The diseases of tropical climates and their treatment : with hints for the preservation of health in the tropics / by J.A.B. Horton.

Contributors

Horton, James Africanus Beale, 1835-1883.
Foster, W. D. -1981
Ward, J. W., active 1885
King's College London

Publication/Creation

London : Churchill, 1874.

Persistent URL

https://wellcomecollection.org/works/k26dawek

License and attribution

This material has been provided by This material has been provided by King's College London. The original may be consulted at King's College London. where the originals may be consulted.
This work has been identified as being free of known restrictions under copyright law, including all related and neighbouring rights and is being made available under the Creative Commons, Public Domain Mark.

You can copy, modify, distribute and perform the work, even for commercial purposes, without asking permission.

Wellcome Collection
183 Euston Road
London NW1 2BE UK
T +44 (0)20 7611 8722
E library@wellcomecollection.org
https://wellcomecollection.org

Man without learninge and remembrance of things past falls into a beastlye sottishnesse and his life is no better to be accounted of than to be buried alive.

Ex Libris
W. D. Foster, M.D. Cantab.

L. S. Room 15015

KING'S College LONDON

Horton Library
The diseases of tropical climates...
1874
KCSMD RC961. HOR

200826356 6
KING'S COLLEGE LONDON

Digitized by the Internet Archive
in 2015

https://archive.org/details/b21302807

J. B. Ward

1885

THE DISEASES OF TROPICAL CLIMATES AND THEIR TREATMENT.

THE

DISEASES OF TROPICAL CLIMATES

AND THEIR

TREATMENT.

WITH

Hints for the Preservation of Health in the Tropics.

BY

J. A. B. HORTON, M.D. EDIN., F.R.G.S.,

Surgeon-Major of the Army Medical Department; Associate of King's College, London; Foreign Fellow of the Botanical Society of Edinburgh; Corresponding Member of the Medical Society of King's College; Late President of the Pathological Society of Edinburgh; Member of the Institut d'Afrique of Paris; &c., &c. &c.

LONDON:

J. AND A. CHURCHILL, NEW BURLINGTON STREET.

MDCCCLXXIV.

The Author Reserves all Rights.

573 457 KCSMD RC961. HOR

LONDON:
W. J. JOHNSON, PRINTER,
121, FLEET STREET.

Lilian Sargeant Room
15016
11.6.70
Presented

DEDICATION.

To SIR JAMES RANALD MARTIN, C.B.,

Physician to the Council of India, &c.

SIR,

In taking the liberty of dedicating the following pages to you, I do so from a high sense of your distinguished talent and reputation as a Tropical Physician of indisputable skill and acknowledged authority.

I have derived much valuable assistance from your published work and literary contributions on Diseases incidental to European Constitution in the Tropics; and, in token of my high esteem and appreciation, I beg to dedicate to you this work on DISEASES OF TROPICAL CLIMATES AND THEIR TREATMENT.

I am, Sir,

Your obedient Servant,

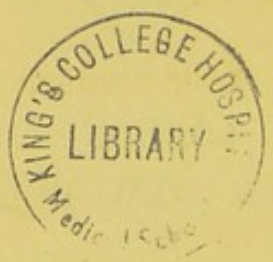
THE AUTHOR.

WESTERN AFRICA,
September, 1874.

573457 KCSMD RC961. HOR

LONDON:
W. J. JOHNSON, PRINTER,
121, FLEET STREET.

Lilian Sargeant Room
15016
11.6.70
Presented



DEDICATION.

To SIR JAMES RANALD MARTIN, C.B.,

Physician to the Council of India, &c.

Sir,

In taking the liberty of dedicating the following pages to you, I do so from a high sense of your distinguished talent and reputation as a Tropical Physician of indisputable skill and acknowledged authority.

I have derived much valuable assistance from your published work and literary contributions on Diseases incidental to European Constitution in the Tropics; and, in token of my high esteem and appreciation, I beg to dedicate to you this work on Diseases of Tropical Climates and their Treatment.

I am, Sir,

Your obedient Servant,

THE AUTHOR.

Western Africa,
September, 1874.

PREFACE.

More than fifteen years ago, on leaving the University of Edinburgh for the Tropics, I formed a resolution to examine carefully and record faithfully, the various symptoms, and etiology of those Diseases of Tropical Climates which might come under my notice; examining and noting them down, in as ready and comprehensive a manner as possible; to record the various *post-mortem* examinations which I might chance to make; to examine and make personal observations of the effects in the system, of the different modes of treatment recommended by various writers; and then to draw my own conclusions from the whole.

Having served with troops in some of the most deadly intertropical climates, in charge of and attached to military forces in the field on several

occasions—in one of which, out of a force of 200 rank and file, I had no less than 103 men at once in hospital, suffering from Scorbutic Dysentery of the worst possible type, Diarrhœa, Malignant Remittent and Intermittent Fevers, Abscesses and other Diseases of the Liver and Spleen—I had ample opportunities of carrying my resolution into full practice during fifteen years, in which I was continually in the vortex of Tropical Diseases, both among the military and civil population. An excellent and comprehensive method of reducing such a mass of facts into a convenient compass, will be found in page 314 (Cholera).

In collecting together my notes, and arranging them in the form in which I now present them to the Profession, I have endeavoured to bring in also the opinions and experiences of the most able writers on the subjects of which I have treated, comparing them with one another, as well as with my own observations; and although I am painfully aware of the fact, that there are many

deficiencies and shortcomings in the work, more especially as the printers' proofs had to be sent out to the coast of Africa for correction, a great number of which were revised whilst busily engaged in the field in the recent Ashantee Campaign; yet still I will crave their indulgence in stating that in thus placing the accumulated facts before them, I have endeavoured to describe the diseases faithfully, both from my personal observations, and from what I have obtained from the writings of others; and I hope that I have succeeded in giving much useful information on Tropical Diseases generally; and placing in the hands of young tropical practitioners, a hand-book of practical importance and utility in their early career.

On the subject of treatment, I may state that I have personally employed nearly all the remedies recommended; and as the Dietetic Treatment of Diseases in the Tropics, if it do not surpass, is by no means inferior to the Therapeutic, I have endeavoured to ascertain the most

recent hypotheses on the effects of various forms of food in diseased conditions; and point out what should be permitted, and what ought to be avoided. The Regimen, by which I mean treatment referable to exercise, gestation in the open air, effects of change by sea or land, &c., as well as Tropical hygiene have, as far as my limit would allow, been fairly entered upon in these pages. In performing the task which I undertook, I have to acknowledge that I availed myself of the works and contributions of Sir R. Martin, Professor Aitken, Dr. Wood, Dr. Barlow, and others, as well as the notes I made whilst attending during 1868-69 the able Lectures of Dr. Maclean, Professor of Military Medicine in the Royal Victoria Hospital, Netley. My best thanks are due to the various subscribers in Africa and England, who have gladly subscribed for copies of the work to an amount which would nearly cover the printers' expenses.

This work has been divided into three parts, and is closed with an Appendix.

PART FIRST treats *primarily*, of those pyrexial diseases which have pathologically a common origin, depending on the effects of the poisonous effluvia of terrestrial emanations. This poison, which as yet has not been chemically ascertained, lies dormant in the system for variable periods, and then produces derangements of the nervous centres in degrees in accordance with the amount of concentration; *secondarily*, of pyrexial diseases which are *suorum generum* produced by specific poison, having almost a defined geographical limit, and propagated by a contagious virus.

PART SECOND treats generally of diseases in the Tropics affecting the abdominal region; *primarily*, of diseases producing an alteration in the functions of the mucous membrane lining the stomach and intestinal canal, some of which lead to specific lesions of the organs with which they are connected; *secondarily*, of diseases of some of the solid viscera of the abdomen.

PART THIRD comprises *primarily* those diseases which are produced by morbific matter generated

within the system, either hereditarily transmitted (the system presenting hereditary tendency to them) or acquired; *secondarily*, local diseases affecting particular parts or special organs of the body.

The APPENDIX refers to the subject of Tropical Hygiene, which is considered under the head of Dress, Food, Drink, Exercise, Sleep, Bathing, and the Regulation of the Passions.

WESTERN AFRICA,
October, 1874.

TABULAR SYNOPSIS.

PART I.

LITORAL, MALARIAL, AND SPECIFIC TROPICAL FEVERS.

I.—FEBRIS INTERMITTENS—AGUE.

PAGE

General Observations and Varieties 1
Symptoms and Progress—(*a*) Cold Stage; (*b*) Hot Stage; (*c*) Sweating Stage; (*d*) Incidental Symptoms and Variations 3
Pathology and Morbid Anatomy 9
Causes—Predisposing 16
,, Exciting 18
Sympathetic System, the Organs attached 27
Diagnosis and Prognosis 32
Treatment—During the Paroxysm 33
,, During the Intermission 37
,, Dietetic in Malarious Fevers 50
,, Professor Park's Views on the Dietetic Treatment of Fever (foot note) . . . 51
,, Prophylactic, of Malarious Fevers . . . 52

II.—FEBRIS REMITTENS—MARSH REMITTENT.

General Observation; Difference between Remittent and Intermittent Fevers; Local Designations . . . 59
Symptoms and Progress 62
Duration of the Fever 70
Causes—Predisposing 71
,, Exciting 73

PAGE

Treatment 241
,, Therapeutic—Narcotic 242
,, ,, Sudorific 243
,, ,, Astringent 251
,, ,, Counter-irritants, &c. . . . 254
,, ,, Fomentations 256
,, ,, Laxative 257
,, ,, Enemata 259
,, of Dysentery with Hepatic Complications . . 260
,, ,, with Scorbutic Taint . . . 261
,, of Chronic Dysentery 263
,, Dietetic, in Acute Dysentery 265
,, ,, in Chronic Dysentery 267
Management of Convalescence in Dysentery 268
Effects of Change in Dysentery 269

IV.—DIARRHŒA.

Symptoms and Progress 270
Chronic Diarrhœa 276
Pathology and Morbid Anatomy 277
Causes of Diarrhœa 279
Treatment of Diarrhœa 284
Medicinal Substances 285
Dietetic Treatment 287
Habiliments 288
General Management 288

V.—EPIDEMIC CHOLERA.

General Observations and History 290
Symptoms of Sporadic Cholera 302
,, and Progress of Epidemic Cholera . . . 303
Febrile, or Stage of Reaction 305
Report of twelve cases 314
Pathology and Morbid Anatomy 319
Dr. Baly's Description (foot note) 320
Causes—Predisposing 326
,, Specific and Determinating 327
,, Atmospheric Influences, or Epidemic Constitution . 329
,, Professor Hallier's Theory 336
Diagnosis and Prognosis 338

PAGE

General Mortality in Epidemic Cholera 339
Treatment in stage of Cholerine 345
,, in stage of Collapse 347
,, in stage of Reaction 349
,, Dietetic 349
,, Report of General Board of Health (England) . 350
Special Treatment—Professor Maclean 351
,, ,, Drs. Hoffmeister and Richards . . 354
,, ,, Dr. John Gason 356
Dr. Gull's Report on the value of each class of remedies employed in Treatment 359
Prophylactic Treatment 372

B.—VISCERAL DISEASES.

I.—ORGANIC DISEASES OF THE LIVER.

1.—Hepatitis.—Inflammation of the Liver.

General Observations 386
Symptoms and Progress of Hepatitis 387
,, ,, Perihepatitis 387
,, ,, Suppurative Hepatitis 389
,, ,, Interstitial Hepatitis 391
Pathology and Morbid Anatomy 394
Causes 396
Diagnosis and Prognosis 402
,, Decubitus, as a sign 405
Results of Acute and Chronic Hepatitis 406
Treatment—Acute Hepatitis 408
,, Chronic Hepatitis 415

2.—Hepatic Abscess.

Symptoms and Progress 416
Pathology and Morbid Anatomy 419
Causes of Hepatic Abscess 421
Diagnosis and Prognosis 427
Mortality in Hepatic Abscess 428
Treatment 430

3.—Chronic Hypertrophy and Induration.

PAGE
Symptoms and Progress 434
Results of Chronic Enlargement 437
Pathology and Morbid Anatomy 437
Diagnosis and Prognosis 438
Treatment of Chronic Enlargement and Induration . . 439
Nitro-muriatic Acid Bath 441

II.—FUNCTIONAL DISEASES OF THE LIVER.

1.—Hyperæmia, or Congestion of the Liver.

General Observations 446
Symptoms and Progress 446
Causes of Active and Passive Congestion 448
Morbid Anatomy and Pathology 449
Diagnosis and Prognosis 450
Treatment 451

2.—Excessive Secretion and Elimination of Bile.

Symptoms and Progress. 452
Causes 453

3.—Deficient Secretion of Bile.

General Observations 454
Symptoms and Progress 454
Causes of Deficiency 455

4.—Vitiated Secretion of Bile.

General Observations 456
Treatment of Excessive Secretion 456
„ Deficient and Vitiated Secretion . . . 457

5.—Icterus—Jaundice.

Symptoms and Progress 459
Causes of Icterus 463
Pathology and Morbid Anatomy 466
Diagnosis and Prognosis 467
Tests for Biliary Acids 467

PAGE

Mortality in Jaundice and other Hepatic Diseases . . 469
Report of one case of Jaundice 471
Treatment of Jaundice 474

III.—DISEASES OF THE SPLEEN.

1.—Chronic Splenitis with Hypertrophy—Ague Cake.

Anatomy and Position of the Spleen 477
Symptoms and Progress of Chronic Cases 479
" " Acute Cases 481
Causes of Ague Cake 483
Pathology and Morbid Anatomy 485
Diagnosis and Prognosis 486
Mortality in Chronic Splenitis 487
Treatment of Ague Cake 490
Tonic Treatment 491
Alterative Treatment 492
Local Applications 493
Diet and Regimen 498

PART III.

CONSTITUTIONAL AND OTHER DISEASES.

I.—ANÆMIA—A WANT OF BLOOD.

Symptoms and Progress 501
Anæmic Murmur 503
Pathology and Morbid Anatomy 503
Professor Hughes Bennett's Views of Anæmic Murmurs . 504
Causes of Tropical Anæmia 506
Diagnosis and Prognosis 508
Treatment 509
" Exercise, and Diet 511

II.—BERIBERI—THE BAD SICKNESS OF CEYLON.

PAGE
Historical Remarks 513
Symptoms and Progress 513
Pathology and Morbid Anatomy 516
Causes—Predisposing and Exciting 516
Diagnosis, Prognosis, and Mortality 517
Treatment 518

III.—CHRONIC RHEUMATISM.

Remarks and Varieties 520
Symptoms and Progress 520
Pleurodynia, Description of 522
Gastrodynia, Nature of 524
Torticollis, Wry-neck, Nature of 524
Lumbago 525
Sciatica 526
Report of a Case of Chronic Rheumatism 527
Pathology and Morbid Anatomy 530
Causes of Chronic Rheumatism 533
Diagnosis and Prognosis 533
Treatment of Chronic Rheumatism 534

IV.—DELIRIUM TREMENS.

Symptoms and Progress 540
Dr. Craigie's General Description of 543
Morbid Anatomy, Pathology, and Nature 546
Causes of Delirium Tremens 549
Diagnosis and Prognosis 550
Mortality in Delirium Tremens 551
Treatment of Delirium Tremens 553
,, Hydrate of Chloral 556
Prophylactic Treatment 557

V.—SUNSTROKE—INSOLATIO.

General Remarks 558
Symptoms and Progress 559
Varieties—Cerebro-spinal 562
,, Cardiac 563
,, Pulmonary Apoplexy 563

PAGE
Pathology and Morbid Anatomy 563
Causes of Sun-stroke 565
Treatment of Sun-stroke 567

VI.—GOITRE—BRONCHOCELE.

Symptoms and Progress 571
Pathology and Morbid Anatomy 572
Causes of Goitre 575
Cretinism 576
Diagnosis and Prognosis 576
Treatment 577

VII.—DRACUNCULUS—GUINEA WORM.

General Remarks as to Habitation 580
Symptoms and Progress 580
Pathology and Morbid Anatomy 586
Dr. Bastian on the Anatomy of the Worm 589
Causes of Guinea Worm 594
,, From Drinking Water 595
,, Hereditary Transmission 598
,, Direct Contact with the Earth 598
Prevalence of Guinea Worm—Period of Year . . . 605
Locality and Propagation 606
Results of Guinea Worm 607
Diagnosis and Prognosis 613
Treatment 614
,, Palliative 615
,, Radical 616

VIII.—FRAMBŒSIA—YAWS.

Remarks, Symptoms, and Progress 621
Pathology and Morbid Anatomy 623
Causes 625
Diagnosis and Prognosis 626
Treatment 626

IX.—ELEPHANTIASIS ARABICUM.

PAGE
Symptoms and Progress 628
Pathology and Morbid Anatomy 630
Causes 631
Treatment 631

APPENDIX.

HINTS FOR THE PRESERVATION OF HEALTH IN TROPICAL CLIMATES.

General Observations 633
Twelve Rules for Regulation of Dress 639
Eleven Rules for Regulation of Diet 642
Twelve Rules for Regulation of Drink 644
Twelve Rules for Regulation of Exercise 647
Twelve Rules for Regulation of Bathing 650
Twelve Rules for Regulation of Sleep 652
Twelve Rules for Regulation of the Passions 655

ERRATA.

Page 6, line 17, for *Hemiciania*, read *Hemicrania.*

Page 40, line 4, for *au*, read *ou;* and line 17, for *Dr. Bruce Jones*, read *Dr. Bence Jones.*

Page 179, line 3, for *water rash*, read *water brash.*

Page 239, line 1, for 1,587, read 587.

Page 254, line 9, for *when even* read *whenever.*

Page 336, line 25, for *Dr. Launder Lindsay*, read *Dr. Lauder Lindsay.*

Page 337, line 7, for *Mr. Simons*, read *M. Simon.*

Page 337, line 27, for *Dr. Aitkin*, read *Dr. Aitken.*

PART I.

LITORAL, MALARIAL, AND SPECIFIC TROPICAL FEVERS.

GENERA.

I.—Intermittent Fever (Febris Intermittens—Ague).

II.—Remittent Fever (Febris Remittens—Marsh Remittent).

III.—Ardent Continued Fever (Febris Perniciosa—Malignant or Typhoid Fever).

IV.—Yellow Fever (Typhus Ictoredes—Yellow Fever or Vomito).

V.—Break-bone Fever (Febris Denguis—Dandy Fever).

I.—INTERMITTENT FEVER—AGUE.

Ague is a disease sporadical in some parts of temperate climates, but very common in all tropical countries. It is known under the nosographical name of *Febris intermittens*, from its paroxysms occurring at stated intervals with perfect intermission; but from the varied types and periods of its occurrence, in different places and in different individuals, pathologists have distinguished it by names well adapted to its paroxysmal periods—viz.:—

I. The *Ephemeral* or *Quotidian*—the paroxysm occurring once in every twenty-four hours.

II. The *Tertian*, or *Secundum* of Watson—the paroxysm occurring once in every forty-eight hours.

III. The *Quartan*—the paroxysm occurring once in every seventy-two hours.

Each of the three types has characteristic peculiarities; *e.g.*, the Quotidian paroxysm begins in the morning, the Tertian at noon, and the Quartan in the afternoon. But this is not invariably the case; for sometimes it occurs later or earlier, when it goes under the name of Postponing or Anticipating paroxysm respectively. Thus, we speak of Postponing Quotidian, when it is deferred till noon, and Anticipating, when it occurs in the night.

The average duration of the paroxysm in the Quotidian, in the proportion which the stages bear to one another, is from ten to twelve hours, and the average duration of the intermission is about the same. In the Tertian, the average duration is from six to eight hours, and that of the Quartan is from four to six hours. The Quartan, therefore, has the longest intermission and the shortest paroxysm, and the Quotidian precisely the reverse. To express these facts in mathematical language, it may be said, that the length of the paroxysm varies inversely with the length of the cold stage, inversely also with the length of the interval.

Besides the three principal divisions, other minor divisions have been reckoned, which would occupy too much of our space were we to enter into a close investigation of each; but suffice it to say, that they are the Double Quotidian, the Double Tertian, the Triple Tertian, the Duplicate Quartan, the Double Quartan, and the Triple Quartan, all which are known under the generic name of Erratic forms of Ague.

The second of the three principal divisions, the Tertian, is of very frequent occurrence in some temperate climates, and is often seen in the wards of hospitals even in England. But the Quotidian or Ephemeral form is a disorder which is a pest to European constitutions in tropical climates. Ague is by no means a dangerous disease, except when it is complicated with other diseases. The Ephemeral occurs generally in places where miasmatic vapour is much concentrated; but where good sanitary improvement is absent, we have the Tertian; where healthy sites are chosen, and proper sanitary mea-

sures taken in building, the Quartan is found, as is now the case in Calcutta.

Before proceeding any further, it is necessary to premise that the intervening period between the termination of one paroxysm and the beginning of the next is called an *intermission*, whilst the period occupied by one paroxysm and one intermission is called an *interval*.

We shall consider, in the first place, the *symptoms* of Intermittent Fever; then its *pathological relations;* after which we shall consider its *causes*, giving much time and space to *malaria;* then its *prognosis;* and, last of all, its *treatment* and *prophylaxis*.

Symptoms and Progress of Ague.

A paroxysm of Ague consists of three stages, which are named from their characteristic phenomena, the *cold*, the *hot*, and the *sweating* stage.

Cold Stage.—A person, having exposed himself to the causes which bring on the disease, when the first stage is about to commence, experiences languor and helplessness; he begins to yawn, gape, and stretch; he finds his mind less active, his mental energies more or less dull. In severe cases, there is real stupor; but in the generality of cases the patient's mind is very dull; he is unequal to bodily or mental exertion, and with these he has great depression of spirits. Very soon after, he feels a sensation of coolness, first in the back, then over the whole body; the patient grows pale, through the blood deserting the superficial capillaries, and he feels a sensation of oppression about the epigastrium; his features become shrunken, and his skin dry and constricted, and

so very rough, as to receive the name of *cutis anserina*, from its resemblance to goose skin; his mouth and fauces become dry, and he begins to tremble slightly; intense cold is felt over the whole body; physical examination shows that the temperature has perceptibly fallen; the trembling increases, till he is in a state of downright violent shivering; his teeth chatter, and his knees knock together; there is a sense of creeping and shuddering over the skin, the hairs of which bristle slightly, and stand on end; and this state is technically called *horipilatio*. The patient complains of great pain in the head, back, loins, and thighs; his ears, lips, nails, and cheeks turn blue, and the secretions are diminished; his urine becomes scanty, pale, and limpid, probably owing to the constriction of arterial twigs of the renal vessels; his respiration is short, quick, and anxious; his pulse is small, frequent, and sometimes irregular. The depression and anxiety is caused by the accumulation of a large quantity of blood in the large and internal vessels. In some cases the individual complains that he has a feeling as if his lower and upper extremities were as small as a crow-quill, and that he could scarcely imagine them larger. These symptoms terminate at length in universal convulsive shakings.

Hot Stage.—During the cold stage, the blood has receded from the minute capillaries over the sentient surface, and accumulated in large quantity in the larger interior vessels. After this stage has existed for a certain period of varied duration, the skin becomes relaxed, and the hot stage commences. There is a gradual sensation of warmth over the body, at first irregular,

transient flushes, which are succeeded by a steady, dry, and burning heat, which increases till it exceeds the natural standard. The skin, which before had been pale and constricted, now becomes swollen, tense, red, and pungent to the touch; the face becomes red and turgid, the eyes injected; there is a great throbbing over the temple; the pulse, from having been feeble, becomes hard and very rapid. Such is the excitement now, that the aching of the head at times is of an acutely painful type. The sensibility, which in the cold stage had been diminished, now becomes preternaturally acute. The urine, which before had been pale and watery, is now scanty and high coloured; the patient is uncomfortable and restless, he complains of great thirst and dryness of the skin; probably because the extremities of the secreting vessels are still in a state of constriction; the breathing becomes deeper and fuller from blood getting into the smaller vessels; but there is more or less oppression; the action of the heart is violent, and occasionally there is more or less dyspnœa.

Sweating Stage.—Another change now takes place, and the sweating stage comes on; the skin, which, from being pale and rough, had become hot and smooth, now recovers its natural softness. At length a slight moisture is observed to break out upon the face and neck, which extending, soon becomes a universal and equable perspiration; the heat of the body descends to its usual standard; there is a relaxation of the internal secreting vessels, in consequence of which the thirst ceases; the urine plentiful, but turbid, depositing a lateritious sediment; the tongue becomes moist, the pulse regains its natural and

wonted frequency and force; the hurried respiration becomes free and tranquil, the pains depart, and after the sweating has diminished, as well as all other symptoms, the appetite returns, and the patient is, as it were, perfectly as well as before.

Incidental Symptoms.—Occasionally we meet with some incidental symptoms. During the cold stage we may have coma or apoplexy, and during the hot stage violent delirium; sometimes we have tetanic convulsions during the paroxysm, but this is very rare; more frequently, however, we have one or other of the following:—extreme debility, syncope, rapid spasm, neuralgia, petechiæ of the skin (which disappears with the paroxysm), jaundice, and dysentery. From an exposure to the principal exciting causes of Ague, many diseases assume the aguish or intermittent character; and this phenomenon is observed in the intermittent attacks of *Hemiciania*, or Face-ache, or Brow-Ague.

The duration of Ague is very variable; in some parts of temperate climates, the Quotidian is most common in spring, the Tertian both in spring and autumn, and the Quartan in the autumn. In tropical climates, the Quotidian, as a rule, is the most prevalent; although in India, the Tertian prevails to a great extent, and this occurs generally in the beginning and end of the rainy season, when there is great miasmatic exhalation.

Variations.—The paroxysms of Ague are sometimes *absent*, at which time it is called Dumb Ague; sometimes *incomplete*, occasionally *inverted*, sometimes *irregular* or *erratic*, and sometimes *partial*, or affecting only a part of the body. Frequently, during their progress, the

Intermittent Fevers change their type, the Tertian and Quartan become Quotidian, and the Quotidian becomes Remittent Fever. In many individuals the commencement of the fever is first noticed by a severe pain in the head, and a transient heat all over the body; this increases and brings on the hot stage; there exists, from beginning to end, no cold stage whatever. The headache in these cases is generally very intense, and accompanied with heat on the sole of the foot and burning in the back.

After the attack of the fever has subsided, the patient in many cases suffers from sympathetic eruptions. This in some individuals takes the form of *Herpes*, appearing on the upper and lower lip, especially towards the angle. I have met with cases where this eruption covered the prepuce and socket of the gland penis, forming small blisters, which, when rubbed, become painful, especially when walking. In others, large pimples cover the face, especially the forehead; while others again are subject to blind boils.

Ague, like many other diseases, affects all ages, from the *fœtus in utero* to the grey-headed man; but it is, *ceteris paribus*, less likely to affect the very young and aged than those of middle life, and it is more frequent in men than in women.

During a paroxysm of fever, the *temperature* rises suddenly, even as high as from 105° to 106.3° Fahr., coincidental with the commencement of or preceding the cold stage, always long before the shivers commence. It commences at first gradually, but rapidly rises in the hot stage; it vacillates at the commencement of the

sweating stage, and then declines rapidly at the rate of 2° Fahr. every five to ten minutes, and becomes normal during convalescence.

The condition of the *urine* is remarkably altered; it increases in quantity during the cold and hot stages. It is most abundant at the termination of the cold and commencement of the hot stage; decreases slowly during the latter part of the hot stage, and rapidly during the sweating stage. This refers principally to its water constituent. The reaction at the commencement and during the fit is acid; the colour of the urine pale; the urea and chloride of sodium very much increased, the latter to five times its normal strength; the uric acid is also increased, but the phosphoric acid diminishes. Towards the end of the paroxysm during the sweating stage and commencement of intermission, the urine has an alkaline reaction, it is high-coloured, and contains an abundance of urates, either deposited or in solution; the uric acid is still beyond its normal quantity, but the urea, water, and chloride of sodium diminish rapidly. In the analysis of the urine, we find many abnormal constituents, such as albumen, blood (with less quantity of red corpuscles), and renal casts.

The increase of urea has an important bearing in the development of the febrile heat of Ague. Dr. Sidney Ringers has shown, that long before any rise in the temperature, the elimination of urea from the system has increased; and it is well known by those who have suffered from fever, that, before any decided febrile symptoms, one feels as if he had lost in weight considerably, and this must be attributed, according to Dr.

Parkes, to the rapid molecular tissue changes that are going on in the system, to the breaking up of albumen, and the growth of cells in the liver, which give rise to the increased thermometrical state.

In severe cases of fever, the blood undergoes some alteration; it has a darker colour, the serum dark purple, and in the air it presents a cherry-red colour; it coagulates in a large mass, but the consistency is slight.—*Maclean.*

Pathological Anatomy.

I have previously stated that during the cold stage, the blood leaves the capillaries of the surface, and accumulates in the deep-seated large vessels. Ague is generally complicated by local congestions. Sometimes we have inflammatory pains of the head, at other times inflammatory effects of the chest and abdomen, particularly *Gastritis* and *Hepatitis*. In tropical climates Ague is most frequently attended with bilious vomiting and purging, Jaundice and Dysentery, occasionally with congestion and effusion in the head, chest, and abdomen; the mucous membrane of the alimentary canal is in a state of active congestion; the liver becomes hypertrophied, and contains a large quantity of bile. Frequently in the chronic form of Ague, or after its cessation, there is an enlargement of the vascular spongy organs. The spleen is hypertrophied, and undergoes some changes in its minute structure; this enlarged spleen is called Fever-cake or Ague-cake. The tumour formed by the enlarged spleen occupies the left hypochondriac region, and is sometimes found to weigh more than eight pounds. I have seen a case in a female, where if the spleen could have been weighed, it would not

have been less than sixteen pounds. Sometimes we meet with cases in which there are enlargements of both the spleen and liver, and this is met with in persons who have been some time in the tropics, and who have had frequent attacks of Ague.

Through the enlargement of the spleen, the blood becomes impoverished, the effect of which is manifested in some individuals by the asthenic suppurative inflammation of the *cutis vera* and *subdermoid areolar* tissue, commonly known as boils. Congestion, or active enlargement of the spleen, exercises a powerful influence in keeping up the morbid trains of action of the original fever, and in producing relapses.

In more than 500 cases of Ague, in which he observed the state of the spleen, writes M. Piorry, "I came to the conclusion, that the organ is invariably enlarged during the progress of the fever, and that by the use of quinine, the spleen diminishes in size; that its reduction in size bears some relation to the quantity of quinine taken; that the effect it produces upon the fever is in proportion to the reduction of the spleen; that the disease is cured simultaneously with the subsidence of the splenic enlargement, and that the fever is apt to run on so long as the spleen exceeds its normal size."

Dr. Billing remarks, that the cause which prevents the cure of Ague is visceral disease, which may either have existed before the intermittent, or might have arisen during its continuance. The Ague and the visceral disease, whether of bowels, liver, spleen, or lungs, &c., act reciprocally as cause and effect. The Ague aggravating the visceral disease by causing congestion during each

paroxysm; the visceral disease by keeping up morbid sensibility during the intermission (or even apyrexial state between the paroxysm, when the disease is named remittent) which prevents the cure; but, if by mercury or bleeding, &c., the visceral disease be removed, the Cinchona exercises its influence on the nervous system, and finally arrests the Ague.

Sometimes this enlarged spleen and liver produce in the system that peculiar chronic anæmic condition, known under the name of *Leucocythæmia* or *Leukæmia*. The face is pale, and of a dusty, yellowish hue, the eyes are encircled with a livid areola, the lips lose their colour, and the pulse is frequent, quick, and small. There are œdematous swellings of the feet; great heaviness and listlessness, palpitation of the heart, pains in the back, loins, and hips; transitory pains in the abdomen, vomiting, constipation, great dyspnœa, epistaxis, and flatulency and acidity in the stomach and bowels; sometimes the patient suffers from dysenteric symptoms, more frequently dysenteric diarrhœa, or simple diarrhœa. At this stage the fever occasionally assumes a hectic type, if not checked; and it then runs to a fatal termination.

In *Leucocythæmia* there is an unusual increased quantity of white blood corpuscles with a simultaneous diminution of the red in the blood. To Dr. Hughes Bennet of Edinburgh, and Virchow of Berlin, is due the honour of first directing the attention of the profession, the one to the characteristic phenomena of the disease—viz., the increased quantity of colourless corpuscles, with a diminution of the red cells in the blood; the other to the pathological lesions to be observed in the disease.

In a qualitative analysis of the blood, in a case of Leucocythæmia, with enlarged spleen, Scherer found, besides the normal constituents, acetic and formic acids, lactic acid, gelatine, and hypoxanthia. There is a morbid alteration in the structure of the spleen, liver, and lymphatic glands, which may exist either separately or together; the enlargement of the spleen is the most constant.

Of the origin of these elementary cells in the blood, Virchow thinks that,—1. They may multiply in the blood by the division of pre-existing cells. 2. They may primarily be introduced into the blood through the lymph or chyle, which are conceived to convey the developed, as well as the undeveloped, globules, derived from the lymphatic glands, the spleen, and its connecting tissue. That they are formed on, and detached from, the walls of the blood-vessels has not yet been proved; but it appears that the increased proportion of the colourless corpuscles, with a corresponding diminution of the red in cases of the enlarged spleen, should lead us to apply the results of the researches of Kölliker and Hewson with respect to the function of that organ. Kölliker has proved that the spleen of man, as well as that of many vertebrated animals, under certain circumstances, promotes the destruction of red corpuscles. He "supposes that they decrease in size, and become grouped together in round clumps, which acquire nuclei, and are enveloped so as to constitute cells filled with altered blood corpuscles in various stages of disintegration; thus the substance of the contained blood corpuscles is then resolved into pigment granules of a golden-yellow,

brown, or black colour; and that the cells may thus remain, or become blanched into colourless cells, very much resembling the pale corpuscles of the blood. The red corpuscles may be seen with jagged edges, and the serum of the splenic blood, on examination, is found to be of a deeper colour. Chemical analysis of the blood returning from the splenic veins unquestionably corroborates this view, especially when the animal is well fed."

Again, it has been shown from the researches of Hewson, that the spleen supplies the germs of those cells which ultimately become blood corpuscles (white), and this is highly probable since—1. There is no difficulty in the admission of such corpuscles into the smaller veins of the spleen, if Mr. Gray's account of its lacunar circulation be correct; and that there is no physical impossibility in the reception of particles of such a size into the interior of even a close vessel of capillaries, is proved from the curious fact that, with certain precautions, starch grains may be made to pass into the mesenteric veins. 2. There is an unusual proportion of colourless corpuscles in the blood of the splenic vein. 3. The period of the greatest functional activity of these organs is generally during the state of early childhood, when the formative processes are going on with extraordinary activity; and there are, at this time, a "larger proportion of colourless corpuscles in the blood than at any subsequent period, at least in the healthy state."

In cases of severe Ague, where congestion of the spleen and liver is diagnosed, accompanied with a pale, dusky hue, and other anæmic symptoms, we may safely

say—1. That the abundance of the white corpuscles depends upon the increased formative power of the spleen, augmented by the cells of the chyle which are poured into the blood. 2. That the diminution of the red corpuscles is produced by the increased action of the spleen in destroying them; favoured by the abnormal state of the liver, which causes the spleen to be always in a turgid state, which seems favourable to this peculiar action.

Very severe forms of incessant Intermittent Fever may terminate either in chronic enlargement of the liver and spleen, complicated with abscess of the former organ, or with induration and softening; in *ascites*, or even *anasarca*, which may be caused by, or connected with, the visceral disease; in fevers of a remittent or continued type; and in fatal Dysentery—*e.g.*, several cases in the Ashantee Expedition of 1863-4.

Ague has been found to give a periodicity to other diseases, either in a new attack or in old diseases. In 1860 I had severe weekly attacks of Ague, which afterwards subsided under treatment. Soon after I became exposed to wet and cold, which brought on a neuralgic pain in my lumbar regions, the affection took the periodical character, and came on every day at four o'clock p.m., and continued till five a.m., commencing with slight pain, which later became intolerable, and then, after exhausting itself, gradually subsided.

The fearful visceral complications which we meet with in this disease are illustrated in an Indian case of Sir Ranald Martin, the *post-mortem* of which was recorded by Mr. Pollock, of St. George's Hospital. The subject

was a Captain ——, who contracted a fever in Aracan, India, which was followed by enlargement of the spleen and liver. "The peritoneum was covered throughout its free surface with an opaque, white, false membrane. This membrane was thin on the surface of the abdominal wall and small intestines, but was very thick elsewhere, as on the surface of the stomach, transverse colour, and liver, from which viscera it could be peeled off. From the peculiar manner in which it was spread over and attached to these organs, when the abdomen was opened, the small intestines were the only viscera that could be seen. The large intestine, stomach, liver, and spleen were hid from view by the false membrane, and situated at the upper part of the abdominal cavity. The membrane on the right side was continuous from the abdominal wall over the ascending colon to the spine, and so bound down the ascending colon that, until the membrane was removed, the situation of the bowel was not ascertained. From the surface of the bowel the membrane passed to and attached itself to the mesentery of the small intestines over the vertebræ, in some parts thicker than others, so that it might almost be said to consist of bands, and from their attachments they must have compressed the ascending colon. On removing the membrane from the irregular mass, the stomach, transverse colon, omentum, and spleen with the liver, were brought into sight; but all these viscera had been compressed, as it were, into the mass by the false membrane spread over them, the membrane being stronger in this situation, equal to three or four sheets of paper in thickness. The membrane here was readily removed.

The liver was enlarged, but chiefly on its left side; and between the longitudinal fissure and the extremity of the left lobe and its anterior margin, there was a whitish-yellow mass of hardened deposit which dipped some two inches into the substance of the liver, and it was some three inches broad. When cut into it was firm and consistent, and appeared to consist of fibrous tissue, with portions of fatty matter, somewhat resembling the character of scirrhus, but less hard. The spleen was healthy, but larger than usual. The kidneys were healthy. The other viscera were not examined."

In some severe cases of Intermittent Fever, as I have before stated, there will be found dropsy in different parts of the system, principally in the lower extremity; with albuminuria; yet the kidney, if examined, is found to be perfectly healthy. These effusions might be due to the degenerate state of the blood, which, being very poor and watery, escapes through the blood vessels. In these cases the action of the skin should be promoted.

The period of incubation of Intermittent Fever varies greatly. In some individuals the Fever shows itself after a few hours' exposure to the causes which lead to the attack, but in others after weeks or even months.

The causes of Ague may be divided into *predisposing* and *exciting*.

Predisposing Causes.

1. *Debility.*—Debility, or general weakness of the body, however produced, independent of the presence of any particular disease, has a powerful influence in predisposing one to Ague. The knowledge of this is important for the prophylactic treatment.

2. *Intemperance.*—Intemperance is the bane and curse of many residents in intertropical countries. Alcohol, in the shape of brandy, gin, rum, or aquedent, being obtainable with greater facility than in countries with a temperate climate, is more freely made use of; its action, enhanced by the heat, produces great excitement and depression of the nervous centres, leading to vomiting and sickness, congestion or other affection of the spleen and liver, giddiness, and great weakness. When continued for any length of time, general debility and despondency are the results, which predispose the whole system to aguish attacks.

3. *Depression of Spirits.*—Any circumstance which tends to lower the body at large, predisposes to Ague, whether it be over-exertion of the body, the brain, or mind; a want of good food or clothing; a want of pleasurable excitement of the mind; or *great dread of the climate.* The action of the mind as a predisposing cause may be illustrated by the case of the crews and passengers engaged in the celebrated Niger Expedition of 1841. When all the men on board were full of hope of scientific and geographical discoveries, although exposed to the exciting causes of Intermittent Fever, they continued healthy for some weeks; but when one after another fell a victim to that dreadful disease—when the prospect of success seemed covered with a gloomy veil, and the expedition threatened to be an entire failure—nearly one-half of the number succumbed under its pernicious effects, so that the survivors were obliged to return.

4. *Age and Sex.*—Ague occurs more in persons of middle age than in either infants or persons of extreme

age; and among these more in the male than in the female sex, because those of the former are much more exposed.

5. *A previous Attack.*—This, in many cases, is the strongest predisposing cause in persons who have just entered the tropics, especially those of irregular habits. The malarious poison remains for a considerable time in the bones, so that a very slight cause will be sufficient to reproduce it; but the attacks become less frequent when the system has been inured to the climate, as it is then enabled to resist the effects of the poison.

Exciting Causes.

These consist in the exhalation of a certain invisible effluvium from decayed vegetable as well as animal matter, which formerly received the technical names of *phyto-septic matter, vegeto-putrescent matter, miasma, marsh-miasmata,* but which is now known as *malaria.* Its presence is detected solely by its action on the constitution. There are two hypotheses laid down to account for the origin of malaria. First, that it is the production of vegetable aud animal decomposition; secondly, that it is an exhalation from the earth favoured by the state of the marsh. Here I intend to treat malaria as the result of both causes. This deleterious agent, to be produced, requires some degree of moisture, as this re-agent is indispensable to the decomposition of vegetable matter and the disengagement of the miasma. By moisture, vegetable and animal fermentation and putrefaction are accelerated, and the exhalation of malaria results. Any thing, therefore, that puts a stop to putrefaction, such as dry weather

in a moderate swamp, stays the disease. Extreme wet has identically the same effect, by impeding putrefaction; but wet may be reduced by dry weather to just sufficient swampiness to favour its production by vegetable decomposition. Upon these data, then, it is evident that swamp, in its approach to dryness, is the harbinger of the disease, while an excess of rain has a preservative power. Thus we see that, according to situation, the same thing may produce an evil or a salutary effect. Exhalation is stayed by inundating a swamp, and accelerated by moistening a dry part sufficiently for exhalation to take place.

In tropical countries, when there has been much rain in the rainy season, the weather is comparativaly very healthy, because the rivers and canals are plentifully supplied with water, which flows on rapidly, and all the marshes are inundated, and thus prevented from becoming any longer the source of noxious exhalations; but at the beginning and termination of the rains, the quantity of rainfall being small and quickly evaporated by the sun, fever is much more frequent and malignant than at any other period. During the very dry weather, in intertropical countries, fever is less frequent, because there is no moisture through excessive evaporation; and vegetable matter, either on the surface or on the soil, becomes too dry for putrefaction, and the consequent formation of marsh miasmata.

As we consider these miasmatic or paludal poisons to be a production of vegetable and other decomposition, not only a certain degree of moisture is necessary for their exhalation, but also a certain degree of temperature; for, by

exposing a body to an exceedingly high temperature, we produce such incipient changes in the ultimate structure of the body that no decomposition can take place. Beyond 56° of north latitude Ague is seldom traceable; a continuous temperature beyond 60° of Fahrenheit's scale is necessary for its production; so that, as we approach the equator, its evolution is more abundant, virulent, and pernicious. Hence aguish diseases are much more severe in the tropical than in the temperate climates, and in the latter climates much more severe in autumn than at any other period; because, in hot climates and in hot seasons, there is far more vegetable matter to decompose; and as an increase of heat produces a great increase of decomposition, we may logically infer, that in a warm temperature fever is much to be attributed to the facility with which decomposition takes place.

The lagoons of India, China, Japan, Africa, and other tropical countries, may be safely regarded as the source of the most deadly malarious emanations. I experimented on myself, when stationed in the unhealthy region of Quittah, on the bank of the extensive lagoon in the Guinea Coast of Western Africa; and the result was that, at a certain period, the lagoon is not only a generator of malaria, but that it exists in it in a very concentrated form.

Stagnant water, through the decomposition and putrefaction of the organic matter which it contains, produces Ague. Therefore, any quantity of water, however small, lying stagnant, containing decayed vegetable and animal matter, is sufficient, more or less, to cause Intermittent Fever. Many places, which have only a small pond or a

muddy pool, such as is frequently seen about houses in equatorial countries, produce aguish disease.

Generally, we meet with two sickly seasons in tropical climates—viz., the beginning and ending of the rains. The several circumstances which combine to render these seasons unhealthy may be thus epitomized. 1. The occasional occurrence of rain, with the subsequent heat, leads to the formation of stagnant pools, rich in vegetable and animal putrescent matter. 2. The clearing of the fields by planters, in preparation for sowing, deprives the country of the salutary effects of vegetable life in absorbing the excess of malarious effluvia emanating from stagnant pools and other sources, together with those arising from the decomposition of the cleared vegetation. 3. The decomposition of vegetation, through the heat of the sun at the approach of the hot season, and the ghastly effluvium emanating from the earth at the rise of the sun after rainfall. 4. The great want of electric agencies in the atmosphere (thunder and lightning), and the consequent diminution of nature's universal disinfectant—ozone.

Although the natives and residents of malarious places are not so liable as new comers to the violent forms of Ague, yet, when inhabiting a low, swampy region, they are chronically affected by the insalubrity of the atmosphere. Travellers speak of them as "puny, sallow, and sickly; feeble in body, and spiritless in mind; yellow-faced, with swelled bellies and wasted limbs; as being subject to dropsy, phlegmatic, melancholy, and short lived." Some writers have remarked, that from some peculiarity or idiosyncrasy, the natives of tropical climates

are scarcely affected with endemic fevers. Of the West Indian blacks Dr. Ferguson said: "To him marsh miasmata are, in fact, no poison; and hence his incalculable value as a soldier for field service in the West Indies. The warm, hot, moist, low, and leeward situations, where these pernicious exhalations are generated and concentrated, prove to him congenial."

I must take exceptions to this statement of so eminent a physician, as my experience, shared by most tropical physicians, leads me to hold that the African, especially the West Indian black of the present age, when exposed to the influence of malaria, suffers dreadfully from it, especially when brought in contact with it in a strange country. What disabled the soldiers of the West India Regiments near the Praah during the late Ashantee Expedition, and made them prone to Dysentery of a malignant type? It was the constant attack of the fever, both of remittent and intermittent type, whilst garrisoning that frontier. Of the 103 cases of sickness in hospital at the Praah, out of a force of 200 men, three-fourths were suffering from fever; and, from the examination of the returns of that year from the Gold Coast, the proportion of Fever cases was more than all the other cases put together. It is true that they are not so susceptible as Europeans, but their constitutions are by no means proof against its ravaging effects. The statistical report of the Army Medical Department goes a great way to corroborate this statement. In 1859, among the white troops serving in Jamaica, strength 624, the number of Intermittent Fever cases was 72; in 1860, strength 594, number of cases, 14; in 1862, strength 702, number of

cases, 12.* Among the black troops serving in Jamaica during the same years the result was as follows: 1859, strength 807, number of cases, 325; 1860, strength 711, number of cases, 123; 1862, strength 826, number of cases, 82.

Certain kinds of soil are peculiarly favourable for the development of miasma—such as loose penetrable porous and sandy soils. Clayey soils, from the power of retaining moisture for a considerable time, are very favourable; whereas gravelly soils, from their letting it escape, are the least favourable. It is not a matter of question now that the geological nature of certain soils bears intimate connection with certain pathological conditions of the inhabitants residing in their neighbourhood, as has been traced in different diseases, such as *Goitre* and *Cretinism*, both of which are produced under a similar geological constitution. These relations may also be traced in paludal diseases. It has always been asserted that ferruginous soils are most unhealthy. Sir Ranald Martin long ago advanced this theory, and explains that, in certain climates and localities, the decomposition of the organic material by the iron, together with the magnetic phenomena elicited by heat and other agents, may lead to the development of disease, especially fevers. I have lived for years on ferruginous soils, and have carefully examined all the conditions necessary for the development of the disease; I have made chemical examinations of, and reports on, ferruginous soils in the laboratory of Netley Hospital; and it is my firm belief

* A part of the white troops were stationed on the hill.

that they are the most healthy soils, as the iron purifies the soils, by decomposing and dissipating those organic materials which are the noxious sources of disease (*vide* "Climate and Meteorology of Western Africa," pp. 121 to 124, and "Blue Book Army Medical Department," p. 333).

According to Professor Maclean, malaria is generated in the disintegration of some hard rocks; the breaking and exposing to decomposition of some granite rocks in Hong-kong led to fever. Many rocks contain a species of fungi, which, when exposed to the action of the weather (as when broken up for building purposes), leads to development of fever of the most malignant type.

Malaria is more potent and virulent at night than during the day, which may result both from the greater susceptibility of the body at that time, and from its being condensed and concentrated by the diminished temperature; the misty atmosphere, the diminution of the expansibility of the air, and the over-hanging fog, all tend to its accumulation in the air. Practically, then, in tropical malarious districts, the night air is to be avoided. "Early to bed" is always a good and wholesome rule; but the other half of the proverb, "early to rise," becomes, in some countries, and in certain seasons, an unsafe precept. At least, it is hazardous to leave the house early without the use of certain precautionary means.

There are some laws of practical importance in Ague, which all those who study the subject should be made well acquainted with, and which I shall here state in brief but comprehensive manner, viz.:—

1. That the lower strata of the air are generally the

most dangerous, either from the specific gravity of the pestiferous exhalation, or from its union with moisture, or from some peculiar (at present) inexplicable attraction towards the earth.

2. That Ague may extend from its source by being driven by the wind, in which respect it is analogous to heavy fog.

3. That the cultivation of the soil, and the consequent drainage of swampy lands, causes the diminution of Ague in a country.

4. That marsh poison has also been observed to be attracted by, and to adhere to, the foliage of many umbrageous trees, which makes it dangerous to sleep under them.

5. That it loses its properties by passing over a large surface of water.

6. Malaria may be drifted up by the wind on the sides of ravines to a great height; according to Dr. Parkes as far as 500 feet. Dr. Maclean thinks to from 1000 to 2000 feet; and this will account for malarious fever occurring at such a height when there are no immediate local causes.

Of the chemical properties of malaria we are perfectly ignorant; nor are pathologists decided as to its nature or physical properties, whether gaseous or made up of solid particles; nor is the idea that malarious influence is the result of chill or abstraction of heat entertainable. Liebig, in his ingenious hypothetical fermentative theory, classed the poison of malaria under what we now call the zymotic poisons. He maintains that a substance, in the act of decomposition, added to a mixed fluid in

which its constituents are contained, can reproduce itself in that fluid exactly in the same manner as new yeast is produced, when yeast is added to liquid containing gluten. The study of zymotic poisons has most recently occupied the careful attention of many able experimentalists. The views of Hallier, of Vienna, with regard to development from fungi, that certain contagium particles or micrococci give origin to bacteridia in the system, are still open to investigation (*vide* Hallier's views in the *Chapter on Cholera*). The researches of Dr. Sanderson as to the nature and mode of existence of the contagious principles of zymotic diseases, have thrown a great light on the subject, from which the following deductions may be derived—viz.: "that every kind of contagium, as regards its physical form, consists of extremely minute, separate, solid particles, to which the term *microzymes* is given; these particles being spheroidal, transparent, of gelatinous consistence, of density equal to that of the animal fluid in which they are contained, and therefore not deposited by subsidence, and composed of albuminous matter. They are organized beings; self-multiplying, organic forms." It remains now to study fully the organoleptic properties of microzymes, their origin and mode of propagation, and to show, as some researchers maintain, that if they take origin from fungi, they do so, not as the alteration of the cell contents of the protoplasm, but as the result of chemical changes in connection with their putrefaction (*vide Lancet*, Oct. 1, 1870, p. 473).

Whilst considering the subject of the nature and organoleptic properties of the malarial contagia, I cannot

pass over the views lately in vogue, and which I have collected some facts to maintain, relative to the periodicity of Ague, and the *rationale* and *modus operandi* in the treatment with quinine and arsenic. It is argued, from the coincidental effects produced by the cold stage of Ague—viz., the chill, desertion of the blood from the superficial capillaries, and the consequent paleness, dry and rough skin, and sunken features, quick and anxious respiration, feeble pulse, and diminished secretion; and that produced by the galvanization of the sympathetic nerves in the neck, as exemplified in the experiments of M. Brown-Sequard, viz., dilation of the pupils, desertion of the blood from the superficial vessels, diminution or absolute check of the secretions, and the lowering of the temperature, and all the vital functions (Lecture ix., *Lancet*, vol. 1, 1858)—that the cold stage of Ague may be produced artificially by the excitation of the sympathetic nerves, upon which depends the contraction of the blood-vessels. The hot stage is produced by a natural reaction of the blood-vessels to even beyond their natural calibre, which phenomenon is observed also in the division of the sympathetic nerve. From noticing these circumstances, the conclusion was come to that the sympathetic system was the part of the organism specially affected by malarious poison; and that the phenomena of Ague depend on a periodical excitement of it by the poison; followed by an unequally immoderate reaction in the opposite direction, which latter at length settled down the equilibrium of health.

The view as to the sympathetic system being the organism attacked by malarious or paludal poison, will

enable us to explain many of the concomitant symptoms of Intermittent or other litoral Fevers; and although sufficient pathological lesions have not been demonstrated in them, yet still we are warranted in assuming from the various changes in the viscera, in the neighbourhood of and abundantly supplied by, the sympathetic system, that there must be some changes in the sympathetic ganglia, which lead to those changes in the viscera.

One of the most troublesome symptoms in these fevers is the severe *vomiting* and *nausea* which accompany them. As the sympathetic system governs the functional action of the stomach and bowels, its derangement must necessarily produce a derangement in the healthy actions of those organs. This vomiting may become very alarming, and prostrates the patient to a great extent. There are invariably an aversion to food and great thirst.

Effects of Ague on the Spleen, Liver, and Lymphatics.—The spleen is supplied by a lash of nerves from the splenic plexus of the semilunar ganglion; by repeated attacks of Ague the organ becomes at first congested, but afterwards permanently enlarged. When we consider the effect that will be produced by undue excitement or irritation of the lash of nerves with which it is supplied, the increased activity which is given to the vessels distributed in it, and the enormous engorgement which will follow as a consequence, the due enlargement may be explained. This condition disappears without the use of medicines if the nervous excitement is not much prolonged; otherwise the enlargement becomes chronic and permanent. The reduction takes place quicker in children than in adults. The effects on the liver

and lymphatics are gradual, and more apt to be permanent.

Headaches.—Malarious Fevers very often begin with severe headaches. In many cases this headache is very intense, and produces a burning sensation all over the body. It very often assumes the character of nervous headache, which pain, according to Dr. Symonds, is located in the vaso-motor of the sympathetic nerves of the brain and skull.

The Periodic Fits.—From arguments drawn from the rhythmical action of the heart, and the periodical monthly phenomenon of menstruation in the female *uterus*, both of which organs are principally supplied with, and animated exclusively by the sympathetic ganglia distributed in them, the conclusion is drawn that the periodical character of Ague is dependent upon a periodicity impressed upon the sympathetic system, and manifested in all the phenomena, morbid and natural, over which it presides.

Other examples might be adduced to show that the sympathetic-nerve system is principally concerned in malarious fevers—*e.g., the effects on the vocal organ.* The voice sometimes suffers most fearfully. In the case of a woman, who stammered, which came under my treatment, the voice was so altered that her natural articulation was completely lost during the whole time she was under the influence of the Fever. Both during the paroxysm and the interval, she crowed in a most peculiar manner, and could scarcely be understood. She gained her natural voice as soon as the fever subsided. In another very peculiar case, not only was the proper tone of the voice

deranged, but the nerves (*submaxillary ganglion* of the sympathetic), influencing the actions of the *palato-glossus* and *palato-pharyngeus* muscles, were affected. They seemed to have been paralyzed; solids were taken with very great difficulty, and fluids, either in the shape of medicine, water, or food, were the head not thrown back considerably, escaped through the nostrils in continuous streams. Improvements in the voice and in the action of the *glossal* muscles, were evident as soon as the fever began to subside.

The constitutional effect of quinine goes also to prove that its therapeutic benefit depends on its action on the sympathetic ganglia, as manifested in the reduction of the temperature of the body, and the moistened and relaxed condition of the surface which it induces. But we have further theoretic proof in the peculiar effect it has on the ear; when large doses are taken deafness is experienced, and a disagreeable sound is heard which is very distressing to the patient. According to Von Proeltsch, both the *tensor* and the *levator palati* muscles are engaged in governing the internal or oral extremity of the *Eustachean tube*—the one closes, the other opens it; these muscles are supplied with sympathetic ganglia. When paralysis of these muscles occurs, as the result of cold or diphtheria, a loud sound is continually heard in the ear of the part affected, which is greatly increased by lying down. This is supposed to be due to an affection of the sympathetic ganglia supplying the parts leading to a continuous opening of the *Eustachean tube*. It is not unusual to find associated with it partial paralysis, more or less, of the affected side; a feeling of weight and uneasiness of

the shoulder, and an uncomfortable sensation in the neck, as well as more or less deafness of the ear. When this affection exists, and a small dose of quinine is taken, the whole of the symptoms become exaggerated, the deafness is increased considerably; a loud buzzing sound is continually heard in the ear, which appears to throb through the head on lying down. This (as in my case) continued for two days after the quinine was taken, but gradually decreased until the third day, when the sound was heard more in the throat, at a position where the right *Eustachean tube* opens. Repeated experiments on myself lead me to believe that the effect of the quinine was to act on the sympathetic ganglia, and that it thus increased the paralysis of the muscles of the palate, especially the *tensor*.

