|---|--------------------------------------|---|---|---|----|
| 1839 | - | - | - | Febris remittens biliosa | - | - | - | 20 |
| 1st six months of 1840 | - | - | - | Fever (not yellow) species not named | - | - | - | 77 |
| July | - | - | - | " Ephemeral Fever " | - | - | - | 7 |
| August | - | - | - | " " | - | - | - | 13 |
| September | - | - | - | " " | - | - | - | 8 |
| October | - | - | - | " " | - | - | - | 12 |
| November | - | - | - | " " | - | - | - | 12 |
| December | - | - | - | " " | - | - | - | 4 |

 55

PROGRESS OF FEBRIS FLAVA SIMPLEX. NUMBER OF CASES IN EACH YEAR AND MONTH. FROM RECORDS OF DEMERARA SEAMAN'S HOSPITAL.

| Year. | Jan. | Feb. | March. | April. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. | Total. |
|-------|------|------|--------|--------|------|-------|-------|------|-------|------|------|------|--------|
| 1839 | | | | | | | | | | | | | |
| 1840 | | | | | | | | | | | | | |
| 1841 | 11 | 13 | 35 | 7 | 5 | 10 | 11 | 12 | 9 | 10 | 15 | 4 | 142 |
| 1842 | 0 | 3 | 1 | 1 | 0 | 0 | 7 | 8 | 19 | 14 | 19 | 17 | 89 |
| 1843 | 6 | 11 | 4 | 3 | 9 | 11 | 15 | 8 | 11 | 27 | 17 | 26 | 148 |
| 1844 | 7 | 10 | 2 | 3 | 6 | 14 | 13 | 20 | 19 | 12 | 17 | 12 | 135 |
| 1845 | 11 | 9 | 4 | 25 | 26 | 26 | 36 | 48 | 44 | 52 | 54 | 24 | 359 |
| 1846 | 11 | 0 | 0 | 3 | 9 | 2 | 6 | 10 | 13 | 15 | 13 | 6 | 88 |
| Total | 46 | 46 | 46 | 42 | 48 | 70 | 88 | 106 | 115 | 130 | 135 | 89 | 961 |

THE NUMBER OF CASES OF YELLOW FEVER, MITIOR AND GRAVIOR, TREATED DURING EACH YEAR, WITH NUMBER OF DEATHS, AND RATE OF MORTALITY.

| Year. | Feb. Flava Mitior. | Feb. Flava Gravior. | Total. | Deaths. | Rate Mortality on Total. | Rate Mortality on Gravior. |
|-------|--------------------|---------------------|--------|---------|--------------------------|----------------------------|
| 1839 | - | 234 | 234 | 103 | 44.01 | 44.01 |
| 1840 | 113 | 311 | 424 | 39 | 9.19 | 12.54 |
| 1841 | 14 | 666 | 680 | 123 | 18.00 | 20.00 |
| 1842 | 168 | 345 | 513 | 110 | 21.42 | 31.88 |
| 1843 | 55 | 69 | 124 | 17 | 13.71 | 24.64 |
| 1844 | 61 | 15 | 76 | 10 | 13.16 | 66.66 |
| 1845 | 18 | 2 | 20 | 2 | 10.00 | 100.00 |
| Total | 429 | 1642 | 2071 | 404 | 19.51 | 24.60 |

NUMBER OF ADMISSIONS AND DEATHS OF YELLOW FEVER, MITIOR AND GRAVIOR, MONTHLY, FOR THE RESPECTIVE YEARS.

| Year. | Jan. | | | Feb. | | | March. | | | April. | | | May. | | | June. | | | July. | | | Aug. | | | Sept. | | | Oct. | | | Nov. | | | Dec. | | |
|-------|------|-------|---------|------|-------|---------|--------|-------|---------|--------|-------|---------|------|-------|---------|-------|-------|---------|-------|-------|---------|------|-------|---------|-------|-------|---------|------|-------|---------|------|-------|---------|------|-----|----|
| | Mit. | Grav. | Deaths. | Mit. | Grav. | Deaths. | Mit. | Grav. | Deaths. | Mit. | Grav. | Deaths. | Mit. | Grav. | Deaths. | Mit. | Grav. | Deaths. | Mit. | Grav. | Deaths. | Mit. | Grav. | Deaths. | Mit. | Grav. | Deaths. | Mit. | Grav. | Deaths. | Mit. | Grav. | Deaths. | | | |
| 1839 | - | 26 | 5 | - | 3 | 2 | - | 2 | 2 | - | 15 | 3 | - | 11 | 3 | - | 14 | 4 | - | 25 | 7 | - | 33 | 17 | - | 30 | 19 | - | 53 | 25 | - | 26 | 16 | | | |
| 1840 | - | 67 | 17 | - | 27 | 4 | - | 32 | 3 | 17 | 16 | - | 18 | 3 | - | 18 | 3 | 16 | 5 | - | 7 | 1 | 16 | 15 | - | 12 | - | 27 | 32 | 3 | 11 | 57 | 6 | | | |
| 1841 | 5 | 100 | 13 | - | 111 | 18 | 9 | 22 | 3 | 4 | - | - | 1 | - | - | 4 | - | 14 | 5 | - | 73 | 18 | - | 136 | 32 | - | 62 | 6 | - | 71 | 15 | - | 68 | 13 | | |
| 1842 | 13 | 29 | 9 | 7 | 27 | 6 | 8 | 19 | 8 | 4 | 12 | 2 | 9 | 4 | 9 | 25 | 10 | 4 | 22 | 8 | 5 | 33 | 10 | 32 | 53 | 16 | 35 | 46 | 23 | 33 | 39 | 11 | 18 | 27 | 7 | |
| 1843 | 10 | 9 | 1 | - | 1 | - | - | 5 | 2 | - | 3 | 2 | - | 4 | 3 | - | 1 | 2 | 1 | 2 | 10 | 4 | 8 | 8 | 2 | 1 | - | 7 | 1 | 6 | 2 | 114 | 22 | 27 | | |
| 1844 | 3 | - | - | 12 | 4 | 3 | 12 | 1 | 1 | 3 | 1 | - | 8 | 3 | 1 | 5 | 2 | 2 | 1 | 1 | 6 | 2 | 2 | 6 | 2 | 1 | - | - | - | - | - | - | - | - | | |
| 1845 | - | 1 | 1 | - | - | - | - | - | - | - | - | - | - | - | 3 | - | - | - | 11 | 1 | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | | |
| Total | 31 | 232 | 46 | 19 | 173 | 33 | 32 | 76 | 17 | 29 | 35 | 2 | 20 | 43 | 7 | 21 | 77 | 18 | 33 | 58 | 19 | 21 | 144 | 41 | 62 | 247 | 68 | 52 | 157 | 49 | 73 | 197 | 55 | 43 | 209 | 49 |

YEARLY AND MONTHLY TABLE OF ADMISSIONS AND DEATHS FROM YELLOW FEVER (INCLUDING FEBRIS FLAVA SIMPLEX), OF DEMERARA SEAMAN'S HOSPITAL.

| | 1839. | 1840. | 1841. | 1842. | 1843. | 1844. | 1845. | 1846. | Total. | | | |
|--|-------|-------|-------|--------|-------|-------|-------|-------|--------|---|------|------|
| Cases admitted- | 238 | 424 | 822 | 602 | 272 | 211 | 379 | 88 | 3036 | Centesimal Mortality on all Cases, 13·3. | | |
| Died - - - - | 103 | 39 | 123 | 110 | 17 | 10 | 2 | - - | 404 | | | |
| Cent. Mortality | 4·32 | 9·1 | 14·9 | 18·2 | 6·2 | 4·6 | ·5 | - - | | | | |
| | Jan. | Feb. | Mar. | April. | May. | June. | July. | Aug. | Sep. | Oct. | Nov. | Dec. |
| 1839. | | | | | | | | | | | | |
| Admitted - - | 26 | 3 | 2 | - - | 15 | 11 | 14 | 25 | 33 | 30 | 53 | 26 |
| Died - - - - | 5 | 2 | 2 | - - | 3 | 3 | 4 | 7 | 17 | 19 | 25 | 16 |
| 1840. | | | | | | | | | | | | |
| Admitted - - | 67 | 27 | 32 | 33 | 18 | 32 | 21 | 8 | 31 | 28 | 59 | 68 |
| Died - - - - | 17 | 4 | 3 | - - | 3 | 3 | - - | - - | - - | - - | 3 | 6 |
| 1841. | | | | | | | | | | | | |
| Admitted - - | 116 | 124 | 66 | 11 | 6 | 14 | 25 | 85 | 145 | 72 | 86 | 72 |
| Died - - - - | 13 | 18 | 3 | - - | - - | - - | 5 | 18 | 32 | 6 | 15 | 13 |
| 1842. | | | | | | | | | | | | |
| Admitted - - | 42 | 37 | 28 | 17 | 13 | 34 | 33 | 46 | 104 | 95 | 91 | 62 |
| Died - - - - | 9 | 6 | 8 | 2 | - - | 10 | 8 | 10 | 16 | 23 | 11 | 7 |
| 1843. | | | | | | | | | | | | |
| Admitted - - | 25 | 12 | 6 | 10 | 14 | 18 | 18 | 20 | 27 | 35 | 25 | 62 |
| Died - - - - | 1 | - - | - - | - - | - - | - - | 1 | 4 | 2 | 1 | 1 | 7 |
| 1844. | | | | | | | | | | | | |
| Admitted - - | 10 | 26 | 15 | 7 | 17 | 21 | 14 | 28 | 27 | 12 | 22 | 12 |
| Died - - - - | - - | 3 | 1 | - - | 1 | 2 | - - | 2 | 1 | - - | - - | - - |
| 1845. | | | | | | | | | | | | |
| Admitted - - | 12 | 9 | 5 | 25 | 26 | 29 | 48 | 49 | 44 | 52 | 56 | 24 |
| Died - - - - | 1 | - - | - - | - - | - - | - - | 1 | - - | - - | - - | - - | - - |
| 1846. | | | | | | | | | | | | |
| Admitted - - | 11 | - - | - - | 3 | 2 | 9 | 6 | 10 | 13 | 15 | 13 | 6 |
| Died - - - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - | - - |
| Sums of Admissions - | 309 | 238 | 154 | 106 | 111 | 168 | 179 | 271 | 424 | 339 | 405 | 332 |
| and Deaths - - | 46 | 33 | 17 | 2 | 7 | 18 | 19 | 41 | 68 | 49 | 55 | 49 |
| Sums of Admissions divided by Sums of Deaths - - | 14·8 | 13·8 | 11· | 1·8 | 6·3 | 10·7 | 10·5 | 15·1 | 16· | 14·4 | 13·5 | 14·7 |

All the cases of yellow fever in the shipping were not sent to hospital. Some medical practitioners deemed it necessary to make opposition to that establishment, and occasionally seamen were reluctant to leave their ships. Hence the above tables give an imperfect view of the absolute number of cases, and of the influence of season, &c. on the average mortality. Some corrections, however, may be made in our approximations by the millesimal mortality of the shipping generally, as it is well

known that the only fatal disease prevailing during the time in question was the yellow fever epidemic.

MILLESIMAL MORTALITY OF THE SEAMEN WHO ARRIVED IN DEMERARA RIVER BETWEEN 1835 AND 1846 INCLUSIVE.

| Annual Aver. | Yrs. | Jan. | Feb. | Mar. | April. | May | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|--------------|------|-------|-------|-------|--------|-------|-------|-------|-------|-------|-------|-------|-------|
| .5 | 1835 | 3.9 | 00.00 | 00.00 | 3.7 | 00.00 | 00.00 | 00.00 | 00.00 | 00.00 | 00.00 | 00.00 | 00.00 |
| 2.9 | 1836 | 3.0 | 5.4 | 8.7 | 9.1 | 6.2 | 00.00 | 7.1 | 00.00 | 00.00 | 00.00 | 00.00 | 00.00 |
| 60.9 | 1837 | 00.00 | 3.4 | 3.7 | 3.0 | 18.2 | 195.5 | 131.9 | 101.8 | 101.9 | 226. | 37. | 65.2 |
| 69.3 | 1838 | 111.7 | 71.8 | 97.3 | 23.5 | 47.1 | 94.5 | 117. | 80.9 | 69.8 | 35.6 | 70.2 | 40.6 |
| 37.7 | 1839 | 24. | 17.4 | 14.8 | 9.4 | 14.3 | 4.8 | 10.5 | 43.2 | 52.9 | 48.6 | 117.9 | 69.3 |
| 15.6 | 1840 | 62.3 | 64.6 | 13.0 | 3.7 | 12.2 | 12.3 | 4.0 | 6.2 | 00.00 | 6.8 | 5.1 | 29.6 |
| 32.5 | 1841 | 24.3 | 84.1 | 9.0 | 3.7 | 5.5 | 4.8 | 12.5 | 59. | 124.7 | 32.7 | 38.7 | 51.1 |
| 32. | 1842 | 34.4 | 19.1 | 27.0 | 7.3 | 5.2 | 45.1 | 30.2 | 30.1 | 36.1 | 147.4 | 20.5 | 27.4 |
| 5.3 | 1843 | 10.8 | 00.00 | 00.00 | 4.0 | 00.00 | 3.5 | 2.6 | 7.4 | 7.2 | 2.1 | 4.3 | 26. |
| 3.1 | 1844 | 00.00 | 9.7 | 00.00 | 00.00 | 3.2 | 10. | 00.00 | 15.4 | 00.00 | 1.9 | 2.5 | 2.1 |
| 2.4 | 1845 | 3.6 | 00.00 | 00.00 | 2.6 | 2.6 | 2.3 | 4.1 | 2.0 | 00.00 | 4.3 | 5.9 | 00.00 |
| 1.7 | 1846 | 00.00 | 6.7 | 1.9 | 00.00 | 2.1 | 2.9 | 2.7 | 00.00 | 3.3 | 00.00 | 2.6 | 00.00 |
| | | 25.1 | 24.6 | 12.2 | 6. | 9.2 | 25.5 | 26.2 | 25.3 | 33.6 | 29.2 | 22.9 | 24.8 |

CENTESIMAL PROPORTION OF DEATHS FROM YELLOW FEVER DURING COURSE OF EPIDEMIC IN SEAMAN'S HOSPITAL, THE "SIMPLE" FORM BEING INCLUDED IN THE NUMBER OF CASES.

| Year. | Jan. | Feb. | March. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. | Annual. |
|-----------------|------|------|--------|------|------|-------|-------|------|-------|------|------|------|---------|
| 1839 | 19.2 | 66.6 | 100 | 00 | 20 | 27.2 | 28.5 | 28 | 51.5 | 63.3 | 47.1 | 61.5 | 42.7 |
| 1840 | 25.5 | 14.8 | 9 | 00 | 16.6 | 9 | 37.5 | 00 | 00 | 00 | 5 | 8.8 | 8.4 |
| 1841 | 12 | 14.5 | 4.5 | 00 | 00 | 00 | 20 | 21.1 | 22 | 8.3 | 18.3 | 18 | 10.6 |
| 1842 | 28.1 | 16 | 28.5 | 11.8 | 00 | 29.3 | 24.2 | 21.7 | 15.3 | 24.2 | 12 | 11.2 | 18.5 |
| 1843 | 4 | 00 | 00 | 00 | 00 | 00 | 5.5 | 20 | 7.4 | 2.8 | 4 | 11.2 | 4.6 |
| 1844 | 00 | 11.5 | 6.6 | 00 | 5.8 | 9.5 | 00 | 7.2 | 3.7 | 00 | 00 | 00 | 3.7 |
| 1845 | 8.3 | 00 | 00 | 00 | 00 | 00 | 2 | 00 | 00 | 00 | 00 | 00 | 0.2 |
| 1846 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | ,, |
| Means of months | 12.2 | 15.4 | 18.6 | 1.5 | 5.3 | 9.4 | 14.7 | 12.3 | 12.5 | 12.3 | 10.8 | 13.8 | |

NOTE.—From 1841 only is the "simplex" grade recognised.

PROGRESS OF INTERMITTENT FEVER IN SEAMAN'S HOSPITAL DURING EPIDEMIC, AS SHOWN BY MONTHLY ADMISSIONS.

| Year. | Jan. | Feb. | Mar. | April. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. | Total. |
|-------|------|------|------|--------|------|-------|-------|------|-------|------|------|------|--------|
| 1839 | | | | | | | | | | | | | |
| 1840 | 2* | 4 | 8 | 6 | 3 | 0 | 0 | 4 | 1 | 13 | 8 | 1 | 50 |
| 1841 | 8 | 2 | 6 | 8 | 7 | 8 | 3 | 11 | 7 | 8 | 10 | 3 | 81 |
| 1842 | 8 | 6 | 5 | 6 | 10 | 3 | 4 | 5 | 5 | 7 | 2 | 1 | 62 |
| 1843 | 1 | 1 | 0 | 1 | 1 | 3 | 0 | 1 | 4 | 6 | 4 | 1 | 23 |
| 1844 | 1 | 0 | 0 | 1 | 0 | 0 | 3 | 2 | 5 | 3 | 2 | 1 | 18 |
| 1845 | 1 | 3 | 5 | 0 | 0 | 1 | 3 | 2 | 3 | 4 | 2 | 2 | 26 |
| 1846 | 6 | 7 | 6 | 3 | 0 | 1 | 5* | 7 | 4 | 1 | 3 | 6 | 49 |
| Total | 27 | 23 | 30 | 25 | 21 | 16 | 18 | 32 | 29 | 42 | 31 | 15 | 309 |

* One death.

From the foregoing tables it will be seen that our late epidemic, in its prevalence and virulence, had two maxima, which were divided by the year 1840. In fact, from the gradual diminution of virulence in the intervening period between the maxima points, it would seem as if our last had been a *double* epidemic. In the last six months of 1840 there were but 14 deaths out of 613 total admissions into the Seaman's Hospital; or 9 deaths out of 225 yellow fever cases. This interval contrasts strongly with the more abrupt *lull* which occurred in December, 1837, and beginning of 1838.

It is also seen that the epidemic has been subject to the general laws which influence the prevalence and virulence of febrile and other colonial disorders generally, as respects months, and that the vernal equinox through all conditions persists in being the healthiest period of the year.*

The termination of the epidemic was preceded by the prevalence of the "simplex" form, denoting that the virus had become gradually weaker; till, at last, in the great rainy season of 1845, it entirely ceased, superseded by a slight, but a very general influenza.†

* [The following Return of Deaths from Fever, in Barbados, is given for the purpose of comparison; the accordanees do not require to be pointed out, whether as to duration, fluctuation, or apparent influence of season.

RETURN OF THE DEATHS FROM FEVER, MONTHLY, AMONGST THE TROOPS IN THE GARRISON OF ST. ANN, BARBADOS, EXCLUSIVE OF OFFICERS, FOR A PERIOD OF ELEVEN YEARS, IN THE FIRST SIX OF WHICH, AND THE TWO LAST, YELLOW FEVER WAS THE PREVAILING FORM OF THE DISEASE.

| | 1838. | 1839. | 1840. | 1841. | 1842. | 1843. | 1844. | 1845. | 1846. | 1847. | 1848. | Totals. |
|-----------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---------|
| January - - - | - - | 1 | 5 | - - | - - | 7 | - - | - - | - - | - - | 21 | 34 |
| February - - - | - - | 2 | 4 | 2 | 1 | 9 | - - | - - | - - | - - | 2 | 20 |
| March - - - | 1 | 6 | 2 | - - | 12 | 2 | 1 | - - | 1 | 1 | 4 | 30 |
| April - - - | - - | - - | 1 | 1 | 7 | 1 | 1 | - - | 2 | - - | 4 | 17 |
| May - - - | - - | 2 | - - | - - | - - | 1 | - - | - - | 1 | - - | 1 | 5 |
| June - - - | - - | 1 | - - | 9 | - - | 2 | - - | - - | - - | - - | 4 | 16 |
| July - - - | 1 | 1 | 1 | 1 | - - | - - | - - | - - | - - | - - | 5 | 9 |
| August - - - | 1 | 2 | 2 | 4 | - - | 2 | - - | 1 | - - | - - | 6 | 18 |
| September - - - | - - | 3 | - - | - - | 2 | - - | - - | - - | - - | - - | 17 | 22 |
| October - - - | - - | 2 | 1 | 10 | 2 | 2 | - - | - - | - - | - - | 13 | 30 |
| November - - - | 6 | 17 | - - | 16 | 4 | - - | - - | 2 | 1 | 1 | 43 | 90 |
| December - - - | 5 | 13 | - - | 10 | 16 | - - | - - | - - | - - | 3 | 30 | 77 |
| Total - - - | 14 | 50 | 16 | 53 | 44 | 26 | 2 | 3 | 5 | 5 | 77 | 295 |

]—ED.

† In 1844 the first cases of scarlatina known to have occurred in the colony were seen. The subjects of it, however, were chiefly children of the colonists, and those of the mixed races.

Occasionally since then the suffused face and eye, frontal headache, and crimson-edged tongue, have been seen engrafted on the intermittents of the seamen of the shipping, showing that

* The following return may be useful, as bearing upon some of the points

RETURN SHOWING WHEN REMITTENT OR YELLOW FEVER

| Year. | Period of the Year. | Corps. | Strength. | Admitted. | | | |
|--------------------|-------------------------------------|--|------------|-----------|--------|---------|------------|
| | | | | Intermit. | Remit. | Concom. | Interodes. |
| 1815 | | | | | | | |
| 1816 | From Sept. till Feb. 1817. | Gen. Hosp. | 2310 | 36 | 470 | 705 | - - |
| | | Royal Art. | 270 | 10 | 112 | 3 | - - |
| 1817 to 1819 | } | | | | | | |
| 1820 | | From Sept. to Jan. 8. 1821. | Gen. Hosp. | 47 | 3 | 2 | 37 |
| | | Royal Art. | 212 | 1 | - - | 64 | 20 |
| | | 21st Regt. | 619 | 1 | - - | 40 | 26 |
| | | 1st W. Ind. | 329 | - - | - - | 13 | 1 |
| | | 13th Dep. | 401 | 1 | 2 | 28 | 5 |
| 1821 | From Oct. till Dec. | Gen. Hosp. | 182 | - - | - - | 89 | - - |
| | | Royal Art. | 110 | 1 | - - | 42 | - - |
| | | 4th foot. | 603 | - - | 112 | 22 | - - |
| 1822 to 1835 | } | | | | | | |
| 1836 | | From Nov. to Feb. 1837. | 76th Regt. | 436 | 2 | 58 | 152 |
| 1837 | | | | | | | |
| 1838 | From Nov, till Dec. | 52nd Regt. | 506 | - - | - - | 13 | 37 |
| | | NOTE.—Of 12 Officers taken ill with Yellow Fever, 3 died. | | | | | |
| 1839 | From Nov. till middle of Jan. 1840. | 52nd Regt. | 533 | - - | - - | 37 | 68 |
| | | NOTE.—1 Officer died of Yellow Fever—the only one taken ill; 10 Seamen of the Royal Navy died of Yellow Fever. | | | | | |
| 1840 | | | | | | | |
| 1841 | From Nov. till Ap.1. 1842. | 33rd Regt. | 552 | - - | 18 | 22 | 31 |
| | | 92nd Regt. | 389 | 1 | 41 | 22 | 5 |
| | | NOTE.—10 Seamen, Royal Navy, died of Yellow Fever. | | | | | |
| 1842 | From Nov. till Jan. 1843. | 46th Regt. | 552 | - - | - - | - - | 112 |
| | | 81st Regt. | 294 | - - | - - | 1 | 22 |
| | | NOTE.—4 Seamen of the Royal Navy died of Yellow Fever. | | | | | |
| 1843 to 1846 | } | | | | | | |
| | | | | | | | |

a taint still exists; but, since the period named, the yellow fever has ceased to have a separate existence among the diseases of the colony.*

discussed in this chapter; it was drawn up carefully from documents in the Inspector's Office, Barbados. [See pp. 46. and 47.]

WAS PREVALENT IN BARBADOS FROM 1815 TO 1846.

| Died. | | | | Remarks. |
|-----------|---------|-----------|--------------|---|
| Intermit. | Re-mit. | Con. Com. | Ictero-odes. | |
| | | | | No prevalence. |
| - - | 29 | 166 | - - | Prevailed in the Brick Barracks, and Brick Barracks Officers' Quarters. It had been prevalent in Bridgetown for nearly seven months previously. |
| - - | 18 | 2 | | |
| | | | | No prevalence. |
| - - | - - | 1 | 40 | Prevailed generally in the Garrison and its vicinity, in the Dockyard, and in Collymore Rock. |
| - - | - - | - - | 5 | |
| - - | - - | 1 | 2 | |
| - - | - - | 1 | 1 | |
| - - | - - | 1 | 5 | |
| - - | - - | 16 | - - | Prevailed in the Garrison; but the Barracks not mentioned. |
| - - | - - | 15 | | |
| - - | 11 | 2 | | |
| | | | | No prevalence. |
| - - | 7 | 8 | - - | Prevailed in the Stone Barracks. |
| - - | - - | 1 | 6 | No prevalence. Prevailed in the Brick Barracks—Officers' Quarters. |
| - - | - - | 2 | 16 | Prevailed in Brick Barracks—Soldiers' Quarters. |
| | | | | No prevalence. |
| - - | - - | 1 | 21 | Prevailed in Stone Barracks. |
| - - | - - | 1 | 9 | |
| - - | - - | - - | 16 | Prevailed in Stone Barracks, and on board of her Majesty's ship "Crocodile;" and amongst the Detachment of the 81st Regiment arrived in the "Crocodile" from St. Kitts. Some cases occurred in Hospital amongst the Patients and Orderlies. |
| - - | - - | - - | 8 | |
| | | | | No prevalence. |

CHAP. V.

MORTALITY OF THE EPIDEMIC YELLOW FEVER.

IT is difficult to discover what per centage of mortality occurred in purely *untreated* cases. From the first, however, it did not require much nicety of observation to find out that the number of deaths among a given number of cases, as well as a given number of cases among a certain number of susceptible persons subjected to similar exposure, had determinate laws. The early appreciation of this fact was of great service to the reputation of the medical practitioner at a time when the treatment was nearly totally inefficient. I find among my earliest notes of the epidemic a remark on what I call the *complement of mortality*, and one or two instances of an application of the knowledge of it. The barque "Glasgow" (Milrae, Master,) was attended by Dr. F., who was exceedingly unfortunate with the cases on board of this Clyde vessel. Seven or eight of the crew had died, and the rest, including the Master, were so disheartened, that it was determined to change the practitioner, and I was requested to take charge. Having no desire thus to supersede Dr. F., I declined, and explained to the shipmaster that it was highly probable that, henceforth, there would be no more deaths on board, as the *complement of mortality was already full*. The result was as predicted. In the same note I find it stated, of course on mere general observation, "The mortality generally ceased below 8 in the Bristol, Liverpool, London, and Clyde vessels, and below 4 in the Belfast vessels." This was during the first half of the epidemic. Perhaps the mortality of the Babel temporary Seaman's Hospital might be taken as the mortality of *untreated* cases; for from the total disorder and want of supervision in that establishment, and the inadequacy of the sick-nurse attendants, it is likely the disease was in no way beneficially affected by the treatment prescribed.

Many trivial cases were no doubt admitted in the general alarm; so that this dilution would compensate in the deduction of an average made from observations at the *beginning* of an

epidemie. Several ships which sailed from this port in the early period of the epidemie had eases occurring at sea, in which all attacked died. But it is probable there was compensation by previous cases of recovery. If the mortality of the temporary hospital be taken to represent the proportional deaths from the untreated disease, we must assume it at 29 per cent. The mortality of *treated* cases as educed from records of the present Seaman's Hospital, will give a full, or even an excessive, rate; for many cases were admitted in a hopeless condition, the medical practitioners in many instances making the hospital a receptacle for such cases as they feared would terminate fatally.

Our epidemie, as has been stated of scarlatina, varied in intensity from a "flea bite to the plague." The *simplex* cases represent the former lesion named in the quotation.* It will be well, therefore, to give the centesimal mortality of the epidemie as shown in the Seaman's Hospital from 1839 till its termination *for each form* or variety, as in the annexed table.

| Feb. Flava Mit. Cases. | Feb. Flav. Grav. | Total. | Deaths. | Rate of Mortality on Gravior. | Rate of Mortal. on Gravior and Mitior. | Feb. Flava Simp.† | Rate of Mortal. on all Cases. |
|------------------------|------------------|--------|---------|-------------------------------|--|-------------------|-------------------------------|
| 439 | 1642 | 2071 | 404 | 24·60 | 19·51 | 961 | 13·3 |

* [The mortality, probably, in no two invasions of yellow fever will be similar. The following table shows the proportion per cent. of deaths, to the number of fever cases admitted in the military hospitals in Barbados, from 1816 to 1842. It may be proper to premise, that the terms remittent, communis continens, and icterodes, as commonly used, are hardly distinctive; sometimes, according to certain preeoneeived ideas, one name being used, sometimes the other.

PROPORTION PER CENT. OF DEATHS TO THE NUMBER ADMITTED.

| Years. | Intermittent. | Remittent. | Com. Con. | Icterodes. |
|--------|---------------|------------|-----------|------------|
| 1816 | - - | 8·07 | 23·72 | - - |
| 1820 | - - | - - | 2·19 | 39 |
| 1821 | - - | 9·82 | 21·56 | - - |
| 1836 | - - | - - | 5·26 | - - |
| 1838 | - - | - - | 5·40 | 23·52 |
| 1841 | - - | - - | 4·54 | 83·33 |
| 1842 | - - | - - | - - | 17·91 |

] — ED.

† This form, as before stated, was noticed and recorded first in 1841.

The rate of mortality on mitor and gravior cases among individual patients was somewhat influeneed by *age*.

| | | | | | |
|-----------------------|---|--------|---|-------|-----------|
| Thus, under 15 years, | - | it was | - | 24·39 | per cent. |
| „ from 15 to 20 years | - | „ | - | 23·44 | „ |
| „ „ 20 „ 30 „ | - | „ | - | 28·45 | „ |
| „ „ 30 „ 40 „ | - | „ | - | 19·90 | „ |
| „ „ 40 „ 50 „ | - | „ | - | 21·91 | „ |
| „ „ 50 upwards | - | „ | - | 22·22 | „ |

CHAP. VI.

ORIGIN OF THE EPIDEMIC.

As Demerara lies permanently within the meteorological yellow fever zone, and as persons fresh from cold climates and susceptible of the pathogenic influence of yellow fever arrive daily, and as notwithstanding it is only after long intervals of years that yellow fever is observed among us, it is evident that some element is required in the formation of the disease besides European blood and tropical heat. It is also evident that, whatever that element may be, it is different from the pathogenic entity of intermittent fever; the latter a disease which is constantly present here in all its types, complications, and sequelæ.*

The condition of the health of the shipping before, during, and after the last epidemic, as shown in the difference of mortality, points out how the sanitary condition of the same locality is altered by the presence or absence of the subtle and invisible poison of yellow fever. Perhaps as striking a contrast is seen in the condition of the present water-side terminus of the railway company. These premises, when owned by the late Mr. Benjamin during the epidemic, gave out the most virulent malaria. By sleeping one night on those premises Dr. Reid (of the east coast, then on a visit to town), a settler of eight or ten years' residence, was attacked by the *gravior* form of the prevailing disease, from which he narrowly escaped with life. At present these premises are filled with red blooded Englishmen, and yet no symptom of yellow fever has shown itself among them, after an exposure of many months to the locality.

* [The history of the disease in the West Indies seems to me perfectly in accordance with the above conclusion. It is remarkable that some of the most destructive outbreaks of yellow fever have occurred amongst the troops at stations where intermittent fever is almost unknown as indigenous. Brinstone Hill, in St. Kitts, may be particularised; Fort Charlotte, in St. Vincent; and the garrison of St. Ann, in Barbados; and it is not less remarkable that those colonies, in which agues are most common, have been least frequently visited by the malignant fever; of which Demerara and Berbice are striking examples.]—ED.

What the yellow fever poison may be has never been demonstrated. Whatever it be, it is probable that in all localities within the yellow fever zone it is the same thing. The auxiliaries of it, however, may be different, as well as the vehicle of communication, and perhaps it may be generated in a variety of soils. Extreme heat and drought, however, do not seem to influence its development here.* The year 1833, during which the very beds of the navigable canals were deeply cracked from drought, was not followed or accompanied by an invasion, and the epidemic was long on the decline before the long dry season of 1845 and 1846. The return of our epidemic approximates to the metonic cycle.

Three great staples in succession have been cultivated in this Colony, — cotton, coffee, and sugar: an epidemic has happened here while each flourished. Putrid coffee water has a most offensive and nauseating odour. Yet coffee estates were in general healthy, and Dr. Rush's opinion could find no followers here. The suspicions of Dr. Dunkin in his report to Dr. Chisholm during a period of the first epidemic, viz. the defective drainage here, is still favourably entertained; it is the popular opinion. The epidemic of 1819 was imputed to the decomposition of a cargo of damaged salt fish which had been thrown into the deep trench then existing in the rear of America Street, at the store of a Mr. Kernon. The river obstruction

* [The same remark applies to the West Indies generally; in the majority of instances the most severe attacks of the disease have occurred in the cool season, and not unfrequently when the weather has been peculiarly agreeable as regards sensation, and it might be supposed, *à priori*, favourable to health. From the records in the Inspector's office in Barbados, in uninterrupted series for forty years, it would appear, that the disease, in different situations and years, has seemingly been unconnected with any known meteorological states of atmosphere, or indeed with any known circumstance affecting health, *i. e.*, in relation to the exciting cause. Though it has been of most frequent occurrence in the cool season, it has also occurred during the season of greatest heat, and it has persisted occasionally through the rainy season, and through the dry. In Demerara, in 1825, a drought so severe prevailed, — there had scarcely been a shower for ten months, — that ditch water was brought in casks from a distance of fourteen miles; rum was readily exchanged for water. The mortality was great amongst the cattle from mere want of water, yet the troops and the inhabitants were healthy. Many instances might be given of absence of fever in connexion with rainy seasons. It has been asserted, that in Barbados, the weather which is most favourable to the crops (when a large proportion of rain falls,) is also most favourable to health; a proposition, it may be, commonly true, and yet not without exceptions.] — Ed.

formed by the stellings, was a favourite cause for the last epidemic.* But the only imputed cause of the late epidemic yet published professionally, is that of *imported contagion*.

In the London Medical Gazette of the 20th January, 1838, there appeared a letter from the late Sir Andrew Halliday "On the Malignant Fever of British Guiana," in which are published extracts from a letter from Dr. William Fraser, health officer of the Port of Demerara. Sir Andrew remarks: "The facts brought forward by Dr. Fraser are, perhaps, the strongest that were ever adduced in confirmation of a certain variety of the yellow fever being highly contagious." And Dr. Fraser himself states in the letter: "I maintain, and will prove from circumstances which came under my observation during the prevalence of the epidemic (now, thank God, happily on the wane), that infection alone formed the source and entire medium of its existence and propagation." On the 24th March, 1838, the late Dr. William Ferguson, inspector-general of hospitals, replied in the London Medical Society to the paper of Sir Andrew Halliday. Dr. Ferguson's reply was based on general grounds, acknowledging that his (Dr. Fraser's) "cases would be good enough in the way of proof, if we had not others equally good which will show contagion to have been impossible." Dr. Ferguson's reply is distinguished for a bold and manly reliance on principles (the result of former experience), even when ignorant of the circumstances of the particular case under discussion, and when he admits that appearances are against him. Dr. Ferguson is evidently excited by indignation at an attempt to raise an *odium theologicum* against the non-contagionists, and retorts lustily against quarantine officers who are paid to discover

* [Wherever yellow fever has prevailed, whether in the south of Europe, on the continent of America, or in the West Indies, various and most dissimilar conjectures have been made respecting its cause, not one of which has been satisfactory, enforcing the conclusion, that the true cause is yet unknown. These conjectures are striking examples of the tendency to the *post hoc, propter hoc*, mode of reasoning,—the mistaking of sequences for effects, of coincidences for causes, in connexion with hasty generalisation. Every inquirer, who has given close attention to epidemic diseases,—from Hippocrates to Sydenham, and from Sydenham to our contemporaries,—has been forced into the acknowledgment of a hidden cause, a something known only by its effects, impalpable, invisible, distinct from the causes of ordinary diseases,—according to Hippocrates, a something divine; according to Sydenham, a something emanating from the bowels of the earth.]—ED.

“imported contagion.” The appearance of these papers failed to excite the slightest interest among the medical practitioners of the Colony, or to provoke the slightest attempt to interfere in the disputation. There was no difference of opinion to excite discussion here; for there was not a single person, professional or nonprofessional, in the length and breadth of the Colony, who in 1838, after the first alarm had subsided, had the least suspicion of contagion in our yellow fever. I believe Dr. Fraser (who is now in Scotland) regretted the appearance of his letter, and did not fail privately to blame Sir Andrew Halliday for publishing an immature opinion. There is great want of caution exhibited in Dr. Fraser’s letter: hasty statements, probably on mere hearsay evidence, were fancifully arranged by him without previous inquiry as to their authenticity or genuineness; and the consequence is, that of the facts admitted by Dr. Ferguson to be “good enough,” not one of them that is “good enough” is a *fact*. Those who know Dr. Fraser as I do, will acquit him of any attempt to cheat either an individual or the public; but the material statements contained in his letter in support of the contagiousness of our epidemic are either defective, hypothetical, or fictitious. My only reason for referring to them at all is, that they are put on record, and, without this notice, their value might be misunderstood and misapplied. The materials for their disproof, collected in 1838, are now lying before me, but it is unnecessary for me, unless particularly called on, to refer to them further.

During the epidemic the yellow fever cases in their worst forms were never separated from other patients in our hospital wards. Such a thing was not deemed necessary, and never thought of. They were classified with acute cases. Our hospital nurses never got infected, although in the closest connection with the sick, and often smeared with their ejections; and these nurses were chiefly German and Portuguese immigrants. The resident surgeons, dispensers, and stewards were all susceptible subjects, and, with one exception, about to be named, escaped without an attack. Mr. Bell, the first dispenser of the Seaman’s Hospital, then lately from England, spent several nights in *Water Street* attending on a sick friend, Mr. Huddleton, got yellow fever, and died the night he was gazetted to his appointment, and never did one day’s duty at the hospital. Certainly

his friend had the same disease, but Mr. Bell caught it as Mr. Huddleton had caught it, in *Water Street*. The way to give a yellow fever nurse the yellow fever was not by bringing him in close contact with the sick, but by discharging him or her from the hospital. After knocking about town for a few weeks, and getting into the malarial districts, they would, it is likely, be brought to hospital as yellow fever patients. Several nurses discharged for bad conduct suffered in that way. Dr. Bonyun, then one of the resident surgeons of the Seaman's Hospital, and not long from Europe, slept continuously in the Seaman's Hospital while it was crowded with yellow fever, without suffering from the disease, and without fear of contagion. In December, 1843, the mate of the "Matilda Luckie" was admitted with the *gravior form* of the disease, and of a low type, of which he died. His bed was in a sheltered corner of ward No. 2., and had mosquito netting all around. Into this bed a seaman named Bruton, who was admitted for disease other than yellow fever, —slight indisposition,—was put for several days without any infection of any kind following. Neither was such an experiment deemed hazardous to the subject, nor objectionable, except on the score of cleanliness. Experiments made by me on the mucopurulent looking matter which frequently exudes from the eyes in the late stages of yellow fever, applied to healthy conjunctivæ, showed that though slight ophthalmia followed, no yellow fever contamination was the result. Many ships lost "hands" after their departure from port, and were obliged to put into Barbados and other islands for additional men; but we never heard of any spread of yellow fever among the islands in consequence. None of the Georgetown medical practitioners suffered from the yellow fever except Dr. Fraser and myself. The disease picked out the new-comers of an establishment, and no reluctance was felt either by friends, relatives, or acquaintances, to perform any service for the sick. Our ventilation is certainly excellent, but it does not render the exanthemata uninfectious when they pay us their rare visits. Strange is it, if the yellow fever had been contagious or infectious, that nobody here but Dr. Fraser, during eight years, had been able to detect that quality of the epidemic.

It is necessary in candour to state, that, during the epidemic, many patients admitted to hospital for other diseases, got

yellow fever, and some died of it thus as a consecutive disease. A list of the primary affections will be given. There are circumstances, however, connected with these cases of yellow fever, which render contagion an improbable cause. The patients, in whom the disease occurred, were generally those of the chronic-case wards; thus, the ward of the first story of the Seaman's Hospital was that in which they generally occurred there; and, in the Colonial Hospital, a Portuguese or German immigrant, if sent down among the Negroes, (ulcer cases) in ward No. 5. (of the present Queen's College Building), ran much risk of a yellow fever seizure. My predecessor, Dr. Smith, was of opinion that the cases which happened in the wards on the lower floor of the Seaman's Hospital, were occasioned by the vicinity of a pond in the hospital garden, and right to windward. He had this pond filled up in consequence of this opinion, and certainly the cases of yellow fever, commencing in hospital, became very rare afterwards. No. 5. ward, in the Colonial Hospital, (now Queen's College,)* was on the ground floor; the floor was below the level of the surrounding land, but was closely boarded with 'grove and tongue;' at the sides, however, many rat-holes perforated the floor. Below the floor there constantly existed a pool of filthy water, the oozing of the surrounding ground; to empty which, from time to time, a well, with a pump, had to be sunk in the next apartment.