Staff-surgeon Mosse relates a case of great pathological interest, which occurred in the West Indies, in a patient who, during a severe attack of malarious Fever, took very large doses of quinine, which made her completely deaf and blind. This complete blindness might be referred to the effects of the quinine on the *vaso-motor* branches of the *lenticular ganglion* supplying the various ramifications of the *arteria centralis retinæ*, causing congestion of the *tunica vasculosa*.

Pains in the Back of the Thigh.—This is a very constant symptom in an attack of Ague. The pain is dull and uncomfortable, and is relieved by compressing the fleshy portion of the thigh. It is a pain traceable to the *vaso-motor* or sympathetic nerves distributed to the parts, and ceases with the Fever.

In the tropics we often find after a short but severe attack of Fever that distant organs suffer severely. I

have noticed cases where the *finger and toe nails dropped off after a fever*; the tips of the fingers became ulcerated and quite deformed, remaining so for years without the nails showing signs of ever again being reproduced. The chief cause of this may also be referred to the interruption of the nutrition of the parts, occasioned by the powerful action of the malarial poison on the *vaso-motor* branches of the sympathetic nerve of the limbs; so also may we account for the falling off of the hair, in some cases soon after recovery from a severe attack of Malarious Fever.

When the system is convalescent from, but yet debilitated by, the effects of paludal fever, a severe flash of lightning with thunder sometimes leads to the development of a large number of boils on the surface. Is this not an electric effect on the sympathetic system supplied to the cutaneous glands?

Assuming these data to be correct, the action of quinine and arsenic can be easily explained by admitting that they produce a powerful effect on the sympathetic system when taken internally.*

Diagnosis and Prognosis.

Intermittent and Remittent Fevers may be mistaken for hectic, suppuration, or stricture of the urethra with retention of urine. Hectic may be distinguished from the Quotidian Ague by its paroxysm being irregular, and occurring generally in the evening. Its stages are also irregular; and during its course no rigour comes on, but sweating, constant feverishness, and a full pulse.

---

* For the cryptogamic origin of Malarious Fever, *vide* exciting causes of Remitting Fever.

Hectic is only a symptom of some local disease; the urine has not that lacteritious red, brick-dust sediment, which is found in Intermittent Fever, but a pink deposit. Stricture of the urethra and abscess in the peritoneum often give rise to rigors; if there is, however, a doubt, administer the remedy for Ague, and if the Fever does not succumb to treatment, examine for local disease.

The diagnosis of Intermittent from Remittent Fever is a mere question of degree.

Prognosis.—It is favourable when the paroxysm is of short duration, regular in its occurrence, and the intermission free from fever; when it is of recent date; when there are herpetic eruptions on the surface of the lips and the angles of the nose, and small eruptions on the forehead. The Quotidian and the Tertian forms are favourable. It is unfavourable when, instead of postponing, we have anticipating paroxysms; when the disease has lasted for a long time with feverish state during the intermission; when the paroxysm, violent in form, is of long continuance, attended with much anxiety and delirium; when there is hypertrophy and other diseases of the liver and spleen; when there is an hæmorrhagic tendency in the mucous membrane of the system; and when the disease is of a Quartan form.

I shall now consider the treatment of Ague by dividing it into—During the Paroxysm, and During the Intermission.

Treatment during the Paroxysm.

During the cold stage our chief aim should be to increase the heat of the body as much as possible by

artificial means. This is done in various ways—by putting the patient in a warm bed; by restoring the warmth of the body by hot bricks and bottles to the feet; by bags of hot salt or bran on the pit of the stomach; by the administration of warm diluents, such as barley-water, beef-tea, toast-and-water, gruel, weak tea, or of warm gentle cordials, according to the patient's state of exhaustion. Infusion of mint, or decoction of ginger, will be found of use to hasten the hot stage.

Opium and its compounds, from having a tendency to put a stop to the paroxysm, have been given with very satisfactory result. I have sometimes found the administration of quinine in small doses (one grain every two hours) during the cold stage, in conjunction with morphia, to have a decided effect in mitigating the intensity of the fever. When there is a mild headache it does not at all increase it; but when it is severe, it is contra indicated. The following formula will be found of use :—

℞.—Morphiæ hydrochloras . . . . gr. ij.
Quiniæ sulphas . . . . . gr. vj.

Misce, et divid. in pil. sex. — One to be taken every two hours.

Amongst drunkards we might occasionally meet with great prostration of the powers at the very onset of the fever, accompanied with fainting fits and almost absent pulse, and these effects may be also observed in weak and delicate individuals, who have long been exposed to concentrated malarious influences. In these cases the diffu-

sible stimulants (carbonate of ammonia) will be found most useful.

℞.—Ammoniæ carbonas . . . . . ℥ij.
Aqua camphoræ . . . . . f℥iv.
Syrupus zingiberis . . . . . } āā f ℥j.
Aqua pura . . . . . }

Misce—fiat mistura.—A dessert-spoonful to be taken every hour or half hour.

A small quantity of port wine or brandy and water will be found of great use in these cases, especially if followed by mustard cataplasm over the pit of the stomach. A bottle of good moselle or champagne, when the stomach can receive it, is an admirable remedy in the cold stage of fever, and very seldom fails in bringing on early the hot and sweating stage.

During the hot stage the previous remedies should be laid aside, and cold should be induced by cold air, cooling drinks, and by the hydropathic system of cold or tepid ablution. The cooling drinks should be given in small quantities so as not to produce an oppressive action on the stomach. Advantage may be obtained by administering a diaphoretic powder consisting of ten grains of Dover's powder and five of James', followed in an hour's time by an aperient, containing a small dose of mercury, which will help to relieve the portal circulation; black draught is about the best at such a time.

Sometimes during this stage the patient becomes delirious, in which case his head should be kept high and bathed with the following cold evaporating lotion, viz.:—

℞.—Spiritus vine rectificatus . . . . } āā f ℥j.
Liquor ammoniæ acetatis . . . . }
Aqua camphoræ . . . . . f ℥xiv.

Misce.—To be constantly supplied.

The following sedative mixture at bed-time, or at the commencement of the delirium :—

℞.—Liquor morphiæ hydrochloratis . . .	♏ xxx.
Spiritus ætheris co.	♏ xv.
Aqua pura	f ℥ss.

Misce.—The same mixture to be repeated in four hours if the delirium continues.

Leeches may be applied over the temples with good effect.

When great fulness over the spleen and liver is diagnosed, with pain and oppression over the epigastrum, dry cupping, if applied over the regions of the spleen, liver, heart, and chest, will be found to give great relief.

During the sweating stage the patient should be kept as quiet as possible; if faint or debilitated, stimulating drinks should be administered, such as brandy or wine and water.

From an *à priori* argument one would think that the best remedy in an attack of Intermittent Fever, would be to use the most powerful antiphlogistic remedies, and thus we see that at the time when mercury was thought a certain curative for every disease, the enthusiasm of the period always triumphantly proclaimed that death would never take place after mercury had taken great effect on the system. But it is a mistaken nosology to think that Intermittent Fever is inflammation; although it might be accompanied by, and may lead to, inflammation of special organs. "What kind of inflammation," writes Dr. James Johnson, "must that be which explodes, as it were, the moment the clock strikes a particular hour, and this for days and weeks together? What kind of

inflammation is that which every second day terminates in profuse perspiration from head to foot, and yet is renewed after an interval of forty-eight hours with the symptoms as before, and so on? Do we see real and unequivocal inflammation pursue this course? Never are the causes of this intermittent phlegmasiæ (if such an expression be not a solecism in medical language) of a periodical or intermittent nature? No. They do not accommodate themselves to any particular theory." Mercury, when employed as an adjunct to other purgative medicines, is of value, otherwise it becomes useless and injurious to the system.

Treatment during the Intermission.

By the term intermission we mean the period between paroxysms. The most powerful and effectual means used during the apyrexia may be epitomized in two brief but pregnant terms—*purgative* and *tonic*. The former cleanses the stomach and the intestines of those hurtful accumulations which are apt to impede the beneficial operation of the latter; for the latter our chief remedies are quinine, or the active principle of cinchona, and arsenic.

Purgatives.—The most important purgatives in the treatment of these Paludal Fevers are those which possess the merit not only of clearing the alimentary canal, but relieving the engorgement of the portal circulation. Podophyllin resin stands in high estimation; rhubarb, colocynth, and jalap, in combination with calomel, have been found of great value.

At the very onset of the disease a brisk purgative, with

quinine, will be found advantageous in cutting short the various stages. The following formula of Mr. Eales, late surgeon of H.M.S. Prometheus, is excellent :—

℞.—Extractum colocynthidis co. . . .	} āā gr. iv.
Pulvis jalapæ co.	
Quiniæ sulphas	
Pulvis antimonium tartaratum . . .	gr. ½.
Aqua pura	℥j.

Misce.—To be taken immediately, and followed in two hours' time by—

℞.—Quiniæ sulphas	} āā gr. vj.
Magnesiæ sulphas	
Pulv. potassæ nitras	gr. iv.

Misce.—

Or the following purgative mixture :—

℞.—Pulvis rhei co.	} āā gr. x.
Pulvis jalapæ	
Hydrargyri subchloridum	gr. iii.
Aqua pura	℥i.

Misce.—To be taken at once, and followed in one or two hours' time by a brisk saline aperient.

There is a very agreeable effervescing saline purgative which is a most important medicine in the treatment of all malarious diseases of tropical climates, and which should be possessed by every family residing in the tropics, viz.—"Lamplough's Pyretic Saline." It is a powerful and useful adjunct for procuring the brisk action of the more powerful purgatives, and its constant use, by relieving the intestines of improper ingesta, mitigates a great deal the intensity of the fever. Its taste is pleasant and refreshing, so that it might be taken at any time. With men who are accustomed to hard

drinking and keeping up late at night in the tropics, the Pyretic will be found an agreeable *vade mecum*, which should be used every morning to relieve the intestine and other abdominal viscera, and give more life and vivacity to the system during the day.

When there is much congestion of the liver, spleen, and other viscera, the following recipe will be found of use :—

R.—Extractum rhei	℈iij.
Pulvis ipecacuanha	gr. xxiv.
Pulvis zingiberis	gr. vj.
Sapo durus	q. s.

Misce.—Divide in pil. xxiv., two of which to be taken every four hours.

Sometimes the action of quinine on the system is nullified by irritation in the urinary organs. Great benefit will be found by administering, in frequent doses, a mixture composed of the Bicarbonate or Acetate of Potash, or some Soda Salts with Antimonial Wine.*

Tonics.—Our chief tonic is quinine, or the active principle of the Cinchona bark. It is the most powerful remedy we have in all cases of malarious Fever. As to its *modus operandi* in the system, pathologists are not clear.

M. Briquet is of opinion that—1. It does not act

* Dr. Livingstone's Remedy for African Fever.—The medicines, which must be pure and unadulterated, are as follows :—Six or eight grains of resin of jalap, and the same amount of rhubarb, with four grains of calomel and four of quinine, made into pills with spirit of cardamoms ; the whole is a full dose for a man. On taking effect, quinine (not the unbleached kind), in four grains or larger doses, is given every two hours or so till the ears ring or deafness ensues. This last is an essential part of the cure.

directly on the marsh poison. 2. It does not act on the general state of the organ, or on the blood; but it has especial action on the nervous system. "*C'est la médecine du quitte au double, celle que les militaires emploient quand pour couper la fièvre ils avaient une double ration d'eau de vie chaude mèlée de poudre à canon.*" 3. It does not act by increasing the vital forces or by sustaining them. 4. It is not by a tonic, or an astringent action, or a stimulant action, but by a sedative stupefient action, that it acts on the marsh poison.

Dr. Bruce Jones thinks that quinine acts in weakening the pulse in a similar way as arsenic, hydrocyanic acid, opium and other narcotics, antimony, and nitre, and gives the following as the general conclusion arrived at by the above observer—viz. 1. That the maximum diminution of the pulse is rarely twenty to twenty-five pulsations a minute, even in typhoid fever. 2. That the diminution is always in direct relation to the previous frequency of the pulse. 3. That the reduction is never below forty beats a minute. 4. That much fibrine in the blood, or active inflammation prevents the depression. 5. That large doses of quinine produce so serious a perturbation of the economy, that they should not be given unless the illness, as regards length, seriousness and accidents, is sufficiently important.

Quinine is best administered in a fluid state, as a larger quantity can thus be taken into the system within a given time. It is insoluble in water, so that a small quantity of dilute sulphuric acid should be added to make a supersulphate, in which it is soluble. With regard to the doses, the best tropical practice is to give the solution, six

grains to the dose, every six hours, as the sweating stage commences. When called to see a patient in fever whose bowels have been confined, quinine should form an essential adjunct in the purgative draught ordered, as it assists greatly in cutting short the stages of the fever. The following is the ordinary mode of making up the quinine mixture :—

℞.—Quiniæ sulphas	℥ gss.
Acidum sulphuricum dilutum . . .	f ℥j.
Tinctura aurantii	āā f ℥iv.
Syrupus aurantii	
Decoctum cinchonæ flavæ	℥v.

Misce.—One-sixth part to be taken every six hours.

With children the dose is smaller according to age. The tincture and syrup of orange are only added to disguise the taste; and, where they cannot be obtained, they can be dispensed with.

Some physicians in the East and West Indies prefer giving it in doses of twenty-five to thirty grains during or just after the sweating stage; but this large quantity is objectionable, in that it disposes the system to the injurious effects of the quinine by producing excessive disorder for the time of the cerebro-spinal functions, and sometimes derangement of the stomach. I have seen ít produce in a patient a distaste for quinine which they cannot afterwards overcome; but it certainly put a stop to the fever. When the stomach is very irritable, *quinine might be advantageously combined with opium or morphia.* When there is anæmia or *malarial cachexia* and great weakness, it is best given with *tincture of sesquichloride of iron;* or the *phosphate of iron;* or

phosphate of quinine will be found to expedite the cure. If the system is predisposed to diarrhœa, or if the patient had suffered previously from dysentery, and there is a diarrhœal tendency during the fever, the citrate of quinine and iron in three grain doses every two hours, will be found very serviceable and effective.

"Warburg's Fever Tincture" has been strongly recommended, as it has a large quantity of quinine in its composition, and serves as a good aperient. It might be employed with great advantage. It produces great diaphoreses, so that the bedding is almost always thoroughly drenched; when administered it exhales an aromatic effluvia. Before administering it the patient should be made to abstain from drink, half of the small phial should be first given, and the other half three hours afterwards; care should be taken that the patient does not expose himself afterwards. In adynamic cases it should be administered in smaller doses. The supposed composition of this remedy is as follows:—

Take of	aloes, sedoary	āā ℥j.
,,	Angelica root, camphor . . .	āā gr. ij.
,,	Saffron	gr. iij.
,,	Proof spirit	℥iij.

To twenty-five drachms of the filtered tincture dissolve half a drachm of quinine disulphas. [The dose is five drachms, consequently each dose contains eight grains of quinine.]

The *Hypodermic injection* of quinine has been strongly recommended by writers, and said to have proved of great service in places where quinine is scarce, where absorption from the intestinal canal is very much obstructed, and where the symptoms do not allow of its imbibition by the mouth.

Dr. Goddard Rogers recommends the use of a salt of quinine supplied by Messrs. Bullock and Reynolds, which is soluble in distilled water, and not that of the London Pharmacopæia, which requires ten minims of dilute sulphuric acid to form a perfect solution of ten grains of the disulphate; the former produces no smarting or prolonged tenderness when introduced by the syringe, whilst the latter does. His trial of the remedy by hypodermic injection, proves that quinine in small doses of one or two grains is sufficient to cure Ague; that its physiological and beneficial effect is obtained when large doses internally administered failed; that where there is hepatic or splenic complication in long established cases, it often fails.

In very large doses quinine, according to Pareira, produces the following effects:—1. *Gastro-enteric irritation*, marked by pain and heat in the gastric region, nausea, gripings, and purgings. Occasionally ptyalism, as well as constipation, has been observed. 2. *Excitement of the vascular system*, presenting the following symptoms: increased frequency and fulness of pulse, increased respiratory action, a furred tongue, and other signs of a febrile state. 3. *Disorder of the Cerebro-spinal functions*. With these symptoms headache, giddiness, contracted, in some cases dilated pupils, disorder of the external senses, agitation, difficulty of performing various voluntary acts, somnolency; in a few cases delirium, and in others stupor.

Quinoidine, *Quinidine*, or *Quinidina*, have been employed with success in malarious diseases, and in places where quinine cannot be obtained, the concentrated solution of quinidine will be found to be a good substitute for

quinine. I have several times administered it, and found it serviceable where there is great debility, but its extremely disgusting taste is a great objection to its use.

The alkaloid of many other barks have been beneficially used, such as Salicina, the alkaloid principle of the willow bark; *ilicin*, that of the holly; *heberin*; *peperine*, the crystalline salt of pepper. When pure it forms colourless rhombic crystals, neutral, insoluble in water, soluble in alcohol and acetic acid. Its effect in Intermittent Fever is more powerful than any of the other alkaloids mentioned above. The experiments of Drs. Meli and Gordini led to the following results—viz., that 1. *Peperine*, in doses of *six* to *eight* grains, cures Intermittent Fever. 2. It is more efficient in *powder* than in *pills*. 3. It succeeds in certain cases in which the *sulphate of quinine* fails. 4. It is more effectual in preventing *relapses*. When given in pills its action is more perfect when made up with an aperient substance, thus :—

℞.—Pilula colocynth. et hyoscyami . . . } āā gr xij.
Piperinæ . . . . . }
Extractum gentianæ . . . . . q. s.

Misce, et divide in pil. xij.—Of which one to be taken every hour during the apyrexia.

Cobwebs.—Dr. Donaldson, of Madras, has lately introduced this remedy, which was in vogue about a century ago in the treatment of Intermittent Fever. He gave cobwebs in five grain doses made into pills every third hour; in some instances, he commenced with fifteen grains, and afterwards gave ten grains. In its results he considers it superior in many respects to quinine.

I have tried this remedy whilst serving with the troops in Western Africa during the commencement of the

rainy season, and although the number treated was not such (being ten) as to warrant the establishment of an opinion, yet still I might state that in every case the most satisfactory results were obtained. The cobwebs were first gathered, washed, dried, and ground into powder, and made into pills, five grains each; from ten to twenty grains should be given before the attack of the fever, and five grains every two or three hours in the interval. It has the effect of cutting short the fever, and preventing the great weakness that often follows.

It is important that *cobwebs*, as a remedy for Intermittent Fever, should be much more generally known by the inhabitants of tropical climates, so that, when they are without the more ready and reliable medicine, quinine, they may only have to look to the roofs of their houses for a remedy of great value.

Arsenic.—This is a remedy of great value in malarious fevers; the *liquor arsenicalis* is the preparation mostly in use, beginning with small doses of three to four minims, until eight or ten minims can be tolerated with impunity. It should never be given on an empty stomach, especially when in combination with acrid substances. Great care should be observed in administering it, and the patient should be carefully watched, as an overdose is apt to produce gastritis, great pain or pressure over the stomach, faintness, nausea, and vomiting; swelling or tenderness of the bowels; a sense of constriction in the throat, intense thirst, headache, and frequent pulse. Among the native doctors in Hindustan, arsenic is used to such an extent as to be prejudicial to the constitution of those to whom it has

been administered. It has a tonic effect on the nervous system, and, according to Dr. Billing, acts as an equivalent to a union of bark and mercury, by increasing the secretion of the bile and curing chronic inflammation, and therefore it ought to be more extensively used in the fevers of tropical climates than it is, especially when quinine is scarce; but it should not be continued more than eight days.

In many cases where quinine cannot be tolerated, arsenic will be found of great use. It is a good diaphoretic, and may be given during the pyrexia, as well as in the interval.

℞.—Liquor arsenicalis		f ℥ss.
Vinum antimoniale	}	āā f ℥iss.
Vinum ipecacuanhæ	}	
Syrupus aurantii		f ℥iij.
Decoctum cinchonæ flavæ		f ℥vii.

Misce—fiat mistura —One ounce to be taken every three hours, and the effects carefully watched.

A combination of quinine with arsenic, is very efficacious in many stubborn cases. The following formula from the Military Prescription Book has been successfully tried:—

Take of	Sulphate of quinia . . .	1 drachm.
,,	Arsenical solution . . .	2 fl. drachms.
,,	Dilute sulphuric acid . .	1 fl. drachm.
,,	Tincture of bark . . .	2 fl. ounces.
,,	Tincture of ginger . . .	½ fl. drachm.
,,	Refined sugar . . .	20 grains.

Mix.—Dose, 1 fl. dram, to be taken every two hours. Watch the effect of the arsenic.*

---

* On the toleration of arsenic in Malarious Fevers, *vide* Remittent Fever, Article—Arsenic.

In many cases of Intermittent Fever, where there are symptoms of severe vomiting and nausea, with congestion of the spleen and liver, and the quinine acts as an irritant to the stomach, beneficial results will be obtained by the administration of *nitro-muriatic acid*. It mitigates all the symptoms, and ultimately cures both the fever and the hepatic derangement, for in most of these cases the fever is not consequent on but subsequent to the hepatic affection. The following mixture will be found to answer in such cases :—

℞.—Acidi hydrochlori diluti	f ℥j.
Acidi nitrici diluti	f ℥ss.
Liquoris taraxaci	f ℥j.
Infusum cinchonæ flavæ	f ℥vij.

Misce.—One ounce to be taken every four hours.

Blood-letting.—A treatment which has been recommended very strongly by no less authorities than Drs. M'Kintosh and W. Twining, is blood-letting in the cold stage of the fever; the one stating that bleeding at the commencement of the cold stage in a regular Intermittent, is not only safe, but more successful than any other treatment; the other that it prevents debility in a direct manner by saving the vital fluid. Modern practice has entirely changed this view, and every-day practice leads most practitioners in tropical climates to explode the idea of general blood-letting in Intermittent Fever, as it causes a great deal of injury to the system, and protracts the convalescent state. Local depletion will be found in many cases of great service, in which case a small quantity of blood should be allowed to flow. Thus when there is severe and prostrating headache, or con-

gestion of spleen and liver, leeches over the temples and in the region of the stomach and spleen may occasionally produce great relief; but general blood-letting should never be performed, especially in adynamic subjects, and Drs. Elliotson, Watson, Stokes, Gregory, Denmark, Copland, and Martin hold the same opinion.

Dr. Stokes mentions the following as some of the injurious circumstances which generally accompany bleeding in the cold stages of fever:—"The occurrence of new local inflammatory symptoms and the supervention of a low irritative fever. From the examination of the cases, I apprehend that an impression will be received against the indiscriminate or even frequent use of bleeding in the cold stage of Ague. It may be remarked that in the great majority, quinine had to be administered before the disease was eradicated; that many of them had an extremely slow and dangerous convalescence, that in several instances the disease, so far from being relieved, appeared exasperated by the practice; that local inflammatory affections occurred several times after the operation; and lastly, that the bleeding appears to have a tendency to convert Intermittent into Continued Fever. . . . These facts should make us very cautious how we interfere with nature by means of the lancet in simple Intermittent, where we have so certain and, as far as I have seen, so infallible a remedy as the sulphate of quinine."

Before terminating my observations on the treatment of Malarious Fevers, I must say a few words on the influence of meteorology in increasing or diminishing their effects, as I have made it a subject of close investigation

and experiment. I shall, however, confine myself more particularly to the *effects of Ozone* in Malarious Fevers. The quantity of ozone in the atmosphere has an indisputable effect in influencing fever in malarious districts. When it exists in large quantity fever seldom occurs, and when in small quantity fever is more frequent and of longer duration. When the quantity of ozone is very large in the atmosphere, a person may with impunity expose himself to places where malaria is rife, without the manifestation of its constitutional effects for days and even weeks; and although a large quantity of ozone in the air destroys evidently a large quantity of the substance which is the harbinger of fever, yet that which remains if imbibed by the system is sufficient to cause a paroxysm, although for the time prevented from manifesting itself by the powerful influence of the ozone, which is taken into the system by respiration, and by impression on the exposed sentient surface.

From experiments made on myself and officers serving with me, I find that when there is a large quantity of ozone in the atmosphere, a small quantity of quinine is sufficient to check Malarious Fevers; but when the quantity is small, a far larger quantity is required to check the progress of the fever.

The conclusions deduced from the observations made are the following: 1. That the larger the amount of ozone in the atmosphere the smaller will be the number of Malarious Fever cases in the district; *au contraire*, the smaller the quantity of ozone the greater will be the number of cases of fever amongst the population, *cæteris paribus*.

2. That the quantity of ozone in the atmosphere, even

when large, does not neutralize the whole of the malaria generated from the different paludal beds scattered over the earth's surface or a particular district, but a quantity is left which may be absorbed and accumulated in the system until sufficient to overbalance the changes in the different essential organs, or the proper action, in the sympathetic system leading to the development of the fever.

3. That in cases where there is a large quantity of ozone in the atmosphere, the quantity received into the system, either by absorption through the lungs or by the general surface undecomposed, aided by the chemico-vital changes, is able to check the manifestation of its influences, but not entirely to annihilate it.

4. That when the quantity of atmospheric ozone is small, and consequently a small quantity or none at all is absorbed into the system, the chemico-vital changes being no longer able alone to prevent the manifestation of the effects of the poison, fever bursts forth in full vigour.

Chemistry has not as yet supplied us with the means of collecting and preserving ozone for any length of time; being a powerful oxydizing agent, its formation is easily followed by its decomposition or deoxydation, but when a method is found for collecting and preserving it for a considerable time undecomposed, I believe we shall have at command a powerful remedy against Malarious Fevers.

Dietetic Treatment in Malarious Fevers.

Some observation is very necessary in this department of the subject, as the due appreciation of it increases the chance of the patient, preventing too much waste of tissue,

and assisting the rapid restoration of the patient during convalescence. As at the commencement of the fever there is generally a disinclination for animal or nitrogenous food, it should not be insisted upon, but starchy or carbonaceous food, with sugar and a little fat, should be permitted, and that in frequent doses, so that a large quantity may be consumed during the course of the day. From experience I find that this increases the ability to recover in tissues, reduces the emaciation observable after fever, and furnishes force to voluntary and involuntary muscles; it does not increase the febrile heat nor act injuriously in any way in the system; whilst, on the other hand, animal or albuminous food tends to keep up the conversion of the molecular tissue into albumen and then urea, without nourishing the muscular and nervous tissue, to increase the temperature, and if taken without starch and fat, to actually starve the patient.

Arrowroot, barley, sago, corn, starch, bread and butter, boiled rice, milk and whey, mealy potatoes, and cod liver oil should be permitted during the paroxysms of fever, with a very small quantity of weak broth or soup during the intermission. During convalescence, however, meat or albuminous food, in the form of soups, beef-tea, &c., with fat, should be added to the carbo-hydrates or starch foods.*

---

* Professor Parkes, in his able lectures on the "Elimination of Nitrogen from the Human Body," published in *Lancet* of 22nd April, 1871, touched very cautiously on the subject of the treatment of Fevers, as dictated by our present knowledge of the physiological chemistry of the tissues of the body in health and disease. He says: "Can we foretell from our present knowledge of the chemistry of fever, what should be the treatment by diet?

Prophylaxis against Malarious Fevers.*

From the foregoing it will be seen that Malarious Fevers are most common in districts which are ill-drained, and abound in stagnant marshes and collections of decayed vegetation; that they hover about the banks of rivers, the borders of marshes, the edges of pools; that they predominate very generally in the neighbourhood of pig-styes and badly-conducted drains, and take special delight in the incense of putrefying animal matter; that they are repugnant to fresh air, and when left to them-

---

I do not think that our knowledge is sufficiently precise for this, and practice alone can rightly guide us. Still some suggestions present themselves. There is in fever a waste of albuminous tissues; it would, therefore, at first sight appear an indication to feed those tissues with nitrogenous food. But it may be questioned whether they can be fed. Can disintegrating nervous tissue, or voluntary muscle, which is in a state of forced rest, make any use of the albumen brought to it? Some of Huppert's observations indicate that it cannot be, and that the nitrogen is eliminated without being used by the casting parts; and, if so, what becomes of that albuminous food? It must be disposed of by the glandular elements, and add to the work already thrown on those organs. May it not be that, in the height of pyrexia, partial abstinence from nitrogen should be the rule, while the succeeding period of apyrexia is that in which it should be given when the body retains it, and thus makes up the standard it had lost? I advance this with great reserve; and yet I cannot but believe, from experience, that the almost exclusively animal diet sometimes given in fevers is not so useful in sustaining strength as is supposed, and that if it were not for the loss of appetite, which limits the supply, we should perceive more clearly the bad effects. I have thought that the vast deposits of urates, which in some cases mark the end of fevers, might be really caused by excessive animal food; and

---

* *Vide* "Climate and Meteorology of Western Africa," by the Author, p. 288.

selves will linger for years amidst scenes of filth and corruption, and fold in their deadly embrace all human beings who are so unfortunate as to be thrown into their company. As a preventive, therefore, the *primum mobile* of our action should be to drain the land, to use stringent means for preventing the accumulation of decayed vegetable or animal matter, and consequently to put a stop to all malarious effluvia or exhalation.

With regard to the individual who must be exposed to Malarious Fever, or "who has once had the fever," writes

---

I have actually seen gouty attacks brought on by that system of feeding.

"On the other hand, in fevers the fat of the body disappears. A supply of fat to meet this is seldom attempted in practice; and yet there is no doubt that, if digestible fats are given to patients, the degree of emaciation is much less, and at the end of the fever the body seems more speedily to recover itself. Yet fats are often considered hurtful, and are sometimes excluded from fever diets, so that, with the large supply of animal food, the patients are brought almost into a state of Bantingism. Why should not cod liver oil, which is so useful in subacute, and even in acute febrile phthisis, or other fats as butter, be used in all febrile cases when the stomach can bear them? And another argument for the use of fat with nitrogenous food is given by the experiments of Voit, which indicate that fat aids the formation of the organ-albumen; *i.e.*, assists in the construction of the tissues. The starches and sugars are generally given in fevers, and it cannot be doubted that this is right, though probably the amount usually given is too small. We know that febrile heat will not be increased by any aliments of this kind; and it seems probable that the carbo-hydrates furnish force for the heart and other muscles to convert. The excellent effect of milk and whey, when taken largely, in preventing emaciation, is an argument for this practice. In convalescence the addition of fats and carbo-hydrates to the albuminous food is even more necessary, for a man may be starved on a highly nitrogenous diet without them. The albumen is converted into urea without nourishing the muscular and nervous tissue."

Dr. Watson, "he should, in whatever place he may happen to be, avoid exposure to extremes of cold and heat, and the neglect of changing wet clothes, wet shoes and stockings for instance:—

"In malarious districts, in tropical climates, for example, persons should bear in mind the fact that the miasmata are much more virulent in the night than in the day, and closer to the surface of the earth than in the higher strata of the atmosphere. They should refrain, therefore, from going out late in the evening or early in the morning in countries where, and in seasons when, Ague is rife; should take care not to go out fasting. A good hot breakfast should be first taken, or, at any rate, some moderate stimulant. A crust of bread, or a glass of wine, or a small quantity of ardent spirits will fortify the system against the pestilential miasma. Generous diet and a fair allowance of fermenting liquor are proper, also, for all persons in aguish countries."

To substantiate the fact that good living is a safeguard against Malarious Fevers, I will add an example, which I noticed in the late Ashantee Expedition with an officer of the 1st West India Regiment. Lieutenant S—— arrived at the encampment at the Praah on the 30th April, full of strength and vigour, having just arrived from the West Indies in a transport. Ten other officers came up with him. Unfortunately he was not only a vegetarian but a water drinker. He was able for a week to attend to the duties of the camp, after which he gradually became weaker. The countries around the encampment had not in cultivation vegetables which contained a sufficient amount of protein compound necessary for his nourish-

ment. He was the first laid up, and he had a most severe attack of Bilious Remittent Fever; and only ten days after his arrival I was obliged to send him down to the coast, where for many weeks he lay in a precarious state, and for a long time still refused to take any meat or wine. Seeing the dangerous state into which he had brought himself, he altered his creed, and began to take beef tea, chicken broth, and wine, which rallied him a great deal, but his constitution being too weak and prostrated, he gained strength very gradually; and fearing a relapse which might prove fatal, he was invalided to England.

I should strongly recommend that persons who reside in malarious districts, or who in any way are exposed to the influence of malaria, should now and then take the sulphate of quinine, as it serves as a preventive; or should the person be attacked, he would have a milder and more manageable disease than another who has not been so protected. The best mode of giving quinine for such a purpose is in the form of quinine wine; four grains to every ounce of sherry; of which, especially during the fever season, one ounce should be taken every morning before going out, and repeated if required in the afternoon.

Among other things that should be guarded against, is the too frequent use of drugs, especially calomel, and other mercurials, which have actually killed far more people in bygone years in tropical climates than even fever. "Calomel," writes Dr. Baikie, "has no real or curative effect on malarious poison, but only adds fuel to fire, as the unfortunate to whom it is administered has to

contend against two poisons rather than one." Avoid also the too liberal use of intoxicating liquors.

Additional precaution is necessary, especially in the navy when Intermittent Fever is epidemic, and an invasion of *yellow fever* is threatening. For individual safety the comprehensive maxim of Celsus should always be consulted, viz., by timely avoiding the various predisposing and exciting causes, until the physical sensibility of the system is reduced by habit; and in proportion as this advice is adhered to, the naval practitioner may be assured that not only the chance of sickness will be greatly diminished in his own person, but that in a well-regulated ship, aided by the earnest and judicious co-operation of the officers, the lives of the men under his charge may be preserved to an extent beyond his expectations in ordinary seasons and circumstances. He must always remember that the prevention is more important than the treatment.

"The most speedy means of prevention" writes Sir Ranald Martin, "in respect to towns and garrisons will always be found in the removal of both the sick and the healthy to a locality where the temperature is sufficiently low, such as a neighbouring elevated range, or dry well ventilated ground. The next most ready means is segregation."

Quinine should be used twice a day, and should be continued for a longer or shorter period as may be found necessary. The other necessary naval precautions may be thus epitomized :—"Whenever fever makes its appearance on board ship, the vessel should at once proceed to sea, and to the coldest atmosphere within reach."

The most immediate measures of prevention should be

to alleviate direct solar exposure, to prevent fatigue, and excesses in the use of spirituous and fermented liquors.

Seamen should be kept as remote from unhealthy coasts as is consistent with duty, anchoring some miles out to sea, during the night especially.

Duties in boats should be conducted during the early mornings and evenings, avoiding alike the noon-day heat and the deadly emanations from the shores common to the night.

When men are landed, a careful and well selected encampment should be chosen on high and dry ground. Meals should be regularly served and carefully cooked, and no more spirit should be issued than is customary. Coffee should be given early in the morning as a habit, and after unusual fatigue, cold, wet, or mental depression; and labour ought not to commence till coffee has been taken.

Holds of ships should not be cleaned on the spot where the fever has originated, or during its prevalence; but the cleaning should be deferred till the arrival of the vessel in a colder latitude.

Green wood should not be placed on board ship in hot climates. It ought to be barked and partly charred.

The inhabitants of a malarious district should use a nourishing, slightly stimulating diet, and should maintain a cheerful and confident temper.

Never go to an infected spot with an empty stomach, or when the body is exhausted by fatigue and perspiration.

A large quantity of beer is not advisable, as it disturbs the liver; sherry, port, hock, claret, and a little brandy

and water, will be found more serviceable, and less likely to excite the liver.

When there is a suspicion that an epidemic fever is approaching, the strong, robust, newly-arrived individuals should at once be put to sea, or removed to a climate where the temperature is not above 60° Fahrenheit. If this is impossible, they should seek a mountain retreat where thorough ventilation is certain to be secured by strong winds; or remove to the borders of the sea, where the strong sea breeze is able continually to sweep the foul air generated from the soil. They must always remember that they are the most susceptible to its attack.

II.—REMITTENT FEVER.

Febris Remittens, which is synonymous with *Bilious Fever, Bilious Remittent, Marsh Remittent, Jungle Fever* of the East Indies, the *African, Bengal, Mediterranean,* or *Walcheren* Fever, is a Malarious Fever, characterized by irregular repeated exacerbations, the remissions being less distinct in proportion to the intensity of the fever. It is accompanied by functional disturbance of the liver, and frequently by yellowness of the skin—*nomenclature of diseases.*

Great intensity of headache characterizes the fever, "the pain darting with a sense of tension across the forehead. The symptoms rise and fall in daily succeeding paroxysms, causing a stage of remission, and a stage of exacerbation." It partakes of the character of and resembles both intermittent and continued fever; and as it arises from the same cause that produces the former it may be regarded as a kindred disease. It abounds in tropical climates where paludal poison is much generated, and where vegetable decomposition is most rife, from the great quantity of vegetable matter to be decomposed, and the heat of the sun to favour it. Sometimes Remittent Fever commences in a very mild form, but after-

wards becoming severe until it assumes the character of yellow fever.

There are marked differences between *Remittent and Intermittent Fevers.* In the latter the cold, hot and sweating stages are always complete and distinct, whilst in the former the contrary is the case; in the latter the period of remission is generally complete and remains so for stated periods according to the form the disease takes, whether quotidian, tertian, or quartan; but in the former, the remission is most irregular, and allows of no time for the use of proper means for arresting its progress. Remittent Fever is invariably followed by long and protracted convalescence, and is more prone to end fatally; whilst the Intermittent, if taken in time, has very short convalescence, and is most generally cured.

In the form of *Scorbutic Bilious Remittent,* it had a most deadly effect among the soldiers in the East and West Indies, but more especially in the latter place, in years gone by, when the pathology and treatment of the disease were but little known. Dr. John Clark, writing of the epidemic of fever between the years 1768 and 1771 in Calcutta, says that frequently it carries off the patient in twelve hours; that in Bengal during the sickly season, "the uncertainty of life is so great that it frequently happens that one may leave a friend at night in perfect health who shall not survive the following day. There have been several melancholy instances of persons who have returned home in a state of perfect health from performing the last duties to a deceased friend, and have next day been numbered with the dead." According to the same authority in 1770 there was a fearful epidemic which

played such a fearful havoc amongst the population that the disease had a cold stage of twelve hours. 80,000 natives and 1,500 Europeans succumbed to its deadly influence.

"In (1784) the *Valentine*," writes Mr. Magennis, the commander, "and six other vessels stationed at Khidgeree, there died of fever and dysentery, 170 men, the usual period of their stay in the Hooghly being from August to January. Curtis writes that about the same time, out of two companies of the 98th and 100th Regiments embarked in England for India, there died during a 'suffering and tedious passage of exactly eleven months, 75 men, 40 of them being from fever, 18 from dysentery, and the remainder from scurvy and cachexia.' It was on this occasion that the 2nd Battalion of the 42nd Regiment alone suffered a loss, by the time it landed in Calcutta, of 5 officers and 116 men, all from fevers, bowel complaints, and the scurvy. It would appear that the unfortunate companies referred to by Curtis, had some occasional filling up from the other ships as the numbers decreased; but making allowance for these circumstances, the loss of life was horrible, especially when we reflect that each ship in the fleet shared a like mortality."—*Influence of Tropical Climate, Sir J. R. Martin*, page 142.

In the West Indies in early times so dreadful was the havoc of Bilious Remittent Fever among the European population that once in every five years the whole number of its white population were destroyed by it. In intertropical Africa, this same disease proved in former years most deadly to European naval and military officers and missionaries. From the degree of severity of Remittent Fever some writers have made three divisions.

1. The autumnal remittent of temperate countries as England, France, Germany, Holland, Hungary.

2. The summer and autumn remittent of warm countries as Spain, Italy, Greece, the Mediterranean coast and islands generally, the Levant, the north of Africa and Asia, and the United States.

3. The endemic remittent of hot and tropical climates, as in the south of Asia, Central and Western Africa, Equinoctial America and the West India Islands (*Martin*).

Remittent fevers in consequence have received names designating the localities where they have been treated. Thus we have the *Gall Sickness* of the Netherlands, the *Walcheren Fever, Fever* of the *Levant* (*Irvine*), *Mediterranean Fever* (*Burnett*), *Hungarian Sickness, Puka Fever* of the East Indies, *Bilious Remittent* of the West Indies and the Mediterranean, *Bulam Fever, Sierra Leone Fever, Fever of Fernando Po* and *Bight of Benin, African Fever*, and *Bengal Fever*.

Respecting its occurrence Dr. Robert Jackson said Bilious Remittent Fever is one of the most common and one of the most important of the febrile forms which occur in armies and even in civil communities. It belongs to all countries, and is endemic in the West Indies at all seasons of the year, especially among native subjects and those who have been so long resident as to be acclimatized. It owes its origin to emanations from the soil, more generally or more partially diffused.

Symptoms and Progress.

At first the patient complains of languor, listlessness, and restlessness; he feels constant feverishness which

seems to leave him at varied intervals; after a time he has a cold fit, which is ushered in by occasional chilliness, but which may occur suddenly, when the patient may unexpectedly be seized with faintness, vertigo, confusion of thoughts and ideas; the heat returns gradually to its natural standard, but soon becomes more and more intense; cerebral disturbances follow. We have now a painfully acute state of every sense, the conjunctiva is injected, intense thirst and great heat of skin felt, with severe headache. With these symptoms we have especially in tropical climates, sometimes violent delirium; at other times the patient becomes exceedingly giddy. Sometimes we have quite a reverse symptom, and instead of delirium, he is oppressed with great drowsiness, lethargy, or even coma. Severe gastric irritation is noticed, there is pain, tenderness, and uneasiness at the gastric and deodinal region, retching and vomiting, with the bowels in a state of constipation. The vomiting is most generally of a bilious greenish colour, varying however in tint according to the severity of the attack, being sometimes light, at other times dark bottle-green colour and even bloody. The tongue is more or less furred, redder than natural at the top and edges; there is a total loss of appetite and great thirst. It is sometimes accompanied with rheumatic pains in the joints, with tottering of the limbs, pain in the back and loins, and downcast features; the pulse at first is small and very weak, varying from 90 to 130; during the hot stage it increases in fulness and force.

After the disease has run its course, the symptoms begin to subside, moisture is observed on the face and neck, which gradually extends over the whole body; the

skin becomes soft and healthy; the countenance cheerful; the tongue generally covered with a very slight fur; the thirst, nausea, and vomiting abate, and the patient falls into a quiet sleep by which he feels much refreshed on waking: the pulse returns to its natural standard; and the patient is disposed to take some nourishment.

The duration of the paroxysm varies greatly; the cold stage is generally short, whilst the hot stage occupies from two to eight hours; in some mild cases it terminates in six or seven hours, but in a more severe one it may extend to forty-eight hours; the fever, however, remits with sweating and a reduced temperature, "a soft expanded pulse, diminished in frequency down to about 90 in the minute, a full, free and regular respiration," and more copious action of the secreting and excreting functions.

The duration of the remission is very variable and irregular; it may last ten, fifteen, or even forty hours, and then the fever returns, or it it may be so trifling that it may require an acute eye to detect it. This second paroxysm is always more severe than the first, if the progress of the fever has not been checked during the intermission, and usually neither any cold stage, rigor, nor even chilliness precede it. On the other hand, all the febrile symptoms run much higher, the skin is hotter, the pulse more frequent, the headache greater, the senses more confused, and the delirium or coma, when that exists, more violent in degree and more sudden in its accession, and these symptoms sometimes persevere with or without the black vomit, till they terminate, perhaps, in convulsions, and at length in death. The severe forms of the

fever are sometimes accompanied with a yellowish hue of the skin and white of the eyes. The yellowness is said to be less where there is copious bilious diarrhœa, and where the urine is of a dark yellow-brown colour, and the evacuation is of a dark tar-like appearance, and emits an offensive odour; the disease once on foot gradually increases in intensity until even it reaches the eighth or tenth day of its duration.

As it continues, the patient has *a worse and a better day*, the former increasing in number and frequency, whilst the latter takes a reverse course. There is a daily exacerbation, which commences generally in the afternoon and becomes more severe at night; the patient is troubled with fearful dreams, and ultimately becomes perfectly maddened under his delusions; he escapes from his bed, and dashes his way through the window, if not watched, into the streets; these symptoms are indicative of certain death. At this stage he either shows signs of low incoherent muttering delirium, or is perfectly calm, scratching at the bedclothes or grasping at phantoms with *subsultus tendinum*, involuntary evacuations of urine and fæces take place, the extremities become lead-coloured, hiccup and death terminate his sufferings. When the disease, however, takes a favourable turn, the paroxysm terminates with a profuse perspiration, and a quiet comfortable sleep ensues. As he wakes, the pulse is slower and more regular, and stronger; the appetite gradually returns; the tongue clean and moist sometimes throws off its fur in flakes; thirst diminishes, headache declines in strength, the skin becomes cool and moist, and generally a slow convalescence follows.

The effects on the various systems of the body are well marked.

Digestive System.—The tongue at the commencement of the disease is generally covered with a thick whitish or yellowish-white fur, thicker towards the centre, having a feeling of being large and flabby, and marked on its periphery by impressions of the teeth; the edges are usually red, but in a more advanced stage the coating assumes a darkish brown appearance. Sometimes the tongue is dry, presenting several furrows, accompanied with severe thirst. The pharynx is red, having the follicles much enlarged and ædematous, producing in many cases a kind of catching cough or hacking, bringing up sometimes simple mucus, at other times mucus mixed with blood. The tonsils and velum palati are often enlarged; sometimes the gums are spongy and look aphthous. There is great pain and pressure over the epigastrium, with a feeling of weight; abhorrence of food, with nausea and vomiting, which, if long continued, greatly exhausts the patient; the bowels are constipated, but when stools are obtained by purgatives, they present a dark colour, having a very offensive odour; sometimes the constipation is followed at the advanced stage of the disease by severe dysenteric diarrhœa; the condition of the bowels on the whole varies, as there are cases where diarrhœa exists from the very beginning, the evacuation being of a biliary character. The vomited matter is sometimes greenish, sometimes bluish, at another time of a coffee-ground blackish hue, whilst in mild cases it is composed only of mucus. Hepatitis is a very rare complication, there often is a slight increase in the hepatic

dulness with pain in its lower margins; generally there is an enlargement of the spleen.

Genito-urinary System.—The urine is scanty, acid in character, of a higher specific gravity, non-albuminous, of a reddish brown colour, leaving a deposit of the same colour, slightly tinged with bile, and composed of urates, crystals of uric acid and oxalates; the urea is increased, but the uric acid and pigment decreased; during the remission it is more natural and leaves a lateritious deposit when kept for any time, composed of urates of soda and ammonia coloured by purpurine. Occasionally during the course of the disease the urine is suppressed, although now and then we may meet with cases where it is copious and limpid, alkaline in nature, and of a low specific gravity.

Circulatory System.—The impulse of the heart is very weak; radial pulse at the beginning of the attack rises to 90 or 100, weak; but as the hot stage advances becomes small, feeble and more frequent, ranging from 112 to 140, and then gradually falls to its natural standard as resolution begins to take place.

Respiratory System.—The respiration is generally irregular and accelerated, and sometimes interrupted by deep sighs.

Integumentary System.—The eyes are whitish, sometimes tinged with yellow without any expression; in some cases they are suffused, and in others protruded and look wild. The face at the beginning of the attack is flushed, sometimes it is pale and shrunken, the skin is dry and corrugated, very hot, and when the disease is severe has a deep yellow colour; "in persons of a phlegmatic habit

and large abdomen, the skin is moist, clammy and cadaverous, indicative of prostration of the nervous and vascular functions," emitting a sour smell. Sometimes we meet with a copious eruption of sudamia.

In not a few cases, instead of following either of the courses above indicated, the disease, somewhere from the ninth to the twelfth day, takes on a new character, very much resembling that so frequently met with in enteric fever. All irregularity in the recurrence of the paroxysms now generally ceases. The pulse becomes very frequent, often rises to 120 in the minute, sometimes reaching or even exceeding 140, while it is small and rather feeble. The skin is dry, and either universally hot or cold, in some places brown or blackish in colour. Sordes often collect about the teeth, tongue, and lips. The sufferings from nausea, vomiting and headache, diminish or cease. The bowels, though in some cases costive, are in others loose, with unhealthy discharges, dark, bloody, or dysenteric. The urine is scanty or suppressed, or is retained, producing sometimes great distension of the bladder. Stupor, or low delirium, with *subsultus tendinum*, picking of the bedclothes, slipping down in the bed, &c., supersede the former cephalic symptoms. Not unfrequently the patient thinks himself in a strange place, and insists upon returning home, sometimes rises from his bed and sinks exhausted upon the floor. At length if relief is not obtained, prolonged coma sets in, the pulse sinks to nothing, the surface becomes cold, and death speedily follows. When the fever assumes this character it is often protracted, sometimes running on for three or four weeks or even longer.

This form of disease is frequently curable, and a favourable turn is indicated by the tongue becoming moist and throwing off its fur in flakes, and a slow convalescence follows; but the tongue may clean in the ordinary way, and we may look for a rapid recovery. (*Wood.*)

Convalescence.—When the disease appeared in a mild form and the treatment applied takes the desired effect, the severity of the paroxysmal symptoms gradually abates in force and frequency, and in the course of a few days, varying from the third to the eighth day, the patient might completely recover and return to his usual and wanton health. But when the disease has been very severe, and produced important alterations in the vital functions of some of the internal viscera to the great detriment of the patient's constitution, we find the convalescence to be exceedingly slow and protracted, and he exhibits signs of marked sufferings; the pulse, although reduced in quality and frequency, yet still beats beyond its average, and either is very weak or is very small; the tongue is imperfectly clean and covered with white or brownish-white fur, especially at the roof, the countenance dejected, the appetite still bad, with considerable tenderness in the region of the stomach; there is great prostration of the strength with copious night sweats. There are derangements of several of the visceral organs; the liver and spleen are enlarged, and there is a great disposition to dyspepsia and jaundice; great liability to relapses or recurrence of dangerous and sometimes fatal symptoms. The occurrence of a relapse must be particularly and carefully watched, and the least sign should be readily met. Sometimes during this stage

head symptoms more or less annoy the patient; there is great wakefulness, with depression of spirits, which might lead in many cases to hypochondriacal notions—this might be the result of inflammation and effusion in the cerebral cavities. All these symptoms, if well combated, will gradually abate, the patient slowly pick up flesh and strength, and a change by sea will be found to be the best and most rapid restorative agent that could be advised.

Sometimes during convalescence the patients complain of rheumatic pains in various parts of the body which they generally state to be very distressing—sometimes the seat of the pain is referred to the left intercostal region, nearer to the region of the heart, increased by pressure over the intercostal space; patients sometimes complain of a numbing pain in the elbow and arm, in the majority of cases the pain is referred to the loins and thighs. I remember a patient who traced at the back of his thigh from the pain he was suffering at the time, the course of the sciatic nerve with some of its branches.

Duration.—The duration of Bilious Miasmatic Remittent Fever depends greatly (as the consideration of the convalescence has shown) on the degree of the attack, and the amount of mischief done to the internal organs, and particularly to the watchfulness of the attendant during convalescence against the ushering in of any dangerous symptoms as well as the use of prompt measures to ward off every disposition to relapse. In mild cases patients have recovered completely and gone about their duty within eight days of the attack, whilst I have met with cases where the patients have laid in a precarious state for several weeks, and when convalescence happily super-

vened, they had to be treated for a considerable time before they ultimately get well; but it required another two months with change of air before they could get their usual strength. The duration is from the fifth to the sixteenth day, when convalescence takes place; but the average duration of the disease may be safely stated to be from the fifteenth to the twentieth day, although it might be protracted, in very severe cases, to seven or eight weeks. The period at which death takes place varies also with the amount and degree of the visceral and cerebral complications; it might take place on the third or fourth day or not until several weeks have passed; but the average time is about the eighth day.

Causes.—The causes of Bilious Remittent Fever are the same as those of Intermittent Fever, to which reference must be made; they are predisposing and exciting.

Predisposing Causes.

The predisposing causes of Bilious Remittent Fever may be arranged under five heads—viz.: 1. *Endemic influence.* 2. *Non-habituation to tropical climates.* 3. *Extremes of every kind.* 4. *Particular seasons of the year.* 5. *Depression of spirits.*

Sometimes it will be observed that Remittent Fever of a very severe type spreads in certain places with great rapidity and fatality, whilst places in the immediate neighbourhood are perfectly exempt from it, although they are subject almost to the same changes of temperature and other climatic influences; this can only be attributed to endemic causes. It will be found also that Europeans who have resided for a long time in the tropics

become less subject to Remittent Fevers; as well as natives who have lived all their lives under its endemic influences, such as the natives of India, Africa, and the West Indies; but new comers are very susceptible of it. If a European of long residence in the tropics leave for a change in a temperate climate, the longer he remains away the more susceptible his system becomes to the attack of endemic fevers; and if a native of tropical climates reside for a long time, say from three years and upwards in temperate climates, on his return he is as susceptible as a new European comer to the endemic diseases of the tropics.

One of the greatest predisposing causes of this fever is extremes of every kind; "extremes of supply and deficiency, of repletion, and of privation; excesses of every kind especially in the use of spirituous liquor, wine, fermented drinks, and of tobacco, each and all of them dispose to fever." We find the same effect produced by great fatigue, consequent on excessive labour; whether pleasurable, as going for a shooting expedition, or obligatory, as in siege operations; long marches; exposure to extremes of heat and cold; to night air with heavy dew and fog.

Remittent Fever is very prevalent at certain seasons of the year; it is more common in the beginning of the rains, when the atmosphere is very sultry, and the hot seasons have been peculiarly long and dry, and there are occasionally heavy rains followed by severe scorching heat; after the rainy season, when the rains have been few and the sun very powerful. There are times when Remittent Fevers of the most intense character prevail

during the rainy season, and produce deadly effects among the population, which can only be traced to epidemic influences.

The feeding of troops with salt rations during a long voyage to the East, has a tendency not only to vitiate he blood but to depress the spirits; so also the want of proper cover and clothing during a campaign predisposes the system to the scorbutic, and therefore, the worse form of Remittent Fever. All causes of debility, therefore, induce the fever.

Exciting Cause.

This is exactly the same as in the Intermittent Fever, viz., *malaria* or *the exhalation from low, damp soil;* but to produce the disease, the system must be made susceptible to its influence, and the effluvia must be in a highly concentrated and powerful form.

With regard to its periodical occurrence, Dr. Craigie has observed, that when Remittent Fever, or other paludal or litoral fever, has, under certain concurrent circumstances of weather, seasons, and physical peculiarities, made its appearance in any locality, it necessarily attacks all those who are by constitution, habit, or age, susceptible and predisposed; and the majority of these, especially if enfeebled by previous dynamic or organic disease, it destroys. The population, therefore, outliving such an epidemic visitation, is no longer equally susceptible, and is greatly less likely to be attacked the ensuing season, unless it be more febriferous than the past, which, though not always, is more generally the case. The effect of this, therefore, is that while the endemic disease continues for a season to attack and

destroy its ordinary annual proportion of the population, it does not for several years attack the extraordinary population, because that proportion is not yet ready for or susceptible of its attack.

In the course of a few seasons, however, during which the young may have grown up and become adult, the adults become careless, and perhaps irregular and incautious by long immunity, and their constitutions less able to resist deleterious or morbific impressions, and the whole population of the place has become greatly augmented by the arrival of persons from various other countries, a considerable number of susceptible persons will have been gradually gathered; and at the end of five or six years the population of a place of 25,000 or 30,000 inhabitants may have become augmented, perhaps by an additional fifth or even a third. The majority, or the totality of these persons, will be more or less predisposed and susceptible; then a season of excessive drought ensues, in which solar desiccation and little wind form conspicuous characters: fever appears, and spreads first slowly and gradually, but afterwards, springing up in many points, rapidly coalesces, and in a short time is so general and fatal, that it assumes an epidemic character. The usual mortality in the meantime takes place, all the susceptible and predisposed subjects pass through the disease, or are cut off; and the population of the place is once more reduced to its state of epidemic unsusceptibility, and endemic or ordinary liability. This is the usual course of epidemics of paludal or litoral fevers in all countries within the tropics, and indeed, with the 45th degree of north and south latitude. (*Craigie.*)

It has long been suggested that minute *fungi* or *cryptogamic plants* play an important part in Malarious Fevers, and lately Dr. J. H. Salisbury has advanced (see *American Journal of Medical Science*, January, 1861) the theory that these vegetable growths are essential elements in their production and development. Dr. Massy, of the Army Medical Staff, whilst serving in the malarious regions of Jaffna, endeavoured to show, by careful experiments and observations, the presence of these cryptogamic vegetations both in the atmosphere and drinking water, by which means they enter the system. He detected these vegetable sporules in many of the secretions and excretions of the body, and pointed out their relations to the diseases of the region.

During the late epidemic of Yellow Fever or severe Bilious Remittent Fever at the Mauritius, Dr. Schmidt, who was stationed in the Grand River Depôt Hospital, referred the outbreak to the presence of these microscopic vegetable organisms. In all cases of persons who died of fever, and in those suffering from paludal fever, whom he examined, he found abundantly these organic sporules in their secretions and excretions, and in the living mucous membrane of the stomach and mouth, in the air, and in stagnant pools. These parasites resemble the cryptococcus cerevisiæ; they "often cover the whole intestinal tract," he writes, "and on living persons suffering from fever I can detect them in the secretions on the corner of the mouth, on the tongue, on the eyes, and even, but not always, over the whole surface of the skin." He sometimes detected them in the surface of the lungs but not in the blood; "some of these parasites appear under the

microscope of 800 powers quite hollow (*mycelium*), others contain nuclei and spores (*receptacula*), others again show cell articulations. Between the reticulated meshes the spores are imbedded." He could not find these parasites in the secretions of entirely healthy persons.

The subject requires a great deal more investigation, since paludal fevers have been known to attack individuals in the very depth of winter, and in places where it is impossible for vegetable organization to ferment and germinate; and I have frequently seen persons reside for a long time in malarious districts, and yet entirely escape an attack of fever until they arrived in a colder latitude. There are, however, "very many circumstances connected with aguish fevers which seemed explicable on the hypothesis of their dependence on cryptogamic plants; such as the very circumscribed limits within which malaria often prevails, the attendant moisture, the special prevalence and activity of malaria during night; its affinity for low-lying grounds; the barrier which a mountain chain opposes; the protective influence of a belt of trees, which appears to act as a filter to the air, depriving it of its noxious properties; the probability of the poison in water; and the frequency with which diseases of fungoid origin attack the trees and plants of a malarious neighbourhood." (*Lancet.*)

Pathological and Morbid Anatomy.

The mucous membrane of the throat, stomach, and desdenum shows signs of inflammation according to the degree of retching, vomiting, and nausea, as well as

oppression and tenderness of the epigastrium during life; in the scorbutic form when the blood flows from the membranes of the stomach, bowels, and kidneys, they are found to be very thin, and to have undergone a passive inflammation; Brunner's glands much enlarged, and the patches of Peyer's gland are sometimes found inflamed and ulcerated; the spleen enlarged and much softened; some of the abdominal cavities are filled with serum; the liver is often enlarged, and generally more or less softened, but unequivocal marks of inflammation are seldom found. The most striking phenomenon revealed by dissection is a loss of the natural reddish-brown colour, and a substitution of a bronze or slate colour, or of both variously mingled, upon the external surface of the organs, and of a uniform olive, or light bronze, upon its cut surfaces. The distinction between the lighter and deeper colours in the interior structure of the organ existing in health, is no longer observable. In many cases the organ will be found quite healthy and slightly changed in colour; the gall-bladder generally contains black viscid bile.

When after some days' illness the nervous system becomes very much involved, and the patient complains of a feeling of dead weight in the feet, followed by wanderings and incoherent expression, with spectral delusions, we must look out for lesions in the brain after death. In these cases the ventricles are generally filled with serous exudations; which appear also in a great many cases between the membranes.

Diagnosis and Prognosis.

Remittent Fever is distinguished by its remittent character; the previous dyspeptic symptoms with nausea, vomiting, and retching; the irregularity of the exacerbation and remission; the pain and tenderness over the epigastrium; the throbbing pain in the head; with spectral illusion and ringing in the ears. But these symptoms may not all appear, or they may appear in a modified degree.

As regards the prognosis, in a mild form of the disease, there is no fear of danger, as the disease generally runs its course and terminates favourably, if there is no inflammatory complication. But in severe cases it requires the vigilant care of the practitioner, to prevent and combat by active measures every symptom of visceral complication, the existence of which at once changes the nature of the attack, and places the life of the patient in a most dangerous state. At the onset of the disease, he should have his attention particularly drawn at every period of his visit to the state of the abdominal and cerebral organs, as any inflammatory action in either of these regions might lead to a rapid and most serious result.

The most unfavourable signs are—mental incoherence; the existence of severe local complications; a muddy countenance with extreme debility, anxiety, and restlessness; low muttering delirium; muscæ volitantes; a presentiment of death; bleeding from the nose, mouth, bowels, and kidneys: and the unfavourable tendency of the existing epidemic.

The following table drawn by Col. Sir Alexander

Tulloch, shows the relative mortality of Remittent Fever at the foreign stations occupied by British soldiers :—

Stations.	Period of Observation.	Aggregate Strength.	Number Attacked.	Died.	Proportion of Death to Admission.
Windward & Leeward Command	20 years	86,661	17,799	1,966	1 in 9
Jamaica	20 ,,	51,567	38,393	5,114	1 ,, 8
Gibraltar	19 ,,	60,269	y. f.* 314	28	1 ,, 11
			1,522	423	1 ,, 3⅗
Ionian Island	20 ,,	70,293	6,934	623	1 ,, 11
Bermudas	20 ,,	11,721	y. f.* 19	6	1 ,, 3
			277	101	1 ,, 2¾
Nova Scotia and New Brunswick	20 ,,	46,442	15	—	1 ,, 15
Canada	20 ,,	6,428	294	18	1 ,, 16
Western Africa	18 ,,	1,843	1,601	739	1 ,, 2
Cape of Good Hope	19 ,,	22,714	15	1	1 ,, 15
St. Helena	9 ,,	8,973	25	1	1 ,, 25
Mauritius	19 ,,	30,515	6	1	1 ,, 6
Ceylon	20 ,,	42,978	4,643	868	1 ,, 5½
Tenasserim Provinces	10 ,,	6,818	594	22	1 ,, 27
Madras	5 ,,	31,627	1,139	54	1 ,, 21
Bengal	5 ,,	38,136	1,311	89	1 ,, 14¾
Bombay	5 ,,	17,612	2,854	114	1 ,, 25
Malta	20 ,,	40,826	384	16	1 ,, 24

Treatment of Remittent Fever.

It will be found in the treatment of so dangerous and fatal a disease, that much might be gained by attending to minor matters which immediately surround the patient. The medical attendant, after having prescribed to the patient's state requiring prompt attention, should order the room to be arranged in as pleasing a manner as possible, his tone of voice to the patient should be very cheerful, and his expression hopeful; the ventilation should be

* Prevalence of Yellow Fever indicated.

very carefully regulated, and the room kept cool and shady. It will be found that the disease varies in intensity and fatality from different causes, and these should be particularly noted: the seasons of the year; the duration of the disease; the stage of the paroxysm will always be found a great desideratum in the commencement of the treatment of this formidable disease; and the care which is necessary may be seen at once when he remembers that he has to treat a "fever violent, concentrated, and rapid in its nature and tendencies; that he has but a few days, and sometimes but a few hours between the invasion of the disease and the recovery or death of the sufferer; that whilst he requires the most cool, measured, and careful judgment in the selection of his means of cure, he is to be prompt, direct, and powerful to a degree not known and therefore not required elsewhere." Sir R. Martin advises the practitioner to select his means of cure with judgment and apportion them carefully, and afterwards apply them promptly; he has to measure his means to the wants of nature; avoiding what ought to be avoided, and doing neither too much nor too little.

The indications in the treatment of this disease are as follow:—

1. To relieve the portal and abdominal congestion.
2. To relieve the epigastric irritation.
3. To moderate the febrile action.
4. To prevent the recurrence of the paroxysm.
5. To allay the intense thirst.
6. To support the system from extreme weakness.
7. To combat the tendency to cerebral congestion, and relieve other local symptoms.

1. *The first indication of relieving the portal and abdominal congestions* may be fulfilled by the use of *Purgatives and Emetics.*

Purgatives.—This remedy is of first importance in the treatment of Remittent Fever, when we consider that one of the most important and troublesome symptoms in this disease is a torpid state of the whole abdominal viscera leading to great congestion in each of them. In an uncombined state, the simple purgatives act by removing the retained and vitiated excreta from the bowels, and consequently relieve the system from irritable and offensive matter, whilst at the same time they promote a free and uninterrupted nervous and arterial circulation, and by exciting the secreting and excreting functions of the bowels, produce a sedative effect in them, and thus relieve the cavities of both the head and the abdomen from sources of congestion. Combined with mercury, they act as chologogues, and thus relieve the portal circulation from stagnation, and the liver from diseases consequent on the torpid state of the bowels; they rouse the dormant sensibility of the bowels, and aid in restoring the balance of the general circulation, and thus afford a renewed activity to the functions of secretion. When we consider the certain action of purgative medicines, and that their influence is exerted on the most extensive secreting surface of the human body, we shall at once perceive how powerful must be their effects. (*Martin.*)

Sometimes an ordinary dose of purgative is found not to produce the desired effect; the constant torpidity of the bowels will render it necessary for a constant administration of purgative once perhaps every second or third

day. The compound extract of colocynth, the pulv. rhei co. or pulv. jalapæ, might be given with calomel.

The following draught might with advantage be administered:—

℞.—Pulvis jalapæ comp.	gr. x.
Calomelas	gr. iv.
Pulvis rhei comp.	gr. v.
Aqua pura	℥j.

Misce.—To be taken immediately; followed in about two or three hours by an infusion of senna with Epsom salts.

Or these pills might be substituted, preceding the administration of the infusion of senna and salts:—

℞.—Extractum colocynthidis comp. . . . } Pilula rhei comp. . . . . }	āā ℈j.
Hydrargyri subchlor. vel calomelas . . } Quininia sulphas . . . . . }	āā gr. xii.
Oleum lavendulæ	♏ v.

Misce.—Fiat massa in pilulæ iv., of which two to be taken for the dose.

The quinine there acts as a tonic and anti-periodical. I have often found it very serviceable, when administered with the purgative. In subsequent constipation during the course of the disease, the above pills should be repeated, or a saline purgative given; such as seidlitz powder or pyretic saline.

The purgative remedy recommended in Intermittent Fevers will be found equally good.

Emetics.—The very fact of the patient suffering from severe nausea and vomiting, with in many cases painful retching, will show at once that this remedy is contra-indicated. In some cases, however, when we have a suspicion that the stomach is loaded with ingesta, and

there is much nausea without vomiting, with painful eructation from the bowels, the emetic will be found to produce great relief to the stomach and the general system. The following might be given, followed by a draught of warm water :—

℞.—Pulvis ipecacuanhæ . . . . . ℈j.
Antimonium tartaratum . . . . gr. ¼.
Aqua pura . . . . . ℥i.
Misce.

But the emetic is contra-indicated and might do harm, "when the habit is full, the arterial action high, the pulse hard and tense, or small, deep, and concentrated, the skin thick or torpid, or where the functions of important organs, viz., the head, lungs, or liver, are oppressed by sanguineous congestion." It might sometimes lead to gastric irritation and inflammation.

The second indication is to relieve the epigastric irritation; and this is fulfilled by the use of counter-irritation, cupping, leeching, and fomentation.

Counter-Irritation.—This might be fulfilled either by the use of liniments, mustard plaster, or anodynes.

The liniment most answerable for this purpose is the following :—

℞.—Oleum crotonis . . . . . ℥iv.
Linimentum camphoræ comp. . . . ℥ij.
Oleum olivæ . . . . . ℥v.
Misce—Fiat linimentum.

A strong mustard plaster may be applied over the pit of the stomach, and kept there from twenty minutes to half an hour. When, however, the epigastric irritation is persistent, accompanied with extreme oppression, great

relief will be obtained if a blister is applied over the stomach, and prussic acid administered internally, as in the following mixture :—

℞.—Acidum hydrocyanicum dilut. . . .	f ℥ss.
Potassæ bicarbonas	℈ijss.
Tinctura opii	♏ xx.
Mistura tragacanthæ	℥v.

Misce.—Fiat mistura—Two table spoonfuls equal to one ounce to be taken every three or four hours.

In conjunction with tincture of cardamom, prussic acid has a very powerful influence in preventing or stopping the *excessive vomiting*, (which forms a very troublesome symptom in severe Ague and Remittent Fever,) especially when made into an effervescing draught as in the following :—

No. 1.

℞.—Acidum hydrocyanicum dilutum . . .	f ℥j.
Tinctura cardamomi co.	f ℥iss.
Acidum tartaricum	℈ij.
Aqua pura	f ℥viij.

Misce.—Divide into six parts.

No. 2.

℞.—Sodæ bicarbonas	℥iss.
Aqua pura	f ℥viij.

Misce.—Divide into six parts.

Mix one part of No. 1 to one part of No. 2, and administer whilst effervescing. This is to be repeated about two hours afterwards if the vomiting does not cease.

Cupping.—In the early stage of the disease, when the nausea and retching with epigastric oppression are extreme, and the patient can only bring up a sour or

bitter fluid, cupping over the region of the stomach will be found to produce great relief, not only in the stomach, but also in the general system. The abstraction of four or five ounces of blood or even the dry method is to be followed by an emollient plaster. I often found belladonna extract well mixed with a small quantity of mustard and half a drachm of tincture of opium, and kept for two or three days over the stomach, to produce great relief and give much comfort.

Leeching.—In cases where cupping cannot be resorted to, a few leeches can be put over the stomach, followed by warm poulticing, and afterwards a mustard cataplasma.

Warm Fomentation.—This will be found to be very soothing to the patient, who must be made to lie on his back, and a flannel steeped in warm water slightly wrung with the hand applied over the stomach, and then covered with oil skin. Warm linseed or other poultice might replace the warm water with equal comfort to the patient.

The third indication is to *moderate the febrile action;* and the following remedies have been recommended—viz., blood-letting, tartar emetics, diaphoretics, mercury, and the application of cold and warm effusions to the surface.

This indication is best fulfilled by placing the patient in the most favourable position for combating the exhausting effect of the disease, and we are to employ the above remedies with the smallest expenditure of strength.

Blood-letting.—Local blood-letting, for the above reasons, I have found in the majority of cases to be pre-

ferable to general blood-letting, and in fact I have never once employed the latter. And in the use of the former care must be taken to see that no continuous oozing of blood proceed from the wound. In tropical climates we find that a person suffering from a severe form of Bilious Remittent Fever is feeble and depressed in spirit, and his system suffers either from extreme and habitual relaxation, from the continuous influence of the heat, from an impoverished state of the blood, or from the debilitating effects of other diseases; *bleeding in these cases produces positive harm.* We bleed in order to prevent organic or other injury being done by inflammation to different organs, and therefore we find it of great utility when there is local inflammation as well as active congestion.

But general blood-letting has been recommended by many able physicians. Sir J. R. Martin states: "If the patient be seen in the forenoon, on the accession of the first, second, or third paroxysm of ordinary Remittent Fever, if he is of sound constitution and not beyond middle life, blood-letting from the arm while the patient is in the recumbent position should be practised to the extent of relieving the sufferer from præcordial oppression, from visceral fulness and congestion, or from intensity of headache, whichever may predominate. If along with reduced force and frequency of the pulse, and reduction of the morbid temperature, we obtain from the operation a gentle relaxation of the skin, we have the best evidence of relief from visceral congestion, whether the operation be performed for the cure of fever, dysentery, or hepatitis; the quantity of blood abstracted

being regulated by the effect and not by the arbitrary measures in ounces. It will sometimes happen, however, from peculiarity of diet, habit, or other cause, and notwithstanding the utmost circumspection, that the relaxation of the skin will proceed to sweating, with symptoms of depression of the vital powers; then from half a grain to a grain of opium, or from fifteen to twenty minims of laudanum, with as many of chloric ether, should be administered. This will impart tone to the heart's action, and soothe the nervous excitement, while it will allay gastric and intestinal irritation. It is only in cases of depression, however, such as this, that opium is to be recommended in the very early treatment of fever; but when requisite it will be found to calm both mind and body." He goes on to state that "if the fever is mild, or does not assume the severe form, one general blood-letting, made in the recumbent position, will be sufficient to relieve the patient from abdominal and cerebral congestion." He recommends a dose of calomel, with compound extract of colocynth, and James' powder to be exhibited within an hour after bleeding, which should be followed in two hours by a powerful cathartic, such as the infusion of senna with sulphate of magnesia. After the remission in the afternoon, which must be expected if the remedies act freely, six to ten grains of calomel, with four of James' powder, should be given at bed time, if the skin is dry. "On the early morning visit of the following day," he says, "the patient will probably be found in a more complete state of remission, when the sulphate of quina should be freely and repeatedly administered. Given in this latter manner, the quina applies

itself to the whole extent of the mucous digestive surface, so as to give full effect to its tonic and antiperiodic influences, and a larger dose of it can thus be borne in the early stage of fever, than if given without the purgative." Should there be a re-occurrence of the paroxysm, with oppression or fulness of the epigastric region and behind the ears, a mixture composed of antimonial wine and nitrate or acetate of potash should be given.

"If Remittent Fever," says the same author, "has existed unrestrained, however, for several days, and the patient is not seen till the accession of the third or fourth paroxysm, or even later, provided the general powers of the constitution remain uninjured, general blood-letting is still the principal means to save life, followed by calomel, purgatives, and quinine, in the manner previously indicated. But if on the other hand, the duration of the disease being as above, the paroxysms have become indistinct, running into each other with but brief or ill-defined intervals, while abdominal and cerebral complications arise, as indicated by epigastric fulness with anguish, or by approaching stupor or delirium, congestion now wearing the aspect of inflammation; then the time and manner of applying our more active means demands the nicest care to ensure not only their just effects but their safety. Blood-letting may even now constitute the principal means of saving life, but it must be guardedly abstracted, whether generally or locally, and calomel given after as a necessity."

Dr. Robert Jackson, a military physician of high repute, laid down the following rules in order to render the operation more certain and perfect :—

1. That it be made within six hours from the invasion of continued fever, or before the paroxysm of the periodic fever of violent excitement has attained its acme.

2. The simple act of abstracting blood from the circulating system, is often decisively effectual in arresting the course of the fever where it is resorted to at an early period, and where the progress is properly conducted.

3. It is still salutary, but of less decisive effects, where the course is more advanced, that is, beyond the third day. It is not of dependence but is prohibited, and it is occasionally useful even at late periods. It is thus not safe to carry it to the extent of effecting precipitate arrest; it is safe, if well arranged, to alleviate impending danger, and often to facilitate the development of regular crises.

4. If employed thus, it obviates or removes congestion, and thereby prevents effusion into internal cavities and into the substance of internal organs.

5. Abstraction of blood is moreover safe, and its effect is ofter important, at the first moments of relapse.

6. Prescribed with consideration, and applied with management in execution, blood-letting is both a safe and powerful remedy, either decisive of cure by its own power, or preparatory of the curative powers of others. It is the main engine of successful practice, it is the sole remedy.

7. But though I say this in truth, I do not say that blood-letting in a large, even in any quantity, is uniformly proper or uniformly safe.

8. Though the abstraction of blood is generally beneficial, it is only so conditionally, and under management.

If the effect produced by it be not seconded by well-considered means of stimulation or conservation of auxiliary power, general or local harm will be greater than good. But while blood-letting is a remedy of nice management in cases of relapse, it is to be avoided, as well as other remedies of strong operation, where there exist appearances of approaching a favourable crisis. On the contrary, where the critical power labours, and the critical effect is marred through internal impediment, the abstraction of blood in a given quantity is often followed by signal benefit; it gives facility to the course of the salutary process artificially obstructed.

9. If there be no prohibitory circumstances in the case, one bleeding is preferable to repeated small bleedings.

10. But though I regard the abstraction of blood as a remedy of the first importance, for the abrupt and successful cure of fever, either primarily or secondarily, I am yet free to own that its good effect depends principally on the manner of adjusting the abstraction to the condition.

11. It often fails, and even sometimes does harm, where, employed as principal, its real place is only that of auxiliary; and *per contra,* where employed as auxiliary, its real place is that of principal.

General blood-letting is an obsolete practice in the treatment of tropical remittents in these days, and we can count upon a more happy termination of the disease without it.

Tartar Emetic.—This remedy will be found of very great service when febrile action is high; it is to be employed not as an emetic but as a sudorific and sedative,

in which case from $\frac{1}{4}$ to $\frac{1}{8}$ of a grain, with a little carbonate of magnesia, should be given every two hours. It acts by moderating the frequency of the pulse, increasing the secretions and exhalation of the gastric-intestinal membrane, as well as of the liver and pancreas it reduces the heat of the skin, and causes perspiration without vascular excitement; calms cerebral excitement; renders moist the passages of the lungs; and in some measure favours the secretion of the urine.

Diaphoretics.—At the height of the febrile exacerbation, the great point of consideration is how to cut short this stage by inducing diaphorices; nature begins the cure of the worst forms of miasmatic fevers by bringing on sweating, and it should therefore be our object to aid nature in this attempt, for by so doing we shorten the duration of the hot stage, and thus shorten the duration of the fever, moderate its violence, and produce a more complete remission. This gives us full opportunity for endeavouring to put a final stop to the disease.

We have above considered the value of tartar emetic: "all the metallic salts," writes Dr. Billing, "have more or less an astringent effect on the capillaries; and to this influence I attributed the universal efficacy of antimony as an antiphlogistic remedy, it being doubly valuable in acute cases from its sedative effects on the heart and pulse, continued with its locally tonic or astringent effects on the capillaries of inflamed or congested parts, as well as on those of all the secreting structure. Hence, too, its efficacy in small repeated doses, in cases where there is great depression of the system, by its relieving the relaxation of the capillaries by which the depression

is caused. Nay, more, we can manage to insure its full antiphlogistic effects without the inconvenience of nausea, by combining it with a little opiate and aromatic."

Any diaphoretic preparation which assists in correcting the nausea and vomiting, whilst at the same time it is refreshing and agreeable to the sick, must be considered the best. I have always found an effervescing draught when once taken by the patient to be more acceptable than any other; I give frequently the citrate and carbonate of potash, with lemon or lime juice; it sometimes produces gripings, therefore a little laudanum or the liquor opii sedativus might be added as in the following mixture:—

℞.—Potassæ bicarbonas	. . . . .	℥ij.
Liquor opii sedativus	. . . . .	f ℥iss.
Aqua camphoræ	. . . . .	f ℥iii.
Syrupus aurantii	. . . . .	f ℥vi.
Aqua pura	. . . . .	f ℥iij.

Misce—Fiat mistura.—Half an ounce of which, mixed with a table spoonful of lime juice, to be taken whilst effervescing.

If there is restlessness and general uneasiness and wakefulness, from twenty to thirty drops of the compound chloric ether spirit will be a useful adjunct to each dose of the above.

Mercury.—In the form of calomel, it should be given with other purgatives as already recommended; so as to relieve the portal circulation and increase the excretions and secretions of the body by acting upon the capillaries. *The application of cold or warm effusion to the surface.* The topical application of either cold or warm effusion will be found very soothing to the patient. The head, face, and arms might be bathed with cold water now and

then; a little lime juice or vinegar may be added to it, and the whole body sponged with it. When done, it makes the patient feel lighter and more agreeable. Sponging with tepid water is equally agreeable.

Cold effusion during the height of febrile exacerbation has been recommended by Drs. Jackson, Currie, and Dickson, the effect of which is to relax the skin and produce copious perspiration; the patient, according to the last gentleman, is to be seated in a convenient receptacle, and from some elevation a large stream of cold water should be poured over his head and naked body; this is to be continued until he is pale, or his pulse loses its fulness, or his skin becomes corrugated and he shivers; friction is then to be applied over the well-dried surface, and he is replaced in bed. Dr. Jackson regards this use of cold water effusion to be dangerous or ineffectual where deep congestion or strong inflammation exists in any of the internal organs.

During this stage, if the patient be wrapped up in a cold wet sheet, and then blankets applied over it, the skin will soon be relaxed, and gentle perspiration the result. (*Maclean.*)

4. The fourth indication, viz., *to prevent the reoccurrence of the paroxysm*, is fulfilled by the use of quinine, arsenic, &c.

Quinine. — This valuable remedy requires some caution in its administration in this disease; in large doses it should on no account be given when the paroxysm of the fever is on the patient, and more especially where there are signs of gastric or cerebral inflammation or congestion, with scanty or depraved secretions, full

and hard pulse, as it may lead to the fixing of the inflammatory and congestive tendency to the brain.

Quinine is safe, and should be administered when there is a complete remission ; when there is no sign of venous congestion ; when the pulse is reduced in frequency and force ; when the skin is moist and the secretions free. A large quantity should at once be given either in two, three or four doses according to the length of the remission ; the latter is preferable, eight-grain doses might be given at three different times before the expected return of the paroxysm. In fact, we have to rely on it as the sovereign remedy to prevent by one stroke the fatal effect of a very severe attack. A paroxysm of great violence, says Dr. Wood, has occurred from which the patient has been saved only by the most strenuous exertions, and there is reason to fear that a similar one will prove fatal, recourse should be had to *quinine in the remission, however* imperfect or short it may be. When the fever has hitherto shown little or no tendency to remit, and the grade of violence is such that fatal results appear imminent, should the slightest remission show itself, and the symptoms not be those of cerebral inflammation or strong determination, the *quinine should be poured in without stint.* The more nearly a case approaches the above extremes, the stronger is the indication for the use of antiperiodic remedies. Warburg's tincture, described in page 42, is one of the best remedies to be administered when the patient is strong and the skin very dry. (*Vide* precautions.)

When the urinary organs are very irritable, great relief will be obtained by the administration of the salts

of potash and soda, principally the bicarbonates ; they can be usefully combined with quinine, whose action it assists. (*Maclean.*)

Arsenic. — This is a remedy much used by natives of India, but its injurious administration leads to permanent injury to the system. According to Dr. Billing its action is equivalent to the union of bark and mercury, as it increases the secretion of the bile and cures chronic inflammation. As we require powerful remedies in the treatment of severe Remittent fever, given in large doses, arsenic from its poisonous effects on the system is contra-indicated. But in the administration of arsenic in paludal fevers, it must be remembered that when the system is much charged with malarious matter great toleration of the remedy is observable ; so that to produce a proper antiperiodic effect, a much larger dose than ordinary is required, either at once or in small repeated doses. When there is no gastric irritation, Dr. Morehead has shown that half a grain of arsenious acid which is equal to a drachm of the liquor potassæ arsenitis is sufficient to prevent a mild attack of Intermittent Fever, when given two hours before its occurrence ; and that this half a grain is equivalent to fifteen grains of quinine, a larger quantity is required when fever of a severer type is endemic or prevalent.

Sulphur, Hyposulphite of Soda, and Magnesia.—Since Malarious Fever was regarded as being caused by the development of cryptogam in the system, these medicines have been recommended as a remedy and a prophylaxis ; from fifteen to thirty grains to be given twice or three times a day. Dr. Ronzani, following

the example of Polli, administers the hyposulphite of magnesia and lime in larger doses for Marsh fevers and enlargement of the liver, giving about ninety grains in the day and gradually increases it. The low price of the remedy recommends itself to the public.

Carbo-azotic Acid.—The preparation prepared by Mr. Calvert, of Manchester, has lately received great praise; it is to be given in two-grain doses cautiously repeated until the patient gets his skin of the colour of the medicine—viz., yellow.

In adynamic cases quinine might be introduced into the system by hypodermic injection. *Vide* Intermittent Fever, page 42.

The fifth indication is *to allay the intense thirst.*

For this purpose ice and water should be administered, as it has the effect not only of allaying the thirst, but also of reducing the irritability of the stomach. When, however, ice cannot be obtained, an agreeable mixture can be made with lemon or lime juice, sugar and water. The cold effervescing draught, composed of carbonate of potash and lime juice, (page 92,) answers this purpose well.

The sixth indication is *to support the system in its extreme weakness,* for which purpose stimulating medicines, wine and brandy, and proper diet should be given.

The practitioner will find it of great importance to be careful in the choice and the administration of stimulants; sometimes during the course of the disease, the system suffers from very severe prostration, the pulse small, frequent, and compressible, the countenance anxious, and the breathing laborious; stimulants will be found of

great service, and the degree of existing debility must be our guide in the dose to be employed.

Ammonia.—When a mild stimulant and not much prostration is required, the carbonate of ammonia is indicated; mixed with camphor it acts with greater effect. In other cases the diffusible stimulant is of greater use, and chloric or sulphuric ether may be added :—

℞.—Ammoniæ carbonas	℥j.
Spiritus ætheris chlorosi	℥iss.
Aqua camphoræ	℥vj.

Misce. — A large tablespoonful, equal to one ounce, to be administered every hour.

When there is nervous exhaustion with a disposition to fainting, and a profuse perspiration, life may be saved by the administration of opium in stimulating doses. Half a grain to a grain of opium with calomel, or twenty to thirty minims of the tincture of opium with chloric ether and calomel, will rouse the patient by relieving the vascular and nervous depression.

Wine and Brandy.—These must be used when the degree of prostration is great; they must be considered only as stimulants, and the use of quinine and other remedies should not in consequence be stopped. In cases where there is great danger to life by the extreme debility without any cerebral complication, from a half to one whole bottle of good port wine might be safely given in the course of the day. If brandy be used, from three to four drachms might be given every hour in soda-water.

Champagne will rouse the patient a great deal, but its effect is not so powerful as the two preceding articles.

If an intemperate habit of life had previously been led, a still larger quantity will be required.

Diet.—The diet of the patient should be light and easily digested, small in quantity but frequently administered, and very simple in quality. The solids should be principally farinaceous. Arrowroot in combination with small quantities of beef-tea; strong soups even in small and frequent doses should not be given during the fever, but a liberal supply of milk and animal jellies, and a large quantity of carbo-hydrates should be permitted; some chicken or young pigeon when convalescence has set in, will be found to be relished by the patient. Succulent fruits, pine apples, avacado pears, and oranges are agreeable and beneficial. (For further particulars see page 50, Dietetic Treatment in Malarious Fevers).

The seventh and last indication is *to combat the tendency to cerebral congestion and to relieve other local indications.*

In almost all cases of Remittent Fever the brain suffers more or less, and, therefore, it is necessary to guard against any circumstance that may lead to congestion or inflammation. The hair must be thinned or shaved, and cold water constantly applied to it, or *ice and water*, or *ice in bladder;* or cold water poured over the head in streams whilst supported above a basin, at the same time warm bottles or hot bricks applied to the feet. When there is reason to suppose that cerebral congestion or inflammation exists, the most powerful remedy is required. Leeches to the temples in great number and a large blister either on the back of the head or over the whole head will be required.

In these cases there is great loss of sleep, and a state

bordering on, and generally ending in delirium; and Dr. Gordon of Dublin correctly remarked, that the affection of the cerebral functions frequently assumes great importance in fever; their derangement is sometimes indicative of disease in the respiratory apparatus, or in the digestive canal; more commonly, however, it is owing to the organic nervous influence produced by the fever on the brain and nervous tissue itself. One of the most prominent characteristics of this lesion is insomnolency, causing or at all events followed by delirium, &c.

Chloroform is considered of great advantage in such cases; it not only subdues cerebral excitements, but acts also on the nervous ganglia in the abdomen, reducing the sensibility of the alimentary canal. Dr. Corrigan recommends the following mixture:—

℞.—Chloroformum	f ℥v.
Pulvis glycyrrhizæ	℥v.
Aqua camphoræ	℥ixss.

Misce—Fiat mistura.—One ounce to be taken for a dose.

Chlorodyne is also a very useful remedy in this state, and may be substituted for chloroform. Dr. Aitkin gives the following formula:—

℞.—Chloroform	f ℥iv.
Spiritus ætheris sulphurici	f ℥ij.
Theraicæ	f ℥j.
Mucilago acaciæ	f ℥j.
Morphiæ hydrochloras	gr. viij.
Acidum hydrocyanic dil. (2 per cent) . .	f ℥ij.
Oleum menthæ piperitæ	♏ iv. ad vj.

Misce bene.*—Dose five to ten minims. The dose should be repeated as often as the sedative effect subsides. It is a very valuable remedy.

* The following is the direction given:—The difficulty in compounding *chlorodyne* is in getting the chloroform to mix with the

Cupping over the temples will generally be found of great use.

Occasional Complications.

We have, under the head of the first indication, given the treatment of the disorder of the stomach; there may, however, be *constant constipation*, for which cases a constant use of purgatives might be required; *pain in the liver* might exist, a blister, or strong iodine pain with other treatment will relieve it; *enlargement of the spleen* might co-exist with the fever—this must be attended to during convalescence; *diarrhœa* might supervene—mild astringents must be given.

Management during Convalescence.

This is a consideration of vast importance in the treatment of Bilious Remittent Fever, as its neglect might lead to serious complications and death. Our attention should be particularly given to the diet of the patient, which should be regulated in quantity and quality—bread and butter, buttered or milk toast, boiled rice, mealy potatoes, weak broth, soft boiled or poached eggs, oysters, boiled flesh of poultry, young pigeons, and succulent fruits and the easily digested meats should be given.

---

treacle. It will not do so alone, but the use of a little thin gum, or even water, effects their mixture almost at once. The morphia ought first to be dissolved in the chloroform; then mix with treacle the gum or water, first using about the same bulk of chloroform and treacle, afterwards adding the rest of the chloroform by degrees, constantly shaking briskly the bottle in which it is made up; and then add gradually the other ingredients.

If there be restlessness and sleeplessness, the hydrate of chloral in thirty-grain doses, repeated every four hours, or a little opium in diffusible stimulants should be given at bed time. The nitro-muriatic acid mixture with bark should be taken three times a day.

The patient should be allowed to gestate in the open air, either in the morning or evening before dew-fall, and last but not least, he should be *removed from local* or *endemic influences.*

III.—ARDENT CONTINUED FEVER.

FEBRIS PERNICIOSA—*malignant* or *typhoid fever of the tropics*—is a disease which occurs principally during the very hot weather in tropical climates, and generally in constitutions which have previously been depraved by irregular habits, accompanied with severe functional disorders and extreme and dangerous defection of the nervous system; with sometimes fearful derangement in the organs of digestion, respiration, circulation, and secretion; it runs a peculiarly irregular course of some days, during which, if it does not prove fatal, it sometimes becomes paroxysmal.

SYMPTOMS AND PROGRESS.

It is sometimes difficult to distinguish, at the very onset of the disease, this form of complaint, as it may assume the character of Bilious Remittent or Intermittent Fever; but the following general symptoms, as given by Dr. Wood, will show at once the dangerous nature of the fever:—An unusual paleness or lividness of the face; an absence of rigors or sense of chilliness, or a feeling of heat while the extremities are really cold, and a want of uniform heat after reaction; a disposition to copious or frequent

vomiting and purging, with a sense of unusual weight or oppression at the epigastrium; an extraordinary frequency, feebleness or irregularity of the pulse; much anxiety, restlessness or tossing about of the limbs, or a disposition to faintness; considerable delirium or drowsiness; a prolongation of the cold stage; and a less degree of febrile excitement than might have been anticipated; and the continuance in the pyrexia of some mental confusion, sleepiness, faintness, or unusual anxiety and uneasiness. These are symptoms of the worse forms of the fever, and which prognosticate great mischief if prompt remedies be not at once used.

The symptoms of a severe form of this fever as has been observed in India resemble, to a great degree, those of sunstroke in its worst form. Dr. Henderson gives the following as quoted by Martin:—Flushing and swelling of the face, amounting in some cases to blindness; a parched and burning skin; a full and frequent pulse; difficult and oppressed breathing; giddiness and sense of fulness in the head, amounting to acute pain, in some instances with burning heat of the eyes, succeeded by loss of sense and motion, and faltering of the tongue; dilated pupils, twitching of the muscles of the face, subsultus tendinum, involuntary evacuations.

These symptoms were the result of severe excitement of the nervous and vascular functions, with congestion of the cerebral vessels, without stertor or paralysis, produced in the irritable constitution of the hard drinking and unseasoned Europeans by the excessive heat.

But we do not meet with these severe symptoms in all cases of pernicious fevers. In the ordinary cases

the symptoms generally commence with those of Miasmatic Fever; sometimes it might remain for one or two days as the common Intermittent or Bilious Remittent. There is at first a feeling of chilliness and pain in the head, back and limbs, heat of the body, flushed face, brilliant and congested eyes, irregular pulse, and then after a little time the symptoms assume a more dangerous type, exhibiting great derangement of both the organic and animal functions, or that of the former predominates over the latter, or the latter more intensified than the former. When the organic functions seem to be greatly affected the pulse is very irregular, feeble, sometimes fluttering and corded, very frequent, ranging from 110 to 150; the heart's action is sometimes loud, sometimes tumultuous, but in the majority of cases is feeble, irregular and intermitting, and the pulse in consequence is sometimes so small that it could not be felt at the wrist. The respiration is sometimes irregular and hurried—the patient panting for breath and begging to be fanned. When the disease has gone on for some time, in some cases "breathing seems like a succession of deep sighs, occasionally each respiration is interrupted in its progress, and effected as if by a double effort."

The tongue is but slightly altered in the majority of cases from its natural state, looking rather pale and dry. The patient complains of a sense of burning heat, thirst, and oppression over the epigastrium; the thirst is excessive and unquenchable, and no amount of drink can relieve him, the fluid being in most cases voided by the stomach. Sometimes the contents of the stomach when ejected are tinged with blood; another time they are com-

posed only of muco-serous fluid. The bowels are in the generality of cases very loose, the stool being bloody and dysenteric; "the discharge sometimes consists of a bloody serum, like the washings of flesh, sometimes of blood nearly or quite pure, and either dark coloured or uncoagulable or partially in clots. Several ounces of blood are not unfrequently lost with each evacuation." Sometimes, however, the discharge is only bilious.

The appearance of the patient is more or less striking; the face, hands, and feet are of a livid paleness; the features shrunk and impassive, or singularly expressive of an amazement or alarm, though still clear and even bright; "the skin contracted and the fingers shrivelled as if long soaked (like those of a washerwoman) in soap and water; the extremities, and sometimes even the trunk, chillingly cold, though not sensibly so to the patient; the surface either partially moistened with a clammy perspiration, standing sometimes in large isolated drops like bullæ upon the face and breast, or universally bathed in a profuse cold sweat;" the patient suffers from uneasiness, jactitation and restlessness, sometimes complains of spasm of the muscles of the calves of the legs. If life be not destroyed before the second week, spots may be discovered in the skin, varying in colour, according to the amount of biliary deposits formed on the derma.

In some cases the patient is seized suddenly and violently, and all the symptoms coming on in rapid succession; the great heat, intense thirst, violent throbbing, restlessness, and racking headache continue with varied intensity, mingled with unsuccessful attempts at re-

action, for a period varying from one to three days, when, unless relieved by remedial measures, they terminate in death. The coldness increases, invading sometimes the whole body, except a small portion near the heart; the respiration becomes slower and more sighing, with lengthening intervals between the acts; the pulse gradually sinks, and often quite ceases in the extremities for several hours before death; the cerebral function at last fails; the countenance assumes the hypocratic expression; and the patient usually dies in tranquillity "as if falling into sleep." But the symptoms do not always run such a fearful course, especially when appropriate means have been used. After continuing for some time the disease gradually begins to show signs of relaxation; the pulse becomes fuller and stronger, the skin warmer, and when a state of reaction is supposed to be setting in, the patient again falls into a state of extreme danger, and then again shows signs of life. There is no real remission or intermission;—warmth gradually diffuses itself from the central parts of the body to the extremities—the skin becomes more moist and soft; the ghastly hue and hypocratic expression change gradually into slight colour and liveliness—the pulse becomes fuller, stronger, and less frequent: but sometimes it still remains frequent with some uneasiness in the stomach without vomiting and purging, and a remission might be stated to be fairly set in; and if proper means be not now used to prevent its re-occurrence, the disease re-appears the next day with increased violence, and may in very robust constitutions again become remittent; but the third attack generally proves fatal. These so-called attempts at remission are met

with in those cases where the system, besides the specific poison, is charged with malaria. The disease generally assumes a very severe and decided type from the very commencement; the evacuations of the bowels fœtid, and there are moderate degree of tympanitis, and mucous diarrhœa. In very rare cases nature, however, makes a grand effort at restoration without medicine, and each successive paroxysm grows milder, and the functions of the liver gradually begin to be established by the appearance of dark alvine evacuation from the bowels, and the patient ultimately recovers. When the disease shows signs at the very beginning of a morbid state of the cerebro-spinal innervation, we find the patient suffer from stupor in a greater or less degree, according to the intensity of the exciting cause; there is observed great drowsiness; slight incoherence; forgetfulness of what had been accomplished; stammering; mistaking one word for another; hesitation in the speech; stertorous and noisy respiration; full pulse, either fast or very slow; fatal coma now supervenes and death.

Causes of Ardent Continued Fever.

The predisposing causes may be referred to those of the other Malarious Fevers already described, especially habits of intemperance and unacclimatization; as well as the effects of malaria on the constitution.

The principal exciting cause has been referred by tropical writers to the effects of the excessive heat of a tropical sun on a highly predisposed constitution. Dr. Mouat describes it as a Remittent Fever of the severest kind, presenting cerebral symptoms, "arising from ex-

posure to fatigue under the influence of a high temperature." The example given by Dr. Milligan, Surgeon to the 63rd Foot, and quoted by Martin, describes a very severe form of sunstroke. During a military funeral in Madras, in which the 63rd Foot was exposed to the direct rays of the sun, its surgeon reported that the greater number of men were in the prime of life; but there were amongst them some old soldiers who had served twenty years and upwards, some of it in the West Indies, and were much broken down by severe and intemperate habits. The entire corps had just returned from the Australian Colonies, where spirituous liquors can be had on easy terms. The regiment landed at Madras in the month of May, and from the date of the funeral the hospital was filled with fever cases; two men dropped down and died on the very day of the funeral and for several days afterwards the fever cases augmented considerably. "I have reasons to believe," he continues, "that the effects of the exposure to the rays of a vertical sun did not rest here, but laid the foundation of future mischief in assisting to originate Fever, Hepatitis, and Dysentery, from which the regiment afterwards suffered severely."

But the true exciting cause of *typhoid fever of the tropics* is the generation of putrefying animal matter, and the contamination of the drinking water by decomposed animal substance, though the system might at the same time be saturated with malarial poison, which complicates the disease, making it more serious and imparting a paroxysmal character to it.

Pathology and Morbid Anatomy.

Post-mortem examination shows signs of severe morbific derangement in those organs which exhibited symptoms of severe injury during life. Thus, when the abdominal organs appear to be much affected, we meet with signs of inflammation of the mucous membrane of the stomach, which is sometimes softened and thickened, white or red in colour. The deodenum showing the same appearance, the patches of peyers are thickened and enlarged, when death takes place after a short illness; but when life is prolonged, and the disease continues for two or three weeks, there is infiltration and ulceration of the patches. The liver might be enlarged and engorged with blood, or small and somewhat brittle; the spleen is sometimes congested, at other times natural.

When head symptoms have been present, the cerebral organs, if examined, exhibit signs of inflammation and congestion; the pia mater and arachnoid injected; the main substance also injected and increased in density; there may be serous effusion in the ventricles, and in very intense cases bloody effusion.

Treatment of Ardent Continued Fever.

The indications for treatment are:—

1. To stimulate the nervous system from its dormant condition.

2. To counteract the morbid actions in the organic and animal functions, and prevent exhaustion of the system.

3. To employ powerful remedies at the stage when the disease is less severe.

The first indication is fulfilled by the administration *internally* of opium or its preparations, hydrate of chloral, sulphate of quinine, Cayenne pepper, the diffusible stimulants, alcoholic stimulants; *externally*, of heated substances, cold effusion, stimulating liniments.

Opium or its preparations.—Opium will be found of great use, when there is no cerebral disease as indicated by delirium, from its power when taken in small doses of acting as a stimulant, exciting the vascular system in general, and that of the brain in particular, leading to alterations in the condition of the nervous functions; of producing constipation, although in a slight degree, and of preventing the tendency to vomiting. The pulv. opii, tinct. opii, or the liquor morphiæ hydrochloras might be given in combination with other substances.

Sulphate of Quinine.—In small quantities quinine might be given with good results, as it excites the vascular system, increases the frequency and fulness of the pulse, as well as reduces the temperature of the body. It might be given in combination with calomel and opium :—

℞.—Quiniæ sulphas	. . . . .	℈j.
Calomelas	. . . . .	gr. x.
Pulvis opii	. . . . .	gr. v.

Misce et divide in pil. x.—One to be taken every hour.

Cayenne Pepper.—It has the effect of rousing the nervous innervation; although it has but a slight stimulating effect on the general system, yet still it is a valuable stimulant in the torpid and languid condition of the system, producing sensation and warmth in the stomach,

with the promotion of the digestive functions. It should be given in the form of pills as the following :—

℞.—Pulvis capsici	℈iiss.
Pulvis zingiberis	℥ss.
Pulvis sacchari alba	℈ij.
Mucilago tragacanthæ	q. s.

Misce et divide in pil. x.—One or two of the pills to be given during the administration of the quinine pills, or half an hour after.

Diffusible Stimulants.—These are to be used when all the above have failed from their too active effect on the brain. The carbonate of ammonia should be employed. (*Vide* prescription, Intermittent Fever, page 35.)

Alcoholic Stimulants.—One should guard against their administration, unless everything else has failed, and it is a case of life and death, when wine or brandy might be given. When convalescence has set in porter is then of great service.

Heated Substances.—This plan should commence the treatment of the disease; hot water bottles, hot bricks, hot irons, &c., should be placed in close proximity, but not in actual contact with the limbs of the patient. The feet might be put in hot water, or the body be immersed in a tepid bath of the temperature little above blood-heat of from 110° to 120° Fahr.

Cold Affusion.—Some practitioners have strongly recommended the use of cold affusion or cold bath, but this should not be employed when ulceration or inflammation of the bowels has commenced. When decided upon, the patient should be laid naked and a pitcher of cold water poured over his body until he complains of chill, and then

he should be rubbed quite dry, be placed between blankets, and warmth applied to the feet. As soon as the patient feels chilly, he should be removed from the water at once, for if carried beyond that it might lead to serious results.

Stimulating Liniments.—The turpentine liniment should be applied all over the body, especially over the stomach and along the spine; hot oil of turpentine alone, or brandy mixed with Cayenne pepper, may be used in the same way. The following ammoniacal liniment is of great value:—

℞.—Liquor ammoniæ fortior . . . . . ℥ss.
Linimentum camphoræ compositum . . } ānā f ℥j.
Oleum terebinthinæ . . . . . }
Tinctura capsici . . . . . f ℥ss.

Misce, fiat linimentum.—To be rubbed over the stomach, abdomen, and along the spine.

The second indication, viz., *to counteract the morbid action in the organic and animal functions and prevent exhaustion of the system,* is fulfilled by cupping, cold applications, ipecacuanha, acetate of lead.

Cupping or Leeching.—This is indicated, when from the very commencement the patient suffers from coma; it should be done over the temples and leeches applied behind the ears. When there is inflammation, pain and tenderness over the abdomen, leeches may be applied on the abdomen.

Cold Application.—Ice water or ice bags should be applied around the head, but when ice cannot be obtained, the cold evaporating lotion already described

might be used (Intermittent Fever, page 35); at the same time hot bottles are applied to the feet.

Ipecacuanha and Acetate of Lead.—When diarrhœa or sero-sanguineous discharges from the bowels take place, ipecacuanha in combination with small doses of acetate of lead will be of great service. Acetate of lead alone may be used when the discharge is copious and consists of blood, as it has a powerful effect in diminishing the calibre of the capillary vessels, and lessens both circulation, secretion, and exhalation. It should be given frequently and in small doses in combination with opium.

The fourth indication is *to employ powerful remedies at the stage when the disease is less severe.* Quinine in large doses should be given, so as to saturate the system thoroughly with it. When there is great want of sleep, chloroform (Remittent Fever, page 99) might be beneficially administered, or the liquor morphiæ hydrochloratis.

IV.—YELLOW FEVER.

Hæmogastric or Yellow Fever—"the hurricane of the human frame"—is endemic in certain sea-port towns in the tropics, occurring sporadically nearly every year, as in many of the West India Islands, and on the Mexican Coast. It is occasionally found every second year in New Orleans, Mobile, and Charleston; and occurs epidemically on the West Coast of Africa, in Vera Cruz, Havana, and in many of the sea-port towns of South Western Europe, Baltimore, Philadelphia, and New York; but it is unknown in Eastern Africa, Asia (Canton, Calcutta, Smyrna, Japan), and South Eastern Europe.

Topographically it is a disease which modern pathologists now regard to be one *sui generis;* endemic only in towns on the sea-coast (where the inhabitants are much crowded together); on the borders of navigable rivers, especially where they empty themselves into the ocean, in garrison forts, and in ships; but, under certain circumstances, sporadic in other places, never or very seldom appearing beyond 40° of north latitude, and being a disease of hot weather and warm climate, never without a temperature of at least 78° Fahr. promoting its

production and propagation, nor above the elevation of 2,500 feet above the level of the sea.* Within its supposed limits it is not diffused uniformly; it depends in part on the morbid effects of certain causes, not as yet sufficiently determined, but which, all circumstances being favourable, lead to its extension, and is capable of being propagated by contagion.

Symptoms and Progress.

Yellow Fever (true and pestilential) partakes more of the character of continuous fever, having no decided remission; but, for the sake of convenience, we will divide the symptoms into four stages—viz., 1st, the cold, or stage of stupor; 2nd, the stage of reaction or excitement; 3rd, the period of remission (so called); 4th, the period succeeding that of remission, and terminating either in death or recovery.

The First Stage.—The cold, or stage of stupor.—There is at first lassitude, listlessness, faintness, and giddiness more or less severe, accompanied with a slight sensation of cold, with acute pains in the head, back, loins, and limbs. The pain in the head is generally supra-orbital, and is attended with a dull heavy feeling, and a sense of fulness and constriction. Sometimes, instead of acute local pains, the patient complains of general uneasiness,

---

* According to Gilbert Blane, the Fever never occurs either in tropical or temperate climates, unless when the atmospheric heat has been for some days steadily at or above 80° Fahr., 21° of Reaumur, or 26·67 cent.; according to Mathei, 72° Fahr. or more, and according to Humboldt, 75° Fahr. or 24° cent. Humboldt asserts that it never ascends to 3,044 feet above the level of the sea, Mathei 2,500 feet, Craigie 1,600 feet.

or *malaise,* which is felt to be more intolerable than the severe pain when confined to a particular part. There is a slight sensation of nausea and vomiting; the matter ejected appears to consist principally of vitiated bile, exhibiting the colour, but not the other healthy properties of that fluid; but generally it is pale, watery, of slightly bitter acid taste, greenish in colour and frothy. The vomiting occurs at short intervals, and the quantity of matter thrown up varies greatly. This is a very constant and obstinate symptom; when it occurs earlier it is not so dangerous as when it commences in the latter course of the disease, as it is likely to terminate in black vomit; there is a sense of rawness in the fauces and œsophagus. Cardialgia, a distressing state or sense of burning in the stomach, sometimes presents itself, but generally it does not occur till reaction has taken place. There is oppression and soreness in the epigastrium, with a considerable præcordial distension; the tongue is of a pale or leaden colour; the upper surface covered with a viscid white or yellow coat. The bowels are generally constipated, and evacuation seldom takes place in the whole course of the disease without the use of a laxative; the intestinal contents, when ejected, sometimes resemble tar, both in colour and in consistence, and not unfrequently possess such a degree of acrimony as to cause extensive excoriation. The pulse is weak, small, frequent, and in many cases there is an undulating, vibratory, or vermicular motion, rather than a regular pulsation; the respiration is hurried and interrupted by frequent sighs; the countenance is expressive of extreme anxiety, and also of distress, especially when the attack is severe.

The surface of the body at this stage feels cold, and the skin is of a yellowish livid colour, and bedewed with a cold, viscid sweat; great languor and prostration are invariably attendant on this period of the disease, and so suddenly does the muscular energy become paralyzed in more severe cases, that the patient will fall to the ground, and continue helpless for some time; the shock sometimes is so great that his vital organs are greatly oppressed, and the patient is carried off before reaction sets in, by black vomit, universal hæmorrhage, or general convulsion.

The Second, or stage of reaction or excitement.—There is a considerable change in the train of symptoms, some new ones now make their appearance, whilst some of those which had been present during the preceding stage cease, and others become greatly aggravated. The epigastrium still continues to be painful to the touch, and, if the cardialgia and vomiting had not been present, they now set in; but if they had existed, they now become more distressing as the languid energies of the system revive; there is considerable relief from the epigastric oppression as the blood is impelled by the increased power of the heart to the smaller vessels, from which it had receded during the stage of stupor; the pulse now undergoes a corresponding change; from being weak, feeble, and oppressed, it becomes full, hard, and tense; its principal characteristics during this period are hardness and tension, but however violent the febrile state of the system is, the pulse, though hard and tense, remains small and easily compressed. The disorder in the sensorial function becomes now considerably augmented, and if the patient

had no delirium previously, he generally gets it now; on the other hand if he had, the increased determination of blood to the head renders it more violent. The face is now flushed and tumid, which is regarded as a specific capillary irritation, as the hectic of phthisis and the fuliginous expression of typhus. Sometimes the suffusion occupies a zone over the eyes, and about an inch above and below them; the pains over the eyes, together with the sense of fulness become excruciating; the eyes are injected, red, and protruded; the injection is sometimes as intense as that in ophthalmia, but without any lacrymation or photophobia. The tongue appears preternaturally red and vascular; its upper surface covered with a dry brownish crust, in most cases where gastric affection is severe; but in others only a moist, white or yellowish mucous incrustation is observable. The urine becomes now scanty and surcharged, and ultimately suppressed; the colour is deep red or yellow, sometimes slightly tinged of sulphur, primrose, straw, or light gamboge. In some cases the yellow suffusion of the skin and eyes makes its appearance at this stage of the disease, but most frequently as the circulation returns to the cutaneous vessels, the skin regains its natural and wonted colour, and at length becomes preternaturally florid; there is great efflorescence in the skin, in the form of a cutaneous rash over the chest and extending over the abdomen and arms. Sometimes rose-coloured spots are observed in the skin, circular in shape, and varying from the size of a flea-bite to a small button; "they result generally from mosquito wounds, and become hæmorrhagic at the end of the disease, when it terminates fatally;" the temperature rises considerably,

above the healthy grade; the forehead is usually the hottest part of the body; at times it is the chest. The temperature in the axilla varies from 102° to 107° Fahrenheit. The moisture with which during the preceding stage the surface had been bedewed is now dissipated or absorbed, and the skin is left dry and husky. During this stage of reaction, both the local pains and the general distress are considerably augmented, and to such a degree that the patient's suffering becomes almost insupportable. The alvine evacuations are alkaline, scanty, thick and muco-jelly-like, with a thin serum around the bottom of the pan; no tenesmus, but a burning sensation after evacuation; the vomited matter consists of mucus and bile, streaked or speckled with blood. After a time, or in some individuals, in the second occurrence of the stage of excitement or reaction, the patient without warning or nausea, suddenly ejects a quantity of clear, limpid, or slightly opalescent, acrid fluid, the white vomit cotemporaneous with the first shedding of epithelium from the tongue, and indicates the beginning of the stage of acrid elimination of some authors; this white vomit consists of fluid more or less acrid, which is unaffected by heat or nitric acid. There is great thirst, which cannot be allayed by anything, as the stomach is now so irritable, that anything taken internally is instantaneously ejected. This stage continues for about twenty-four hours, and is succeeded by a remission of the most urgent symptoms.

The Third, or stage of remission.—In true pestilential Yellow Fever, there are seldom any sensible remissions, although in the malarial variety the remission is generally

complete; there is an abatement of the local and general pains, especially of those referable to the head, chest and stomach; the pulse is softer, fuller, and less frequent, and the temperature of the cutaneous surface is reduced to its natural standard. The remission is more complete in proportion to the violence of the preceding stage, and according to the early or late employment of the curative means. In exceptional cases the symptoms as well as the sensations of the patient continue for several hours so much improved, as to excite sanguine hopes of recovery; and sometimes the recovery of the patient dates from this remission, but most frequently this apparent improvement is delusive. In the generality of cases, whilst there is an abatement of the intense pains, the patient continues in a low, languid state, averse to both mental and bodily exertions; there remains some gastric irritability with tenderness and oppression in the epigastrium. This stage terminates about the twelfth hour, and is succeeded by the symptoms which mark the fourth or last stage.