These hospital cases were then, probably, either cases in which the disease contracted in the usual localities was latent on admission, and passed through a long incubation, or the hospital wards were not quite out of the malarial district and elevation.

The only instance of public precautionary measures being adopted under the impression that the epidemic disease was contagious, was at Berbee, at Fort Canje. Captain Warburton, at the instance of Assistant-Surgeon Turner, established a rigid *cordon*, and prevented all intercourse with the town of New Amsterdam. Previous to this no case had appeared in the garrison. An effect of the cordon was to prevent huesters, and others, bringing in fresh provisions, fruit, &c. to the soldiers. The soldiers were also of necessity thrown on their

* Close by Vlissingen Sluice.

own resources *pour passer le temps*. However, notwithstanding all communication having been cut off with the town, the yellow fever epidemic soon appeared in the garrison, and poor Doctor Turner fell a victim, not to the yellow fever, according to the practitioners who attended him, but to inflammatory fever, the result of extreme fatigue, mental anxiety, and chagrin.*

* [Of the Inspectors-General of Hospitals who have served in the West Indies during the last forty years, amongst whom the respected names of Sir Charles Ker, Dr. Jackson, and Dr. Ferguson, are prominent, all have been persuaded that yellow fever, including its many varieties or modifications, is of local origin, and is not propagated by contagion, with the exception of one, Mr. Green, who was a strict contagionist, and who during the epidemic of 1819, a fever of wider range than is usual, acted accordingly, attempting even the enforcing of quarantine regulations, after the manner practised in the Mediterranean, where he had previously served, and had witnessed plague. The vexatious and futile character of these measures are not yet forgotten in Barbados. Before entering on an undertaking of the kind, even supposing the disease to be guarded against to be contagious, it would be well to consider the extent to which it is practicable. If the doctrine of contagion be false, how many are the evils unavoidable from the attempt to enforce quarantine: these are strongly exemplified in every account we have from eye-witnesses of the plague, comprised in panic, desertion of the living, neglect of the dead; in brief, horrors on horrors, and even crimes on crimes. For those inquirers who are in doubt on the subject,—that is, whether yellow fever is contagious or not,—it might be well to keep in mind Dr. Rush's reflections, made after he had given up his early opinion that the disease is contagious; in expressing which, "he begs forgiveness of the friends of science and of humanity, if that opinion had any influence in increasing the misery and mortality attendant upon that disease. Indeed, such is the pain he feels in recollecting that he ever entertained or propagated it, that it will long and perhaps always deprive him of the pleasure he might otherwise have derived from a review of his attempts to fulfil the public duties of his situation."

The early advocates of the contagious origin of yellow fever supposed that it was brought from Siam, the later contagionists have referred it to the western coast of Africa; proof is wanting of the correctness of either conclusion. Père Labat, whose work on the West Indies was published in 1738, states that the "Mal de Siam," (the yellow fever of that period), was conveyed to Martinique in the "Oriflamme," a vessel which came from Siam with the remains of the establishments attempted at Merguy and Bannock, and which touching at Brazil, got the malady there, where it had been destructive for seven or eight years. The African origin of yellow fever was proposed by Dr. Chisholm, he attributing a malignant fever which broke out in Grenada to contagion from the ship "Hankey," which, in 1793, arrived from Boulama, having on board some of a party, who, under Captain Beaver, had attempted to establish a colony on that island, but without success, mainly owing to the ravages of fever, which, from the account of it by Captain Beaver, appears to have been different altogether in its character from the malignant yellow fever of the West Indies, such as it appeared before and since, and yet was strangely considered by Dr. Chisholm a new disease.] — ED.

CHAP. VII.

PREDISPOSING, EXCITING, DETERMINING AND AUXILIARY CAUSES.

THE grand *predisposing* cause of an attack of the epidemic was the state of constitution, induced by a previous and recent residence in a cold climate.* The grand *exciting* cause, during several years, was exposure to the influence of certain localities, the chief of which was the *embouchure* of the Demerara River. Georgetown, and the shipping, being situated within the malarious locality, and their population containing the largest proportion of northern blood, the disease began there first and continued there last.† At the beginning of the epidemic, and

* [If the cause assigned in the text as the chief predisposing cause be true, it is deserving of serious attention, especially as regards the distribution of troops; and that it is true, considering the history of yellow fever in the West Indies, can hardly I think be doubted. Very many instances might be adduced of regiments suffering severely from yellow fever shortly after arrival. In 1805, the 15th Foot in about three weeks, soon after their landing in Barbados, lost 110 men and 7 officers, swept off by this fever. Recently, in the same island, the 88th Regiment suffered severely from it, after having been nearly a year in this island; the 66th, after having been only a few weeks; and the 72nd, after having been there about ten months. The two regiments last mentioned arrived about the same time, the one from Malta, the other from Gibraltar; and though stationed in the same garrison, and doing duty together, but occupying different barracks, though separated only by the parade ground at the outbreak of the disease, yet for not less than five months the 72nd escaped the malady. The inference hence, in relation to contagion, need not be pointed out.

To revert to the assigned predisposing cause: — if, as I believe, it must be admitted to be such, and powerfully influential, it ought to be kept in mind and acted on: no troops fresh from a cool or cold climate should be landed either where yellow fever is, or has very recently been. The troops for service there ought to be those who have been longest in the West Indies. This should be a rule, and, excepting perhaps in time of war, might always be observed.] — ED.

† [The above proposition in relation to the exciting cause, — *that something* which produces the disease, — seems to be equally well founded on large experience in the West Indies, as that the newly arrived from a cool or cold climate are most disposed to contract it; and also equally deserving of attention as a practical rule in the distribution of troops. When yellow fever makes its appearance in a particular spot, removal from that spot is the true measure of security; sometimes removal to a short distance, as of a few hundred yards, would appear to be sufficient; but, if it be practicable, removal to a greater distance is desirable, and to ground in its character

till after the lull at the end of 1837, Europeans of many years' residence, and some of the black and coloured population, and Indians, suffered from the disease. Among the old European residents, or white Creoles of the West Indies, however, when it occurred it rarely ended fatally, although the type was of the gravior form. After 1838, the epidemic became almost peculiar to new comers from cold climates. *Complexion* seemed a matter of little consequence. The Negro cook on board of Nova Scotia and United States' traders was susceptible, and the dusky South Sea Islander, if prepared by previous northern residence. The lower the isochiemal curve of his native country, or home, the more virulent was the attack of the epidemic on the subject of it.

Thus, while the per-centage of mortality among West India Islanders, in the Seaman's Hospital, was 6·9, that of French and Italians was 17·1, that of English, Irish, and Scotch was 19·3, that of Germans and Dutch was 20, and that of Swedes, Norwegians, and Russians 27·7. There appears an exception to this law in the case of North Americans, as their per-centage

different from that where the disease originated. Late experience in Barbados proves the propriety of this. When yellow fever broke out in the 88th Regiment, occupying the lower barraeks in the garrison of St. Ann, the encamping of them on ground close to the higher barraeks, in the same garrison, occupied by the 7th Royal Fusileers, who were then free from fever, and altogether escaped it, was successful. The same result occurred, for a time, when the disease appeared shortly after in the 66th Regiment, who followed the 88th, in the lower barraeks; their removal to the higher ground at first appeared to be successful, but only for a while; ere long the fever made its appearance in the upper barraeks then occupied by the 72nd Regiment, and indeed appeared more or less throughout the garrison. With the experience I now have, and the strong conviction in consequence, I am satisfied that in the instance of this outbreak of fever, whether in the 88th, 66th, or 72nd, the recommendation on the part of the medical officer, when consulted by the general officer commanding, would have been best given in conformity with the above, — to remove the regiment attacked not from one part of the garrison to another, but to a greater distance, and to a situation altogether different from that where the disease had made its appearance. Having in my capacity of Inspector-General of Hospitals been the medical officer consulted on the occasion referred to, I have the less hesitation in making these remarks. Whether in a military point of view, such a removal of the troops from the garrison to a distance could have been effected with propriety, is altogether another consideration. Life, it must be remembered, in the army, must always be held subordinate to duty. And, it should be remembered too, that there are many instances on record, that a removal to a very short distance has been effectual. With the medical officer the preservation of life is the only consideration, with the general officer duty is the first consideration.] — Ed.

of death was only 15·7. This exception, however, has no force, for it is caused by the short period of exposure of the North American traders, whose stay seldom exceeds eight or ten days in port.* From the records, from which the above centesimal proportions have been calculated, the *simplex cases* have been struck out in all instances.

Intemperance was occasionally a predisposing cause by recklessness of exposure; but abstinence, as shown on board of the American *tectotal ships*, was no protection. In fact *delirium tremens* was not an unfavourable complication of the disease.†

Sometimes the *determining* cause seemed of the slightest description — the shock on the stomach by an ice cream or glass of iced punch, or the indigestion of an unripe orange, would occasionally set the train of symptoms in motion. It seemed at one time as if those resident in the infected districts circulated the poison habitually through their system; that old residents had in an eminent degree the power of eliminating it and keeping its presence latent — had a tolerance of it; but that new comers, and particularly those of florid complexion and rigid

* An approximation to the correction due for short residence will be found in the following Table of 489 Yellow Fever Cases admitted to the Seaman's Hospital, and observed as to length of time in harbour.

| Time in Harbour. | Total Cases Mittior and Gravior. | Total Deaths. | Centesimal Mortality. |
|------------------|-------------------------------------|---------------|--------------------------|
| Under 1 Week - | 19 | 1 | 5·2 |
| 1 to 2 Weeks - | 84 | 17 | 20·2 |
| 2 to 4 Weeks - | 137 | 38 | 27·7 |
| 4 to 6 Weeks - | 98 | 31 | 31·6 |
| 6 to 9 Weeks - | 96 | 34 | 35·4 |
| 9 to 12 Weeks! - | 32 | 5 | 15·6 |
| 12 to 16 Weeks - | 17 | 1 | 5·8 |
| 16 upwards - | 6 | 2 | 33·3 |

† [Of 96 men, of the 88th Regiment, attacked by yellow fever in 1847-8, the majority were "drunken characters;" 52 were so designated in a nominal return now before me, which was drawn up at the time by the surgeon of the corps; of these 52, no less than 18 proved fatal,—whilst of the 44 designated temperate, 3 only died. But in the 66th Regiment, which succeeded the 88th, and suffered shortly after from the same fever, as many sober men were the victims of it as intemperate; according to a nominal return, extending from the 26th February to the 4th August, 1848, of 15 who died of 98 attacked, 5 only were men either intemperate or reformed drunkards, the remainder being considered temperate. It need hardly be remarked, that the greatest caution is requisite in drawing general conclusions, and that they can hardly fail of being erroneous, excepting when they are the results of extensive induction.] — ED.

fibre, were constantly, in reference to the presence of the virus, in a state of *tottering equilibrium*; so that in them the slightest unfavourable impulse to the balance — the lowering of the vital powers by fatigue, the suppression of any of the depurating secretions, a shock to either of the nervous centres, or the depressing emotions — were sufficient to excite the latent poison. There was no external sign of the epidemic poison in the eyes of those in health, as at New York, and described by Dr. Rush; but the notion of its presence in a latent condition, and in augmenting and diminishing quantities, whether circulated in the blood or impressed on the organic nerves, is countenanced by many phenomena of the epidemic, — such as slight preliminary attacks, with longer or shorter intervals of perfect health preceding even fatal attacks, and the well-marked three grades of the disease. Cases have been admitted into the Seaman's Hospital, and private cases have been noticed death-stricken from the first, wherein the system seems to have been so saturated with the poison as to have prevented any stage of excitement. Cases also have been noticed of genuine yellow fever, but with the characteristics so slight as to raise a doubt as to the peculiarity of the fever.

There was no external sign by which the more or less perfect saturation of the system could be detected during health. But in those cases, — and they were chiefly among new comers, — where the immediate attack was referable to a slight determining cause, the disease always exhibited its utmost violence. An instance of the determining effects of the depressing emotions is well exhibited in the case of Mr. Rankin, an old colonist, the druggist, close by Robb's Stelling, referred to in the first chapter. Mr. R. had been in good circumstances up to a short period before his death in 1842, and although living in the midst of the worst district of Water Street, he retained robust and uninterrupted health. About 1842 he became involved in the general mercantile distress then prevalent in Georgetown: in fact he was utterly ruined. Moreover, immediately before his illness, he became particularly depressed by what he supposed to be treachery on the part of one of his friends. The malaria then produced its deadly results on him. He died of black vomit, after having passed unseathed through the pestilence of the previous years. Even fretting and temporary chagrin have

been the determining cause of a fatal invasion: an instance, the notes of which are now before me, is in the case of Dr. Leitch, late surgeon to the "Arabian," immigrant transport. On Saturday morning, the 22d September, 1843, the proprietor of a plantation on Wakenam engaged to call for Dr. Leitch, to carry him for a few days to his estate. The gentleman neither came at eleven o'clock, the hour appointed, nor sent any message of explanation. Dr. Leitch, all prepared, waited hour after hour on the quarter-deck (under awning) till evening, and was much fretted by the disappointment. That night he got the yellow fever, and died on the sixth day of his illness with black vomit. In the same page of my notes with Dr. Leitch I find a case of death from yellow fever, the determining cause of which also was distress of mind. It was a mulatto, of the name of Felix Theome, a native of Martinique, whose goods had been distrained in Berbice, by a Commissary of Taxation, on the plea of their being smuggled. As was to be expected in a constitution of the tropical regions, his system struggled hard against the strong tendency to death. He died on the twelfth day of his illness, and four days after black vomit had ceased. The mental emotions had not only the effect of developing the disease in the susceptible, and those who had been exposed to the morbid localities, but also played an important part in the procession of the symptoms and on the result. During the progress of the epidemic it was discovered that if a sailor affected with the fever happened to be brought to the hospital when the hearse was present, the worst prognosis was to be formed. The intelligence of the arrival of the hearse had also the most injurious effect on the sick and convalescent within the wards. So much was this the case that a new dead-house had to be built out of sight of the hospital, and the approach of the hearse so managed that its visits were unknown to the patients. As fear and grief and the other depressing congestive emotions acted as auxiliary causes, so, on the other hand, did confidence and hope obviate the tendency to death; and, in accordance, moral courage and exaltation of feeling acted as the most powerful *adjuvans* of treatment.

CHAP. VIII.

No epizootic disease prevailed during the period of the epidemic, except on its decline in 1843, when some fatal malady destroyed many cattle in the Mahaieony and Berbiee districts. This epizoon, however, showed no connexion with the yellow fever. Several sporadic cases of disease, and speedy death, in feathered stock imported from the United States and England,—the chief symptoms drooping of the wings and the exudation of black fluid from the beaks before death,—have been told to me by intelligent nonprofessional persons. The only case, apparently, of yellow fever among the lower animals that came under my observation, was in a young dog.*

This dog was the last of a litter that were whelped, and lay on the stelling of Messrs. Johnston, Brothers, and Co.; all the rest had died with the same train of symptoms, according to the information which I received from the intelligent and much lamented partner of the firm, the late Mr. Allen. They had died between the fifth and seventh days of their illness. The symptoms were similar to those in man,—viz. fever for two or three days, then a subsidence of it, irritable stomach, loathing of food, yellowness of eyes, point of nose, groins, and belly, and, finally, death. I saw the last one the day before its death. The post-mortem examination bore out the symptomatology. Mr. Allen informed me that the same bitch had littered previously on the same part of the stelling, and all the puppies, but one, died of the same symptoms. He also declared that black vomit (and he had frequently seen it in the human subject) was ejected from the young dogs that had previously died: but there was none in the stomach of the one I inspected.

The object of narrating this case, and the value of it, is to show to the pathological experimentalist that in the *young dog* he has a subject apparently susceptible of the yellow fever malaria.

* [In the West Indies generally, I have not been able to learn that any domestic animals have been attacked during the prevalence of yellow fever: no instance of the kind is recorded in the Inspector's Office in Barbados.]
—E.D.

DIVISION II.

CHAP. I.

THE DISEASE.

AN attack of yellow fever of our last epidemic in a well-pro-nounced case was manifested in the following symptoms. *Alternate flushings and rigors resolving within twenty-four hours into a perfect hot stage.** The rigors frequently coexisted with hot skin, and were felt chiefly on turning or making any movement under the bed-clothes. A sensation of heat felt by application of the hand chiefly over the head and chest; *supra-orbital headache; suffusion of face and part of lucid cornea opposed to light;* preter-natural redness of the mucous membrane, of nares, lips, *and tip and edges of tongue;* recti muscles of abdomen well marked and tense, without tympanetic distension; thirst; nausea proceeding on to retching and vomiting of ingesta and of scanty yellow bilious fluid; alvine evacuations dark, apparently long retained, abilious, and often fetid; tenderness of epigastrium evinced on careful pressure.

These symptoms continue steady during two or three days, the bilious ejections, however, becoming greenish by the end of that time. The fever then subsides; the skin becomes cool and pleasant; the tongue shows a disposition to clean, and there is less *fieriness of tip and edge;* thirst abates, and there is some appetite for food. The patient's anxiety and morbid fear of death, which may have been very great, subside, and both he and the bystanders are satisfied of his convalescence. By and bye

* [In the yellow fever of Barbados, the commencement of the disease was not distinctively marked, as well as can be ascertained; even after some progress was made, it was often difficult to determine whether the fever would prove remittent, the common continued, or yellow fever; and, in consequence, the names applied were often erroneously given. In some instances the disease was ushered in by rigors, or by flushings and chills; but in very many these were not reported to have occurred; and commonly inquiry was made to ascertain whether they had been experienced or not.]—ED.

the eye, which has lost its glistening appearance, assumes a condition of chronic vascularity, of a dull orange red. The flushed countenance has given way to a sottish appearance and greasy dirty complexion. If the eyelid be turned down, a yellowish suffusion is perceived on the sclerotica; the forehead has a dusky appearance, which extends also to the angles of the mouth, and over the neck and chest. Pressure of the hand over the chest or abdomen will now leave pale finger-marks, indicating languor in the capillary circulation. Some food which the patient has been permitted to eat lies heavy on the stomach, and is rejected. The stomach again becomes irritable, and clear mucous acid fluid is thrown off in considerable quantities. If this last symptom continues with severity for a few hours, specks may be noticed in the fluid, as if a pinch of snuff had been scattered in it; or a tenacious dark clayey deposit will be found in the bottom of the basin. The gastric irritation may now again subside, and the fur will clean off the tongue, and the fiery edge and tip disappear, leaving a preternaturally clean or raw surface; or an attempt at fur may show itself as if a coat of milk-and-water had been brushed over the tongue.

The yellow or purple suffusion of surface is now more marked; in general, local uneasiness is chiefly referred to the fauces, or to the course of the œsophagus, or ensiform cartilage; but the patient feels tolerably well and hungry. If the finger be now drawn briskly across and against the pectoral muscle, a wheal will follow the pressure, rising up and subsiding with a vermicular motion. After a time an indication of loss of vital cohesion shows itself, probably by epistaxis or ecchymosis; and, in consequence of some uneasiness, the patient turns himself in bed, and an involuntary gush of black vomit is spurted over the bed and furniture. Bloody oozings take place from the mouth, ears, or anus; the scrotum becomes excoriated; the blistered surfaces become raw and claret-coloured. The skin is damp and cold, though the patient complain of heat; the fingers are shrivelled; an unpleasant odour emanates from the breath and body. Black vomit continues to be ejected. The pulse loses strength, till at last it ceases to be felt at the wrist, and the patient dies with intelligence unclouded, and his muscular strength but little impaired, telling you he is getting quite well, or, as a poor dying Irish sailor expressed himself, “iligant this

mornin.” The foregoing description refers chiefly to the gastric variety of the disease.*

It will be perceived that the disease shows two grand stages, viz. that of reaction, or fever, and that of unhealthy subsidence; the period of irritation, and the period of contamination; and that the duration of the disease is nearly equally divided by these two stages. Practically, however, and perhaps naturally, the stages of the malady resolve themselves into three, viz., that of simple *excitement*, which occupies three fifths of the duration of the disease; that of simple *acid elimination*, which characterizes the second; and that of *passive hæmorrhage*, (of which black vomit is one of the manifestations) as the third.

In cases terminating in *convalescence* the symptoms were parallel, as far as they went, with those cases ending fatally. Thus, an attack may terminate favourably at the end of the first stage, or at the end of the second, or at the end of the third, — periods at which nature seems to struggle for a resolution of the disease, the later, however, the less effectually. These three stages in a measure represent the three varieties of the disease which prevailed during the epidemic: Thus the “simplex” form is described by the first stage, — the “mitior” by the first and second, — and the “gravior” is included in the third.

When the head is the principal seat of the disease, the cerebral, and eye symptoms, are most strongly marked; delirium, or coma, frequently supervene, and convulsions may close the fatal case. In some of these cases black vomit may not occur. Dark porter-coloured urine, and hæmorrhage of black blood from the bowels, may be vicarious of black vomit, when the kidneys and bladder, or intestines, are the chief locality of the disease.

Occasionally cases were seen among the Portuguese immigrants of what perhaps might be called *chronic* yellow fever,

* [As applied to the gastric variety of the disease, the above description accords well with what was witnessed in the last outbreak of yellow fever in Barbados. In the worst cases, — those in which there were marks of passive hæmorrhage, — it is remarkable how little the intellect was affected, or the muscular strength. The ejeeta were criteria; but neither the state of pulse, nor the feelings and perceptions of the patient. Often extreme danger existed when the patient considered himself all but well, and when the pulse was little different from that in health.] — ED.

in which the virus seemed for some time smouldering, preceded and attended by a mere *molimen*, instead of the ordinary fever. It seemed as if the *virus* had been partly divested of its irritant quality, and that the disease simulated scurvy. In other cases the first stage seemed shortened or annihilated by the overwhelming dose of the virus. A few cases occurred in which the characteristic appearance of tongue and eye, and pain in head, were absent for two or three days; but the yellow skin and black vomit preceded death. Notwithstanding, however, these few exceptions to the normal procession of symptoms, the first stage was a necessary antecedent to the second, and the second to the third, almost universally.*

* [At different times and seasons in the same country, and in countries varying in climate and physical circumstances, it would appear that yellow fever exhibits many varieties, — hardly, perhaps, less so than scarlatina, variola, or measles. Endemics have been brought to my notice by medical officers of long experience in the diseases of the West Indies, in which there has been associated with yellowness of skin little or no tendency to passive hæmorrhage, in which, in the treatment, the lancet has been used with advantage, and in which the blood abstracted has coagulated firmly, and has even been cupped and exhibited a buffy coat. In the beginning of the present century, as observed by Drs. Jackson and Ferguson, it was commonly associated with an inflammatory diathesis. Occasionally it has not been distinguishable from common remittent fever, except by yellowness of skin, — a symptom that can hardly be considered diagnostic, as it is not manifest in every case of the disease, when existing epidemically. Though generally very fatal, yet sometimes it has appeared in a mild form, and has been far less destructive than remittent fever, when the latter has been severe.

Taking into account the variation to which it is subject, and also the variation to which remittent fever is subject, it is not surprising that such different views should have been taken of yellow fever, and are still entertained; and this by individuals who have had opportunities of observing every form of West Indian fever. By some, adhering to the doctrines of Bancroft, yellow fever and remittent fever are held to be merely varieties of the same disease, arising from one cause, — malaria of vegetable production; not contagious or infectious, and liable to recurrence in the same individual. According to others, yellow fever is a disease *sui generis*, contagious or infectious, and always imported. By others, as by the author, it is thought to be, like remittent fever, of local origin; like it, not capable of spreading by contagion or infection, and yet distinct in its nature and depending on a cause different from the malaria productive of fevers of the intermittent and remittent kind. Taking into account all the facts which have come to my knowledge on the subject, the last-mentioned view seems to me most probable; the best supported, and best fitted to enable one to read intelligently the various accounts we have of the disease, and best fitted also to be a guide to practice; especially if it be supposed, as facts would seem to warrant, that yellow fever may be variously complicated and modified, — at one time by inflammation of the membranes of the brain, denoted by lymph effused and pus in the fatal cases; at another by the remittent fever taint,

Secondary symptoms or sequelæ occasionally arose after convalescence from the third stage of the disease, and retarded the restoration to perfect health, and occasionally proved fatal. These were principally abscesses, which, when once discharged, seldom again filled, — furunculi, — swelling of lymphatic glands, — swelling and sloughing of parotid, — bullæ, — active hæmorrhages from ulcerated surfaces, — and jaundice. But, in general, convalescence was rapid and complete, and attended with a speedy restoration of all the healthy functions. A delightful sense of the freshness and beauty of nature, quickly succeeded the most virulent symptoms. I vividly remember to this day — and it is ten years since — the pleasure experienced on the seventh day of illness, when, being convalescent, I was permitted to be wheeled on a sofa to the window. The trees were so green, the sky so bright, and the flight of the birds so joyful, I remarked at the time that it was worth while to be sick to feel such a rapture in recovery. How different the sensations in convalescence from intermittent fever !*

&c. It is much to be regretted that the subject has too often been entered on in a controversial manner, and truth has been sacrificed, however unintentionally.] — ED.

* [The rapid recovery to perfect health described in the text, was very remarkable in a large proportion of the convalescent from yellow fever in Barbados: seeming clearly to indicate that no serious organic lesion was connected with the attack. Recovery from remittent fever, on the contrary, is often tedious, especially in British Guiana; and relapses, or after attacks, or attacks of ague, are of frequent occurrence.] — ED.

CHAP. II.

PERIOD OF INCUBATION. — YELLOW FEVER A SECONDARY OR PARASITIC DISEASE SOMETIMES. — MODE OF INVASION. — HOUR OF SEIZURE. — HOUR OF DEATH. — LAW OF DURATION. — PULSE. — YELLOW SUFFUSION. — SKIN AND EYE. — BLACK VOMIT. — BLOOD. — RELAPSE. — APPETITES.

SEVERAL points of inquiry arise out of, and are not satisfied by, the last chapter. Some of these are referred to in the above heading, and will be each noticed in detail. The period of incubation, or the period between exposure and the manifestation of the disease, will be ascertained by the Table of Time in Harbour already given. In some cases, however, the patient has arrived in the colony, and within one week died of yellow fever, having been attacked within the first twenty-four hours after arrival. Miss R. left this colony, with her mother and sister, in one of Booker Brothers' ships, having been exposed to river influence only the one night previous to departure. All were in good health on embarkation. After being at sea fourteen days, they all sickened; Miss R., who had been far advanced in phthisis, died of yellow fever. Mr. Beamish had been exposed to the malarial locality of Water Street, at Walmsley and Bowes, on Friday; he left town the same day, and sickened with yellow fever on Sunday. Dr. Reid's exposure, and interval between exposure and attack, was the same. Mrs. Bolton, of the "Rapid," was only one night in the malarial district, and within twenty-four hours after proceeding to Sand Hills, was seized with the epidemic. Thus it would appear that the period of incubation is very various, and that some systems can for a long period throw off the morbid agency; while, with others, exposure the most casual and temporary produces immediate effects. A case occurred in the Seaman's Hospital, wherein the period

of incubation seemed extended to four months, being kept latent, probably, by the phthisis under which the patient was suffering.*

Patients previously suffering from intermittent fever, dropsy, iodism (eoryza from hydriodate of potash), and ptyalism, have had the epidemic disease engrafted thereon: peritonitis and pneumonia have likewise failed to exclude the invasion, and the most inveterate lichen tropicus. It has added itself to delirium tremens and to lead colic: it has supervened during the flow of the catamenia. Patients under treatment for anæmia and intermittent fever, sarcocele, scald, bruises, and flesh wounds, fractures, rheumatism, erysipelas, ophthalmia, syphilis, strictures, ulcers, eczema, mosquito wounds, hooping cough, and phthisis, have been attacked, and often fatally, by our yellow fever.

The following particulars of the case of scald †, will show how the disease behaved as a parasite in that instance:—

“ Corrections of extreme cases, as shown by Register. George Abraham, aged 18. 41 days ill, 36 in hospital.

“ Was admitted for severe scald of chest and abdomen, seven days previously. In good general health; complained of headache and pains over chest on fourth day of admission, and was bled and purged. Headache persisted over eyes till tenth day of admission, with frequent dosing; tongue, pulse, and skin natural. On the seventh day, pupil of right eye was observed larger than left. Suffered since admission from mosquito ‘bites,’ but on seventh day of admission had a mosquito net, and slept well. The scald is represented as healing in the same report in which his first complaining of headache is noticed. A blister to nape, was the remedy used antecedent to perfect absence of headache. The gums became spongy, from mercurials, at same time. Headache returned and intermitted till evening of twelfth day; till then, general health good. Pulse then became 108, skin and tongue natural, and gums spongy. Headache became

* [This uncertainty as to the latent period of the disease is especially deserving attention in the army and the navy. As it may often render obscure the effect of removal from the spot where the disease originated, so it ought to check surprise or disappointment if the beneficial effect is not immediately witnessed.]—ED.

† Taken from my preliminary corrections of the Register by the Case Books in reference to the duration of the fatal cases.

aggravated in afternoon, but pulse became natural, and blistered surface still discharges. Fourteenth day of admission: the skin became warm and dry, pulse 100, but no thirst, and tongue natural. In the evening, after taking cal. gr. i. and pulv. antim. gr. iij. every hour for a few doses, became sick and vomited *green slimy fluid*, with grumous dark sediment. Tenderness of abdomen, less headache, dilated pupil, tongue a little furred, skin hot, dry, pulse 108, low-spirited, — medicine stopped; febrile symptoms entirely subsided, except quickness of pulse; vomited again mouthfuls of yellow bile; nausea and gripes. Pulse gradually comes down to healthy standard, and all symptoms disappear under treatment till eighteenth day of admission, when he is entirely *convalescent*. On the eighteenth day in the evening complains of muscular pains of legs, for which he got colchicum: pains left him on the twenty-second day, and he was quite well except from swelling and ulcerations of legs from mosquito 'bites.' He goes on improving, except as to ulcers, which are irritable and painful, and discharging watery matter very copiously, and complaining of pains along the course of the muscles and tendons of legs, till thirty-second day of admission in the morning, when the sores began to bleed and the secretion to diminish: pains along the tendons persist, low-spiritedness, mosquito vesicles on foot. Evening: skin hot, crying from frontal headache; vascular adnatæ, red lips, tense recti, with attempts of nature to throw off the febrile action, bad night, vascular dull eye, stomach easily nauseated, stools fetid, — dark, papillæ become prominent and fiery on dorsum of tongue, pulse quickened from 96 to 115, skin warm, sighing respiration, action of heart violent. Thirty-fourth day of admission: incipient black vomit, tip of tongue becomes red; died on thirty-sixth day of admission.

“ *Conclusions* :

“ That instead of the above being actually a slow ease, it was a rapid one. That the poison was probably latent even prior to the date of admission.

“ That on the 9th day of February the formative stage of the yellow fever had commenced after the *extensive* scald began to heal; that it smouldered till 22nd, when it was at last put down by energetic treatment; next day disease showed again signs of existence, but the drain of blister and ulcers keep down the morbid action (signs, tense recti and muscular pains) till 27th.

Then interval. 5th, 6th, and 7th of March, muscular pains recommence; the formative stage. — Disease developed on the 8th, which ends in black vomit, yellow eye, and death, on 12th March, 11 a.m. Thus the treatment of a scald, two baffled attacks, and one developed and fatal one, occupy the forty-one days.”

When it thus became a parasitic disease, the symptoms, of course, were considerably modified at first, but the epidemic disease ultimately absorbed all the other symptoms.

The invasion sometimes commenced with malaise of several days' duration. Sometimes the formative stage showed itself in diarrhœa; in a few cases it commenced with apoplectic or paralytic symptoms. Sometimes, if the treatment were early adopted, or the patient was suffering from another malady, reverberations, repulse, and relapse, were observed in the first stage, thus abnormally extending its period. About one-half of the normal cases were so sudden and pronounced in the seizure, that the exact hour of attack could be precisely ascertained. And thus, as the following Table, will clearly show, the hours of six a. m. and six p. m., when, in our latitude, the most violent of atmospheric disturbance of the day occurs, were most favourable to the seizure.*

[For Table, see next page.]

* [It may be worthy of remark, that at the time of sunrise, — the coolest period of the twenty-four hours, when, according to the observations of the Author, a large proportion of attacks commence, — the temperature of the body is lowest. This is the result of a series of trials conducted on my own person consecutively for nearly three years, in the West Indies; at the same time the pulse was commonly slowest. This condition of the system might favour an attack.] — ED.

TABLE OF THE HOURS OF ATTACK, AS ASCERTAINED IN 1145 CASES OF YELLOW FEVER (GRAVIOR, MITIOR, SIMPLEX); ALSO OF THE HOURS OF DEATH IN 335 CASES. (COMPILED FROM REGISTERS AND CASE BOOKS.)

| Hour. | Cases ending in Convalescence. | Cases ending in Death. | "Simplex" Cases. | Total. | Deaths. |
|-----------|--------------------------------|------------------------|------------------|--------|---------|
| 6 A.M. | 168 | 42 | 27 | 237 | 18 |
| 7 " | 44 | 5 | 12 | 61 | 6 |
| 8 " | 60 | 5 | 7 | 72 | 7 |
| 9 " | 18 | 2 | 1 | 21 | 17 |
| 10 " | 26 | 7 | 6 | 39 | 15 |
| 11 " | 27 | 0 | 2 | 29 | 19 |
| Noon. | 38 | 15 | 9 | 62 | 16 |
| 1 P.M. | 16 | 1 | 3 | 20 | 27 |
| 2 " | 34 | 9 | 1 | 44 | 15 |
| 3 " | 27 | 3 | 8 | 38 | 11 |
| 4 " | 43 | 8 | 4 | 55 | 16 |
| 5 " | 20 | 4 | 0 | 24 | 10 |
| 6 " | 80 | 20 | 24 | 124 | 12 |
| 7 " | 18 | 3 | 4 | 25 | 13 |
| 8 " | 48 | 13 | 3 | 64 | 14 |
| 9 " | 24 | 3 | 2 | 29 | 10 |
| 10 " | 25 | 5 | 3 | 33 | 17 |
| 11 " | 15 | 1 | 2 | 18 | 12 |
| Midnight. | 38 | 13 | 6 | 57 | 16 |
| 1 A.M. | 14 | 2 | 0 | 16 | 14 |
| 2 " | 9 | 1 | 0 | 10 | 12 |
| 3 " | 8 | 2 | 1 | 11 | 6 |
| 4 " | 12 | 2 | 1 | 15 | 21 |
| 5 " | 38 | 3 | 0 | 41 | 11 |
| | 850 | 169 | 126 | 1145 | 333 |

Mem. In noting the hour, the minutes, whether before or after, have been invariably dropped.

It is likely that a larger number are due to midnight; seventeen cases of attack are omitted marked "12 a. m. and p. m.," from obscurity as to the real hour, although this record probably referred to midnight. The same remark refers to one case of death.

From the column of hours of death, it will be seen, that the diurnal variations are inconsiderable, when the cases are taken in the mass. A further and different mode of investigation, however, may elicit some important general fact; for, in picking out the hours of death, they were frequently observed following each other in groups, which are necessarily disarranged by the present Table.

The *average duration* of an attack of our epidemic, ending in convalescence, estimated from 1158 cases of the *gravior* form and 428 cases of the *mitior* form, was 6·34 days for the former, and 5·35 for the latter. The *average duration* of a fatal attack, estimated from 404 cases, was 7·08 days. In these estimates, the day of attack and the day of death or of convalescence, are reckoned *each* one day. Although the maxima and minima days of duration differed widely from this average, those of the *gravior* being 23 and 2, and those of the *mitior* 13 and 2, and those of the *deaths* 24 and 2, yet the vast majority of cases fall in closely with the averages, and this coincidence happened always more particularly when the disease was purest, and the epidemic pulsations most intense. The averages may therefore be assumed as the *law of duration* of each class respectively.

The manner in which the law of duration was disturbed, was chiefly by abnormal prolongation of some one of the stages, or by the interval between the stages being so prolonged as to amount almost to convalescence*, or suddenly cut short by resolution, or fatal congestion, or nervous shock. Healthy activity of the secretions, such as bilious stools and copious urine indicated, would prolong the duration of fatal cases. Treatment had a marked effect on the law of duration; and complications, and secondary symptoms, and relapse from ill-managed or imperfect convalescence, also disturbed it.

The average number of days during which patients convalescent from the yellow fever remained in the hospital till perfect health was restored, was, for 417 *mitior* cases, 6·55, and 1140 *gravior* cases, 7·91 days. Retarding and accelerating causes acted with as much force on this period as on that of actual disease. For particulars as to actual numbers convalescing, dying, or perfectly restored to health, on the various days, see diagram illustrative of these points.

The *pulse* was rarely very quick during any period of the disease. It was highest in first stage, and gradually declined in frequency. Before death it generally became quicker and smaller, and, where much fluid ejections occurred, it became

* Some such cases seemed like double or triple seizures. The intermissions were, however, unprofitable, and only altered the procession of symptoms by *inserting* intervals, — the ultimate attack showing accumulation and maturity of disease.

extinct at wrist many hours before death. During convalescence, the pulse was uniformly slow where no complication existed. The pulse was quickest in the cerebral variety. In some cases, when the disease determined to the intestines, the pulse became startlingly slow, even on the second day of disease*: thus in Mr. Maekae's case, it was 48; he recovered. In case 2895 of Seaman's Hospital, the pulse, on the sixth day of fever, was 24. The insidious nature of some of the attacks (when the seat of the malady was the intestinal, urinary, or pulmonary apparatus), the perfect ease of the patient, the external air of good health, and the *solemnity of the pulse* in such cases, frequently inspired the practitioner with a kind of awe and horror, of the new, treacherous, and remorseless malady.

In some cases of our late yellow fever, it seemed as if the poison acted directly, and at once, as a sedative on the heart; and in some cases there seemed a sudden and temporary excitability of it, which must have been favourable to the production of fatal local congestions.

TABLE SHOWING THE AVERAGE PULSE ON DIFFERENT DAYS OF THE DISEASE, WITH A COLUMN OF THE NUMBER OF OBSERVATIONS FROM WHICH EACH AVERAGE IS OBTAINED.

| Number of Observations. | Day of Disease. | Average Pulse. |
|-------------------------|-----------------|----------------|
| 121 | 1 | 97.40 |
| 338 | 2 | 90.80 |
| 406 | 3 | 83.53 |
| 388 | 4 | 80.44 |
| 311 | 6 | 78.56 |
| 206 | 6 | 78.74 |
| 125 | 7 | 78.78 |
| 71 | 8 | 75.62 |
| 46 | 9 | 75.76 |
| 29 | 10 | 77.58 |
| 16 | 11 | 76.37 |
| 7 | 12 | 76.00 |
| 5 | 13 | 79.20 |

Remarkable differences in the pulse are sometimes observed at different periods of the day.

* [Slowness of pulse, in connexion with certain diseases of the abdominal viscera—not of an inflammatory kind, is worthy of remark; jaundice is a striking instance of the kind: less marked ones are met with in cases of functionary derangement of the primæ viæ, though not without exceptions.]
—ED.

1. *Examples of its rising in frequency.*

| Case | | | Pulse. | | | Pulse. |
|-------|---------|--------------|--------|---|-----------|------------------|
| 521. | Morning | - | 84 | - | Afternoon | 126 |
| 828. | " | - | 80 | - | " | 108 |
| 1318. | " | (of 5th day) | 70 | - | " | 100 |
| 986. | " | (of 3rd day) | 72 | - | " | 120 |
| 1506. | " | (of 3rd day) | 52 | - | " | 86 |
| 2053. | " | - | 100 | - | " | (of 4th day) 150 |
| 2215. | " | - | 112 | - | " | (of 4th day) 156 |
| 2215. | " | - | 92 | - | " | (of 8th day) 134 |

2. *Examples of its falling in frequency.*

| Case | | | Pulse. | | | Pulse. |
|-------|---------|--------------|--------|---|-----------|--------|
| 583. | Morning | - | 108 | - | Afternoon | 54 |
| 985. | " | - | 100 | - | " | 72 |
| 986. | " | (of 2nd day) | 120 | - | " | 108 |
| 1137. | " | - | 96 | - | " | 64 |
| 1277. | " | (of 2nd day) | 100 | - | " | 64 |
| 1278. | " | (of 5th day) | 120 | - | " | 80 |

3. *Examples of its falling and rising suddenly.*

| | |
|-----------|---|
| Case 986. | On 2nd day falls from 120 to 108. |
| " " | " 3rd day rises to 120, and again falls to 80. |
| " 1318. | " 5th day rises from 70 to 100 ; falls to 80 on morning of 6th, and to 50 in evening. |
| " 2215. | " 4th day rises from 112 to 156, and on 8th, from 92 to 134. |

The pulse is often observed to rise or fall suddenly in frequency shortly before death.

1. *Examples of its rising.*

| | |
|-----------|--|
| Case 381. | On day of death rises from 68 to 80. |
| " 656. | " " 58 to 72. |
| " 2080. | " " 88 to 120. |
| " 2601. | From 80, day before death, to 110 on day of death. |
| " 2609. | On day of death rises from 78 to 100. |
| " 2680. | " " 84 to 120. |
| " 2712. | From 80, day before death, to 124. |
| " 2775. | " 100, " 134. |
| " 2830. | " 80 to 96 and 116, day of death. |

2. *Examples of its falling.*

| | |
|-----------|---|
| Case 367. | From 120 to 98, day before death, and again rises to 120. |
| " 656. | " 84 to 54, " |

Note. It is to be observed that these remarkable differences in the frequency of the pulse are rarely accompanied by corresponding febrile exacerbations, &c.

Although the remarkable slowness of pulse in convalescence from our yellow fever was early observed, the following limited trial for comparison by me on the subject is, I believe, the only one which has been made. The fact was observed long before the experiment was instituted.

COMPARISON OF ADULT PULSES IN CONVALESCENCE FROM VIRULENT YELLOW FEVER WITH ADULT PULSES IN CASES CONVALESCENT FROM INFLAMMATORY DISEASES, AND ADULT PULSES IN CASES WHERE NO FEBRILE ACTION HAD EXISTED; MADE IN SEAMAN'S HOSPITAL THIS DAY* (10TH SEPT. 1843).

| Yellow Fever. | | | Inflammatory Cases. | | | Accidents and Ailments, without Fever. | | |
|---------------|--------|------------|---------------------|--------|---------------------|--|--------|-------------------|
| Name. | Pulse. | | Name. | Pulse. | † Previous Disease. | Name. | Pulse. | Previous Ailment. |
| Fletcher - | 50 | irregular. | Pearse - | 115 | Bronchitis. | Purcell - | 76 | Muscular |
| M'Laren - | 56 | regular. | | | Empyema. | | | pain. |
| Wilson - | 52 | " | Harding | 102 | Paracentesis. | Sinclair - | 84 | Eccentricity |
| M'Tomouy | 58 | irregular. | | | Asthma. | | | of conduct. |
| More - - | 58 | regular. | Hall - - | 102 | Empyema | Martin - | 84 | Paralysis — |
| | | | Rowzer | 90 | Paracentesis | | | (chronic). |
| | 5)272 | | Lynass - | 100 | Cough; sus- | Briar - - | 84 | Anchylolysis of |
| | 54·4† | | | | pected tu- | | | knee joint. |
| | | | | 5)509 | bercular in- | Johnston | 84 | Bruise of leg. |
| | | | | | filtration in | | | |
| | | | | 101·8† | right lung. | | 5)412 | |
| | | | | | † Average | | | |
| | | | | | pulse. | | 82·4† | |

N.B. All the patients convalescent from yellow fever have been and are taking wine (8 oz. Moselle) each daily; none of the others have had any stimulant.

The heat of surface was greatest over the head and chest, and in the hands, arms, and feet. It was greatest, and persisted longest, in the cerebral variety of the disease. When the local determination of the disease was to the intestines, mucous surface of the lungs or urinary apparatus, the least febrile excitement existed. In a few cases there seemed to be determination to the skin from mosquito wounds, and this variety was attended with little excitement also. The fever heat lasted during the first stage only in normal cases. Inflammatory complications sometimes excited the animal heat even after the supervention of black vomit; but this was very rare, and, in general, the

* [Unusual slowness of pulse was very often observed in the yellow fever of Barbados, and commonly accompanied with undue coolness of skin, especially in the extremities; it was a remarkable feature of the disease, after its first invasion, — the time varying in different cases. The Author's minute observations on this symptom appear to me very valuable.] — ED.

second stage was attended by natural heat of surface, and the third by dampness and coldness of at least the extremities.*

A purple, and sometimes a lobster-red, condition of skin seemed occasionally the equivalent for yellowness during life, and, although *white* marks were left temporarily by pressure, the purple or livid colour after death subsided to dependent parts of body, leaving uniformly a yellowness of upper parts. The term "yellow" applied to the fever has been objected to, as a trivial name derived from a symptom which is not only not universally present, but alleged as very rarely so. It certainly must be admitted that a large proportion of cases of yellow fever are unattended by yellowness of surface or even of eye, for the disease may be cut short by treatment, or the epidemic may be of the simplex grade, or the milder, and the yellow suffusion may be so slight as to escape notice.† But it is a highly important symptom, and in every fatal case the yellow suffusion of a deeper or fainter tint will be observed after death. The yellowness of this fever, which seems independent of obvious liver disease, is truly characteristic, and furnishes, though not an unobjectionable, a good appellation for the disease.‡ I have noticed yellowness in the blood before it showed itself on the surface or eye, and this both in arterial and venous blood when the jet impinged against the side of a white dish. The yellowness does not seem to affect the fœtus in utero. Mrs. D. was delivered of a fine healthy clear child during convalescence

* [From the few observations which were made with the thermometer on the temperature of men labouring under yellow fever in Barbados, during the last endemic, it did not appear to be high,—when highest not exceeding 104° of Fahr. in the axilla. In two instances trial was made of the temperature after death, (four hours,) in one, (Fitzpatrick,) that of the brain was found to be 98°, of the lungs 100°, of the heart 101°, (left ventricle,) 100° (right ventricle;) in the other, (Reynolds,) that of the brain was 98°, that of the lungs 102°, of the heart 104°, (left ventricle,) 103° (right,) of the liver 103°. For these latter observations I am indebted to my friend Staff-Surgeon Dr. Spence, who, in the capacity of principal medical officer of the garrison of St. Ann, had ample opportunities to study the disease, which, till attacked himself by it, he zealously availed himself of. The subject of heat of body, in yellow fever, has not yet had the attention paid to it which its importance deserves.]—ED.

† It is seen round the edge of a blistered surface before being visible elsewhere on the skin.

‡ [This remark, I believe, will be admitted to be correct by those medical officers who have had most experience of the disease in the West Indies: by some it is considered as the chief diagnostic symptom.]—ED.

from yellow fever of the gravior form, and while she herself was yet of a deep yellow colour. The tints of colour in the disease varied. It might be a dirty parchment, light lemon, a gamboge, or a deep orange, or ehromc or ochre. The colour rarely affected the internal white tissues. If, as sometimes happened, the vascularity of the eye was slight or absent, there was no difference in appearance from simple jaundicc.

Sometimes ecchymosis of eye, and yellowness of a circumscribed character, coexisted and extended *pari passu*, the yellowness keeping one eighth of an inch in advance of the ecchymosis. After absorption of blood in convalescence a deep orange colour was left in the blood spot.* Sometimes a muddy appearance of white of eye, and dusky greasy appearance of eyelids extending to cheeks, was the only discolouration. In scrofulous sores the eurdy discharge was tinged. The eye was frequently tinged when there was no other discolouration. When yellow suffusion was deep, convalescence was slow. Yellow skin was always a sign of great intensity of disease. Among the 2071 mitior and gravior cases 385, had *yellow skin*, and of these 385, 178 died. Thus the proportion of cases in which the symptom appeared was 18·54 per cent., and the rate of mortality of the symptom was 46·23 per cent.

The following Table will show the number of cases in which yellow skin was observed on different days of the disease, the number of deaths and rate of mortality for each day, and the rate per cent. of symptom.

| Day of Disease. | 1. | 2. | 3. | 4. | 5. | 6. | 7. | 8. | 9. | 10. | 11. | 12. | 13. | 14. | 15. | Unascertained. |
|-------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-----|-----|------|-----|----------------|
| Total No. of cases | 8 | 16 | 46 | 89 | 86 | [66 | 30 | 18 | 7 | 8 | [5 | -- | -- | 3 | 1 | 2 |
| No. of deaths - - | 1 | 4 | 18 | 44 | 53 | 27 | 13 | 10 | 1 | 3 | 2 | -- | -- | -- | 1 | 1 |
| Rate of mortality - | 12·50 | 25·00 | 39·01 | 49·45 | 61·62 | 40·90 | 43·33 | 55·55 | 14·28 | 37·50 | 40·00 | | | | | |
| Rate per cent. of symptom - - | 0·38 | 0·76 | 2·22 | 4·20 | 4·15 | 3·14 | 1·45 | 0·87 | 0·34 | 0·38 | 0·21 | -- | -- | 0·14 | | |

The expulsive efforts of the stomach are of a very different kind in the first and third stages of the yellow fever. There is

* [Stains of an ochre colour in the brain and kidneys, in instances in which it may be inferred blood had been extravasated, I have found, on chemical examination, to depend on the presence of peroxide of iron, derived, no doubt, from the blood corpuscles.] — ED.

violent retching, straining, suffusion of face and spasm of recti muscles, at first. But when black vomit is established, all these cease, and the stomach seems to act alone. Then the patient will speak to you, lean his head over the bed, eject his mouthful or basin-full of black vomit, and resume his conversation with scarcely any interruption. Sometimes it comes up as if in rumination, and at others it is ejected in a spout to a considerable distance. In both latter cases, however, it seems perfectly involuntary. The vomiting in the last stage is generally provoked by swallowing any thing either fluid or solid, but I have seen it induced by the erect position, and the *act of falling asleep*. The white ropy acid fluid, which is frequently ejected at the close of the second stage in considerable quantities, and with much relief to the symptoms, is generally attended with considerable retching. This is the fluid which, during our epidemic, was called "premonitory" or "precursory" fluid, or "white vomit."*

The first effect of black vomit seems to be of the most salutary kind, particularly on the tongue. Indeed, when with sudden improvement of the tongue and other symptoms there exists dirty or other discolouration of the surface, and at the age of the disease when black vomit might be expected, then *succussion* will sometimes detect the presence of the effused fluid before vomiting occurs. The scanty clay and snuff-like black vomit generally attends or follows the "white vomit" of the second stage or milder form of the disease.

"Black vomit" is rarely black; it is generally of a dark brown or umber. Its appearance is sometimes thin, like bog water,—sometimes thick, like molasses. It is rarely homogeneous. A black, thick, filamentous, or flocculent, or granular, or scaly precipitate separates in the basin from the brownish supernatant water, and generally, in reference to space, occupies about one fourth of the whole. Black vomit seems to be blood acted on by acid, and varying in appearance on account of the different manner of its extravasation, whether in drops, stream, or minute

* [In the late endemic in Barbados, a fluid, answering tolerably to the description of "white vomit" given in the text, was not of unfrequent occurrence, though not so frequent as to arrest attention. It would be interesting to know what its composition is, especially whether it is serous. The slightest chemical examination might suffice to determine the question.]—ED.

exudation, and the different proportions of acid and serum which the extravasated blood meets with. Solution of nitrate of silver throws down a white precipitate from black vomit. Black vomit reddens litmus paper, and it effervesces with alkaline carbonates. In one experiment ζ i. of carbonate of potash neutralized ζ xii. of black vomit. If liquor potassæ be added to black vomit beyond what is required for neutralizing the acid, the granular or floeculent sediment becomes dissolved, and the vomit becomes homogeneous and perfectly clear, like light-coloured port wine. In one case, ζ i. of black vomit, mixed with an equal quantity of water, required ζ ii. of liquor potassæ to render it transparent and homogeneous. Although black vomit itself is odourless,—when distilled, the clear water that comes over has a peculiarly offensive odour. If it be inspissated, the extract, although not fœtid, nor pungent, nor exceedingly disagreeable, produces on some persons instant retching on being smelled. Blood allowed to drop, as in epistaxis, into water acidulated with muriatic acid, forms a very tolerable specimen of some descriptions of black vomit. The altered condition of the blood, previous to extravasation into the acid fluids of the stomach, may have some modifying effect in forming the material known as “black vomit,” but I have seen genuine black vomit contemporaneous with florid epistaxis.*

Black vomit is a symptom not essentially necessary to a genuine case of yellow fever. It manifests only one phase of the stage of passive hæmorrhage, and many other hæmorrhages (even lochial) may be its equivalent as well as its accompani-

* [The view taken by the Author of the nature of “black vomit,” accords, I believe, with the most accurate experiments which have been made on it. I have always found peroxide of iron in the ashes procured by incinerating the solid dark matter obtained by evaporation. Under the microscope “black vomit” has appeared to be very heterogeneous, exhibiting small irregular plates, not unlike epithelium plates; numerous particles, not unlike blood corpuscles altered by the action of water; and some larger and greyish clustered particles. The black vomit, the subject of this examination, was from a sporadic case of fever, which terminated fatally, in Barbados, in November, 1845. Other specimens, tried when the disease was endemic in 1848-9, had just the same microscopic character: in every instance it was found to be acid, either by the test of litmus paper, or by effervescence on the addition of an alkaline carbonate. In Jamaica, as I have been informed by an eminent physician of that island, an oily fluid has often been observed on the surface of the black vomit in sporadic cases of yellow fever, there common, and that in instances where no oleaginous medicines had been administered.] — ED.

ment. As some time elapsed before the precursory or white vomit was distinctly recognized as a symptom of the malady, the number of cases in which it occurred, is no doubt understated from the case books. It is shown, however, as might be expected, to occur oftener than black vomit. Out of the 2071 cases of mitior and gravior, it is noticed in 417, while there are only 366 cases in which black vomit occurred. Black vomit generally followed the precursory vomit; but many cases of death have occurred after the latter only. The general earliness of this symptom, as the antecedent of black vomit, will be shown by the following Table.

PRECURSORY VOMIT.

| Day of Disease. | 1. | 2. | 3. | 4. | 5. | 6. | 7. | 8. | 9. | 10. | 11. | 12. | 13. | Unascertained. |
|---------------------------------------|----|----|-----|----|----|----|----|----|----|-----|-----|-----|-----|----------------|
| Total number of cases in each day - - | 10 | 66 | 103 | 95 | 72 | 37 | 21 | 8 | 1 | 0 | 1 | 2 | 0 | 1 |

The per centage of the mitior and gravior cases in which black vomit occurred, was 17·67.

Black vomit, although a very unfavourable symptom, and more so than yellow skin, being as 75·68 to 46·23, is still not necessarily fatal. Out of the 366 cases of it, 277 only died, giving the centesimal mortality just stated, viz. 75·68. The number of cases in which black vomit was observed, on different days of the disease, the number of deaths and rate of mortality for each day, and the rate per cent. of symptom on each day, will be seen by the following Table.

| Day of Disease. | 1. | 2. | 3. | 4. | 5. | 6. | 7. | 8. | 9. | 10. | 11. | 12. | 13. | Unascertained. | B. V. Doubtful. |
|-------------------------------|------|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|----------------|-----------------|
| Total No. of cases | 2 | 5 | 32 | 76 | 89 | 83 | 26 | 15 | 10 | 7 | 2 | 2 | 1 | 5 | 11 |
| Rate per cent. of symptom - - | 0·09 | 0·24 | 1·72 | 3·67 | 4·40 | 4·10 | 1·25 | 0·72 | 0·48 | 0·31 | 0·09 | 0·09 | 0·04 | 0·24 | 0·52 |
| Deaths - - - | - | 5 | 22 | 59 | 68 | 66 | 19 | 12 | 5 | 6 | 1 | 1 | 1 | 4 | 8 |
| Rate of mortality | - | 100·00 | 68·75 | 77·64 | 76·40 | 79·51 | 73·33 | 80·00 | 50·00 | 85·71 | 50·00 | 50·00 | 100·00 | 80·00 | 72·72 |

Yellow skin and black vomit were closely associated as to the time of their appearance. But the former was generally the antecedent (fortunate for the patient when otherwise). Thus,

in 139 ascertained cases, the former preceded the latter in 51 instances, appeared simultaneous in 46, and succeeded it in 42 instances. The double symptom of yellow skin and black vomit was of all others the most dangerous, and especially when the latter succeeded the former, and within twenty-four hours. The coexistence of these two symptoms was observed in 144 cases, being 6.95 per cent. of the 2071 milder and graver cases admitted to Seaman's Hospital. Out of these 144 cases, 122 died, making the mortality of the conjoined symptom 84.72 per cent.

The following Table shows the day of disease on which yellow skin and black vomit occurred simultaneously, also the number of cases in which the former preceded or succeeded the latter, and the number of days it so preceded or succeeded.*

YELLOW SKIN AND BLACK VOMIT.

| 122 Deaths. | | | | | | 22 Recoveries. | | | | | |
|-----------------|---------------|-----------------------|---------------|------------------------|---------------|----------------|---------------|-----------------------|---------------|---------------------|---------------|
| 40 Cases simul. | | 45 Cases preceded. | | 32 Cases succeeded. | | 6 Cases simul. | | 6 Cases preceded. | | 10 Cases succeeded. | |
| Day of Disease. | No. of Cases. | No. of Days preceded. | No. of Cases. | No. of Days succeeded. | No. of Cases. | Day of Disease | No. of Cases. | No. of Days preceded. | No. of Cases. | No. of Days. | No. of Cases. |
| 3d | 3 | 1 | 28 | 1 | 25 | 3 | 1 | 1 | 3 | 1 | 5 |
| 4th | 14 | 2 | 10 | 2 | 4 | 4 | 1 | 2 | 2 | 2 | 2 |
| 5th | 9 | 3 | 5 | 3 | 2 | 5 | 2 | 4 | 1 | 3 | 2 |
| 6th | 10 | 4 | 1 | 7 | 1 | 6 | 2 | | | 4 | 1 |
| 7th | 3 | 5 | 1 | | | | | | | | |
| 8th | 1 | 0 | 0 | | | | | | | | |

Black vomit may continue several days. Thus, case 2038, admitted 26th June, 1841, has black vomit on 29th, which lasts for three or four days, convalesces on thirteenth day of

* [By some inquirers it has been conjectured, that the yellowish hue of the skin in this disease is not, like that which occurs in jaundice, produced by the staining effect of bile in the blood, but is rather owing to the blood itself, analogous to that kind of discoloration the result of a contusion with ecchymosis. I am not aware that this opinion is supported by any facts; and many circumstances seem to militate against it, and to favour the more commonly received conclusion, that bile is the cause of the discoloration. Often in yellow fever when the skin is yellow, the urine contains bile, judging from its colour and its becoming greenish on the addition of an acid. In convalescence from yellow fever the skin clears rapidly, more rapidly than from that discoloration which follows a bruise. The subject is not undeserving of experimental inquiry; what is doubtful may probably be made clear by a few chemical experiments judiciously conducted.]—Ed.

fever, and is discharged on 21st day. (Pulse ranged from 80 to 64.) Case 2601, admitted 31st July, second day of fever, has black vomit on 2nd August, and dies on the 8th, having black vomit every day for six days. Case 3055, admitted 15th November, 1841, second day of fever, has premonitory vomit on the 16th, and black vomit on the 17th, 18th, and 19th, and yellow skin on the 19th: sudden and unexpected improvement takes place on 21st, is convalescent on 23rd, and discharged on 30th.

The blood was rarely, if ever, altered till after the first stage. The first apparent alteration was yellow discoloration of the serum. In the late stages there was a loss or impairment of coagulability. This change was most evident, as might be expected, in the more protracted or chronic cases. I have never seen but once what could be called "dissolved blood" (blood that remained fluid) drawn from a vein or artery. In many cases, the blood became much darker than natural after the first stage, arterial blood seeming venous. In such cases, acute nervous agitation, and what I believe Dr. Graves calls "cerebral respiration," were observed. If the condition of the blood that circulated through the system were estimated by the oozings from gums, anus, or ulcers, dissolved blood would be supposed of common occurrence in the disease. But such a mode of estimating the blood's condition would have been exceedingly fallacious. Thus, Tucker, admitted to Seaman's Hospital in September, 1842, was bled from arm by me to ʒvi., while his skin was yellow, mind stupified, urine scanty, *oozing of black molasses-like blood* from mouth and anus, cadaveric odour from body, after black vomit; and yet the blood was florid, though with yellow serum, and clot so firm, that after standing eighteen hours, when four-fifths divided through, the clot could be suspended by one of its sections, without any tendency of the other to break off. This healthiness of the circulation, simultaneous with a dissolved appearance of the extravasated blood, was not uncommon, and frequently continued during all the successive stages, and up to the hour of death.*

* [In a few instances, I have examined the blood corpuscles of men in different stages of the disease. They have not appeared, under the microscope, to be distinctly altered; their definition has been well defined; their size nearly, if not quite, normal: in one or two instances they seemed to be

An early alteration of the blood, however, when it did occur, was a very unfavourable sign. Hæmorrhages seemed to arise as often from a loss of vital cohesion of the solids as the fluids. Epistaxis was the hæmorrhage of least importance. Hæmatemesis, or even a tinge of blood in the fluids ejected from the stomach, at the commencement of, or early in the attack, was a most dangerous indication. But hæmatemesis succeeding black vomit was favourable, the undecomposed blood probably indicating a cessation of the acid formation.

Although some of the inhabitants of Georgetown, who passed through the late epidemic, had resided here during the epidemic of 1819, there was no instance of a sufferer from the epidemic of 1819 being attacked by that of 1837 and the following years. Neither do I believe there is an instance of a second complete attack, after a month's perfect restoration to health.* The

thinner than usual. The blood for trial was taken by puncturing a vein of the back of the hand, and receiving the drop or two that flowed into a strong solution of common salt. The blood of a person in health, similarly treated, was used for comparison. "Black vomit" had occurred in most of the cases; one case terminated fatally a few hours after the trial. These results led to the inference, the same as that adopted by the Author, that a tainted or dissolved state of the blood is not the cause, or essentially connected with, the occurrence of "black vomit."

When the blood was examined by the microscope after death, on the post mortem inspection, however rapidly made, the corpuscles were found to be altered in form, variously puckered. It was sometimes found to be acid, by the test of litmus paper, — sometimes not; sometimes it gave off an ammoniacal odour when mixed with quick lime, — sometimes this odour was not perceived. In most instances, after death, the blood was dark, thick, and did not coagulate; nor were coagula in most instances found in the cavities of the heart and great venous trunks; if found, they were usually very soft: coagulated lymph, fibrinous concretions, were of rare occurrence indeed. In some instances of death from hæmorrhage into the substance of the lungs ("pulmonary apoplexy"), I have found the blood destitute of the power of coagulating, even more liquid than in fatal cases of yellow fever.]—ED.

* [Instances of this kind have been brought to my notice by an experienced medical officer, Staff-Surgeon Richardson; an esteemed friend, a staff-surgeon, whom I attended in Barbados, had a narrow escape with life from a second attack, some years having intervened since the first,—but, in the interval, he had been out of the yellow fever zone. It must be admitted, I believe, that a second attack of yellow fever, as of variola, or of other diseases said to occur only once in life, is rare, and the exception to the general rule. Probably it will be found that the proportion of second attacks varies greatly in different epidemics; in that of 1818, in Trinidad, 13 cases are reported as second attacks of the disease, and these fatal, after complete recovery from the first. The fever was very malignant; in the barracks at Orange Grove, near Port of Spain, in less than two months, viz. from the 28th August to the 13th October, the deaths from it amounted to 42; the number of men stationed there is not given, but, from the extent of accommodation it could not have been great. In Malta, when small-pox

disease, however, was frequently baffled, and returned; and the liability to a return was in proportion to the mildness or shortness of the previous attack. Relapses and exacerbations, however (even after the characteristic symptoms of the gravior type), were not rare, but generally occurred close after the period of convalescence.

The following are examples: —

Case 44. Admitted 5th February, 1839 with seald: attacked with yellow fever on the 9th, is convalescent on the 21st, an exacerbation on 25th, intense febrile excitement (probably aggravated by mosquitos) up to the 10th March, when black vomit occurs, and the patient sinks on the 12th.

160. Admitted with yellow fever, 8th May, 1839, the day of attack; is convalescent; has a relapse on the 19th, of which he dies on the 23rd.

199. Admitted on 10th May, 1839, convalescent on 17th; relapse on 21st, again convalesces on 23rd.

292. Admitted on the 6th August, 1839, about the third day of fever, convalesces; and is discharged on the 9th; readmitted on 13th August, the day of attack, and dies on the 15th.

296. Admitted on the 12th August, third day of the fever; discharged convalescent on 14th; returns on 16th, and is again discharged convalescent on 17th.

325. Admitted 6th September, 1839, about the sixth day of disease; is pronounced convalescent on the 8th, suffers relapse on the 12th, and has black vomit, and dies on the 16th.

342. Admitted 10th Sept., third day of fever; is convalescent on 13th; has a relapse on the 19th; skin becomes tinged on the 20th; has black vomit on the 22nd; and dies on the 23rd.

355. Admitted 13th Sept., on the second day of the fever; has

was epidemic there, in 1830-31, 91 cases of second attacks were recorded; the total number of all cases of the disease was 8,067, and the total of fatal cases, 1,172. (See returns on the subject in my work, "Notes and Observations on the Ionian Islands and Malta.") A well-authenticated instance of the occurrence of small-pox eleven different times in the same individual has been mentioned to me by a general officer, lately deceased. His mother was the subject. She first had small-pox by inoculation; afterwards she caught it from her children; all the attacks were smart, and the last not less so than the first.

If admitted, as seems just and fully warranted, that a second attack of yellow fever is rare, the propriety of employing as nurses those who have been once attacked is obvious, and this apart from all considerations about contagion, inasmuch as the duty is arduous, and, from the fatigue induced and broken rest, the disposition to contract the disease, if within the limits of the exciting cause, is augmented.] — ED.

frequent threatenings of relapse, and is discharged on the 23rd October.

1143. Admitted 15th April, 1840, second day of fever; is convalescent on 18th; has a relapse on 22nd; is again convalescent on 26th; and discharged on the 5th May.

1247. Admitted 4th June, 1840, second day of fever; has black vomit the following day; is convalescent on the 11th; relapses on 14th; again convalesces; and is discharged on the 27th (impaired intellect from the fever?).

1277. Admitted 15th June, 1840, second day of fever; convalesces on 20th; exacerbation on 22nd; convalesces again on 27th; and is discharged 3rd July.

1319. Admitted 7th July, second day of fever; has premonitory vomit the same day; is convalescent on 13th; relapse on 18th; again premonitory vomit on 20th; convalesces on 23rd; and discharged on 24th July.

1488. Admitted 12th Sept., on fourth day of fever; is convalescent on the 14th; and discharged on the 16th; readmitted the same evening with relapse; has black vomit; convalesces on 18th; discharged on 19th.

1449. Admitted 12th September, 1840, about the fifth day of fever; has black vomit the same day; is convalescent on 14th, and discharged on 16th Sept.; readmitted the same evening with relapse; has again black vomit shortly after admission; is convalescent on 19th, and discharged on the same day.

1456. Admitted 14th Sept. 1840, second day of disease; has premonitory vomit the day after admission; convalesces on 18th, and is discharged on 28th; readmitted on 4th October, day of attack; convalesces on 7th, and is discharged on 17th. The first attack was the most severe; had premonitory vomit, and convalesced on sixth day; convalesced from second attack, on fourth day, and had no suspicious vomit.

1613. Admitted 26th October, fourth day of fever; has premonitory vomit on 29th October; is convalescent on 1st November; exacerbation on 9th; again convalescent on 12th; and discharged on 19th November.

1569. Admitted 15th October, third day of disease; black vomit on the following day; is convalescent on 18th; and discharged on 26th; readmitted on 2nd November, on third day of fever; again black vomit; is convalescent on the 4th; and discharged on 9th November.

1892. Attacked on 28th December, 1840, and admitted same day; convalescent on 30th; exacerbation on 2nd January; convalescent on 4th; discharged on 21st.

1945. Admitted 13th January, 1841, on the second day of fever, and is convalescent on 17th; relapse on 24th; again convalesces on 26th; and is discharged on 31st.

1903. Admitted 3rd January, 1841, third day of disease; has suspicious premonitory vomit on 4th January, and suspicious black vomit on the 6th; convalesces on the 7th; and is discharged on the 16th; returns same evening with exacerbation, and is again discharged on 23rd.

1878. Admitted 24th December, 1840, second day of fever; convalesces on 27th; and is discharged on 7th January; readmitted on 20th January, 1841, fourth day of fever, having yellow skin; again convalesces on 24th; and discharged on 19th February.

2077. Admitted 1st February, 1841, second day of fever; convalesces on the 4th; relapse on 6th; has black vomit on the 9th; dies on the 11th.

2212. Admitted 24th February, second day of fever; convalesces on 26th; and is discharged on 10th March; readmitted on 14th March, fourth day of fever; black vomit on 15th; dies on 17th.

2901. Admitted 6th October, 1841, the day of attack; *has yellow skin and premonitory vomit the same day*; is convalescent on 13th October, and discharged on 16th; second attack on 22nd; convalesces on 27th; and is discharged on 31st.

3002. Admitted on 3rd November, third day of disease; is convalescent on 6th; and discharged on 8th; readmitted on 11th (day of attack); has premonitory vomit on the same day; black vomit on 12th; dies on 13th.

3100. Admitted on 25th November, 1841, the day of attack; is convalescent on 28th; an exacerbation the same evening; is again convalescent on 1st December; a relapse on the second; and dies on the 9th (black vomit).

3123. Admitted on 30th November, the day of attack; is convalescent on 4th December; a relapse on 7th; has premonitory vomit; yellow skin on 9th; black vomit on 9th; dies on 11th.

3164. Admitted on 11th December, the second day of fever; convalescent on 13th; relapse on 15th, on which day has premonitory vomit; black vomit on 18th; yellow skin on 19th; and dies on the 22nd.

3448. Admitted on 2nd April, 1842, the second day of fever; is convalescent on the 6th; and discharged on the 21st April, having been detained with dyspepsia; readmitted on 27th April, third day of fever; had premonitory vomit on 28th; yellow skin on 29th, and dies on 30th.

3702. Attacked on 20th August, 1842; has yellow skin on 22nd,

and convalesces on 27th; exacerbation on 1st September; again convalesces on 3rd; has third exacerbation on the 6th; attacked by pneumonia, of which he dies on 17th September.

3827. Attacked on 20th September, convalesces on 23rd; and is discharged on 26th; relapse the same day, and is readmitted on 28th; has premonitory vomit on 29th; black vomit and epistaxis the same day, the 29th; and yellow skin on 1st October, on which day he dies.

The *appetites* were pretty uniform, and were conformable to the stages of the disease. Cold water was the diluent most sought after during the first stage, wine was frequently liked at the close of the first stage and beginning of the second, and milk was drunk eagerly during the third.* It frequently happened when I suggested milk that the patient would remark that it was the very thing he longed for and wanted, although it had not occurred to him to ask for it.

Intense hunger was of frequent occurrence during the third stage. It was invariably a sign of evil. Febrile excitement, exhaustion after febrile excitement, and the acid elimination, afford a rationale of these appetites.

In the great majority of cases convalescence was immediately followed by a perfect performance of all the healthy functions, and then, as also in the formative and first stage, wounds healed kindly.

* [In the yellow fever of Barbados, sucking bits of ice, or sipping iced water and toast-and-water, and iced milk, either alone or diluted, were commonly relished, and that even when there was little heat of skin or of tongue.] — Ed.

CHAP. III.

POST MORTEM APPEARANCES.

THE following is an analysis and digest of the *post mortem* reports made on ninety-seven fatal cases of yellow fever during the years 1841, 1842, and 1843:—

| | Cases. |
|---|--------|
| <i>External appearance of cadaver</i> , yellow of various tints in | - 53 |
| not observed - - - | - 40 |
| general lividity - - - | - 1 |
| pale - - - - - | - 1 |
| flesh-coloured and purple at depending parts - - - | - 1 |
| black (being a negro) - - - | - 1 |
| In the above cases there was yellow skin, with lividity of depend- ing parts - - - - - | - 20 |
| with extensive ecchymosis - - - | - 4 |
| with petechiæ - - - - - | - 3 |
| remarkable shrivelling and maceration of skin - - - | - 1 |

On turning to the cases of those, the colour of whose skin is not observed in the post mortem examination, it is to be inferred that the yellow suffusion must have existed, although not recorded. Its constancy rendered it at last unnoticable.

In the case recorded '*general lividity*' the examination was made five hours after death, and it is highly probable that if the inspection had been delayed a few hours longer the yellowness would have been developed by the subsidence of the capillary congestion. The case whose skin is recorded as '*pale*' had yellow suffusion of the eyes four days before death, and the immediate cause of death was hæmorrhage from stomach. The case which is recorded as '*flesh-coloured*' was no doubt a similar case to that of '*general lividity*,' in which capillary congestion obscured the colour. On turning to his case it is reported that the eyes were *very yellow* during life. Every fatal case of the fever showed yellow suffusion at least of the eye:—

In three cases there was remarkable cadaveric rigidity. In one case excessive obesity. The muscles in one case were pale, softened, and easily torn, and of a dirty colour. Sloughy suppurating ulcers of the temples and eyelids and calves, and outer aspects of legs and *bullæ* containing yellow fluid (rendered green by muriatic acid) and indurated lymphatics, in one case.

Bloody clotted extravasation, without apparent lesion of surrounding parts over sternum, 1.

Crepitation in subcutaneous cellular tissue, 1.

Infiltration of bloody serum into subcutaneous cellular tissue, 1; blistered surface in a raw putrid state, 1.

Blistered surfaces deep crimson, or dark and bloody, many.

Putrefaction considerably advanced after 12 hours, 1.*

In general the subcutaneous cellular tissue and muscles were healthy in appearance.

The skin might be of a deep yellow and peritoneum white, as in 'Case 2728.' The peritoneum generally took a livid or slate colour from the hyperæmiated condition of the subjacent coats of the stomach and intestines. In 13 cases it is recorded as *yellow*, in 3 cases as *white*, in 1 as remarkably *pale*, injected and dull in 11, congested in 1, claret or roseate colour over stomach in 1, and *green* in 1. The colour was partial. Thus in some of the cases in which yellowness was observed the colour was confined to the stomach, and in two cases exclusively to the intestines.

Abdomen was tympanitic in 3 cases only; its cavity contained a considerable quantity of yellow serum in 1 case; was painfully hot to the hand 3 hours after death in 1 case.

Mesenteric glands were enlarged and congested in 1 case. Mesentery was extensively ecchymosed in 1 case. *Mesenteric vessels* gorged in 10 cases.

* [In all the fatal cases which occurred in Barbados during the last invasion of yellow fever, the tendency to rapid putrefaction was strongly marked. It may be observed that the same tendency is exhibited within the tropics in all instances of rapid termination of acute diseases, especially if blood-letting has not been largely used. It seems referable to two circumstances, — high atmospheric temperature favourable to the putrefaction of animal matter; and the large proportional quantity of blood in the cadaver favouring slow cooling, or the retention of heat in the body. In appreciating and describing the appearances which present on *post mortem* examination within the tropics, or wherever the atmospheric temperature may be high, ample allowances must be made for the influences referred to, or the gravest mistakes will be committed, especially as regards inflammation. How often are parts stained or dyed by the dissolved colouring matter of the red corpuscles of the blood said to be inflamed — highly inflamed!] — ED.

Stomach :—

Cases.

| | | | | | | |
|--|---|---|---|---|---|----|
| containing black vomit | - | - | - | - | - | 79 |
| ,, other than black vomit and no black vomit | - | - | - | - | - | 9 |
| blood | - | - | - | - | - | 1 |
| empty | - | - | - | - | - | 2 |
| containing mucous fluid only | - | - | - | - | - | 2 |
| contents in reference to black vomit not stated | - | - | - | - | - | 5 |
| in the instances wherein black vomit was found, the blood was imperfectly converted in | - | - | - | - | - | 14 |
| black vomit with much green mucous fluid | - | - | - | - | - | 2 |
| clothed with viscid white mucus | - | - | - | - | - | 3 |
| contained a live lumbricoides | - | - | - | - | - | 1 |
| maggots | - | - | - | - | - | 1 |
| quite healthy | - | - | - | - | - | 2 |
| healthy, but containing black vomit | - | - | - | - | - | 2 |
| containing black vomit with both stomach and œsophagus | | | | | | |
| healthy | - | - | - | - | - | 1 |
| contracted to the size of an ordinary colon | - | - | - | - | - | 1 |
| with hour glass contraction, with about $1\frac{1}{2}$ inch passage between the pouches | - | - | - | - | - | 1 |
| much contracted | - | - | - | - | - | 2 |
| much inflated | - | - | - | - | - | 2 |
| large, thin, atrophied, softened | - | - | - | - | - | 1 |
| externally of healthy appearance | - | - | - | - | - | 1 |
| large veins of, remarkably congested | - | - | - | - | - | 1 |
| colour of internal surface dull dirty greenish red | - | - | - | - | - | 1 |
| dirty dull yellow | - | - | - | - | - | 1 |
| red, apparently by bloody imbibition | - | - | - | - | - | 1 |
| green | - | - | - | - | - | 1 |
| reddish green | - | - | - | - | - | 1 |
| remarkably opaque whiteness of pyloric portion | - | - | - | - | - | 1 |
| black vomit striæ in submucous coat | - | - | - | - | - | 1 |
| deep claret colour with hæmorrhagic lines and stellated or dotted hyperæmia without black vomit in stomach | - | - | - | - | - | 5 |
| submucous coat elevated and blackened by infiltration | - | - | - | - | - | 1 |
| rugæ much developed and surface | - | - | - | - | - | 5 |
| mammillated | - | - | - | - | - | 53 |
| thin at cardia and mammillated at pylorus | - | - | - | - | - | 1 |
| mucous membrane thin | - | - | - | - | - | 1 |
| soft and easily scraped | - | - | - | - | - | 11 |
| firm and unyielding | - | - | - | - | - | 1 |
| engorged and thickened without inflammation | - | - | - | - | - | 1 |

Stomach :—

| | | | | | |
|--|---|---|---|---|----|
| thickened to one-tenth of an inch | - | - | - | - | 1 |
| peeled, showing dissected and disorganised vessels | - | - | - | - | 2 |
| eroded and blackened | - | - | - | - | 3 |
| superficial ulcerations and erosions of | - | - | - | - | 15 |
| foul or sloughy ulcerations of | - | - | - | - | 4 |
| inflamed [?] | - | - | - | - | 11 |
| generally hyperæmiated, or congested | - | - | - | - | 71 |
| " " of which with ecchymosis | - | - | - | - | 15 |
| remarkable submucous vascular arborizations* | - | - | - | - | 8 |

Esophagus :—

| | | | | | |
|---|---|---|---|---|----|
| mucous membrane hyperæmiated and congested | - | - | - | - | 41 |
| inflamed | - | - | - | - | 8 |
| ecchymosed in <i>submucous coat</i> | - | - | - | - | 11 |
| red, extravasation into | - | - | - | - | 2 |
| mucous membrane eroded | - | - | - | - | 54 |
| destroyed and curled up in black soft pieces | - | - | - | - | 2 |
| showing leashes of exposed and disorganised red vessels | - | - | - | - | 2 |
| granular appearance near cardia | - | - | - | - | 3 |
| generally softened | - | - | - | - | 1 |
| ulcerated | - | - | - | - | 11 |
| mammillated | - | - | - | - | 2 |
| extensive submucous arborizations | - | - | - | - | 8 |
| healthy | - | - | - | - | 8 |

Intestines :—

| | | | | | |
|---|---|---|---|---|----|
| peritoneal coat dull green | - | - | - | - | 5 |
| yellow | - | - | - | - | 2 |
| normal | - | - | - | - | 3 |
| bowels highly inflated | - | - | - | - | 5 |
| ,, contracted | - | - | - | - | 2 |
| ,, healthy | - | - | - | - | 3 |
| extensive subperitoneal extravasation | - | - | - | - | 1 |
| submucous extravasation | - | - | - | - | 11 |
| mucous membrane of small intestines highly hyperæmiated | - | - | - | - | 18 |
| small intestines, mucous membrane studded with black specks | - | - | - | - | 1 |

* [The appearances after death from yellow fever are so like those which are detected after death by arsenic-poisoning, and so many symptoms are common to both, that the idea has occurred, "of the mineral, in some form or other, being the pathogenic cause of yellow fever." The author, in communicating this to me in a note, adds,—"This is sheer hypothesis, however, and requires apology for even adverting to it." Such it surely is,—mere hypothesis; nor is there any reason to consider it well founded. It may help, however, to convey an impression of the lesions under consideration, and on that account only it may be deserving of attention.] — ED.

| | Cases. |
|---|--------|
| <i>Intestines</i> : — | |
| enteritis [?] | 3 |
| containing black vomit and mucus | 11 |
| bloody, green mucus | 2 |
| pure black vomit | 1 |
| tarry black vomit | 4 |
| greenish purulent-looking mucus, otherwise healthy | 1 |
| containing only white mucus | 2 |
| „ white and green ditto | 4 |
| „ green mucus, down to jejunum, and primrose yellow mucus afterwards | 2 |
| slate coloured mucus | 1 |
| containing in duodenum tarry black vomit, in upper part of jejunum green mucus, and in lower part of jejunum yellow mucus | 2 |
| marked submucous arborizations in all small intestines | 7 |
| <i>Large Intestines</i> :— | |
| containing yellow mucous fæces | 1 |
| „ a live lumbricoides | 1 |
| mucous membranc generally congested | 7 |
| hyperæmiated in patches as far as rectum | 6 |
| bloody and thick mucus in, with bloodless mucus in small intestines | 1 |
| bloody throughout | 1 |
| marked submucous arborization | 13 |
| healthy | 2 |
| <i>Aggregate and Solitary Glands</i> :— | |
| well developed | 35 |
| hyperæmiated | 8 |
| surrounded by blue ecchymosis | 1 |
| „ red areolæ | 1 |
| with black 'navels' | 3 |
| <i>Duodenum</i> :— | |
| healthy | 1 |
| much contracted in calibre: otherwise healthy | 1 |
| containing much yellow viscid matter, otherwise healthy | 1 |
| „ air vesicles below mucous membranc | 1 |
| dirty greenish hue | 1 |
| excessively hyperæmiated | 27 |
| containing much black vomit admixtures | 11 |
| mammillated | 1 |
| extensive submucous arborization | 9 |

Jejunum :—

| | | | | | | | |
|--|---|---|---|---|---|---|----|
| healthy | - | - | - | - | - | - | 1 |
| containing much black vomit admixtures | - | - | - | - | - | - | 11 |
| excessively contracted (same case as when duodenum was so) | | | | | | | 1 |
| hyperæmiated | - | - | - | - | - | - | 13 |
| ecchymosis into | - | - | - | - | - | - | 3 |
| small and numerous superficial ulcers | - | - | - | - | - | - | 1 |
| extensive ecchymosis into both jejunum and ileum | - | | | | | | 1 |
| invagination of | - | - | - | - | - | - | 2 |
| extensive submucous aborization | - | - | - | - | - | - | 2 |

Ileum :—

| | | | | | | | |
|---------------------------------------|---|---|---|---|---|---|----|
| contracted (as in preceding instance) | - | - | - | - | - | - | 1 |
| containing much black vomit | - | - | - | - | - | - | 13 |
| hyperæmiated | - | - | - | - | - | - | 19 |
| ecchymosis of | - | - | - | - | - | - | 1 |
| mucous membrane eroded | - | - | - | - | - | - | 1 |
| extensive submucous arborizations | - | - | - | - | - | - | 7 |
| empty | - | - | - | - | - | - | 1 |
| perfectly healthy | - | - | - | - | - | - | 1 |

Cæcum :—

| | | | | | | | |
|-------------------------------------|---|---|---|---|---|---|---|
| contracted (as in above case) | - | - | - | - | - | - | 1 |
| containing dark molasses like blood | - | - | - | - | - | - | 3 |
| blood and fæces | - | - | - | - | - | - | 1 |
| black vomit matter | - | - | - | - | - | - | 5 |
| much hyperæmiated | - | - | - | - | - | - | 8 |

Colon :—

| | | | | | | | |
|------------------------------------|---|---|---|---|---|---|----|
| much contracted | - | - | - | - | - | - | 11 |
| inflated | - | - | - | - | - | - | 4 |
| containing much black vomit matter | - | - | - | - | - | - | 5 |
| hyperæmiated | - | - | - | - | - | - | 3 |
| „ and ecchymosed | - | - | - | - | - | - | 2 |
| green coloured internally | - | - | - | - | - | - | 1 |
| superficial ulcers on | - | - | - | - | - | - | 2 |
| colon and rectum healthy | - | - | - | - | - | - | 1 |

Rectum :—

| | | | | | | | |
|--|---|---|---|---|---|---|---|
| containing black vomit matter | - | - | - | - | - | - | 3 |
| white mucus and blood, while black vomit was in stomach, and tarry black vomit in jejunum | - | - | - | - | - | - | 1 |
| much congestion of | - | - | - | - | - | - | 1 |
| superficial ulcerations in | - | - | - | - | - | - | 1 |
| submucous extravasation | - | - | - | - | - | - | 5 |
| quite healthy* | - | - | - | - | - | - | 2 |

* [I am inclined to infer that most of the abnormal appearances observed

The few following cases give a connected view of the contents of stomach and alimentary canal:—

Case 2804. One quart of black vomit in stomach, with a few grains of barley. Fluid like tar in duodenum and jejunum; scanty yellow mucus in lower part of ileum; in cæcum and ascending and transverse colon, grey mucus; in rectum, deep brown and crimson mucus.