The Fourth, or stage succeeding that of remission, terminates either in death or recovery.—This stage usually varies both in its severity and duration, according as the system has or has not been exhausted by the ravages of the previous stages of the disease; but generally in the commencement of this stage, the struggles of the system are less violent than during the preceding stage of excitement, so that a favourable tendency is indicated, and the disease may go on favourably if the vomiting and cardialgia be less urgent, and therefore show a less degree of gastric irritability, if the epigastric tenderness and oppression be less, if the cerebral pain and disorder as

well as the general distress be more tolerable, and if the alvine discharge exhibit a more natural colour than during the preceding stage, the morbid appearance then quickly passes away, and does not return.

In some cases the symptoms of reaction make their appearance for the second or third time, but when recovery eventually takes place, they become less severe at every repetition, and the intervening period of remission becomes more perfect and of longer duration. But when the disease pursues a course towards a fatal termination, the symptoms of reaction are usually mild, but the suffering is more considerably augmented, the gastric irritation greater, and consequently the vomiting becomes more incessant, and the burning more distressing, the oppression and tenderness in the epigastrium very severe, the tongue dry and coated with a yellowish tint, approaching to dark brown; the mental disorder becomes unmanageable, the countenance assumes a dark brown colour, the pulse less tense and hard, but more frequent and vibrating, the anxiety and jactitation increase, and "though the debility is great, yet the patient's struggles are so violent, that it requires the united forces of several men to restrain him."—(*Zieknor*).

Sometimes, after this state has continued from thirty-four to thirty-six hours or upwards, it is followed by a partial remission, which continues for a short time, and is then succeeded by another reaction; "the symptoms progress from bad to worse, a bloated, desponding, anxious, inquiring countenance expresses the distress of the patient, combined with incessant and distressing jactitation, which ends rapidly in exhaustion and death."

In youthful and plethoric Europeans the symptoms are exceedingly violent and dangerous in their character. The heat is a burning pungency, while the skin is dry and constricted, the headache is intense, the countenance appears to be agitated by the most fearful apprehension, or by approaching delirium; the bowels are constipated, the tongue red, clean and tremulous, and indicates an increase of gastric and intestinal irritation, and consequently an increase of danger; the urine is scanty and surcharged, and ultimately all the secretions are suppressed. There is distention of both hypochondria, with pain and burning heat, and anguish at the epigastrium. Irritation, hiccup, and vomiting continue at first of a clear glairy fluid, which alters to a brown or dark colour like coffee grounds, and the quantity ejected exceeds greatly that which has been used in the drink. In persons of sanguine complexion, the countenance is apt to assume a livid, yellow, putrid-like appearance, with a black encrusted tongue, and in most cases the whole of the surface of the body becomes more or less yellow, which indicates the most severe form of the malady, and the patient may be carried off exhausted in all his functions, so early as the second, or more generally on the third day.

Dr. Blair, writing of the epidemic of British Guiana, says that cases of long-standing chronic disease terminate suddenly and fatally by the black vomit, without any precursory fever, to the surprise and consternation of the bystanders. Dr. Wilson also remarks that the term insidious has often been applied to the West India fever, and with great propriety, for he states that while

the poison is frequently sapping the powers of life, there is often little to inform us of the mischief that is going on within, so that the symptoms frequently do not prepare us for the fatal issue. "In the midst of our security," he adds, "and when we are imagining all is going on well, we are shocked by the sudden eruption of the black vomit, or the accession of profound coma, rapidly producing death." The insidious nature of the severe form of this disease was remarked by Dr. Barry, of Sierra Leone, West Coast of Africa. The state of the patient's mind is generally peculiar, as the poor sufferer appears entirely unconscious of his helpless state, and generally expresses himself as being much better, until the fatal heat receding from the surface, dissolution takes place, sometimes preceded by violent straining of the eyeballs and incoherent expressions, or else by some convulsive motions. At Gibraltar the patients died without taking to their beds, or "on foot," as it was termed. The following case is given by Louis: Dr. Matthias, who died at Gibraltar, after an illness of four or five days, experienced no other symptoms than severe pains in the calves of the legs and a suppression of urine. He had no nausea and did not vomit, and his mind was clear during the whole course of the disease. He noticed, however, the suppression of urine, dictated three or four letters to a friend, begged him to write rapidly the last that he might sign it, then devoted a short time to an affectionate intercourse with his friend, and soon after becoming speechless he thanked him by a sign, and in a quarter of an hour was dead.

When in a severe case there is a partial remission, it

will be succeeded by another, which is the last effort of nature; the train of fatal symptoms now takes place; the patient is insensible of his situation, the eyes become dull, heavy, and glassy, the pulse is preternaturally slow, the skin feels cold and is of a dusky livid hue, there is a sudden return and voracity of the appetite with singultus, black vomit, hæmorrhage, and then death.

There is always a yellowness of the skin, which, however, is not a diagnostic symptom. Usually it appears about the close of the third day, by a faint tinge in the sclerotic, or on the forehead, neck, or breast, from which spot it diffuses itself over the whole body. Of the yellow appearance from which the disease takes its name, Mason Good gives the following description: The yellowness commences in some few cases within the first forty-eight hours, sometimes on the third day, and frequently not until the fourth or fifth. It is, indeed, sometimes observed but a few minutes before or after death. He believes that in many cases it might with attention be discovered in the eyes; but that it is commonly first observed on the cheeks, extending towards the temples, and about the angles of the nose and mouth; about the lower jaw and on the neck, along the course of the jugular veins, whence it afterwards spreads in stripes and patches along the breasts and backwards, so as at last to become universal in some patients, though in others it remains partial. The yellowness is sometimes of a dingy or brownish hue, sometimes of a pale lemon, and at others of a full orange colour. When the yellowness appears only in patches or spots, and of a dingy or brownish hue, they are frequently intermixed with other spots of a florid

red, or a purple or livid colour. The yellowness of the skin is, with one practical exception, derived from the bile; and the manner of its entrance into the blood vessels is thus accounted for by Mr. Bancroft. When there has been very frequent violent vomiting for some length of time, the stomach, diaphragm, and abdominal muscles are apt to become irritated in an extreme degree, so that at each effort of the former to discharge its contents, the latter will frequently be thrown instantaneously into strong spasmodic contraction, and the liver, together with the gall-bladder, will be, as it were, suddenly caught and then tightly squeezed with a powerful pressure, the necessary consequence of which pressure seems to be that all the fluids contained in that viscus will be driven towards both extremities, backwards as well as forwards, in those vessels which are not provided with valves to prevent their retrograde motion. Under such circumstances it can scarcely be doubted that the bile will be forced to regurgitate in this manner, and pass from those ducts into the vena cava at each violent compression of the liver, and that thus by continued and strong spasmodic contractions of the before-mentioned muscle in vomiting, a considerable quantity of bile may be carried into the circulation, and a yellow suffusion, resembling jaundice, be very speedily produced.

Sometimes the yellowness of the skin occurs partially in patches or spots, in elevated vesication or bloody feruncles; their most common site is on the wrist, or over the meta-carpal joints, along the front of the legs, elbows, the scapulæ, and over the hip, in the parot region, and over the forehead and lip. They are gene-

rally in close proximity to the smaller arterial branches, such as the ulnar, radial, and anterior tibial, gluteal, intercostal and facial arteries. They become tender, acuminated, and inflamed, and sometimes form large abscesses of purulent matter, with a pale or inflamed surface, and this chiefly when below the scapulæ or over the lip. On the legs they present a flat purplish vesication, between the size of a split pea and a sixpence; when opened a watery curdy sanies is discharged; on removing the vesicle entirely away a circular perforation is observed in the centre, which can be traced as far as the deep fascia or the muscle, and if squeezed one or two dark clots and then a little purulent matter would escape, and the parts soon heal up. When, however, this vesicle is over a joint, abscess with or without severe death of tissue, glands, &c., will follow.—(*Blair.*)

Varieties.—Dr. Lyons, of Dublin, in the Lisbon epidemic of 1857, has described five types—viz., 1st, the *algid*; 2nd, the *sthenic*; 3rd, the *hæmorrhagic*; 4th, the *purpuric*; 5th, the *typhus*.

Professor Maclean in his Lectures on Military Medicine at Netley Hospital, describes the following four forms.—1st, the *sthenic*, or *inflammatory* form; 2nd, the *malarial* form. 3rd, the *hæmorrhagic* form; 4th, the *algid* form.

The sthenic or inflammatory type.—There is great irritability and a disposition to walk about, severe and persistent pains in the head, calf, and back; no marked rigour, but a feeling of heat and rigour alternating. There is a remarkable rise in the temperature from 3° to 5°, and in some cases 7° Fahr. Heat in the axilla from 102° to 103°; the skin is red, harsh, tense, and dry; the

eyes are suffused, and there are pains on pressure over the ball; the tongue is red, clean, and dry, in some cases creamy, furred, dry, and brown, then contracted and parrot-like. There is nausea, with pain and oppression in the epigastrium; bowels constipated; the respiration painful and laborious; the circulation irregular; the impulse of the heart full and strong; sound very clear, and ranges from 110 to 130 in the minute; the disease takes a low and typhoid character when the pulse is 115. There is wandering and muttering at night, and the patient becomes violently delirious. The yellowness of the skin is more constant, commencing in the conjunctiva on the third and sometimes on the ninth day, in the pyrexia or after it. There are bloody spots in various parts of the body, and hæmorrhage from the mucous membrane, accompanied with black vomit. The black vomit is more frequently absent, and the stomach after death contains more or less blood. The urine is highly coloured and scanty, and contains a large quantity of albumen, blood, and tube cast; sometimes the urine is wholly suppressed. During the reaction it is passed voluntarily, but often involuntarily; the albumen diminishes immediately, the urine is of smoke colour; urea and epithelium plentiful. Death is generally very sudden.

The malarial type.—Professor Maclean considers that malaria has a modified influence in producing yellow fever, and this form is met with amongst new arrivals, with florid complexion, of intemperate habits, or total abstinence. This is a very severe type of the disease, and the individual appears to be stricken with death from the very first. There is generally a succession of heat

and chills, pungent heat of skin, face, and head, intense nausea and vomiting, and the bowels constipated; this state of intense fever will continue for three days and then the fever abates, the skin becomes yellow, the thirst diminishes, and the patient may become convalescent, or the partial abatement may cease, and the fever return in a more intense form, the eyes become vascular, and countenance greenish; there is then a dusky yellowish colour over the body; tongue red and raw; severe thirst, the vomiting sprinkled with dark spots like particles of snuff; the appetite voracious, upon which the black vomit supervenes; the skin becomes damp and cold; the patient frequently impatient of the bed-clothes, and tossing about; then delirium and death. There is generally an unpleasant odour from the body, which Professor Maclean considers as a sign of an approaching decomposition of the tissues. Flies quickly appear around it. The faculties are generally unimpaired to the very last. When cerebral symptoms are prominent, black vomit is less prominent. The black vomit and clots of blood from the stomach, often present an oily appearance.

The hæmorrhagic type.—This is the most dangerous form of the disease; there are profuse and simlvtaneous discharges of blood from various parts and organs of the body; the mucous membranes of the mouth and alimentary canal, of the chest, kidneys, vagina, &c.; and the connecting tissues of the body are surcharged with blood. It may usher in the sthenic or other type, and principally in plethoric persons; it is fatal between the fifth and seventh day. There is a characteristic yellow fever smell from the body; the temperature is about 101°, and pulse

102 to 103 beats. There is a good deal of stupor and nervous depression.

The algid type.—In this form there is early prostration of the vital powers; the countenance is sunken, "eye dull and filmy, surface cold," face of dirty livid colour; extremities cold and livid; coldness and lividity of the lips and tongue; temperature below the ordinary; pulse small, feeble and quick, pains on the calves of the legs and cramp in the feet; there is hæmorrhage in various parts of the body and purpuric patches all over the skin; this form is very fatal, as the patient from the very commencement shows signs of death; it may come on suddenly whilst walking or standing, and the patient is knocked down, and in a few hours falls into profound collapse, and dies soon afterwards.

Pathology and Morbid Anatomy.

It has been contended that Yellow Fever was purely a malarious disease, that it was Remittent Fever of an exaggerated type; but recent researches have led to the conclusion that true or pestilential Yellow Fever is a disease *sui generis*, and of a specific nature, "propagated by a contagious virus or poison, which multiplies itself by its passage through the human system, and which reproduces the same specific Yellow Fever;" it has a continuous type, and presents the following characteristic symptoms; pyrexia, suppression of the urine, yellowness of the skin, black vomit, and delirium.

Professor Maclean gives the following specific distinction between true Yellow Fever and Remittent Fever.

1. There is an absence of periodicity, which is an unfailing characteristic of true malarious fevers.

2. In Yellow Fever men pass from recovery to health with no or very little evidence of the existence of any cachexy.

3. Yellow Fever is at once destroyed at a temperature where malarious fevers exist and are distinctive.

4. Albumen in the urine is almost invariable in Yellow Fever, but only occasional in Remittent Fever.

5. In Yellow Fever there is an unexampled range of hæmorrhages; in Remittent Fever they are few and generally absent.

6. In true Yellow Fever quinine is inefficacious; in Malarious Fever it is quickly powerful.

7. In Yellow Fever a second attack is rare; in Remittent or Malarial Fever a first attack does not lead to an immunity from the disease.

The *black vomit* is produced by a severe gastric irritation; in some cases the ejected matter consists of a black, glistening, flaky substance, swimming in a thin watery fluid, in others it is of a coffee-ground consistence; sometimes it is ejected without the slightest effort on the part of the patient, at other times it is done with great exertion and agony. It differs from bile materially both in physical and chemical qualities; bile has a yellowish or greenish yellow tinge always, when spread on a white surface; the admixture of bile and black vomit produces a colour different from both bile and black vomit. Bile differs more decidedly in taste from black vomit, the latter being always insipid when freed from other foreign matters, whereas bile can never be deprived of its bitter-

ness. Of the nature of black vomit Dr. Bancroft thinks "That it is merely blood which has been effused from some of the small arteries, ruptured in consequence of the separation of certain portions of the villous coat, which has coagulated within the general cavity of the stomach, or on the surface over which it is effused, and having been afterwards detached and triturated by the violent and frequent contractions of that organ in the effort of vomiting, has had its appearance as a coagulation of blood altered, and its colour darkened by the gastric juice, or by some chemical decomposition, either spontaneous or produced by the action of the air or other matters contained in the stomach."

According to Dr. Hewson Bache the microscopic characters of the black vomit are as follow :—

1. Amorphous masses of coagulated mucus or serum, and the débris of blood corpuscles, which gave the mass a red or brown colour.

2. Numerous and irregular masses, sometimes presenting an imperfect crystalline form (probably altered hæmatin), which were of different shades, from a reddish brown to a deep black colour.

3. Red blood corpuscles in different stages of alteration which did not correspond to the degree of acidity of the vomit.

4. Various forms of epithelial cells, as the squamous or canoidal. In one specimen a perfect mucous crypt was observed.

5. Brown oil globules, some of which bristled with fine crystals of margaric acid.

6. Besides these constant elements, there were some

occasional ones, such as the *sarcina ventriculi* and the *torula* (the former more frequent than the latter) and some inflammatory corpuscles.

Sir R. Martin has deduced the following conclusions from the observations of American and other authors, relative to black vomit as pathognomonic of Yellow Fever.

1. That Yellow Fever may and does occur without black vomit.

2. That black vomit is not so exclusive and universal a feature of Yellow Fever as some authors have supposed.

3. That black vomit so-called has been witnessed occasionally in the course of Fever of the East Indies, of the Mediterranean, and even in fevers and other diseases within the British Islands, and it is stated to be "an unusual symptom in the yellow fevers of America, which are incontestably of marshy origin."*

4. That to regard black vomit as an invariable and altogether exclusive feature of Yellow Fever, would be almost equivalent to asserting that none have been affected with this disease, but such as have died in the stage of actual vomit.

5. That in many Yellow Fever epidemics, in various countries, numbers have died of this disease without the occurrence of black vomit.

6. With rare exceptions, those who have recovered from Yellow Fever, have not presented the symptoms of black vomit.

7. On the other hand, the matter of black vomit has very generally been found on dissection in the stomach

---

* "British and Foreign Med. Chir. Review," January, 1848, p. 70.

and bowels of subjects, in whom no vomiting of black matter occurred during life.

8. Black vomit constitutes, in the prevalence of an epidemic fever, the most unmistakable sign of its being the Yellow Fever, the black peculiar matter ejected during life or discovered in the stomach and bowels after death, leaving no further doubt as to the nature of the disease.

9. On the other hand, black vomit was remarkably absent in the fever of the Niger Expedition, and in the Gibraltar epidemic of 1814 it was seldom seen.

The specific gravity of black vomit averages from 1.004 to 1.006 at a temperature of 86°; its test is the presence of ammonia; the sediment is easily dissolved by liquor potassæ; the fluid is always acid.

In the elaborate essay of Dr. R. La Roche on black vomit, we find the following observations:—

1. That the black vomit being recognized to be blood acted upon by the acid contents of the stomach, we have no difficulty in perceiving that much of the difference it presents, in regard to its physical appearance, will depend on the manner in which the blood is effused into the stomach, whether drop by drop, or in a stream, and on the degree of acidity of the gastric secretion, or on the quantity of serous fluid it meets with in that organ.

2. It has been found, for example, that whenever blood is exhaled therein in a quantity proportionate to these secretions, it exhibits a black colour, while the aqueous portion is limpid or clear green.

3. If there be a slight excess of blood, more than enough to neutralize the acid, instead of black we have a

nut-brown, a chocolate, or reddish matter, and the watery portion, when filtered, is of a rum, brandy, or red colour.

4. If the hæmorrhage be great, the fluid presents all the characteristic marks of blood, either with or without admixture of black vomit.

About the close of the disease the alvine evacuations may be black, or sometimes of a grass, olive, or spinach green, or fawn colour; sometimes rusty, sometimes primrose, sometimes brown; they are scaly and mucous; alkaline in reaction, except when mixed with black vomit; in this scanty mucous stool on examination a little thin serum is to be observed, composed of mucous, broken-up epithelial matter, and myriads of epithelial granules with occasional waxy flakes like a piece of cuticle.

In cases where there is hæmorrhage (a sign of dissolution) there is an atonic state of the solid contents of the body, so that blood issues from every aperture of the body at the same time, from the mouth, nose, anus, urethra, and vagina, and also from blistered surfaces. The blood shows little disposition to coagulate, and is of a dark grumous appearance. This is a fatal symptom, and generally takes place on the third or fourth day of the disease, and the fatal termination of the disease on the fourth or fifth day.

In the examination of the morbid anatomy of cases of Yellow Fever, the abdominal cavity chiefly demands our attention, especially when the symptoms indicating that a severe affection of the stomach had been predominant; there is generally inflammation and congestion of that viscus; and the internal surface, when black vomit had existed, presents a layer of black material adhering close

to it with a quantity of the same substance contained in the viscus; the muscular coat is turgid, and the pylorus is vascular and congested; there are congestion and thickening of the omentum and peritoneum, which are of a darkish red colour When the head affection forms the principal feature of the disorder, the brain is firmer and increased in volume; the blood in the arteries, in the medullary position, is extravasated through over-distention of those vessels. The ventricles contain a yellowish straw-coloured water, and the choroid plexuses are loaded with blood; the vessels of the dura mater and pia mater are injected, and the membranes are generally in a turgescent state.

We give the following as the summary of after death appearance from Yellow Fever, recorded by Martin and Johnson:—

1. In the most malignant and rapidly fatal epidemics, the body seldom suffers much diminution in bulk, while the abdomen appears tumid and enlarged; there is a yellow tint of the surface, with livid blotches, some parts becoming of a brown or dark hue. The muscles are of a dirty dusky hue and flabby in texture, or pliable on pressure. The abdominal viscera are more or less congested, indicating a remarkably rapid loss of vital cohesion of the several textures, where diminution of the bulk of the body is perceptible. On the other hand, owing to previous large loss of blood from the digestive mucous surface, the viscera will be pale, softened, and somewhat shrunk.

2. The *post-mortem* appearances in the liver, as in the other viscera, vary in proportion to the violence and

duration of the fever, exhibiting at times congestion, softening, friable—at others, a pale olive hue; while the gall-bladder is generally shrunk, containing no bile, or else there is found in it a little tar-like fluid. The rhubarb colour of the liver has been remarked as characteristic of some of the most severe forms of epidemic Yellow Fever. The spleen and pancreas have generally been found in a softened condition.

3. The æsophagus, stomach and deodenum, present patches of a dark livid hue, with the epithelium of the mucous digestive surface diluted in many places, while the mucous membrane is separated from the adjacent tissue. The stomach and small intestines contain more or less of the nature of black vomit. This matter, as also a black jelly-like substance, is frequently found in the intestines, even where no black vomit existed during life. Less frequently there is found in the intestines a fluid of a reddish tint, and more nearly resembling blood.

4. The appearances discovered in the heart and lungs will depend on the amount of blood which has been discharged in the form of black vomit, or which has oozed from the various passages; and where death has occurred without such losses both lungs and heart were found gorged and congested, the blood being more or less dark and grumous. False polypi are sometimes found in the cavities of the heart.

Causes—Predisposing Causes.

1. Certain topographical condition of the country—*e.g.*, a place containing a number of lagoons or ponds of stagnant water, having marshes of greater or less extent, the

beds of which are below the level of a surrounding sea, preventing proper drainage, situated in the mouths of rivers or along the sea-shore. In the definitions of Yellow Fever, I have considered what limits of elevation are necessary for its occurrence. The statement of Dr. William Ferguson, the Staff-Surgeon attached to the expedition to St. Domingo in 1796, is worthy of attention. "Our head quarters," he said, "were in the town and its adjunct Brizoton, as pestiferous as any in the world; and here we had constant Yellow Fever in all its fury. At the distance of a mile or two on the ascent up the country, stood our first post Torgean, where the Yellow Fever appeared to break off into a milder type of Remittent. Higher up was the post of Grenier, where concentrated Remittent Fever was rare, and milder Intermittent with Dysentery prevailed; and higher still was Fourmier, where Remittent Fever was unknown, Intermittent uncommon, but phagedenic ulcers so frequent as to constitute a most formidable type of disease; and higher still were the mountains above l'Arkahaye, of greater elevation than any of them; far off, but within sight, low down, in what was called the height of Leogame, where a British detachment had always enjoyed absolute European health—indeed it might be called better, because the climate was more agreeable than in higher latitudes. Here," he very justly continued, "were the separate regions or zones of intertropical health mapped out to our view as distinctly as if they had been done by the draughtsman. Taking Port-au-Prince for the point of departure, we could pass from one station to the other, and with a thermometer, might have accurately noted the

locale of disease according to the descending scale, without asking a question among the troops who held the posts. It was just as impossible, or more so, to carry a Yellow Fever up the hill to a post in sight, as it would have been to escape, had they been brought down and located amidst the swamps of Port-au-Prince."

We may relate as predisposing causes, the *climate* of the West Indies, of the south of Spain, of the sea-ports of intertropical America, and Mexico, and of Western Africa; the *male sex*, from their constant exposure to its exciting causes, intemperance, fatigue, unwholesome food; all cases of debility, depressing passions of the mind, such as privation, exposure, and excess; filth and overcrowding; imprudent exposure to night air; the recent arrival of strong healthy Europeans where the disease exists.

Causes—Exciting Causes.

The real nature of the specific poison of true Yellow Fever is unknown; it is an *organic poison* eliminated from the system through the liver, spleen, kidneys, and bowels.

It is believed that Marsh miasmata possess a modified influence in producing it. In 1853 there was a severe epidemic of Yellow Fever in New Orleans, and a Commission was appointed by the State Government to report on its origin and spread; the following are their conclusions:—

1. That the epidemic was not derived from abroad, but was of spontaneous origin.

2. That there existed in New Orleans very peculiar

meteorological conditions, known by general experience, to be capable of producing, in co-operation with local causes, fatal and malignant fever.

3. That these conditions were present in an exaggerated degree, and impressed upon the prevalent type of disease, susceptibilities and habits of assimilating it to another and distinct form of fever.

4. That this shows in all localities within the ranges of the meteorological state or influence, an infectiousness not necessary to or characteristic of the fever, but purely casual and accidental, the result of physical causes, and which it loses as soon as these causes disappear.

Diagnosis and Prognosis.

Yellow Fever has been confounded with plague as well as with Typhus Fever. The diagnostic signs distinguishing it from *Plague* are:—(1) in Plague the patient is generally attacked with buboes and carbuncles (glandular and cutaneous diseases), whilst in Yellow Fever the system is quite free from these affections. (2) In Yellow Fever, the patient is generally attacked with violent febrile paroxysm, but this is not essentially the case in Plague. (3) Yellow Fever prevails only in hot countries, and during the hot season, but Plague is more a disease of ultra-tropical climates; from *Typhus Fever* (1) that Yellow Fever occurs in the hot season, and is extinguished in the cold season, whilst the reverse is the case with Typhus Fever. (2) Yellow Fever commences with an exceeding high degree of constitutional disturbance, with many symptoms peculiar to itself; Typhus Fever is generally mild at the beginning. (3) Yellow Fever

attacks most violently and readily the young and robust, whilst the reverse is the case with Typhus Fever. (4)Yellow Fever has a period of slight remission, but Typhus Fever has none.

But it is necessary that we should have symptoms sufficiently diagnostic to distinguish it from the malarious forms of fever. The following are the most prominent described by Drs. Gilkrest and Copland :—

1. Yellow Fever makes its invasion more insidiously, but runs its course more rapidly than the Remittent, the latter being more open and phlogistic.

2. The shock to the vitality of the body is manifested earlier in Yellow Fever, as is also the contamination of the circulating fluids and the soft solids.

3. Jactitation, mental depression, apathy or delirium appear much earlier in Yellow Fever.

4. The lemon yellow of the skin appears much earlier in Yellow than in the Remittent Fever.

5. Nausea and vomiting appear earlier in Yellow Fever, the latter symptom being marked by more distress and by the ejection of a greater quantity of fluid, unmixed with bile, and being composed of some exudation from the stomach, or of the serum of the blood.

6. The vomitings in Yellow Fever are unaccompanied by retchings or apparent effort.

7. The character of the pulse in Yellow Fever is distinctive, being rapid in its rise, then soft and asthenic, proceeding on to weakness, in equality, irregularity, and lastly, weakness.

8. The suffused red state of the conjunctiva, with more or less brilliancy of the eye, according to constitution and

age of the subject, and having sometimes a drunken-like appearance.

9. The lurid redness of the countenance in many cases, and the depressed and anxious expression in all.

10. The severe deep pain in the orbits.

11. The clean, red, raw, or bloody state of the tongue, the soreness of the throat, pharynx, and along the æsophagus, an acrid burning sensation of the stomach, the sense of constriction in the chest, and anguish at the præcordia.

12. The thick compact feeling furnished by the skin, its diminished sensibility at the advanced stage, and the dingy tint of it with the livid or leaden patches at least.

13. The constipation, scanty secretion, complete suppression of the urine, and absence of bile in the dejections.

14. The leucophlegmatic, flaccid, swollen, and pallid appearance of the soft solids, without any very evident emaciation in most instances.

15. The lemon yellow of the skin is distinctive, and would seem to depend on a stagnation of dissolved blood in the capillaries, and not upon the colouring matter of bile, as in Yellow Fever.

16. The continued type of the Yellow Fever in general —its origin, progress, and propagation, as compared to Remittent Fever.

Prognosis.—The prognosis is very difficult and treacherous, and Dr. Blair, who had ample experience of several epidemics of Yellow Fever in the West Indies, gives the following particulars :—

The number of the characteristic symptoms present and the degree in which they are manifested, furnish

criteria of the severity of the case, and also the ratio of danger. A slow pulse and moderate temperature of the body and a quiet stomach, are always favourable indications. That the more fiery crimson the tip and edge of the tongue, the more irritable the stomach, the severer the headache, the worse the prognosis of the first stage, and vice versâ. Slight or moderate epistaxis is a sign of little prognostic value in any stage; but a streak of blood in the early vomit indicates much danger from the attack; while the same, during the stage of black vomit, or after acrid elimination has set in, is favourable if the corpuscles are found entire. In the second stage, the earlier or more complete the suppression of urine, and the more copious ejections of black vomit, the more imminent the danger; but if the urinary secretion continue, and the black vomit be scanty from the first, or is afterwards suppressed, the patient may yet survive. Urine simply albuminous is a less serious sign than when it also contains tube-casts; but if these are transparent and few in number, they do not add much to the gravity of the indication. Free, copious urine, no matter how dark or bilious, is the most favourable of any single sign. If urine be scanty, and it be loaded with tube-casts entangled in epithelial and coagulable matter, the light buff colour curdy sediment before mentioned, it indicates a complex lesion of the secreting structure of the kidneys. It is the urine symptom in its maximum of severity, and is as fatal as if the suppression had already occurred. Blood corpuscles in the urine are not looked upon with apprehension. A faltering of the articulation is a bad prognostic, and a difficulty of protruding the tongue

enhances it. Prognostics are derived from the effects of treatment. If the resolvent dose do not bring away "stools characteristic of the powder" calomel, but instead a thin grey bilious matter, or if early hyper-cinchonium be induced, it is an unfavourable indication. The danger of the case is enhanced by inflammatory complications, and by hypertrophy of the heart. A recent residence in a temperate climate, the race or complexion of the individual, the fact of his previously having suffered from a severe attack, or an abortive one, will enter into an estimate of his chances of recovery. Occupation and profession determine the susceptibility of the person. Those who inhale disagreeable odours, are less prone to the disease, such as soap makers and tanners; those who are exposed to the heat of furnaces, such as cooks and engineers, are more prone; the aged or very young are less prone; those of age and vigour from 25 to 45 are more prone. There is no particular difference in race, although long residence in infected spots makes a person less prone to the disease.

The investigation of Yellow Fever by R. Jackson, as seen by him on the south coast of Spain, led to his recording the following unfavourable prognostic symptoms:—

1. Sudden invasion, with intense pain of the head and eyeballs, sickness and vomiting.

2. Convulsions, apoplectic stupor, or outrageous delirium, when in the fever.

3. A torpor, heavy, or statue-like aspect of the countenance.

4. A dry, rough, and milk-white, or swollen red tongue.

5. Distress and anguish, with pain at the epigastrium, forcible eructations, or explosion of flatus from the stomach, or obscure hiccough.

6. A ghastly appearance, with a faint nauseous odour from the body.

7. Yellowness of the skin, with turgid veins of the conjunctiva in the latter stage.

8. Torpor of the skin and insensibility to irritants.

9. Extreme dampness or extreme dryness of the skin, petechia, streaks of patches of a livid or green colour.

10. Vomiting of a black matter or of a bitter bile green or yellow; or dejections of black watery stools with shreds.

Mortality in Yellow Fever.

The mortality in Yellow Fever is very different in different epidemics. Of 134 instances in which the disease occurred, the deaths were 130; of 1,739 cases, the deaths were 1,265; of 35 cases, 34; of 20 cases, 19; but in 16,517 cases, 6,684.

The average mortality of Europeans from this disease might be gathered from the following statistical details, quoted by Martin:—

1. Dr. William Ferguson observed that in a period of little more than four years, nearly 700 commissioned British officers and 30,000 soldiers were swept away by the virulence of this disease. This took place at St. Domingo in 1795, where he served during the whole period. Within a year one of the finest armies of France perished from the disease. Sir William Pym, speaking of the epidemics of Yellow Fever in the several islands in the West Indies, in which he served in 1794-5, says that

there died in the course of a few months not less than 6,000 men.

2. Sir Gilbert Blane states that in 1804, out of a population, civil and military, in Gibraltar, consisting of 16,000 persons, there died a proportion considerably above the usual devastation of the pestilence of the Levant, or nearly 6,000 persons.

3. Under the mild, and what has been called, the French and Spanish treatment, the mortality of Malaga in 1804 was 11,486 out of a population of 36,054. In the epidemic of the previous year, in the same place, 6,684 deaths occurred out of 16,517 persons attacked.

4. Dr. Rush admitted that in the Civil Hospital of Philadelphia, where bleeding was sparingly used, the physician depending chiefly upon salivation, more than one-half died of all the patients who were admitted.

5. The Yellow Fever, which broke out at Brimston Hill, St. Christophers, in 1812, is described as having been of great severity; the entire number of cases treated were 422, of which not fewer than 118 died, affording a mortality that treads closely upon the heels of that in the Plague.

6. At Barcelona, in 1821, according to Gilkrest, scarcely a patient survived in the wards given up to the distinguished members of the French Commission, and the mortality under French and Spanish physicians in the establishment called Seminaria was 1,265, out of 1,739 cases treated.

7. Dr. Townsend, of New York, states that in 1822 the mortality in that city was in the proportion of three to four of those treated, the virulence of the disease being continued into the month of October.

8. During five visitations of Yellow Fever at Gibraltar, the mortality was as follows :—

Years of the Epidemic	1804	1810	1813	1814	1828
Military and their Families	869	6	391	114	507
Civil Inhabitants	4864	17	508	132	1170
Total Mortality	5733	23	899	246	1677

9. On the Island of Boa Vista, the ratio of mortality amongst the various races was as follows :—

Spaniards, Portuguese, and French	1 in 2·28
English and American	1 ,, 1·6
Native Population—Slaves	1 ,, 33·4
,, ,, Free	1 ,, 14·6

10. It is necessary to add, however, that epidemics are recorded in the West Indies and America, as having been of a comparatively mild character, but it has been doubted whether some at least of these visitations were not in reality aggravated or unusual forms of autumnal Remittent. But however this may have been, there were other instances in which the symptoms and the rate of mortality left no doubt as to the disease having been of the true Yellow Fever nature.

The following is a tabular summary of the mortality from Intermittent, Remittent, and Yellow Fevers, of the British troops in the West Indies, the Mediterranean and North America, by Colonel Tulloch :—

Deaths from	Windward, Leeward, Command.	Jamaica.	Gibraltar.	Malta.	Ionian Islands.	Upper Canada.	Lower Canada.
Intermittent Fever	1 in 169	1 in 163	1 in 60	1 in 311	1 in 236	1 in 1143	1 in 535
Remittent do...	1 ,, 9	1 ,, 8	1 ,, 14	1 ,, 24	1 ,, 22	1 ,, 11	1 ,, 5
Yellow do.	1 ,, 2½	1 ,, 1⅓	1 ,, 1⅔	—	—	—	—

Contagious and Infectious Nature of Yellow Fever.

It has long been a point of dispute between able and learned writers as to the contagious nature of this fever; some have propounded a most decided opinion that it is not contagious, while others have maintained that it is decidedly so.

Those who held the latter opinion, which is now regarded as the correct one, aver:—

1. That Yellow Fever has been carried to wharves and sea-port towns by vessels arriving from abroad and unloading.

In 1844 the crew of H.M. Ship "Eclair," whilst serving on the West Coast of Africa, became affected with Diarrhœa between the 15th and 16th March and the 3rd of April, the men were employed in boats exploring a creek. Exposed much to all the vicissitudes of the weather, to malarious exhalations from the muddy banks of the river, and from contagious mangrove swamps; they slept sometimes on shore, but generally in beds; they experienced much fatigue, disappointment, and mental depression. While this duty was being performed, Diarrhœa affected many of the crew; and on the 3rd of April the first case of fever occurred. Dr. Bryson, in his report on the first case of fever, said: "Having thus traced the fever of the 'Eclair' from its first appearance on board at the Island of Sherbro, until it ceased previously to her arrival at Sierra Leone, and from its re-appearance there in a more concentrated form until it finally disappeared some time after her arrival in England, it is impossible not to be struck with the close similarity

it bore to that of the 'Bann;' both vessels contracted the disease at Sierra Leone, and apparently from the same cause or causes, and other similar circumstances. In both vessels, in the course of a few weeks, it assumed an epidemic character, if it did not acquire contagious properties. The one vessel proceeded to the barren, rocky Island of Ascension, a few degrees south of the equator, where a disease of the same character made its appearance amongst the inhabitants and committed great ravages; the other proceeded to the nearly equally barren island of Boa Vista, a few degrees to the north of the equator, where, in like manner, a disease a short time afterwards broke out and raged with equal severity."

An outbreak of Yellow Fever in St. Nazaire, a sea-port town situated at the mouth of the Loire, in August, 1861, furnishes conclusive evidences of the contagious and infectious nature of this malady. The introduction of the disease was "traced to a ship, the 'Anne Marie,' which had arrived from the Havannah. During her passage two of the crew had died from Yellow Fever, but as the last death had occurred thirteen days before the vessel reached St. Nazaire, she was not subject to quarantine. The mate, who superintended the unloading of the cargo, died on the 5th of August, and of the seven workmen from the Gloire employed in discharging the cargo, six died before the 8th. Between the 4th and 8th of the month several fatal cases of the disease occurred in the St. Nazaire, Painbœuf, and Indret (the latter place being ten miles from Nantes on the Loire). Two cases of Yellow Fever occurred also at L'Orient, before the 19th of August, one of which was fatal. The first case was that

of a seaman belonging to a steamer plying between St. Nazaire and L'Orient, and who had been on board the 'Anne Marie' in the former port. Eighteen persons, it is believed, lost their lives in this outbreak." When the disease was recognized, the authorities at once established an hospital-ship off St. Nazaire, with the necessary staff of medical officers and nurses, and they condemned and scuttled the 'Anne Marie.' "

2. That Yellow Fever has been carried by individuals from an infected neighbourhood to a healthy one.

The case in the steamer plying between St. Nazaire and L'Orient, above quoted, is an example. In 1858 fever of an epidemic character began to manifest itself in the colony of Sierra Leone at the beginning of the unhealthy season, which spread to the vessels in port. Most of the Europeans left for England and other healthy places by the first opportunity. Some went to the Gambia, where the disease soon made its appearance, whence it was carried to the French Colony of Goree, and ultimately to Senegal.

3. That like all contagious diseases it cannot be taken a second time.

This fact has led to the recommendation by many tropical physicians of the practice of inoculating with the Yellow Fever virus the inhabitants, when the disease appear in its epidemic form; and it has been done with the result of preventing the disease, or even where it does occur, of its assuming a very mild form.

In 1850 the Lords Commissioners of Her Majesty's Privy Council requested an investigation to be made by the President and Fellows of the Royal College of Phy-

sicians relative to the Bulam or Yellow Fever, and on the 31st December they delivered the following report. The points investigated were:—

1. As to the Bulam being *sui generis*, and distinct from Remittent, or the Marsh Fever of warm climates.

2. As to its being an infectious disease; that is, communicable from person, and likewise capable of being imported.

3. As to the non-liability of persons to a second attack of the disease.

After a very careful consideration of all the facts and arguments adduced on both sides, with reference to the first question proposed, the College are of opinion that sufficient grounds have not been laid for stating that Yellow Fever is a disease *sui generis*.

With regard to the second question, it appears to the College to be sufficiently proved, that this disease is, under certain circumstances, infectious, and consequently that it may be imported.

The principal circumstances under which the infectiousness of the disease is likely to be developed, would seem to be a high temperature and moisture of the atmosphere, particularly in unhealthy seasons, and when the influence of these causes is aggravated by local insalubrity of site, and by the absence of free ventilation.

That the disease has been in some instances imported, the history of the epidemic fever which occurred on Her Majesty's Ship "Eclair," and at Boa Vista in 1845, affords conclusive evidence.

The third question proposed, respecting the non-liability of persons to second attacks, does not admit of

being settled in a decided manner. Strictly speaking, there is no disease of which it can be affirmed absolutely that one attack renders a person insusceptible of a second.

With respect to the contagiousness of Yellow Fever, the following able conclusions arrived at by Dr. M'William, of the Royal Navy, after a minute and careful investigation of the subject, introduced new ideas on the point in question. He says:—

1. That Yellow Fever is decidedly contagious on some occasions.

2. That the universality of this property being defective, importation can seldom be proved; inoculation is impossible, and the disease requires a peculiar susceptibility of condition in order to act.

3. That it is not safe to generalize from the first observation, and to conclude that Yellow Fever is at all times contagious, because it is undoubtedly so sometimes, for these reasons:—

a. Because there are fevers undistinguishable by symptoms from contagious Yellow Fever, which certainly are not contagious.

b. Because we are not sure how far contagion may not be an accidental property impressed on a poison by contingent circumstances, or may be only the development of a property of self-reproduction always possessed by the morbid poison, but generally in so slight a degree as to be unappreciable. If the former opinion be correct, Yellow Fever is both contagious and non-contagious. If the latter, it is also in the majority of cases non-contagious, in the conventional meaning of the term.

4. That contagion is only a property accidentally impressed on the Yellow Fever, appears probably,

a. Because in no other way can we explain the extraordinary discrepancies and opposing statements of men, whose honesty of purpose is undoubted.

b. Because it is almost a necessary assumption in order to explain certain facts in the history of Yellow Fever.

c. Because it is in accordance with analogous phenomena manifested by other morbid poisons.

d. Because there is really some direct proof of it in the apparent development of fever on board ships with clean habits, and the removal from the influence of the land.

5. That if this conversion of a non-contagious into a contagious poison be desired, there is no alternative but to admit the existence of a specific contagious Yellow Fever.

6. That the doctrine of a specific contagious Yellow Fever is alone supported by the fact that it destroys the necessity of admitting the convertibility of poisons, a circumstance considered by many observers as in the highest degree unlikely and unphilosophical.

We now maintain that true Yellow Fever is contagious without doubt, but that there are many affections which former writers have designated epidemics of Yellow Fever, which in fact were no Yellow Fever, but a non-contagious malignant bilious Remittent Fever.

Whilst considering the contagious nature of Yellow Fever, I shall not close without stating the views of

Deputy-Inspector-General of Hospitals, Robert Lawson, of the Army Medical Department, on the influence of pandamic causes in the regulation of fevers. He maintains that local rather than personal contiguity is the chief cause of the extension of Yellow Fever. With respect to the supposed extension of diseases, such as Cholera and Yellow Fever, by personal communication, he says: "It is clear that to settle the question the experiment should be tried whether personal communication can propagate the malady independently of the local causes, which many consider give rise to it, but the difficulty is to ensure that this has actually been done in any given case. At Newcastle (Jamaica) in 1856, cases of Yellow Fever, attributed to the low ground, were put into the hospital among the ordinary sick, and after a while some of the patients and attendants who had not been away from Newcastle for months became affected with the same disease." Now Mr. Lawson thinks that this endemic influence proves only that the causes of the disease were sufficiently active at the hospital to induce it, although there is a possibility of the fever being propagated by personal communication; but the endemic did not stop there, for after the sickness of the hospital became manifest, it was cleared, and the inmates removed to a more healthy zone about 400 feet distant. In this place the attendants and other patients ceased to be attacked, although placed under identical circumstances as far as personal causes are concerned; here the local causes were removed, the personal remained, and yet as he maintains, the disease no longer affects those subject to the latter; the only conclusion admissible is that local

and not personal causes originated the disease in the locality previously occupied by the sick.

As the instances chiefly depended on of late years to establish the personal communication of Yellow Fever, are those occurring in ships, mostly steamers, he endeavours to show that it is not only from the holds of steamers or coal ships that emanations capable of producing Yellow Fever are confined, but that other vessels might carry the impurity on board, from which the disease might be propagated. The case of the sailing vessel "Ciudade de Belem" from Para in Brazil to Lisbon with a cargo of hides and other articles, he cites as having brought the disease from the former place to the latter, where the disease first manifested itself three days after their arrival when the hatches were opened, and all hands together with the pilot and health-guard officer were attacked. Two fatal cases occurred on board before they left Para, but during the voyage not one case occurred. We have here a clear case of a ship carrying a cause of Yellow Fever in her hold across the Atlantic, or generating it there during her passage with sufficient intensity to affect the persons who were exposed to the emanations from it, on the hatches being removed at the port of discharge.

Here Mr. Lawson considers that personal communication is beyond a question, for the period which had elapsed between the possible exposure of the crew in Brazil, and the outbreak at Lisbon—forty-one days—is too long for the disease to remain in them in the incubative stage. Our present knowledge of fevers generally places the point beyond a doubt that Yellow Fever is

propagated, not only by personal, but principally by local causes acting on an epidemic constitution.*

Treatment of Yellow Fever.

Respecting the true mode of treating Yellow Fever, very little indeed has as yet been practically known; different physicians have recommended and used various means in one epidemic which in another has been found almost entirely useless; each epidemic seems to differ in character as the circumstances and the localities in which they occur differ from one another. Before commencing treatment, the medical attendant should first master the type of the prevailing epidemic, whether it is phlogistic, adynamic, or sthenic; then the ages and habits of his patients, their constitutions, the facts whether they are new or old residents, the stage of the disease, and its degree of epidemic severity. He should commence his treatment by strictly observing the recommendations detailed in the treatment of Remittent Fever—viz., a cheerful tone of voice, a hopeful expression, a well-regulated ventilation, and the room kept in proper heat.

Our attention should be first directed to the state of the stomach; then to take advantage of any seeming remission in applying proper means to put a stop to the disease, and to relieve the system from existing symptoms. When the stomach is very much distended with ingesta, and there is no great tenderness of the epigastrium, no gastric irritation, and we see the patient in the

* "Statistical, Sanitary and Medical Report, 1861," p. 406, Army Medical Department.

very early stage of the disease, it will be advisable to administer an emetic of sulphate of zinc, from a scruple to half a drachm to the dose; but if there is irritability of the stomach, and a disposition to vomiting, we should aid it by the administration of warm water.

Particular attention should at this early stage be paid to the bowels and liver; the former is in most cases in the state of constipation, and the latter in a state of inactivity. Calomel should be given in large doses, followed shortly afterwards by a brisk purgative, and the bowels should be kept continually opened by the administration of a saline purgative. Dr. Blair recommends the administration of calomel with large doses of quinine, followed by a saline draught, which should be repeated at the interval of four or six hours:—

℞.—Hydrargyri sub-chloridum . . . . gr. xx.
Quiniæ sulphas . . . . . gr. xxiv.

Misce—fiat pulvis.—To be taken immediately, followed in an hour's time by—

℞.—Magnesiæ carbonas . . . . . ʒii.
Magnesiæ sulphas . . . . . ʒii.
Aqua menthæ piperitæ . . . . ʒviij.

Misce—fiat haustus, or Lamplough's Pyretic Saline.

This remedy Dr. Blair regards as abortive doses, and should be repeated until apyrexia is produced.

Mercury is sometimes given in smaller doses after the bowels have been properly cleared. Two grains of calomel with a quarter of a grain of opium is administered every hour. Both these treatments have their merits.

The patient should be placed in a warm bath, but if too weak, warm affusion with flannel wrung in hot water should be applied to the whole body; it promotes the action of the skin, produces a pleasant feeling to the patient, and engenders cleanliness.

Where the mucous membrane has been denuded of its epithelium, *gum water* should be used, as it lubricates, defends, and soothes the raw surfaces. Dr. Blair recommends three drachms of the purest powdered gum arabic, dissolved in six ounces of cold water, and a table-spoonful administered every one or two hours. It will be relished for thirty-six or forty hours, and then the patient will get tired of it; it should now be substituted by or alternated with thin-made arrowroot.

When the surface of the skin is exceedingly hot, much relief is sometimes obtained by wrapping the body with a wet sheet or blanket, which reduces the temperature of the body by evaporation. After copious black vomit and the skin is cold, a wet sheet will also be found not only beneficial, but also most acceptable to the patient.

Our greatest care should be to meet the irritability of the stomach with the excessive vomiting which might ensue, and this is best done by giving refrigerant drinks —the effervescing diaphoretic draught recommended in page 92 (Bilious Remittent Fever), will be found the best. In many cases great advantage might be obtained by the administration of *prussic acid*, which allays the pain and irritability of the stomach. The best mode of preparing it is to be found in page 84. The patient should at all times be allowed to drink *ice water*, or a

piece of ice should be put on his tongue, and should be allowed gradually to melt down.

Chloroform (prescription, page 99), might with advantage be used; or chlorodyne, made according to the formula given in page 99, or the hydrate of chloral frequently used.

We have now to anticipate the approach of black vomit, and use every means in our power to avert it. We therefore use the pure oil of turpentine, internally and externally—a remedy which has long been recommended by Dr. Copland, and which has lately been favourably reported upon by Dr. Laird, of Her Majesty's Ship "Medea," and Dr. Archibald Smith, a practitioner in Peru. Dr. Laird administered it in fifteen minimum doses with a little nitric æther and camphor mixture, every three or four hours, until a remission came on, when he gave quinine. As an adjuvant, he employed occasional doses of blue pills, followed by castor oil, sinapism, cupping, blisters, and evaporating lotions to the head. *Out of sixty cases thus treated, only four deaths occurred.* The turpentine taken internally very seldom disagrees with the stomach, nor does it excite the pulse or induce strangury.

Applied externally with olive oil it will be found of great service; it acts powerfully when applied over the abdomen, and may stop the black vomit, as in the case of a sailor boy, reported by Dr. Laird, who had suffered from black vomit and suppression of urine. Three hours after the frictions were applied this patient made a pint of healthy urine, and, after an interval of eight hours, he passed a pint and a half more urine of the same character.

Early next morning black vomit, which had been present for about thirty-six hours, entirely ceased, and the lad appeared otherwise much improved. Whilst resisting the administration of nutritive enema, convulsions came on and he died. The following was the *post-mortem* appearance: No trace of black vomit was detected, but a very small quantity of dark green matter was found in the ileum; the mucous lining of the stomach was much congested and discoloured dark red, but its epithelium was perfectly intact, and although the liver presented the usual fawn colour, the skin was not tinged yellow. From fifteen Dr. Laird increased the dose of the turpentine to forty minims, according to the severity of the case, and gave it in combination with hydrocyanic acid.

Dr. Smith (U.S.) used turpentine in much larger doses. When administered by the mouth he gives one drachm for a dose, but in the form of an enema he used half an ounce several times a-day. He states that fifty per cent. of Indians, even in the last stage with black vomit, have been saved by its use, but it was not so successful with other coloured and mixed races, and least so with Europeans. On the decline of the fever he administered valerian with æther, camphor and musk, carbonate of ammonia, opium and creosote, camphor and opium and capsicum, with opium pills, and to prevent the accession of black vomit, he gave two minims of creosote, and half a grain of opium made into a pill every four hours.

The dose of turpentine in Yellow Fever, should not be less than thirty minims, given every three or four hours, with other diaphoretics and stimulants.

The following is a very useful formula:—

℞.—Oleum terebinthinæ	f ℥iv.
Aqua camphoræ	f ℥j.
Tinctura cardamomi co.	f ℥ijss.
Spiritus atheris sulphurici	f ℥iv.
Syrupus aurantii	f ℥iss.

Misce—fiat mistura.—Half an ounce to be administered every three or four hours.

When there is suppression of the urine, or a tendency to it, opium, either in the form of morphia, powder or tincture, should be cautiously administered, as so susceptible is the system to the effects of opium that a tenth of a grain in some constitutions may prove fatal.

Dietetic Treatment.

The food of the patient should be properly regulated. Dr. Blair suggests that the food during the course of Yellow Fever, should be of the blended description, chicken, tea, arrowroot, sago, and barley water, constituting the chief articles, and these should be taken in minute quantities, at a time when the stomach is at all irritable. This rule also applies to drinks of all kinds. The patient is greedy for a large draught of fluid, but by sucking it through a glass tube of small bore, or by a tea or table-spoonful, there is a greater probability of their being retained. A cold effusion of oatmeal was found an agreeable drink for men who are accustomed to the meal. A dislike of sweets was observed among the patients, and when lemonade was asked for, the usual quantity of sugar was objected to; probably from its rendering the liquid too dense for ready absorption by the stomach, and therefore less quenching. Tea was found so uniformly to dis-

agree with the patients and occasion vomiting, particularly in the advanced stages, that at length it had to be expunged from the Yellow Fever dietary. Dilute alcoholic drinks were given freely and with good effect. Where brandy could not be obtained, pure whiskey (tolerably free from acidity and fusil oil), and well diluted with water, answered every indication. In some instances the effervescing wines were relished and retained, but they are very liable to the objections of changing foreign matters, and the production of mismanaged fermentation.

General blood-letting was at one time regarded by many physicians as the best remedy that could be resorted to in Yellow Fever. Thus Dr. Rush recommended that sixteen ounces should be taken from the arm at one time, and repeated if necessary. Dr. Robert Jackson, thirty to forty ounces at a time, and repeated until a powerful impression is made on the disease. Dr. Chisholm recommends "bleeding to the extent necessary." It is, however, a treatment which is found to do much more harm than good. Mr. Laird found it extremely hazardous. Sir Ranald Martin remarked that blood-letting has not proved needful or useful, whether in the epidemic as it prevails on the African coast, or that of Spain, or yet in the West Indies. In fact, as in Cholera so in Yellow Fever, the shock to the organic nervous system, and the injury to the blood, especially when the subjects of treatment are placed in low, damp, or crowded localities, induce so great a prostration to the nervous and vascular functions, even in the young, and in those of a phlogistic habit, as to render any considerable abstraction of blood a more than questionable operation.

But great advantage will be derived by local depletion, either by leeches or cupping, when there is great determination of blood to the head; when the epigastrium is tender and painful; when the liver shows signs of incipient inflammation, and when the spleen is inflamed and painful.

The following are the treatments recommended by Dr. McKinlay: Purgatives, calomel and antimony every three or four hours, cooling saline diaphoretics, sponging with vinegar and water, quinine and bitter infusions during convalescence, with barley and ice water for drink. To alleviate and overcome vomiting, he used an effervescing draught in *combination* with tincture of opium, enemata containing turpentine, sinapism, and blisters on the epigastrium.

Treatment during convalescence.—When the active stage of the disease is known to be subdued, one should have recourse to remedies which should prevent its recurrence and establish the patient in his usual health.

The bitter tonics will be found of great use, and those only should be given which sit readily on the stomach, and do not produce constipation, but keep the bowels gently open. Such remedies are indicated because the digestive organs are in a most disturbed state. Cusparia, which is an aromatic, tonic, and stomachic, will be found of great use; the infusion might be given in combination with aromatic spirit of ammonia or chloric ether, or the following mixture might be administered instead :—

R.—Tinctura cuspariæ	f ℥vj.
Infusum ejusdem	f ℥vj.
Tinctura cardamomi co.	f ℥vj.
Spiritus ammon. aromat.	f ℥j.
Syrupus aurantii	f ℥iij.

Misce—fiat mistura.—Two table-spoonfuls three times a day.

But when, as is often the case in the tropics, cusparia could not be obtained, quinine, in small doses often repeated, will be found of great service. The *diet* should be properly regulated at the very beginning of convalescence. The patient should still be treated with arrowroot, beef tea, barley water, sago, chicken broth. Afterwards he should be allowed to take substances which are easily digestible, such as fish, chicken, boiled mutton, and young pigeons. The drink should be confined to small doses of good brandy and water, or soda water, often repeated, and some good port. When he could eat fish and mutton, then porter might be allowed, and perfect cleanliness in person, clothing, and bed linen should be strictly enjoined.

For *Prophylactic treatment* of Yellow Fever, *vide* Intermittent Fever, page 56.

V.—BREAK-BONE FEVER.

Dengue or Break-bone Fever is a disease characterized by the presence of a febrile paroxysm of a continued type, accompanied with rheumatic affections of the joints, and papular eruptions over the body. It was first noticed by Dr. Rush, in 1780, in Philadelphia. In 1827 an epidemic of it occurred in the West Indies, where it received the name *"Break-bone"* Fever from the coloured inhabitants. Among the Spanish population it is called the *Dengue*, and among the black population of St. Thomas it is known as the *Dandy Fever*; it is the *scarlatina rheumatica* of Aitkin.

Symptoms and Progress.

At the commencement of the affection the patient complains of the general symptoms of fever—viz., headache, listlessness, pain in the eyeballs when moved, and great intolerance of light; the skin is hot and dry, the tongue not visibly changed at the beginning, but sometimes covered with a white fur; the eyes are red and sometimes watery, the pulse frequent and strong; the individual complains of extreme weakness and debility, and sometimes of sleeplessness. After this state has

continued for a day or more, he complains of pain in the loins and sometimes on the side, and then on the back of the thigh and leg; pain now slightly affects the whole of the joints of the body, especially the ankles and knees. In persons who have irritable stomachs, nausea and vomiting are amongst the symptoms, as well as uneasiness about the epigastrium.

At this stage the lymphatic glands begin to be disturbed from the transmission of injurious secretions from the joints and muscles already affected; at first a slight pain is felt in those of the groin, axilla and neck, which increases rapidly as they are touched; the glands are swollen and tender; the testicle, more particularly the epidydimus, now participates with the other glands in their inflammatory condition, and becomes much enlarged; the glands of the skin next follow, and a papular eruption soon covers the surface.