2806. Black vomit in stomach; yellow mucus, becoming paler towards lower part, in small intestines; dark green feculent mucus in colon and rectum.

2811. Bloody black vomit in stomach; light coloured mucus in small intestines; bloody black matter in large intestines.

2816. Black vomit in stomach; black vomit and green mucus in duodenum and upper part of jejunum; lighter coloured in lower part of jejunum; a little yellowish mucus in an otherwise empty ileum; greenish black mucus in cæcum; greyish feces in colon and rectum.

Liver:—

| | Cases. |
|---|--------|
| recorded as natural - - - - - | 3 |
| recent adhesions of peritoneum and diaphragm* | 1 |
| ,, ,, diaphragm - - - - - | 1 |
| ,, enlargement of - - - - - | 20 |
| enlargement of right lobe of - - - - - | 4 |
| unusually small - - - - - | 4 |
| remarkably elastic - - - - - | 4 |
| flabby and elastic - - - - - | 1 |
| friable - - - - - | 17 |
| much softened † - - - - - | 2 |
| hard and grating - - - - - | 1 |

after death from yellow fever are mainly referable to deficiency or excess of blood in the parts; such, for instance, as the pale hue of the liver, the variously coloured surface (as to degree) of the primæ viæ, &c. The rapidity of attack,—the rapid manner of recovery,—are nowise favourable to the notion that any of the viscera are seriously altered in their organisation; and the same inference seems to be applicable to the composition of the fluids. At the same time, for the sake of inquiry, it ought to be kept in mind that a small change, whether in the solid structure of the body or in the circulating fluid, may have the most serious effects, even to death. Who, *à priori*, would imagine that the exclusion of atmospheric air from the lungs for three minutes could prove fatal? or that certain animal and vegetable substances (proved by experience to be intense poisons), could rapidly produce death, even though they have no appreciable effect on any of the textures of the body when destitute of life?] — ED.

* In this case terrific hiccup during life.

† In one of these cases the liver was so soft and friable it could not be held by the hand.

Liver :—

| | | | | | | | | |
|--|---|---|---|---|---|---|---|----|
| dense | - | - | - | - | - | - | - | 2 |
| cirrhosis | - | - | - | - | - | - | - | 1 |
| external colour of deep yellow | - | - | - | - | - | - | - | 10 |
| " " pale yellow | - | - | - | - | - | - | - | 9 |
| uniform yellow colour of investing membrane and parenchyma | | | | | | | | 1 |
| external surface mottled yellow and red, and yellow and slate colour | - | - | - | - | - | - | - | 1 |
| pale green | - | - | - | - | - | - | - | 1 |
| greenish brown | - | - | - | - | - | - | - | 2 |
| very red | - | - | - | - | - | - | - | 1 |
| ' Bath brick ' colour | - | - | - | - | - | - | - | 1 |
| pale slate colour | - | - | - | - | - | - | - | 1 |
| ochrous brown | - | - | - | - | - | - | - | 2 |
| reddish yellow externally and internally | - | - | - | - | - | - | - | 1 |
| mottled externally, ' Bath brick ' colour internally | - | - | - | - | - | - | - | 1 |
| ' Bath brick ' colour externally and speckled internally | - | - | - | - | - | - | - | 2 |
| mottled pinkish red externally, clayey yellow internally | - | - | - | - | - | - | - | 1 |
| mottled, of different shades of yellow, externally, dark yellow internally | - | - | - | - | - | - | - | 1 |
| light brown externally, anæmiated internally- | - | - | - | - | - | - | - | 2 |
| speckled, red on yellow ground, externally and internally | - | - | - | - | - | - | - | 1 |
| red dots surrounded by yellow rings internally | - | - | - | - | - | - | - | 16 |
| inflamed | - | - | - | - | - | - | - | 1 |
| portal system gorged | - | - | - | - | - | - | - | 13 |
| " " empty | - | - | - | - | - | - | - | 2 |
| parenchymatous congestion | - | - | - | - | - | - | - | 17 |
| anæmiated | - | - | - | - | - | - | - | 2 |
| gorged with bile drops | - | - | - | - | - | - | - | 1 |
| " " black blood | - | - | - | - | - | - | - | 4 |
| " " thin serous blood | - | - | - | - | - | - | - | 4 |
| gall bladder empty | - | - | - | - | - | - | - | 5 |
| green bile in gall bladder | - | - | - | - | - | - | - | 30 |
| yellow bile | - | - | - | - | - | - | - | 5 |
| dirty brown olive bile | - | - | - | - | - | - | - | 1 |
| bloody yellow bile | - | - | - | - | - | - | - | 1 |
| gorged with bile | - | - | - | - | - | - | - | 12 |
| mucous membrane of gall bladder darkly hyperæmiated | - | - | - | - | - | - | - | 2 |
| intensely red and bladder filled with yellow bile* | - | - | - | - | - | - | - | 1 |

* [In the majority of instances, the liver has been found, after death from yellow fever in Barbados, of a yellowish hue, somewhat between straw colour and that of unbleached wax, and unusually friable. The same has frequently been observed before. My friend Mr. Gulliver, conjectures the cause of the

| | Cases. |
|---|--------|
| <i>Spleen</i> :— | |
| perfectly healthy - - - - - | 6 |
| friable and soft - - - - - | 12 |
| almost fluid, with broken-down black blood - - - - - | 1 |
| containing much grumous blood - - - - - | 1 |
| “ thin claret-like blood - - - - - | 2 |
| congested - - - - - | 11 |
| enlarged* - - - - - | 14 |
| <i>Urinary Bladder</i> :— | |
| containing urine - - - - - | 20 |
| very much distended with urine - - - - - | 1 |
| containing limpid urine - - - - - | 1 |
| contracted - - - - - | 4 |
| thickened - - - - - | 2 |
| mucous and submucous membrane ecchymosed and injected - - - - - | 1 |
| <i>Kidney</i> :— | |
| inflamed † - - - - - | 10 |
| unusually large - - - - - | 1 |
| unusually small - - - - - | 1 |
| congested - - - - - | 3 |
| cortical structure hypertrophied - - - - - | 23 |
| abscess in surrounding cellular tissue - - - - - | 1 |
| containing a serous cyst - - - - - | 1 |
| friable - - - - - | 2 |
| softened ‡ - - - - - | 2 |

pale hue to be “merely a bloodless state of the organ, a draining off of the red corpuscles in the black vomit from the portal system;” adding (I quote from a note from him), “If this be true, the hepatic lobules ought to be reddest in the centre, and palest at the circumference; that is to say, the portal vein being distributed to the interlobular spaces, blood drained from this vessel would render the margins of the lobules pale, while their centre (supplied by the venules which open into the vena cava) might be expected to be redder.” This explanation accords with my recollection of the peculiar appearance of the liver.

In the destructive yellow fever which prevailed amongst the troops in Dominica, between April and June, 1838, “a small quantity of transparent lymph” is noticed as being commonly found in the gall-bladder in the fatal cases, with the liver of “a buffy colour.”—Ed.

* [The spleen, in the majority of the fatal cases of the late endemic in Barbados, exhibited no uniform, or indeed but rarely any well-marked, morbid appearance.]—Ed.

† The pyuritis was generally slight, but occasionally extended to urters.

‡ [In many instances, in the fatal cases of yellow fever in Barbados, the kidneys have exhibited a congested state, with ecchymosis of the investing membrane; and the urine, during life, has been found to be albuminous, coagulating when heated and on the addition of nitric acid: this I have learned from Staff-Surgeon Dr. Collings, who has made many observations and

Lungs :—

| | | | |
|---|---|---|----|
| adhering to pleura by red coagulum and engorged | - | - | 1 |
| inflamed (1st stage) [?] | - | - | 1 |
| apoplexy of, with extravasation | - | - | 6 |
| gorged | - | - | 20 |
| shrivelled, collapsed, and uncongested | - | - | 2 |
| bronchi injected and lined with blood and mucus | - | - | 1 |
| bronchi simply injected | - | - | 3 |
| pus or puriloid matter found in blood | - | - | 3 |
| tubercle [?] in blood detached, but unsoftened | - | - | 1 |

Heart :—

| | | | |
|--|---|---|---|
| enlarged | - | - | 5 |
| enlarged, flabby, and pale | - | - | 1 |
| contracted and small | - | - | 1 |
| soft and flabby | - | - | 8 |
| valves imperfect | - | - | 3 |
| left side gorged with black fluid blood | - | - | 2 |
| highly arterialised blood in left ventricle | - | - | 2 |
| dark thin blood with clots in right cavities | - | - | 5 |
| yellow and greenish yellow coagulum in right cavities | - | - | 3 |
| “ “ with black blood | - | - | 4 |
| “ “ in left auricle | - | - | 1 |
| heart generally full of blood | - | - | 1 |
| right auricle contracting on the application of stimulants | 2 | | |
| hours after death | - | - | 1 |
| pericardium containing much yellow effusion | - | - | 3 |

Aorta :—

| | | | |
|--------------------|---|---|---|
| full of blood | - | - | 1 |
| yellow coagulum in | - | - | 1 |

Head :—

| | | | |
|---|---|---|----|
| scalp, integuments gorged with dark blood | - | - | 3 |
| sinuses and vessels enormously congested | - | - | 10 |
| general vascularity and congestion | - | - | 14 |
| extravasation on brain | - | - | 3 |

experiments on the subject. In a letter with which he has favoured me, of the 28th December, 1848, he says,—“ In every case of decided yellow fever I have found the urine highly albuminous ; a condition which it assumes about the second or third day and maintains throughout, increasing as the disease advances, and, in cases of protracted convalescence, continuing long after all symptoms but debility have left the patient.” Most of the albuminous precipitates, he mentions, were of a brownish colour ; in some cases just before the fatal termination, the presence of blood in the urine was recognised by the microscope. In two instances he found the albumen in the urine replaced by a substance having the properties of caseine.]—ED.

| <i>Head</i> :— | Cases. |
|---|--------|
| membranes of yellow tinge - - - - - | 1 |
| arachnoid milky - - - - - | 11 |
| choroid plexus gorged and pia mater injected - - - - - | 2 |
| serous effusion from arachnoid - - - - - | 3 |
| effusion into ventricles (seldom more than $\frac{3}{8}$ iss) - - - - - | 13 |
| brain pale - - - - - | 1 |
| soft* - - - - - | 1 |

Spinal Column :—

Only one examination of. In that case it was found congested with venous blood. Priapism was observed before death (Case 2816 of “Seaman’s Hospital Register”).

The *Blood* in the dead subjects was almost invariably abnormally thin and black.†

The second anatomical characteristic of the disease was the hæmorrhagic lesion of the mucous and submucous surface of the alimentary canal, and the peculiar excretions therein contained. The cardiac end of the stomach was the chief site of the inflam-

* [As there are varieties or modifications of yellow fever, so it would appear, as might be expected, that the lesions discovered after death are also far from uniform. The details given by the Author sufficiently demonstrate this. I may add a few examples from the records in the Inspector’s Office, in Barbados. In the endemic which prevailed, and was so fatal among the troops at Brimstone Hill in St. Kitt’s, in 1812, which came under the observation of Dr. Jackson, marks of inflammation of the membranes of the brain—viz., lymph and serum effused—were noticed in a large number of instances. In 1811, in the fever that prevailed in the garrison of St. Ann, Barbados, Dr. (afterwards Sir Charles) Ker mentions that there was little determination to the stomach, but that the brain was strongly affected, the patient usually dying comatose. In the fever of 1816, in the same garrison, Dr. Ferguson reports—that cerebral inflammation was a common accompaniment, and that coagulable lymph was often found on the surface of the brain. In the same year yellow fever occurred and was destructive in Antigua, Tobago, and Grenada: at each station a peculiarity is reported in the lesions discovered after death. In Grenada, the liver was found most affected: in Tobago, the throat and lungs; in the latter, the intestines often had a gangrenous appearance, and the omentum an appearance as if inflamed: in Antigua, as in Barbados, the brain was the chief seat of the lesion. The worst cases in this epidemic were marked by hæmorrhages and the black vomit.]—ED.

† [In the late endemic in Barbados, the blood in the body was generally of dark colour, as if not duly aërated; but, according to my recollection, it was rather unctuous and thick than unduly thin: concretions of fibrin, or even crassamentum, were rarely found where they usually occur, viz., in the cavities of the heart and the great venous trunks. The appearance of the blood, whether abstracted during life or examined shortly after death, did not at all denote inflammatory action.]—ED.

matory or congestive hyperæmia. The œsophagus, particularly at its gastric extremity, was next in frequency affected. The affection of the œsophagus had, however, some peculiarities, and chiefly in being attended with a peeling or erosion of the epithelial coat in longitudinal stripes. This erosion might occur without hyperæmia, and *vice versâ*.

The erosion was always more or less marked as vomiting had been more or less severe during life. The intestines followed the œsophagus in frequency of lesion. Sometimes the congestion or ecchymosis of the mucous and submucous surface of the alimentary canal was so intense and extensive as to give them a sphacelated appearance, and an appearance of gangrene to the whole intestinal peritoneum, on opening the walls of the abdomen.

The villi were the chief seats of engorgement, sometimes to perfect blackness. The hyperæmia had sometimes a stellated appearance, sometimes dotted or blurred or striated, sometimes arborescent, and generally of a rusty red colour; frequently inflammation, congestion, and ecchymosis were so blended as to defy discrimination. The hyperæmiated or eroded surfaces were generally clothed with viscid mucus; sometimes the stomach was of a uniform deep claret colour, as if by the imbibition of imperfectly formed black vomit, and giving its peritoneal coat a rosy hue. Sometimes the general red discoloration of an apparently inflamed piece of stomach or intestine could be scraped off without injuring the mucous tissue. On such a piece being slightly washed of its mucosities and held up to the light, the appearance resolved itself to a mere film of blood, adherent apparently by the undeveloped epithelial matter. The ecchymosis was occasionally in the mucous, frequently in the submucous, and only once in the subperitoneal tissue. The unusual condition of the solitary and aggregate glands seemed due entirely to surrounding and interstitial congestion and ecchymosis. At the ilio-cœcal valve the hyperæmia was thickly punctuated, like a close shaven black beard.

Submucous arborization was of general occurrence in the large vessels. In one case it was in six-inch-length patches in the jejunum, and of three feet in the ileum, accompanied with extensive ecchymosis. Sometimes the capillaries (particularly of the œsophagus) were developed as in chronic ophthalmia, but of a

dark colour. The ulcerations occasionally showed a foul sloughy base, but in general they were merely peelings or erosions of unusual depth, and they were in longitudinal stripes. Hyperæmia frequently reddened and elevated their edges. Their surface was frequently formed of the submucous tissue and meshes of dead capillaries. The source of the black vomit could always be traced to hæmorrhagic spots generally in the stomach, but if not there, in the œsophagus or duodenum. The presence of black vomit in the stomach after death was the rule, its absence the exception. It was generally found in considerable quantities, so that on turning over the cadaver it would gush profusely out of the mouth and nares. Black vomit seemed merely an ulterior effect of the hæmorrhagic condition of the blood, mucous membrane, and capillaries; and although sometimes absent, its antecedent lesion was always present in a pure case of death from yellow fever. An early and fatal complication might destroy the patient before the disease was matured, and then, of course, many of the anatomical signs would be absent. If the patient died of secondary symptoms, then many of the anatomical signs were absent, for they had passed away. Bloody black vomit was found in death after the third stage of the disease had shown a tendency to convalescence. In a case of death sixteen days after black vomit and yellow skin (Boenke's), although no black vomit was found in the stomach after death, the hæmorrhagic spots of mucous membrane still persisted. But in cases of normal duration, sometimes, black vomit was not ejected before death, nor found in the stomach after death. In these cases the development of the sign seemed to have been prevented, either by the supremacy of an active *inflammatory* condition of the stomach (as in the case of M'Leod, — a drunkard, or in that of Loudon), or by traumatic hæmorrhage draining the stomach and rest of the body of its blood, as in Case 2856., or by excessive engorgement of, or extravasation into, a neighbouring viscus or cavity, as in the case of West.

Where black vomit had been ejected during life, still it did not, in a few cases, show itself in the stomach after death. Sometimes emesis, by emptying the stomach immediately before death, caused this absence of the black vomit. Sometimes its ejection and elimination had ceased for a short time before death, and in that case the peristaltic movements carried the con-

tents of the stomach into the intestines. Treatment had its effects in altering the appearance of black vomit. Where the *mistura cretæ* had been used, or much milk allowed in the last stages, the character of the black vomit was much altered by the admixture. The appetite was frequently voracious before death. William Evans ate an egg heartily fifteen minutes before he died. Thus food occasionally formed an admixture with the black vomit found in the stomach.

The anatomical signs of our late epidemic disease were fully as characteristic as the living symptoms. The yellowness of surface, particularly of eyes; the *embonpoint*; the condition of the blood; the hyperæmia of the alimentary passages, particularly the cardiac ends of stomach, and œsophagus, and the duodenum; the hæmorrhagic state of the system, as indicated by the surface of raw blisters, by the oozings in mouth, and the black vomit in stomach, by ecchymosis and passive congestions; the peeled condition of the œsophagus; the *unjaundiced* condition of some or all of the internal white tissues, — gave in the dead subject indications which were not to be mistaken for the effects of any other known disease of the colony.

CHAP. IV.

TREATMENT.

DURING the first twelve or eighteen months of the epidemic, I believe all published, and many original, plans of treatment were tried, — sometimes with a gleam of success, but all finally abandoned. Although an interesting subject, it does not fall within my plan to review those failures, — but, instead, merely to point out briefly such of them as were undoubtedly injurious; such as were not adequately tried; and such plans as were undoubtedly of efficacy, and on which, after matured experience, the practitioner could rely. And first it may be mentioned, that blood-letting was injurious as the *basis of any system* of treatment, either in large quantities, or small and repeated quantities. It permanently reduced the pulse, prostrated the powers of life, and quickened the fatal termination. In many cases these effects were so marked, that the consulting physician could detect the fact of the patient having been bled without inquiry or an examination of the arm.* Of course the more inflammatory or dynamic the type, the less mischief ensued.

* [In a few cases during the late endemic in Barbados, the abstraction of blood from the arm had a trial, to the extent of eight or ten ounces; in a small number of instances it appeared to be of service, — in others to have no decided good effect, — and, in every instance if exceeding much this quantity, or if the v. s. were repeated, the effect was decidedly injurious, marked by death. These trials were made only when the strength of the pulse, and other present symptoms seemed to indicate the propriety of blood-letting, and would have indicated it without doubt in ordinary fevers of the continued kind, or in any of the phlegmasiæ. Yet in the West Indies there are experienced practitioners, — though the number, I believe, is small, — who hold that yellow fever is to be subdued by blood-letting, and who, in all, even the worst cases, trust mainly to it in the treatment; — a circumstance demonstrative of the difficulty of the subject, and the little reliance to be placed on individual experience in epidemics in which the tendency to end in death is great.

Probably those practitioners who have confidence in the remedial effect of the abstraction of blood in yellow fever first employed it in an endemic complicated with an inflammatory state of some organ, especially of the mem-

Local bleeding, however, was frequently requisite as subsidiary treatment; and sometimes in the first stage, when the tension of the pulse was extreme, and there threatened local congestion, venesection was admissable. But in all cases the more economical the expenditure of blood, the better. When there was much suffusion of face, and injection of eyes, and the frontal headache was very severe, then a few ounces of blood from the temporal artery gave great relief. Sometimes, however, the *mere incision* gave immediate relief to all the head symptoms without a drop of blood being drawn. In epigastric tenderness cupping will relieve it, as well as the concomitant irritability of stomach and fieriness of tongue. In this case also little blood need be taken. Frequently all the gastric symptoms disappear with the application of the exhausted glass, even before the scarificator is used. In all cases the lancet or cupping instrument should be used merely to meet some imminent symptom, to remove some inflammatory or congested complication, to render the disease *pure*, and prepare the system for the reception of the specific treatment. Blood-letting, thus limited, and in any shape, is admissible only in the first stage of the disease.*

Antimonials, also, except in the *simplex* grade of the disease, or when there was little irritability of stomach, were highly prejudicial. From the analogy of jaundice many used the nitro-muriatic acid internally. The experiment, however, was seldom repeated by the same practitioner, for the exasperation of the stomach symptoms became extreme.

branes of the brain, of which instances are recorded in foot-note p. 100. In those fevers, according to Drs. Jackson and Ferguson, the abstraction of blood largely was necessary and of decided benefit. Other instances are on record of yellow fever, both in the West Indies and in America, in which the abstraction of blood was mainly relied on as a remedial means,—endemies of the same type, more or less complicated with the phlegmasiæ or inflammation of some one particular organ.]—Ed.

* [The above remarks are well adapted, I believe, to regulate the use of blood-letting in yellow fever, and are deserving, in consequence, of careful attention by the bedside of the patient.

I am not aware that the abstraction of blood from the hæmorrhoidal veins has yet been had recourse to in this disease. It may be deserving of trial either by means of leeches applied to the verge of the anus, or by puncturing the hæmorrhoidal veins when protuberant. This mode of treatment has been suggested in a note I have received from Mr. Gulliver, founded on the supposition—a very probable one,—that in yellow fever, before the occurrence of black vomit, there is accumulation of blood in the *vena portæ*.]—Ed.

Among the medicines which were attended with danger in our yellow fever the salts of opium may be mentioned. In some cases when the irritability of stomach was accompanied by general restlessness and uneasiness, a ten or fifteen drop dose of the acetate of morphia has been followed by tranquillity, without any unpleasant symptom being induced; but, on the other hand, I have seen stupor, prostration, and complete narcotism follow the use of three drops of the solution of the acetate (one-tenth of a grain of the salt). This was in case 4099 of the Seaman's Hospital Register. It was in that case administered on the seventh day of illness. When this drug is used it should be administered early in the disease; but, considering the tact and discrimination necessary to obtain beneficial results, it would perhaps be more judicious to place it in the *index expurgatorius* of yellow fever materia medica.*

Of the plans of treatment not adequately tried I would particularise the transfusion of the nonpurgative salines. In four cases only was transfusion tried. They all died; but they were moribund when operated on. In the last stages of the disease, when in most cases the stomach rejects almost every thing, and the pulse is scarcely felt at the wrist, and the skin is livid and damp, transfusion of blood or of saline solutions into the veins seems the obvious mode of restoring the lost power of the heart. In any future epidemic it is worthy of an extended trial in the third stage of the disease. The imminence of the symptoms need not discourage the practitioner. Black vomit is no indication of gangrene or sphacelus; it is a curable symptom even now. Its first effects seem critical and salutary. It seems the last effort of nature to relieve the system of the disease. There may be but one element of success wanting in the struggle, and could we but manage this *nisus*, an epidemic would lose its terrors. The only practical point which need be adverted to, from the slight experience I have had of transfusion in yellow

* [Opium or morphia, in doses similar to those mentioned in the text, and in a like condition, — viz. irritability of stomach, general restlessness, inability to sleep, — was used in Barbados, in the late endemic in many instances with advantage and with comparatively little risk of the bad effects referred to by the Author. In other epidemics, however, such bad effects may be produced by it: too much caution, therefore, cannot be observed in making trial of it.] — ED.

fever patients, is the necessity for using the *twisted* suture after the operation, by which alone hæmorrhage could be prevented.*

The *materia medica* of the practitioner in yellow fever might, after the experience of the entire epidemic, be almost included in the following list, viz. a *compound* of *calomel* and *quinine* in the proportion of 20 grains of the former to 24 grains of the latter, and known by my prescription at the Seaman's Hospital, and on the boards at the head of the patients, and in the case books of the resident surgeon, by the symbol "20 and 24."—*Castor oil*; *water*; *cantharides blister*; *Rhenish wine*; *chalk mixture* (without any essential oil); *creosote*; *liquor potassæ*; *ammoniacal paste*; *sinapisms*; *musk*; *carbonate of ammonia*; *spirit of mendererius*; *magnesia*; *laxative enemata* and *lemonade*.† The dietetics were barley-water, sago, arrowroot, tea, chicken-broth, beef-tea, and toasted bread (unbuttered).‡ The above includes all that is peculiar in the established treatment of normal yellow fever. Complications were treated on general principles. The efficacy of the remedies above enumerated had been determined chiefly by empirical treatment, and the use of them was known before their rationale or *modus operandi*. A casual view will show that they comprise febrifuges (but what is not so obvious, one of special and extraordinary power,) evacnants, refrigerants, counter-irritants, cordials, antacids and vegetable acids. The 1st, 2nd, 3rd, and 4th classes refer to the treatment of the first stage of the disease; the 5th to the inter-

* [The history of transfusion, whether of blood or of saline solutions, does not appear to be in favour of their remedial power. Moreover, what success can be expected from trials of the kind in moribund cases, and who would consider himself justified in making them except in such cases?]—ED.

† [In Barbados, during the late epidemic, trial was made in the advanced stage of the disease, of chlorate of potash, and also of nitrate of silver, and of spirits of turpentine, in small doses, but without apparent good effect. The hope was that the chlorate might act beneficially on the blood; and the nitrate of silver and the turpentine on the stomach. The saline plan of treatment was also tried, and likewise with negative results. In the yellow fever which prevailed in 1828, superacetate of lead, it is reported, was tried by a medical officer, Mr. O'Callaghan, in the early stage of the disease, when the stomach was irritable, and with advantage. It was given in grain doses every half hour, and, in a few instances, in doses of four grains, dissolved in water; purgatives were afterwards administered.]—ED.

‡ [Salt was relished, in the yellow fever of Barbados, used in rather large proportion, in beef-tea or chicken-broth; and it was believed to be serviceable.]—ED.

mediate stage; the 2nd, 5th, and 6th to the third stage; and the 7th to a protracted state of the second and third stage, as if the disease were a *chronic yellow fever*; in cases of which, yellow suffusion generally persists long without much irritability of stomach, or evolution of acid gastric secretions. When a medical practitioner was called to a case of yellow fever in the formative stage (for the practised eye could even then discover its existence), or within a few hours after the development of the first stage of the disease, if he prescribed 20 grains of calomel and 24 grains of quinine, and in six hours followed it by a dose of ℥iii of castor oil, he would in, perhaps, nine cases out of ten, immediately arrest the disease. If the disease did not yield to the first dose, the calomel and quinine were to be repeated every six hours as long as there was no contra-indication, and as long as the first stage of the disease existed. Sometimes after the repulse of the disease by the first or second dose, it rallied, particularly if the patient had presumed too soon on his cure, or exposed himself to fatigue, or indulged at table. I have often seen this repulse and rally occur in several alternations; and as the symptoms were all, as it were, external, and the power of the remedy palpable, the observing of their antagonistic play was curiously interesting. Sometimes, — and then not unfrequently by imprudence on the part of the patient, — the disease finally seized and carried off its victim. As long as the first stage of the disease continued, and the blood remained apparently uncontaminated, this plan of treatment offered good hopes of recovery; but its success was in proportion to the earliness of its use. Very early in the first stage it might be designated a *specific*, I believe: I have never had occasion to prescribe more than six such doses to any one patient; and I have no recollection of ptyalism ever having followed its use. It was a matter of much importance to attend to auxiliary treatment where any predominant symptom deserved notice. Thus, as before mentioned, much frontal headache, with injection of eyes and suffusion of face, might require arteriotomy, or blistering of nape of neck; and crimson-edged tongue and tender epigastrium, and irritable stomach might require cupping and sinapisms, or blisters. Intense heat of surface might require the cold drip or wet sheet (of which more anon). But all

this was desultory and symptomatic treatment, and subservient to the grand object of getting the calomel and quinine introduced *cito, tuto, et jucunde*. The contra-indication to persistence in the quinine and calomel treatment was early *hypercinchonism*. An intolerance of the quinine, shown by an unusual and violent effect on the head, and causing much deafness after the first dose, contra-indicated its further use, and offered the most unfavourable prognostic of the case. This sign, in the first stage of the disease, was as unfavourable as *hunger* in the last. However beneficial this treatment was for the first stage, it was prejudicial if used in the second or third. If it did not *resolve* the diseased action at first, it was to be given up. It is necessary to state that there was one drawback to the calomel and quinine cure, — the *cure by resolution*, viz., that it still left the patient susceptible of another attack unless he removed from the malarious district.*

When, during the first stage, the heat of surface was moderate, or felt pungent only on lengthened application of the hand, as if the heat were deeper than the cuticle, and was concealed by a greasy perspiration, then sponging with vinegar and water, or tepid water only, was required. But when the heat of surface was dry and ardent with restlessness, the application of a sheet (the only covering) wrung out of cold water and wrapped round the trunk and limbs became requisite. In such cases the head was generally much affected, and its temperature was reduced

* [The above mode of treatment by quinine and calomel, which appears from the accounts of the author to have been so successful in the yellow fever he describes, was tried in the last endemic yellow fever of Barbados, and extensively; but, I regret to state, not with like success. In the cases which first occurred, in many instances it seemed to be beneficial; in those which followed, the good was less marked; in very many it was doubtful, or null: but even in these latter cases it did not seem to aggravate the symptoms. In the treatment of the pure remittent fever — that arising from the same cause as intermittent, — quinine given in large doses, so as to produce cinchonism, is an heroic medicine, as widely-extended experience in this class of diseases in the West Indies clearly proves; affording, in the majority of cases, almost certain security of recovery, and these cases of such severity that without such aid many of them could not fail of proving fatal. It is possible that the difference of effects of the quinine and calomel plan of treatment in Demerara and Barbados may have been owing to the yellow fever in the former locality having been modified by the malarious influence productive of remittent fever, — an influence in that malarious country affecting almost all diseases, and seemingly indicated by the train of symptoms of the yellow fever, especially the earliest, — the alternations of chills and heats.] — Ed.

by having it shaved and covered with a piece of thin cambric, on which water dripped from a basin suspended over head by the capillary action of a bundle of cotton threads, having one end immersed within the basin of water and the other ends hanging over the edge of the basin. In reducing the dry ardent heat of the first stage, ordinary cold baths or sponging, by inducing a series of reactions, exasperated the symptom. The only means of thoroughly reducing it was by the *continuous* evaporation of the wet sheet and head-drip. When they were required it was necessary to protect the pillow by oil-cloth, and to remove the bedding from the paillasse, so that when the wet sheet was removed the patient could have a dry and comfortable bed. The application of the wet sheet till it dried was generally sufficient to reduce the temperature to a natural standard, and then the sheet was removed; but if the heat persisted, aspersion was required, or the sheet might be redipped and reapplied a second or third time. Before the heat on reduction admitted of being *kept* at a natural standard, the skin generally had to be rendered cold, with some appearance of maceration of the fingers, on the removal of the sheet. I do not recollect a case which required its continuous application longer than twenty-four hours. I have known the head-drip required for three days. The wet sheet is a powerful agent, and its effects must be watched, particularly where a tendency to pulmonary disease has existed. Its applications are not unpleasant to the feelings of the patient, except sometimes from the first shock. In such cases, if the sheet be dipped in tepid instead of cold water, every end will be equally well obtained without the shock.*

During the second stage of the disease, the best treatment was *expectant*. A careful restriction of diet and drink to articles of the blandest and lightest description, and small quantities at a time, and resistance to the indiscretion of the patient and the officious interference of friends in such matters. If the disease ceases with this stage, the same carefulness must be extended to the period of convalescence. If aperients are required, mag-

* [These directions for the reduction of temperature I believe to be of great importance. The ordinary manner by which it is attempted to keep the head cool—by the application of a wet cloth—probably does more harm than good, as the cloth is generally allowed to become dry at night.]—ED.

nesia or enemeta are best. If a stimulant be permitted, it should be a moderate quantity of the best hoek or very weak brandy and water, well cooled, though not iced, in each case. If much gastric irritation show itself, and the epigastrium has not already been blistered, *sinapisms* frequently reapplied will now be of much benefit, and liquor potassæ in barley-water. When the disease proceeds on to the third stage, the cautions as to the nice management of diet and drink must still be in a great measure maintained; and though the chances of life are now fearfully diminished, we must bear in mind that the disease is still curable, and that it has a period of duration which it must be our endeavour to make the patient outlive. This can frequently be done by vigilantly watching the symptoms and mitigating them; by warding off some of the corrosive effects of what seems to be a depuratory secretion, and by sustaining and husbanding the general powers of life. Where counter-irritants are required, the ammoniacal pastes or sinapisms are to be preferred. Cantharides blisters never do well in the last stage; they exhaust and form hæmorrhagic surfaces. The diminished heat of the extremities must be met by dry frictions, light flannel clothing, and hot applications. Emesis was frequently moderated or checked by the exhibition of drop doses of creosote made into a light emulsion with mucilage and sugar.* It acted most beneficially when the tongue had lost its fiery edge and tip. In cases where creosote was least beneficial, chalk mixture was found to answer best. It was taken in ζ i. doses every one, two, or three hours. Sometimes, though rarely, the patient complained of the *mistura cretæ* loading the stomach, and then it had to be discontinued. Signal advantage was often derived from this remedy, not only in allaying the vomiting and burning at the *scrobiculus cordis*, but also on the indications of the tongue. *Liquor potassæ* in twenty drop doses is now eligible, or may alternate with or be a substitute for the *mistura cretæ*. It was generally used with barley-water as the vehicle. About ζ ii. of the liquor potassæ was the average quantity which a patient required during the entire period of the second and third stage. When the stomach would bear

* In my experience no beneficial effect ever followed the use of hydrocyanic acid for allaying the irritability of stomach.

carbonate of ammonia and musk in combination*, its effects were highly beneficial. Ten grains of carbonate of ammonia and thirty grains of musk were an ordinary dose, which was frequently repeated. In some rare cases wherein the heat of the extremities persisted during the third stage, the aq. ammon. acetat., with an excess of ammonia, was exhibited with advantage. A mixture of carbonate of ammonia and hydriodate of potash in solution was often used and retained with salutary effects. Carbonate of soda was sometimes substituted for *liquor potassæ*. The remedies admitted of much variety as to formula, but the *antacid* and *cordial*, combined or separate, was the basis of treatment. Of all cordials the best was Rhenish wine. The Seaman's Hospital incurred very considerable expense in the purchase of that article, for unless the hook was of the very best quality it proved detrimental instead of curative. When of good quality it is retained when every thing else is rejected, and it is universally liked by the patients. I have seen the most excellent effects from its use, and have often given it to the extent of two bottles in twenty-four hours. I believe it has saved many lives, and I know of no adequate substitute for it. Its flavour should be marked yet delicate. If it sensibly effervesces with the carbonates it is useless, for it will not only be rejected by the stomach but disliked by the patient.

Chicken-broth, milk, barley-water, and thin arrowroot or sago, should be given frequently, but in small quantities. When convalescence is established, it is of the utmost consequence that the transition to the diet of health should be gradual. Cases of exacerbation and relapse have been known to follow the too early transition from even "barley" to "low" diet.

After the cessation of the disease, and the stomach is restored to health, a jaundiced state of the skin and ill-conditioned abscesses, and other occasional sequelæ, will require lemonade, oxymuriate of potash, and decoction of cinchona, or change of air, and treatment on general principles.

The foregoing memoranda of treatment refer to the epidemic in the *mitior* and *gravior* grades.

* Two or three rejections are not to prevent a further continuance of the remedy.

When the *simplex* grade prevailed the cases were infallibly cured by a purgative and quinine pushed on to cinchonism.*

* [The type of the fever must of course determine the treatment to be employed with the best chance of success. Consequently too much attention cannot be paid to ascertain its exact nature,—first by studying the symptoms, and next by careful inspection of the body in cases of fatal termination. Unfortunately when yellow fever is most malignant and destructive, and the inquiry alluded to is most required, there is commonly, from the pressure of duty, especially in military hospitals, little or no time to engage in it.

Medical officers, to serve with advantage in the West Indies, should make yellow fever a special study. It is to be hoped the time will come when instruction will be given on the diseases of the army, by competent teachers, to the candidates for commissions in the medical department. The General Hospital at Fort Pitt, Chatham, with its valuable pathological museum, is admirably adapted for the purpose; and I have no hesitation in expressing my opinion that competent teachers might be found in the retired medical officers of the higher grades, were the appointments given not by favour but to merit, and were they to be considered in themselves distinctions. This was a subject which Dr. Jackson took much to heart, and advocated strongly; prompted so to do chiefly from considering the treatment of yellow fever in his time, as at present too commonly, one of routine in the army, and of little efficacy. He not only addressed the Medical Board on the measure, but also the General, the then Commander of the Forces in the West Indies. Were there such a system of teaching established, another benefit might result from it: the attention of young men might be directed to inquiry; questions, of which there are so many unsolved, might be proposed, to be investigated as opportunities offered, in their after career, the solution of which would greatly advance medical science, and could not fail to improve medical practice.]—ED.

DIVISION III.

“ SOME of the physieians of New Spain admit that the epidemics of the *vomits*, as well as the smallpox, are periodical in the torrid zone, and that the happy time already approaches when Europeans may land on the coast of Vera Cruz without incurring greater risk than at Tampico, Coro, Cumana, or wherever the climate is excessively warm and at the same time very healthy. If this hope is realised, it will be of the greatest importance carefully to examine the modifications of the atmosphere, the changes which shall take place at the surface of the earth, the draining of marshes, and, in a word, all the phenomena which shall coincide with the termination of the epidemic.”—*Humboldt*. *

In the preliminary remarks, the mud flats and sand banks which form the *foreshores* of British Guiana have been referred to: of such as these no doubt the whole colony was originally formed. They shelve out into the sea in front of the poldered land, and are composed of banks or flats, of fine siliceous sand (eaddy), or shell sand, or drift mud, in alternate ridges, or superimposed in the order as stated. The sea sometimes encroaches on the land, and these foreshores are washed away, and plantation embankments injured or destroyed, and the safety of the town threatened. Sometimes the sea again recedes, new land rises in the sea front, demanding laborious and expensive operations to keep the draining trenches and sluices patent. These oscillations are periodical and alternating; but their causes and laws have never been determined or investigated: and, indeed,

* [A belief, founded on partial experience, commonly prevails in the West Indies, that the outbreak of yellow fever there is periodic, as expressed in the quotation in the text from Humboldt. Its recurrence at intervals of time may be considered as well established; but it cannot be admitted to be equally well established that the intervals are regular and alike, so as to admit of being calculated. The Return in foot-note p. 46, 47. is proof of this in Barbados; and were there Returns of the same kind for the other islands in which troops have been stationed, additional proof of it, it may be confidently asserted, would be afforded.]—Ed.

they have hitherto excited little remark, except at the moment when the obstructions to drainage, or destruction of dams, buildings, and embankments, have entailed expense or loss. Future observations may connect these oscillatory movements of our foreshores with meteorological cycles, in which the force and direction of the wind will be found material elements. There appear to be three epochs of oscillation determined. From the records of the Royal Engineers' Office it appears that representations were made relative to the encroachments of the sea at Fort William Frederick in 1797, and that in 1799 and 1800 considerable outlay was required for defensive work against the sea.* In June, 1820, and not till then, similar representations were made as to the dangerous state of the dams and fortifications, —so much so as to excite a serious discussion in the Court of Policy; and in 1821 and 1822 a large sum was voted for the reconstruction of the dams; and now, in 1847, the government is at similar work. Each of these periods of encroachment must have been preceded by a corresponding epoch of alluvial deposition. An old map, by Major Van Bouchenrœlder, demonstrates this for the first period; that of the second epoch can be inferred only. Reference to a map of the front of the Military Grounds in 1836, drawn from a survey by the late Thomas Hubbard, sworn surveyor, at the instance of the late Mr. Robertson, for the purpose of obtaining a government grant of the recently formed land, shows clearly an advanced stage in the completion of the third period of deposit.

The periods of the acme of accumulation seem singularly coincident with the prevalence of epidemic yellow fever, and the period of wash, or encroachment of the sea, with the disappearance of the disease. The plan now published of the Military Grounds, shows the condition of our foreshores in 1836 and 1847.† It is required as an aid only for future investigators, the condition of these foreshores, then and now, being within the easy recollection of the present colonists. The land, which had been making all along the shore steadily till after 1837, has been, for the last three or four years, melting away, and now the military works are threatened with destruction; the river bank on both

* It was then stated that the Equinoctial tides had risen thirteen feet.

† See Plate ii.

sides is washed; old barriers, as at Plantation Ruimveld, require to be renewed; churches, as at St. Swithin's, to be removed; and along the east coast a retreat is in many places required for the whole plantation embankments. Simultaneously with these scavenger operations of the sea, the yellow fever epidemic has disappeared. In connecting these phenomena with each other, it can be done now in a general way only. They are simply associated phenomena,—whether by accident, or in the relation of cause and effect, or as joint effects of a common cause, very many future observations may be required to decide. The present coincidence, however, is of importance as a finger-post to the whereabouts the pathogenic causes are to be sought. Whether the alluvial depositions act mediately or immediately — what poisonous animalculæ may be generated on them — what vegetable effluvium exhaled — what gas extricated — what the malaria may consist in — there are no data even for conjecture.* But still sufficient evidence has

* [In no instance of yellow fever in the West Indies, of which any precise account has been given, has there been any accordance amongst those under whose observation it fell, as to its cause. The opinions formed on the subject have been hardly fewer in number than the inquirers or speculators themselves. Contagion, deficient ventilation, defective drainage, and stagnant water, — decomposing vegetable and animal matter, near or distant, — the breaking up of virgin soil, or of ground that had long been fallow or never cultivated, — rank vegetation, or the unchecked overspreading of bush or jungle or low coppice wood in the neighbourhood, are some of the most notable circumstances which, from time to time, and in different situations, have had the blame, according to this or that one's opinion. The *post hoc, propter hoc* mode of reasoning, as already mentioned, has been the one most commonly employed. If there has been no marsh within many miles of the spot where the disease has appeared, those who are not contagionists, and must find an obvious cause, will, perhaps, point to a dried-up well or cistern from whence an offensive smell proceeds, or to the action of a current of air coming from a marshy spot some miles off, or to some blubber, or damaged decaying salt fish, allowed to remain on a neighbouring shore in a putrid state, or to neglected privies; forgetting that at other times the same circumstances have occurred unproductive of disease, or endeavouring to account for the difference of effect by constitutional predisposition, aiding, when the disease has occurred, and *vice versâ*.

All things considered, I believe it must be admitted that the true cause of yellow fever, like that of ague, and remittent fever, and of cholera, is yet unknown, — a subject for conjecture and research. The most accurate observations that have been made on it, not restricted to one epidemic or to one spot, but comprised in its general history, seem to favour most the conjecture that its cause is of a material kind, — a specific matter, rather than a combination of influences; some emanation from the earth, partial in extent, and variable in intensity; increasing and decreasing irregularly, and ceasing in operation as it commenced, without obvious or marked peculiarities of

been elicited from the last epidemic to show that our inquiries must be directed to the *shore*. If it be argued that the accumulation on the foreshores have acted only mechanically by obstructing the internal drainage of the country, and therefore the pathogenic causes are to be sought for within the empoldered lands generally, it may be asked why yellow fever is not engendered at post Mahaica, or on the Corentyne coast,—the worst drained, the swamiest, and yet in all seasons the healthiest portions of the colony.

Some new element is required in the generation of yellow fever beside what is to be found usually within our embankments, and it is in all probability dependent on a sea change.

To carry on an investigation on the influences which induce our yellow fever epidemic, would be more than any one individual would be suited for. Although the pathogenic cause may be close at hand and easily reached, the assiduous and joint researches, on a well considered plan, of the geologist, chemist, botanist, entomologist, and physician, would be the necessary earnest of success in any such undertaking. A minute inquiry into the vegetable, animal, and mineral constituents of our foreshores, should be made now, while the disease is absent, and carefully recorded for comparison with a similar one, to be commenced and continued during the next epidemic. In the difference there may be found some entity, or condition, common to all localities where yellow fever exists. Government, of course, alone could provide for a scientific commission of the kind required, and it would be no doubt expensive. But in anything feasible for discovering the origin of yellow fever, an

atmosphere;—in brief, a most subtle and violent poison, acting, probably, through the medium of the blood, and, when not itself destroyed by the living powers, destructive of life. It is easy to find analogies in favour of this conjecture in the operation of most of the poisons, whether animal or vegetable, including some that are mineral, arsenic for instance, which has already been alluded to. Were poisoning conducted on a large scale, and no inquiry instituted to detect the crime and the kind of poison used, and one were used for a time, and no other, the consequence would be an epidemic as mysterious, as to its origin, as yellow fever is now, or cholera, and as well marked in its symptoms. What research has accomplished in the instances of ordinary poisoning, we must hope it will effect when carried further, and with a minuteness and delicacy increasing with the difficulty of the inquiry, in the instances of yellow fever and other epidemic diseases.]
—ED.

evil of so great a magnitude, there is an object worthy the exertion of science, and of unsparing expenditure.*

The following tables are intended to show the "modifications of the atmosphere which coincided with the termination of the epidemic." In order to determine their value, it will be necessary to state, that for the first two months of 1843, observations were made on the heat, weight, and moisture at 8 A.M., 2 P.M., and 8 P.M. daily; that from the 1st March, 1843, the meteorological hours were those recommended by the Committee of Physics of the Royal Society of London, 3 A.M., 9 A.M., 3 P.M., and 9 P.M.; that the instruments were elevated about $35\frac{1}{2}$ feet from the ground, or $33\frac{1}{2}$ from the level of the sea at high water of spring tides, in a chamber, the aspect of which was north and east, and where they were well protected from reflected or radiated heat; that the pressure of atmosphere was ascertained by Hyde's sympiesometer, from Watkins and Hill of London, which, by comparison with Sir Robert Schomburgk's mercurial barometer, was found to be +.068, the standard barometer of the Royal Society. The rain gauge was elevated about 45 feet, and observed once in 24 hours. The wind gauge was Whewel's, and read off twice daily, viz. at 6 A.M. and 6 P.M., in order to estimate the day and night, or land and sea breeze. The wet and dry bulb hygrometer only was used. The electroscope was an insulated copper wire, raised 83 feet, and not in the neighbourhood of trees, with a gold leaf electrometer, properly sheltered from the rain, and whose glass shade contained lime that had been rendered anhydrous. It will be seen that, although the observations were made with great regularity, there is an occasional blank. Thus the self-registering thermometer got out of repair; the rain gauge also: on such occasions blanks are left in the tables. It will be seen also that till *July*, 1843, Whewel's anemometer was not erected; till that time Lind's had been tried, but without satisfaction. An entire break occurs during July, August, September, and October, 1845 (the two last months of which were without

* [The advantage of such inquiry as that suggested in the text can hardly be doubted. Recently a board of commissioners was constituted in British Guiana for entering on the investigation in that colony, which straitened circumstances and want of funds, unfortunately, hitherto have rendered inefficient.]—ED.

rain). The observations from November, 1845, till February, 1847, I obtained from Mr. Sandeman, of the Georgetown Observatory. These are not strictly comparable with the Hospital observations, as they are the means of observations made at different hours. Mr. Sandeman's hours are 7, 8, 9, 11 A.M. noon; 1, 2, 4, 5, 7, 8, 9 P.M. In this climate, however, the mean of these hours, and those of the Royal Society, will elicit similar results. Mr. Sandeman's observations also are discontinued on Sundays, except in one observation on the rain gauge. The elevation of his instruments is considerably lower than that of the Hospital instruments; the Georgetown Observatory being elevated only about three feet from the level of the ground. Some of the circumstances worthy of remark in the following tables, are the high barometric curve and its gradual decline, the increased power of the wind (ascertained not to be due to the wear of instrument), and the low temperature of the long continued drought of 1845 and 1846. The electrical observations were made with great punctuality. The table shows *only the days on which electrical excitement was observed*, and *the days on which no observation of the instrument was made*, between the 2nd April, 1843, and 17th August, 1844. The infrequency of electrical excitement was unexpected, but is probably due, in serene weather, to the high average in the ratio of humidity.

MONTHLY MEANS OF METEOROLOGICAL OBSERVATIONS TAKEN IN GEORGETOWN, DEMERARA.

| Date. | Temperature. | Dew Point. | Weight of Atmosphere. | Elasticity of Vapour. | Ratio of Humidity. | Velocity of Wind. | Rain. | Temperature. | | |
|-----------|--------------|------------|-----------------------|-----------------------|--------------------|-------------------|-------|--------------|------|-------|
| | | | | | | | | Max. | Min. | Diff. |
| 1843. | | | | | | | | | | |
| January | - 80·2 | 73·0 | 30·014 | ·799 | ·790 | - - | 7·99 | 83·6 | 76·0 | 7·6 |
| February | - 79·6 | 72·0 | 30·106 | ·771 | ·777 | - - | 6·16 | 83·1 | 75·9 | 7·2 |
| March | - 80·1 | 72·1 | 30·183 | ·775 | ·769 | - - | 3·61 | 83·5 | 76·4 | 7·1 |
| April | - 80·8 | 72·5 | 30·214 | ·784 | ·761 | - - | 1·78 | 84·3 | 77·1 | 7·2 |
| May | - 80·6 | 74·7 | 30·211 | ·846 | ·826 | - - | 16·16 | 84·4 | 77·1 | 7·3 |
| June | - 80·4 | 74·4 | 30·260 | ·836 | ·822 | - - | 13·32 | 83·2 | 76·5 | 6·7 |
| July | - 81·6 | 74·9 | 30·275 | ·850 | ·804 | 22·10 | 3·79 | | | |
| August | - 82·0 | 74·9 | 30·289 | ·850 | ·800 | 30·15 | 5·00 | | | |
| September | - 81·9 | 73·6 | 30·277 | ·815 | ·763 | 38·95 | 3·52 | | | |
| October | - 81·7 | 74·0 | 30·258 | ·825 | ·777 | 40·85 | 0·72 | | | |
| November | - 81·0 | 74·9 | 30·248 | ·850 | ·820 | 44·30 | 3·58 | | | |
| December | - 80·5 | 74·3 | 30·279 | ·835 | ·818 | 56·95 | 6·07 | 84·3 | 76·2 | 8·1 |
| Means | - 80·8 | 73·8 | 30·218 | ·820 | ·794 | Total. 233·30 | 71·70 | | | |
| 1844. | | | | | | | | | | |
| January | - 80·0 | 74·1 | 30·280 | ·828 | ·824 | 29·47 | 0·20 | 85·2 | 73·0 | 12·2 |
| February | - 80·3 | 74·6 | 30·267 | ·841 | ·829 | 51·70 | 2·29 | 85·0 | 75·0 | 10·0 |
| March | - 80·1 | 75·1 | 30·262 | ·856 | ·849 | 44·15 | 7·58 | 85·0 | 75·0 | 10·0 |
| April | - 80·2 | 75·6 | 30·348 | ·870 | ·860 | 32·25 | 7·14 | 86·0 | 74·5 | 11·5 |
| May | - 80·6 | 76·2 | 30·237 | ·888 | ·867 | 24·50 | 17·26 | 86·0 | 74·7 | 11·3 |
| June | - 80·0 | 75·4 | 30·262 | ·864 | ·860 | 17·10 | 19·93 | 86·0 | 75·0 | 11·0 |
| July | - 81·0 | 76·0 | 30·244 | ·883 | ·852 | 10·65 | 6·38 | 87·0 | 76·0 | 11·0 |
| August | - 81·8 | 75·7 | 30·236 | ·874 | ·821 | 15·40 | 6·15 | 87·0 | 75·7 | 11·3 |
| September | - 82·0 | 75·5 | 30·213 | ·867 | ·809 | 21·55 | 1·09 | 87·0 | 75·5 | 11·5 |
| October | - 82·3 | 75·0 | 30·210 | ·855 | ·790 | 26·00 | 0·06 | 88·2 | 75·0 | 13·2 |
| November | - 81·5 | 74·8 | 30·185 | ·847 | ·804 | 24·55 | 6·31 | 88·8 | 75·0 | 13·8 |
| December | - 81·9 | 73·3 | 30·151 | ·807 | ·755 | 31·45 | 10·04 | 86·0 | 74·2 | 11·8 |
| Means | - 81·0 | 75·1 | 30·233 | ·857 | ·827 | Total. 328·77 | 84·43 | 86·5 | 74·9 | 11·5 |

METEOROLOGICAL OBSERVATIONS — (continued).

| Date. | Temper- ature. | Dew Point. | Weight of Atmo- sphere. | Elasti- city of Vapour. | Ratio of Humidi- ty. | Velocity of Wind. | Rain. | Temperature. | | | |
|-----------|-------------------|---------------|-------------------------------|-------------------------------|----------------------------|----------------------|--------|--------------|------|-------|------|
| | | | | | | | | Max. | Min. | Diff. | |
| 1845. | | | | | | | | | | | |
| January | - 77.4 | 73.0 | 30.124 | .799 | .864 | 39.60 | 13.34 | | | | |
| February | - 77.8 | 73.3 | 30.149 | .806 | .861 | 36.45 | 7.04 | | | | |
| March - | - 77.7 | 75.8 | 30.156 | .875 | .938 | 60.03 | 11.24 | | | | |
| April - | - 78.5 | 76.0 | 30.149 | .882 | .920 | 53.71 | 7.70 | | | | |
| May - | - 78.6 | 75.8 | 30.165 | .877 | .911 | 51.90 | 15.54 | | | | |
| June - | - 78.2 | 75.9 | 30.148 | .878 | .926 | - - | 15.98 | | | | |
| July | | | | | | | | | | | |
| August | | | | | | | | | | | |
| September | | | | | | | | | | | |
| October | | | | | | | | | | | |
| November | - 81.3 | 75.3 | 29.859 | .862 | .715 | 59.78 | - - | 81.1 | 75.7 | 12.4 | |
| December | - 78.9 | 74.1 | 29.908 | .829 | .764 | 119.47 | 5.55 | 84.8 | 74.6 | 10.2 | |
| Means | | | | | | | Total. | | | | |
| | | | | | | | 76.39 | | | | |
| 1846. | | | | | | | | | | | |
| January | - 79.2 | 72.7 | 29.971 | .790 | .727 | 74.75 | 2.06 | 84.6 | 75.4 | 9.2 | |
| February | - 79.0 | 70.8 | 30.003 | .743 | .684 | 99.55 | .85 | 84.7 | 75.1 | 9.6 | |
| March - | - 79.8 | 72.2 | 29.977 | .777 | .694 | 131.27 | 2.06 | 85.04 | 75.6 | 9.8 | |
| April - | - 80.6 | 74.1 | 29.925 | .829 | .738 | 88.68 | 5.93 | 85.7 | 76.4 | 9.3 | |
| May - | - 80.7 | 76.2 | 29.928 | .887 | .794 | 71.53 | 14.08 | 86.0 | 76.5 | 9.5 | |
| June - | - 79.8 | 76.2 | 29.964 | .889 | .811 | 66.95 | 14.92 | 84.9 | 75.0 | 9.9 | |
| July - | - 79.3 | 75.3 | 29.997 | .863 | .785 | 28.56 | 13.27 | 85.4 | 73.9 | 11.5 | |
| August - | - 79.4 | 75.3 | 29.975 | .863 | .770 | 28.59 | 8.80 | 86.1 | 74.5 | 11.6 | |
| September | - 81.5 | 75.1 | 29.924 | .856 | .719 | 23.58 | .61 | 87.6 | 75.9 | 11.7 | |
| October - | - 80.0 | 75.3 | 29.927 | .863 | .755 | 44.90 | 5.88 | 86.9 | 74.3 | 12.6 | |
| November | - 80.3 | 75.1 | 29.902 | .857 | .759 | 63.72 | 5.57 | 86.0 | 74.5 | 11.5 | |
| December | - 79.0 | 75.0 | 29.912 | .854 | .814 | 52.50 | 11.23 | 84.1 | 74.6 | 9.5 | |
| Means - | | | | | | | Total. | | | | |
| | | | | | | | 774.58 | 85.26 | 85.6 | 75.1 | 10.5 |
| 1847. | | | | | | | | | | | |
| January | - 77.8 | - - | 29.952 | - - | - - | 115.66 | 9.29 | 82.6 | 74.2 | 8.4 | |
| February | - 77.4 | - - | 30.009 | - - | - - | 115.81 | 3.23 | 81.9 | 73.8 | 8.1 | |

HOURLY METEOROLOGICAL OBSERVATIONS AT THE EQUINOXES AND SOL-

| Date 1843. | | Temperature.* | | | Dew Point. | Weight of Atmo- sphere. | Elasti- city of Vapour. | Ratio of Humidi- ty. | Direction of Wind. | Plu- vio- me- ter. | |
|---------------|-------|---------------|------|-------|---------------|----------------------------------|-------------------------------|----------------------------|-----------------------|-----------------------------|------|
| | | Dry. | Wet. | Diff. | | | | | | | |
| 17th Mar. | A. M. | h. | | | | | | | | | |
| | | 6 | 76·2 | 71·7 | 4·5 | 69·6 | 30·200 | ·714 | 80 | N. E. | ·044 |
| | | 7 | 76·7 | 74·7 | 2·0 | 73·9 | 30·200 | ·822 | 92 | N. E. | |
| | | 8 | 79·0 | 74·5 | 4·5 | 72·6 | 30·225 | ·788 | 81 | N. E. | |
| | | 9 | 81·2 | 75·0 | 6·2 | 72·4 | 30·225 | ·783 | 75 | N.N.E. | |
| | | 10 | 83·0 | 74·0 | 9·0 | 70·0 | 30·250 | ·723 | 65 | | |
| | 11 | 83·0 | 73·7 | 9·3 | 69·5 | 30·225 | ·711 | 64 | N. E. | | |
| | NOON | 12 | 84·7 | 76·0 | 8·7 | 72·4 | 30·225 | ·783 | 67 | | |
| | | 1 | 84·2 | 76·2 | 8·0 | 72·9 | 30·225 | ·797 | 70 | | |
| | | 2 | 84·0 | 75·2 | 8·8 | 71·4 | - | ·760 | 67 | | |
| | | 3 | 83·2 | 74·5 | 8·7 | 70·7 | 30·175 | ·740 | 67 | | |
| | | 4 | 82·2 | 75·0 | 7·2 | 72·0 | - | ·772 | 72 | | |
| 5 | | 81·7 | 75·0 | 6·7 | 72·2 | 30·100 | ·778 | 73 | | | |
| NIGHT | 6 | 81·0 | 73·7 | 7·3 | 70·4 | 30·150 | ·735 | 70 | | | |
| | 7 | 81·2 | 74·2 | 7·0 | 71·2 | 30·150 | ·752 | 73 | | | |
| | 8 | 80·5 | 74·5 | 6·0 | 71·9 | 30·175 | ·771 | 77 | Calm | | |
| | 9 | 80·0 | 75·0 | 5·0 | 72·9 | 30·175 | ·797 | 80 | E.N.E. | | |
| | 10 | 80·0 | 75·0 | 5·0 | 72·9 | 30·175 | ·797 | 80 | E. | | |
| | 11 | 79·5 | 74·5 | 5·0 | 72·4 | 30·200 | ·782 | 79 | E.N.E. | | |
| 12 | 80·0 | 75·0 | 5·0 | 72·9 | 30·175 | ·797 | 80 | N. E. | | | |
| 18th Mar. | 1 | 79·0 | 74·7 | 4·3 | 72·9 | 30·150 | ·796 | 82 | N. E. | | |
| | 2 | 80·0 | 74·0 | 6·0 | 71·4 | 30·150 | ·758 | 76 | N. E. | | |
| | 3 | 78·7 | 74·0 | 4·7 | 72·0 | 30·150 | ·773 | 81 | N. E. | | |
| | 4 | 78·7 | 74·0 | 4·7 | 72·0 | 30·125 | ·773 | 81 | N. E. | | |
| | 5 | 78·7 | 73·7 | 5·0 | 71·4 | 30·125 | ·760 | 79 | N. E. | | |
| | 6 | 78·5 | 73·2 | 5·3 | 70·9 | 30·150 | ·744 | 80 | N. E. | | |
| 21st June | A. M. | 6 | 78·7 | 75·7 | 3·0 | 74·5 | 30·287 | ·839 | 87 | Calm | |
| | | 7 | 78·2 | 76·0 | 2·2 | 75·1 | 30·300 | ·857 | 90 | Do. | |
| | | 8 | 79·7 | 77·0 | 2·7 | 76·0 | 30·312 | ·880 | 89 | Do. | |
| | | 9 | 82·2 | 77·7 | 4·5 | 76·0 | 30·287 | ·882 | 82 | N. E. | |
| | | 10 | 81·7 | 77·7 | 4·0 | 76·2 | 30·325 | ·887 | 84 | Calm | |
| | | 11 | 82·5 | 78·0 | 4·5 | 76·3 | 30·312 | ·891 | 82 | Do. | |
| | NOON | 12 | 83·7 | 78·0 | 5·7 | 75·8 | 30·275 | ·877 | 77 | N. E. | |
| | | 1 | 84·2 | 77·7 | 6·5 | 75·2 | 30·275 | ·859 | 74 | E. | |
| | | 2 | 84·2 | 78·0 | 6·2 | 75·6 | 30·250 | ·871 | 76 | N. E. | |
| | | 3 | 84·0 | 78·0 | 6·0 | 75·7 | 30·250 | ·874 | 77 | N. E. | |
| | | 4 | 84·0 | 77·2 | 6·8 | 74·5 | 30·225 | ·841 | 74 | N. E. | |
| | | 5 | 82·5 | 77·0 | 5·5 | 74·8 | 30·225 | ·848 | 78 | N. E. | |
| NIGHT | 6 | 81·5 | 76·0 | 5·5 | 73·8 | 30·225 | ·819 | 77 | E.N.E. | | |
| | 7 | 80·7 | 76·7 | 4·0 | 75·1 | 30·250 | ·856 | 83 | N. E. | | |
| | 8 | 80·2 | 75·7 | 4·5 | 73·9 | 30·250 | ·822 | 82 | E.N.E. | | |
| | 9 | 80·0 | 75·5 | 4·5 | 73·7 | 30·225 | ·817 | 82 | E.N.E. | | |
| | 10 | 79·5 | 75·5 | 4·0 | 73·9 | 30·250 | ·822 | 83 | E.N.E. | | |
| | 11 | 79·5 | 75·5 | 4·0 | 73·9 | 30·250 | ·822 | 83 | N. E. | | |
| 12 | 79·0 | 75·0 | 4·0 | 73·4 | 30·250 | ·808 | 83 | Calm | | | |
| 22d June | 1 | 79·0 | 75·7 | 3·3 | 74·3 | 30·250 | ·835 | 86 | E.N.E. | | |
| | 2 | 78·2 | 75·7 | 2·5 | 74·7 | 30·225 | ·845 | 89 | E. | | |
| | 3 | 78·0 | 75·0 | 3·0 | 73·8 | 30·225 | ·820 | 87 | Calm | | |
| | 4 | 78·0 | 75·0 | 3·0 | 73·8 | 30·250 | ·820 | 87 | Do. | | |
| | 5 | 78·0 | 75·2 | 2·8 | 74·1 | 30·250 | ·828 | 88 | Do. | | |
| | 6 | 78·0 | 75·2 | 2·8 | 74·1 | 30·250 | ·828 | 88 | Do. | | |

STICES, COLONIAL HOSPITAL, GEORGETOWN, LAT. 6° 48' N., LONG. 58° 11' W.

| Date 1843. | | Temperature. | | | Dew Point. | Weight of Atmo- sphere. | Elasti- city of Vapour. | Ratio of Humi- dity. | Direction of Wind. | Plu- vio- meter. | Portion of Sky covered, in 8ths. | |
|---------------|-------|--------------|------|-------|---------------|----------------------------------|-------------------------------|----------------------------|-----------------------|------------------------|---|---|
| | | Dry. | Wet. | Diff. | | | | | | | | |
| 21st Sep. | h. | | | | | | | | | | | |
| | A. M. | 6 | 79·7 | 75·0 | 4·7 | 73·1 | 30·325 | ·801 | 80 | E. | - - | 7 |
| | | 7 | 80·0 | 75·0 | 5·0 | 72·9 | 30·325 | ·797 | 79 | E. | - - | 7 |
| | | 8 | 81·2 | 76·0 | 5·2 | 73·9 | 30·325 | ·823 | 79 | N. E. | - - | 7 |
| | | 9 | 82·7 | 75·7 | 7·0 | 72·8 | 30·337 | ·793 | 72 | - - | - - | 7 |
| | | 10 | 84·2 | 76·2 | 8·0 | 72·9 | 30·325 | ·797 | 69 | E. | - - | 7 |
| | | 11 | 85·2 | 76·5 | 8·7 | 73·0 | 30·350 | ·798 | 67 | E. N. E. | - - | 7 |
| NOON | | 12 | 86·0 | 75·7 | 10·3 | 71·3 | 30·325 | ·756 | 62 | E. N. E. | - - | 7 |
| | | 1 | 86·0 | 75·2 | 10·8 | 70·6 | 30·300 | ·737 | 60 | N. E. | - - | 7 |
| | | 2 | 86·0 | 77·0 | 9·0 | 73·4 | 30·275 | ·808 | 66 | N. E. | - - | 2 |
| | | 3 | 85·2 | 75·7 | 9·5 | 71·7 | 30·250 | ·765 | 64 | N. E. | - - | 1 |
| | | 4 | 84·7 | 75·2 | 9·5 | 71·2 | 30·225 | ·752 | 64 | N. E. | - - | 2 |
| | | 5 | 85·2 | 75·2 | 8·0 | 72·2 | 30·212 | ·779 | 72 | N. E. | - - | 1 |
| | | 6 | 82·0 | 75·0 | 7·0 | 72·1 | 30·250 | ·774 | 72 | N. E. | - - | 1 |
| | | 7 | 81·0 | 75·0 | 6·0 | 72·5 | 30·225 | ·786 | 75 | N. E. | - - | 0 |
| | | 8 | 81·5 | 75·0 | 6·5 | 72·3 | 30·250 | ·780 | 74 | - - | - - | 0 |
| | | 9 | 79·7 | 75·0 | 4·7 | 73·1 | 30·250 | ·801 | 80 | - - | - - | 0 |
| | | 10 | 78·5 | 74·5 | 4·0 | 72·8 | 30·250 | ·793 | 83 | - - | - - | 0 |
| | | 11 | 78·5 | 75·0 | 3·5 | 73·6 | 30·250 | ·814 | 85 | - - | - - | 0 |
| NIGHT | | 12 | 78·5 | 74·2 | 4·3 | 72·4 | 30·250 | ·783 | 82 | - - | - - | 0 |
| 22nd Sep. | | 1 | 79·7 | 76·0 | 3·7 | 74·5 | 30·225 | ·840 | 85 | - - | - - | 3 |
| | | 2 | 78·7 | 75·0 | 3·7 | 73·5 | 30·250 | ·812 | 85 | - - | - - | 7 |
| | | 3 | 78·7 | 75·0 | 3·7 | 73·5 | 30·250 | ·812 | 85 | - - | - - | 7 |
| | | 4 | 79·5 | 75·7 | 3·8 | 74·2 | 30·250 | ·830 | 84 | - - | - - | 7 |
| | | 5 | 79·2 | 75·7 | 3·5 | 74·3 | 30·262 | ·833 | 85 | - - | - - | 7 |
| | | 6 | 79·0 | 75·7 | 3·3 | 74·3 | - - | ·835 | 86 | - - | - - | 7 |
| 21st Dec. | | 6 | 80·0 | 76·7 | 3·3 | 75·3 | 30·225 | ·864 | 86 | N. E. | - - | 3 |
| A. M. | | 7 | 80·2 | 77·0 | 3·2 | 75·7 | 30·225 | ·875 | 87 | - - | - - | 6 |
| | | 8 | 81·7 | 77·0 | 4·7 | 75·1 | 30·275 | ·858 | 81 | - - | - - | 6 |
| | | 9 | 83·5 | 78·0 | 5·5 | 75·9 | 30·325 | ·879 | 78 | - - | - - | 6 |
| | | 10 | 84·0 | 78·0 | 6·0 | 75·7 | 30·350 | ·874 | 77 | - - | - - | 8 |
| | | 11 | 84·0 | 78·5 | 6·0 | 75·7 | 30·325 | ·874 | 77 | - - | - - | 8 |
| NOON | | 12 | 83·2 | 78·0 | 4·7 | 76·8 | 30·325 | ·905 | 82 | - - | - - | 8 |
| | | 1 | 84·0 | 79·0 | 6·0 | 75·7 | 30·300 | ·874 | 77 | - - | - - | 7 |
| | | 2 | 84·0 | 78·0 | 5·0 | 77·2 | 30·275 | ·916 | 80 | - - | - - | 7 |
| | | 3 | 83·0 | 78·0 | 5·0 | 76·1 | 30·262 | ·885 | 80 | - - | - - | 6 |
| | | 4 | 83·7 | 78·0 | 5·7 | 75·8 | 30·275 | ·877 | 78 | - - | - - | 7 |
| | | 5 | 83·0 | 78·0 | 5·0 | 76·2 | 30·250 | ·885 | 80 | - - | - - | 5 |
| | | 6 | 81·5 | 78·2 | 3·5 | 76·7 | 30·275 | ·902 | 85 | - - | - - | 8 |
| | | 7 | 81·5 | 78·0 | 3·3 | 77·0 | 30·275 | ·910 | 86 | - - | - - | 7 |
| | | 8 | 81·2 | 77·0 | 3·2 | 76·8 | 30·287 | ·906 | 87 | - - | - - | 1 |
| | | 9 | 81·0 | 77·2 | 4·0 | 75·4 | 30·269 | ·865 | 83 | - - | - - | 1 |
| | | 10 | 81·0 | 77·0 | 3·8 | 75·7 | 30·325 | ·874 | 84 | - - | - - | 0 |
| | | 11 | 81·0 | 77·0 | 4·0 | 75·4 | 30·300 | ·865 | 83 | - - | - - | 0 |
| NIGHT | | 12 | 80·5 | 77·0 | 3·5 | 75·6 | 30·300 | ·871 | 86 | - - | - - | 0 |
| 22nd Dec. | | 1 | 80·5 | 77·0 | 3·5 | 75·6 | 30·262 | ·871 | 86 | - - | - - | 0 |
| | | 2 | 80·0 | 77·0 | 3·0 | 75·8 | 30·250 | ·877 | 87 | - - | - - | 2 |
| | | 3 | 80·0 | 77·0 | 3·0 | 75·8 | 30·250 | ·877 | 87 | - - | - - | 2 |
| | | 4 | 79·5 | 77·0 | 2·5 | 76·0 | 30·237 | ·883 | 89 | - - | - - | 1 |
| | | 5 | 80·0 | 77·0 | 3·0 | 75·8 | 30·250 | ·877 | 88 | - - | - - | 2 |
| | | 6 | 79·0 | 77·0 | 2·0 | 76·2 | 30·225 | ·888 | 91 | N. E. | ·047 | 8 |

HOURLY METEOROLOGICAL OBSERVATIONS.

| Date 1844. | Temperature. | | | Dew Point. | Weight of Atmo- sphere. | Elasti- city of Vapour. | Ratio of Humid- ity. | Direction of Wind. | Velo- city. Inches. | Plu- vio- meter. | Portion of Sky covered, in 8ths. | |
|---------------|--------------|------|-------|---------------|----------------------------------|-------------------------------|----------------------------|-----------------------|---------------------------|------------------------|---|---|
| | Dry. | Wet. | Diff. | | | | | | | | | |
| 21st Mar. | h. | | | | | | | | | | | |
| A. M. | 6 | 78.0 | 74.0 | 4.0 | 72.3 | 30.275 | .780 | 83 | - - | - - | 2 | |
| | 7 | 79.7 | 75.2 | 4.5 | 73.3 | 30.275 | .809 | 81 | E. N. E. | .05 | - - | 4 |
| | 8 | 81.0 | 76.0 | 5.0 | 74.0 | 30.300 | .825 | 79 | - - | .07 | - - | 5 |
| | 9 | 81.5 | 76.2 | 5.3 | 74.1 | 30.350 | .828 | 79 | N. E. | .10 | - - | 5 |
| | 10 | 81.2 | 76.0 | 5.2 | 73.9 | 30.325 | .823 | 79 | E. N. E. | .10 | - - | 4 |
| | 11 | 82.0 | 76.0 | 6.0 | 73.6 | 30.350 | .814 | 76 | - - | .12 | - - | 4 |
| NOON | 12 | 82.7 | 77.5 | 5.2 | 75.5 | 30.300 | .867 | 79 | N. E. | .07 | - - | 3 |
| P. M. | 1 | 83.0 | 77.0 | 6.0 | 74.6 | 30.300 | .843 | 76 | N. N. E. | .05 | - - | 2 |
| | 2 | 82.5 | 76.5 | 6.0 | 74.1 | 30.262 | .828 | 76 | E. N. E. | .10 | - - | 1 |
| | 3 | 82.5 | 77.2 | 5.3 | 75.1 | 30.225 | .857 | 79 | E. N. E. | .15 | - - | 0 |
| | 4 | 82.2 | 77.0 | 5.2 | 74.9 | 30.225 | .852 | 79 | E. N. E. | .10 | - - | 1 |
| | 5 | 81.7 | 76.2 | 5.5 | 74.0 | 30.225 | .825 | 78 | E. N. E. | .10 | - - | 0 |
| | 6 | 79.7 | 76.0 | 3.7 | 74.5 | 30.300 | .840 | 85 | - - | - - | - - | 0 |
| | 7 | 79.5 | 76.0 | 3.5 | 74.6 | 30.300 | .842 | 85 | - - | - - | - - | 0 |
| | 8 | 79.0 | 76.0 | 3.0 | 74.8 | 30.300 | .848 | 87 | E. N. E. | .05 | - - | 0 |
| | 9 | 79.0 | 75.7 | 3.3 | 74.4 | 30.275 | .836 | 86 | - - | - - | - - | 0 |
| | 10 | 79.0 | 76.0 | 3.0 | 74.8 | 30.275 | .848 | 87 | - - | - - | - - | 1 |
| | 11 | 79.0 | 76.0 | 3.0 | 74.8 | 30.300 | .848 | 87 | E. N. E. | .05 | - - | 0 |
| NIGHT | 12 | 78.7 | 75.5 | 3.2 | 74.2 | 30.275 | .832 | 86 | E. N. E. | .10 | - - | 1 |
| 22d Mar. | | | | | | | | | | | | |
| A. M. | 1 | 78.0 | 75.0 | 3.0 | 73.8 | 30.250 | .820 | 88 | - - | - - | - - | 1 |
| | 2 | 78.5 | 75.5 | 3.0 | 74.3 | 30.250 | .834 | 87 | - - | - - | - - | 1 |
| | 3 | 78.2 | 75.2 | 3.0 | 74.0 | 30.250 | .826 | 87 | - - | - - | - - | 1 |
| | 4 | 77.5 | 75.2 | 2.3 | 74.3 | 30.250 | .834 | 90 | - - | - - | - - | 1 |
| | 5 | 78.0 | 75.5 | 2.5 | 74.5 | 30.250 | .840 | 89 | - - | - - | - - | 1 |
| | 6 | 78.0 | 75.5 | 2.5 | 74.5 | 30.250 | .840 | 90 | E. N. E. | .05 | - - | 2 |
| 21st June | | | | | | | | | | | | |
| A. M. | 6 | 79.0 | 75.0 | 4.0 | 73.4 | 30.262 | .808 | 83 | - - | - - | - - | 6 |
| | 7 | 78.0 | 75.0 | 3.0 | 73.8 | 30.287 | .820 | 88 | - - | - - | - - | 8 |
| | 8 | 79.7 | 77.0 | 2.7 | 75.9 | 30.300 | .880 | 89 | - - | - - | - - | 8 |
| | 9 | 79.7 | 76.5 | 3.2 | 75.2 | 30.325 | .860 | 87 | S. S. E. | .10 | 0.50 | 8 |
| | 10 | 81.0 | 77.2 | 3.8 | 75.7 | 30.325 | .874 | 84 | S. E. | - - | - - | 8 |
| | 11 | 84.0 | 77.0 | 7.0 | 74.2 | 30.300 | .831 | 73 | S. E. | .15 | - - | 7 |
| NOON | 12 | 85.0 | 77.5 | 7.5 | 74.5 | 30.300 | .841 | 71 | E. S. E. | .10 | - - | 4 |
| P. M. | 1 | 85.0 | 77.0 | 8.0 | 73.8 | 30.275 | .820 | 70 | E. S. E. | .20 | - - | 5 |
| | 2 | 84.5 | 77.0 | 7.5 | 74.0 | 30.275 | .826 | 71 | E. S. E. | .20 | - - | 4 |
| | 3 | 84.5 | 77.7 | 6.8 | 75.1 | 30.250 | .856 | 74 | E. S. E. | .10 | - - | 3 |
| | 4 | 84.0 | 77.8 | 6.2 | 75.4 | 30.262 | .865 | 76 | E. | .05 | - - | 7 |
| | 5 | 82.0 | 77.0 | 5.0 | 75.0 | 30.275 | .854 | 81 | - - | .05 | - - | 5 |
| | 6 | 81.5 | 77.0 | 4.5 | 75.2 | 30.287 | .860 | 82 | - - | - - | - - | 2 |
| | 7 | 80.7 | 76.7 | 4.0 | 75.1 | 30.300 | .856 | 83 | - - | - - | - - | 1 |
| | 8 | 80.0 | 76.0 | 4.0 | 74.4 | 30.300 | .836 | 84 | - - | - - | - - | 0 |
| | 9 | 81.2 | 76.2 | 5.0 | 74.2 | 30.312 | .831 | 80 | E. | .05 | - - | 1 |
| | 10 | 80.2 | 76.0 | 4.2 | 74.3 | 30.300 | .834 | 83 | E. | .07 | - - | 1 |
| | 11 | 80.0 | 76.0 | 4.0 | 74.4 | 30.300 | .836 | 84 | E. | .08 | - - | 1 |
| NIGHT | 12 | 81.0 | 76.7 | 4.3 | 75.0 | 30.325 | .853 | 82 | E. | .10 | - - | 2 |
| A. M. | 1 | 80.0 | 76.5 | 3.5 | 75.1 | 30.325 | .856 | 85 | E. | .05 | - - | 1 |
| | 2 | 79.7 | 76.0 | 3.7 | 74.5 | 30.275 | .840 | 85 | - - | - - | - - | 2 |
| | 3 | 79.2 | 76.2 | 3.0 | 75.0 | 30.275 | .854 | 87 | - - | - - | - - | 1 |
| | 4 | 78.5 | 76.0 | 2.5 | 75.0 | 30.275 | .854 | 88 | - - | - - | 0.83 | 1 |
| | 5 | 78.5 | 76.0 | 2.5 | 75.0 | 30.287 | .854 | 88 | - - | - - | - - | 8 |
| | 6 | 77.7 | 75.0 | 2.7 | 73.9 | 30.325 | .823 | 89 | - - | - - | - - | 8 |