This febrile state lasts from a day and a half to three or four days, and the patient falls into a remission, suffering, however, from slight rheumatism, with pain in the swollen glands and extreme weakness; so great indeed is the weakness, that patients will be found to express themselves that they feel as if they have no members attached to their body. This remission continues for two, three, or four days, and if proper means are not employed for the suppression of the fever, a paroxysm occurs which is severer than the first, and there is a marked increase in the rheumatic pains of the joints; there is nausea, but no vomiting; the tongue is coated with a dark brown fur, and the weakness much increased; the gums present a scorbutic appearance, red and spongy, which, in a very

severe case, ulcerates; the pulse is slow and weak, and there is cold sweat occasionally all over the body.

At this stage, the patient generally complains of heat in the skin, with itching, and on the sixth or seventh day an eruption appears, first on the upper part of the body, and then spreads over the whole surface. The "eruption is extremely variable in character, being sometimes smooth, red and continuous, as in scarlatina; sometimes in patches, rough, and of a darker hue, as in measles; and occasionally also either papular, vesicular, pustular, or furunculous; and often there is a mixture of two or more of these forms. Cutaneous affections like urticaria and erysipelas are also occasionally observed; and even carbuncles occur; in some few instances the eruption assumes a petechial character," and upon subsiding, these various forms generally resolve themselves into a furfuraceous or scaly desquamation. After the disease has run its course and terminates in these eruptions, the patient becomes gradually free from fever and pain, but there remains some stiffness and soreness in the joints, with great weakness, especially if the patient had only newly arrived in tropical climates, and great depression of spirits.

In very severe cases, the pain in the testicle will be found to be very severe, with enlargement of the epidydimus, and effusion of serous fluid in the sac of the tunica vaginalis; the joints will remain painful and puffy; there will be pains in the muscles; sometimes intercostal neuralgia and pain in the joints. There may be great anxiety and extreme nervousness, with intermittent palpitation of the heart; the various lymphatic glands which

had been swollen may now form indolent tumours, but they very seldom suppurate, except excited by other causes.

Causes of Dengue.

The causes of Dengue can only be traced to epidemic influences in places where malaria is rife; many sporadic cases are met with, assuming various forms, but they are not so well marked as when under epidemic influences. It attacks all classes, rich or poor, male or female, black or white, the very young or the very aged. It is decidedly contagious and dependent on specific poison, occurring in many or every member of a family. It has been transported from the West Indies to the West Coast of Africa in the dirty linen of the female followers of soldiers, during the reliefs of the detachments of the West India Regiments. Malaria seems to have some influence in moderating or intensifying its symptoms; in a less malarious district the symptoms are generally mild, the remission longer, the weakness not very great, and the papular eruptions moderate; but all these are met with in exaggerated forms where the malaria is concentrated. Dengue bears some pathological affinities with the other malarious diseases, but it is not dangerous.

Pathology and Morbid Anatomy.

This disease has a regular intermission, which lasts for some days; in its course certain eruptions appear on the skin, which generally relieve the internal irritation; it is accompanied with paroxysms of arthritic pains, which are dependent on the epidemic or local influence which brings on the disease; these do not begin with the symptoms or

phenomena characteristic of Rheumatic Fever, but most likely are occasioned by certain abnormal conditions of the primary assimilative organs; the nerve sheaths and the various lymphatic glands are affected, bubo induced, and the testicles enlarged.

Epidemically it occurred in Philadelphia, 1780; in Calcutta, Berhampore, Benares, 1824; New Orleans, Island of St. Thomas, Charleston, and Savannah in 1827; the Southern States of America, Charleston, and the ports on the Gulf of Mexico in 1850. Sporadically it occurs in the Intertropical States of America, in the East and West Indies, and in Western Africa. The attack lasts generally from eight to ten or twelve days.

Diagnosis and Prognosis.

It can be distinguished from all the other paludal fevers by the persistency of the rheumatic or neuralgic symptoms, and by the cutaneous eruptions as well as the length of the remission. It is less fatal than any of the other fevers.

The prognosis is almost always favourable, although the symptoms may be alarmingly intense. It is unfavourable when it occurs in the very aged and infirm, and accompanied with severe weakness, or in the infant, leading to convulsions.

Treatment of Dengue.

The indications in the treatment are:—

1. To remove from the *primæ viæ* any ingesta which might in the course of the disease lead to irritation.

2. To mitigate the febrile symptoms.

3. To use means during the remission to prevent the recurrence of the paroxysm, or mitigate its influences.

4. To use appropriate means during convalescence.

The *first indication* is fulfilled by giving the patient a mild purgative, which will clear the stomach and bowels speedily from all hurtful accumulations, and at the same time spare the strength; the best means is castor oil, half an ounce to an ounce to be administered. Lamplough's Pyretic Saline is more agreeable, and may be given, but should be repeated during the course of the disease.

The *second indication* is fulfilled by applying hot bricks to the feet and sides, ice and water to the head when it is painful, and an effervescing diaphoretic draught, as recommended in page 92, can be given with very good results. The pains should be subdued by the use of anodyne, of which opium in moderate doses, or hydrate of chloral often repeated, will prove to give great relief. Dover's powder at bed-time is a safe remedy.

The *third indication*—viz., to use means during the remission to prevent the recurrence of the paroxysm, or mitigate its influence, is most important, as by applying judicious means the system might be freed from the painful results of the second paroxysm. We have now sufficient time to apply means to accomplish our design, which we should do fearlessly and with vigour. The bowels should be kept free with a saline purgative, and strong tonics should be administered; a combination of quinine with alkali is the best. Whilst we endeavour with the tonic to prevent the recurrence of the paroxysmal fever, we at the same time endeavour with the alkali to remove the morbid substances which have been circulated in the system by means

of the blood, and which have such fearful effect on the glands and joints. The following mixture will be found to answer the purpose :—

℞.—Potassæ carbonas	} ana ʒi.
Potassæ nitras	
Quiniæ sulphas	ʒss.
Tinctura aurantii	f ʒiij.
Aqua pura	℥vss.

Misce—fiat mistura.—One ounce to be taken every three hours.

Should this mixture disagree with the stomach, the alkali might be given repeatedly with some vegetable bitters, such as quassia or columba, or gentian, and the quinine administered alone. Narcotics might be given to procure sleep at night, should there be much wakefulness and restlessness, of which the best is the compound soap and opium pills, or the tincture of opium or morphia. By the adoption of these means the remission might continue with complete recovery, and the rheumatic pains gradually subside. But should the febrile stage reappear, it will be milder, with smaller eruptions and less constitutional disturbance. We must combat the weakness and exhaustion by the free use of wine, with malt liquor, porter more answerable. The diet should be very nutritious and light.

The remedies to be prescribed with a view to treatment in convalescence, are those which relate to the local distress consequent on the disease. The lymphatic enlargement, the adenites or bulbs, the enlarged testicles with hydrocele, and the enlarged glandulæ concatenatæ of the

neck, should be painted over with the iodine paint, made after the following:—

℞.—Iodinii . . . . . ℥j.
Potassæ iodidi . . . . . ℥ij.
Spiritus vini rectificati . . . . f ℥j.

Misce.—For external application only. An iodide of potassium mixture should be given internally.

The treatment of *the rheumatic pains* should consist in the administration internally of quinine and iron, *e.g.*, the citrate of quinine and iron with alkalies. A blister should be applied to the course or seat of the pain, and the surface dressed with morphia. The treatment of the *eruptions* should consist in the application of the simple bismuth ointment.

PART II.

TROPICAL ABDOMINAL DISEASES.

GENERA.

A.—INTESTINAL DISEASES.

I.—Indigestion (Dyspepsia vel Pyrosis—Indigestion).

II.—Constipation (Obstipatio—Costiveness).

III.—Dysentery (Dysenteria vel Colitis—Bloody Flux).

IV.—Diarrhœa (Alvus Soluta—Looseness of Bowels).

V.—Asiatic Cholera (Cholera Morbus vel Maligna—Epidemic or Malignant Cholera).

B.—VISCERAL DISEASES.

I.—Organic Diseases of the Liver.

1.—Hepatitis—Inflammation of the Liver.

2.—Hepatic Abscess—Abscess of the Liver.

3.—Chronic Hypertrophy—Chronic Enlargement and Induration of the Liver.

II.—Functional Diseases of the Liver.

4.—Hyperæmia—Congestion or Simple Enlargement of the Liver.

5.—Excessive Secretion of Bile.

6.—Deficient Secretion of Bile.

7.—Vitiated Secretion of Bile.

8.—Icterus vel Morbus Regius—Jaundice.

III.—Diseases of the Spleen.

1.—Chronic Splenitis with Hypertrophy—Ague Cake.

A.—INTESTINAL DISEASES.

I.—INDIGESTION.

Dyspepsia,* or indigestion, is a functional disorder of the stomach, which has an obscure origin, neither dependent on, nor symptomatic of inflammation or irritation of that organ, producing a depression or diminution of the action of the stomach, and an imperfect performance of the functions of digestion.

It is a disease of very common occurrence in tropical climates, where the abuse of spirituous liquors is more the rule than the exception, and in many cases it is the precursor of other diseases more peculiar to tropical climates. I shall here treat Dyspepsia in its extensive sense, as all the causes which contribute to its occurrence in temperate climates have led to its production in tropical climates, where climatic causes make the symptoms more exaggerated and the cure more difficult.

Symptoms and Progress.

The symptoms of Dyspepsia are very various, as the disease is seldom seen in its origin, not until the patient

* From δυσπεπτω, I digest with difficulty.

has been suffering from it for some time. He complains sometimes of pain in the region of the stomach, which might be only slight, when he expresses himself as suffering from *heartburn* or cardialgia; but more frequently he complains of an undefined uneasiness in the epigastric region which constantly gnaws him, without any real pain, but it is decidedly uncomfortable, accompanied generally with a burning heat, or a sensation of slow vascular irritation. Sometimes the patient strikes his stomach or ties a handkerchief round it tightly, so as to change the sensation. The heartburn is generally felt soon after a meal is taken, but sometimes with an empty stomach, depending most probably on an acid state of the stomach.

The uneasiness of the epigastrium is relieved by eating, as it is much more felt when the stomach is empty; but sometimes a full stomach is accompanied by a feeling of distention and weight, which in many cases continues to such an extent that the patient is only relieved by vomiting. There is at the same time no irritability or inflammation of the stomach or deodenum.

In many forms of Dyspepsia the pain comes on in paroxysms, sometimes very severe or violent, accompanied with flatulent distention, with shooting pains in the shoulders and sides; the abdominal pain is gastralgic and spasmodic, and is known commonly as gastrodynia. Sometimes a dull aching pain supervenes about half-an-hour after a meal, accompanied with flatulent eructation and distention, and a very impaired appetite, and in other cases it occurs two or three hours after.

The most frequent and troublesome symptom is the

loss more or less of the appetite, which is known as *Anorexia*. Sometimes, however, the patient complains of a feeling of hollowness and sinking in the stomach when it is empty, which makes him crave after food; the appetite is in a morbidly perverted state; there is no proper healthy feeling of hunger, which would be produced if there were a disorder of the innervation. Although we might consider *hunger* as a sensation which primarily originates in the stomach, and is conveyed to the nervous centre by the conditions of the capillary vessels distributed throughout the body, yet still its immediate cause is the want of the nitrogenized and non-nitrogenized substances which are necessary to repair the waste of tissue caused by our every-day actions. The former goes to supply the albumen and fibrine in the tissue consumed by the action of the body, and the latter to the maintenance of animal heat by the union of oxygen and hydrogen, and other chemical changes. After the food has undergone the necessary changes in the chylopoetic viscera, it is distributed into the various tissues of the body, and hunger is felt, and "as non-nitrogenized substances are intended," writes Dr. Barlow, "mainly for the supply of carbon and hydrogen to support the eremakausis, by which carbonic acid and water are being continually formed and exhaled by the lungs, it must follow that when this process is greatly impeded, as when the pulmonary circulation is obstructed by disease of the initial valve, or old capillary bronchitis, or when there is general venous congestion from feeble circulation, we have loss of appetite. And the same thing occurs in respect to the nitrogenized substances, when

there is a disturbance of the capillary circulation and consequent suspension of the vital functions in fevers. Whatever, therefore, materially embarrasses either the pulmonic or systemic circulation will destroy the appetite." For similar reasons the same result is obtained if the functions of the skin, or kidneys, or any of the different excretory organs be disordered.

One very troublesome symptom is the eructation of wind or belching, which is produced by the evolution of gases generated by the fermentation of food in the stomach. It is very unpleasant, and when detained in the stomach undergoes the same changes "which a similar mass of organic matter would do if placed in a bag and kept moist at the same temperature. Sometimes, however, this gas appears to be secreted by the stomach itself, for some persons suffer from it when that organ is empty, and are particularly liable to be troubled by it when a meal is delayed beyond the accustomed hour. When eructations are produced by the decomposition of the food in the stomach, they will often be most offensive, even to the patient himself, sometimes suggesting to him the idea of rotten eggs or foul drain, from the amount of hydro-sulphuric acid evolved." Sometimes an intensely acid fluid or portion of the food in the stomach is brought up in the act of belching, which is very disagreeable.

In many cases the patient suffers from nausea and vomiting, which at times become very troublesome. Sometimes, after considerable retching, the patient brings up a little mucus or some yellow biliary fluid; this is very often met with when the cause of Dyspepsia is produced

by excess in eating and drinking, and then the patient generally complains of having a bilious seizure, or being *bilious*. In other cases the individual suffers from *water-rash* or *pyrosis*, which produces considerable annoyance. It occurs generally in paroxysms, and commences with a feeling of constriction and pain at the pit of the stomach, which in some cases is felt between the shoulders and increased by any attempt at raising the body into an erect position, the pain is severe, and comes on principally when the stomach is empty; it is accompanied with a burning sensation, and an eructation of a thin watery fluid, generally tasteless, but sometimes acid. The digestion is very much impaired, which might be caused by the dilution of the gastric juice by the watery fluid, thus impairing its solvent property. The period at which the attack is principally felt is in the morning and afternoon, and sometimes a large quantity of the watery fluid is secreted as soon as the patient is about to commence a meal; and it is an affection which, when once it has occurred, is apt to re-occur.

But there are other symptoms of a general nature which are felt in cases of indigestion, and which are consequent on, but not the cause of, the derangement of the stomach. "Among these are various disordered sensations, such as headache, giddiness, and heaviness of head, muscæ volitantes, and other results of perverted vision, tinnitus aurium, and other unreal sounds, irregular pains between the shoulders, in the back, and other parts of the body; a feeling of coldness between the shoulders, stricture or uneasiness about the throat, and irritation in the larynx and fauces, leading to frequent attempts to clear the

throat, which at length become habitual. There is often, also, general uneasiness or malaise, a tendency to low spirits, a feeling of indifference, or of anxiety and apprehensiveness, an indisposition to exertion, irritability of temper, fretfulness, &c.; the patient is apt to imagine himself affected with consumption, organic diseases of the heart, or some other incurable malady; palpitation of the heart coming on at irregular intervals, dyspnœa, and a short dry cough are not unfrequent symptoms, and tend to confirm these melancholy impressions. The patient in general sleeps badly, is disturbed by unpleasant dreams, sometimes by nightmare, and awakes unrefreshed and depressed in mind. Sometimes, however, he sleeps soundly, whilst in another case there is a morbid tendency to drowsiness. Occasionally there is a discharge of frothy mucus after a hawk, the pulse is generally irregular, sometimes too slow, at other times too fast, and frequently irritable. The tongue furred, especially in the morning, when there is a sour taste in the mouth on waking. The urine is sometimes copious, limpid, and almost colourless; at other times scanty, high coloured, depositing sometimes a lateritious, and at other times a whitish precipitate. Sometimes, again, it is quite natural. Now and then there is abnormal acidity in the urine, at other times abnormal alkalinity" (*Parkes*)—which exists when there is torpid digestion and acid vomiting; in the former case the urine is scanty and deposits urates and oxalates of lime, and the principal symptoms are cardialgia, nausea, and frontal headaches. Crystals of oxalate of lime are common, and chloride of sodium is diminished.

The skin is sometimes dry and the temperature irregular,

sometimes hot, at other times cold; the bowels are generally constipated or costive, unless when accompanied with other disease, such as functional disorders of the liver, with an excessive increase of bile, when bilious diarrhœa or chronic inflammation of the bowels is the result. In cases of indigestion the flow of bile is generally diminished when the stool is hard and scanty, of a clay colour, which might diminish the peristaltic action of the intestines below their point of exit in the deodenum, delaying their contents; and thus act primarily on the functions of the stomach, but sometimes it is perverted. When the disease has lasted for a long time, the patient loses flesh, becomes emaciated, pale, and sallow, presenting an anxious countenance.

It is not in all cases that the disease is allowed to run such a severe course. In many cases the patient is seen when he has suffered only from a few paroxysms, and has not gone through all the symptoms above detailed.

Pathological Anatomy of Dyspepsia.

Dyspepsia, as we have before stated, is virtually a functional derangement of the stomach and neighbouring viscera, and, therefore, before considering its pathology, we must bear in mind those circumstances which are essential to secure healthy digestion. They are, as stated by Dr. Hughes Bennett, the following :—

1. A proper quantity and quality of the ingesta.
2. Sufficient mastication in the muscular coat of the stomach.
3. Active contractility in the muscular coat of the stomach.

4. Proper quantity and quality of the gastric, biliary, and pancreatic fluids.

5. A consecutive and harmonious action of the intestinal canal.

There is always great depression of the innervation of the stomach, produced by various causes, sometimes accompanied with secretion of excessive watery fluid interfering with the action of the gastric juice during chymification; the deficient innervation disturbs or prevents the peristaltic action of the stomach, hinders the proper admixture of the gastric juice with the food, and consequently the proper solution of the ingesta, which, unremoved from the intestines, and aided by the heat of the body, undergo chemical decomposition, the result of which is acetic or hydrochloric acid and various gases. This leads to flatulency and acid, watery eructation, and by its irritation on the mucous membrane of the stomach, leads to what is commonly known as heartburn.

The nervous disorders which generally accompany severe forms of Dyspepsia are caused by sympathetic action in the nerve centres from the disturbed state of the stomach and the vitiated bile; constipation and congested portal circulation might be induced from the same cause.

Causes of Dyspepsia.

1. The most common cause of indigestion in tropical climates is *an excessive use of alcoholic and vinous drinks or habitual drunkenness;* the stomach here is called to perform excessive work, and then a reaction follows of

great depression, which might lead to an entire loss of excitability; the individual suffers from bilious and gaseous eructations, and is very much distressed.

2. *Excess in eating,* as well as the *habitual use of food that is difficult of being digested,* is also another prolific source of indigestion. The stomach is greatly excited and over distended, leading to that feeling of weight and fulness already described; frequently there is bilious vomiting which greatly relieves the patient.

3. *The habit of eating rapidly* is another cause, and this is due to improper mastication or mechanical trituration of the food; to the insufficient action of the saliva on it either in mixing it with air and giving it viscidity, or in acting chemically on the food, changing the farinaceous compound into glucose; and lastly, to the overloading of the stomach.

4. *Mental emotion* also affects the digestion. It is a most common thing to see persons who have suffered great trouble, suffer from Dyspepsia; also persons of melancholy temperament, literary men who are subject to intense and protracted study, the dissatisfied and despondent, persons engaged in absorbing mental occupations, whether of a literary or a commercial nature. Mental emotion paralyzes the action of the nerves supplying the stomach, and therefore interferes with its contractile movement, which is necessary for the due admixture of the gastric juice with the ingesta, and the rapid removal of the chyme from the stomach to the deodenum, and Dyspepsia is the result.

5. *Excessive exercise* or *over fatigue* has similar effects by exhausting the muscular action of the whole body,

and consequently acts on the contractile movement of the stomach.

6. *Sedentary habits* have a decided effect in impairing the gastric energies, the stomach participates in the general debility of the whole system, which is caused by want of exercise. It at first exerts itself to overcome the difficulty, and then falls to a proportionate degree of weakness, and by its continuance becomes permanently affected. This is one of the great causes of *Dyspepsia* amongst European ladies in tropical climates.

7. *A derangement of the "consecutive and harmonious action of the alimentary canal,"* by retaining the unassimilated portion of the food, is another cause of Dyspepsia.

Thus we have seen dyspeptic symptoms produced by whatever obstructs the contractibility of the alimentary canal, by whatever mechanically occludes its calibre, or by whatever produces a structural change in its mucous surface.

8. *Undue increase, diminution, or perversion of the pancreatic, biliary, or gastric juice,* form other causes for deranging the digestion, and will always require treatment. The functions of these several fluids in the human economy make their derangement of very great importance, the pancreatic juice acts on the fatty compounds of the food as they pass through the deodenum; the second facilitates the assimilation of the nutritive portion of the chyme; and the third acts on the albuminous compounds in the stomach, so that any deviation from the natural condition leads to impaired digestion.

9. *Imperfect performance of the functions of the glands of the general surface.*

10. The last, and by no means the least, cause of indigestion is *idiosyncrasy*. There are some persons who find particular kinds of food to have an injurious effect on their digestion, whilst those same foods are used with impunity by the general mass. The remedy of course is obvious.

Diagnosis and Prognosis.

Dyspepsia might be mistaken for chronic gastritis, but the following symptoms which are characteristic of the latter disease, will enable us to discover the distinction at once. There are marked symptoms of inflammation, the pain is severe, and is increased by pressure over the pit of the stomach, vomiting more frequent and pulse more accelerated, the tongue often red, there is a general dislike to food; the vomited matter is sometimes mucous or muco-sanguineous, or even coffee ground, and hot drinks increase the pain.

Prognosis.—This disease is by no means a fatal complaint of itself, but it may change its type from being purely functional to organic, and the patient may die from the exhaustion that may be produced. Most frequently the disease terminates favourably, especially in recent cases, but there are cases on record where it sets up functional and ultimately organic diseases of the liver and pancreas which make the prognosis unfavourable. Prolonged cases of Dyspepsia terminate most frequently in chronic gastritis.

Treatment of Dyspepsia.

There are three things worthy of consideration in the treatment of this disease, viz. :—

1. The correction of any general habit which might be observed to act injuriously on the patient.

2. The use of proper diet to suit the peculiarity of each case.

3. The application of remedial agency to existing symptoms.

The first indication is fulfilled by advising the patient against excess in everything, both in eating and drinking. The old rule, *be moderate in all things*, should be strictly obeyed. The patient should allow time for digestion to take place before he again calls the stomach to work; four hours at least should intervene before each meal. "When a person," says Dr. Barlow, "in good health has taken a heavy though moderate meal, including animal food, he can well go on for six hours or more, and even though actively employed, he will hardly be ready for another within that time. When, indeed, the food has been of a light, simple kind, bread, or bread and milk, or bread and butter with tea or coffee, the stomach will have sooner emptied itself, and be sooner ready for reception of more food, and therefore, Dr. Abernethy's rule of six hours, which allowed from four to five for digestion and one for rest for the stomach, was a very fair one for the interval after a full meal; but with feeble persons, and after a meal of soluble food, the stomach would be empty, and after a time exhaustion will succeed much within this period. For persons who take very light and

very soluble food, four hours are perhaps a sufficient interval. Nothing, however, can be more obviously absurd than putting one meal into the stomach before the former one can have been converted into chyme, and have passed the pylorus, and thereby requiring the stomach to supply gastric juice for substances in different stages of solution. For similar reasons a variety in the articles of food must be had, and also because the use of several dishes affords a series of fresh stimuli to the appetite, and induces the taking too much." When Dyspepsia is thus produced, and there is reason to believe that the stomach is over distended with solid ingesta, great relief will be obtained in the administration of an emetic, or if vomiting exists, to encourage it by warm deluents. If, however, the stomach be not distended and acid eructations exist, a purgative should at once be administered.

The following will be found to be an excellent epitome of the habits necessary to be corrected: Eating too much at one time, eating too often or too seldom, taking too great a variety of food at the same meal; drinking too much liquid before or with the meals; imperfect mastication of food; the habits of resuming bodily or mental occupation directly after eating; indolent and sedentary habits; the neglect of personal cleanliness (daily ablution of the body with cold water in the shower bath, followed by friction with a rough towel, or the flesh brush, or hair gloves, should be particularly insisted on); the abuse of purgative medicines, that is to say, taking purgatives, not because the bowels require them, but because the patient feels uneasy; the habit of drinking, smoking, chewing tobacco, opium eating, and drinking tea and coffee in

excess. If any particular article seem to disagree, it should be carefully avoided. Where there is much flatulence, vegetables and fruit in excess will be often found to increase the disorder. Every source of mental depression to be avoided; relaxation in all cases to be recommended from mental application or severe studies; change of air should be encouraged, with light reading, innocent amusements, mild open-air exercise, cheerful society, active and proper occupations, good sleep, well-ventilated sleeping apartments, and friction over the abdomen. Sometimes Dyspepsia is found amongst persons who are addicted to the dirty habit of spitting, the prevention or avoidance of which produces a cure.

Exercise should always be insisted on, as it increases the action of the lungs and heart, supplying every part of the body with blood, and properly adjusts the nervous influence, but the exercise should not be fatiguing, and if at all violent, it should not be just before or after a meal. In the former case it destroys the appetite, and in the latter increases the Dyspepsia. There are "two different kinds of passive exercise, the best as a general rule for Dyspepsia is riding on horseback; the next best riding in a somewhat rough vehicle, or over a rough road." These forms will, however, be injurious to persons of delicate constitution, but they will find the like advantage in driving in an ordinary open carriage, or sailing, or in India travelling on a railway. Of the modes of active exercise, "walking is best for persons somewhat advanced in life; running, leaping, &c., may be practised by the young. Gymnastic exercises are also useful, but care is necessary to avoid the temptation of carrying them

to extremes. In bad weather and for persons who cannot conveniently leave their homes, exercise of various kinds within doors should be contrived. The ordinary household duties afford abundant opportunities for active exercise to females. When the patient cannot command the means or opportunities for riding, he may substitute the plan recommended by Halsted, or some analogous one for giving passive exercise to the stomach. This consists in bending the body forward, and so relaxing the abdominal muscles as to allow the hands to be pressed with their palms upwards beneath the stomach, and then by gentle and repeated impulses with the fingers, keeping up a regular movement in that organ." This will be found of great use in flatulence, or when the indigestion is not accompanied with any pain.

The second indication, *the use of proper diet to suit the peculiarities of each case,* is fulfilled by the employment of easily digested food and the avoidance of every substance of difficult digestion; but I must here remark that in numerous cases what may be found palatable and wholesome to some individuals, may be injurious to others, so that it is very difficult to lay down any general rule; but the following are obtained from experience and from the best authorities on the subject: Of meat the following will be found of easy digestion: tender beef or mutton, chicken or common fowl, the flesh of phlintambo or deer, pigeons, partridges, and other small birds; the flesh of different kinds of wild animals, raw oysters, calves' liver, and soft-boiled eggs; but when meat is recommended it should be entirely free from fat and skin, and open-air exercise should always be insisted on, so as to impart free

action to the excreting organs and insure complete digestion, otherwise the breath becomes offensive, tongue loaded, urine foul, and the eructation disagreeable.

Fresh milk is a highly nutritious diet and very easily digested, and is very much recommended when chronic gastritis is diagnosed; ice cream, when it could be obtained, will be found very agreeable, but it must be allowed to dissolve freely in the mouth and be eaten slowly.

Other substances of a doubtful nature might also be allowed, but this must depend on the discretion of the practitioner. These are generally of vegetable origin; they are apt, if not judiciously used, to produce acidity and flatulence, but, however, their total avoidance might lead to disagreeable consequences. The substances to be preferred are wheaten bread, which should always be light, stale, and perfectly free from acid, crackers made without shortening of any kind, well-boiled rice, and Irish potatoes, either roasted or boiled, so as to be dry and mealy. The sweet potato (*canvulvulus batatas*) when dry and mealy is also good; when otherwise, it produces flatulency. Tomatoes agree with great many people. Among the Jollof tribes in north-western Africa, who are peculiarly subject to Dyspepsia, tomatoes are used in almost all their food. Sometimes they use instead the fruit pulp of the boabab, or monkey-bread tree.

There are other substances which when used in small quantities act as stimulants to the digestive apparatus, but when abused act injuriously—viz., the usual condiments, salt and pepper (black and cayenne), radishes, mustard, pickles, sauces, &c.

Dr. Aitkin has given the following dietary, when a fair amount of exercise is taken, as a modification of that proposed by Dr. Leared :—

BREAKFAST (8 A.M.).

Bread (Stale)	4 oz.
Mutton Chop, or other Meat (Cooked), free from Fat and Skin	3 oz.
Tea, or Warm Milk and Water and Sugar, or other Beverage	¾ of a pint.

LUNCHEON (1 P.M.).

Bread (Stale)	2 oz.
No Solids, such as Meat or Cheese.	
Liquid	¼ of a pint.

DINNER (5 OR 6 P.M).

Bread (Stale)	3 oz.
Potatoes and other Vegetables	4 oz.
Meat (Cooked) free from Fat and Skin	4 oz.
Liquid, not more than	½ of a pint.

TEA OR SUPPER (NOT SOONER THAN THREE HOURS AFTER DINNER).

Bread (Stale)	2 oz.
No Solids, such as Meat or Cheese.	
Tea, Weak Brandy and Water, or Sherry and Water, Toast and Water, to the extent of	½ of a pint.

Of the substances to be avoided as being difficult of digestion, we may mention all fruits, whether fresh, preserved, or pickled, all fat, salted and smoked meat, and those which are tough, from whatever source derived. Of the particular kinds of animal food, pork, pig, veal, domestic ducks and geese are particularly difficult of digestion, also grouse and the flesh of helon deer. The

flesh of very young or very old animals is usually less digestible than that of the same animal in the intermediate stages of life. Fish is generally deemed of difficult digestion, and most shell-fish, especially mussels and lobsters, should be avoided by the dyspeptic. The following substances should also be avoided: Pastry, fresh, hot, and heavy bread, puddings, cakes made with butter or fat, hard-boiled eggs, jellies, gravy, large quantity of soups, fried meats, sausages, and cheese; butter, lard, and fat after being subject to heat. Acid vegetables might lead to acidity, except in some particular cases, when taken in small quantities. So also honey, brown sugar, and molasses.

The correction of drink is an invaluable remedy in the treatment of indigestion in tropical climates. Excessive use of vinous or spirituous drinks forms the primary cause of Dyspepsia in the tropics. The patient should be put under regular allowance, and if healthy and of a robust habit, should be prevented entirely from its use, since the best drink in all dyspeptic cases is pure, cold water. If drink of any kind be advisable, a small quantity of pure French brandy with equal quantity of water should be given at regulated intervals.

The third indication is the *application of remedial agency to existing symptoms.*

The first symptoms which we are generally called upon to relieve is the removal of unwholesome ingesta from the intestinal canal, and the remedy best suited for this purpose is that which combines both a tonic and a laxative property—thus the combination of rhubarb and aloes, with the addition of a little ginger, will be found excel-

lent, when there are no piles or irritation in the uterus, as in the following:—

℞.—Extractum aloes socatrinæ . . . } ana ℈iiss.
Pulvis rhei . . . . . }
Pulvis zingiberis . . . . . ℥ss.
Syrupus . . . . . q. s.

Misce—fiant pilulæ xij.—Of which two to be taken at bed-time occasionally.

But when there is a marked deficiency in the flow of bile, the *compound colocynth pills* with *calomel*, or the *podophyllin resin*, will be found of greater use; or a mercurial purgative might be given in combination with *taraxacum* with advantage.

℞.—Extractum taraxaci . . . . . ℥j.
Pilula hydrargyri . . . . . ℈j.
Pilula rhei . . . . . ℈iiss.

Misce—fiant pilulæ xij.—Two to be taken at bed-time.

Sometimes the prominent symptom is severe acid eructation or water-rash. This should be neutralized by the use of some alkali; *bismuth* in combination with *magnesia*, as in the following, I have always found to be very rapid in its cure:—

℞.—Magnesia carbonas . . . . . ℥i.
Bismuthi subnitras . . . . . } ana ℥ss.
Pulvis cretæ aromaticus vel. confectio aromat. }

Misce—divide in pilulis vj.—One to be taken an hour before every meal.

The quantity of bismuth might be increased to eight or ten grains in the dose. Dr. Barlow has recommended

bismuth in conjunction with small doses of *strychnia*, as in the following:—

℞.—Bismuthi subnitras	ʒss.
Strychnia	gr. ¼.
Extractum papaveris	gr. xij.

Misce.—Fiant pil. vj., è quibus sumat j. ter in die.

When, however, the flow of gastric juice is diminished, which is indicated by slow digestion and a sense of load after eating, a moderate quantity of sherry or Madeira should be taken after dinner, and a little brandy, warm water and nutmeg at bed-time, if in the aged. When the Dyspepsia is chronic, the *mineral acids*, especially nitro-muriatic acid, are about the best remedies indicated, given in infusion of quassia. Dr. Budd establishes the views of Prout on the powerful curative effect of nitric and muriatic acids in the treatment of certain forms of gastric disorders. Prout, he said, found them of special efficacy in the gastric disorder that occurs in what is termed oxalic diathesis, and that is marked chiefly by distressing flatulence, and palpitation or irregular action of the heart occurring some time after meals, and by the presence of oxalate of lime in the urine. The mineral acids are often useful to persons in whom digestion is habitually slow and feeble from a scanty secretion of the gastric juice, and who have a sense of weight or oppression of the stomach after meals. They are often useful, as Pemberton showed, in the indigestion, attended with excessive formation of lactic acids, that occurs in weak and nervous persons, and where the stomach has been for some time disordered and weakened by any source of irritation elsewhere.

Hydrochloric acid alone is a favourite remedy of M. Frousseau in certains forms of Dyspepsia; he exhibits it with much advantage after meals. Of its effects he says: "I do not wish to go beyond the fact, and only repeat that in the different forms of Dyspepsia, connected with chronic affection, whether of the thorax or abdomen, hydrochloric acid taken after meals may lead to therapeutic results deserving attention."

Among females and the aged, chalybeates will be found useful; *e.g.*, the *tinctura ferri sesquichloridi* or the *ferri carbonas cum saccharo*, either singly or in combination with bismuth.

When sickness is present, *carbonic acid* is both agreeable and effective. It should be given in the form of soda water, or in an effervescing draught. When accompanied with vomiting, the *liquor potassæ* in one-drachm doses every four hours in soda water is a good remedy. Some aromatic drinks such as *peppermint, ginger,* or *cardamom* will stop the flatulence. The pain before dinner can be stopped by the administration of a little magnesia before every meal, and the pain after meals by the nitrate of bismuth and strychnia pill soon after a meal is taken.

II.—CONSTIPATION—COSTIVENESS.

Constipation, *obstipatio, torpor intestinorum,* or *costiveness,* is that state of the bowels in which the irregularity of the stools consists in their being less plentiful or less frequent than in health, which might be produced either by functional or by structural derangement of the bowels. It must, however, be borne in mind that during health different individuals present different symptoms or periods of the operation of the bowels; in some the bowels are moved once or twice every morning, in others three times a day; others again have motions once every two or four days, whilst I know some who would go on for ten days without any injurious effect. As constipation is a symptom in almost every case of tropical disease, the first symptoms present, if correctly interpreted and treated, would tend to mitigate many very formidable complaints. Under this consideration I feel no doubt that I shall be excused in treating it here as amongst the diseases of tropical climates.

Symptoms and Progress.

There is first a feeling of uneasiness and heat all over the body, especially in the abdomen, accompanied with head-

ache, or merely heat in the head, slightly furred tongue, heaviness in the eye, disagreeable taste in the mouth, and sometimes foul breath, the patient complains of being out of sorts, yet still able to attend to his occupation. In the early stage no derangement of the pulse is observed nor is the appetite quite lost, although it might be sensibly affected. When this continues for some time, a feeling of heaviness or twisting is felt in the abdomen, with perhaps slight pain in the colon, or a sudden intense darting pain which is relieved on stooping, flatulent movement can now be traced from right to left about the umbilicus, and the patient sometimes begins to yawn or gape. Frequently the action of the bowels might not be entirely stopped, but regular in their occurrence, yet the quantity at each motion is so small that the individual suffers from the effects of costiveness, and a large quantity of fæcal matter will be found obstructing the bowels, which produces a feeling of weight or oppression in the fundament, occasioning a desire to relieve himself by going to stool, but which is always ineffectual; the bowels are much distended, and the patient has nausea or vomiting, or complains of sick headache.

But the persistence of constipation might lead to very serious complications, and when the patient complains of severe sharp pain which is increased by pressure at any motion of the body, we must think seriously whether or not the peritoneal covering is affected with inflammation.

The fæcal matter in constipation is hard and dry, consisting of knotty constricted lumps which are passed with straining and painful distention of the anus. Its

colour depends greatly on the quantity of bile discharged; when light and clay coloured, it contains no bile at all, and when black or light black, it contains but a very small quantity of the secretion. These hard fæces are generally lubricated with a white or bloody mucus.

In treating cases of Diarrhœa or Dysentery in tropical climates, it behoves one to be very careful in dissecting the account given by the patient, because in many cases it will be found that constipation similates them. Thus a patient might be suffering for a long time with constipation, and the accumulation of the fæcal matter leads to the irritation of the bowels, which gives rise to offensive liquid alvine discharges, containing some mucus and producing unpleasant sensation and uneasiness in the abdomen, so that he regards it as an attack of Diarrhœa; or the discharge might be bloody, or muco-sanguineous, and then the patient complains of suffering from Dysentery. But in both cases the evacuation forces itself either through or around the hard fæcal mass, or through an aperture in the mass; it is therefore evident in the treatment how careful we should be in our diagnosis, as I have seen many serious consequences follow a careless and superficial examination of these so-called diarrhœal and dysenteric cases, when treated persistently with astringents and opiates.

Besides the above symptoms, we might have to treat other local conditions which are consequent on constipation: thus, inflammation and irritation might be set up in the bowels; or the bowels might be inconveniently distended; if long continued, constipation might lead to ulceration or gangrene of the intestines; the blood might

be contaminated with excrementitious matter; or the absorption of recrementitious matter might be prevented. From its mechanical presence constipation may lead to congestion or sympathetic irritation of several of the abdominal and pelvic viscera. It is often attended, even in its occasional attacks, with dulness, depression of spirit, drowsiness, irritability of temper, vertigo, headache, flushing of the face, pains in the loins and limbs, palpitation, dyspnœa, furred tongue, gastric derangement, and various disorders in the biliary, urinary, and generative organs. When habitual, it produces the same effect in an aggravated degree, and others even more unpleasant. Bleeding from the rectum, hæmorrhoidal tumours, fissures and prolapsus of the anus, fistulæ in ano, strangury, catarrh of the bladder, sick headache, diarrhœa, dysentery, hepatic congestion and inflammation, dyspepsia, sickness, foul breath, epistaxis, apoplexy, epilepsy, paralysis, hysteria, melancholia, hypochrondriasis, and insanity, are among the disorders which have been traced to constipation as their source.

Causes of Constipation.

1. *Diminution of the contractile power of the coats of the intestines.*

This in a great many cases is the result of over distention by hard fæcal matter, especially in the colon, leading to severe torpidity of that organ; the contractibility is either lost or deficient, and the alvine excrementitious matter has no direct influence over it; the constipation in these cases is peculiarly obstinate. This condition might be produced by the habit of forcibly keeping within the

discharge; neglecting the calls of nature; or it might be the result of old age, or of sedentary habits, excessive mental occupation, sensual indulgences of all kinds, morbid diversion of the nervous energy to other organs, the use of narcotics and especially opium, and consequently it is found habitual amongst opium-eaters in the East Indies; also diseases of the nerve centres, brain, and spinal cord, and lesions of the nerves supplying the bowels; it is sometimes a sequence of severe miasmatic fever. I have met with several cases where patients after an attack of severe bilious Remittent Fever suffer from a dangerous kind of constipation, dependent on non-contractile condition of the intestinal coats.

2. *Diminution of the natural secretions which act as stimulants to the excrementitious matter of the intestines.*

Any substance which arrests the secretion of the bile or pancreatic juice leads to constipation, the former particularly is necessary for the healthy action of the bowels; such exercises which lead to excessive aqueous secretion from the skin, lead to diminution of their secretions and to constipation; excessive drinking deranges the healthy action of the liver, and produces the same result. Healthy soldiers after a long and fatiguing march suffer from constipation.

3. *Mechanical obstruction, either by solid ingesta, contraction or thickening of the coat from chronic inflammation, encroachment of tumours, &c., may lead to constipation.*

Treatment of Constipation.

The treatment of constipation or costiveness may be divided into medicinal, mechanical, and dietetic.

The *medicinal treatment* depends on the use of various therapeutic agencies, and these must be made dependent on the condition of the bowels—viz. :—

1. When the constipation is dependent on derangement of the liver (congestion or torpidity) which is a very frequent cause of that disease in tropical climates, the mercurial purgatives will be found of very great use. They might be given either in the form of calomel in combination with other purgatives, or in the form of blue pills, followed by a saline draught, which might be repeated after the first action of the bowels, although in much smaller doses; in those cases I often give the following :—

℞.—Hydrargyrum subchloridum . . . gr. iv.
Pilula colocynthidis . . . . . gr. vj.
Extractum hyoscyami . . . . . gr. iij.

Misce—fiant pilulæ ij.—To be taken at bed-time ; or immediately, followed in the morning, or three or four hours afterwards, by this saline draught :—

℞.—Magnesia sulphatis . . . . . ℥ij.
Tinctura sennæ . . . . .)
Tinctura jalapæ . . . . .) ana f ℥ss.
Tinctura cardamomi co. . . . .)
Spiritus ammoniæ aromat. . . . .) ana f ℥ xx.
Aqua pura . . . . . f ℥j.

Misce—fiat haustus—or a table-spoonful or more of the Pyretic Saline.

2. When the constipation is produced by the ordinary cause—viz., a mere accumulation of solid fæcal matter in the intestines, the saline purgatives in combination with senna are an excellent remedy for producing copious serous secretion, from the peculiar action of the latter on the muscular coat.

They might be given as above with slight increase in

the quantity of the sulphate of magnesia, adapting it to the age and constitution of the individual; with those who do not possess any dislike to castor oil, it is an efficient remedy when administered in these cases, from a dessert to two table-spoonfuls might be given for the dose according to the habit of the individual. The best remedy for destroying the taste of castor oil I have found is to chew a little lime or lemon peel before and just after taking the oil, and then wash the mouth with pure water. Dr. Fox's palatable castor oil might be administered.

When constipation is rather obstinate from inactivity or insensibility of the intestines, we might have recourse to the more irritant purgatives, such as jalap, gamboge, and colocynth, which may be combined or given separately; the two last given in pills, the first in powder in combination with rhubarb, as in the *pulvis purgans* of King's College Pharmacopæia.

℞.—Pulveris jalapæ . . . . . gr. viij.
Pulveris rhei . . . . . gr. xij.
Misce—fiat pulvis.

Some practitioners, however, prefer croton oil, which is quick, and unlike the irritant purgatives, does not lead to inflammation of the intestinal coat; a drop might be placed on the tongue and washed down with a liquid.

3rd. When constipation becomes habitual, we have to depend more on mechanical treatment, of which I shall hereafter speak, although medicines are also necessarily employed. Great advantage will be derived in the use of aloetic purgatives in combination with rhubarb and some bitter tonics—see prescription under last indication of treatment in indigestion; but aloes should not be

administered when there is present any symptoms of piles.

Seidlitz powders might be administered occasionally in the morning, or Lamplough's Pyretic Saline, when there is the least indication of constipation, and be kept up, gradually increasing the period in which each dose is taken, until the natural functions of the bowels become regular.

4. When constipation is produced or followed by weakness and irritability of the stomach and bowels, a mild aperient should always be given in combination either with bitter tonics or chalybeates; thus a combination of aloes and iron with gentian is generally very efficient, and the following from King's College Pharmacopœia, I have often found to answer best :—

℞.—Aloes socotrinæ	. . . . .	℥iss.
Myrrhæa	. . . . .	℥ij.
Ferri sulphatis	. . . . .	āā ℈j.
Extractum gentianæ	. . . . .	

Misce—fiat massa in pilulas lxvj. dividenda.—Two of which to be taken now and then.

But when there is torpidity of the bowels in the old or even in the young, a more energetic remedy will be required, a salts and senna mixture taken now and then, as that in the Military Hospital formulary of prescription, will answer the purpose :—

℞.—Magnesia sulphatis	. . . . .	℥j.
Tinctura zingiberis	. . . . .	f ℥ij.
Spiritus ammoniæ aromaticus	. . .	f ℥ij.
Tinctura sennæ	. . . . .	f ℥ss.
Infusium sennæ	. . . . .	f ℥viij.

Misce—fiat mistura.—One ounce (two tablespoonfuls) for a dose.

5. When constipation is produced by local inflammation of the intestines, the treatment is obvious; the employment of violent cathartics is contra-indicated; we should apply a blister of leeches over the painful parts, and a pill internally containing calomel and opium, so as to subdue the inflammation, whilst at the same time a gentle purgative might be given, such as castor oil or olive oil:—

℞.—Hydrargyri chloridi	gr. xxiv.
Pulveris opii	gr. iij.
Confectionis rosæ canini	g. s.

Misce—fiant pilulæ xij. (K. C. Ph.)—One every four hours.

Mechanical Treatment.

The remedies available in this department are numerous; *friction* should be applied over the bowels, either gently with the hand or with warm flannel or flesh-brush; *tepid* or *cold application* to the spine or loins; cold shower bath; enveloping the fundament in warm vapour bath; the application over the abdomen of cloth wet with ice water; leeches to or cupping the spine; regular habits of life; change of air and scene; relaxation from too severe application; moderate exercise of the body; when a hard fæcal mass is discovered in the rectum, removal by a scoop or the finger to be effected; enema of tepid water to be poured into the rectum, or even into the colon if practicable. We should advise the patient who suffers from habitual constipation, to establish a regular habit of going to the privy, although it might be ineffectual at the first, but by careful persistence without straining, his object might be obtained; straining may lead to piles or protrusion of the guts.

Dietetic Treatment.

This is one of the most important in the treatment of this disease, as by its proper regulation we may hope for a more easy and speedy action of the two former remedies; the individual should avoid all indigestible food, all astringent diet, unripe fruit, farinaceous substances, and should use those which possess a laxative property (not seedy), such as pine apples, avacado pears, rose apples, edible berries, melons, oranges, grapes, tomatoes, infusion of tamarind pulp; besides bran bread, oatmeal, gruel, and broths. Milk constantly used has been known to produce constipation in children, and therefore we should be very careful about it.

III.—DYSENTERY—BLOODY FLUX.

Dysentery is a specific inflammation of the surface of the mucous membrane, as well as the lenticular and tubular glands of the large intestines, extending sometimes to the small intestines, followed by scanty mucous, bloody, or purulent stools, tormina, tenesmus, and great straining. It is synonymous with *colitis*, *bloody flux*, and the *scourge of armies*.

Symptoms and Progress.

Dysentery sometimes commences with cold shivering, accompanied with fever, but generally it sets in with Diarrhœa, frequent calls to the stool; the motions are scanty, mucous, gelatinous, streaked with blood, and accompanied with pain and tenesmus. After a few days, or in twelve or twenty-four hours, the patient begins to feel slight uneasiness in the abdomen, which increases until it assumes the form of an irregular "shooting" pain, which at first is limited to the rectum; occasionally, however, only griping pains are felt; these symptoms are technically called *tormina*. The tongue at this early stage of the disease is slightly white and loaded; the pulse a little accelerated; after a short time all these symptoms become

more acute; the pain commencing from the rectum ascends to the epigastrium; the whole abdomen is attacked with severe and constant pains, although in some rare cases there is no pain complained of except when the patient is passing a motion. But this is not a sufficient guarantee that there is no inflammatory action in the cæcum, colon, and rectum; as these organs may be inflamed or even ulcerated without causing great uneasiness, depending on the different degress of excitability and sensibility of the constitution attacked. A sense of heat extending all over the course of the colon is felt; frequent calls are made to the stool, and the evacuation consists either of pure blood or mucus, or a white glairy matter like the white of eggs mixed with blood. Pain is felt on pressure over the region of the transverse colon, about two inches above the umbilicus, as well as on grasping the descending colon and sigmoid flexure on the left side of the abdomen.

As the disease advances, the calls to the stool usually become more frequent, the tenesmus more severe, the evacuation gradually changing from a mucous, slimy, gelatinous character to a more watery consistence, having a dark colour and a muddy solution of feculent matter, or a considerable quantity of fæces. The urine is high coloured, passed frequently, and there is some difficulty in passing it; the tongue is furred and loaded, the pulse more accelerated, the skin harsh, hot and dry, the tormina and tenesmus increase, the calls to the stool become incessant, increased at night and early in the morning, leading to prolapsus, especially in children.

When the straining and tenesmus are very frequent

and urgent, it is a sign that the rectum is much inflamed; if the *tenesmus* or feeling after each stool that something still remains to be removed be very severe in any particular instance, if the patient present but little abdominal fulness or tension, if he complain but little of *tormina*, or of heat and soreness in the abdomen, if he can bear pressure without uneasiness being produced about the region of the cæcum and sigmoid flexure of the colon, we may then consider that the disease is chiefly located in the rectum; but although this inference may be drawn from the symptoms present, especially if there be little constitutional disturbance, we ought not to depend upon it with certainty, and should never allow it to seduce us into the adoption of weak measures of cure.

The number of calls to evacuation in simple Acute Dysentery varies from ten to twenty-four or even thirty in the twenty-four hours; in some the discharge consists at first merely of a small quantity of mucus and blood, or transparent whitish mucus, but in others the evacuation is copious, consisting of bloody slime with bile and shreds of excoriated epithelium mixed with the exudation of the mucous surface; the discharge has a peculiar and characteristic odour, the *odor dysenterica*, very offensive and unlike the natural fæcal smell. When an evacuation of fæces is procured, it is mostly in lumps or hardened balls, resembling *forced meat balls*, but harder, which are called *scybalæ*, but they are by no means frequent; the discharge gives considerable relief to the patient; as the disease advances, the constitution becomes greatly impaired, the tongue foul, and very frequently covered with aphthous eruptions. The evacuations are sometimes of singularly

variegated hues, consisting of a glairy mucus, mixed with a greenish, gelatinous, bilious substance, or with a muco-purulent matter, with large pieces of albuminous-like concretions, streaked with fluid blood, or with dark coagula; sometimes the motions are of a pitch-like consistence, instead of a thick mucus, and there is sometimes a thin serous discharge, rather red, and which may not be inaptly compared to the washings of meat.

When this stage has arrived, a large quantity of blood is frequently discharged from the bowels, fluid in consistence, with shreds or large sloughs of exudation, resembling the inner membrane of the intestinal canal, but which is in reality a new membrane formed in the inner coats of that canal, like the dysmenorrhæal membrane formed in the internal surface of the uterus; sometimes the blood is of the consistence of coagula and of dark grumous clots; at other times it consists of pure blood; but most commonly it is of a venous character, of a dark brown, muddy appearance mixed with watery feculent and offensive dejection.

When the disease puts on a fatal appearance, the abdominal pain is most excruciating, and the abdomen tumid, tense, and somewhat swollen, there is more frequent inclination to go to stool, tenesmus and tormina increase, and the cramps excruciating; the skin is very hot and dry, the face flushed and eyes glaring, the tongue furred of a dirty brownish appearance, or it throws off its fur and becomes red, smooth, and ghastly, and the thirst is urgent; the patient is anxious, sleepless, weak, exhausted, and restless; the urine is scanty, high-coloured and discharged with great difficulty; the pulse quick,

hard, but compressible; then follows hiccup and vomiting. There is no headache, and the intelligence is unimpaired, the character of the alvine evacuation is altered, and consists now exclusively of blood mixed with purulent matter, sanies or vitiated secretions, the evacuations take place involuntarily, the pulse then becomes small and very rapid, the patient puts on a ghastly look, low muttering delirium supervenes, and death.

Most commonly the disease takes a favourable turn between the sixth and twelfth day, and terminates in Chronic Dysentery, the evacuations continue for some time the same, or consist of frothy mucus; afterwards they become purulent, generally small in quantity, but sometimes very abundant and mixed either with blood or shreds of lymph and fæces, or with putrid or highly offensive sanies; when Chronic Dysentery proves fatal, the patient becomes altered and prostrated by the suffering, and dies weak and emaciated. The signs of dissolution are first observed in the heart. When, however, it takes a favourable turn, the patient gradually recovers, but convalescence is slow and rarely complete.

In intertropical climates, either in Asia, Africa, America, or the West Indies, Dysentery is frequently complicated or associated with an affection of the liver, and with a highly vitiated state of the biliary secretions. On attending such cases from the beginning, we find these two diseases—viz., Hepatitis and Dysentery coeval, but we very seldom see the disease in its early stage, until the phenomena pathognomonic of simple, acute, or complicated Dysentery are developed. Sometimes the premonitory signs characteristic of this complicated form

of disease are the same as in the simple case—viz., tormina and tenesmus; but most generally we find the countenance pale, the appetite lost, the bowels costive, disordered, and irritated, the skin cold with horripilatio, sickness, chilliness, and coldness in the back, especially in the lumbar region, extending to the sacrum, sometimes to the anus, griping pains extending through the abdomen, especially in the epigastric and hypochondriac regions, attended with a sense of fulness and oppression at the præcordia, and then there is lowness of spirit, slight dyspnœa, and vomiting.

The alvine evacuations in these complex cases are morbid in colour, consistence, and odour; the dejection at the first period is dark and offensive, and seldom mucous or bloody; the colour undergoes varied shades of hue, generally green, bottle-green, greenish brown, or black mixed with venous blood; sometimes clay-coloured, at other times slimy and watery, having a greenish, frothy slime on the surface; frequently in the advanced stage of the disease and in fatal cases the colour of the stool is ochre-like, reddish brown, or consisting chiefly of water with blood diffused through it; the tenesmus is urgent, with scalding of the anus and often *prolapsus ani*. In this form the urine is scanty, high-coloured, muddy, and evacuated with pain and difficulty, and in many cases I have seen complete spasm of the neck of the bladder so severe that I had to use the catheter. There is in almost all these cases great pain and oppression over the pit of the stomach, extending to the right shoulder, great anxiety at the præcordia, dyspnœa, pain in the chest, accompanied with a dry, teasing cough, headache, giddi-

ness, sickness of the stomach, sometimes vomiting, great depression of the spirits, and a quick, feeble, and irritable pulse; the tongue in the early part of the disease is generally white and covered with a yellowish fur, but in the advanced stage is either dry, clean, smooth, red, and lobulated, or is dry and covered with a dark crust; the skin is sometimes covered with a greasy, cold, clammy perspiration, or copious sweat, but at other times is dry, harsh, and of a dirty appearance; often there is great thirst, the features are anxious and sunken, and the conjunctiva of the eye livid or purplish.

When the disease assumes the form of Chronic Hepatic Dysentery, the symptoms are milder, tormina and tenesmus are not severe, there is no pain sometimes even on pressure in the course of the colon, the calls to the stool are less frequent; but there is great debility, depression of spirits, sinking of the powers, *particularly in old topers*, the skin is of a dirty colour, and the countenance of a sallow cast.

I have in the preceding pages given a general and comprehensive view of the symptoms and progress of Dysentery, but it must be remembered that these vary to a great degree in different individuals, depending on the force and activity of the predisposing and exciting causes, of the constitutional susceptibility, age, length of residence in the tropics, as to whether the disease is simple or complicated, and the season of the year. In some cases the disease is very easily cured, whilst in others in spite of every treatment it runs a fatal course, and I may here state that the present advanced state of therapeutic treatment of Dysentery almost precludes us from

permitting it to run so fatal a course; in fact, *death from Dysentery is now rather an exception than the rule, as it used to be a few years ago.* In some cases only a few of the symptoms are present and in very mild form, whilst in others the whole of the symptoms characteristic of the disease make their appearance during its progress. The type of the disease has also great influence in its symptoms; if acute or sub-acute, the symptoms are of inflammatory nature, without at first presenting any tendency to great depression of the nervous, circulatory, and muscular functions, but if asthenic or adynamic, there is severe loss of power, great complications of other viscera, and intensity of all the symptoms.