HOURLY METEOROLOGICAL OBSERVATIONS — (continued).

| Date 1844. | Temperature. | | | Dew Point. | Weight of Atmos- phere. | Elasti- city of Vapour. | Ratio of Humi- dity. | Direction of Wind. | Velo- city. Inches. | Plu- vio- meter. | Portion of Sky covered, in 8ths. | |
|---------------|--------------|------|-------|---------------|----------------------------------|-------------------------------|----------------------------|-----------------------|---------------------------|------------------------|---|---|
| | Dry. | Wet. | Diff. | | | | | | | | | |
| 21st Sept. | h. | | | | | | | | | | | |
| A. M. | 6 | 79.0 | 76.0 | 3.0 | 74.8 | 30.200 | .848 | 87 | - | - | - | 8 |
| | 7 | 78.7 | 76.0 | 2.7 | 74.9 | 30.212 | .851 | 89 | - | - | - | 7 |
| | 8 | 82.7 | 79.0 | 3.7 | 77.6 | 30.250 | .931 | 84 | S. E. | - | - | 5 |
| | 9 | 84.0 | 78.5 | 5.5 | 76.4 | 30.250 | .894 | 79 | S. E. | - | - | 6 |
| | 10 | 83.5 | 79.2 | 4.3 | 77.6 | 30.250 | .930 | 83 | - | - | - | 6 |
| | 11 | 85.2 | 79.0 | 6.2 | 76.7 | 30.250 | .902 | 76 | N. E. | - | - | 4 |
| NOON | 12 | 86.0 | 78.5 | 7.5 | 75.2 | 30.250 | .860 | 70 | E. | .10 | - | 4 |
| P. M. | 1 | 85.2 | 76.2 | 9.0 | 73.7 | 30.175 | .817 | 69 | E. N. E. | .05 | - | 2 |
| | 2 | 85.2 | 76.0 | 9.2 | 73.6 | 30.250 | .814 | 69 | E. | .10 | - | 2 |
| | 3 | 85.0 | 78.0 | 7.0 | 74.9 | 30.137 | .851 | 72 | E. S. E. | .05 | - | 3 |
| | 4 | 84.5 | 78.0 | 6.5 | 74.9 | 30.125 | .857 | 74 | E. | .05 | - | 2 |
| | 5 | 83.0 | 76.5 | 6.5 | 73.9 | 30.137 | .822 | 74 | E. | - | - | 2 |
| | 6 | 82.0 | 77.0 | 5.0 | 74.2 | 30.150 | .831 | 78 | - | - | - | 2 |
| | 7 | 81.0 | 77.5 | 3.5 | 74.5 | 30.162 | .841 | 81 | - | - | - | 1 |
| | 8 | 80.0 | 76.0 | 4.0 | 74.4 | 30.175 | .836 | 83 | - | - | - | |
| | 9 | 81.0 | 76.5 | 4.5 | 74.7 | 30.150 | .845 | 81 | - | - | - | |
| | 10 | 79.5 | 75.2 | 4.3 | 73.5 | 30.187 | .811 | 82 | - | - | - | |
| | 11 | 79.2 | 76.0 | 3.2 | 74.7 | 30.187 | .846 | 86 | - | - | - | |
| NIGHT | 12 | 79.0 | 75.5 | 3.5 | 74.1 | 30.175 | .828 | 85 | - | - | - | |
| A. M. | 1 | 78.7 | 75.0 | 3.7 | 73.5 | 30.162 | .812 | 85 | - | - | - | |
| | 2 | 78.0 | 75.5 | 2.5 | 74.5 | 30.125 | .840 | 89 | - | - | - | |
| | 3 | 77.5 | 75.0 | 2.5 | 74.0 | 30.125 | .826 | 89 | E. S. E. | - | - | |
| | 4 | 77.0 | 75.0 | 2.0 | 74.2 | 30.137 | .831 | 92 | - | - | - | |
| | 5 | 77.0 | 75.0 | 2.0 | 74.2 | 30.137 | .831 | 92 | - | - | - | |
| | 6 | 77.5 | 75.0 | 2.5 | 74.0 | 30.157 | .826 | 89 | - | - | - | 1 |
| 21st Dec. | | | | | | | | | | | | |
| A. M. | 6 | 77.5 | 74.0 | 3.5 | 72.5 | 30.150 | .786 | 84 | S. E. | - | - | 8 |
| | 7 | 76.5 | 74.0 | 2.5 | 73.0 | 30.150 | .798 | 89 | - | - | .092 | 8 |
| | 8 | 78.5 | 75.7 | 2.8 | 74.6 | 30.187 | .842 | 88 | - | - | .006 | 8 |
| | 9 | 79.7 | 75.2 | 4.5 | 73.4 | 30.225 | .809 | 81 | E. | .05 | .003 | 8 |
| | 10 | 81.0 | 74.7 | 6.3 | 72.0 | 30.200 | .773 | 74 | E. | .05 | - | 7 |
| | 11 | 82.2 | 75.5 | 6.7 | 72.7 | 30.200 | .792 | 74 | E. N. E. | .20 | - | 8 |
| NOON | 12 | 82.0 | 75.0 | 7.0 | 72.1 | 30.175 | .774 | 72 | E. N. E. | .05 | - | 8 |
| P. M. | 1 | 82.0 | 74.2 | 7.8 | 70.8 | 30.150 | .742 | 69 | E. N. E. | .10 | - | 6 |
| | 2 | 80.5 | 74.0 | 6.5 | 71.2 | 30.150 | .752 | 74 | E. N. E. | .15 | - | 7 |
| | 3 | 82.0 | 74.2 | 7.8 | 70.8 | 30.127 | .742 | 70 | E. N. E. | .05 | - | 8 |
| | 4 | 81.5 | 74.2 | 7.3 | 71.0 | 30.125 | .740 | 70 | E. N. E. | .10 | - | 5 |
| | 5 | 80.0 | 74.0 | 6.0 | 71.4 | 30.150 | .758 | 75 | - | - | - | 8 |
| | 6 | 79.0 | 74.5 | 4.5 | 72.7 | 30.125 | .789 | 80 | - | - | - | 8 |
| | 7 | 79.0 | 73.5 | 5.5 | 71.0 | 30.175 | .749 | 77 | - | - | - | 5 |
| | 8 | 79.0 | 73.2 | 5.8 | 70.6 | 30.187 | .738 | 76 | E. | .15 | - | 6 |
| | 9 | 78.5 | 72.0 | 6.5 | 69.0 | 30.175 | .699 | 72 | E. N. E. | .15 | - | 7 |
| | 10 | 77.7 | 74.0 | 3.7 | 72.4 | 30.175 | .784 | 84 | E. N. E. | .05 | - | 5 |
| | 11 | 77.0 | 73.0 | 4.0 | 71.2 | 30.125 | .753 | 83 | - | - | - | 3 |
| NIGHT | 12 | 77.0 | 73.5 | 3.5 | 72.0 | 30.112 | .772 | 85 | - | - | - | 8 |
| A. M. | 1 | 77.0 | 71.2 | 5.8 | 68.6 | 30.112 | .687 | 75 | - | - | - | 3 |
| | 2 | 76.0 | 71.0 | 5.0 | 68.8 | 30.175 | .691 | 79 | - | - | - | 2 |
| | 3 | 76.0 | 72.0 | 4.0 | 70.2 | 30.175 | .727 | 82 | - | - | - | 4 |
| | 4 | 75.5 | 72.0 | 3.5 | 70.4 | 30.151 | .733 | 84 | - | - | - | 4 |
| | 5 | 75.0 | 72.0 | 3.0 | 70.6 | 30.175 | .739 | 87 | - | - | - | 0 |
| | 6 | 75.2 | 72.0 | 3.2 | 70.6 | 30.100 | .737 | 85 | - | - | - | 7 |

ELECTROMETER.

(Hourly Observations.)

1843.

- March 17th, 6 a. m. No indication either with or without flame.
- 7 a. m. No indication.
- 8 a. m. Strong positive electricity (by flame); gold leaves, opening instantly after being discharged by finger, remained diverged 4 minutes after flame being extinguished.
- 9 a. m. Positive electricity by flame not so strong as at last observation; leaves remained open 3 minutes after flame being extinguished.
- 10 a. m. Strong positive electricity by flame; divergence continued $2\frac{1}{2}$ minutes after flame.
- 11 a. m. Electricity strong, *positive* (by flame); leaves discharged themselves against side of electrometer frequently and quickly.
- 12 noon. As at last observation; but leaves discharged themselves, and re-opened twice after flame being extinguished.
- 1 p. m. Positive electricity by flame; leaves open 2 minutes after flame.
- 2 p. m. Positive by flame; leaves discharge and open instantly.
- 3 p. m. Positive electricity without flame; leaves diverged $\frac{1}{4}$ inch.
- 4 p. m. Do. do. with flame.
- N.B.—In the interval between the observations at 2 p. m. and 4 p. m. positive electricity was constantly indicated without flame.
- 5 p. m. No indication either with or without flame.
- 6 p. m. Slight divergence by flame.
- 7 p. m. No indication with or without flame.
- 8 p. m. Do. do. do.

1843.

- March 17th, 9 p.m. No indication with or without flame.
 — 10 p.m. Slight divergence by flame.
 — 11 p.m. No indication.
 — 12 night. Ditto.
- March 18th, 1 a.m. Slight divergence by flame.
 — 2 a.m. Do. do. do.
 — 3 a.m. Do. do. do.
 — 4 a.m. Divergence stronger.
 — 5 a.m. Do. do.
 — 6 a.m. No indication either with or without flame.
- Sept. 21st. and 22d. No divergence during 24 hours; delicacy of electrometer proved by applying excited glass rod after each observation; flame not used.

ELECTROMETER.

Observations were made at the Regular Meteorological Hours between 2nd April, 1843, and 17th August, 1844, with the Omissions and Intermediate Observations stated below, with the following results:—

| Date. | + | | + | | | Date. | + | | + | | |
|-----------|--------|--------|--------|--------|---|---------|------------------------------------|--------------------------------|--------|-----------|----|
| | or | — | or | — | | | or | — | or | — | |
| | 3 A.M. | 9 A.M. | 3 P.M. | 9 P.M. | | 3 A.M. | 9 A.M. | 3 P.M. | 9 P.M. | | |
| 1843. | | | | | | 1843. | | | | | |
| April - | 2 | 0 | + | 0 | | Nov. - | 21 | 0 | — | 0 | 0 |
| " | 4 | 0 | + | 0 | | " | 23 | 0 | — | 0 | 0 |
| " | 5 | 0 | + | 0 | | " | 24 | 0 | — | 0 | 0 |
| " | 6 | 0 | + | 0 | | " | 26 | 0 | 0 | + | 0 |
| " | 7 | 0 | + | + | | Dec. - | 1 | 0 | + | 0 | 0 |
| " | 8 | + | 0 | + | | " | 3 | 0 | 0 | + | 0 |
| " | 10 | 0 | + | 0 | | 1844. | | | | | |
| " | 12 | 0 | + | + | | Jan. | From 1st till 6th no observations. | | | | |
| " | 13 | 0 | 0 | + | | " | 13 | | | | |
| " | 14 | 0 | + | 0 | | " | 14 | | | | |
| " | 15 | 0 | + | + | | " | 21 | | | | |
| " | 16 | 0 | + | + | | " | 30 | | | | |
| " | 17 | 0 | + | + | | Feb. | | | | | |
| " | 19 | 0 | + | 0 | | March | 1 | 0 | 0 | + | 0 |
| " | 20 | 0 | 0 | + | | " | 2 | 0 | 0 | + | 0* |
| " | 21 | 0 | + | + | | " | 4 | 0 | — | — | 0 |
| May - | 23 | 0 | 0 | 0 | 0 | " | 11 | 0 | 0 | 0 | + |
| " | 28 | 0 | 0 | 0 | 0 | " | 12 | 0 | 0 | 0 | 0 |
| June - | 2 | 0 | 0 | 0 | 0 | " | 14 | 0 | 0 | 0 | 0 |
| " | 21 | 0 | + | 0 | 0 | " | 29 | 0 | 0 | 0 | 0 |
| " | 27 | 0 | 0 | + | 0 | " | 30 | 0 | 0 | 0 | 0 |
| July - | 6 | 0 | 0 | + | 0 | April - | 4 | 0 | 0 | 0 | 0 |
| " | 7 | 0 | 0 | + | 0 | " | 7 | 0 | 0 | 0 | 0 |
| " | 11 | 0 | 0 | + | 0 | " | 8 | 0 | 0 | 0 | 0 |
| " | 22 | 0 | + | 0 | 0 | " | 9 | 0 | 0 | 0 | 0 |
| " | 30 | 0 | 0 | + | 0 | " | 13 | 0 | 0 | 0 | 0 |
| August - | 4 | 0 | + | 0 | 0 | " | 14 | 0 | 0 | 0 | 0 |
| " | 7 | 0 | 0 | 0 | 0 | " | 15 | 0 | 0 | 0 | 0 |
| " | 16 | — | — | 0 | 0 | " | 22 | 0 | 0 | 0 | 0 |
| " | 18 | 0 | 0 | 0 | 0 | " | 23 | 0 | 0 | 0 | 0 |
| " | 20 | 0 | 0 | + | 0 | " | 24 | 0 | 0 | 0 | 0 |
| " | 31 | 0 | 0 | 0 | 0 | " | 25 | 0 | 0 | 0 | 0 |
| September | 4 | 0 | 0 | 0 | 0 | " | 30 | 0 | 0 | 0 | 0 |
| October - | 1 | 0 | 0 | + | 0 | | | | | 1 P. M. | |
| " | 2 | 0 | 0 | + | 0 | May - | 5 | 0 | 0 | + | 0 |
| " | 5 | 0 | 0 | + | 0 | " | 6 | 0 | 0 | + | 0 |
| " | 6 | 0 | 0 | + | 0 | " | 6 | 0 | 0 | + | 0 |
| " | 7 | 0 | + | 0 | 0 | | | | | 3h.50P.M. | |
| " | 25 | 0 | 0 | + | 0 | " | 12 | 0 | 0 | + | 0 |
| November | 11 | 0 | + | 0 | 0 | | | | | 11 A.M. | |
| " | 12 | 0 | + | + | 0 | " | 18 | 0 | + | 0 | 0 |
| " | 13 | 0 | 0 | + | 0 | " | 31 | 0 | 0 | 0 | 0 |
| " | 15 | 0 | 0 | + | 0 | Aug. - | 17 | No electr. observed till date. | | | |

NOTE. — 0 signifies no observation made.

+ signifies positive electricity observed.

— signifies negative electricity observed.

In intermediate dates not entered, it is to be understood that, though regular observations have been made, no electrical excitement was noticed.

* Sparks were visible on applying a metallic insulated knob. Observer received shocks as far as elbow.

DAILY AMOUNT OF RAIN AND EVAPORATION*

| Day. | January. | | February. | | March. | | April. | | May. | | June. | | | | | | |
|-------|----------|--------|-----------|--------|--------|------|--------|--------|------|--------|--------|------|--------|---------|----|--------|---------|
| | Evap. | Pluv. | Day. | Evap. | Pluv. | Day. | Evap. | Pluv. | Day. | Evap. | Pluv. | Day. | Evap. | Pluv. | | | |
| S. 1 | .1319 | 3.3820 | W. | .0833 | .2292 | W. | .0944 | | S. | .0526 | .2333 | M. | .0693 | .2165 | T. | .0693 | .0526 |
| M. 2 | .0833 | | T. | .0833 | .0138 | T. | .0988 | .0583 | S. | .0610 | .1277 | T. | .0415 | .1444 | F. | .0804 | .2472 |
| T. 3 | .0624 | .3050 | F. | .0625 | .0486 | F. | .0665 | | M. | .0943 | | W. | .0555 | .0138 | S. | .0583 | .0526 |
| W. 4 | .0624 | .0277 | S. | .0555 | .2916 | S. | .0916 | .1873 | T. | .0889 | | T. | | | S. | .0443 | .2333 |
| T. 5 | .0902 | .0297 | S. | .0694 | | S. | .1223 | | W. | .0943 | | F. | .0415 | .0056 | M. | .0638 | .3804 |
| F. 6 | .0693 | .0693 | M. | .0555 | .4722 | M. | .0999 | .0415 | T. | .0916 | .0305 | S. | .0415 | .9885 | T. | .0583 | .3888 |
| S. 7 | .0764 | .0311 | T. | .0528 | .1529 | T. | .1082 | .0277 | F. | .0889 | | S. | .0221 | .0026 | W. | .0526 | .5915 |
| S. 8 | .0555 | .1804 | W. | .0833 | .6443 | W. | .0665 | .0305 | S. | .1167 | | M. | .0305 | 3.2270 | T. | .0443 | .4804 |
| M. 9 | .0693 | .3610 | T. | .0750 | | T. | .0804 | .0111 | S. | .1082 | .0610 | T. | .0498 | .0471 | F. | .0583 | .1082 |
| T. 10 | .0277 | .4234 | F. | .0528 | .0312 | F. | .1111 | .0555 | M. | .0889 | | W. | .0471 | .0888 | S. | .0748 | .0194 |
| W. 11 | .0346 | .1111 | S. | .0833 | | S. | .1332 | | T. | .0971 | | T. | .0526 | .3693 | S. | .0555 | .2915 |
| T. 12 | .0488 | .4790 | S. | .0833 | | S. | .0693 | | W. | .0721 | | F. | .0526 | .0693 | M. | .0111 | 2.1411 |
| F. 13 | .0625 | | M. | .0694 | | M. | .0943 | .2360 | T. | .0665 | | S. | .0443 | .8996 | T. | .0332 | 2.2410 |
| S. 14 | .0764 | | T. | .0833 | | T. | .1251 | | F. | .0889 | | S. | .0387 | .2915 | W. | .0194 | .4109 |
| S. 15 | .0625 | | W. | .0416 | 1.1336 | W. | .0971 | .0305 | S. | .0693 | | M. | .0277 | 2.2881 | T. | .0804 | .2833 |
| M. 16 | .0555 | .2708 | T. | .0208 | 1.4776 | T. | .1082 | .1111 | S. | .0665 | | T. | .0249 | .0111 | F. | .0555 | .6858 |
| T. 17 | .0555 | .3958 | F. | .0764 | .5915 | F. | .1054 | .0443 | M. | .0610 | | W. | .0221 | 1.1052 | S. | .0583 | 2.2465 |
| W. 18 | .0555 | | S. | .0416 | .2222 | S. | .0586 | | T. | .0804 | | T. | .0498 | 1.5717 | S. | .2415 | 1.1830 |
| T. 19 | .0694 | | S. | .0833 | .0999 | S. | .0999 | | W. | .0833 | | F. | .0360 | .0638 | M. | .0721 | .2500 |
| F. 20 | .0645 | | M. | .0833 | | M. | .0748 | | T. | .0721 | | S. | .0555 | .2528 | T. | .0443 | |
| S. 21 | .0416 | .7777 | T. | .0833 | | T. | .0638 | .1804 | F. | .0249 | .2556 | S. | .0498 | | W. | .0665 | .1499 |
| S. 22 | .0555 | .0208 | W. | .0833 | .0166 | W. | .0638 | | S. | .0415 | .4386 | M. | .0555 | | T. | .0471 | .1195 |
| M. 23 | .0694 | .0055 | T. | .1111 | | T. | .0526 | .0083 | S. | .0498 | | T. | .0360 | 2.1884 | F. | .0610 | .2222 |
| T. 24 | .0582 | .0055 | F. | .0748 | .0860 | F. | .0555 | .2110 | M. | .0498 | | W. | .0415 | .5886 | S. | .0804 | |
| W. 25 | .0416 | .3749 | S. | .0471 | .0166 | S. | .0332 | 1.2357 | T. | .2262 | .0305 | T. | .0498 | | S. | .0776 | |
| T. 26 | .0833 | .6388 | S. | .0721 | .4527 | S. | .0388 | .7942 | W. | .0413 | .1471 | F. | .0583 | .4664 | M. | .0526 | |
| F. 27 | .0833 | .0208 | M. | .0693 | .1804 | M. | .0415 | | T. | .0249 | .4276 | S. | .0638 | .1972 | T. | .0748 | .2250 |
| S. 28 | .0833 | | T. | .0888 | | T. | .0999 | | F. | .2222 | .0305 | S. | .0498 | | W. | .0498 | |
| S. 29 | .1041 | | | | | W. | .0526 | | S. | .0804 | | M. | .0583 | .0498 | T. | .0665 | .3220 |
| M. 30 | .0555 | .0833 | | | | T. | .0388 | .3360 | S. | .0583 | | T. | .0526 | .7638 | F. | .0610 | |
| T. 31 | .0764 | | | | | F. | .0583 | .0138 | | | | W. | .0748 | .1526 | | | |
| | 2.0568 | 7.9936 | | 1.9695 | 6.1609 | | 2.4984 | 3.6132 | | 2.4609 | 1.7824 | | 1.3932 | 16.1635 | | 1.7130 | 13.3261 |

* Evaporation from a japanned tin dish.

DURING TWELVE MONTHS, IN INCHES, FOR 1843.

| July. | | | August. | | | September. | | | October. | | | November. | | | December. | | |
|---------------|-------|-------|---------------|-------|-------|---------------|-------|-------|-------------|-------|-------|---------------|-------|-------|---------------|-------|-------|
| Day. | Evap. | Pluv. | Day. | Evap. | Pluv. | Day. | Evap. | Pluv. | Day. | Evap. | Pluv. | Day. | Evap. | Pluv. | Day. | Evap. | Pluv. |
| S. | ·0693 | | T. | ·0498 | ·5388 | F. | ·0665 | | M. | ·0685 | | T. | ·0668 | ·0360 | S. | ·0748 | ·3637 |
| S. | ·0804 | ·0277 | W. | ·0721 | | S. | ·0665 | ·0055 | T. | ·0833 | | F. | ·0721 | ·4357 | S. | ·0943 | ·0277 |
| M. | ·0776 | ·1533 | T. | ·0860 | | S. | ·0804 | | W. | ·0776 | | S. | ·0721 | | M. | ·0583 | ·0081 |
| T. | ·8333 | ·0415 | F. | ·0721 | | M. | ·0582 | ·0081 | T. | ·0833 | | S. | ·0833 | ·2720 | T. | ·0748 | ·2888 |
| W. | ·0555 | ·3664 | S. | ·0860 | | T. | ·1056 | | F. | ·0860 | | M. | ·0943 | | W. | ·0888 | |
| T. | ·0610 | | S. | ·0610 | | W. | ·0693 | | S. | ·0804 | | T. | ·1223 | ·0804 | T. | ·0833 | |
| F. | ·0555 | | M. | ·0721 | ·6080 | T. | ·0638 | | S. | ·0916 | | W. | ·0971 | | F. | ·0748 | ·0415 |
| S. | ·0471 | ·5191 | T. | ·0665 | ·5492 | F. | ·0527 | ·9939 | M. | ·1026 | | T. | ·0804 | | S. | ·0983 | |
| S. | ·0943 | ·0389 | W. | ·0498 | | S. | ·0943 | ·2249 | T. | ·0776 | | F. | ·0971 | ·0027 | S. | ·0860 | |
| M. | ·0748 | | T. | ·0888 | ·1388 | S. | ·1111 | | W. | ·0860 | | S. | ·0943 | | M. | ·1054 | |
| T. | ·0526 | ·0165 | F. | ·0776 | | M. | ·0888 | | T. | ·0999 | | S. | ·0833 | 0027 | T. | ·1167 | |
| W. | ·0610 | ·8744 | S. | ·0665 | ·0333 | T. | ·0833 | | F. | ·0943 | | M. | ·0665 | | W. | ·1026 | |
| T. | ·0555 | | S. | ·0833 | | W. | ·0693 | | S. | ·0971 | | T. | ·0721 | | T. | ·0583 | ·6743 |
| F. | ·0638 | ·1499 | M. | ·0555 | | T. | ·0583 | ·3746 | S. | ·0748 | | W. | ·0333 | | F. | ·0693 | ·4971 |
| S. | ·0721 | | T. | ·0555 | | F. | ·0471 | ·0999 | M. | ·0804 | ·0471 | T. | ·0471 | ·2915 | S. | ·0693 | ·0111 |
| S. | ·0776 | | W. | ·0693 | ·1606 | S. | ·0555 | ·0583 | T. | ·0943 | | F. | ·0415 | ·1693 | S. | ·0748 | ·0721 |
| M. | ·0610 | | T. | ·0583 | ·6137 | S. | ·0693 | | W. | ·0999 | | S. | ·0971 | | M. | ·0693 | ·0916 |
| T. | ·0555 | | F. | ·0638 | ·0721 | M. | ·0748 | | T. | ·0971 | | S. | ·0860 | | T. | ·0741 | ·7466 |
| W. | ·0804 | ·0496 | S. | ·0860 | | T. | ·0804 | | F. | ·1054 | | M. | ·1223 | | W. | ·0415 | ·6497 |
| T. | ·0583 | ·0748 | S. | ·0999 | | W. | ·0804 | | S. | ·0776 | | T. | ·1054 | | T. | ·0610 | ·0277 |
| F. | ·0693 | ·0111 | M. | ·0916 | | T. | ·0750 | | S. | ·1251 | | W. | ·0888 | ·4721 | F. | ·1100 | |
| S. | ·0638 | | T. | ·0888 | | F. | ·0833 | | M. | | | T. | ·0748 | ·4220 | S. | ·0860 | ·0997 |
| S. | ·0804 | ·2915 | W. | ·0804 | | S. | ·0638 | | T. | - - | ·4663 | F. | ·0498 | ·0610 | S. | - - | ·2914 |
| M. | ·0971 | | T. | ·0665 | | S. | ·0750 | | W. | ·0387 | | S. | ·1054 | ·6414 | M. | ·0888 | ·0111 |
| T. | ·0555 | ·0055 | F. | ·0526 | ·0583 | M. | ·0833 | | T. | ·0583 | ·1777 | S. | ·0748 | ·2915 | T. | ·0986 | ·1630 |
| W. | ·0665 | | S. | ·0498 | ·0555 | T. | ·0721 | | F. | ·0748 | | M. | ·0833 | ·0916 | W. | ·0693 | |
| T. | ·0804 | ·0693 | S. | ·0748 | | W. | ·0638 | | S. | ·0665 | | T. | ·0888 | ·0916 | T. | ·0691 | |
| F. | ·0583 | | M. | ·0748 | | T. | ·0750 | ·5051 | S. | ·1776 | | W. | ·0943 | | F. | ·0860 | |
| S. | ·0693 | ·0944 | T. | ·0748 | | F. | ·0833 | ·2527 | M. | ·0943 | | T. | ·0748 | | S. | | |
| S. | ·0804 | ·0055 | W. | ·0999 | ·1747 | S. | ·0833 | | T. | ·0387 | | F. | ·0988 | | S. | | |
| M. | ·0498 | ·0055 | T. | ·0583 | | | | | W. | ·0583 | ·0333 | | | | M. | | |
| 2 1074 3·7949 | | | 2·2324 5·0030 | | | 2·2335 3·5230 | | | 2·4900 7244 | | | 2·4680 3·5865 | | | 2·1565 6·0652 | | |

DAILY AMOUNT OF RAIN AND EVAPORATION *

| Day. | January. | | February. | | March. | | April. | | May. | | June. | | | |
|------|----------|--------|-----------|-------|--------|------|--------|--------|------|--------|--------|------|--------|---------|
| | Evap. | Pluv. | Day. | Evap. | Pluv. | Day. | Evap. | Pluv. | Day. | Evap. | Pluv. | Day. | Evap. | Pluv. |
| M. | 1 | | T. | ·0750 | | F. | ·0442 | | M. | ·0415 | | W. | ·0582 | ·0250 |
| T. | 2 | | F. | ·0554 | | S. | ·0581 | | T. | ·0554 | ·0692 | T. | ·0609 | ·0748 |
| W. | 3 | | S. | ·0528 | | S. | ·0442 | ·0415 | W. | ·0277 | ·0667 | F. | ·0528 | |
| T. | 4 | | S. | ·0555 | | M. | ·0442 | ·1712 | T. | ·0554 | ·1110 | S. | ·0385 | |
| F. | 5 | | M. | ·0526 | ·0135 | T. | ·0250 | 2 7932 | F. | ·0250 | ·1662 | S. | ·0304 | ·1135 |
| S. | 6 | ·0883 | T. | ·0693 | 1·3500 | W. | ·0304 | 3·0712 | S. | ·0304 | ·5581 | M. | ·0526 | ·6942 |
| S. | 7 | ·0497 | W. | ·0665 | ·3610 | T. | ·0554 | ·0554 | S. | ·0216 | ·0108 | T. | ·0250 | ·9245 |
| M. | 8 | ·0632 | T. | ·0665 | ·0881 | F. | ·0527 | ·0608 | M. | ·0250 | 1·6103 | W. | ·0555 | ·6186 |
| T. | 9 | ·0407 | F. | ·0211 | | S. | ·0608 | ·0991 | T. | ·0331 | | T. | ·0277 | 1·2301 |
| W. | 10 | ·0757 | S. | ·0750 | | S. | ·0635 | | W. | ·0304 | | F. | ·0250 | 2·1270 |
| T. | 11 | ·0549 | S. | ·0583 | | M. | ·0554 | | T. | 0331 | | S. | ·0765 | 1·3411 |
| F. | 12 | ·0497 | M. | | | T. | ·0250 | ·2537 | F. | ·0608 | | S. | ·0387 | 1·5741 |
| S. | 13 | ·0407 | T. | ·0277 | | W. | ·0663 | ·4094 | S. | ·0498 | | M. | ·0443 | ·3360 |
| S. | 14 | ·0496 | W. | ·0387 | | T. | ·0527 | ·1388 | S. | ·0304 | | F. | ·0555 | ·4192 |
| M. | 15 | ·0413 | T. | ·0583 | ·0277 | F. | ·0554 | ·0635 | M. | ·0387 | ·1553 | W. | ·0415 | ·1469 |
| T. | 16 | ·0495 | F. | | | S. | ·0555 | | T. | ·0583 | | T. | ·0249 | ·2109 |
| W. | 17 | ·0550 | S. | | | S. | ·0555 | | W. | ·0721 | | F. | ·0277 | ·6051 |
| T. | 18 | ·0301 | S. | | | M. | ·0608 | | T. | ·0916 | | S. | ·0305 | ·0277 |
| F. | 19 | ·0295 | M. | ·0387 | | T. | ·0527 | | F. | ·1019 | | S. | ·0250 | 1·0413 |
| S. | 20 | ·0189 | T. | ·0526 | | W. | ·0581 | | S. | ·1111 | | M. | ·0192 | 2·3937 |
| S. | 21 | ·0230 | W. | ·0554 | | T. | ·0815 | | S. | ·0971 | | T. | ·0250 | 1·8911 |
| M. | 22 | ·0348 | T. | ·0493 | | F. | ·0554 | | M. | ·0999 | | W. | ·0305 | ·2777 |
| T. | 23 | ·0563 | F. | ·0610 | ·5263 | S. | ·0663 | | T. | ·0888 | | T. | ·0526 | ·5581 |
| W. | 24 | ·0593 | S. | ·0655 | ·0081 | S. | ·0608 | | W. | ·0554 | ·4913 | F. | ·0333 | ·1499 |
| T. | 25 | ·0591 | S. | ·0750 | | M. | ·0635 | | T. | ·0192 | 2·1380 | S. | - - | ·0071 |
| F. | 26 | ·0306 | M. | ·0583 | | T. | ·0581 | | F. | ·0360 | ·5070 | S. | - - | ·1388 |
| S. | 27 | ·0290 | T. | ·0027 | | W. | ·0415 | | S. | ·0305 | ·6109 | M. | ·0555 | ·2858 |
| S. | 28 | ·0357 | W. | ·1246 | | T. | ·0833 | | S. | ·0471 | ·2380 | T. | ·0693 | ·0305 |
| M. | 29 | ·0287 | T. | ·0581 | | F. | ·0555 | ·3054 | M. | ·0638 | ·4165 | W. | ·0555 | ·0071 |
| T. | 30 | ·0329 | | | | S. | ·0250 | ·0693 | T. | ·0555 | | T. | ·0526 | |
| W. | 31 | ·0368 | | | | S. | ·0415 | | | | | F. | | ·0138 |
| | | 1·1630 | | ·2021 | | | 1·2766 | 2·2947 | | 1·5866 | 7·1493 | | 1·1247 | 17·2630 |
| | | | | | | | 1·6483 | 7·5325 | | | | | | ·9987 |
| | | | | | | | | | | | | | | 19·9398 |

* Evaporation from a japanned tin dish.

DURING TWELVE MONTHS, IN INCHES, FOR 1844.

| July. | | | August. | | | September. | | | October. | | | November. | | | December. | | |
|---------------|-------|--------|---------------|-------|--------|---------------|-------|-------|--------------|-------|-------|---------------|-------|--------|----------------|-------|--------|
| Day. | Evap. | Pluv. | Day. | Evap. | Pluv. | Day. | Evap. | Pluv. | Day. | Evap. | Pluv. | Day. | Evap. | Pluv. | Day. | Evap. | Pluv. |
| M. | .0331 | 1.385 | T. | .0415 | | S. | .0665 | .0277 | T. | .0608 | | F. | .1050 | | S. | | |
| T. | .0358 | .0358 | F. | .0348 | | M. | .0833 | | W. | .0831 | | S. | .1077 | | M. | .0554 | 3.2963 |
| W. | .0277 | .0192 | S. | .0554 | .0277 | T. | .0888 | | T. | .0804 | | S. | .1188 | | T. | .0581 | .9972 |
| T. | .0250 | .0304 | S. | .0500 | | W. | .0583 | | F. | .0858 | | M. | .0969 | | W. | .0635 | |
| F. | .0331 | | M. | | | T. | .0610 | | S. | .0898 | | T. | .0804 | | T. | .0331 | .1743 |
| S. | .0358 | | T. | .0331 | | F. | .0526 | | S. | .0885 | | W. | .0831 | .0250 | F. | - | .1689 |
| S. | .0385 | .0831 | W. | .0415 | | S. | .0693 | | M. | .0581 | | T. | .0581 | .1523 | S. | .0692 | .2658 |
| M. | .0331 | .2804 | T. | .0243 | .0054 | S. | .0721 | | T. | .0608 | | F. | .0763 | | S. | .0746 | |
| T. | .0250 | .0277 | F. | .0608 | .0692 | M. | .0833 | | W. | .0662 | .0484 | S. | .0831 | | M. | .0635 | |
| W. | .0412 | .8385 | S. | .0554 | | T. | .0971 | | T. | .1108 | | S. | .0716 | | T. | .0554 | .1412 |
| T. | .0331 | .1108 | S. | .1054 | | W. | .0916 | | F. | .1084 | | M. | .0635 | | W. | .0527 | |
| F. | .0471 | .1971 | M. | .0387 | .7967 | T. | .0860 | | S. | .0581 | | T. | .0777 | .0118 | T. | .0554 | |
| S. | .0496 | .2216 | T. | .0277 | .3054 | F. | .0610 | | S. | - | .0054 | W. | .0719 | .0223 | F. | .0331 | .5416 |
| S. | .0358 | | W. | .0555 | 1.1218 | S. | .0833 | | M. | | | T. | .0804 | | S. | .3331 | .8746 |
| M. | .0608 | 1.3185 | T. | .0916 | | S. | .0748 | .0415 | T. | .0885 | | F. | .0635 | | S. | - | .1251 |
| T. | .0498 | .1966 | F. | .0415 | .4580 | M. | .0721 | | W. | .0858 | | S. | .0719 | | M. | .0748 | .2359 |
| W. | .0358 | .3348 | S. | .0555 | 1.4356 | T. | .0498 | | T. | .0885 | | S. | .0111 | .1297 | T. | .0526 | .0721 |
| T. | .0216 | | S. | .0693 | | W. | .0555 | | F. | .0682 | | M. | .0381 | | W. | .0443 | .2581 |
| F. | .0331 | | M. | .0721 | | T. | .0776 | | S. | | | T. | .0831 | .8837 | T. | .0583 | 1.5354 |
| S. | .0554 | | T. | .0498 | .0305 | F. | .0833 | .9719 | S. | .0871 | | W. | .0432 | .1162 | F. | .0776 | .0055 |
| S. | .0608 | | W. | .0498 | | S. | .0792 | | M. | .0858 | | T. | .0138 | .0831 | S. | .0608 | .2106 |
| M. | .0277 | | T. | .0618 | .0748 | S. | .0676 | | T. | .0831 | .0027 | F. | .0554 | | S. | .1063 | |
| T. | .0304 | | F. | .0583 | | M. | .0622 | | W. | .0831 | | S. | .0508 | | M. | .0555 | .0205 |
| W. | .0162 | 1.2774 | S. | .0776 | | T. | .0858 | | T. | .0969 | | S. | .0508 | .4631 | T. | .0804 | .1139 |
| T. | .0581 | .2109 | S. | .0610 | .5748 | W. | .0526 | | F. | .0831 | | M. | .0692 | .2771 | W. | .0554 | .3693 |
| F. | .0608 | | M. | .0748 | | T. | .0692 | .0469 | S. | .0993 | | T. | .0635 | .0554 | T. | .0716 | |
| S. | .0385 | .5358 | T. | .0776 | | F. | .1023 | | S. | .0831 | | W. | .0800 | .6560 | F. | .0804 | .0081 |
| S. | .0331 | | W. | .0555 | 1.1495 | S. | .0969 | | M. | .0858 | | T. | .0969 | 3.3793 | S. | .0635 | .0777 |
| M. | .0831 | .5308 | T. | .0555 | .0665 | S. | .0831 | | T. | .0682 | | F. | .0692 | | S. | .0794 | .5324 |
| T. | .0692 | | F. | .0498 | .0638 | M. | .0760 | | W. | .0797 | | S. | .0608 | .0635 | M. | .0831 | .0081 |
| W. | .0581 | | S. | .0555 | | | | | T. | .0770 | | | | | T. | .0804 | .0027 |
| 1.2864 6.3879 | | | 1.6811 6.1527 | | | 2.1422 1.0880 | | | 2.2940 .0565 | | | 2.1409 6.3185 | | | 1.7715 10.0453 | | |

DIVISION IV.

ILLUSTRATIONS.

PLATE I.

OF Georgetown; showing position of Robb's Town, Water Street, Stellings, Sluices, Mud Lots, Shipping, and Military Grounds, the original and chief site of the late epidemic.

PLATE II.

Fore shores of Eve Leary, Plantation, Thomas and Kitty, as they were the year previous to the epidemic, and as they are after the epidemic.

PLATE III.

Plan of Stabroek, now Georgetown, in 1804; showing recent encroachments of and defences against the sea at that period.

PLATE IV.

Features, complexion, and hæmorrhagic appearance of a Madeira immigrant in advanced stage of yellow fever.

PLATE V.

Tongue on seventh day of yellow fever; day before death; hæmorrhage from bowels in this case; Portuguese immigrant.

PLATE VI.

Cardiac end of stomach and œsophagus of patient. (3493. S. H. Register.)

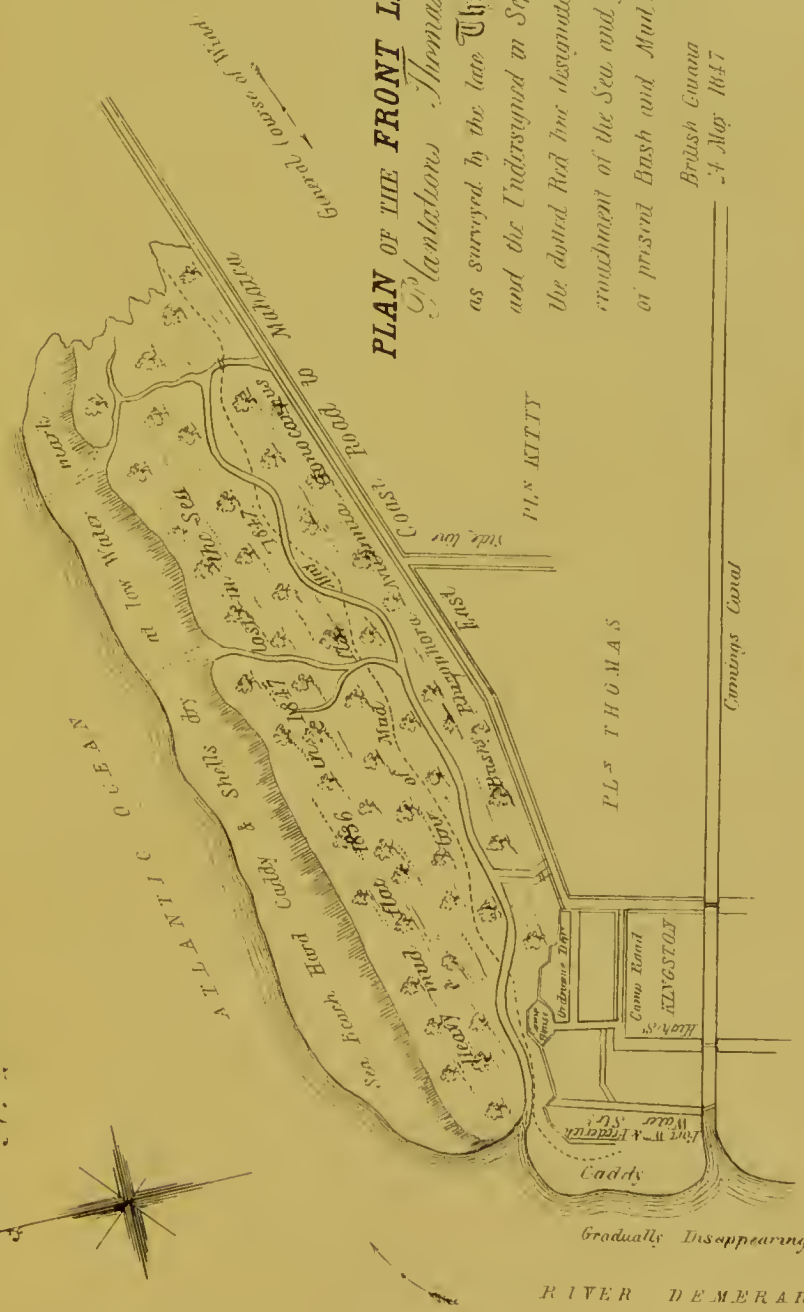
SKETCH OF GEORGETOWN and its Environs



- M. S. N. Harbord del.
- 1 Military Hospital
 - 2 Officers Barracks
 - 3 Soldiers do.
 - 4 Cummings Canal
 - 5 Lanabara
 - 6 Observatory
 - 7 Burial Ground
 - 8 Camp House
 - 9 Commissariat
 - 10 Prager Alley
 - 11 Holness St.
 - 12 Vlissingen Abuce
 - 13 Canal
 - 14 America St.
 - 15 Canals
 - 16 Fort William Frederick
 - 17 Station Street
 - 18 Kanassone Station
 - 19 Town Station
 - 20 Sea-Brack
 - 19 Steam-Boat Station
 - 20 Sluice
 - 21 Unquahart Station
 - 22 Sluice
 - 23 Holness Station
 - 24 Sluice
 - 25 Rolls Station
 - 26 Sluice
 - 27 Station
 - 28 Ferry Station
 - 29 Station
 - 30 Sluice
- N.B. the Double lines as at 13-15 in the Sketch denote Canals throughout.



No. 2



PLAN OF THE FRONT LANDS *See Page 111*
Plantations Thomas and Hilby
 as surveyed by the late **Thos. Hubbard**
 and the Undersigned in September 1836
 the dotted Red line designates present or
 encroachment of the Sea and general bond
 of present Bash and Mud Flat.
 British Guiana " Henry Ramsford
 24 May 1847 Sworn land Surveyor



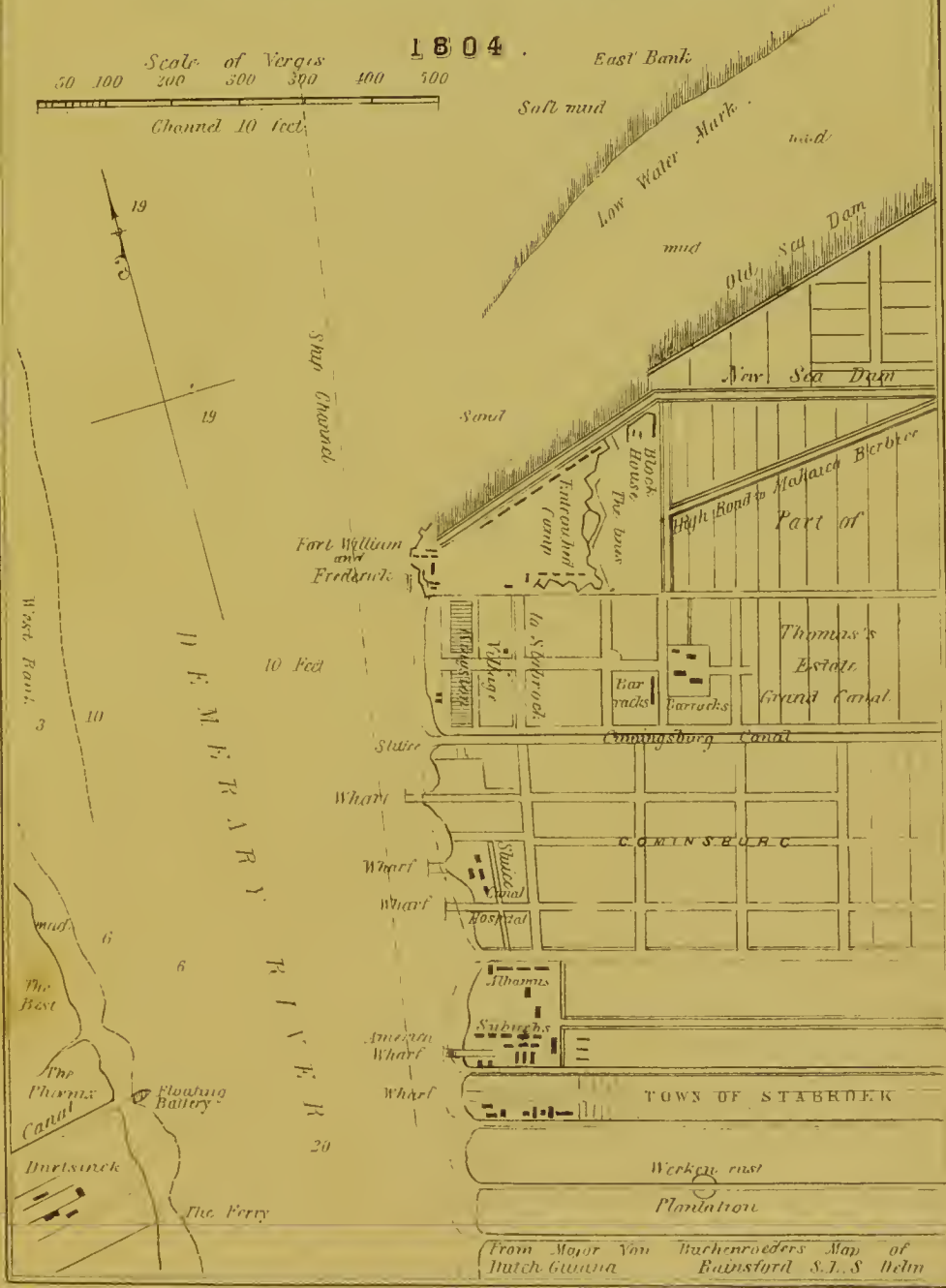
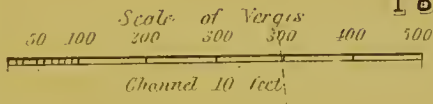
Equivalent in fathoms
 125 F. English



Plan of Stabroek With its Vicinity

THE CAPITAL OF DEMERARY.

1804



From Major Von Buchenroeders Map of Dutch Guiana

M & S. Bonhart Inq.











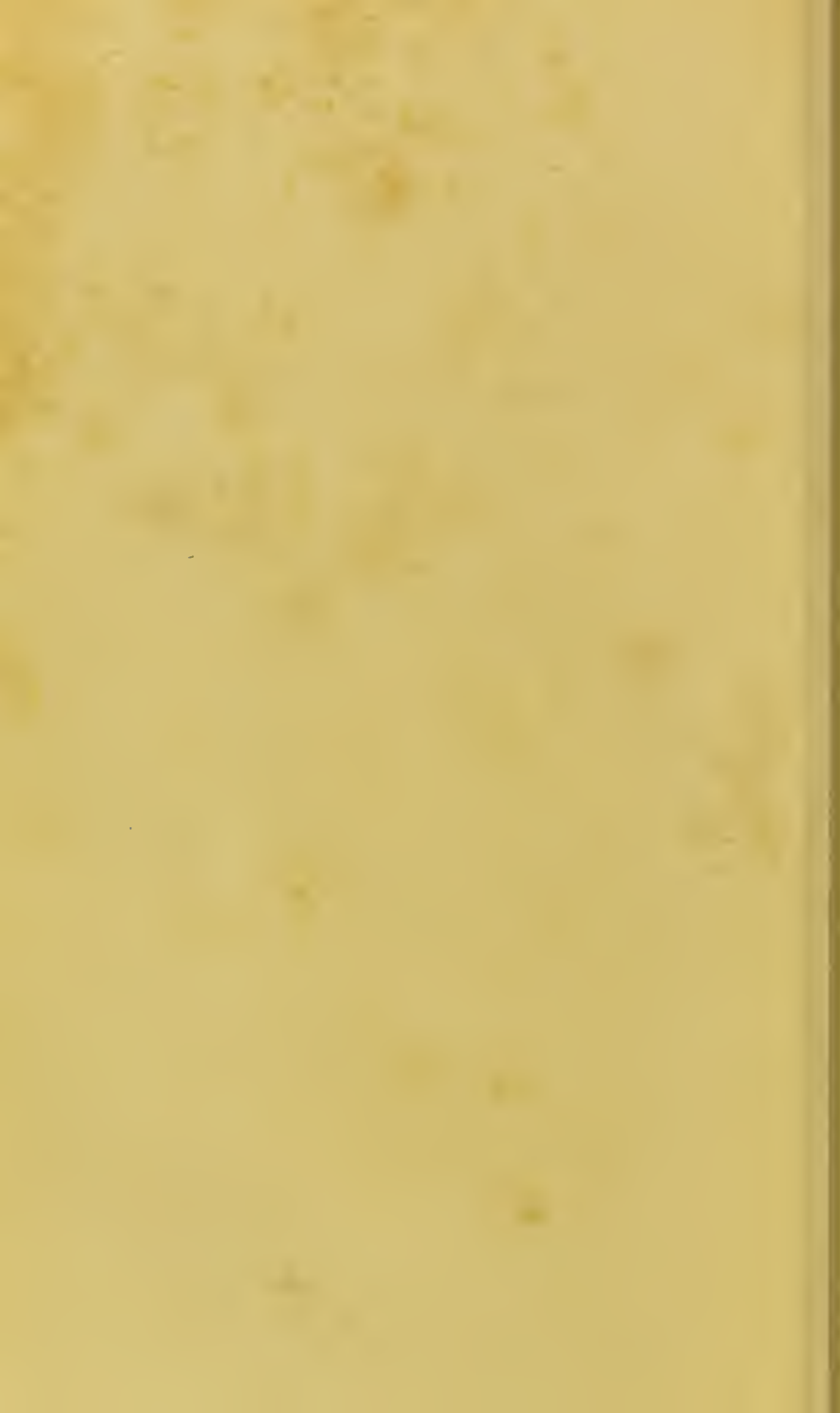


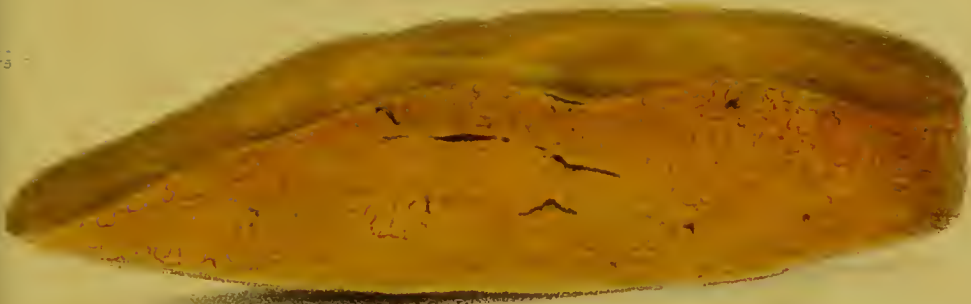








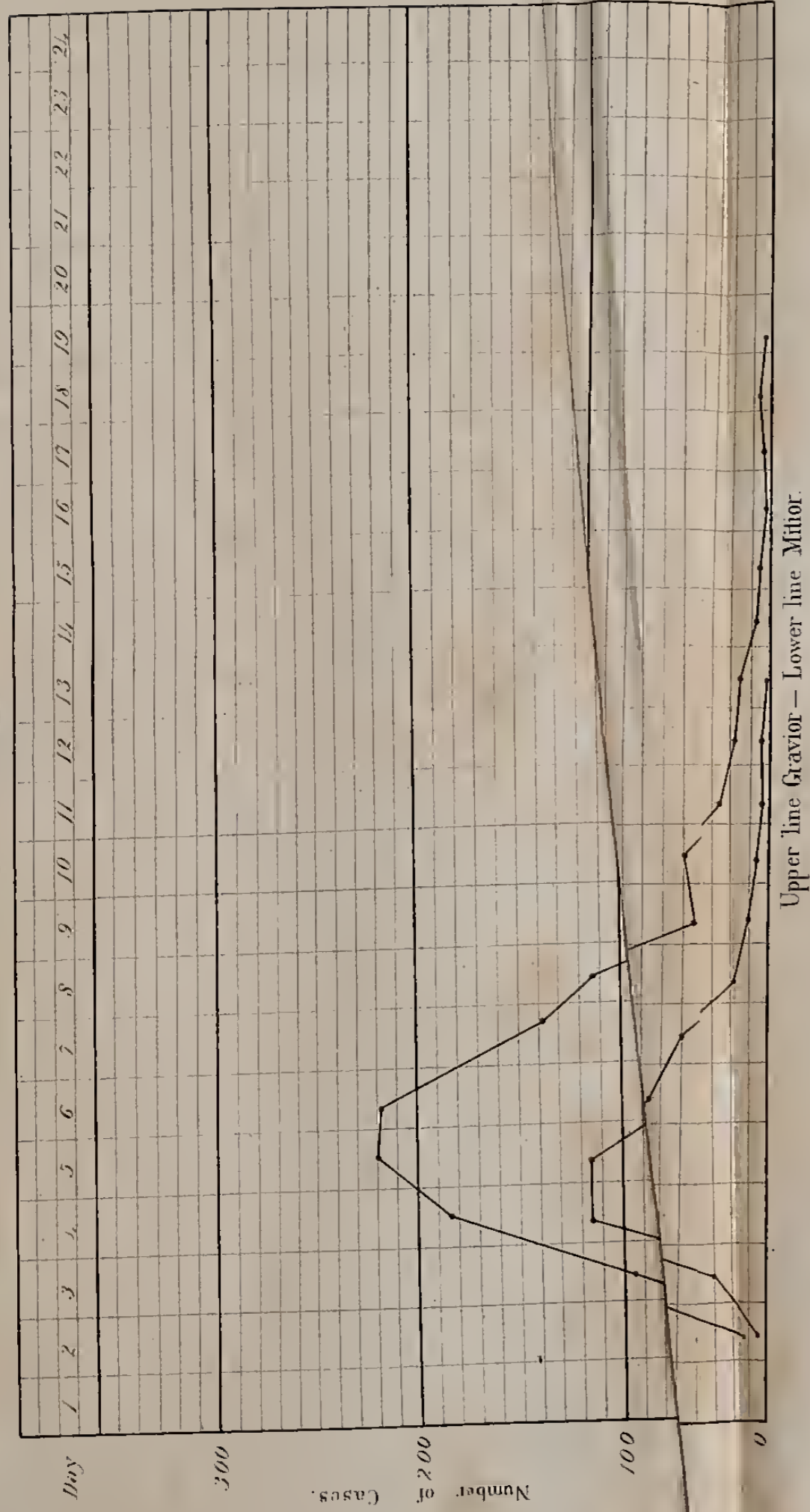




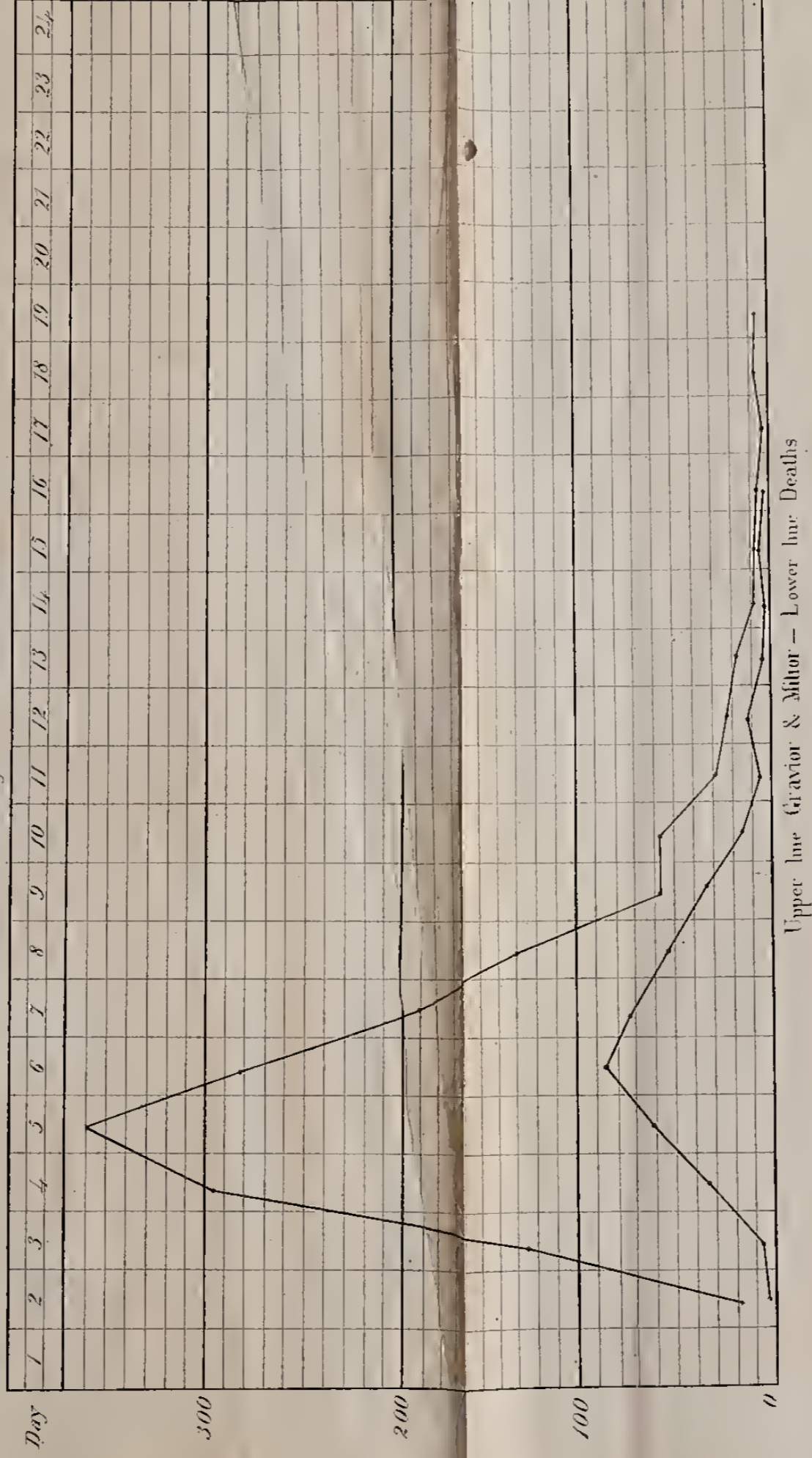


DIAGRAMS ILLUSTRATIVE OF THE LAW OF DURATION OF YELLOW FEVER,
 1st SHOWING THE DAY OF CONVALESCENCE.

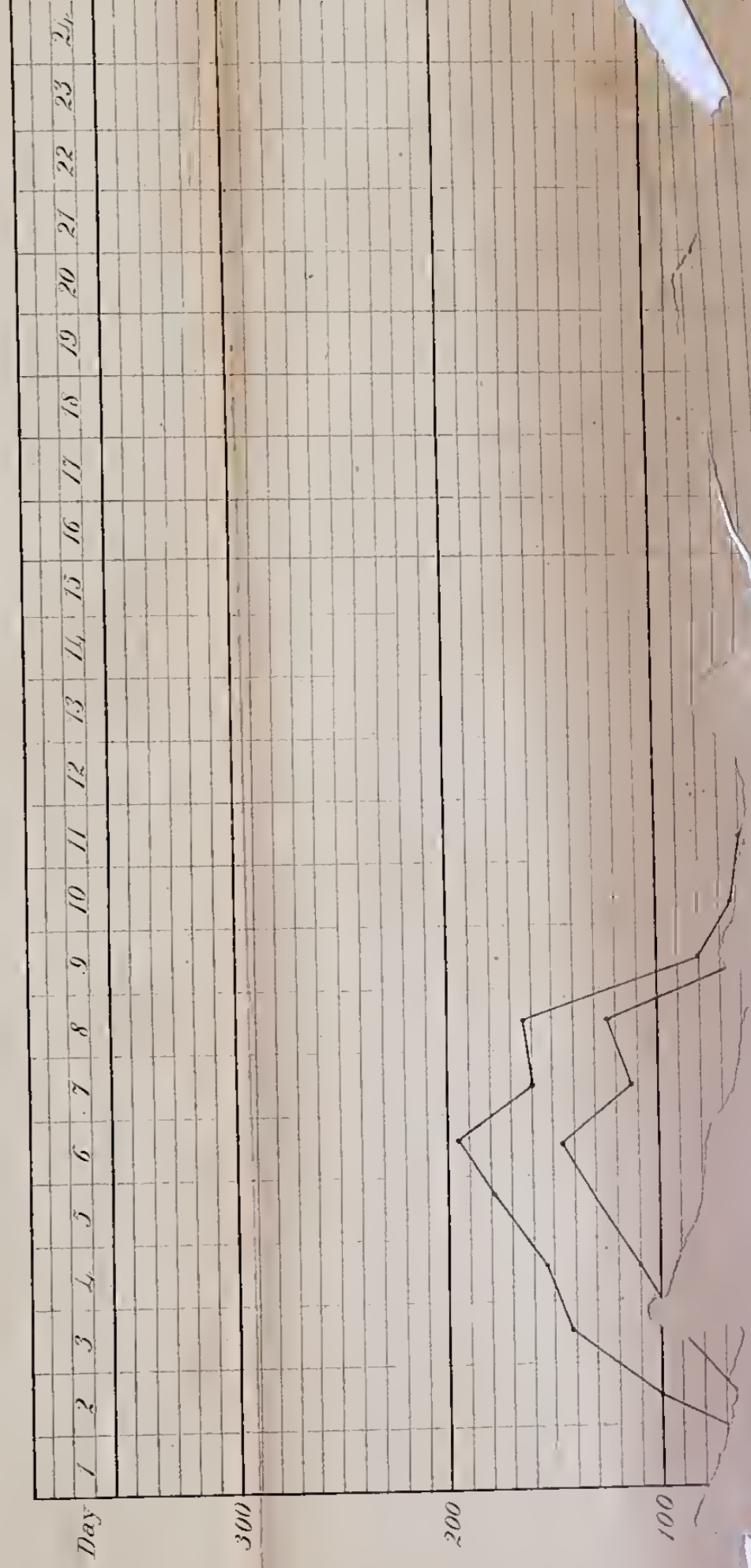
Gravator 1138 - Mitior 428 Cases.



2^d SHOWING THE DAY OF CONVALESCENCE, MITIOR & GRAVIOR,
 and day of Death in 404 Cases.



3^d SHEWING THE DAY OF PERFECT HEALTH AFTER CONVALESCENCE FROM YELLOW FEVER.



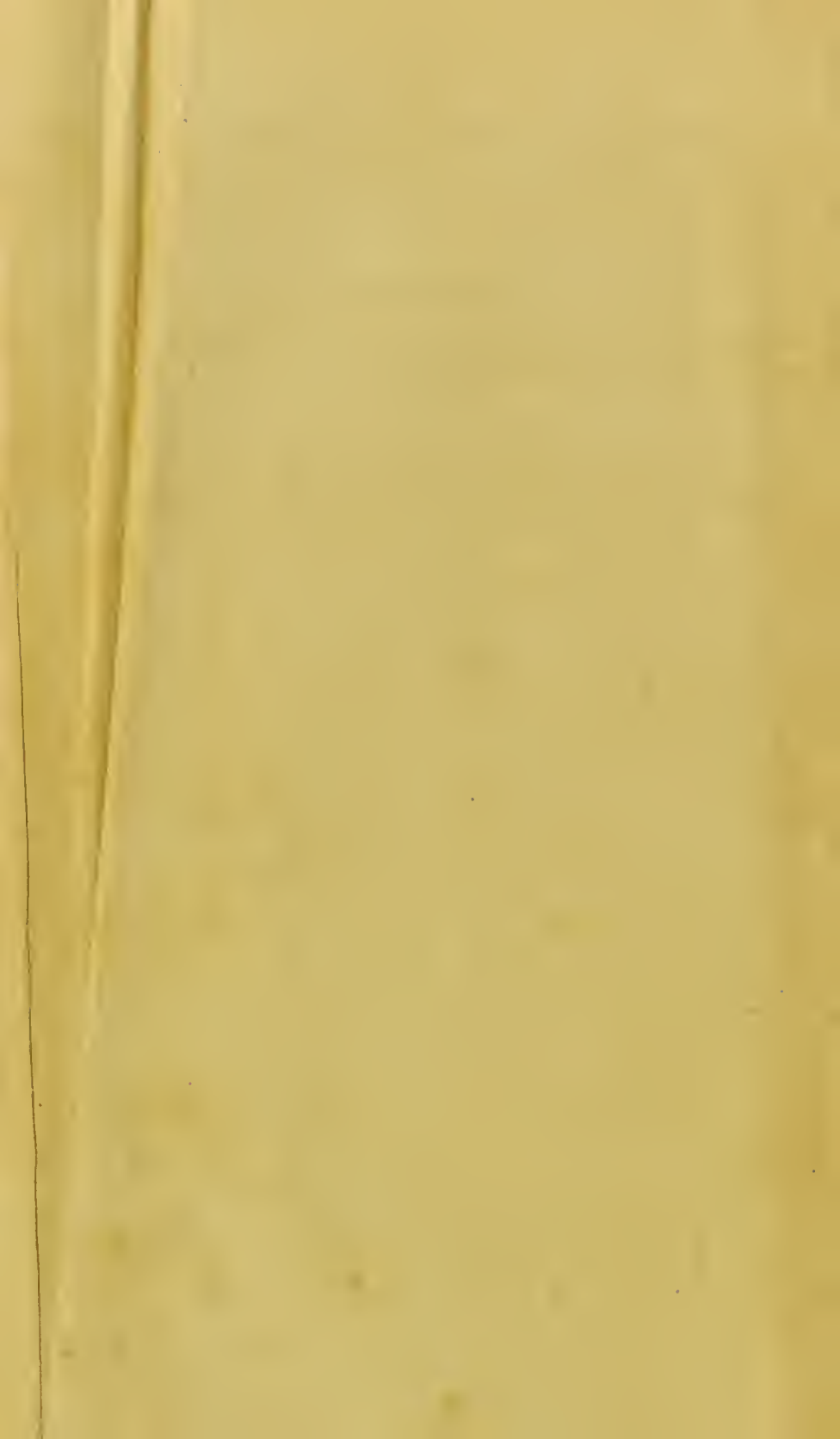


PLATE VII.

Ecchymosed condition of cardiac portion of stomach in yellow fever (case 3332. S. H. Register).

PLATE VIII.

Hyperæmia of intestine, with points of extravasation. (From drawing in possession of Dr. Bonyun.)

PLATE IX.

Fig. 1. Common appearance of liver in yellow fever (section of).

Fig. 2. Hyperæmia of mucous membrane of bladder in case of yellow fever (case 3422. S. H. Register).

PLATE X.

Diagram of the law of duration of yellow fever, and duration of period of convalescence.

APPENDIX.

I.

[For some observations on the origin of the endemic fever which recently occurred in the garrison of St. Ann, Barbados, and of which such frequent mention, as to certain particulars, has been made in the foot notes, I beg to refer to a paper on the subject published in the September number of the Edinburgh Medical and Surgical Journal, in which the hypothesis is advocated that the disease was of local origin, and neither imported nor contagious, contrary to a report that it was introduced by her Majesty's steamer "Growler" from the coast of Africa, that vessel having touched at Barbados in proceeding from Trinidad, which she first made, to Bermuda.

Since that paper was written, I have not ceased to make inquiry respecting the "Growler" during the few days she was detained at Barbados, with the hope of obtaining the most exact information; but I cannot say with success. The difficulty of learning the naked truth on occasions of this kind is hardly credible to the inexperienced in such investigations. I may mention a few circumstances in illustration. The report that the "Growler" introduced the fever, was first spread shortly after the first appearance of the disease. Careful inquiry then made on the spot contradicted it, and of course satisfactorily proved it to be without foundation. Notwithstanding, the report did not cease to spread; and on my return to England, in the December following, I learnt that ear had been given to it here, and that it had credit—partial indeed—for truth. Soon after a note was communicated to me by a friend from an officer who had been in Barbados during the first outbreak of the fever, giving a particular account of the manner in which the men who first contracted it communicated with the "Growler," not only by going on board, but more than that, by going into the sick-bay to visit some acquaintance, then labouring under the disease. Nothing could be more precise than this statement of the transaction; and yet, shortly after, I was assured that the officer who wrote it knew nothing of the matter,—

that his description was drawn from his imaginings or from loose hear-say surmises.

Coincidence seems to be an inexhaustible source of error, and that almost of necessity, from the nature of cause and effect. Apart from the coincidence of the outbreak of the fever partially in the garrison of St. Ann, and the arrival of the "Growler," with fever on board, no one circumstance favoured the conclusion that it was thus introduced. The two fevers, I think it may be asserted, were of a different kind. No fever was introduced into Port of Spain, Trinidad, by the "Growler"; none into Bridgetown, Barbados; none into the family with which the sick when landed in Bermuda freely communicated; and, further, for many months, the fever afflicting a part of the garrison of St. Ann, was confined to that portion of the troops stationed in the low grounds where it first broke out.

Coincidence by itself surely is of no account; it is constancy which gives it importance in the relation of cause and effect. In obscure cases, it should be only suggestive. The late fever in Bona Vista, the first appearance of which was coincident with the arrival of the "Eclair," with fever on board, from the coast of Africa, by many has been considered as a demonstrative example of the importation of the disease: yet Dr. King, who was employed officially to investigate the matter, arrived at the conclusion that it was of local origin; as, in his opinion, was also of local origin that fever which was endemic in Bermuda in 1843, which the contagionists traced to an individual, a passenger, landed from a mail steamer, said to have been labouring under fever, but in reality under pulmonary consumption. The fact most in favour apparently of the Bona Vista fever being imported, is the general healthiness of the island for many years previously. But this may be delusive. There are numerous instances in the West Indies, of the absence of the disease for successive years with marked healthiness, and of its appearance suddenly when least expected,—much after the manner of cholera and influenza in various parts of the world. Bona Vista, it is worthy of being remembered, is within the yellow fever zone, and one of a group of islands in which Europeans have suffered severely from the disease,—especially the Portuguese, when, as at an early period, their fleets touched at the Cape de Verds, in passage to Brazil. Southey, in his History of Brazil, speaks of the pestilential climate of the Cape de Verds. He remarks, "because it had been the custom, fleets continued to be sent there, though sure to decimate, perhaps even to lose, more than half their numbers;" adding that more than a third of the troops and seamen of the Portuguese fleet assembled there in 1629, were cut off. He quotes for this fact Piso, in his work "De Morbis Contagiosis." The words of the Dutch

author are, “Anno 1639, magno nostrorum commodo, juxta Sinum omnium Sanctorum tertia pars classis Hispaniæ maligna et contagiosa febre extincta.”*]—ED.

II.

On the Employment of Quinine in the Treatment of the Fevers of the West Indies.†

WHEN quinine is taken by an adult to the extent of thirty or forty grains, it produces certain cerebral symptoms, the constants of which are, a *ringing noise in the ears*, and more or less *deafness*.

This set of symptoms, where there is no idiosyncrasy, indicates the saturation of the system by the medicine, as ptyalism does mercury; and may be conveniently known by the name of *cinchonism*. Rare instances occur in which hypercinchonism is induced by a very few grains of quinine, accompanied by many nervous symptoms and formication so severe as to proscribe the use of the remedy. In some, and this may occur in cases which had hitherto been normal, cinchonism has not been induced till after the administration of seventy-two grains of quinine.

Cinchonism is not peculiar to quinine. By other vegetable febrifuges, — such as salicine, Angostura bark, and beberine, — cinchonism can be induced, but not with the same certainty as by quinine, neither in the same uniform series of phenomena, neither with the same harmlessness. Cinchonism seldom lasts longer than twenty-four hours, except in some cases of anæmia, in which the writer has known it continue upwards of a week. Quinine has been prescribed by the writer to patients of both sexes and all ages, and, where ascertainable, almost invariably to cinchonism, during thirteen years, and probably to the extent of several thousand ounces of the sulphate; and during that time he has seen no ease of danger from its effects, with the exception of three or four cases of imputed abortion. To many the

* See Hist. of Brazil, i. pp. 105. 208. 571.

† [The efficacy of the quinine mode of treatment of remittent fever, as it commonly occurs in the West Indies, is marked by the circumstance, that during the first quarter in which it had an extensive trial, after the circulation of this paper, out of 165 cases of disease returned “Remittent Fever,” two only proved fatal; and these, from the lesions discovered on the *post-mortem* examination, there is reason to infer were rather instances of latent phlegmasiæ than of fever of the true remittent kind.] — ED.

muffled ears of cinchonism is not even disagreeable. Cinchonism is capable of superseding and suppressing that excited condition of the circulation and animal heat known as fever, except when depending on anæmia, or symptomatic of inflammation or its effects.

Quinine is purely a febrifuge. Instead of being a tonic or stomachic, it generally induces anorexia, and a relaxed and macerated state of the skin, some tremulousness, and, in many cases, slight aphonia.

As a febrifuge, the full efficacy of quinine is seldom obtained unless pushed to cinchonism. Cinchonism is, therefore, the test and criterion in practice of the full and sufficient use of quinine.

It is probable that the protective influence of quinine against fever seldom lasts longer than the manifestation of cinchonism.

The ordinary headache of fever does not contra-indicate the use of quinine.

The power of quinine seems to be to cut off the connexion between local irritations and constitutional excitement; to disturb and break the series of morbid elaborations set up in some specific fevers, which terminate for the most part in contamination of the blood and loss of vital cohesion of the capillaries. In intermittent fever it is antidotal.

Quinine is of little efficacy in intermittent fever when exhibited during the paroxysm.

Quinine is of no efficacy in the late stages of continued or remittent fever, where the vascular and thermal excitement have been succeeded by organic lesion or contamination of the blood. It should be given, as is well known, in the intermission of intermittent fever, and in the formation, or in the first stage, of continued remittent or yellow fever.

The use of quinine against relapses of intermittent fever, whether the disease has been primary or secondary, is one of its most valuable applications.

In using quinine against the paroxysms of intermittent fever, hourly doses of three grains, till twelve doses be given, is the best mode of saturating the system with the remedy. If, however, the disease be a quotidian, with short intermission, six grain doses hourly, till six doses be given, will be judicious practice.

In the other fevers, where quinine is eligible, and the remedy is prescribed during the existence of febrile excitement, the dose to be efficacious must be large, and the impression on the disease sudden and overwhelming.

An auxiliary to it is also required in such cases. Twenty-four grains of quinine and twenty grains of calomel in one dose, is the

most powerful resolvent of fever. One or two such doses, with an interval of six hours, and followed by a castor oil purgative, is generally sufficient.

But I have prescribed six such doses with efficacy; and I recollect no instance of pyalism occurring when this treatment was required and adopted, and sometimes but mild cinchonism. An intolerance of quinine, or early and intense cinchonism in such cases, is one of the worst prognostics.

In the treatment of simple intermittent fever, or its relapses, calomel is rarely, if ever, prescribed by the writer; sulphate and carbonate of magnesia mixture, or sulphate of magnesia and tartrate of antimony mixture, as a purgative during the hot stage (if needed), or fifteen drops of solution of acetate of morphine, with a drachm of sweet spirits of nitre, if there be much suffering from muscular pains, headache, or emesis and retching, will speedily relieve the paroxysm, and, followed by quinine, in combination with purgative doses of rhubarb, will fulfil all the indications for the intermission. But when a European or North American, probably not long from a cold climate, and during the prevalence of malignant disease, is attacked by fever, and shows, to the quick and practised eye, alarming indications, no fear of the injurious after-effects of the mercurial will have weight to withhold the resolvent dose of calomel and quinine. In cases threatening danger to life only, need it be used; and I know of no instance wherein the slightest untoward result has been experienced from its use.

The combination of quinine with tartar emetic in pneumonic and bronchitic complications of intermittent fever, is eminently successful. The forces which disturb the remedial power of quinine in fever are chiefly inflammatory and congestive complications, or a loaded condition of the alimentary canal. These must be alleviated by appropriate treatment, and the disease rendered as simple or idiopathic as possible, concurrent with the use of quinine. Thus arteriotomy may frequently be required in continued remittent or yellow fever, and in intermittent fever with tenderness over the spleen, a blister may be required as an auxiliary to cinchonism.

There is a form of continued or irregular remittent fever, occurring chiefly in children or adolescents, in which generally no local cause can be discovered, but which is often imputed to worms. But, give what anthelmintics you will, no worms may be passed; hence here they are popularly called "stubborn worms!" This fever may continue for a week, or a fortnight, without any contamination of the blood, or loss of vital cohesion, and probably depends on intestinal irritation. Danger in these cases chiefly arises from the supervention of some

lesion, induced by the long continued and excessive heat, and violent action of the heart, or sympathetic irritation of the brain. In these cases I use quinine with immediate and signal efficacy, in the following manner.

The patient is put into a bath, and the cold affusion is applied till the pulse becomes small and nearly extinct at the wrist, and the skin cold. He then, while in the bath, gets his dose of quinine (two or three grains), and is returned to bed without being dried. The bath and the dose of quinine are continued hourly, as long as the skin persists warm, when the hourly dose of quinine is due. After five or six baths the skin generally becomes permanently cool, and then the quinine is pushed on, to complete einchonism, alone and without the bath. This mode of making an intermission in a continued fever I have never found attended with unpleasant or dangerous consequences, and it will generally subdue the fever after every other method has been tried in vain.

In fever of doubtful origin, and where latent inflammation is suspected, I have frequently used a small cantharides blister as a test; in fact, I never like to pass the blistered surface of a patient without inspecting it, its revelations are often so interesting and important. If, instead of the usual vesication of thin serum and cuticle, the vesication is a bladder of fibrinous coagulum, or suety in consistence, inflammatory action is going on probably in the neighbourhood of the part, and tartar emetic, or such like combinations, are indicated.

Relapses in intermittents have their determinate periods, the day from the last attack being generally some multiple of *seven*.

The usual day of relapse among the acclimated of this colony is the 14th or 28th. After one or two relapses, the law of each individual case can be ascertained by each patient.

The prophylactic, which I have adopted with great success, and in my own person first, many years ago, is as follows: Two days before the anticipated relapse, three grains of quinine to be taken thrice, daily, for four days; and after a similar relapse-interval, the quinine to be again taken in the same manner; and so to be repeated three or four times successively. The disease is eradicated completely by thus baffling the relapse.