I shall now give a brief description of the three different forms of Dysentery as they are found in tropical climates—viz., 1. Acute Dysentery, *Dysenteria acuta,* or *Dysenteria inflammatoria.* 2. Chronic Dysentery, or *Dysenteria chronica.* 3. Scorbutic or Asthenic Dysentery, or *Dysenteria severa.*

Acute or Inflammatory Dysentery.—This disease generally commences with a slight febrile state of the system, and then griping pains in the abdomen tormina, which are relieved by each evacuation; when Dysentery occurs during the cold weather, or during the rains when there has not been excessive heat, the attendant fever is more or less slight, but in the hot season the fever is generally high, the skin hot and dry, the face flushed, pulse hard and quick, and the tongue furred. The patient frequents the stool without being able to evacuate anything (*tenesmus*), but some bloody mucus or bloody slime, and still feels the inclination to return to it; a sense of

heat is felt all over the abdomen rising from the rectum, and there is a feeling of hollowness and sinking in the abdomen. In very severe cases there is violent inflammation, not only of the mucous membrane, but also of the serous coat extending sometimes to the liver, spleen, and kidneys, as well as spasmodic contraction of the abdominal muscles. There is a constant fixed pain in some part of the abdomen, which is increased by pressure, also unequivocal inflammatory fever, or *synocha*, quickness of pulse, heat, thirst, and dryness of skin; the urine is retained, frequent evacuations of mucus, serum or blood, severe tormina and tenesmus, which are felt more about the periods of evacuation, the quantity of mucus evacuated is sometimes small and but very slightly tinged with blood; blood drawn presents the inflammatory puffy coat. This state may exist for a few days, but within the first twelve or fourteen days death generally takes place, or the case terminates favourably by the end of the third or fourth week. Sometimes it lasts for months, gradually passing into

Chronic Dysentery, or sub-acute.—Chronic Dysentery is the proper sequel of Acute or Sub-acute Dysentery, and consists of "an irritated state, an imperfectly cicatrized or ulcerated condition, more or less extensive, of the mucous surface of the cæcum, colon, or rectum, sometimes of all," and this state of continued irritation and partial cicatrization or remaining ulceration of the mucous membrane of the large intestine constitutes the essential point in this form of the disease. The stools consist generally of mucus or pus mixed with blood, the fæces are not altogether absent, as there are often frequent loose fæcal stools, with

biliary matter, accompanied with tenesmus and tormina; when the disease occupies the rectum and lower portion of the colon, the feculent discharge is often consistent, and instead of being uniformly mixed with mucus, is either irregularly pervaded by it in layers or streaks, or enveloped in a thick coating of it, derived from the surface of the bowels with which the fæces lay in contact. There is more or less pain on pressure of the abdomen but almost always tormina, the abdomen is sometimes distended, sometimes not, and sometimes tympanitic; the hair is scanty and dry, the tongue coated and red on the edges or aphthous; the pulse is frequent and weak, the spirits much depressed, patient becomes gloomy, morose, emaciated, and reduced to a *living skeleton*, the skin has a dry, bran-like, furfuraceous aspect, and the epithelium desquamates in scales and powdery particles. This form of Dysentery is more severe, the stools more frequent, and the symptoms more intense at full moons in the tropics than at any other period.

The symptoms of Chronic Dysentery, remarks Sir R. Martin, vary only in degree from those of the Acute, since the motions in the chronic form are voided with tormina and tenesmus, and they consist of mucus with blood or purulent matter with blood, according as the mucous membrane of the large intestine is more or less injured in its structure. When, however, the motions are passed without tormina or tenesmus, the condition of the intestinal coat will be found one of irritation, and the disease is not then serious. When in association with Chronic Dysentery we meet with enlargement of the liver, the symptoms are much disturbed through the anatomical

changes and consequent disturbances of various important functions.

In Dysentery of long standing (chronic) we meet with morbid conditions of the liver of more or less extent, and Dr. M'Pherson deduced the following facts from a number of cases treated in the hospital at Calcutta. Of 160 Europeans admitted and treated, the liver was found to be altered in 84 cases; to contain abscess in 21; to be enlarged in 40; to be engorged and turgid in 4; to be small in 7; to be pale in 26; to be granular in 22; softened in 12; indurated in 5; and to contain cicatrices in 3.

Of 55 Europeans on whom observations were made, the liver was found to be altered in 31 cases; to contain abscess in 6; to be enlarged in 5; small in 5; pale in 11; softened in 1; indurated in 4; contain cicatrices in 1; nutmeg in 6; and cirrhosed in 1.

In the 160 cases he observed the following lesions in the intestine; the *ileum* was over-vascular or congested in 21 cases; to contain slight ulceration and abrasion in 3; to be in a state of sphacelus in 1; the mucous coat of the *stomach* over-vascular or softened in 4 cases; the *large intestine*, chief cæcum, sigmoid flexure, and rectum ulcerated in all the cases; the *ileo-cæcal valve* ulcerated and destroyed in 3; suppuration of the *appendix vermiformis* in 1; thickening and stricture of the intestine in 4; dilatation in 1; *mesenteric glands* enlarged or inflamed in 17; spleen enlarged in 6; kidneys diseased in 2.

In the 55 cases the following intestinal lesions were observed; the large intestine was enlarged or inflamed

in 50 cases; colon contracted in 3; cæcum nearly closed in 1; colon perforated in 1; stomach unhealthy in 6; chronic inflammation and softening in 2; increased vascularity in 2; pylorus in a state of abrasion in 3, and of cancer in 1; small intestine unhealthy in 12; ulceration, and abrasion of the ileum in 2; mesenteric glands enlarged in 16; spleen enlarged in 4.

Dr. M'Pherson observed that it is worthy of remark that the liver has been found in the General Hospital of Calcutta, to have been altered in 111 out of 215 cases; in the Medical College Hospital in 13 out of 30 cases; while Sir James M'Gregor found it in India altered 16 times in 21 cases, and in Egypt as in India he found it diseased.

Scorbutic or Asthenic Dysentery.—This variety of the disease is the most dangerous, and constitutes one of the most fatal forms of Dysentery met with in tropical climates, either on board of a vessel or on land. It occurs chiefly in individuals exposed to the causes of Dysentery who have been subject to various debilitating diseases or influences, and found principally among soldiers in the fields, besieged towns, and on board ships. Amongst soldiers it makes its appearance after long marches and fatigue, exposure to damp night air on guard, and wet, and cold; in the other cases, as well as in prison after long confinement, insufficient supply of food, and the supply of those of unwholesome character, such as long-continued rations of salt meat, and the use of green coffee, brings it on. I have often seen this form of Dysentery the sequel of Intermittent and Remittent Fevers of a severe type in camps, and there are cases where it acts

vicariously with these diseases, and the Dysentery, along with the fever which generally accompanies it, partakes of the essential characteristic of the fever—viz., a paroxysmal tendency. In these cases there is predisposition to head symptoms, delirium is more frequent, the eyes are more suffused, and the face flushed during the feverish state. In this form of Dysentery may also be included those caused by certain epidemic constitutions of the atmosphere, leading to what is frequently spoken of as *Epidemic Dysentery*; the disease has a tendency to be very malignant, and in every case is more violent than when it occurs sporadically. Sometimes this form of Dysentery is met with amongst individuals suffering from typhus fever or typhous epidemic, and takes the nature of that disease, and becomes likewise contagious, but this form of Dysentery is not very common in tropical climates, although sporadic cases are met with in the unhealthy islands of the West Indies.

In the Scorbutic or Asthenic Dysentery, therefore, the morbid symptoms observable in the acute disease are very much exaggerated, partaking the character of a malignant typhoid or scorbutic disease. They vary with the form and type of the disease, very intense or less so; the most common symptoms are "nausea and vomiting, great thirst, a frequent, feeble, irregular pulse; a foul, brown dry tongue, sometimes black, with sordes about the teeth; a dusky skin, sometimes hot, sometimes cold, and occasionally marked with petechiæ, dark livid spots, gangrenous vesication;" the stools are reddish brown or black, very copious, exceedingly fetid, consisting of "uncoagulated blood; the gums are spongy and bleed when

touched; there is a morbid appetite for vegetables, a great prostration of the vital powers, great depression of the spirit, a severe cachectic condition of the general system, low delirium, and coma. When, however, the disease is accompanied with disorder of the liver and stomach, or when it attacks a constitution which had been previously prostrated with long-continued disease of the liver, the symptoms present are of a most malignant character, and the disease invariably proves fatal; there is extreme oppression in the epigastrium, the vomiting is intense and frequent, the delirium severe; sometimes there is jaundice with yellowness of the eyes, skin, and urine. It behoves us, therefore, to carefully diagnose the different functional and structural derangements of the viscera of the abdomen before we can arrive at a proper mode of treatment."

In this form of the disease the appearance on examination of the abdomen after death developes signs of an adynamic condition of the whole viscera, "the inner surfaces of the large intestines and of the ileum generally exhibit extensive disorganization and decay, the bowels being in many cases filled with shreds and sloughs of mucous membrane externally, and when cut into, the blood which flows is extra bilious and dissolved, but where hæmorrhage from the bowels has occurred, the liver will be found softened and anæmic. The spleen crumbles under the slightest pressure like a mass of grumous blood. Ecchymosed patches are to be seen on the outer skin on the external and internal surface of the bowels, while congestions of diseased blood and softening of the textures are found in the heart and lungs." Sir Gilbert Blane

referred this scorbutic complication sometimes merely to foul air; he says the disease has been known to arise amongst prisoners of war living entirely on fresh diet, and solely imputable, therefore, to confinement in bad air, a dull uniformity of life, depression of spirits, and indolent habits naturally belonging to a state of captivity. Sir Ranald Martin relates cases of suffering from scorbutic Dysentery in Ava amongst the soldiers in the first Burmese war, where 48 per cent. died within ten months. The symptoms noticeable he stated were the following: swollen, loose, and livid gums with ulcerated and sloughing edges and fetid breath, pain and hardness in the calves of the leg, constriction of the hands and purple discoloration of the skin of the lower extremities; œdematous swelling of the feet and legs, anasarca, ascites, hydrothorax. The bowel complaint was characterized by green or greenish yellow discharges, becoming by degrees sanious, then dark, bloody, grumous, and putrid; a sudden and sometimes universal dropsy marked the latter days of the sufferer.

Pathology and Morbid Anatomy of Dysentery.

Dysentery is essentially an extensive inflammation of the mucous membrane of the large intestines and of the glandular structure in them, and sometimes in those of the small intestines, with ulceration thickening and narrowing their coating. The actual point of mischief at the onset of the disease is the areolar tissue below the sub-basement membrane, where exudation takes place, which leads to hæmorrhage, purulent discharges, and ulceration. Dr. Parkes regards this disease as a process of ulceration,

having its commencement in the solitary glands of the large intestines; Mr. Raleigh believes it to be simple inflammation of the large intestines; but whatever might be the various opinions on the subject, we observe in the various *post-mortem* examinations a separation of the epithelial cells of the mucous membrane, and these epithelia being necessary for the process of nutrition, it becomes of pathological importance, and accounts for the wasted and cachectic condition of those who are suffering from Dysentery.

The mucous membrane, when examined after death, in very severe cases is found to be of a deep red colour, intermingled in some cases with green patches which are produced by a highly congested condition of the vascular plexus of the glands and villi with extravasation of blood, pure or serositous, in the areolar tissue, which rapidly undergoes certain changes, and becomes converted into purulent discharges or fibrous thickening, or leads to extensive ulceration of the mucous surface. Sometimes the exudation is poured into the mucous surface, leading to the formation of the false membrane already described in the symptoms, which are sometimes discharged or adhere to the coats of the membrane, narrowing its calibre and afterwards become disintegrated into purulent and other excretory substances.

"There are morbid changes in the various glandular structures of the intestines, the solitary patches of Peyers, Brunner, and Lieberkulm leading to the most dangerous results; these glandular patches become at first hypertrophied, appearing at the early part of their inflammation as a raised mass in the mucous membrane;

this mass afterwards, as the complaint advances, becomes softened, showing a tendency to slough out, which appears more at the edges; in very severe cases this slough takes place, the gland is destroyed, and an ulcer with abrupt edges remains, and the extent of the depth indicates the gravity of the case; when it has passed through the muscular coat into the peritoneal covering, the patient's life is in imminent danger, and when once this last covering is pierced, no powers on earth could save life; the abdomen now becomes very tender and tumid, and the countenance of the patient shows signs of approaching dissolution. Whilst these mischiefs are going on in the intestines, morbid changes are also going on in the spleen, liver, and mesentery; the liver in particular becomes congested, indurated, or ulcerated. On removing the abdominal parietes of a person who dies from the severe form of Dysentery, we perceive a turgid and congested state of the vessels, with adhesions of the serous coverings of the omentum, meso-colon, and mesentery, with varied and more extended adhesions between the different viscera; enlargements and inflammations of the glands of the meso-colon and mesentery, with occasional suppuration in them; inflammation and its results, such as thickening of the coats of the large intestines, softening, ulceration, or sloughing of the mucous membrane of the ileum, or of a portion, or of the entire large bowel; the ulcers having the appearance of variolous pustules, and being in fact glandular ulcerations, sometimes perforating the coats of the intestines into the general cavity; thickening of the coats and contraction of the of cavity the intestines from effusion of lymph, especially of the larger por-

tion, and most frequently at its sigmoid flexure." Sometimes we meet with abscess in the neighbourhood of the cæcum, and adhesions of the omentum to the cæcum.

In practice our attention should first be drawn to the condition of the colon and rectum, where generally we find sphacelation of a portion of the mucous membrane, and ulceration and inflammation of the remainder; the glandulæ solitariæ are said by some authors to be first affected, from which it spreads into the neighbouring tubular glands. The inflammatory action possibly has been occasioned by some irritating cause lodged in the intestines inducing simple ulceration, or from some disordered state of the bowels, causing an increased determination of the blood to that spot. The *post-mortem* appearances are apt to differ from the causes which bring on the disease, and the constitution of the individual affected. From the investigation of the morbid anatomical states in numerous dissections of men who died at Scutari during the late Russian war, Dr. Aitkin distinguished the following as the morbid appearances to be found in Acute Dysentery :—

1. Forms of exudation obvious on the surface of the mucous membrane of the rectum and colon.

2. Forms of exudation not obvious to the unaided eye, but which were seen in all the cases examined by the microscope, to fill the mucous tubular follicles of the large intestine.

3. Forms of exudation obvious to the eye, and demonstrable by the microscope as being developed in the solitary vesicular glands of the large intestine.

4. Changes in the exuded material, which tend first

towards its organization, and subsequently to its disintegration and removal by ulceration.

5. Ulcerative changes in the tissue of the mucous membrane itself.

6. Similar dysenteric lesions extending into the small intestines.

The parts in order mostly affected are the *rectum*, the *sigmoid flexure* of the colon, the *descending colon*, the *transverse colon*, and the *ascending colon*, the *caput cæcum coli* with its *vermiform appendix*, and the lower part of the small intestines; but the most frequent part is the lower portion of the large intestines. The tubular glands secrete and exude a creamy-like substance, which at first forms a thin layer of a homogeneous opaque membrane, of a red, white, or pink colour, but more commonly of a dark olive green, passing into a bluish black. On examination of the surface we observe a number of mammillary fungus-like projections of a thickened and firm base, the centres of which are soft. Dr. Aitkin remarks that in extreme cases the entire mucous surface, from the *caput cæcum* to the *rectum*, may be seen to present all the possible stages of the Dysenteric process. These stages, he states, can in general be distinguished, viz.:—

1. Ulceration of and exudation from the mucous membrane, more or less advanced towards the rectal end of the great intestine.

2. Exudation in various forms towards the middle of the colon upwards from the rectum.

3. The exudation process visible microscopically in the tubular glands, and sometimes also obvious to unaided

vision in the solitary vesicular glands of the great intestines towards the *caput cœcum*.

I have before observed that in Chronic Dysentery there is a great atrophic state of the general system, produced by some marasmic processes; the mucous membranes are peculiarly pale, thin, and wasted, which may be observed by examining the lip and tongue. The buccal and labial glands are greatly diminished in size; on examining microscopically the food swallowed, no algæ or fungi are present in the secretion of the buccal glands, that the process of fermentation is greatly diminished; the tubular, solitary and aggregated glands are found in one or more of these two conditions, either atrophied or wasted away, with a specific gravity of from 1030 to 1036, having undergone some melanotic, molecular, or general fatty degeneration, or in an hypertrophic engorged state, with a specific gravity of 1046, undergoing certain minute changes, which may be considered as preparatory to complete evacuation and destruction of the glandular element. The solid viscus mostly complicated in this disease is the liver, and our standard authorities on this subject are Sir R. Martin (East Indies); Morehead (Bombay Army); Sir James M'Gregor, Dr. M'Pherson, and Mr. H. Marshall (Calcutta, Moulmain, and Ceylon); the French surgeons in the Province of Oran in Algeria, and Dr. Aitkin, pathologist at Scutari and at the R. V. Hospital, Netley.

Sir R. Martin, in his account of the Acute Dysentery of Bengal, quotes from a review on the subject in the *Lancet* the following facts, with respect to hepatic complication in Dysentery:—

1. That Dysentery in a great number of cases com-

mences and runs its course uncomplicated with hepatic disease.

2. That hepatic disease may in some cases be the predisposing or exciting cause of Dysentery.

3. That a large majority of the fatal cases of Dysentery are complicated with hepatic abscess.

4. That in a much larger majority of these cases, ulceration of the intestines is the primary disease, and the source of hepatic abscess.

Some, as Drs. Ballard and Bird, considered that this hepatic abscess depends upon the diseased state of the vein, although Dr. Parkes in his most careful investigation failed to observe it. Dr. Hancock considers the two diseases as running their course together, depending upon one and the same course, but without mutual relation.

Other lesions are sometimes present, such as serous effusions in the various cavities of the body; enlargement and softening or enlargement and induration of the spleen and pancreas; vesicular bronchitis with frothy mucus or puruloid exudation in the smaller bronchial tubes; sometimes lobular pneumonia, exudation into the parenchymatous structure of the lung leading to ulceration, and a discharge composed of pus, broken down pulmonary cells, and granular matter.

We now come to consider the *causes of Dysentery*, which may be arranged under two heads—viz., Predisposing and Exciting. These causes are in many cases under our control, but there are many which are far beyond us, especially those referable to troops in the field. I shall first consider the value of the different

Predisposing Causes.

1. *Frequent attacks of Intermittent and Remittent Fevers.*—It has been held by many writers on tropical Dysentery that malaria is a common and direct or exciting cause of Dysentery, as it co-exists with Intermittent and Remittent or Paludal Fevers, and prevails generally in increased ratio to the intensity of these fevers. "In Jamaica, for example, when the white troops suffered in the large proportion of 91 per cent. annually from paludal fevers, the cases of Dysentery were to those of fever as one to nine; while in the Madras Presidency, when the troops suffered from fever in the much less ratio of only $30\frac{4}{10}$ per cent. annually, the cases of Dysentery were to those of fever as forty-seven of the former to thirty of the latter." Having for several years made this point a matter of careful study and investigation in Dysenteric cases occurring among civil population (European and Native), subjected to the most pernicious forms of paludal fevers in inter-tropical Africa, as well as among soldiers during the first and second expedition against the King of Ashantee, when the men were struck down in numbers by the most fatal forms of Dysentery, I cannot corroborate the opinion that malaria was a direct cause of Dysentery, but it is one of the principal predisposing causes we have in tropical climates; the constant exposure of the system to the effects of paludal fever has a tendency to produce a general relaxation of the vital powers, to vitiate the blood and disturb the healthy action of the spleen and liver; and when the system thus reduced is exposed to the exciting causes of Dysentery,

and not having the stamina to withstand it, the disease breaks out in full violence.

In tropical climates generally, the proper time for Dysentery is during the dry season, or at the commencement and break of the rainy season. I have never been able to trace Dysentery or Diarrhœa purely from malaria; most of the cases in which we must regard malaria as a direct predisposing cause must be referred to those where Dysentery is preceded by a debilitating attack of bilious remittent or any other paludal fever, and where the individual so exposed had no opportunity of obtaining the food necessary to strengthen his constitution, as in the Dysentery amongst soldiers in the field.

2. *Long and fatiguing marches.*—This may be regarded as a predisposing as well as exciting cause. I have known several cases in which the system of an individual which has been exposed to causes which lead to the production of Dysentery, such as bad diet and exposure to wet and cold, attacked with the most fatal form of Dysentery when subject to long and fatiguing marches. During the second expedition against the Ashantees, when the left wing of the 4th West India Regiment and a detachment of the 1st arrived at Cape Coast in 1864, they were kept on salt rations for three weeks, when a detachment of 200 men was sent to Prahsoo Camp; they were scarcely there three days when four of them were admitted with the worst form of Dysentery, in three of which it had commenced on the line of march, and the exciting cause can only be attributed to the long and fatiguing marches they had lately been subjected to.

3. *Salt and preserved rations.*—This is the chief pre-

disposing, and I might say exciting, cause of Dysentery among soldiers in the field; in the first place, the salt ration does not and cannot possess the same quantity of nourishment as the fresh, bulk for bulk, inasmuch as it has to be saturated a long time in water before it can be used, and the same quantity cannot be eaten, and after a time the salt ration becomes distasteful and rejected by the stomach. This kind of ration has an irritating effect on the intestinal mucous membrane, which ultimately leads to symptoms of Dysentery. Of salt rations the remarks of Dr. Christison will always be found to be very true—viz., that the salt meat of military and naval rations is not the same as the salt meat of civil life; the former is highly salted in order to keep for two or more years in every climate; its nutrient value is thus greatly over-rated, and its nutritive constituents are still further diminished by the process of washing out in water before it can be eaten. Thus, he justly adds, besides the irritant effects of the salt diet in producing Dysentery, another element exists as a cause of disease—viz., the insufficient nutrition which the salt ration diet is able to impart. That salt ration is one of the greatest predisposing causes of Dysentery, we have incontrovertible proofs in the Dysentery which attacks sailors and soldiers in the tropics, especially whilst in encampment. In the West Indies "in the windward and leeward command, when the rations issued to the troops consisted of salt provisions five days in the week, the mortality from disease of the stomach and bowels among the officers, was as two to four per cent., while that among the soldiers was as 20 to 20·7, or a tenfold ratio. On the contrary in

Jamaica, where salt provisions are issued to the troops only two days in the week, the mortality from the same diseases approximated so nearly in these branches of the service as to be almost on an equality. The Sierra Leone Commissioners on the West Coast of Africa, who investigated this subject on the spot, were of opinion that the large proportion of salt rations mainly contributed to the sickness and mortality from disease of the stomach and bowels in the form of Dysentery and Diarrhœa."

In Sir Alexander Tulloch's statistical report, during the years 1825, 1826, and 1827, out of a force of 1,387 men, previous to the alteration of the ration, when salt provisions were served out five days in the week, the number of men suffered from and admitted for Dysentery was 700, and the number of deaths 71, and in 1828, 1829, 1830, and 1836, when the ration was altered to two days of salt provisions in the week, the number of men admitted for Dysentery and Diarrhœa out of a total strength of 388 were 211, but the number of deaths was only 2.

5. *Intemperance*;—excess in the use of wine, spirituous liquors, or tobacco. When persons who show no regard for temperance are placed in a position where the constitutions are constantly under the influences which produce Dysentery, they more than others invariably become affected, and the disease generally assumes a very obstinate type.

6. *Too frequent use of drastic purgatives, the use of ill-prepared indigestible food or unwholesome diet, retained excretions, endemic and epidemic influences, diseases of the spleen and liver, overcrowding in a confined place, excessive mental depression, and impure air contaminated with organic effluvia.*

Exciting Causes.

1. *Eating unripe irritating fruit when the system is under the endemic or epidemic influences of Dysentery.*—Unripe indigestible fruit in such cases acts as a severe intestinal irritant which frequently terminates in Dysentery; some authors have denied the fact that fruits injudiciously used may produce Dysentery. I have seen an indisputable case in which after an indulgence in green mango, Dysentery was induced within eight hours. This was in the case of a boy about eleven years old; and unripe fruit is the frequent cause of Dysentery amongst children in the tropics, whose intestinal mucous membrane is very active and easily irritable; the first morbid effect subsequent to the inflammation of the mucous coat of the large intestines is inflammation of the patches of Peyers, which become very much enlarged, and should the disease not be stopped at once, other symptoms characteristic of Dysentery begin to manifest themselves.

2. *Variation in temperature.*—The change from cold to very hot weather is known by tropical physicians to be the sole cause of Dysentery in many constitutions, especially Europeans of short residence in tropical climates. "The principal exciting cause of Dysentery," writes Dr. Massy, "is connected with variations in temperature, which, by checking the perspiration, induce vitiated secretion and internal congestions. These influences are chiefly felt in the Bengal Presidency during the hot winds, especially in the rainy season of September and October. During the prevalence of these hot winds soldiers wear little clothing, constantly discarding flannel, belts, &c.,

and while in a profuse perspiration they lie down in a draught; the wind, even though it may be hot, acts coldly upon the wet calico clothing, and bowel complaints or fever result." *

3. *Cold night air and exposure to wet and cold.*—There are various ways by which Dysentery might thus be produced; *a.* Night guards amongst soldiers and sailors; soldiers on guard at night in tropical climates suffer seriously from changes in the weather, especially those serving in the interior of hot countries where the variation of the temperature between day and night is very great; the land around swampy, vegetation luxuriant, and the night air damp and very foggy; during the day the excessive action of the sudorific glands, as well as the liver, caused by the intense heat of the sun, produces a great deal of perspiration, and sometimes leads to a plentiful supply of biliary secretion, which the cold damp night air suddenly checks; and thus a determination of blood to the mucous membrane of the intestinal coat is induced. *b.* I have met with persons who were the subjects of Chronic Dysentery, suffer from a severe relapse by the opening of the windows of their chamber at night, and allowing the cold air to fall directly on their body. *c.* A want of sufficient clothing.

According to Hirsch sudden exposure to cold after great heat is merely a *causa occasionalis* of Dysentery, and does not of itself bring on Dysentery, but may aid the action of the more potent causes.† But

* Abstract of a Paper on Acute Dysentery, Army Medical Report for 1859, p. 280.

† Handbuck der Historisch Geograph. Pathol., Band ii., p. 234.

Dr. Ferguson says "true Dysentery is the offspring of heat and moisture; of moist cold in any shape after excessive heat. Nothing that a man can put into him would ever give him true Dysentery."

4. *Worms.*—This I have found to be a fatal cause in Dysentery of tropical climates, and unless the worm is removed in time, the disease generally proves fatal: the patient evacuates watery stools mixed with blood, and complains of tormina or severe cutting pains in the abdomen; sometimes the pain is diffused generally and intensely felt on pressure. I have met with two cases of this kind, in which the worm was of the species tænia solium, one of which was over 6 feet in length.

5. *Impure water* (*impregnated with vegetable and animal matter*).—This is a very fruitful source of Dysentery in the tropics, and has been noticed by all writers on this disease. In 1799 Lempriere noticed in May the increase of bowel complaints in Jamaica, when after a flood the water was bad and turbid, loaded with filth and dirt. In Secunderabad and in Deccan in the East Indies, Dysentery is of very frequent occurrence from the same cause. In the first expedition against the Ashantees on Gold Coast, Western Africa, impure water operated most directly in producing Dysentery. When the troops arrived at Swadrue, such was the want of water that both officers and men were obliged to use for drinking and other purposes water of the most filthy description, taken from open swamps; the effect was immediate and fatal in some constitutions, whilst in others it manifested itself after some days.

Drinking the brackish water in some parts of Western

Africa I have found to bring on Dysentery in persons not accustomed to it, and Lempriere also mentioned that at Kingston and Port Royal where a good supply of water could not be obtained, the inhabitants drank the brackish water of the place, and Dysentery was induced.

Other impurities are also capable of producing Dysentery when the constitution is epidemically disposed—such as suspended earths and animal organic matter—phosphate and chlorides of lime and magnesia, nitrate of lime and ammonia, large quantities of chlorides of sodium and magnesium.

Mortality in Dysentery.

Dysentery, says Dr. Robert Jackson, is one of the most important of the maladies that occur amongst troops, particularly in the West Indies, where in some of the islands it amounted to one half, even to more than half of all the forms of acute diseases which appear in the hospital return of sick. . . . It is dangerous in itself, more fatal in fact among the military in the West Indies, either primarily or secondarily, than any other, the concentrated fever, as incident to strangers, excepted. According to W. Annesley's calculations we find that during a series of years when the troops in India were not actively employed in the field, the annual rate of admission into hospitals (Bengal Army) was 25 per cent. of the effective strength, while the annual mortality was only 5½ per cent. of the nominal admission. In the Madras army the rate of mortality was 8 per cent., though the rate of admission was only 25 per cent.

PREVALENCE AND MORTALITY OF DYSENTERY IN VARIOUS COUNTRIES.

BY SIR ALEXANDER TULLOCH, K.C.B.

STATIONS.	Period of Observation.	Aggregate Strength.	DYSENTERY.		
			Attacked.	Died.	Proportion of Deaths to Admissions.
Windward & Leeward Command	20 years	86,661	17,843	1,367	7·7 per cent.
Jamaica	20 ,,	51,567	4,909	184	3·7 ,,
Gibraltar.....	19 ,,	60,269	2,653	64	2·4 ,,
Malta	20 ,,	40,826	1,401	94	6·6 ,,
Ionian Islands..	20 ,,	70,293	3,768	184	4·8 ,,
Bermudas	20 ,,	11,721	1,751	36	2·0 ,,
Nova Scotia and New Brunswick	20 ,,	46,442	244	18	7·4 ,,
Canada	20 ,,	6,428	735	36	4·8 ,,
West Africa ...	18 ,,	1,843	370	55	14·2 ,,
Cape of Good Hope	19 ,,	22,714	1,421	44	3·0 ,,
St. Helena	9 ,,	8,973	751	69	9·0 ,,
Mauritius	19 ,,	30,515	5,420	285	5·2 ,,
Ceylon.....	20 ,,	42,978	9,069	993	11·1 ,,
Ternasserin Province...	10 ,,	6,818	1,460	137	9·3 ,,
Madras	5 ,,	31,627	6,639	559	8·3 ,,
Bengal.....	5 ,,	38,136	5,152	411	8·0 ,,
Bombay	5 ,,	17,612	1,879	151	8·0 ,,

THE PROPORTION IN WHICH DIFFERENT AGES SUFFER FROM THE RETURNS OF THE TROOPS IN MAURITIUS.

BY SIR ALEXANDER TULLOCH, K.C.B.

FORCES IN THE MAURITIUS.	AGE.			
	18 to 24	25 to 33	33 to 40	33 to 40
Aggregate Strength of Seven Years.....	3,892	5,361	1,215	300
Died of Dysentery	62	63	24	8
Ratio per 1000 of Mean Strength.	6·7	11·8	19·7	36·6

STATISTICAL REPORTS OF THE SANITARY CONDITION OF THE TROOPS IN WEST COMMAND.—BY SIR ALEXANDER TULLOCH, K.C.B.

PREVIOUS TO ALTERATION IN RATIONS.						SUBSEQUENT TO ALTERATIONS IN RATIONS					
YEAR.	Mean Strength.	Dysentery and Diarrhœa chiefly.		Ratio per 1000 of Mean Strength.		YEAR.	Mean Strength.	Dysentery and Diarrhœa chiefly.		Ratio per 1000 of Mean Strength.	
		Admitted.	Died.	Admitted.	Died.			Admitted.	Died.	Admitted.	Died.
1825	571	235	82	411	56	1828	232	139	1	600	
1826	471	256	26	543	56	1829	114	50	—	439	$5\frac{1}{10}$
1827	345	209	13	606	38	1830 to 1836	42	22	1	524	
				Average.	Average					Average	
Total ..	1387	700	121	505	51	Total...	338	211	2	543	$5\frac{1}{10}$

In the Peninsular War the British army lost no fewer than 4,714 men by this disease only; in 1812 about 2,340 died; in 1813 about 1,829; and in 1814 more than 748 succumbed.

From the year 1813 to 1836 in the stations at Calcutta, Chinsurah, and Berhampore in Bengal Proper, there was an aggregate force of 25,433 men in His Majesty's army, among which, according to Colonel Tulloch, 8,498 cases of Dysentery and Diarrhœa occurred.

Between 1842 and 1848, in the Madras Presidency, there was an aggregate British force of 82,342 men, amongst whom there occurred 19,720 cases of Dysentery and Diarrhœa, *i.e.*, 10,531 cases of Dysentery, and 9,189 cases of Diarrhœa.

In Major Cochrane's expedition against the Ashantees in 1863, there were 230 men stationed at Anamaboe, 42 of whom were admitted for Acute and Scorbutic Dysentery of very severe type under my treatment; 4 died whilst in the hospital, and 2 after pronounced convalescent, and sent to another station for change of air.

Between 1830 and 1850, according to Dr. M'Pherson, there were admitted in the European General Hospital of Calcutta, 2,044 cases of Dysentery, of which there were 457 deaths, or 22·3 per cent.

In the Blue Book report for 1866-68, we extract the following, showing the admissions and mortality of Dysentery among both the European and Native soldiers stationed in Ceylon and Hong-Kong during those years :—

WHITE TROOPS.

Station.	Year.	Strength.	Admitted.	Died.
Ceylon	1866	... 886	... 171	... 0
,, ...	1867	... 919	.. 90	... 2
,, ...	1868	... 823	... 137	... 3

BLACK TROOPS.

Ceylon	1866	... 1207	... 211	... 7
,, ...	1867	... 974	... 43	... 4
,, ...	1868	... 1028	... 31	... 3

WHITE TROOPS.

Hong Kong.	1866	... 869	... 146	... 8
,, ...	1867	... 723	... 165	.. 3
,, ...	1868	... 668	... 83	... 0

BLACK TROOPS.

Hong Kong.	1866	... 285	... 82	... 3
,, ...	1867	... 425	... 63	... 3
,, ...	1868	... 691	... 113	... 0

From the records of the European General Hospital at Calcutta, as quoted by Martin, the following was the fearful mortality by Dysentery from 1797 to 1799, before the present improved method of treatment :—

	Treated.	Died.
1797.—March, April, and May	... 37	... 21
,, June and July	... 58	... 38
,, August and September	... 22	... 16
,, November and December ...	... 21	... 15
1798.—March, April, and May	... 17	... 7
,, June, July, and August	... 27	... 14
,, October, November, and December	... 25	... 8
1799.—July, August, September, and October .	31	.. 11
Total	... 238	... 127

In the expedition against the Ashantees in 1864, West Coast of Africa, the cases of Dysentery were more of a scorbutic character; there were treated, from a strength

of 1,587 men of 4th West India Regiment, 127, of which 19 died.

Diagnosis and Prognosis.

Dysentery may be distinguished from Diarrhœa by the bloody stools and by the number of calls; the tormina and tenesmus; the quantity of fæcal matter passed, and its composition, whether containing pus or not. Purulent stools, when there is no trace of fistula in ano, are pathognomonic of Dysentery. Dysentery has an odour *sui generis*, it is most fetid and offensive, especially in its last stage; even in very slight cases it is perceptible, and sometimes this smell alone indicates the nature of the patient's complaint without the disease being as yet fully manifested; and if proper treatment be adopted, the cure is speedy.

As regards the *prognosis* of this disease, it must always be borne in mind that its natural tendency is to run a fatal course, and the most energetic treatment is indicated from the very commencement of the attack, since when once it has got a fair hold on the system, cure becomes rather a difficult matter. When in a case under treatment the stool becomes less frequent and more copious, having a bilious yellowish or fæcal character, the strength not much impaired, the tormina gradually wanes in frequency and severity, the tenesmus diminishes, and there are sediments in the urine, we have sufficient symptoms to look out for a favourable termination. But when the tormina and tenesmus become unceasingly severe and distressing, the stools very frequent and bloody, and the supervention of vomiting, hiccup, and delirium; or when

the tormina and tenesmus suddenly cease, the extremities become cold, deglutition very defective and difficult, the skin covered with clammy sweat, pulse frequent, feeble, and irregular, the motion extremely fetid, micturition difficult, and there are spasms of the neck of the bladder, involuntary motions, subsultus tendinum, and convulsion, we must look out for the worst result, as these symptoms portend a rapid and fatal termination.

The signs are also unfavourable when Dysentery is complicated with or supervenes upon other disease, such as disease of the spleen and liver, scurvy, intermittent, remittent, or typhus fever. When it remains in the system for a long time beyond fourteen days, it becomes rather dangerous, also when a large extent of the colon is involved in the disease, and when it occurs epidemically.

When Dysentery has lasted for a long time in a person who has naturally a weak and small heart, the system is insufficient to withstand its wasting effect. In cases of this kind which have come under my notice, the individuals are generally sensible to within about from a quarter to half an hour before their death; there is ædema of the feet and face; the pulse is very characteristic, very soft, having the feel as if the quantity of blood is insufficient to fill up the blood vessels, easily compressible, not very fast; towards the latter end, it is very intermittent, beating at times slow, then very fast, and afterwards stops for a few seconds. Death is generally very quiet.

Death from Dysentery may be the result of exhaustion from the excessive discharge, of perforation of the intestinal coat into the peritoneum, of general debility, of

giving way of the vital powers through the intensity of the inflammation, or of gangrene of the intestines.

Treatment of Dysentery.

The indications for treatment are to remove all irritating causes which may tend to keep up the disease; to confine the patient to his bed; to regulate his diet; to check the discharges by the use of proper means; to relieve the pain and other unpleasant symptoms; and to employ various local means. I shall here in the first place trace a simple course of treatment of mild Dysentery uncomplicated with hepatic disease, intermittent and remittent fevers, or scurvy. In a very simple case where the patient complains only of tenesmus, slight tormina in the night, and passing of blood, accompanied with very little pain and small quantity of fæces, without any fever, a dose of castor oil with opium—*i.e.*, thirty drops of the tincture of opium, will be sufficient to arrest the disease. But should it commence with slight Diarrhœa without pain or uneasiness, with moderate tenesmus, we very seldom see the disease at the commencement to stop it at once, as the patient generally allows it to run on until it begins to show formidable symptoms, before he seeks for relief; but I have known cases, especially among soldiers, where early application has been made, and a small dose of castor oil and tincture of opium being given, followed by Dover's powder (*Pulv. Ipecac. co.*) has effected a cure. But when pain is referred to certain portion of the abdomen, when tormina and tenesmus are excessive, when the pulse is much affected, then a more

energetic treatment is required. I have here detailed the various treatments which will be required in the different forms of this disease, and shall commence by dividing them into *Therapeutic* and *Dietetic*.

The THERAPEUTIC TREATMENT I shall divide into *Narcotic, Sudorific, Astringent, Counter-irritant with other local applications—Laxative* and *Enemata*.

NARCOTIC.—Of the *Narcotics*, the best remedies we have are the *preparations of opium*. Opium was recommended by Sydenham, and is most usefully employed in combination with almost every other remedy. Its action is both local and constitutional, it acts primarily by diminishing the increased sensibility of the intestines, which is the seat of mischief, and by relieving the morbid spasmodic contraction of its muscular coat, which forms the tormina of the disease and a most troublesome symptom; it checks the excessive secretion of the bowels, and produces a quieting, sedative influence over the general system; it enables the patient to sleep for some time undisturbed, and when added to antimony or ipecacuanha forms a powerful sudorific by directing their actions to the general sentient surface. It is administered either in the liquid form as *tincture opii* or *liquor opii sedativi*, or in the forms of powder or pills; the quantity administered varies greatly, according to the stage of the disease, the amount of disturbance of the constitution, varying from one to three grains; in the early part of the disease, a much smaller dose is required, but when the disease has had a fair hold on the system, there is great toleration of the remedy. But it is in combination with other remedies that opium has been employed.

Hydrate of Chloral is a very useful and quieting sedative, and relieves the patient greatly of the severe tormina and distress.

SUDORIFIC.—The sudorific is the most important method of treatment in Dysentery of tropical climates, and I consider, that if judiciously used, death, even in the worse forms of Dysentery when uncomplicated, would be an exception. The preparation now universally employed is *ipecacuanha*; I have used it in small as well as large doses, and can attest to the value of either. A patient suffering from a severe attack of Dysentery, with griping pains in the abdomen, and frequent calls to the stool, is, when seen by his physician, ordered to bed, and thirty minims of tincture of opium, or the liquid sedative opium administered, and half an hour afterwards from thirty to forty grains of ipecacuanha; he is ordered to remain quite still in bed, so as to delay vomiting; in some cases he goes to sleep and does not vomit at all, while in the generality of cases he vomits once or twice. He feels greatly relieved, and the dose may be repeated after twelve or twenty-four hours, gradually lessening the quantity of the ipecacuanha, so that ten to fifteen grains might be continued for some time until the patient is quite well. After administering it, the patient should be prevented from drinking water; if thirsty, a tea-spoonful may be allowed, as any large quantity of water taken into the stomach may increase the vomiting. The effect of large doses of ipecacuanha is very great, it acts directly on the liver and small intestines, producing a copious bilious stool, and thus relieves the portal circulation; it induces diaphoresis, lowers the pulse, and produces a general sedative effect on the muscular

fibre of the intestines, and thus allays the spasmodic contractions incidental to Acute Dysentery. In India it reduces the mortality from 7·1 per cent to 1·3 per cent. When the Dysentery is very severe, eighty to even one hundred and twenty grains of ipecacuanha in many cases can be tolerated, without producing vomiting. When vomiting has commenced after every dose, it shows that its curative effect is appreciated in the system, and the dose should be reduced and less frequently administered; in slight cases of Dysentery I have seen twenty grains of the powder produce retching and vomiting.

Towards the end of the 17th century, Piso brought from Brazil ipecacuanha, and introduced it as a remedy for Dysentery, and he gave it in one-drachm doses in the form of infusion. It was more or less in use throughout the 18th century, and about the middle of the century was much esteemed by Sir John Pringle, who gave it sometimes in scruple, at others in five-grain doses three or four times daily, at intervals of two or three hours. Mr. Mortimer and other medical officers of the Madras Army, upwards of thirty years ago thought highly of it, and used it freely in scruple doses combined with powdered gum arabic. Still more lately, Dr. Twining advocated its use in doses similar to the smaller one given by Sir John Pringle. Haspel also combines ipecacuanha in full doses with calomel in the early stages of the disease.*

Sir R. Martin has suggested the following considera-

---

* "Clinical Researches on Diseases in India," by Charles Morehead.

tions before attempting to employ ipecacuanha in the treatment of this disease:—

1st. Whether extract of gentian has any or what effect in preventing vomiting under the use of this drug. It is true that after a few days' use, a comparative tolerance of medicine seems to be established, as in the case of the antimonial preparations, but altogether, as it appeared to him, unconnected with the use or disuse of bitter extract.

2nd. Whether the preparation of cannabis indica may from its sedative as well as from its anti-emetic qualities prove serviceable in conjunction with ipecacuanha, or with antimonials; unlike opium and its preparations, hemp does not lock up the secretions.

3rd. Whether four grains of ipecacuanha occasion as much sickness as ten grains, and if so, whether the large dose should be preferred for the cure of Dysentery. If the action of the ipecacuanha be purely repulsive, or if according to Dr. Paris, it be to abate both the velocity and the force of the heart's action, so as to affect "the whole senses of blood vessels from their origin to their most minute ramifications," we may do wrong by being sparing of our dose in so formidable a disease as Dysentery, if the stomach can be made to bear the larger quantity.

When ipecacuanha is given in small and repeated doses, the preparation mostly employed is the *pulv. ipecacuanha co.;* ten grains repeated every two or three hours, until the severe symptoms subside, will be found sufficient for a cure in an early case where inflammation is not high. When Dysentery has remained for some time, and connected with paludal fevers, its effect will be enhanced by

administering it with a tonic. The following will be found useful :—

℞.—Quiniæ sulphas	℈jss.
Pulvis ipecacuanhæ	ʒss.
Pulvis ipecacuan. co.	ʒj.

Misce—fiant pulv. xx.—One to be taken every two or three hours. It has a diaphoretic, sedative, and tonic effect on the general system.

The mode of practice followed by Surgeon Docker, 7th Fusiliers, and Dr. Massy, 2nd Dragoon Guards, is similar to what we have recommended, and which is the practice of Professor Maclean, of Netley Hospital. According to these two gentlemen, when ipecacuanha is administered in large doses, it is necessary first to give the patient about *half an ounce of castor oil,* to clean out the irritating cause in the intestine, and also any hardened fæces that may be present; about three or four hours afterwards, or when the oil has had its proper effect, thirty drops of the liquor opii sedativi should be administered internally, and a mustard cataplasma placed over the abdomen; half an hour after this, a drachm of ipecacuanha should be given in a little water. These precautions are necessary to prevent the revulsive action of the stomach, which in many cases, however, does take place, and the whole of the ipecacuanha is vomited; in this case about half an hour or an hour should be allowed to elapse, and another full dose given. When the sickness and retching are very troublesome, and the medicine is given in the fluid state, Dr. Massy recommends giving two or three drops of hydrocyanic acid first, and a five-

grain pill of ipecacuanha and a little opium made, of which three or four should be given for a dose.

The effect of one or two large doses of ipecacuanha in cases of Acute Dysentery "is usually to produce one or two feculent motions, and the disease terminates. There is in general no gradual alteration of secretion or other symptoms, the disease seeming simply to end; confinement to the recumbent position for a day or two, and farinaceous diet are alone necessary; pain tormina, tenesmus, procidentia ani, blood, mucus, jelly-like secretions, all cease; the appreciable action of the medicine being a few bilious loose motions. But in some instances, the ipecacuanha does not act so speedily, or with such decided benefit, its exhibition at stated intervals may be necessary for two or even three days." Sometimes slight looseness still continues for a short time after the disease is cured, and in some cases the formation of scybalæ and its retention may lead to the development of symptoms of inflammation and a renewed attack, but this may be avoided by the administration of castor oil and opium at stated intervals. The action of ipecacuanha is quick, and saves the constitution from the injury of a protracted convalescence; it should be given at the very commencement of the disease, as time is of very great consideration; it is given simply in from twenty to forty grain doses, either with half to two grains of opium, or the opium might be given half an hour before, and the patient kept from liquid for some hours.

These large doses of ipecacuanha, if persisted in after the acute symptoms have abated, may sometimes occasion alarming symptoms; the severe pains in the

abdomen will cease, but there will be great prostration of the whole system, the pulse quick, small, and extremely weak; a bilious Diarrhœa with the odor dysenterica supervenes, which flows from the patient continually, with scarcely any cessation, but all these quickly stop as soon as the dose is reduced. I shall now give a brief sketch of a severe case of Acute Dysentery, showing the effects in full of ipecacuanha in its treatment. Private A. M., No. 1105, Infantry, was admitted into hospital, 28th April, presenting the following symptoms:—severe pain all over his body, but principally in the abdomen and back; the abdominal pain was of a griping and lancing character, which came on at short intervals, at which time he was unable to take his breath, and had an inclination to go to the stool; his discharge was small, watery, and contained mucus and blood, or bloody slime; he was unable to pass his urine, unless by the aid of instruments, which discovered spasm at the neck of the bladder; the urine was high-coloured, of ordinary quantity. The skin was hot and bathed in clammy perspiration, the countenance pinched as in agony; pulse hard, easily compressible, about 90 in the minute, no appetite. Ordered 10 grains of Dover's powder to be administered three times a day, and hot fomentation over the whole body, and patient placed under blankets; thirty minims of tincture of opium was ordered at 10 p.m., six hours after the last dose of the powder. 29th.—Soon after the warm fomentation the pains over the body were considerably reduced, the number of calls to stool was very much reduced; towards evening he had strong fever, which brought on the pains; ten grains of quinine were

ordered to be taken during the day; the powder to be continued; he slept very well the previous night; the abdominal pains although still existing, were very much reduced, both in frequency and intensity; the stool was less watery, but contained a small quantity of mucus and blood; he was unable to pass freely his urine, so that instrument had to be used; towards evening there was a general improvement of all the symptoms, and the fever had abated, and half a drachm of tincture of opium ordered at 9 p.m. Chicken diet was ordered with 4 ozs. of brandy, to be taken at intervals during the day. 30th.—Patient passed a most restless night; went to the stool more than thirty times; pain in the abdomen excruciating and at short intervals; severe spasms at the neck of the bladder, so that instrument had to be used, ten grains of Dover's powder was ordered at eight a.m., and thirty minims of tincture of opium at twelve o'clock. *Vespere*—Patient spent a most miserable day; he went to the stool every quarter of an hour, with the exception of an hour after he had taken the medicine; he was so weak that he was unable to move from his bed, so that a bed-pan was furnished him; his pulse was about 100, small, thin, and weak; pain, severe and cutting, extended all over the abdomen; pressure produced great pain; the stool was very disagreeable, containing a large quantity of blood and shreds of mucous membrane; the odour most disagreeable and characteristic. On enquiring the cause of such a change it was discovered that the previous night patient had suffered from stoppage of urine, and the attendant without any orders had given him a large dose of salts (sulphate of magnesia); thirty minims of tincture of

opium was administered, a large mustard cataplasm was applied over the whole of the abdomen and stomach, and a quarter of an hour afterwards forty grains of pulv. ipecacuanha was administered; this was at five p.m.; at ten p.m. the ipecacuanha dose was repeated. May 1st.—There was no vomiting after the powder; passed a moderately good night; went to stool about eight times, the stool still contained mucus and blood, the abdominal pain was troublesome, but not nearly so severe as yesterday; the pulse improved in strength and 90; the ipecacuanha in forty-grain doses was ordered to be taken twice a-day—at twelve noon, and at bed-time; and the following diet—chicken broth with rice, no meat to be eaten, two pints of rice water, four eggs, port wine, two ounces of arrowroot and two of sugar. 2nd.—Patient felt much better, the number of stools at night was reduced to three; the bowels much relaxed; no vomiting after the powder, pulse stronger, 90; slight improvement in the appetite; no blood in the stool, it contained bile and feculent matter. *Vespere*—improvement uninterrupted. The diet to be repeated, as well as the ipecacuanha. 3rd.—No change for the worse, still improving, complained of thirst, lemonade from fresh limes was allowed to be taken with the rice water. The powder was ordered to be taken as yesterday; after the twelve o'clock dose he vomited for the first time. 4th.—Had a bad night's rest, and had two vomits after taking the powder last night; he went twice to the stool, but no blood; this morning his abdomen was tumid and distended, and made him feel very uneasy; his pulse and bladder were good; the powder was repeated at ten o'clock; soon afterwards the bowels

became exceedingly loose, no pain or uneasiness, nor vomiting; this state grew worse, and so bad that the patient was obliged to lie with the commode under him, and the discharge flow out without the slightest effort. At my visit at five p.m., the patient was in a state of extreme prostration, countenance very anxious and death-like; the bed-pan was under him, the discharge watery, no blood, containing a large quantity of bile of a somewhat yellowish green colour; pulse exceedingly weak, easily compressible; no pain anywhere, but a general prostration of the whole system; thirty minims of tincture of opium were administered at once, which was repeated at ten p.m. 5th.—Had a good night's rest; went four times to stool; looked much better this morning both in appearance and in symptoms; in the evening visit had only two stools during the day, no blood, and an abatement of the disagreeable smell; ten grains of ipecacuanha were ordered at bed-time. 7th.—Greatly improved, passed a good night; calls to the stool infrequent; appetite improving; stools getting healthy; ten grains of Dover's powder to be given at bed-time every evening until countermanded. 9th.—Much improved, gaining strength every day; walk about in the ward; no pain or uneasiness in the bowels or any part of the body; complains of being very hungry. The chicken diet and extras to be continued, and he is to be permitted to take some of the meat. 11th.—Getting stronger; convalescent, mixture of pernitrate of iron (℥v.) to be taken three times a day, and the powder at bed-time occasionally.

Astringents.—Various astringent remedies have been used in the treatment of this disease, but with very little

or no good effect when the disease has taken a fair hold on the system. *Kino, catechu, hematoxylum,* and even *tannic* and *gallic acids* have in true Dysentery failed to have the slightest influence over the disease, although they have in the beginning of an attack, when the disease is not complicated with hepatic derangement, scurvy, or paludal fevers. I have seen some good effect produced by the use of *tannic acid* in combination with opium. The best astringent which I have used with more or less marked success, and which might be safely employed at any stage of the disease, especially when ipecacuanha cannot be obtained, is chalk and opium. Chalk has a topical influence on the intestinal canal. Its effect is observed directly on the ulcerated surface of the mucous membrane, and it acts by first absorbing in some measure the fetid exudation common in Dysentery; and then being a desiccant it acts as an astringent to the parts. I have frequently used it combined with opium, which increases its effects, in the form of pulv. cretæ co. cum opii or pulv. cretæ arom. cum opii in forty-grain doses every three hours, each dose containing one grain of opium, which might be advantageously increased according to the severity of the disease.

Charcoal.—Dr. Robert Johnson recommends the use of charcoal after the subsidence of the inflammatory stage; a drachm of charcoal powder in rice water is very effective; he writes, "These of all means known to me have had the most instantaneous good effect in this form of disease. When the subject has been prepared by previous evacuations, &c., two or three doses of the powder by the stomach generally effect a cure;" except in severe

cases, where the action of the disease is located chiefly upon the exterior membrane, or in the more remote abdominal organs. He recommends the following powder when tenesmus with pain and heat in the rectum is urgent, and the discharge is very offensive. Take of—

Fine powdered charcoal	℈j.
Powdered rhubarb	gr. x.
Ipecacuanha	gr. v.

Mix and administer.

Acetate of lead with opium, I have found in extreme cases where there is much vomiting and debility, to produce a most wonderful effect; but this remedy cannot be administered in large and regulated doses, as the patient may suffer from lead poison afterwards. In a case which I had not long ago among the native population, the patient had suffered for nearly a month; she was called to the stool twenty or thirty times during the night, discharging bloody pus with slime and shreds of mucous membrane; she was extremely prostrated, hiccups had come on, pulse 130 in the minute very steady, eyes glassy and of deathly whiteness, and the countenance had the appearance of approaching dissolution; in fact, I was sent for at the last moment when the family had no hope of her recovery. Ipecacuanha in large doses was counter-indicated, but the following mixture was at once administered:—

℞.—Pulvis plumbi acetas	gr. ij.
Acidum aceticum dilut	♏ xv.
Tinctura opii	♏ xxv.
Aqua pura	℥iss.

Misce.

This was at seven p.m.; at two a.m. the mixture was repeated; she went to the stool only twice that night; it

was twice repeated during the next day. On the third day her stool had good appearance, without blood, but with small shreds of mucous membrane; ipecacuanha was now given with small doses of opium, and the patient gradually recovered.

Counter-irritant and other local remedies.—We shall divide this into *vesicant, blood-letting, embrocations,* and *fomentation.* Counter-irritant is one of the best remedies we possess, and is always indicated when even the patient complains of severe pain located in one or other part of the abdomen.

Vesicant.—In this division the emplastrum cantharidis will be found the best when we require the effect to be gradual, as it has a most decided effect on the pain; when the dysenteric pain is very much prolonged, severe and difficult to cure, the application will be required to be often repeated. I have had in many cases to apply five blisters over the region of the cæcum, one just after the other has healed; when, however, a quicker effect is required, the liquid vesicant might be painted over the parts, or a mustard cataplasma.

Blood-letting.—Blood-letting was once practised very extensively in the treatment of tropical Dysentery, and is even now extensively employed by physicians in the East Indies. We will consider it under the headings of general blood-letting and local blood-letting. I very much demur to the use of the former in any case of Dysentery in tropical climates; in simple Dysentery it is unnecessary, and in complicated cases, especially in armies in the field, it will be found most injurious; the tendency of blood-letting is to deplete the system, and thus

unfit it for undergoing the exhaustion consequent on Dysentery, and therefore is favourable to, as well as promotes the early dissolution of the system. On the contrary, the system requires to be buoyed up to meet the exhaustion in the latter stage of the disease, which general blood-letting tends only to destroy. In the able work of Sir R. Martin, we read that "amongst the surgeons in Bengal, blood-letting, general and local, takes the lead, and has done so for many years in the treatment of Dysentery. It is the standard remedy, and I believe that when the subject comes early and freely under this treatment, and that the case is not complicated with hepatic or other congestion or with inflammation, little else than a few doses of sudorifics and aperients as aids to general blood-letting, will be needed for the case. But as in most cases of this formidable disease, as it appears in the tropics, the morbid action going on in the large intestines is intimately associated with general abdominal plethora, and individual complications, other and important means speedily follow upon the bleeding; and of these the first are those which act powerfully on all the secreting organs, internal and external, such as calomel with ipecacuanha, in full doses at first, and given at bed-time, followed by mild laxatives, sudorifics, enemata, warm baths and fomentations, blisters and other minor adjuvandæ."

Local blood-letting by leeches and cupping is sometimes of great importance when there is much pain and tenderness in the abdomen. It should be effected over the cæcum, and all along the colon, when the patient complains of much pain; and, when there is much

attendant tenesmus, great relief will be found in the application of leeches to the anus, repeated now and then. But these treatments must be subordinate to the ipecacuanha treatment already described.

Embrocations.—When the pain is diffused all over the abdomen, I have often found the following embrocation or liniment to give some relief when lightly rubbed over the bowels :—

R.—Oleum terebinthinæ	f ℥iv.
Linimentum camphoræ co.	āā f ℥j.
Linimentum saponis	
Oleum olivæ	f ℥v.

Misce—fiat linimentum.—A little chloroform may be added to the above. An anodyne embrocation may be substituted with good effect.

Fomentations.—Fomentations of tepid or warm water to the abdomen give great relief. Warm poultices when applied have the same effect. Some recommend infusion of tobacco (O'Briene, of Dublin). Warm fomentation of the anus is very soothing. When *procidentia ani* has taken place, and the discharge very offensive, much benefit is derived by washing the anus at every stool with Burnett's disinfectant fluid, well diluted with water, or a solution composed of one part of carbolic acid and thirty parts of water. A warm hip bath occasionally used gives great comfort; so also a gentle douche on the anus.

A flannel band, or a broad flannel roller passed repeatedly around the abdomen is also very useful, as it keeps an equable temperature over the region at every season of the year, and acts as a preventive when the

individuals are exposed to varied temperatures in the tropics, as during night-guard in damp, humid, swampy regions.

Laxative.—A mild aperient is one of the most important medicines in the treatment of Dysentery of tropical climates; drastic purgatives act injuriously by irritating the already inflamed mucous coat of the intestines, thus aggravating the disease. Laxatives are administered under twofold indications; *first,* to remove from the intestinal canal any accumulation or irritating secretions that may tend to keep up the inflammation; the *second* is to unload the portal circulation. But great care must be taken in the use of operative medicines in Dysentery, as it might lead to the most fatal results. When Dysentery is preceded by sharp Diarrhœa, which has cleared the bowels of its fæcal accumulations, the admission of purgatives is contra-indicated, but laxatives should be given when it commences without any Diarrhœa. I shall now consider the value of each laxative that has been used.

Castor Oil.—This is the best and most important laxative, and is generally required at the very onset of the disease, especially if we ascertain that it is produced by unwholesome ingesta. Should the stomach revolt at it, it will be proper to make an emulsion of it by the addition of gum arabic, sugar, and oil of carraway. It should be administered in combination with laudanum, which will prevent any irritation of the bowels. It produces a soothing effect, and at the same time operates mildly.

Calomel.—In most of the Dysentery of tropical climates the liver acts very sluggishly, the capillary circulation is very slow and sometimes suspended, the portal circulation

becomes distended and congested, and the capillaries of the bowels similarly affected. Our attention, therefore, in the treatment should be directed to the condition of the liver; and calomel in small doses is indicated. In Acute Dysentery the ipecacuanha treatment should precede the calomel, although these conditions of the abdominal viscera are manifested; and during convalescence blue pills (small doses) might be administered with good effect.

Sulphur and Bitartrate of Potash.—Some practitioners, such as Selle, Cheyne, and Copland, have strongly recommended the use of bitartrate of potash in Dysentery, in the form of an electuary, especially when the action of the liver is suspended. When, however, the inflammatory process has subsided, and we have a suspicion of the existence of ulceration of the mucous membrane, washed sulphur and bitartrate of potash make a useful combination; the mixture acts as a gentle and soothing laxative, and is supposed to have a detergent and healing influences over the ulcerated surface. The following may be a guide for its administration:—

℞.—Sulphur præcipitatum	℥j.
Potassæ tartras acida vel bitartras . .	℥ij.
Oleum carui	gtt. ij.
Aqua pura	℥j.

Misce—fiat mistura.

Rhubarb.—This remedy or its preparations may be used with advantage in the commencement of Dysentery in the tropics when castor oil could not be obtained, but it is in the chronic form that it is found most useful. Combined with opium it produces a soothing effect on the abdomen

by gently removing the hard fæcal matter in the intestinal canal, and afterwards producing an astringent and tonic effect on it.

Enemata.—Various kinds of enemata have been employed, and they are highly useful after the inflammatory stage has ceased, and painful tormina and tenesmus still exist; anodyne enemata in such cases relieve the nervous system from its depressing influence and soothe the irritation; demulcent enemata act as a poultice to the sore or mucous ulcer, protecting it, but these enemata might only produce inconvenience by distending the bowels. Warm water, solution of starch or arrowroot in combination with one or two grains of opium, form an agreeable emollient and astringent enema, which should be first used at bed-time, and if it seems to soothe the patient and he wishes its repetition, it should be done twice a-day; the patient, it must be remembered, is the best judge of the effect, and we must consult his feelings and wishes. *If the rectum be found irritating, which is shown by the intense tormina and tenesmus at night, with frequent calls to the stool, a suppository of ointment of lead, and one or two grains of opium should always be used at bed-time.*

Injections of various kinds have been found to aid in the treatment of Dysentery, especially when it is confined to the rectum; *acetate of lead* and *sulphate of zinc* are the two principal remedies I have used in this form; the former when the symptoms are acute, and the latter when it begins to assume a chronic character; both act as local astringents, and when made with cold water as refrigerants also. Three grains of sulphate of zinc or acetate of lead with half or a grain of opium injected three

times a-day, or eight grains of either with two grains of opium injected at bed-time may be employed, which may be practised early in the disease with happy result. It is necessary that it should be retained, and consequently but a small quantity should be injected at a time, and in the most gradual and quiet manner; from three to four ounces will be sufficient for one application.

Injections form one of the principal remedies of the natives in most parts of Africa as well as other parts for Dysentery, for which they employ various kinds of astringent barks obtained in the forest.

I shall now succinctly go through the course of treatment necessary in the various forms of Dysentery already described to meet the various attendant complications.

Dysentery with hepatic complications.—In this form of the disease the use of mercury (calomel) in combination with ipecacuanha will be found called for at the very beginning of the disease, from twenty to thirty grains of the latter with from four to ten of the former should be given three times a-day, and should be combined with opium, as has already been described; cases are on record where Hepatic Dysentery had been treated without mercury, and the result in many cases has been that dangerous inflammation has taken place in the liver and abscess formed. Cupping and leeching over the region of the liver is a valuable adjuvant.

This hepatic complication might come on before the Dysentery, or in the course of the disease, so that it is essential, whilst treating the disease, always to examine physically the hepatic region, as sometimes it becomes congested, and when examined is found to be tumid and

painful; whilst in another case there may be no enlargement and no uneasiness on pressure, but a torpid condition of the organ with a total absence of bile, which keeps up the bloody discharge. When bile has appeared in the stool and convalescence set in, calomel should be discontinued, the iodide of potassium mixture with tonics should be given, and the region of the liver painted with iodine. The individual should be kept in a well ventilated and cleanly apartment, with his diet properly attended to, and a liberal use of lime juice, fruit, and vegetables permitted.

Scorbutic Dysentery, or *Dysentery with Scorbutic Taint.*—The remedy indicated in this complaint is the free use of lime juice, vegetables, and fruits. "In Scorbutic Dysentery," writes Sir R. Martin, "fresh lime juice with opiates simply, or in the form of Dover's powder, will prove the best medicine, while a liberal allowance of fruits and vegetables should be granted, along with so much fresh animal food as the stomach will bear. When irritability of the stomach exists, the *chlorate of potash, the carbonates of soda and potash* in effervescence, lime juice being in excess, may be given with advantage, and when tormina and tenesmus occur, with bloody discharges from the bowels, anodyne enemata should be employed, while the infusion of cinchona with the nitro-muriatic acid and opium are given by the stomach. When sloughs are discharged by stool along with grumous blood, the scorbutic taint being manifest, the danger to life is imminent. For the removal of the oozing which takes place in Scorbutic Dysentery from the gums and mucous membrane of the bowels, the astringent and tonic proper-

ties of sulphate of zinc largely administered in solution by the stomach and rectum, and used as a gargle, will be found eminently serviceable; with the same view, the muriatic tincture of iron is recommended by Annesley and others; but it is not intended that either means should supersede the use of direct antiscorbutics." In this form of disease, the *sulphur* and *bitartrate of potash* treatment answers well, and so does the use of the *pernitrate of iron*. *Fresh* or *dry bael fruit* is strongly recommended as acting not only as an astringent, but as a purifier of the blood, and a stimulant to the mucous membrane to a more natural action. Ipecacuanha is also used here with advantage, but in small doses only.

Sometimes this form of disease puts on a severe hæmorrhagic tendency, and becomes very dangerous, as death may take place a few hours after admission into hospital; but the disease may continue on for three or four days. The appearance generally presented by the invalid, as observed in Calcutta, is that of much "collapse with a sad, anxious, scorbutic-looking countenance, much restlessness, a cold damp surface, a small quick pulse, and cadaverous odour exhaling from the body, the matters voided consisting of grumous blood, or of fluid largely tinged with blood, with slough and patches of mucous membrane, and having an offensive cadaverous smell;" *post-mortem* examinations showed large deposits of coagulable lymph between the coats of the large intestines, and most generally in the cæcum, sigmoid flexure, and rectum; ulceration of the mucous membrane and perforation of the intestinal coat. The treatment should be most energetic, and no time should be

lost in bringing the system under the influence of remedial agents.

Malarial Dysentery, or Dysentery complicated with Intermittent and Remittent Fevers.—In these cases, the Dysentery will be found only as an attendant complaint, which shows sometimes a disposition to supersede the original disease; our principal aim should be to prevent the occurrence of the paroxysm of fever, by the administration of quinine, and other preparations of the Peruvian bark, in combination with ipecacuanha, astringents, and opiates. Chalybeates with vegetables and the mineral acids, *e.g.*, the nitro-muriatic acid, are of great service. This mode of treatment is also indicated in the typhoid and adynamic forms of Dysentery. The quinine should be administered in large doses, from ten to twenty grains at a time.

Dysentery with Disease of the Spleen.—Here the mineral acids are indicated to improve the conditions of the blood. The nitro-muriatic acid in large doses to be taken internally, and it may also be employed externally. No mercury should be administered, but external use of iodine paint, and internal use of bromide of potassium should be advised.

Therapeutic Treatment of Chronic Dysentery.

In the chronic form of this disease we must expect to find the coats of the intestines in one or other of the following conditions, or all combined:—either relaxed, thickened and narrowed, or ulcerated. The vegetable and mineral astringents and tonics, as well as ipecacuanha in combination with the preparation of opium, are our principal

remedies, and we are to vary their use and watch their effects so as to arrive at what is more adapted to the constitution of the patient under treatment. Sulphate of zinc, diacetate of lead, kino, catechu, tannic acid, simaruba, sulphate of copper, nitrate of silver, lemon juice, vinegar, pyroligneous acid, quince or bael, arsenic, the muriatic acids, are our remedies. When there are pain and irritation, we should apply leeches, cupping, or blister to allay and quiet the peristaltic movement of the bowels.

It will be found, during the course of treatment, that morbid accumulations take place in the intestines, and mild laxatives are now and then necessary. *Rhubarb* will be found of better service than *castor oil*, when given in combination with *magnesia*, *bitartrate of potash*, *ipecacuanha*, and some of the bitter vegetable infusions, such as *calumba*. Ipecacuanha, in doses of from fifteen to twenty grains every five hours, acts with great advantage. When extensive ulceration of the intestines is diagnosed, mercury is contra-indicated as being injurious and tending to hasten the fatal termination; if there be recent congestion of the liver from catching cold even, not much benefit will be derived from it. Sir R. Martin recommends a few doses of mercury to be given in conjunction with sudorifics and purgatives, aided by a warm bath at bed-time.

In some stubborn chronic cases, the Dysentery seems to defy all our ordinary modes of treatment; here we shall find sulphur, in from fifteen to twenty grain doses combined with chalk and opium, a most potent remedy.

When Chronic Dysentery is complicated with chronic enlargement of the liver and disease of the spleen, giving

a general cachectic condition to the whole system, nitro-muriatic acid internally and in bath is most useful. In general, sudorifics do not possess the same powerful effect in chronic as in acute cases; but when the patient complains of much pain, restlessness, and frequent discharges, *a full dose of Dover's powder* at bed-time, or fifteen to twenty grains of the ipecacuanha is highly useful.

In Chronic Dysentery, enemata and injections of all kinds have a most powerful effect; the acetate of lead, or a more efficient astringent, the sulphate of zinc, should be often used as already described. Emulsions of copaiba and oil of turpentine have been used by various practitioners, and reported favourably upon. *Warm* or *hot sea-bath* should be taken every morning, or better on going to bed; out-door exercise should be encouraged, and the flannel band be constantly used round the abdomen.

Dietetic Treatment.

In the treatment of this most intractable disease, the proper regulation of the diet is a very important point, and if we expect to get any good from the therapeutic remedies employed, it behoves us to attend very particularly to the dietetic treatment. When the resources of the medical officers are limited in this particular, as during expeditions, the mortality in these cases is usually great, as we have seen in the various expeditions in India and China, as well as the cases treated in the interior of the Fantee Territory during the late Ashantee war (1864), where the men, suffering from Dysentery, had served out to them salt beef and pork.

I shall divide the dietetic treatment into Mucilaginous or Farinaceous, and Stimulant.

The Mucilaginous or Farinaceous Diet.—In the very commencement of Dysentery the diet should at once be regulated. When the disease first shows itself, *soups* containing little or no fat should be taken once or twice a day; *strong tea,* with more than half the quantity of milk, should be taken four times a day with stale bread; *rice* with gravy is to be used, but meat is to be avoided; *arrowroot, tapioca,* or *sago,* are to be taken in small quantities often, or three or four times a day, and if the individual is very weak, with an addition of half a glass of port wine at each time.

Rice gruel should be made the ordinary drink, and if distasteful, should be made palatable by the addition of sugar and lemon juice. When the disease is very severe, this treatment is to be persevered in without any administration of solid food; should this condition be neglected, intense inflammation may be set up in the bowels, which might act prejudicially in the management of the case. I have seen cases in practice where patients fairly improving, contrary to the strict dietetic rules enjoined, have taken solid food, and have been obliged to confess, when inflammation had commenced, and they began to complain of severe tormina and pain on one or other side of their abdomen; even in convalescence the least alteration in diet is sufficient to bring on a relapse.

Stimulants.—This diet consists in the administration of spirits and wine. Brandy has been used with advantage during the early stage of Dysentery, when there is severe tormina, and when the constitution had previously been

reduced by debilitating circumstances. In a case lately under treatment, a young man of nineteen, whose constitution had been reduced by an attack of secondary syphilis, suffered afterwards from severe prostrating tormina, and passed a stool composed of blood and mucus; in one of the pains he took a large wine-glass of brandy almost neat, and it had the effect of entirely stopping the tormina and tenesmus, and aid the good effects of other remedial agents.

But much the best stimulant is port wine. After the acute inflammatory symptoms have subsided, and the patient begins to complain of weakness, through the incessant calls to the stool, a glass of port wine twice or three times a day should be administered, which can be increased according to the state of exhaustion of the patient; and even where the case is hopeless, the liberal use of port wine eases the way to death, and prolongs the waning life of the patient. For the use of fresh vegetables, lime juice, fruits, &c., in Dysentery, see paragraph on Dysentery with Scorbutic Taint, or Scorbutic Dysentery.

Dietetic Treatment in Chronic Dysentery.—In the treatment of Chronic Dysentery, the diet should occupy our most careful attention; errors in it among patients are very frequent, and we ought, therefore, to be very watchful, else our utmost endeavours will be baffled; "a diet which barely sustains the system, which is bland and unirritating, being all that ought, in any case, to be allowed;" errors in diet protract the cicatrization and reproduce and extend the ulceration. Sir R. Martin says, a deprivation to the very verge of starvation, would, in

many cases, prove salutary by calming the peristaltic irritability, thus affording time for the healing of the ulcerated and abraded surfaces.

Management of Convalescence in Dysentery.—The proper mode of treating patients convalescent in Dysentery, is one of great importance, and it should always be borne in mind, that the state of the intestines is so uncertain, that the least error, however produced, is apt to lead to the recurrence of the disease, and in a more severe form. Sometimes the acute disease, although cured, and the patient virtually in a state of convalescence, leaves a trace behind it in the shape of mucous discharge, with feculent matter unsatisfactory in its consistence; the ipecacuanha treatment here seems not to have the desired effect; the debility is considerable, and there is a relaxed state of the mucous membrane; in such cases the *bisulphite of iron and aluminum* is the best remedy at our command; we administer it at first in five-grain doses, which may be increased to fifteen grains; this remedy was first introduced by Sir James Murray, and is now extensively used in the Bengal Medical Service.

As soon as convalescence is established, the patient should be pretty warmly clad, and allowed to gestate in fresh air; the room made as sweet as possible, and about ten grains of Dover's powder should be administered at bed-time. The solution of pernitrate of iron in ten-minim doses is to be administered three times a day; it has not only a tonic but an astringent effect, and is extremely useful when there has been much hæmorrhage during the course of the disease.

Great care must be taken in the diet of the patient,

which should be light and nourishing, consisting of chicken broth, a small quantity of lamb chop, with the mucilaginous diet already described; together with two eggs with a glass of port wine and a little nutmeg, beaten up together, taken twice a day so long as it is agreeable to the patient.

Effects of Change.—This is a subject which demands some consideration, but which I cannot here discuss at large. In the commencement of Dysentery a change by sea has been the means of restoring individuals to their usual health; the sea air, and motion of the vessel, would seem to act advantageously in restoring healthy action to the coats of the intestines, and remedial agents take greater and a more immediate effect. But when Acute Dysentery has taken a firm hold on the system, the point of question is whether we should risk a watery grave, or give the patient a chance of recovery on land. Experience has taught me that it is most unsafe to send men suffering from Acute Dysentery on a voyage—the disease is very much aggravated, and generally terminates in death, and now that Dysentery is so thoroughly under our control, we should wait for complete convalescence before advising a sea voyage, and then the most beneficial results may be expected.

IV.—DIARRHŒA.

Diarrhœa is a frequent loose or liquid alvine discharge, rather copious and feculent, producing sharp, pinching pain during evacuation without tormina and tenesmus.

Symptoms and Progress.

Frequent calls to the stool, with at first a discharge of mucus and fæces, and pure mucus, or mucus with serum, bile, and chyle. The stool varies in colour in different individuals, and at different periods—white, green, black, yellow, and clay-coloured. The odour is sometimes fetid, sometimes sour. There is much flatulence, and a sensation of weight and oppression in the lower bowels; sharp and lancinating griping pains, which ceases after evacuation; the tongue slightly furred, nausea, and foul breath; pulse at first regular, but afterwards becomes affected and no fever.

But the symptoms and progress of Diarrhœa vary greatly in different individuals, and according to the causes which lead to its production. The mucous membrane of the intestines might be led to increased discharges by any thing which disturbs the healthy condition of the blood; *e.g.*, wet and cold, suppression of the transpiration

by the harmattan, cold dry wind, and by any irritating substance in the canal itself, such as an increased quantity of bile, and of pancreatic secretions, each of which leads to different trains of symptoms. In some cases the usual alvine evacuations are only increased by two, three, or four stools daily, whilst there are cases where the patients have a desire, as soon as they leave the stool, to return to it. Sometimes the Diarrhœa is accompanied with pain, cold skin, and irregular pulse; whilst in others none of these things are traceable. The disease may only remain for a few days, and get well of itself, or it may remain for months amidst all the remedies employed, getting better and then returning, and either terminating in recovery or in death by exhaustion. In every case of Diarrhœa the urine will be found to be scanty and high coloured.

Pathologically, the various forms of Acute Diarrhœa met with in tropical climates might be arranged under the following heads:—

1. *Diarrhœa produced by irritation of the muscular fibre of the intestinal coat, increasing its peristaltic movement, whilst all the other tissues are healthy.*

2. *Diarrhœa from inflammation or irritation of the mucous surface.*

The *first* variety is the most common form of Diarrhœa met with; it may even be caused by mere over-distention of the intestinal canal by too large a quantity of food acting as a stimulus to the muscular fibre, or by sudden mental emotion. The patient passes copious, feculent, watery mucus, or bilious and frothy stools, which are, however, mostly fæcal and of a healthy colour. The

tongue is generally loaded and foul, and the evacuations accompanied with severe griping pains. This form of Diarrhœa, which is called feculent Diarrhœa by the older writers, is induced by unwholesome food, or excesses in eating or drinking, and yields generally to treatment without much difficulty.

In the *second* form of Diarrhœa, or *Inflammatory Diarrhœa,* there is always griping pain, nausea, foul and loaded tongue; watery and serous evacuation, mixed with feculent matter; the colour is sometimes dark brown, greenish brown, and at other times pale grayish or whitish, and this form of discharge is known as *Serous Diarrhœa.* Sometimes with it we have albuminous or membranous shreds, and in other instances whitish albuminous flocculi. The skin is dry and harsh; the temperature of the body increased; the pulse soft, quick, small, and constricted; urine scanty and high coloured; the bowels are flatulent. In other cases unaltered ingesta is found in the stools, showing an atonic state of the coats of the intestines, and a partial suppression of the digestive, assimilative, and absorbent functions; the food passes off almost in the same state as it is taken in, and this condition received formerly the name of *Lienteric Diarrhœa.* The appetite is voracious, and there is great debility, and the patient, if he succumb to it, dies either from stupor or from exhaustion.

This form of Diarrhœa is caused by all circumstances which enhance the increased determination of the blood to the intestinal canal, whether directly upon the mucous membrane or through the system. The direct causes are insufficient mastication of the food, the eating of

indigestible food, acid and saccharine, unripe fruits, mouldy provisions, and high meats. In the line of march certain natural waters—waters impregnated with vegetable matter, abuse of purgative medicines, drinking of cold water in excess, disagreement of peculiar kinds of food from idiosyncrasy.

Diarrhœa might be produced through the system by the application of cold in the general surface of the body, or on the gastro-pulmonary mucous membrane, especially when it is under perspiration. The discharge is mostly of serous or mucous matter, and some writers have denominated this form *Catarrhal Diarrhœa*. One fruitful cause of Diarrhœa in tropical climates is the exhalation of *fetid* or *miasmatic effluvia*. When the system is much surcharged with this deleterious substance, it makes its escape through the intestines by causing irritation in its coats; this form of the disease is called *Malarial Diarrhœa*. Diarrhœa is sometimes the forerunner of the more formidable diseases of the tropics, *Dysentery* and *Cholera*, and we should be most careful and watchful when these two diseases are epidemic in every occurrence of Diarrhœa; the Diarrhœa is respectively called *Dysenteric* and *Choleraic Diarrhœa*.

Frequently in the tropics we meet with Diarrhœa of a most troublesome character, the result of derangement of the liver; there are three forms which are characterized respectively by an increased, a perverted, and a diminished secretion of bile. The *first* form, or *Bilious Diarrhœa*, is that connected with an increased secretion of bile; the stools are liquid, high colour, bright yellow, "sometimes green, from the action of acid in the bowels, generally

rather frequent, and attended with considerable tormina, and a burning or otherwise painful sensation in the rectum during discharge;" the circulation in some of these cases is excited, sometimes not at all, the quantity of bile is much increased, and coming in contact with the mucous surface, acts as an irritant, and thus increases its actions. When very severe, it is attended with nausea and vomiting, and sometimes with symptoms of epidemic Cholera.

The *second* form presents not only an abnormal quantity of the biliary secretion, but also an abnormal character, as it is unhealthy and perverted; the colour of the stool is deranged, being sometimes black, greenish-black, and at other times brown, and not unfrequently of a tarry consistence; in very severe cases, Dr. Wood says that the stools are sometimes "very profuse, and exquisite pain attends the passage of the bile through the bowels. It is important to distinguish the passage of the bile in these cases, from those black discharges which depend on intestinal secretion or hæmorrhage, as the treatment required is different. In the bilious cases, however black the stools may appear in mass, they always exhibit a yellowish tinge if viewed in thin layers;" this perverted secretion may be connected with serious hepatic disease, although in most cases it is a mere functional derangement of the liver.

In the *third* form, the secretion is either entirely suspended or diminished in quantity, and therefore totally different from the two preceding, and is called the *white flux;* the evacuations are light and often of a dirty white colour, being deprived more or less of bile; they are

usually opaque and sometimes almost milky in appearance; which has led some observers to consider them to be chyle, which could not be the case as they (white evacuations) are very plentiful and copious; when very abundant, they resemble somewhat the rice water evacuations of Cholera; in most instances the Diarrhœa appears to depend upon the suspension of the hepatic secretion, and very soon ceases after its restoration; congestion probably takes place in the intestinal mucous membrane, in consequence of a torpid capillary circulation in the liver, and relieves itself by secretion from the distended vessels. Occasionally it is possible that the case may be reversed, and a profuse secretion from the bowels, consequent upon intense irritation, may diminish that supply of blood to the liver which is necessary for the formation of bile; the former condition is more common, and in rare cases these two pathological conditions co-exist. This form of Diarrhœa is attended with less pain, and is very easily rectified by the early application of proper remedial agents; if not, the patient becomes very much depressed in spirit and exhausted, and perhaps dies of exhaustion. Throughout its existence, the patient will complain of indescribable uneasiness, and a feeling of weight in the abdomen, and on an inspection of the stool, we shall soon discover the real nature of the complaint. In such cases, the tongue may be red or ulcerated, and the disease may come on in paroxysms as that of intermittent fever.

I have sometimes observed that during convalescence after an attack of severe debilitating miasmatic fever, a patient suffers from looseness of the bowels, which cannot be traced to any cause; this may be regarded as *Diarrhœa*

from simple debility of the mucous membrane of the bowels.

Having now considered the symptoms and progress of Acute Diarrhœa, we shall next examine what are the particular symptoms and character of

Chronic Diarrhœa.

This will depend principally on the causes which led to its continuation and its origin, whether it be the result of biliary derangement, dysentery, intermittent fever, abuse of purgative medicines, or an hyperæmic condition of the intestinal mucous membrane. In all these cases, however, the disease will be found to have reduced the patient to nearly a skeleton, the countenance anxious, and great irritability of the mind and body. Sometimes in persons of phlegmatic temperament the mind is much depressed, the skin colourless, dry and cold, sometimes soft, but at other times very harsh to the touch; the abdomen shrunken and flabby, sometimes, however, tumid; the tongue is coated white, sometimes brown, at other times red in the edges, with the papillæ tumid; the digestion bad, sometimes voracious, no pain on manual exploration of the region of the abdomen; the alvine evacuations are sometimes of the appearance and consistence of pea-soup, and at other times serous and watery—or, as some patients describe them, like soap and water, or semi-fluid and yeast-like, with little or no colouring matter; the evacuations are voided six to eight or ten times a day without pain, and are very troublesome and copious towards the break of day, about 3 a.m., after which the patient feels very much exhausted, and his knees tremble. The mind

is generally disturbed and the patient sleepless at night, or wakes at the least noise, and feels unrefreshed by his sleep. The urine is generally high coloured, scanty and full of oxalates, sometimes of a greenish colour; the heart's action is feeble; pulse generally low and feeble, ranging from 70 to 80 in the minute.

Exploration of the hepatic region will, in a great majority of cases, reveal an enlarged liver, although in many cases no deviation from the ordinary size can be detected by percussion, or even it might be found much reduced in size. There is, however, great functional derangement, and perhaps organic disorder, keeping up the abnormal secretion of the intestines; and until a cure is effected, the patient is in the most perilous condition.

When Chronic Diarrhœa has existed for any length of time, there is a cachectic and an anæmic condition of the whole system, which latter seems to be drained of its vital fluid; the abdominal secreting organs act abnormally, and the brain and nervous system are in a state of complete anæmia; in fact, there is an atonic condition of the whole system, as well as the mucous surface of the digestive organs. When the disease of the liver is organic, the structural changes are slow; and if examined, the liver will be found to be of a grayish colour, occasionally approaching to drab, its size decreased, its structure soft and friable, but tough, and when cut the section almost bloodless, unless a division of the veins be then made.

Pathology and Morbid Anatomy.

A more able and comprehensive account of the results of the *post-mortem* appearances and morbid anatomy in

death from severe attacks of Diarrhœa cannot be obtained than that which is recorded in the Calcutta General Hospital, and noted by Martin. These are—excessive emaciation of the whole body; anasarca more or less general; serous effusion, occasionally found in the cavities of the pleura and pericardium; a flaccid, flabby state of the heart; omentum perfectly transparent without a particle of fat; in other cases omentum absorbed and shrivelled up, pylorus and commencement of the duodenum abraded and granular; pancreas hard and gritty; the liver large, soft, and flabby, sometimes blue, together with occasional enlargement of the spleen; this organ being softened with grumous blood, while in other cases it was small and indurated; a pale attenuated diaphanous condition of the small intestines was generally observed; cæcum frequently ulcerated and thickened, exhibiting marks of former disease; colon sometimes attenuated, but more generally thickened, occasionally cartilaginous; its mucous membrane being often found ulcerated in many places; mesenteric glands generally much enlarged, mesentery sometimes containing calcareous deposits as large as peas.

There is undoubtedly during life a great depravity of the blood and all the secreting and excreting fluids; the mucous membrane of the bowels is in an irritated or ulcerated condition, and sometimes perfectly congested, and incapable of performing its assimilative and depurative office; it presents a black and an anæmic aspect, having its mucous follicles enlarged, patulous, and excoriated or ulcerated. When to these states of disease we have often superadded the antecedents of structural

alterations, or severe disorder of the liver, or enlargement of the spleen and mesentery, all inducing general anæmia, it must be evident that the case is one of grave character. The blood, and all the abdominal secretions, are very much depraved, as well as diminished.

Causes of Diarrhœa.

In the preceding remarks I have anticipated many of the proximate causes which have given rise to this disease; I have shown that a mere increase of the peristaltic action of the intestinal canals lead to Diarrhœa; that increased excitability, induced by various causes, produces the same result; in fact, I have shown that this disease is induced by the following causes:—inflammation or irritation, by whatever cause it is produced, of the mucous coat of the intestines; altered condition of the biliary and pancreatic secretions; and debility of the mucous membrane of the intestines.

Change of weather is one of the most frequent causes of Diarrhœa, independently of any other circumstances; in the East and West Indies, the approach of the cold weather always leads to the development of congestive hepatic disorder, with Diarrhœa and Dysentery; in Africa, in regions where the harmattan cold, dry wind blows with force during its season, we find that it checks the insensible perspiration, congests the liver, and in new comers, leads to increased action of the intestines, resulting most generally in simple Diarrhœa, but not Dysentery; one who resides in a plain country, where the thermometer is generally high, by proceeding to a mountainous country, where the thermometer is very low, suffers from the

change just as if he had been proceeding from a very hot to a very cold climate; and this is proved by those in the East Indies, who proceed from the lower countries to the Himalayas. "Those who have visited Simla," writes Sir R. Martin, "and some of the stations on the hill ranges of the Himalayas, have very generally observed a change to a pale colourless state of the intestinal secretions soon after the ascent into those regions, resulting, it is presumed, from the comparative cold and damp of the mountain air. Diarrhœa is, in fact, a frequent result of this change of climate; so much so, indeed, as to have received from the British residents there the name of the *hill trot*. Exposure upon active field service, during night and the early morning marches in India, especially in the cold season, often produces the same result. Both the conditions here mentioned, the pale secretion and the Diarrhœa, would appear to result from hepatic congestion, the consequence of the sudden application of cold and damp to the surface of the body, previously relaxed by the heat of the plains. The result is a diminished or suspended secretion of the bile, and a consequent disorder in the entire process of digestion; the matter voided from the bowels being colourless, acrid, and irritating." A very striking instance is the change from Sindh, where the thermometer rose to 135°, to Cabul, where it fell to below 75°. Officers of the Bengal Army, who marched from the former to the latter place, became, soon after their arrival, jaundiced; and a great many, besides being jaundiced, were seized with troublesome Diarrhœa.

Unwholesome diet, or indigestible food, forms another cause—as, for example, raw vegetables—as cucumber and

salads; different kinds of hard, unripe, and raw fruits, plums, melons, pine-apples, nuts, &c.; some kinds of fish, such as shell-fish, crabs, and muscles; putrid food, or to use the phraseology of gastronomists, high food, has given rise to Diarrhœa in some persons. Sometimes it supervenes upon a debauch, the ingesta producing irritation of the intestinal canal: new articles of vegetable food sometimes bring on Diarrhœa, especially when not full grown; so that natives of the tropics are very cautious in using their newly-grown articles, such as new yams, new corn, &c. Sometimes Diarrhœa is brought on by certain emotions of the mind, especially the depressing passions—grief and fear; sometimes we have severe purging from a sudden panic, or a terrible fright, as if we had taken an overdose of black draught; at all events it purges more speedily.

Diarrhœa in the tropics, in many cases, is caused by or supervenes after severe attacks of intermittent and remittent fevers; the system being previously exhausted, the disease in many cases proves fatal. During the first Ashantee war, most of the men in Prahsoo camp, under my charge, who were prostrated with severe malarious fevers, were subsequently attacked with Diarrhœa of an exhausting character, which, in many cases, changed its type to Dysentery. In Calcutta General Hospital it was found that, amongst the European soldiers who served in China, Diarrhœa was a sequel to the intermittent forms of malarious fever of the country; and out of twenty-eight admittances from Chronic Diarrhœa, it proved fatal in fourteen. According to Dr. Stillman, of New York, many cases of Diarrhœa in California were preceded by

malarious intermittent fever, which generally proved fatal; fourteen out of twenty-five cases of Chronic Diarrhœa died within three months, and most of the remaining ones are supposed to have suffered the same fate. Before death the emaciation and anæmia were extreme, and the mind, which had previously been cheerful and hopeful, gave way at last to the most childish imbecility.

Diarrhœa is frequently the precursor of Dysentery and Cholera. An anæmic condition of the abdominal viscera, as well as of the whole system, sometimes leads to Diarrhœa; so also abuse of purgative medicines, constipation, and worms in the intestines.

Diarrhœa has been caused in tropical climates by circumstances which might only be traced to the water employed; and there are many conditions or impurities in water which might lead to its development, either amongst a population, or amongst troops in the line of march. The following is the substance of the condition given by Parkes, and my own remarks on each head:—

1. *Suspended mineral substances.*—The clay and marl, which are found in many large cities—such as the Ganges, the Mississippi, the Gambia, and the Niger—produce Diarrhœa, especially in persons unaccustomed to the water.

2. *Suspended animal, and especially fœcal matters.*—This is seen in tropical climates among the lower class of the inhabitants who use shallow well-water after heavy rains, where the towns are dirty, and fæcal matter is to be found in every nook and corner.

3. *Suspended vegetable substances.*—Diarrhœa occurs among the lower class in places where water is scarce;

and their supply in hot weather is obtained only from stagnant pools left after the rains, containing vegetable and animal decomposing substances.

4. *Dissolved animal organic matter.*—From the fact that in tropical climates it is almost impossible to find unwholesome water, which contains only dissolved and putrescent animal organic matter, we must regard this substance as only a part of other compositions in the water, which, acting together, lead to Diarrhœa.

5. *Dissolved vegetable matter.*—This holds the same place as the remarks just preceding.

6. *Fetid gases.*—Amongst soldiers in the line of march it is frequently observed, after drinking dirty water from stagnant pools containing organic matter and generating sulphureted hydrogen, that they are suddenly attacked with Diarrhœa. Several cases of this kind I observed during the expedition under Major Cochrane in the Goomoor District, Western Africa.

The rapidity with which fetid gases act may be proved by the recorded cases of Dr. Greenhow amongst the prisoners in Salford jail, where the drinking water absorbed a large quantity of sewer gases. Out of 100 sick—

73·68 per cent. fell sick within 24 hours.
21·02 ,, ,, in the second 24 hours.
2·60 ,, ,, ,, third ,,
1·87 ,, ,, ,, fourth ,,
0·75 ,, ,, ,, fifth ,,

7. *Dissolved mineral matter.*—Water containing either lime, magnesia, and the carbonate of soda, and some of these compounds (sulphates and nitrates), causes Diarrhœa.

Brackish water, in persons who are unaccustomed to it, I have often seen lead to the production of severe Diarrhœa and even Dysentery.

8. *Metallic impregnation.*—The decomposition of animal organic matter in water may lead to the production of nitrite or nitrates, which, acting on a metallic vessel used for keeping the water, may lead to its impregnation with that metal, and when drunk produce Diarrhœa.

Treatment of Diarrhœa.

Here again we have to deplore the injudicious method formerly in vogue of giving mercury to ptyalism. Those who recommended this treatment placed great stress on the condition of the stool as indicative of its use, since it was considered that the various colours depend on the morbid state of the bile; whilst it is pretty well known that in many cases, irrespective of the liver, the mucous surface is capable of such morbid secretions, and mercury has been found to act rather injuriously in nine-tenths of the cases in which it is so injudiciously employed.

In the idiopathic forms of Diarrhœa, our first object should be to enquire whether it is produced by inflammatory action, or from irritating matter in the stomach. In cases of inflammatory Diarrhœa, where the skin is dry, and the pulse small and frequent, the stool gelatinous and mucous, the tongue furred and loaded, the abdomen tender on pressure, we should at once apply leeches to the abdomen, followed by warm fomentation or mustard

poultice, and then administer opiates in conjunction with some mild purgative :—

℞.—Oleum ricini	. . . . .	fl. ℥ss. to ℥iss.*
Tinctura opii	. . . . .	f ℥ss.

Misce.—To be taken immediately ; or ℥ss. of pulv. and rhei co. might be administered instead.

We shall, however, consider the treatment of Diarrhœa as consisting, *first,* in the administration of proper medicinal substances ; *secondly,* in the regulation of the diet ; and *thirdly,* in attention to the clothing.

Medicinal substances.—Before the use of medicinal substances, we should ascertain the nature of the complaint from which the patient is suffering, whether simple or complicated, and this should guide us in our treatment. When there is no complication, and the disease depends only on irritation of the mucous surface of the intestines, with acidity of the stomach, the greatest benefit will be derived by administering the different chalk preparations in combination with opium or sudorifics, after the bowels had been cleared with the laxative above described, or the carbonate or bicarbonate of potash or soda will be equally efficacious ; whilst, at the same time, we keep down the excessive secretion by the administration of the mineral and vegetable astringents, combined with small quantities of opium. When the patient shows signs of severe irritation of the intestines, great benefit will be derived from ipecacuanha in combination with opium in the form of Dover's powder. In *Chronic Diarrhœa,* the

* According to the habits of the patient.

mineral and vegetable astringents are of great service, as they act by lessening the calibre of the blood vessels and the structure of the mucous membrane, and heal the aphthous ulceration found in the latter.

When the liver is affected, as in most cases of Chronic Diarrhœa, we must be careful in the use of mercury, as in many cases it might prove very deleterious; but when there is not much anæmia of the general system, if given in small doses in combination with opium or Dover's powder, and some mineral and vegetable astringents, it acts very beneficially. Nitro-muriatic acid administered internally, and combined with opium, is of great value when the Diarrhœa is complicated with hepatic disorder, and so also are the nitric and sulphuric acids; they act speedily on the liver in cases where quick action is required, and cure by constringing and relieving the inflamed capillaries of the mucous membrane, as well as by helping to wash away the acrid bile.

The infusion of the *unripe dried fruit* of the *Indian bael* I have often used with marked advantage. It was first brought under my notice by a consumptive governor, who had suffered severely in the tropics from Chronic Dysentery, and had been invalided to England, where, by the use of this infusion, he obtained marked improvement. I have since tried it in many cases of Chronic Diarrhœa of long standing during the last ten years, and certainly it has a decided effect in checking the progress of the disease. According to Mr. Henry Pollock, the pulp and dried shell contain tannic acid, concrete essential oil, a bitter principle, unprecipitated by tribasic acetate of lead, and a vegetable acid. The following is an excellent

mode of administering the extract in combination with catechu :—

℞.—Tinctura catechu	fl. ℥iij.
Spiritus chloroformi	fl. ℥vj.
Extractum belæ liquidum	fl. ℥xij.
Infusum maticæ	fl. ℥vj.

Misce.—Two table-spoonfuls to be taken three or four times a day.

The different astringent remedies used in combination with opium are :—vegetable—*kino, catechu, kirameria, simaruba, rhatany, hæmatoxylon, tannic and gallic acids, nux vomica, pomegranate, guava leaf, banana root, bark of cashew tree, &c.* ; mineral—*nitric acid, nitro-muriatic acid, sulphuric acid, acetate of lead, bismuth, sulphate of zinc, alum,* and *chalybeates,* especially when given in combination with alum. Catechu might be given in combination with chalk, as in the following :—

℞.—Tinctura catechu	fl. ℥v.
Oleum menthæ piperitæ	gtt. x.
Pulvis cretæ co. c̄ opii	℥j.
Mixtura cretæ	fl. ℥viij.

Misce.—One ounce (two table-spoonfuls) to be taken every four hours.

When the patient complains every evening of fever, and when the Diarrhœa is of malarial origin, quinine dissolved in sulphuric acid should be given in combination with other astringents, or the tonic astringents might be substituted, such as *quassia, gentian, cascarilla, cusparia,* and *angustura.*

Dietetic Treatment.

Diet is a most valuable consideration in the treatment of this disease, either in its chronic or its acute stage, for,

without its proper observation, all the remedies that may be used will be found fruitless, and the disease will take a very fatal form. In many cases of simple Diarrhœa, a strict dietetic regulation alone will be found to cure the disease, without the use of any medicines. At the commencement of the disease, the patient should be kept to farinaceous substances, such as boiled rice and gravy, toasted and stale bread, sago and arrowroot, water crackers, tapioca, and milk in sufficient quantity; the drink should be confined to mucilaginous and farinaceous liquids, such as rice water, gum water, &c. When, however, the Diarrhœa becomes chronic, and the patient suffers from debility, broths and boiled tender mutton should be allowed, as well as concentrated beef-tea and milk. In children, the milk must be diluted with water, or mixed with arrowroot.

Opinions differ as regards the use of fruits. I have always advised the use of ripe astringent fruits—such as guava, pomegranate, cashew, and grapes—as they contain a large quantity of tannin, and as such must exercise some astringent effect on the intestines; but the strong acid or subacid fruits should be avoided, as they tend to keep up the irritation in the intestines.

Habiliments.—The individual should always put on warm clothing so as to keep up an equable temperature over the whole body; flannel should be worn next the skin; in hot weather a large flannel abdominal belt answers best, and damp air as well as cold should be avoided.

General management.—When the skin is hot and dry in acute cases, a warm bath at bed-time occasionally will

be of great service. I have often used a warm salt water bath, which, when it could be obtained, is preferable to the other, especially in chronic cases, as it acts more efficaciously in producing a determination to the skin. When the patient complains of pain in the abdomen, mustard cataplasm or blister might give relief. Moderate open air exercise should be advised, if practicable, in chronic cases, as it generally helps materially in the cure of the disease. Enema containing laudanum might be thrown up into the bowels when there is continued irritation of the intestines, with the desired effect of relieving them. Morphia suppository might be used in the same way, and various astringent injections or enemata.

V.—EPIDEMIC CHOLERA.

CHOLERA is an epidemic disease depending on some atmospheric miasmatic exhalation, which, under certain local and atmospheric meteorological circumstances, occurs in Europe, Asia, Africa, America, communicable by infection, either by atmospheric intervention or by the intercourse of the healthy with the unhealthy, and characterized by symptoms of profuse vomiting and purging, of extreme prostration of strength, and of cramps.

As early as the year 1629, Bontius, a Dutch physician of Batavia, thus described this formidable disease. The Cholera morbus is extremely frequent; in Cholera, hot bilious matter, irritating the stomach and intestines, is incessantly and copiously discharged by the mouth and anus. It is a disorder of the most acute kind, and therefore requires immediate application. When very severe, the animal spirits are exhausted, and the heart—the fountain of heat and life—is overwhelmed with putrid effluvia; those who are seized with this disorder ultimately die, and that so quickly as in the space of four-and-twenty hours at most. This disease is attendant with a weak pulse, difficult respiration, and coldness of the extreme parts; to which are joined great internal

heat, insatiable thirst, perpetual watching and restlessness, and incessant tossing of the body. If, together with these symptoms, a cold and fetid sweat should break forth, it is certain that death is at hand.

In 1774, there was an epidemic of Cholera on the Coromandel Coast in India. Somerat, in describing those who were attacked, said that they had thirty evacuations in five or six hours, which reduced them to such a state of weakness that they could neither speak nor move. Often they were without pulse, their hands and feet cold, their face lengthened, the cavity of the socket of their eyes sunken, which was the sign of death; they felt neither pain in the stomach, colics, nor gripings; there was however a burning thirst.

In March, 1781, the Bengal force, under Colonel Pearce of the Artillery, whilst marching through the northern circus to join Sir Eyre Coote's army, was seized with Epidemic Cholera. The report says that men in perfect health dropped down by dozens; and those even less severely affected were generally dead or past recovery within less than an hour; spasms of the extremities and trunks were dreadful; and distressing vomiting and purging were present in all.

In April, 1783, there was an assemblage of pilgrims in the sacred bath-place of Hurdwar, on the Ganges, and Cholera is said to have broken out amongst them in the springing of an easterly land wind during the night, and carried off innumerable persons. Twenty thousand fell victims to its influence.

In 1787, it appeared in Arcot with marked symptoms of spasm of the præcordia, and sudden prostration of strength.

In April, 1790, Epidemic Cholera attacked the detachment under Colonel Cockerell in the northern circus whilst marching from Bengal to Seringapatam, and proved fatal to the troops. About the same time the fleet, under Sir Edward Hughes, suffered from the same disease; those attacked were reported as soon brought to suffer from great weakness, coldness of the extremities, and a remarkable paleness, sinking and lividity of the whole countenance; great thirst, or a strong desire for cold drinks; no headache, or affection of the *sensorium commune* throughout.

In 1814, Epidemic Cholera broke out among a brigade of the 9th Regiment in June, whilst on the march from Jautnah. Mr. Cruickshanks thus described the conditions of those attacked:—They exhibited all the symptoms now so well known of persons labouring under advanced and atal stages of Epidemic Cholera; the skin cold, and covered with a cold perspiration; the extremities shrivelled, cold and damp; the eyes sunk, fixed, and glassy; and the pulse not to be felt—these persons all die.

In 1817, a fatal epidemic broke out in Bengal, which committed fearful havoc in various parts of Hindustan, and then commenced a fearful march, which did not cease until it had almost enveloped the whole world. In its progress westward "it ascended the Ganges, pervaded Central India, and crossing the mountainous range of the Ghauts, established itself in the year 1818 upon the western coast of the Peninsula. During the same year, it made its way southward to Madras; in 1819 crossed the sea to Ceylon, and before the close of the latter year, appeared in the Mauritius and the Isle of Bourbon.

At the same time it was slowly advancing towards the east and south-east, invaded the Burman dominions, attacked Siam, the Peninsula of Malacca, and the Island of Sumatra, and in 1820 had reached Canton and the Philippine Islands."

Then it extended its fatal marches to the northern parts of China, where it committed great ravages, and was subsequently heard of in Tartary. After arriving in the western coast of the Peninsula of Hindustan, it paused for a while before leaving its native soil; and it was not till the year 1821 that it appeared on the shores of the Persian Gulf, whence it ascended the Tigris and Euphrates, and in 1822 appeared in Syria; in 1823 it reached the shores of the Caspian Sea, and committed great havoc in the Russian city of Astracan.

The disease now halted for several years, ruminating, as it were, whether or not it should cross the boundary and commence a new career of invasion in the hitherto peaceful and undisturbed regions. After five years' pause, in 1828 it appeared at Ohrenburg, on the borders of European Russia: but it did not fairly enter Europe until 1830, when it advanced as far as Moscow. In 1831, it took a western course, attacked St. Petersburg, Warsaw, Dantzic, Berlin, and Hamburg, and showed itself in Sunderland on the north-eastern coast of England. In 1832 it reached Paris and London; and in the same year, over-leaping the barrier of the Atlantic, appeared in Quebec on the 8th June, and at Montreal on the 10th, and thence pursued a rapid course along the St. Lawrence and the Lakes to the Valley of the Mississippi River. On the 24th June of the same year, a detachment from the

main line of the disease, as it crossed the Atlantic, seemed to have struck the shores of the United States at New York; thence it spread northwardly up the Hudson, and southwardly to the Delaware and Chesapeake Bay, reaching Albany on the 3rd and 4th, and Philadelphia on the 5th July, and Baltimore in the course of the same month. About the beginning of November, it appeared in an island off Charleston; in February, 1833, at Havana, in Cuba, where it committed great ravages, and before the end of the year, in Mexico.

Whilst the epidemic was spreading awe and consternation throughout the north of Europe, having left the north-western boundaries of Asia, it took a southerly course from Syria, penetrated the deserts of Arabia, and invaded Egypt, appearing in Mecca in May, and Alexandria in August, 1831. It was very late in attaining the extreme north and the extreme south of Europe; so that it made its appearance in Sweden two years after, and visited Sicily four years after it broke out in New Orleans.

In 1848, the Cholera again visited Europe, after it had committed great devastation in India in 1846. The latest outbreak of Cholera in Europe was in 1865, since which time it has made its appearance yearly in some parts of Europe. It appeared in India, then at Alexandria on or about the 10th May, the first death taking place about the 11th; on the 26th June the number of deaths was 1,034. We quote from the *Lancet's* report on Cholera three considerations, which ought to be borne in mind in estimating the probability of an outbreak of Cholera,* viz. :—

---

* *Lancet*, July 22nd, 1865, page 99.

1. *The epidemic intensity of the disease in the country in which it first assumed an epidemic character* (*Hindustan*).

In the preceding remarks we have shown that, prior to the outbreak of the great visitation in 1831-32, there was a severe epidemic activity in India, commencing at Bengal. It traversed the whole of Hindustan and Persia, until it showed itself in Europe; the outbreak of 1848-49 was preceded by an epidemic outbreak at Cabool and Affghanistan, and was very severe in Persia.

"In 1860, Cholera began to show signs of unusual energy in the Valley of the Ganges, between Calcutta and Patna. Serious outbreaks occurred also at Morar, Jhansi, and in Agra." In December of that year the disease broke out at Teheran, after it had prevailed in Yezd, Kasham, and Koom.

In 1861, a severe outbreak occurred in the north-western Provinces of India. In May, Allahabad, Bhurtpoor, Cawnpore, Allygurgh, and Kerowlee, were attacked; Delhi and Meerut in June; Furruckabad, Umballa, Gwalior, Saharanpoor, Rohilkund, Kutch, Nusseerabad, and other districts in July; Lahore, Etawah, Rajpootana, Bikaneer, and Jodhapoor, suffered a similar fate in August.

2. *The degree and direction of transmission of epidemic influence.*

We have already observed the westward direction the great outbreak of Epidemic Cholera took in 1831-32; how, commencing in Bengal, it invaded Hindustan and China, and some of the islands in the Eastern Archipelago; then Persia, Arabia, and Asiatic Turkey; afterwards appearing in Russia, invaded Western Europe,

crossed the Atlantic, and traversed the Continent of America.

In 1861, it ravaged the north-western Provinces, and appeared in Candahar, and at Bagdad; an isolated but severe outbreak occurred at Jeddah on the Red Sea. It made its appearance in China with pestilential fury, and decimated Japan on the eastern tract in 1862-63.

3. *The epidemic tension of the locality or country of which the probability of invasion is sought to be determined.*

Prior to the epidemic of 1831-32 and 1848-49, there was a great increase of bowel complaints amongst the population, which persisted whilst the epidemic lasted. "The deaths from Diarrhœa in 1863 (the last year for which the mortuary returns have been completed) were 14,943, as compared with 14,192 in 1853, and 11,595 in 1848, taking, however, the fifteen years—1849-63—inclusive of the two previous quinquenniums. In the year 1865 the mortality from Diarrhœa in the metropolis has undergone an unprecedented augmentation. The deaths rose rapidly from 38 in the twenty-second week, to 301 in the twenty-seventh week. Too great a significance must not, however, be given to this fact. The largest total annual mortality from Diarrhœa in England occurred in 1857, when the deaths from this cause numbered 21,189, the deaths from Cholera being 1,150." In 1854, the deaths from Diarrhœa were 20,052, whilst those from Cholera was 20,097.

Besides the disorder of the bowels there was a fatal epidemic influenza, which committed great ravages amongst the population prior to the outbreak of Epidemic Cholera of 1831-32 and 1848-49, and prior to the

epidemic of 1865 there have been very fatal cases of Bronchitis.

I shall now follow up the course of the outbreak of 1865, which had not been so fatal as other epidemics, through the strict sanitary measures which were adopted by the different governments whose interests were concerned. The outbreak of 1865 first made its appearance in Alexandria early in May, simultaneously attacking the neighbouring villages of Rosetta, Tanta, and Zagazig; and amongst the pilgrims at Mecca and Mount Ararat. In June it prevailed in Cairo and Aden, and was committing great havoc in Constantinople and in Ancona. On the 28th June a fatal case occurred in London, and one at Newcastle of twelve hours' duration. In the beginning of July, prior to the 5th, it appeared in Smyrna, and was prevalent in the villages on the Bosphorus; on the 8th it appeared in Beyrout and Jaffa, and the plains about Rambah; on the 19th it occurred in Gibraltar; on the 28th in the town and lazaretto of Malta, in Damietta, in Salonica, in Canea, and in Suez; on the 22nd in Cyprus, Crete, Kustendjie, Galatz; on the 25th in San Savero, in the Capitanata; about the 27th it invaded Trieste, Delos, in the Ægean Sea, in the Island of Gozo; on the 28th it appeared in Sicily, invading Catania and Palermo; and about the same time several cases occurred in the lazaretto in Trebizond, in Albacete, in Spain, and in Madeira; on the 10th in Madrid; on the 20th in Poggio Imperiale; on the 21st in Torre Maggiore and San Paolo; on the 22nd in Piacenza, San Marco, and Osimo; on the 23rd in Foggia; on the 30th, the Cholera appeared in Samsoun, on the

south coast of the Black Sea, and Varna on the west coast.

On the 5th of September, the Cholera appeared in Burriana, in the Province of Castillon; Carthagena, in the Province of Murcia; Alcanez, in the eastern part of the Province of Saragossa, and Palma in the Balearic Isles. On the 8th, in the environs of Seville; in Southern Italy it appeared in Bare; Lucera, twelve miles W.N.W. of Foggia, and Chieti, in the Province of Abruzzocetra; in San Roque, a small town in the mainland of Spain. On the 10th, at Acque and Melazzo, in Piedmont, and in Odessa and Triani. On the 27th at Southampton, in England; between September 22nd and October 1st it appeared in the following places in France:—Paris, Lyons, Arles, Montpellier, La Seine, Sollies-Pont, Nimes, La Crotal, Cette, Salon, St. Paul Charleval, Martigne and Ventaban, Aix, L'Islé, Nice, and Algiers; in Attenberg, near Dresden. On September 24th in Cortosis, in Italy; on the 28th at Modena, Sassualo, and Macerta; on the 29th at Pescara, all in Italy. On October 3rd in Shaling Common and Bitterne, near Southampton, and at Epping in Essex, both in England; on the 11th it appeared at San Giovannia Teduccio, near Naples; in Lisbon and in Elvas, a Province of Alentejo, Portugal; on the 13th in Naples, at Ostuni, Viesti, Grumo, Apulia, in Buditchew, government of Kiew (Russia); on the 19th in Geovinazza, Bicceglie, and Fossona, in Italy; between the 23rd and 31st October the following places—viz., Bordeaux and Avignon. In Italy, Poctici, Barray, Lareto, Mofleta, Zuccarello, and Corneto, near Civita Vecchia.

On the 7th November the Cholera appeared in New York. From this time the epidemic gradually began to disappear or became stationary — being dormant during the winter months, and breaking out in great violence in the summer of 1866 in France and England ; principally in the latter place it was more fatal in the eastern district of London than at any other part. In 1867, sporadic cases were reported in different parts of Europe, but, owing to the vigilant sanitary police kept up, it was prevented from spreading. The disease appeared in various towns in northern Africa. In the summer of 1868 it prevailed most extensively in Morocco, committing great havoc amongst the population; and towards the latter part took a south-easterly and south-westerly course, crossing the desert between Morocco and the trading station in the Senegal River, making *its appearance for the first time in history on the western shores of Africa.*

On the 1st December, 1868, the disease was officially declared to exist in St. Louis, the capital of the French Colony of Senegal; soon afterwards it made its appearance in two large trading stations on the Senegal River—viz., Richard Toll and Dagma; on the 9th April it commenced its ravages at M'Carthy's Island, a small station on the River Gambia, about 180 miles from Bathurst; soon afterwards it broke out at Doomasangsang, a trading station midway between M'Carthy's Island and Bathurst, and then at Albreda, about 15 miles from the latter place. The disease was of such malignity that the people were described as falling dead by the way-side. On the 5th May, Bathurst was officially reported to be infected,

the disease in its malignant form having thus made its appearance in this most unsanitary town. Early in June it made its appearance in the Island of Goree, in the French possession of Senegal, 90 miles from Bathurst; on the 14th June the daily death rate at Goree was 14; Dakar, in the mainland, 19; and Rufisque, 40. The rainy season having now set in, the fury of the epidemic abated; but early in 1869 it made its appearance in the Casamanza, and committed great havoc in the Bajuga Islands; but the Mahommedan population, exercising strict sanitary police in their stockaded towns, and enjoining complete segregation of the different towns, the disease had no chance to spread, and was, as it were, stamped out for a time.