DANIEL BLAIR, M.D.

Postscript to Paper on Quinine, &c.

Georgetown, 1st October, 1847.

THE plethoric and those of large abdominal development are most subject to the congestive form of intermittent, and the thin and emaciated to the typhoid form.

Among the middle and upper classes of society depression of mind is a powerfully determining cause of the congestive form, and in such cases congestion supervenes generally on the *sweating* stage.

Injudicious bleeding in our intermittents is apt to induce the typhoid type; as in the case of Graham, now in the Seaman's Hospital, unnecessarily bled by the ship master.

There are cases of congestion of the lungs in intermittent fever, but of rare occurrence, in which quick and plentiful venesection is required, if the subject can at all bear it. A hacking, dry cough, apparently laryngeal and sometimes paroxysmal—oppression about the heart and chest—extreme restlessness—panting—high fever indicate this state. In such a case bleeding to approaching syncope will, before the arm is tied up, exchange the extreme internal agony and sense of approaching death, for a feeling of perfect happiness and repose.

Care must be taken to discriminate between the foregoing symptoms and those of simple exhaustion; and also between the cough of severe pulmonary congestion and the slight harmless cough which frequently attends an ordinary paroxysm of intermittent. This latter *attends* the paroxysm, the former generally precedes it, sometimes even for several days.

In consequence of the great tendency to anæmia in residents of this colony, and the difficulty experienced here of repairing this lesion of the blood, much circumspection is needed in the use of the lancet. It is seldom used in private practice, and scarcely, if ever, in the civil hospitals, even in pneumonia.

The dieting of convalescents from remittent and intermittent fever must have reference to the previous habit of the patient, and, most of all, to the presence or absence of anæmia. Where there is no anæmia, and intemperate habits, vinous stimulants are unnecessary; but where there is a deficiency of red colour in the membranes, fresh animal food and alcoholic drinks are necessary for the restoration to perfect health. Malt liquor is, in most cases, preferable to wine. Brandy largely diluted will occasionally answer best. Heated palms or restlessness, or discomfort, will require a disuse or larger dilution of the stimulant.

In cases of frequent relapse, or slow and imperfect convalescence, change of air is necessary. Among the wealthy, Barbados is the favourite resort. Those whose circumstances will not afford the expenses necessary for the Barbados' trip, find much benefit by change to either of the coasts of the colony, or, better still, the uplands of Essequibo.

A circumstance, worthy of note, in the effects of change of air and resembling the *nach kur* imputed to the German spas, is, that while the patient is away no amendment may take place in his health, nor till after *his return to the colony*. This *nach kur* is of frequent occurrence.

From the tenor of all the previous remarks, it will be perceived that I consider intermittent fever the *basis* of all the endemic fevers of the colony.

DANIEL BLAIR.

III.

Some Points of Treatment in Late Stages of Fever.

IN remittents, or *continuous* intermittents, wherein the paroxysms are imperfect, and occurring so closely on each other as scarce to leave an interval; and where the period for the administration of the quinine, or quinine and calomel, has gone by, other remedies of much efficacy come into use.

The continuous intermittents referred to generally occur among those of irregular and intemperate habits, or of feeble constitution; and during the warm, close, humid weather of the great rainy season, and the succeeding month, the disease is most liable to become congestive or typhoid. The whites are more subject to this form of disease than the blacks, and the coolies than the negroes.

When the eyes are heavy, sunken, and hazy with mucosities, the *skin warm and dry*, the pulse tolerably developed—sordes on the teeth, and the tongue (whether clean or sordid, rough, glabrous, or spinous) *dry and baked* in appearance, with or without torpor or typhomania, one grain of camphor with ten grains of nitrate of potash hourly will generally in 24 hours improve all the symptoms, but most markedly the tongue, rendering it *moist*. Green tea forms a good article of aliment in these cases.

If, notwithstanding the moisture of the tongue, the other symptoms remain stationary, $\frac{3}{4}$ ss. each of the old spirit of Mindererius and

eamphorated water should be substituted for the nitre and eamphor till the skin becoomes cool and moist.

If the skin be shrivelled, cool, and moist, and the pulse weak, and the rest of the symptoms are simply adynamie rather than typhoid, striking advantage results from the combination of musk with ammonia, two or three grains hourly.

Oceasionally, symptoms indicating the eamphor and nitre are associated with an affection of the membranes of the brain, which, if unrelieved, may end fatally by effusion under the arachnoid. The patient may make no complaint, and marked manifestations of this condition may be absent; but its presenee is to be suspected when there is unusual heat of head, pain in it excited by rotation, sottishness of countenance, and the non-improvement of the tongue by the eamphor and nitre. In such a case, vesication of the nape of neck or entire scalp, and six or eight doses, at intervals of two hours, of calomel (one grain), and James's powder (three grains), will be followed by good results. The latter medicine is well borne, there being no gastric irritation in those cases.

In congestive cases, with the skin cool and damp and livid,—the tongue moist, and perhaps small and clean, with retching and vomiting, or purging of watery fluid,—pulse small and rapid, and respiration hurried,—powerful frictions with flannel and dry mustard continued for several hours, with brandy in large quantities, and as strong as it can be drank, and ammonia, will be requisite. These congestive cases are frequently induced by the ill-timed use of drastic purgatives in fever.

Brandy is frequently required in the collapsed and macerated condition of the body in convalescence from simple intermittent, and in the treatment of the late stages of protracted fever. When the skin is warm, and there is thirst, the brandy should be largely diluted with water.

Secondary diseases must be vigilantly looked after in the latter stages of some of our fevers. Latent pneumonia and bronchitis are frequent, particularly in cases happening when the trade winds blow strongly over the country; the side on which the patient is in the habit of lying, and the depending parts of the lungs, are the principal sites of the secondary affections. The stethoscope should be in frequent use, and the condition of the bowels and the *bladder* often ascertained.

In the consecutive inflammatory diseases referred to, counter-irritations by sinapisms will generally be most eligible, and one-eighth of a grain of tartar emetic can be added to each dose of the nitre and eamphor.

Sometimes, in common intermittent, a feverish excitement is sustained by some slight latent phlegmasia, detected, perhaps, in an inguinal gland, or a tender spleen, which will pass off in twenty-four hours, by a few doses of one grain of calomel and three of James' powder every two or three hours.

Sometimes in common intermittent, from the mismanagement of the quinine by the nurses, a feverishness may continue even after cinchonism, but which is readily removed by a few doses of the spirit of Mindererus and camphor water. Gastric irritation indicated by redness of tongue, anorexia, and probably retching, requires wet or dry cupping, according to the intensity of the symptom and the strength of the patient, and sinapisms over the epigastrium.

In cases of jaetitation, and sighing, and general distress, which sometimes supervene on fever, a cautious dose of morphine acts like a charm. The dose in any case need not exceed fifteen drops of the solution of the acetate. The contraindication is a languid state of the capillary circulation. The back of the hand pressed over the arms, chest, or abdomen, and leaving the finger marks, discovers this state.

During convalescence here from remittent or protracted typhoid, or adynamic intermittent, insanity is not uncommon, with much restlessness, and a desire to escape from hospital. These cases are very manageable and curable as follows:—The scalp is to be shaved and the ammoniacal blistering paste applied three or four minutes till it causes vesication; the scalp is then dressed with ointment of tartrate of antimony which will cause erythema, pustular eruption, and tumidity, which extends to the neighbouring integuments. *As soon as the eyelids become swollen and the eyes closed by œdema*, the patient can be left to himself without any restraint. He becomes hoodwinked, quiet, and rational, his temporary blindness supersedes the straight jacket and dim room, and his wandering thoughts have a constant, fixed, harmless, and absorbing topic in the scalp irritation, independent of its therapeutical power. Poultices readily cure the scalp.

There is a species of fever, apparently a sequel of intermittent, occurring in such subjects as were the West India Rangers, described by the late Dr. Ferguson. These anæmics, with pallid lips and fishy tongues, who, panting on the slightest exertion, and bloated with anasarca, when they get a paroxysm of intermittent, may have a hot dry skin and a pulse of 120 without remission or contamination of the blood, or local pain, or much uneasiness or impairment of appetite, for many weeks. When two fingers are laid along such a patient's pulse, with an unequal pressure, the finger next the heart

being the most pressed, the blood feels thrilling below the fingers, like sand, or as if it were effervescing. How the excessive and uncontrollable heat can be generated and maintained with the few red oxygen carriers which the blood of such patients contains, seems a great mystery.

These are generally bad cases, though not rapidly fatal, and in post-mortem examinations no lesion may be detected, nor abnormal appearance, except bloodlessness and serous effusion, with frequently some hypertrophy of heart (probably formed during the course of disease) and *air bubbles* (not the result of putrefaction) *in the heart's ventricles*.

There is a species of fever here, common among natives and old residents, and chiefly affecting the black and mixed races, and evidently the result of a phlegmasia; but in its habitudes very like ordinary intermittent, and frequently requiring quinine. It is common in Barbados, where, I believe, it is called "fever and ague." It is here called "rose," or "rose and waxen kernel." It is an inflammation of the lymphatic vessels or lymphatic glands, or both, and a succession of attacks induces the disease elephantiasis, or permanent enlargement of the limb by fibrinous anasarca.

This disease is never fatal, unless when erratic or in unhealthy subjects, terminating in excessive suppurations (sometimes within the pelvis), or coming on as a secondary disease, and during slow convalescence. The fever of rose commences with shivering, like a pure intermittent, but seldom ends by sweating. Sometimes the local disease shows itself only *after* the fever paroxysms.

Several quotidian or tertian paroxysms may occur, and then quinine is necessary in the rose.

Calomel (1 gr.), James' powder (3 grs.), opium powdered ($\frac{1}{2}$ gr.), every two hours, for four or six doses, with purgatives either before or after, is the best constitutional treatment for the paroxysms.

This rose fever is as subject to relapses as the pure intermittent, to which it seems closely allied, but the mode of preventing the relapse is totally different. A four or five months' daily course of small doses of sulphate of copper and tartrate of antimony is powerfully prophylactic in this periodical inflammatory fever. I believe a civil practitioner, formerly of Barbados (Mr. Stewart), was the first to use this remedy; and I can testify to its efficacy in numerous cases.

The following is the formula I use:—

℞ Sulph. Cupri gr. i.
Tart. Antimon. gr. $\frac{1}{8}$ ℞ fiat pil. i.

One pill to be taken twice daily; it generally nauseates till after the first week.

When a tolerance is established the pill may be taken thrice daily. This medicine has no effect in reducing the hypertrophied limb; it simply acts by preventing future exacerbations.

DANIEL BLAIR, M. D.

Georgetown, British Guiana,
4th Sept., 1847.

IV.

*Memorandum on the Administration of Quinine in the Lowland Fevers of Jamaica, between the Spring of 1834, and the corresponding Period of 1845.**

1.—A few days after arriving at Jamaica, in 1834, it was my fortune to witness, under the superintendence of an old medical officer,

* [The importance of the subject (the treatment of the fevers of the West Indies) induces me to append the above memorandum, with which I have been favoured, with permission to publish it. The results described tally well with Dr. Blair's experience; and hence it may be inferred that in Jamaica, as in British Guiana, yellow fever, even when most malignant, has more of the remittent fever complication than in Barbados.

It is interesting and satisfactory to know that the quinine plan of treatment is coming into use in China (Hong Kong) and on the Western Coast of Africa, and that, since its adoption, the destructive fevers of these countries have become less fatal.

A correct medical history of bark and of quinine, from their first introduction as articles of the *Materia Medica* to the present time, may be mentioned as a desideratum: it would exhibit marvellous changes in the views of medical men; and how much practice is regulated by theory. At an early period bark was largely used in the treatment of the malignant fevers of the West Indies; about the beginning of the present century it had rather fallen into disuse, excepting in forms distinctly intermittent. From the records in the Inspector's Office in Barbados, it appears that sulphate of quinine was first employed by many medical officers in the Windward and Leeward Islands Command in 1824, *i. e.* four years after its discovery: this was in St. Lucia, in an obstinate case of ague, which had resisted various other modes of treatment; it speedily yielded to this new remedy. From the same records it appears that sulphate of quinine was given in large doses (ʒij) in the remittent fever of Berbice in 1828; and that in the following year it was prescribed largely in the same disease in Trinidad. Of this there is an instructive notice in the Inspector General's (Dr. Baxter) Quarterly Report, dated September, 1829. "There is (he observes) a great discrepancy in the practice of the principal medical officers (in the treatment of fevers) at the different stations, particularly between Trinidad and Demerara, at both which places nearly the same diseases are treated. At Trinidad much bleeding, much purging, and large doses of quinine are looked upon as indispensable to save life. Dr. B. (in Demerara) on the contrary, tells me that he seldom bleeds, uses only *laxatives*, uses no calomel, and gives small doses of quinine. I am glad to say success attends both modes of practice; but Dr. H. (in Trinidad) is so confident and

a few sporadic cases of fever, marked by yellow suffusion, and terminating in black vomit. I was informed by this gentleman, that simple intermittents were rarely witnessed in military practice, and, when they occurred, they were readily cured on the anti-periodic principle: but, that in all cases of *more severe* fever, the plan of treatment pursued was either the antiphlogistic, stimulant, mercurial, or saline. In such affections, quinine, when administered, was given as a tonic only, and during the apyretic convalescence.

2.—About the end of March, I found myself in charge of a detachment of the 56th Regiment, at Phoenix Park, a most salubrious mountain post, situated on the central table land in the interior of St. Ann's. In this delightful locality, the Europeans, with rare exceptions, remained free from all serious complaints: but owing to circumstances which it is here unnecessary to relate, I then had considerable opportunities afforded me of seeing disease, as it affected the *natives* of all classes and colours, in the wide district which extends from the Pedro Valley in the interior, as far as the sea coast between St. Ann's Bay and Ocho-Rios.

3.—At a very early stage of my investigation, it appeared to me that the *endemic* fever, as it exists in the *Lowlands*, was erroneously termed remittent; that it was indeed, strictly speaking, an intermittent, inasmuch as, always within forty-eight and generally within twenty-four hours, there appeared a most distinct apyrexial period.

4.—From the above opinions it naturally occurred to me, that during this apyrexial period quinine should be administered: that, in fact, in these fevers the *anti-periodic* treatment was clearly indicated.

As the season advanced, and those cases occasionally merged, *by*

dogmatical, that he wishes no less than a general adoption of his system throughout the command. I have recommended to him a trial of Dr. B.'s practice, which I have represented as equally entitled to notice from its favourable results; but he spurns all other modes of treatment as dangerous and unworthy of notice, and appears disappointed that any other should have discovered a different mode of saving life. I have again Dr. D., who will hear of nothing but cupping and a ptisan, and appears to acknowledge no disease but lesion of the mucous membrane of the stomach. He is most strongly imbued with the new or rather antiquated theories of the French gastro-enteric school, and pities Dr. B. and Dr. H. as still in utter darkness and in the trammels of the schools." How well does this passage display the contrariety of opinion as to the best mode of treating the fevers of the West Indies at the time it was written; and how little was then known of the efficacy of quinine as a specific febrifuge. In Jamaica, I believe, Dr. Jameson deserves the credit of first giving quinine a trial in large doses, in the treatment of remittent fevers, and, on that account, his "Memorandum" on this subject, showing how he was led to its use, is not without interest.]—ED.

imperceptible degrees, into well-marked remittents, I soon found this medicine could be safely administered *during febrile action*, providing such action, however *absolutely* severe, was yet in itself the sequence of a severe pyrexia, — was therefore, in fact, *relatively* an abatement or remission.

The practice then adopted was, to discover in all cases the moment when the paroxysm should have reached its height, — for whenever this climax was fairly passed, quinine was commenced without further delay, and its exhibition continued during the abatement, and during the remission or intermission, as the case might be. When the fever returned, the medicine was no longer given.

5.—In 1835 I began to doubt if I had pushed the administration of quinine to its legitimate extent, for the following reason:—

I had clearly demonstrated that it might be given, within certain limits, during the presence of pyrexial action: that, in fact, the old-established treatment of intermittents—styled anti-periodic—was equally applicable to all the *severer types of Jamaica fever*. Yet this practice, when fully carried out, involved occasionally a somewhat paradoxical treatment. For example, if called to two cases, each presenting the *same apparent* symptoms, it sometimes happened that, in the course of investigation, the one was found *relatively* to be in the stage of abatement progressing towards remission:—whilst in the other, the paroxysmal severity was on the *increase*. In the former case, quinine was administered; in the latter, it was withheld.

On suggesting that in such cases the pyrexial action, however *relatively unequal*, was yet *absolutely* of the *same intensity*, and that therefore this medicine might be given in both, the idea was at once repelled by an old experienced surgeon, who remarked,—“Give quinine during the paroxysm! why it should never be given when *fever is present at all*: when the bowels are open it is most useful in apyrexia, and during convalescence, but then *only*.”

6.—Whilst treating severe cases during 1837, I again thought my anti-periodic plan, however superior to the old modes, was in itself defective, as it left untouched the *initial paroxysm*; and in all the more malignant fevers observed during that year, it appeared to me, that this paroxysm *alone, when uncontrolled*, caused organic lesions sufficient to destroy life ultimately.

7.—It was not until the spring of 1839, however, that I met with a case, of which the previous history, as I then thought, might justify me in exhibiting this medicine *throughout the paroxysm*, according to my new proposal.

The case I now allude to, was as follows:—A young gentleman, who had not then completed his eighteenth year, early in 1839 was

attacked with the usual seasoning fever, at Up-Park. It was sufficiently severe to leave the result for some time doubtful. During convalescence he went to Stony Hill, a station believed to be nearly 1200 feet above the sea level. In a few weeks afterwards he came to Kingston, and was there attacked with tertian intermittent. Although the type was simple, the seizure was very severe. He was treated on the old anti-periodic system,—recovered,—and went to duty. In a few weeks he again relapsed: this time it was a *double-tertian*; he was similarly treated, and became convalescent. The season was advancing,—there was therefore every probability that if he had another attack, it would prove most dangerous. I accordingly determined, if such an event should occur, to adopt my new plan, viz., to exhibit—in combination with such other remedies as the case might indicate—quinine continuously, without regard to the presence or absence of the febrile paroxysm, from the moment I was called in till the issue of the case was apparent. The fourth attack soon came (July). He had not been two hours ill when I saw him, but the symptoms were well-marked and most violent. I at once administered, with other agents, 20 grains of quinine, and continued the medicine till, at the end of eight hours, he had taken 80 grains. In about twelve hours from the first accession, the fever disappeared, and up to the period of my departure from Jamaica, in 1845, it had never returned.

8.—During the summer and autumn, I treated a great number of cases of the ordinary *endemic* with remarkable success. In the December of the same year, I happened to read, in a Colonial newspaper, that fever had just appeared epidemically at New Orleans, and that in some cases it had been checked by this medicine at the moment of accession. The dose was 40 grains. This statement confirmed my resolution. Till then I had not deemed it possible to *cut short* a case of *epidemic* fever by any remedial agent whatever.

9.—In Jamaica, fever could not be said to prevail epidemically from the end of 1837 up to the winter of 1840. It then assumed a most malignant epidemic form, which continued for about fifteen months.

In February, 1841, when at Spanish Town, I made my first trial, and a successful one, in a case of this epidemic fever which occurred in civil practice. I continued my plan during March and April: in May, when quartered at Fort Augusta, a soldier's wife recovered very remarkably. On my return to Kingston early in June, I persevered, and indeed, *since that period, all* patients under my sole care have been treated on this principle *exclusively*.

10.—During the month of May, a somewhat similar mode of treat-

ment was adopted at Port Royal by Senior Surgeon Williams, of the Royal Artillery, and in September following this gentleman tried a modification in the application of the new principle, which I had once followed.

In the majority of cases the bowels are not confined, and in some even diarrhœa is observed. In those, the plan adopted was—to exhibit immediately a full dose of quinine and calomel, and to continue this prescription, regardless of the pyrexia. In many instances, however, especially in plethoric Europeans, the bowels *were* constipated. In these, a smart purgative was exhibited in the first instance, and then the quinine. This officer judiciously added the quinine to the *purgative itself*, and thereby in such cases gained, on an average, at least two hours, a great matter in a disease so rapidly fatal.

11.—The evident success of the early and continuous exhibition of this remedy in all fevers caused attention, and many practitioners—both military and civil—adopted it. It has generally been grafted on some of the old systems, and, as far as I have been able to learn, by no one who tried this treatment has it ever been relinquished.

12.—I have purposely abstained from alluding to the quantity of quinine administered, as the plan of giving large doses was recommended in Jamaica upwards of twenty years ago, by the late Surgeon O'Holloran; neither is it necessary to detail the various modes of exhibiting this medicine.

13.—The phosphate was the preparation I usually employed. On the recommendation of Drs. Reiersen and Cerioli, of New York, I imported a preparation described as a “Hydro-Ferro-Cyanate.” Unfortunately, although ordered in 1843, it did not arrive till just before I left the Island, and I have never heard the result.

14.—Since my return to Europe, I find that the *individual* doses given by several foreign physicians have greatly exceeded anything I ever ventured upon [80 grains]; I never administered more than 40 grains at a time; this quantity, too, was only given in those instances in which, following the example of the intelligent practitioners of New Orleans, I endeavoured to arrest the disease at the moment of accession. In ordinary cases, 20 grains every two hours, with 10, 5, or 3 of calomel, was the prescription. In some instances it was impossible to cause the usual characteristic symptoms, such as ringing in the ears, &c., &c. This, although often, *was by no means* invariably a bad sign. Even when “quinism,” as it is called, appeared, I continued the remedy, but in greatly diminished doses.

In those cases where the adynamic symptoms were well marked, camphor was substituted for calomel; in others, where there was a hæmorrhagic tendency, neutral salts were given. But in every

instance, these, as well as all other remedial agents, were regarded as subsidiary to the quinine.

15.—From the *days of Hunter* up to the present time, the *characteristic feature* of all the Lowland fevers of Jamaica has always been the pathological phenomenon styled *periodicity*. This periodicity is to be regarded as the direct effect of the local poison, popularly termed miasm; and, of all remedial agents yet discovered, the most powerful in combating the morbid effects of this virus, appears to be—quinine.

T. ROSS JAMESON, M. D.

Staff Surgeon, Second Class.

General Hospital, Fort Pitt, Chatham,
8th December, 1849.

V.

Copy of Draught of Report of the Guiana Medical Society on Questions proposed after the last outbreak of Yellow Fever in Barbados.

“*Question 1st.*—In your opinion, is yellow fever contagious? What is its mode of propagation? and in what localities does it principally prevail?”

“The opinion held by the medical practitioners of this town has always been, that yellow fever is not contagious.* In this opinion we entirely concur. Because, firstly,—that although a constant and free intercourse is kept up between this colony and the West India Islands,—in some of which yellow fever prevails to a greater or less extent every year,—yet we are only subject to its visitations at long intervals, and do not suffer from the disease every year, as it is reasonable to suppose we should were it contagious. Secondly,—in the last epidemic, which prevailed from April, 1837 to 1845, the fever did not attack all races, ages, and sexes indiscriminately, but was confined to Europeans, or other strangers lately arrived in the

* We consider it necessary to define clearly what we mean by the terms *contagion* and *infection*. The spreading of a disease by contagion is when it is transmitted, by direct contact of a person suffering from that disease to another person, irrespective of the locality. The spreading of a disease by infection is when the elements of that disease are originated and evolved from certain localities. Persons visiting such localities can contract that disease, but cannot transmit it to other persons who had not visited such localities. We do not apply the term contagion to places, but to persons; nor the term infection to persons, but to places.

colony; and of these, old men and children were less liable to be attacked than young and vigorous adults. The inhabitants of northern regions appeared to be most obnoxious to its influence, whilst negroes were almost exempt. Thirdly,—the first case of yellow fever which occurred here in April, 1837, was not in a ship, or traceable to any ship coming from an infected locality,—but in Water Street, a part of the town inhabited by merchants and their clerks, where the disease principally prevailed, the victim being a strong young man, who had arrived lately from Dublin, about three months before he was attacked. Fourthly,—because the disease did not spread slowly, but with great rapidity, and appeared in the shipping and different parts of Water Street at the same time. Fifthly,—persons arriving from the country and visiting Water Street were liable to be attacked; and in some instances were attacked, and died on their return home, without disease spreading by contagion. Two or three persons died in Mahaica, a small village twenty-five miles from Georgetown, at different periods of the epidemic. All those persons, it was proved, had visited Water Street, and transacted business there. But the disease did not spread in Mahaica by this contact, nor did it make its appearance in any of the villages or plantations throughout the colony, although a free intercourse between them and the infected locality was constantly kept up—excepting in persons who had visited Water Street, and carried the seeds of the disease home with them. Sixthly,—in the Colonial and Seaman's Hospital the number of cases under treatment for other diseases was very considerable, particularly in the former establishment; yet the number of these patients attacked was inconsiderable; at all events, by no means so great as might have been expected in a contagious epidemic, such as small pox. Out of upwards of 2000 cases of yellow fever treated in the Seaman's Hospital, not thirty cases are recorded as having been attacked whilst suffering from other diseases in the hospital; and most of those who were so attacked had only been under treatment one or two days. Seventhly,—the resident surgeons, apothecaries, stewards, nurses, &c., most of them young men recently arrived from Europe, or other countries, suffered comparatively little, although in constant contact with the disease in all its appalling complications. Eighthly, and lastly,—the facts adduced to prove that yellow fever is contagious are inconclusive; the very opposite being a natural induction from all the contingent circumstances in the mind of any one who witnessed the epidemic yellow fever of 1837 and 1845, although it is difficult to place all the circumstances in a sufficiently clear light to render the induction inevitable in the mind of one who did not witness that epidemic. We conclude, therefore, that the disease we witnessed was

not propagated by contagion, — was not contagious. Nor did it prevail over all British Guiana, but was confined to Georgetown, situated at the mouth and on the east bank of the river, comprising the garrison, Water Street, and the shipping lying off the wharfs of Water Street, and in the stream of the river. Persons dwelling in those localities, and having business therein during the day, being otherwise liable to the disease, were attacked, and no other persons. This fact was so notoriously apparent, that the then colonial surgeon, Dr. Smith, an experienced and highly talented physician, proposed that a wall should be constructed along the east bank of the river, — thus obviating the necessity of wharfs, — which was in his opinion the *focus et origo morbi*.

“ *Question 2nd.*—Was quinine and calomel then used with marked success in the yellow fever epidemic of 1845 and 1847?

“ The most successful plan of treatment followed was the administration of twenty grains of calomel and twenty-four grains of quinine, followed by castor oil in four hours. The calomel and quinine repeated every six hours. As much diluent drink as the patient likes; cold sponging and cold water to head. *Abstaining* from bleeding; and, as soon as the pulse indicated, a free allowance of wine and animal stimulant. In 1837 and 1838, when bleeding, blistering, castor oil, calomel, and antimony, &c. were relied on, the mortality was very great, being 245 in 1837, and 314 in 1838, the population of the river being estimated as 665. The Seaman's Hospital was established in the latter part of 1838; and, as might have been expected, the mortality was considerably diminished, irrespective of the treatment. But we find that in the first ten months of 1839, when bleeding was still persisted in, that there were admitted to treatment 153 cases; 58 died = 39·90. From November, 1839, to December, 1841, 955 cases; 221 died = 23·14; giving 14·76 per cent. in favour of the calomel and quinine treatment. From 1842 to 1845 this plan of treatment was persisted in; and we find that there were 528 cases, of which 139 died = 26·30; but little exceeding the per centage of 1840 and 1841. We repeat, that we think that if the plan of treatment stated above, of 24 of quinine, and 20 of calomel, or, in other words, large doses of quinine and calomel be persisted in, the patient kept cool, and *removed from the supposed site of infection*, that the mortality from yellow fever, although it will still be great, will be much diminished, in whatever part of the world the epidemic may occur. For that the epidemics of Bulam fever, yellow fever, vomito prieto, vomito negro, &c. which have occurred in Spain and the tropics, at various periods, were identical in their symptoms with that which we witnessed here, we have no doubt whatever. The

failure of the calomel and quinine treatment in Barbados and elsewhere was, in our opinion, probably owing to the insufficiency of the doses.

“ *Question 3d.*—Does the remedy quinine act specifically on the poison productive of that fever; or whether, is it merely useful in removing all traces of the ordinary marsh poison, which always exists, and which is known to act with much greater violence when the system is debilitated by any other cause; and, by thus removing a highly dangerous complication, rendering the principal disease more amenable to treatment?

“ We are of opinion that the quinine does act specifically on the yellow fever poison. The seamen who arrive in this river in ordinary seasons are not subject to intermittent fever. The ordinary time for vessels laying in the river being too short for the marsh poison to take effect. But they suffered very much from the yellow fever: and the use of the quinine in large doses, as shown above, was remarkably beneficial. Such seamen as were left behind about the hospital became equally subject to the intermittent fever afterwards as any other European or colonist; and further, it was a subject of general remark among the people, that intermittent fever subjects seldom get yellow fever. There can be no doubt that many of our diseases are complicated by the intermittent fever. Indeed it is a Protean disease which simulates most other diseases, and the specific remedy for it is quinine. But we think that the complication seldom occurs till the patient has been some months in a marsh district. In conclusion, we beg to say that the deductions we have drawn are from records very carefully kept by ourselves, and from our own experience.

(Signed) “GEORGE R. BONYUN, M.D., M.R.C.S.L.
“*President of the Guiana Medical Society.*”

P. S. We must remark that the percentage of mortality is not calculated on the whole number of yellow fever cases admitted to treatment, but only upon such as were designated “*well marked*” cases. Out of $1677 + 733 = 2410$ cases admitted to treatment from 1839 to 1845 inclusive, 874 were set down as simple cases, although indubitably many of them would, without the calomel and quinine, have terminated severely or fatally.

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VI.

*On the Use of Quinine in the Treatment of Remittent Fever; in a Letter from Staff-Surgeon Millar.**

Georgetown, Demerara,

18th March, 1848.

SIR,

I have the honour to acknowledge the receipt of your letter of the 10th instant, calling on me to state, for the information of the Director General, "How, and in what doses, quinine was administered in the cases of remittent fever treated by me, or under my observation, and what were apparently its effects."

In answering this question it is necessary that the principle which regulated the administration of quinine in the remittent fever of this colony should be clearly understood—that this substance, when given to a certain amount, produces a peculiar and specific effect on the constitution, which would appear to be incompatible with the existence of fever, as explained in your second circular memorandum, and in Dr. Blair's paper attached thereto. The symptoms of this state, to

* [From the many documents before me, obtained whilst I was in the West Indies, relative to the quinine plan of treatment of the fevers of that country, I am induced to select the above, having perfect confidence in its author for accuracy of description as well as for correctness of observation.

Were this the proper place, I could adduce much additional and powerful evidence in favour of the efficacy of quinine used as a specific in these fevers, and in corroboration of the practical views contained in Dr. Blair's Treatise, especially by reference to the Quarterly Reports of Second Class Staff-Surgeon, Connell, by which, indeed, my attention was first directed to the subject. He acquired his knowledge of the practice and his faith in it, in British Guiana, from the civil practitioners there, and employed it with marked success in the remittent fever of Grenada.

Those inquirers who wish for fuller information respecting this plan of treatment, will find ample details regarding it in the office in London of the Director General of the Army Medical Department, with every facility for reference.]—ED.

which the term "cinchonism" has been applied, it is needless for me to repeat. They are constant and uniform, and as well established in point of fact as any in medicine. It requires about thirty grains of quinine, given within the space of four or six hours, either in divided doses or as a whole, to induce this state, and when fully induced, the febrile symptoms disappear; the patient may be considered safe, and recovery certain, particularly if thus treated at an early stage of the disease, even as far as the third or fourth day, beyond which its good effects are doubtful.

Quinine, when administered in this manner, appears to act as a powerful sedative, the circulation is lowered, the headache ceases, and the flushed face and hot dry skin give way to opposite states. The state of the skin is peculiar, — cold, clammy, and unctuous to the touch. It is recognised here familiarly by the name of the "*quinine skin*."

In the treatment of the fever which prevailed here so generally among the white troops in the months of July, August, and September, it was generally considered necessary to evacuate the bowels freely before administering the quinine. In the severer cases ten grains were given at first, and five grains every hour, until its specific effect was established. It may be stated that the average quantity required to produce "cinchonism" was from twenty-five to thirty-five grains; but this quantity must be taken within a short space of time — viz., four or six hours. It was generally given in solution, with as much sulphuric acid as was sufficient to effect the solution. The best, and most simple form of administering it, is suspended in a small quantity of water, particularly when the dose is large.

The administering of purgative medicine as a preparatory step does not appear necessary. It was at one time thought that quinine would act more rapidly and in less quantity by first evacuating the bowels freely. Several cases have come under my observation where the quinine was given at once, and with an equally good and certain effect; and, where the symptoms were urgent, I would not now be disposed to wait for the operation of purgative medicines. Calomel has not been found necessary, and was rarely given except as a purgative.

The common practice in civil life in severe cases of remittent fever is to administer at one dose twenty-five grains of quinine with twenty grains of calomel, and to repeat this every four hours, until "cinchonism" is established. It has appeared to me that in ordinary remittent fever such large doses are unnecessary. Perhaps in yellow fever, which I am of opinion has no connexion whatever with the former, such a plan of treatment may be found successful.

The curative powers of quinine in the remittent fever of this colony can scarcely admit of a doubt. When properly administered the duration of the disease ought not to be allowed to extend beyond twenty-four or thirty-six hours.

I have, &c. &c. &c.,
 (Signed) J. MILLAR,
 P. M. O. British Guiana.

Dr. Davy,
 Inspector General of Hospitals, &c. &c.

VII.

On the Discoloration of the Skin in Yellow Fever ; and on " White Vomit."

[IN the foot-note, p. 33, I have alluded to an opinion entertained by those medical men who have witnessed yellow fever, that the yellow discoloration, almost distinctive of the disease, is not owing to bile, but to the blood itself in a diseased state. I revert to the subject to suggest that the colouring matter of the bile — the bile-pigment apart from the bile — may be the cause of the discoloration. If, as is now commonly received by physiologists, this pigment is formed in the blood, and merely separated by the discerning cells of the liver, a rationale may perhaps be offered of some of the phenomena of the disease and of the appearances occasionally witnessed in the inspection of the cadaver. If the healthy function of the liver be arrested, as we are sure it is in yellow fever — and the bile-pigment in consequence not eliminated — its accumulation in the blood, and its absence (as is sometimes observed in the fluid in the gall-bladder), is what might be expected ; and so accumulating in the blood as the disease advances, its staining effect seems to be a necessary consequence. May not the slowness of the pulse, often remarkable in yellow fever, be owing to the bile-pigment in excess in the blood ?

In page 80, mention is made of "white vomit," and in the foot note, that it would be interesting to have its composition ascertained, and whether it is serous or not. Several medical officers, conversant with the disease, to whom I have applied, have not been able to give me any information on the point. Judging from analogy, it will probably be found to be serous, or to contain albumen, — the analogy, for instance, of the discharges in cholera, in diarrhœa, and dysentery,

and, I may add, in catarrh; even in common catarrh, I have found the perfectly transparent fluid which drops from the nostril, possessed of the properties of very dilute serum, exhibiting, with test papers, an alkaline reaction, and affording, on being boiled, a minute quantity of coagulated albumen.]—ED.

VIII.

On the former Use of Bark in Fevers.

[I have mentioned, that at an early period, bark was commonly used in the treatment of the fevers of the West Indies. I am induced, on account of the importance of the subject, briefly to revert to it, with the hope that the practice will have all the consideration it deserves, and that it will be ascertained how far it is applicable to the treatment of other fevers, even not distinctly of the intermitting and remittent type.

Leblond, who practised in St. Vincent and Grenada, about 1766—1768, in the work he published on his return to France, states, that he treated those newly arrived, attacked with fever, as soon as possible with an emetic, followed by a soothing draught, and then (if well evacuated) by bark; administering thirty or forty grains every three hours, till about an ounce had been taken; and this he found, with change to a cooler air, was commonly sufficient to insure recovery. He exhorts to caution in the use of emetics when there is irritability of stomach. According to the theoretical views prevailing at the time, he supposed bark to be an antiseptic, and he therefore administered it in the West Indian fever, which he held to be putrid. He adverts to the bark treatment in these fevers as specially English.

Cleghorn, about the same period, had adopted a like practice in the fevers of Minorca, as we learn from his able work on the diseases of that island. The author of the "Biographia Medica," in his notice of this excellent writer remarks, we stand indebted to him for having "recommended acescent vegetables in low, remittent, and putrid fevers, and the early and copious exhibition of bark; which had been interdicted from mistaken facts, deduced from false theories."

Nearly the same mode of treatment was employed a few years later by Dr. Clark, as is shown by the following extract from his work on the diseases of hot climates, published in 1792, which has been brought to my notice by a friend.

"The common mode of practice (Dr. Clark remarks, vol. ii. p. 301.),

which limits the use of bark to the intermissions of fever, although it answers very effectually in tertians and quartans, yet in quotidians and double tertians, where the intervals are short and often incomplete, is attended with insuperable disadvantage. The few hours of intermission affords no time to throw in a sufficient quantity of bark to prevent the recurrence of the paroxysms; the disease in consequence is aggravated, and from the only medicine being withheld which can give security, very frequently terminates fatally.

“Whilst I resided at China, in November 1771, intermittents were prevalent, as has already been mentioned. The interval free from fever was often very short and the paroxysms severe, and attended with alarming symptoms; and after cleansing the stomach and bowels thoroughly, I immediately commenced with the bark, and continued it regularly in the paroxysms.

“Having ascertained the safety of administering the bark at every period of intermittents, I was induced in China, and afterwards in this country, to try its effects in the paroxysms only. I began by giving ℥ii. at the accession of the fit, and repeated the same quantity in the middle of the paroxysm; and this plan generally succeeded in removing the disease with a very small quantity of bark.”—Ed.

IX.

Extract from a Letter to the Editor from his Excellency Lieutenant-General Berkeley, commanding the Troops in the Windward and Leeward Islands.

“THE first case of yellow fever admitted into hospital here, (St. Ann’s, Barbados,) was Private John M’Guire, 88th Regiment, on the 15th December, 1847. He died on the 19th of the same month, with black vomit and all the symptoms of a very bad case. This man *was never on board the ‘Growler.’* It has been ascertained, however, that Private *Patrick Hearn*, of the same corps, *did visit* the steamer, having a relation on board amongst the crew. Hearn was admitted into hospital on the 9th January, 1848, and died on the 13th, with similar symptoms to those attending M’Guire. After careful inquiry, I am led to think that *no man of the 88th Regiment*, with the exception of *Hearn*, went on board the ‘Growler;’ and as that man had no symptoms of fever until *twenty-five days after* the first fatal case in the corps, and *twenty-two days after the departure* of the ‘Growler’ from Barbados, which was on the 18th December, 1847, I do not

perceive how the assertion can be borne out, that the visit of this soldier to an infected vessel *brought* the disease into the barracks.

“The ‘Growler’ was not placed in quarantine; constant communication to and from Bridgetown was kept up for *eight days*, during which time the vessel remained at anchor and received coals from the town, the inhabitants of which, *at that time, during the whole course of the epidemic, and at present, continue remarkably healthy.*”*

* [In the same letter, which bears the date of Barbados, November 30th, 1849, it is stated that yellow fever had broken out in the 54th regiment stationed in Antigua, in barracks on Shirley Heights, without mention of any suspicion of the disease having been introduced *ab externo*; that up to the 25th of that month, out of seventy-two cases attacked, twenty-eight men and three women had died; that out of twenty-six cases treated by mercury and bleeding the deaths had been thirteen; and out of thirty-six treated by quinine and calomel the deaths had been eleven.

In a letter from Dr. Blair, dated Georgetown, Demerara, December 3, 1849, in reply to an inquiry I made respecting the discoloration of the skin in yellow fever, he observes,—“In regard to the *colour* in yellow fever, I recollect one experiment only which I made on the subject, and I know of no other that has been made. In a case of recovery in the Seaman’s Hospital from an almost fatal attack of well marked yellow fever, a great many vesicles, or small bullæ, appeared over the body and limbs, containing a thin clear fluid of a similar yellow colour to that of the skin. I collected the fluid of several of these, and the colour became *green* on the addition of dilute nitric acid. Previous to this I had been rather inclined towards the belief that the yellow discoloration arose from an altered condition of the blood, such as is perceived when an ecchymosis (a black eye for instance) is in progress of absorption. But this idea was an unsupported hypothesis.”

The above observation and example given by the author hardly needs comment, it seems so conclusive in proof of the discoloration being owing to the colouring matter of the bile being retained in the blood, and by the blood imparted to the skin and other parts in which the discoloration appears, in accordance with the conjecture hazarded in page 158.] — Ed.

THE END.

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