It appeared on the 5th May in Bathurst, where we have the best opportunities of studying the disease. The population was then 4,250, but nearly 1,000 emigrated to different places soon after the disease made its appearance. On the 7th the death rate was 13; 11th, 17; 17th, 42; and on the 22nd, 23rd, and 24th, 74 each day, were the maximum recorded; and on the 16th June there were only two deaths. The total deaths in Bathurst was 1,162. I arrived at Bathurst at the decline of the epidemic, but Staff-Assistant Surgeon Waters gave the following account, viz.:—

"In the most rapidly fatal cases there was very little vomiting, cramps, or purging; they seemed to be in their usual health a few hours before, and would appear to be suddenly overwhelmed with the Cholera poison, and struck down in collapse. During the first week the poison was in so concentrated a form, and the

people were so susceptible of its influence, that the majority of the cases terminated fatally within a few hours, the fluids of the body being drained off with such rapidity that the action of the bowels produced the impression on the ear of a stream of water being passed out of a kettle; and during this period, even from the first moment of attack, the countenances of the natives assumed that ghastly, pinched, slate-coloured appearance, which indicated the commencement of profound and too often fatal collapse." In the majority of cases, there was the usual Choleraic vomiting and purging, with pains and cramps in the limbs and bowels; cold and clammy extremities, and total absence of pulse; the features presenting a peculiar shrunken appearance, with a livid bluish colour; hands shrivelled and contracted, eyes sunken, voice hollow and suppressed; intense thirst and restlessness, suppression of the urine, and a peculiar kind of odour, especially during collapse. When the epidemic declined, the symptoms were milder and more manageable; there was seldom collapse, and the evacuations were not excessive, nor followed by sudden faintings nor exhaustion.

There are two classes of Cholera—viz., English Cholera, and Epidemic or Asiatic Cholera.

I have here to deal principally with Epidemic or Tropical Cholera, although what is designated as English Cholera is a disease occasionally met with in the tropics. As it is well to know the nature and difference of the two diseases, I shall only detail its symptoms, and state how it may be distinguished from common Diarrhœa.

Symptoms of Sporadic or English Cholera.

The patient at first complains of nausea, pain, and burning sensation of the epigastrium, which is succeeded by an evacuation of the alimentary contents, then vomiting of bilious fluid, and purging of an enormous quantity of turbid, yellowish, acrid bilious fluid; griping pains are felt in the bowels, which are followed by a sense of faintness. After a short time there is a chronic spasm of the muscles of the lower extremities, especially of the calves of the legs; the tongue is furred, whitish at the edges, but dark brown in the centre; the pulse small, frequent, and sometimes intermittent; the respiration is difficult, and the thirst craving: these symptoms, if not stopped, may increase in intensity, and then there might be extreme restlessness, great anxiety, cold sweat, and if powerful remedies are not used, the life of the patient is in great danger; hiccup and fainting fits may supervene, then blueness of surface, general convulsion, and death from syncope.

In a medico-legal point of view, physicians are sometimes called upon to distinguish between the *post-mortem* appearances and symptoms of this form of Cholera and irritant poison. The following are the characteristic differences:—1. The evacuation of irritant poison contains blood, which in the Choleraic evacuation is rarely if ever seen. 2. Cholera occurs mostly in summer and autumn; irritant poison at any time. 3. In Cholera there is scarcely any sense of burning in the throat; if present, it follows vomiting, in irritant poison it precedes it. 4. Cholera rarely proves fatal in less than three days, irritant

poison before two days. 5. Cholera may be traced to a cause, but in irritant poison the absence of characteristic symptoms and chemical analysis prove it to be otherwise.

Symptoms and Progress of Epidemic Cholera.

The symptoms of Cholera may be advantageously divided into two stages—viz., 1st, the Cold; and 2nd, the Febrile Stage. During the cold stage the patient is pulseless and asphyxiated. The duration of this state varies from a few minutes to forty-eight or fifty-six hours; in this stage the disease mostly proves fatal. The duration of the febrile stage varies from four to eight days, and the individual has more chances in his favour. In a number of cases, or in different epidemics, the cold stage is found to usher in differently; thus the patient may for some days suffer from painless Diarrhœa, or may only feel a slight indisposition, accompanied with depression of spirits, loss of appetite, oppression at the præcordia, rumbling in the bowels, giddiness, noise in the ears, and twitching in the limbs; at other times, after some luxurious indulgence, the patient is roused up in the middle of the night, or early in the morning, with a sudden and severe pain in the abdomen, sickness, vomiting, purging, and spasmodic contractions of the extremities and abdominal muscles, beginning from the muscles of the fingers and toes. He feels an extreme and indescribable exhaustion; the fingers become corrugated, the body shrinks, the skin cold; faintness supervenes; there are tinnitus aurium and muscæ volitantes; the muscular contraction partakes of the character of the tonic and clonic spasms, but the latter form is more

prevalent. At first, the pulse is small, weak, and accelerated; but when the severe vomiting and spasms have caased, it sinks suddenly, becoming almost imperceptible, and easily compressible.

From the commencement of the disease the temperature of the skin is below the natural standard; now it becomes colder and colder, rarely dry, but generally covered with a profuse cold sweat, or with a clammy moisture. The skin is insensible even to the action of chemical agents, yet the patient complains of oppressive heat of surface, throws off the bed-clothes, and eagerly and copiously drinks cold water. The tongue is moist, whitish, and cold in some cases, but in rare ones clear and lead-coloured. The hands and feet are blue, purple, or livid; the lips and nails blue; he complains of oppressive and distressing sense of pain and burning heat at the epigastrium; the eyes sink in their orbits, very much injected; the cornea is flaccid and the conjunctiva suffused with blood; the orbits are surrounded by a livid circle, well marked in the lower part; the features collapse, and the countenance assumes that cadaverous aspect professionally known as *facies Cholerica;* the respiration is generally slow and oppressed, complexion thick and muddy, the lips and tongue purple, and the voice unnaturally feeble, hollow, and husky, the sound of which is known as the *vox Cholerica.* The urinary secretion becomes scanty and limpid, or entirely suppressed; the biliary secretion, as well as the salivary, are similarly affected; the vomiting and purging, as the case advances, increase from one degree to another: in the generality of cases the matter evacuated is watery, colourless, inodorous,

often homogeneous, but sometimes like muddy water, having a yellowish or greyish hue; the spasms are so severe that the contracted muscles become incredibly hard and rigid. This is the most critical hour of the patient's existence—*life* or *death*. The disease may terminate favourably or unfavourably; in the former case, all the symptoms are gradually mitigated, the vomiting, purging, and cramps are less frequent and severe, and after a time entirely cease; the pulse and colour of the skin return; the urine watery and plentiful; the voice and warmth of the body more natural, and there is a reappearance of bile in the alvine evacuation; the sleep is unusually sound and refreshing, and the respiration is freer and easier, and the patient rapidly recovers.

If, however, the disease lead to a fatal result, which unhappily it often does, the symptoms become all aggravated; the spasms, vomiting, and purging increase for a time, and then the patient lies in such a degree of exhaustion as to be perfectly unable to move a limb; the purging and vomiting cease, the pulse still, the heart's action cannot be felt, and in this prostrate state the patient dies in the course of two or three hours.

The febrile stage or stage of reaction.—After the cessation of the cold stage, in a favourable case, the patient has, as we have seen, some rest and repose, and feels greatly relieved, and makes a rapid and perfect recovery; in which case the pulse rises, the heat of the body reappears, the blueness of the skin disappears, cramps and vomiting cease, the purging and spasms subside, and the

secretion of the urine is restored. But frequently among Europeans, either in the tropics or in Europe, but more especially in the former place, after some refreshing slumber, the stage of reaction comes on, sometimes very trifling, yet still the patient becomes fearfully exhausted and dies.

In most cases, however, the reaction is excessive; a low typhoid fever, or, in the tropics, fevers of both intermittent, and principally severe remittent, now supervene; the gastro-intestinal discharge and irritation reappear; there are eruptions on the skin resembling those of scarlatina, rubeola, erythema, or urticaria without the itching; other lesions may manifest themselves, such as pneumonia, bronchitis, or pleurisy; the brain may be affected, and then we have drowsiness, headache, low delirium, stupor, coma, *subsultus tendinum*, convulsions, and death.

The course and progress of the symptoms of Cholera are very variable. I shall here consider them *seriatim*.

1. *Vomiting and purging.*—These are considered the most prominent symptoms of Cholera, but there are cases on record where fatal collapse supervenes without the appearance of vomiting or Diarrhœa. It commences with the discharge of the ordinary contents of the stomach or bowels, followed by the ejection of a prodigious quantity of watery fluid, resembling in some instances the pyloric discharge or rice water, and in others glairy, ropy fluid. Sometimes the vomiting occurs with little or no Diarrhœa; generally the evacuation, either of the bowels or stomach, which is always attended with severe pain down the legs, and great prostration, consists of a coloured or colourless

liquid, holding in suspension a whitish flocculent insoluble matter, which Dr. Boehm, of Berlin, has proved to consist of epithelial cells. The discharge is sometimes of a brownish or deep chocolate colour, and in the commencement of the attack is tinged with bile. The alvine evacuation has an alkaline reaction, and contains—besides the ordinary composition—chloride of sodium, carbonate of soda, with salts of lime and magnesia. According to Mailhe, a peculiar principle is found in it analogous to albumen, which he called *albuminose*, differing from that protein compound "in not being coagulated by heat or acids, whilst it is precipitated by tannic acid, corrosive sublimate, and alcohol." M. Gilbert stated before the Academy of Medicine, in Paris, that, in the Diarrhœa premonitory of Cholera — *Miasmatic Diarrhœa* — the tongue is swollen, pale, moist, white, and covered with a layer of mucus; whilst in bilious or inflammatory Diarrhœa, the tongue is red, dry, small, and sharp-pointed.

In the investigation of the average duration of fatal cases of the Diarrhœa of Asiatic and Summer Cholera, as observed in 1848, Dr. Farr arrived at the following facts—viz., that the former has a much longer duration than the latter, as three to one; of 4,045 fatal cases of Diarrhœa in males, the average duration was 16·04 days, and of 3,851 females, it was 16·69; whilst the Summer Cholera has only an average duration of about five days.

The following table of Dr. Farr is intended to show the duration of the fatal cases of Diarrhœa, Summer Cholera, and Asiatic Cholera in London, in 1848, which

can be usefully compared with results observed in the tropics :—

Disease.	Total Deaths.	Number under one Day.	Number of Cases terminating in the several Days.									
			1	2	3	4	5	6	7	8	9	10
Diarrhœa.....	119	1	1	8	19	9	5	9	13	8	1	5
Summer Cholera .	106	9	2	14	17	23	11	6	7	4	4	1
Asiatic Cholera ..	129	66	21	12	4	12	6	1	5	—	—	—

Disease.	Total Deaths.	Number under one Day.	Number of Cases terminating in the several Days.						
			11	12	13	14 to 21	21 to 28	28 to 35	35 and upwards.
Diarrhœa.....	119	1	—	—	—	12	13	7	8
Summer Cholera .	106	9	—	2	1	2	1	2	—
Asiatic Cholera ..	129	66	—	1	—	—	—	1	—

The following is the summary of fatal cases of Diarrhœa in different ages in the two sexes :—males, all ages, 16·04 days ; females, all ages, 16·692 ; males and females, ages from 15 to 35, 15·188 ; males and females, ages from 35 and upwards, 17·544.

The *urine* has a low specific gravity, containing albumen, bilious colouring matter, and salts, little or no urea, epithelial débris, with kidney-tube casts. In persons suffering from Choleraic Diarrhœa we find abundant evidence of the presence of albumen in the urine, and M. De Wouves has insisted on this as a diagnostic sign of that species of Diarrhœa. He observes that some days previous to the appearance of the more serious signs of Cholera, albumen is present in the urine, although there is no disease whatever of the kidney, and this he regards as an important means of distinguishing between true Cholera and simple Diarrhœa. During collapse, in many

cases the urinary secretion is entirely suspended until reaction takes place.

2. *Animal functions.*—With respect to the animal functions the mind is generally quiet and undisturbed, the intellect sound; but when there is local irritation in the brain, then the symptoms are aggravated, and delirium or coma sets in; the sensibility is in most cases preternaturally acute.

3. *Collapse.*—This condition is very variable, being well marked in some individuals, and in others it does not occur at all. It is often not met with until the Diarrhœa presents that white, flocculent, watery consistence characteristic of Cholera. When it does occur, the pulse is small and imperceptible; there is a feeble, oscillating movement of the heart, which is discernible upon auscultation. "The blood stagnant in the capillaries, a wound of the surface yields no blood, and little or none flows when a vein is opened. The features and whole body are so shrunken that the patient can scarcely be recognised by his friends. The bluish or purplish colour often pervades the whole surface; the voice feeble or quite extinct; the breath almost as cold as external air; the respiration either hurried and feeble, or very slow, or scarcely perceptible; the countenance calm, or quite inexpressive, and the whole aspect of the patient that of utter helplessness." The reduction of the temperature is such that the thermometer, with its bulb placed under the tongue, sinks often to 90°, and sometimes as low as 80°, and even 70° Fah. This condition continues for a certain time, and then terminates either fatally, or in gradual restoration.

4. *Cramps and spasms.*—These are very frequent and constant symptoms, and attack more violently the strong and robust than the weakly. They begin generally in the extremities affecting each organ, commencing at the toes and the feet; then the calves of the legs, the corresponding muscles of the superior extremities; then the muscles of the thighs and arms; and, lastly, those of the trunk and abdomen. These muscles are almost incessantly contracting; whilst one is relaxing the other is contracting, causing excruciating pains to the patient. The spasms attending Cholera are both clonic and tonic, but more of the latter variety. They do not end with life, for after death the muscles may be found to remain stiff and contracted, or spasmodic twitchings may be observed.

This universal spasm is one of the most painful symptoms of the disease, and presents signs of extreme danger. When the cramp is going on the pulse sinks rapidly, and Dr. Wood has given the following summary of changes which are cognisable:—The extremities become cold, the features shrink, the patient is restless, and complains of intense thirst; the whole surface is bathed with sweat, the urine is scanty, and the skin begins to assume a bluish, leaden, or violet colour, which extends more or less over the body, but is peculiarly striking in the face, hands, and feet. If the complaint be not arrested, the evacuations become still more copious and watery, the thirst insatiable; a burning heat at the epigastrium; a frequent, feeble, and sometimes scarcely perceptible pulse; a cold breath; a cold, pale, though still moist tongue; a cold, shrunken, and inelastic skin; the hands

and feet of a dark purplish or livid colour; the eyes deeply sunk in their orbit, and surrounded with a livid circle; the conjunctiva dry, and of a dirty-whitish state; the nose and lips blue; the secretion of urine and tears suppressed; the respiration short, hurried, and oppressed, and every symptom indicative of extreme prostration present.

5. *State of the skin.*—The skin is generally cold, clammy, shrunken, and covered with profuse cold perspiration, although sometimes it is dry, cold, or of a natural or preternatural warmth; insensible when collapse has set in to touch, or even to the action of chemical agents. In some cases the perspiration is colourless, but in others, more especially about the nails, it has a dark purple colour.

6. *State of the blood.*—The state of the blood varies with the stage of the disease, and the violence of the attack. At an early period, or at the beginning of the cold stage, no material abnormality could be observed; but during the state of collapse the blood is of an unnaturally dark colour, and thick consistence, which may be best expressed by the terms—dark, black, tarry, in regard to colour; and thick, ropy, syrupy, semi-coagulated, in respect of consistence.

According to Dr. William Robertson, in the early stage there is a less quantity of red corpuscles in the blood, which is of a lower specific gravity than in health, and an increased proportion of albumen; these facts prove that anæmic persons are more liable to the attack. There is a less quantity of water or serous fluid, and a greater quantity of some of the solid materials of the

blood. When the disease is fully established, the increase of the red corpuscles in proportion to the other constituents is greater, instead of 140 parts in 1000, it rises, according to Dr. Garrod, of London, to 166 or 177. When exposed to the air, the Choleraic blood, remarked Dr. Joannes, is found to be more difficult to oxydize than that drawn from persons suffering from any other disease; the reason, he considers, is to be traced in the deficiency of the saline constituent which is necessary to assist in blood oxydation; the globules of the blood, when examined microscopically, are found to be torn and slimy, and consequently incapable of gliding in the serum. He regards these phenomena to be produced by an electric disturbance of the atmosphere, "which, in its turn, begets a disturbance of the vital electricity of the blood;" this he also thinks explains the influence of ozone in the epidemic of Asiatic Cholera. The coloured corpuscles in Cholera are pale, circular, caudate, or oval, possessing one or two bright refracting granules, situated in the external membrane.

M. Schmidt gave the following, summarized by Martin, as the effects of the transudation of the blood from the capillaries of the intestines in Cholera:—

1. That the density of the blood, and of its morphological elements (blood-cells and intercellular fluid), is increased in proportion to the duration of the process of exudation from the intestinal capillaries. It reaches its maximum in 36 hours, and then falls again as water is re-absorbed.

2. That the solids of the blood, and of its morphological elements left after evaporation at 248° Fahrenheit, are

relatively increased in a marked degree, according to the time from the commencement of the exudation of the saline fluid from the intestinal capillaries; they reached, after 36 hours, nearly one-half more than the normal proportion, and afterwards sink as fluid is again absorbed.

3. That the increase relates only to the organic constituent (albuminate) of the blood and its morphological elements, and not the inorganic salts; the absolute quantity of which, although indeed increased directly after the onset of severe symptoms, appears to be subsequently diminished.

The fibrine is normal in the early stage of the disease, but when collapse sets in it becomes greatly diminished, and again increased during reaction. The salts are increased, relatively to the whole bulk of the blood, the more soluble being the least so, since they are excreted by the stomach and intestinal canal. The albuminates in the beginning of the disease are much concentrated, through exudation of the saline fluid from the intestinal capillaries, and it reaches its maximum after four hours; then they become normal, and then fearfully diminished; according to Drs. O'Shaughnessy and Garrod, some quantity of urea is to be found in the blood; in the healthy state the blood is wholly alkaline, but choleraic blood is rather acid. The black blood of Cholera, when exposed to the light, is reddened; the air respired during collapse contains less quantity of carbonic acid than in health, during the exertion of the body by cramps and spasms, an increase of the acid in combination with the hæmatosine of the blood must take place, and its retention in the blood may account for the abnormal colour; when

exposed to the air, it is given off, and the blood resumes its natural colour.

Several descriptions have been given of attacks of Cholera by different authors; each case is peculiar in showing the existence or non-existence of one or other of certain characteristic symptoms. I wish here to relate twelve of these cases; but, as they would occupy too much space, I think that I can do them in no better way than by reducing them into that brief and comprehensive method recommended by Dr. Guy, in his Lectures on "Inductive Logic," at King's College, London.

Commentary and Deductions.—From the annexed tabular view, it is evident that out of the symptoms of twelve cases of Epidemic Cholera, reported by different authors, at different times, as they occurred in India:—

I. (a) In 8 of these cases, *nausea and vomiting* did not exist in the beginning, but afterwards made their appearance (8 aA).

(b) In 2 cases, they commenced from the onset of the attack (2 A).

(c) In 1 case, there was neither nausea nor vomiting (1 a).

II. (a) In 2 cases, *exhaustion and sickness* appeared, sometimes after the attack, but were very troublesome (1 bB^3).

(b) In 3 cases, they occurred afterwards in a slight degree (3 bB).

(c) In 2 cases, they occurred from the beginning of the attack (2 B).

(d) In 1 case, they occurred from the beginning, very severe (1 B^3).

III. (a) In 5 cases, *spasmodic contraction* was observed to be absent at the beginning, but made its appearance afterwards (5 cC).

(b) In 2 cases, it was not observed at the beginning and at the end, but existed moderately during the attack (2 cC^2c).

(c) In 3 cases, it was stated to be excessive (3 C^3).

CASES OF CHOLERA.	I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.	X.	XI.	XII.	TOTAL NUMBERS OF SYMPTOMS.	NAMES OF REPORTERS.
Symptoms.	A	B	C	D	E	F	G	H	I	J	K	L		
Nausea and Vomiting	aA	A	aA		aA	aA	aA	aA	aA	A	aA	a	8 aA. 2 A. 1 a.	1. A. S. Haines.
Exhaustion and Sickness....	bB^3	B	B^3	bB			B	bB		bB			1 bB^3. 3 bB. 2 B. 1 B^3.	2. W. Smith.
Spasmodic contraction.....	cC	C^3	C^3	cC^{2}c	cC^{2}c	cC	cC	C^3	cC			cC	5 cC. 2cC^{2}c. 3 C^3.	3. Kelly.
Skin covered with cold sweat	D	dD	D	D	D	dD		D	D	D^1	dD	D	7 D. 3 dD. 1 D^1.	4. Campbell.
Lips and nails blue	e	e	e	e		e			e		eE^1		6 e. 1 eE^1.	5. Duncan.
Skin of livid hue		fF	F										1 fF. 1 F^3.	6. England. 1819.
Eyes sunken and injected ..	gG		G					G^2	G^2				1 gG. 1 G. 2 G^2.	7. R.H.England.1821.
Great thirst.....		hH	H	H^1	H		H^1	H	H	H^1	H	H	1 hH. 6 H. 3 H^1.	8. R. Wright.
Moist whitish tongue		I	I		I	I		I					5 I.	9. Stokes.
Pain and heat of stomach ..		J^2	Jj	Jj		J^3	Jj	J^3		J		J^2	2 J^2. 3 J^3. 3 Jj.	10. A. Campbell. 1820.
Purging.....	K	K	K	k		K^3	K		k	kK			4 K. 2 k. 1 K^3. 1 kK.	11. Dr. W. Pollock.
Anxiety and distress.....			L^2						L	L			1 L^2. 2 L.	12. Cowan. 1823.
Feeble, unnatural voice				M	mM			M		M^3	M^3	M	3 M. 1 mM. 2 M^3.	
Diarrhœa		N^{1}n	N	nN			N^{3}n	N^{3}n		nN			1 N^{1}n. 2 nN. 1 N. 2N^{3}n.	
Contagious or not	O	o	o	o			o	O		O		o	5 o. 2 O. 1 O^2.	
Endemic			P							P			2 P.	
Epidemic		Q			Q			Q^3					2 Q. 1 Q^3.	

EXPLANATION OF SIGNS.

A, B, C, &c.,	signify	stated presence of symptoms.	A^2, B^2, C^2, &c.,	signify	symptoms existing in a moderate intensity, or in a degree not stated.
a, b, c, &c.,	,,	stated absence of symptoms.	A^3, B^3, C^3, &c.,	,,	symptoms existing in a great degree of intensity, answering to the words, "very," "excessive," &c.
Blank	,,	symptoms not noted.	aA, bB, &c.,	,,	absent at first, but supervened.
A^1, B^1, C^1, &c.,	,,	symptoms existing in a slight degree, answering to the words, "some," "slight," &c.	Aa, Bb, &c.,	,,	present at first, but subsided.

IV. (a) In 7 cases, the *skin covered with cold sweat* was stated to be present (7 D).
(b) In 3 cases, this symptom was absent at the commencement, but made its appearance afterwards (3d D).
(c) In 1 case, it existed in a slight degree (1 D^1).

V. (a) In 6 cases, the *blue state of the lips and nails* did not exist (6 e). In 1 case, it came on afterwards.

VI. (a) In 1 case, the *skin of a livid hue* existed intensely (1 F^3).
(b) In 1 case, the lividity was not observed in the beginning, but it appeared afterwards (1 f F).

VII. (a) In 1 case, the *eyes* were *sunken* and *injected*, some time after the attack (1 g G).
(b) In 1 case, it existed during the whole of the attack (1 G).
(c) In 2 cases it existed in moderate intensity (2 C^2).

VIII. (a) In 1 case *great thirst* existed afterwards (1 hH).
(b) In 6 cases it is stated to have existed (6 H).
(c) In 3 cases it existed in a slight degree (3 H^1).

IX. (a) In 5 cases *moist whitish tongue* was present (5 I).

X. (a) In 2 cases *pain and heat of stomach* were present in a degree not stated (2 J^2).
(b) In 3 cases they were very intense (3 J^3).
(c) In 3 cases they appeared (3 J).

XI. (a) In 4 cases *purging* was stated to be present (4 K).
(b) In 2 cases it was stated to be absent (2 k).
(c) In 1 case it was very intense (1 K^3).
(d) In 1 case it did not occur at the beginning of the attack, but afterwards (1 kK).

XII. (a) In 1 case *anxiety* and *distress* were stated to be moderately intense (1 L^3).
(b) In 2 cases they were stated to exist (2 L).

XIII. (a) In 3 cases *feeble and unnatural voice* existed from the very commencement (3 M).
(b) In 1 case it occurred afterwards (1 mM).
(c) In 2 cases it occurred with great intensity (M^3).

XIV. (a) In 1 case *diarrhœa* occurred slightly at the beginning only (1 Nn).
(b) In 1 case it existed during the whole course of the disease (1 N).
(c) In 3 cases it was very severe at the commencement, and ceased afterwards (3 N^3n).
(d) In 1 case it did not commence from the beginning, but came afterwards (1 N^1n).

XV. (a) In 5 cases cholera was stated to be *non-contagious* (5 o).
(b) In 2 cases it was *contagious* (2 O).
(c) In 1 case it was *moderately contagious* (1 O^2).

XVI. (a) In 2 cases cholera was stated to be *endemic* (2 P).

XVII. (a) In 2 cases cholera was stated to be *epidemic* (2 Q).
(b) In 1 case it was *very epidemic* (1 Q^3).

1. From this concise description we are able to draw the most indubitable conclusions with respect to the most frequent and the least frequent symptoms of Cholera.

2. The general time of their appearance, taken as a whole.

3. The most persistent and pernicious symptom.

4. The mode of its occurrence.

I. a. The most frequent symptoms—

Of 12 reported cases of Cholera, there were no less than 10 cases in which nausea and vomiting are stated to exist, either from the beginning of the attack, or appearing afterwards; and in only 1 case was it decidedly stated not to have existed.

11 cases, in which the skin was covered with cold sweat.

10 cases, in which great thirst was felt.

10 cases, in which pain and heat of the stomach were complained of.

8 cases, in which exhaustion and sickness existed.

8 cases, in which there was no purging.

6 cases, there was *vox cholerica*.

9 cases, there was spasmodic contraction.

Therefore the most frequent symptoms are—

Skin covered with cold sweat.	Nausea and vomiting.
Great thirst.	Pain and heat of the stomach.
Spasmodic contraction.	Exhaustion and sickness.
Purging.	*Vox cholerica.*

b. The least frequent symptoms—

The eyes sunken and injected only in .	4 cases.
Anxiety and distress only in . . .	3 ,,
Blue state of the lips and nails only in .	1 ,,

II. The general time of the appearance of the symptoms.

a. In the beginning of the attack—

In 7 cases, the skin was covered with cold sweat.
In 4 cases, there was purging.
In 3 cases, there was feeble and unnatural voice.
In 6 cases, there was great thirst.

b. During the attack—

In 8 cases, nausea and vomiting.
In 5 cases, spasmodic contraction.
In 3 cases, exhaustion and sickness.
In 3 cases, skin covered with cold sweat.

III. The most persistent and destructive symptoms—

Nausea and vomiting.	Spasmodic contraction.
Exhaustion and sickness.	Skin covered with cold sweat.
Great thirst.	Pain and heat of stomach.
Purging.	

IV. Mode of occurrence—

Epidemic	in	3 cases (*i.e.*, reported so).
Endemic	,,	2 ,,
Contagious	,,	3 ,,
Non-contagious	,,	,,

Dr. Poynanski presented to the Academy of Science the following symptoms as premonitory to an attack of Cholera :—

1. That during the prevalence of Cholera it frequently happens that the pulse is extremely low, and reduced to 45, or even 42, in persons apparently in perfect health.

2. That this symptom is unaccompanied by any other denoting a morbid state.

3. That when the pulse is low the blood becomes dark and viscous; whilst in persons whose pulse is in a normal state during the epidemic, the pulse is perfectly healthy.

4. That Cholera only attacks those who have previously experienced a diminution in their pulse.

5. That this diminution, which often occurs weeks before the regular attack, may be considered as a pathognomonic symptom of the approach of Cholera.

6. That those who have experienced the diminution in question have always escaped the disease, whenever they have followed a regimen calculated to accelerate the circulation.

7. That the falling off of the pulse, and therefore the predisposition of the disease, are in general proportional to the want of energy in the circulation of the blood, and to the excess of atmospheric pressure.

8. That this diminution does not occur in healthy subjects when the epidemic has ceased.

Pathology and Morbid Anatomy.

In the examination of the body of persons who have died of Cholera, the principal lesions to be observed are chiefly located in the intestines and in the vascular

system.* During collapse there is severe engorgement of the venous system, with dark, ropy, semi-coagulated blood, especially in the large veins of the right side of the heart. The arterial system is quite emptied of its blood, with the exception of a few clots in the aorta and left side of the heart. The lungs are œdematous, and are in the state of hepatization, frothy, and engorged with

---

* Dr. Baly has given the following pathological changes noticed in Cholera. He says that the principal phenomena which arrest attention are the adventitious state of the mucous membrane, and the more or less extensive patches of capillary and venous hyperæmia and ecchymosis. These, together with the character and amount of the fluid effused, demonstrate an important lesion of the circulation through the affected parts. "How this is produced can at present be no further elucidated than by the hypothesis of a specific poison acting upon the ganglionic nervous centres, or more probably phenomena of the disease, as the profuse sweating and the sudden and severe collapse, which, as has been seen, is not in any necessary and constant relation to the discharges from the mucous membrane. Either would, however, suffice to explain the altered condition of the circulation, since it is well known that if one of the agencies in operation in the capillary circulation be abnormal, there will be a corresponding change in the case, and the rapidity with which it is sent through the tissue. In this respect nearly the same result is produced, whether the blood be unfitted to stimulate and nourish, or the nutrition in the part itself be perverted or defective, or the vessels be deficient in nervous supply: we no longer look for mere mechanical causes of vascular relaxation, and whatever light may hereafter be thrown upon this stage of Cholera, it will no doubt be thrown upon this knowledge of the pathology of the capillary circulation. These morbid changes in the first stage of Cholera are of the simplest kinds; the tissue is infiltrated, and the glandular follicles are distended with the same watery fluid that escapes into the cavity of the intestines; the epithelium, by this maceration, readily separates after death, and to a certain extent during life it occurred to only a very limited extent, and was itself an important change. The coats of the capillaries and smaller veins

blood. There is venous congestion in the brain and spinal marrow, the substance of the heart, the abdominal viscera, the parenchymatous structure of the liver and kidneys, and even the spongy substance of the bone. The serous membrane appears healthy and dry, the secretion diminished in quantity and viscid in quality, whilst the mucous membrane of the intestines looks rosy and

---

are often ruptured, giving rise to ecchymosis; this, with the punctate and sellate character of the hyperæmia, denote a want of tonicity in the vessels, as death occurs only when the phenomena reach their greatest intensity, and when the circulation in the venous system generally is much relaxed, the ramifications of the intestinal veins in particular are often distended with dark blood."

He goes on to say that an examination of the fluids effused from the mucous membrane gives no evidence of the active plasmatic changes taking place in them. On the contrary, the large amount of fluid thrown out, its low specific gravity, and its other physical characters, indicate an almost passive exosmosis, as through a dead membrane.

Some observers have referred the morbid changes to a *catarrhal condition;* others have regarded the disease as a form of serous hæmorrhage; and the Berlin pathologists, whose attention was particularly arrested by the occurrence of amorphous granular fibres in and upon the affected surface of the mucous membrane, designate it as a destructive diphtheritic inflammation. We believe that, for the present, such generalizations, however plausible, are of little value, and that we arrest injury by their adoption. The depression of the capillary power—the extreme exhaustion of the great ganglionic nervous centres in the abdomen—the passive character of the lesions of the mucous membrane—its nominal action being reversed to a fatal exosmosis—are peculiar to Cholera, and give it an individuality which forbids our merging it for the present in any general category.

Although the intestinal tract is the principal seat of the morbid actions, they are not limited to it. The kidneys, at an early stage, are sometimes affected, the urine having been found albuminous prior to its suppression, and the secreting tissue and the living mem-

violetty, containing patches of ecchymosis, especially in the cæcum. The intestinal follicles—aggregate and solitary—are enlarged and prominent, and the cavity filled with a turbid, inodorous, semi-diaphanous fluid of alkaline or acid reaction. The intestinal mucous membrane is generally covered with a layer of whitish or

---

brane of the pelvis present occasionally, after death, lesions of the same character as those observed in the intestines.

In the female the uterine organs are similarly affected, the lining membrane of the uterus and vagina being frequently much congested and ecchymosed, with commencing diphtheritic exudation upon it.

The liver is free from disease, except in some rare cases, where the lining membranes of the ducts and gall-bladder is the seat of the Cholera process, their contents being then of the rice-water character. The distention of the gall-bladder with bile is nearly constant, but cannot be referred to as a pathological indication of any moment, as such a condition is common when the digestive function is long interrupted, and indicates a passive rather an active state.

This is an hypothesis regarding the nature of Cholera based upon the supposition of a suppression of the hepatic secretion, and consequent congestion of the liver. This is altogether unsupported by anatomical facts. The absence of bile from the evacuations is not a necessary phenomenon of the early stage of Cholera. In a large proportion of cases the Diarrhœa ceases to be bilious only when the more intense symptoms set in, and even then the rice-water fluid often gives, with re-agents, distinct evidence of the presence of bile; but when it is no longer passed in the evacuations, the secretion is not altogether suppressed, as shown in the contents of the gall-bladder and duct after death. The hepatic function does not appear to be subject to any further derangements than that which naturally follows upon the retardation of the circulation during the stage of collapse.

It would have been unnecessary to advert to this hypothesis had it not widely influenced the treatment of the disease. Dr. Ayre, the great advocate for the administration of calomel, gives the following rationale of the Cholera process. He says: "Now there is one

greyish flocculent substance, containing an enormous quantity of perfect epithelial cells; these membranes are sometimes elevated in patches from the secretion of false membranes or diphtheritic matter, which, under the microscope, display a number of nuclei. The gall-bladder is filled with fluid containing a trace of bile; the fluid is of

---

condition, which is uniformly and conspicuously present in Malignant Cholera, and is indeed characteristic of it—namely, a suppressed or suspended secretion of the bile as shown by the diminution, and at length total disappearance of it from those watery discharges which are poured so frequently from the stomach and bowels. As a consequence of this cessation of the hepatic function, an accumulation will take place in the liver of venous blood, and an impeded circulation result from it, producing a congested state of that organ, and subsequently by a retention of the blood in its course through them of those abdominal organs whose circulation is associated with it. Now the congestion thus produced in the portal venous system of the liver and its associated organs constitutes the stage of collapse, and under various modifications and grades of intensity, whose real nature and amount are unknown, forms the essence of it all."

"Such a train of reasoning," continues Dr. Baly, "is unsupported by any evidence. The serous rice-water character of Cholera stools is obviously due to special pathological changes in the mucous membrane, and not to any merely mechanical congestion of a secondary kind, as here stated. What these pathological changes are we have endeavoured to show, and have referred them to a specific action of the Cholera poison operating through the blood; a more minute account we are unable to give. The appearance after death in the chest and cranium show that the viscera in these cavities were not primarily affected. The occasional emphysema of the lung, their emptiness of blood, except at the posterior and inferior parts, and the inelastic compressed character of the tissues observed in some cases, are explicable by the state of the respiration and circulation at the last stage of life. The congestion of the veins, and the effusions under the membranes, and into the ventricles of the brain, are referable to the same causes."

a dark colour. The bile is not entirely suppressed, but is diffused through a larger quantity of fluid, and often cannot be detected; the secretions of the glandular structures of the intestines sometimes give biliary reaction with nitric acid. The bladder is generally contracted and empty; the stomach appears healthy, but sometimes is sphacelated, thickened, softened, and friable, but rarely found empty. The intestinal evacuation is of a white flocculent nature, and consists of disintegrated epithelium, stripped from the villi of the alimentary mucous membrane; the desquamation extends from the fauces to the anus. The secretion of the urine is suppressed during collapse, and in the early period of reaction contains urea; but it invariably contains a large quantity of epithelial débris and casts of uriniferous tubes, which tubes are generally found in a state of engorgement with imperfectly developed epithelial cells.

According to Walther, of Kieff, in Russia, the fluid found in the air-passages is composed of the flat epithelial cells of the pulmonary air-vesicles, and of the cylindrical cells of the bronchial tubes; the mammary secretion in nursing is not suppressed, but altered—it is of a low specific gravity, containing a little butter and a small number of milk granules. When death takes place in the state of reaction, the bladder is found to have its wonted dimensions, the arterial emptiness disappears, the venous congestion diminishes, the blackness of the blood is greatly modified; but the evacuations are bilious and sometimes bloody, the mucous membrane of the intestinal canal inflamed, especially in the pyloric end of the stomach, and also in the duodenum; the patches of Peyers and the

solitary glands have the appearance of slight ulceration, and the mesenteric glands enlarged, pale, and purple.

Dr. W. P. Bain, medical officer of the Poplar Union, arrives at the following conclusions as the result of his experience of four Cholera Epidemics (*Lancet*, February 9th, 1867, p. 184):—

1. That Spasmodic Cholera is caused by a special organic poison.

2. That it is communicated by material particles, either inhaled or swallowed when diffused in liquids, as water; in the former case it is communicated on a small scale, in the latter on the grand or epidemic scale.

3. That the period of incubation is about forty hours.

4. That adult males are generally first attacked; then women and children.

5. That the proportion of deaths in the first two or three weeks of the epidemic averages four males to three females, and in the middle and latter periods about five females to three males.

6. That all persons are not equally susceptible, but as a rule it has most power over the badly nourished.

7. That it is not influenced by the atmospheric changes of the barometer, or the hydrometer, or the quantity of ozone, but in the temperate climate by the seasons.

8. That the greatest mortality has always occurred during every epidemic in the district in which the water is most impure.

Dr. Cockle considers Cholera to depend on a local origin of the disease in the gastro-intestinal tract, since the explosion of the disease in the midst of seeming health was inconsistent with the notion of a poison in the

blood, as well as that of a disease of the villi of long date. He considers decomposition of the excreta necessary to the development of the *materies morbi*. "Volatile or subtle matter introduced into the blood unites with some other emeto-cathartic, but only a poison to the given individual; the poison passes into the excreta, which in two or three days decompose the concrete and set free the original element. The prodromata of Cholera are more easily explained by the theory of a disturbance of the epigastric centre than by a blood poison, and the remedying of Choleraic Diarrhœa is effectual for the relief of mischief." Dr. Cockle establishes his views from the fact that in many cases of death from collapse *without external* discharge, the stomach and bowels are found invariably more or less full of peculiar fluid or semi-solid matter—*spoiled blood elements*.

Causes.—The causes of Epidemic Cholera may be advantageously divided into *Predisposing* and *Specific or Determinating*.

Predisposing Causes of Epidemic Cholera.

The predisposing causes which we have described as answerable to Fever and Dysentery answer alike to this disease. Whatever debilitates the vital action, or reduces the strength below the normal standard; old age, fatigue, want, and filth; deficient alimentation, intemperance in eating, but more especially in drinking; confined air, low and damp habitation, grief, fear, severe anxiety, long marches in tropical climates, associated with other debilitating causes. Of this last, Dr. Balfour has proved "that of the native soldiers of the Madras Army 32

died of Cholera in cantonment, and 86 when marching, to an average of 10,000 strong. The attacks were respectively 85 and 200 in 10,000. Dr. Lorimer's report shows that the troops were more frequently attacked on long than on short marches; thus the troops in 219 marches of 20 to 40 days were attacked 39 times, while in 14 marches of 100 to 120 days they were attacked 7 times. If we take 100 marches as the basis, they were attacked 18 times in about 30 days in the one case, while in the other case they were attacked 50 times in 110 days—that is, at the rate of 14 times in 30 days. This is no proof, says Dr. Farr, that fatigue increases the liability to attack—it only proves that on the long marches the men are exposed a longer time to the causes of the disease."

Dr. Joannes, of the Faculty of Paris (Southsea), gives the following summary as the predisposing causes of Cholera:—

Calling.—Those exposed to sudden changes of temperature and long continued labour.

Dwelling.—Those in low and moist places are always more exposed than airy dwellings in dry and elevated positions.

Poverty.—Want of proper clothing and shelter, food insufficient or of bad quality, crowding, intemperance in labour, pleasure, or drink.

Choleraphobia.—Fear; dread of Cholera is a sure predisposing cause.

Specific and Determinating Causes.

The specific causes may be advantageously described

under the two heads of Meteorological and Localizing Causes, or, according to Dr. Barton, *terrene elements*.

It appears from the account of the *Cholera Morbus* of Sydenham, and the "*griping in the guts*" or "*plague in the guts*" of Willis, that Cholera was a disease known in times long passed, and is admitted by every author as being produced by a specific poison, and is considered *sui generis* an Asiatic disease in respect to the temperate climate; and when we take into consideration the account by Sydenham of it as an autumnal pestilential visitor, we could fully realize the expression of Dr. Farr, "that while the material was smouldering in England, the flame which threw the mass into combustion has been of Asiatic origin."

The following are the substances of the theories entertained by different authors, and given by Dr. Baly, as the determinate causes of Epidemic Cholera, and I intend here to follow his arguments in support of the value of each theory :—

1. That the disease spreads by an *atmospheric influence* or *epidemic constitution*, its progress consisting of a succession of local outbreaks; and that the particular localities affected are determined by certain "*localized conditions*," which are, first, all those well-known circumstances which render places insalubrious; and, second, a susceptibility of the disease in the inhabitants of such places produced by the habitual respiration of an impure atmosphere.

Dr. Baly, in his report to the College of Physicians, throws great doubt as to the effects of atmospheric influence or "epidemic constitutions" in the production

and propagation of Epidemic Cholera, as this influence cannot be reconciled with the following facts :—The duration of the epidemic for a long time (several months) in temperate countries, the slow and gradual progress of the epidemic in a determinate course over a whole continent, its frequent cessation sometimes in the winter, its slower progress in the winter than in the summer, its appearance oftentimes in a localized portion of land leaving the countries around untouched, its extension through a country in different directions at the same time, its taking a progressive course for months in direct opposition to that of the wind, its rapidity in crossing the Atlantic compared with its slow progress on land, the constancy with which its appearance in an island or continent is manifested in a sea-port town than in interior lands, and its passing over entire countries from one sea-port town to another.

If the atmospheric influence be regarded as of any value it must depend on some "*electrical condition*" or "*telluric influence*" acting through the moving air, though independent of it. Dr. Baly gives the six following arguments to show that it is untenable :—

1. That Epidemic Cholera is very partially distributed, even among places where the so-called localizing conditions are present.

2. That the outbreak of the disease appears at different times in several parts of the same town, and sometimes of the same buildings.

3. That in different localities the disease ceases at different times.

4. That the disease begins in a few spots or isolated

places where the general condition favouring its development has obviously ceased.

5. That from a given centre, or the centre of first appearance, it extends in different parts of the country.

6. That there evidently exists a connection in many cases between the successive outbreaks in neighbouring places, and especially in different parts of the town, or of a public establishment, where the occurrence of the first outbreak of the series has evidently been the condition determinating those which followed.

From the observations of Messrs. Glaisher, of Radcliffe; Barton, of New Orleans; Budd, of Bristol; and M'Pherson, the meteorological phenomena tending to accelerate Epidemic Cholera are—a moderately elevated temperature; a still, stagnant oppressive atmosphere; a moderate amount of moisture in the air; excessive range of temperature; an entire absence of ozone; and a deficiency of electricity.

2nd. *This theory follows the analogy known to be due to morbid poison, and regards the course of Cholera as a morbific matter which undergoes increase only within the human body, and is propagated by means of emanations from the bodies of the sick—in other words, supply by contagion.*

There are two circumstances which Dr. Baly regards as proving that the cause of Epidemic Cholera is a material substance—viz., its persistence for a certain time, even in localities of a small extent; its very partial distribution in a country, a town, and even in parts of a town; and that most of the circumstances which lead us to object to the first theory go a great way to confirm

this. But before it can be well developed, two conditions are necessary—viz., a defective sanitary provision, whereby exists damp and impure air, especially in low sites, and an increased intensity of heat. That this material substance increases and becomes intensified under the influence of damp and foul air, aided by some degree of heat, proves several facts and the progress of the disease —viz., its persistence during the winter months—this is generally in the interior of large establishments where there is impure air and warmth; its preference during an epidemic for low, damp, and densely-populated districts—especially tracts of countries about the mouths of rivers, crowded towns, dirty and ill-ventilated parts of towns, or single houses of similar character in elevated spots.

The rapid extension of Epidemic Cholera throughout Europe in the summer months, especially along low tracts of country on the borders of rivers, goes far to corroborate the fact that "the increase of the epidemic at its climax results chiefly from the increased number of separate outbreaks, and takes place, as a general rule, most rapidly at the season when a high temperature, and other meteorological conditions, tend to increase the impurities of the air; and in those districts, where local conditions affect the state of the air in the same way, it may be inferred that, while the increase and action of the cause of the disease depend on the state of the air in small localities, its transmission from spot to spot is facilitated by the state of the atmosphere over large areas." But this material substance, or morbific matter, cannot be a *gaseous*, diffusible substance from the local and persistent character of an outbreak of Cholera, but

something solid or liquid which could attach itself with other bodies.

3rd. *The third theory is propounded by the late Dr. Snow, which gives a more specific form to the doctrine of contagion. In this the poison of Cholera is supposed to be swallowed, and to act directly on the mucous membrane of the intestines, and is at the same time reproduced in the alimentary canal, and passes out much increased with the discharges. These discharge in different ways, but chiefly by mixing with the drinking water in wells and rivers, reach afterwards the alimentary canals of other persons, and thus the identical disease is reproduced.*

The propagation of Epidemic Cholera from one place to another might be affected in two ways—1st, by human intercourse; and 2nd, independently by the wind.

That human intercourse, or the communication between the sick and the healthy, forms the most prolific source for the propagation of the disease, abundant evidences are easily gathered. Thus in India the disease has been traced several hundred miles quite in a contrary direction to the blow of the monsoon, or summer hot wind. It continues in ships on the voyage after leaving the infected port; its occurrence amongst bodies of soldiers for weeks during the line of march. The origin of the disease in a sea-port town may be traced to the arrival of a ship from an infected port; the first patient in the town must have had communication with the infected ship, or persons, or things belonging to her.

The second position is, that it is conveyed by the wind. This is proved by its appearance in isolated establishments, such as prisons and lunatic asylums, without any

traceable intercourse with the sick and healthy; by the rapidity with which the first case of a decisive character is followed by others at great distance rapidly proving fatal, and consequently the poison must float in the air, as the medium of "its existence, increase, and power of action," as well as of facility for its locomotion.

4th. *By the fourth theory it is assumed that Cholera, being a morbific matter or poison, is supposed to be reproduced only in the air, and within the bodies of those whom it affects; and that its diffusion is due to the agency of the atmosphere.*

But this propagation of Cholera by human intercourse does not prove that it is contagious. On this point Dr. Baly, in his report, remarks that if the poison of Cholera increases in or under the influence of damp and impure air, and is likewise capable of attaching itself to the surface of bodies, to the walls of rooms, and to furniture, it will also be collected by the clothes of persons living in infected dwellings, will be carried by them from place to place, and wherever it meets with the condition favourable to its increase and action, will produce fresh outbreaks of the epidemic. That its propagation in such a mode as this is at least more frequent than its communication by virtue of true contagion, is to be inferred from the impossibility that any direct communication may have taken place in many of these cases; still more decidedly from the great rapidity with which the disease sometimes spreads at once through the whole population of a city, from the influence of season and temperature, and the character of the localities on the rate of the diffusion of the epidemic, and from the occasional alterations of its intensity during its prevalence in a town. The ultimate

cessation of an epidemic throughout a country, a contingent to a part of comparatively limited extent, furnish, perhaps, still stronger objections to the theory of contagion; for not only are they like most of those beforementioned characters which diseases known to be in the strict sense contagious do not present, but they suggest the belief that the propagation of the disease cannot be maintained by matter emanating from the bodies of the sick. There are some facts which constitute a presumptive argument, of more or less force, in favour of the dependence of the epidemic on contagion, such as the relation, as a general rule, borne by the number of the population of a town, and even of a public establishment, to the duration of the epidemic there, the successive attacks of the different inmates of a house, or of the ward of a lunatic asylum, the ultimate cessation of the disease after a limited number of days in each house or ward, and the fact that, in the cases where the introduction of the disease into a locality has been traced to human intercourse, the supposed vehicle of the infection has usually been a person already suffering from the disease, or clothes or bedding which had been used by the sick in other places; all these facts have been found susceptible of explanation in some instances, in others necessarily of a conjectural nature.

5th. *It is taken for granted that the Cholera matter is increased by a species of fermentation, or a mode of reproduction in impure, damp, and stagnant air, but diffused by means of human intercourse, it being carried into ships, &c., especially in the foul clothes of vagrants, and the baggage of armies.*

Dr. Baly argues in his report that there is not sufficient evidence to prove that the poison is swallowed with the food or drink, and is reproduced in the alimentary canal, discharged with the secretions of the stomach and bowels, and thus propagates the disease by finding access in the same vehicles to the stomach of other persons; nor is the statement that it enters through the lungs conclusive. This is inconsistent with the mass of evidence which establishes the influence of the different conditions of the atmosphere, and with nearly all those facts which would be equally opposed to any creed which regards the human body as the exclusive means for the reproduction of the morbific matter.

6th. *It is assumed that the material causes of the disease may be increased and propagated in and by impure air, as well as in and by the human body.*

This theory, which indicates that the morbific poison increases in impure and damp air, where it is diffused and distributed by means of human intercourse, is supported by a large amount of evidence, but it must not be maintained in entire exclusion of all other, since some of the other theories have in part been admitted.

With respect to meteorological phenomena as a cause of Cholera, I am almost inclined to think that it is hardly sufficient to be regarded as a cause, inasmuch as circumstances exactly similar in other parts of the world where Cholera has never visited do not produce the disease; and in places in which no traces of such phenomena are observed, Cholera has made its appearance; the phenomena which I have already recorded—viz., a misty condition of the atmosphere, which in high places is thin,

and in low places dense—absence of atmospheric motion; high barometric readings—and a total absence or diminution of ozone,* are circumstances which are of yearly occurrence in many places in tropical countries, but without a single sporadic choleraic attack on individuals inhabiting *such places*.

Professor E. Hallier, of Jena, has endeavoured to demonstrate that the morbific choleraic poison may be traced to the existence of a certain fungiform vegetable element and a highly developed spore-cyst: the former floats in the rice-water secretion and vomita of Cholera patients, and the latter sinks in them. In 1848 these bodies were first discovered and examined by Professor Parkes, under the microscope, who described them as *peculiar corpuscles, dark yellow granules,* or *organic corpuscles (about the size of the pale corpuscles of the blood) finely granular on the surface, and containing from six to twelve dark yellow or black granules*. Dr. Parkes also recognized *vibriones* in great number, and two or three *oval transparent bodies* placed end to end. He considered then the peculiar corpuscles or granules to be modifications of fibrine, which, when the stool was kept, increased in number. His observations were confirmed at the time by Quekett, Bowman, Ellis, Hillman, Sharpey, and Jenner, and in 1854 by Dr. Launder Lindsay, who described them as globular corpuscles with distinct, colourless, transparent cell walls, having a distinct, colourless, central

* By ozone is meant *electrified oxygen;* and Dr. Joannes regards it as the vital energy of the air, and that for the oxygen of the air to be assimilated with the blood it must be in an electrified or ozonized state, where it produces life and vital electricity.

nucleus, around which a number of rounded granules of a yellowish green or orange colour aggregate. Dr. Parkes noticed these bodies in 1865 and 1866. These bodies were discovered by the elaborate researches of Klob, Thorne, and Hallier, to be descriptions of vegetable fungi, having the power of multiplying with great facility and of highly infective power. Mr. Simons, in his ninth report, states that both Dr. Thomè, of Cologne, and Klob, of Vienna, "find in Cholera evacuations, and in the intestinal mucus of the dead body, definite organic structures, consisting of excessively fine granules, clustered more or less densely in the interstices of a jelly which surrounds them. The granules divide and subdivide themselves to form beaded threads, which interlace in immense numbers into felted masses in the mucus. The further development of these organisms has been determined by Thomè and Hallier. By sowing or cultivating them these observers have got, after some time, large round cell-like bodies, which rapidly multiplied, and also abundant filamentous fungi (*cylindro-tænium*) on which grew cylindrical spores, capable of developing again to filaments." Professor Hallier undertook to obtain the ultimate form of the fungus by artificial cultivation of the spores, and obtained very interesting series—for an account of which we must refer our readers to Dr. Buchanan's able summary of his paper in the Ninth Report to the *Privy Council,* or to Dr. Aitkin's invaluable work on the "Science and Practice of Medicine."

Of the sources of propagation of Epidemic Cholera, impure water forms the most important—*i.e.*, water contaminated with the morbific poison of Cholera, and this

subject has been thoroughly examined by Dr. Snow, whose investigations are thus summed up by Dr. Parkes:—

1. Local outbreaks, in which contamination of the drinking water was proved, or was very probable, such as at Horsleydown, Broad Street, Wandsworth, West Ham, in England. In India, Mouat records a case of a very severe outbreak amongst soldiers who drank the water of a tidal stream.

2. More general attacks, in which districts supplied with impure water by a water company have suffered greatly, while other districts in the same locality, and presenting otherwise the same conditions, were supplied with pure water and suffered very little.

3. Instances in which towns which could not have had water contaminated with sewage have escaped, and instances in which towns which have suffered severely in one epidemic, have escaped a later one, the only difference being that in the interval the water was improved.

The climate of India must, lastly, be regarded as a very determinating cause of Epidemic Cholera.

Diagnosis and Prognosis.

In the early state of Cholera, it is difficult to distinguish it from ordinary Diarrhœa, the symptoms being so very much alike; the premonitory Diarrhœa may, however, be distinguished from the ordinary form by the absence of pain in the abdomen, and by the presence of albumen in the urine. Epidemic or Asiatic Cholera may be distinguished from the ordinary English Cholera, by the peculiar odour and want of bile in the premonitory Diarrhœa or cholerine; in the intense lividity of the extremities;

in the early and intense collapse which supervenes; in the complete suppression of the urine; in the great mortality of the cases; in the peculiar hoarse voice so peculiar to it, and in the evacuation attendant on it being more profuse and ungovernable.

Various circumstances must be taken into consideration in estimating the probable result of a case of Cholera. Thus: the age of the patient, whether young, middle-aged, or advanced in years, the previous condition of the patient, whether healthy and robust, or weak and debilitated, and the period of the epidemic, whether at its decline, its commencement, or at its acme. The symptoms are very unfavourable when there is extreme collapse after a violent attack, or a total cessation of vomiting or purging; when it occurs in an individual advanced in life, who has been much debilitated from any cause whatsoever. They are favourable, when even during collapse the pulse rises, the skin becomes warm, bile and urine secreted and evacuated, the skin begins to resume its colour, and the voice returns to its natural character. The symptoms prognosticating the early approach of death are dryness of the cornea, a perfect stasis of the blood in the capillaries, and ecchymosis of the conjunctiva.

General Mortality of Epidemic Cholera.

The mortality from Cholera is always very great in whatever country it appears. The Registrar-General, in his report for the summer quarter of 1866, says, "Cholera throws men into terrible convulsions, and kills half of its victims in twenty-four hours; but there is a merciful

warning of its approach in probably every instance, the neglect of which is fatal. So it is with the epidemic in England; it has hitherto commenced generally about October, and has only proved excessively fatal in the following summer. Thus all our towns have six months' notice and the whole winter for the preparation of defensive works. Every district in the kingdom should at once appoint its health officer."

It is computed that at the first outbreak of Cholera, about one-tenth of those attacked die; then seven-tenths, gradually decreasing to five-sixths; three-fourths, one-half, one-third, and then towards the close a large proportion of those attacked recovered. In Astracan the death rate was one to three attacked; in Mishni Novogorod, one in two; Moscow and Casan, three to five; in 1831, at Riga, St. Petersburg, Mittau, Limburg, and Brody, one-half, and at Dantzig, Elbing, and Posen, two-thirds of the whole attacked. (*Aitkin.*)

Of 19,232 fatal cases of Cholera recorded in males, 315 terminated in six hours, leaving 18,917 alive; 3,030 died in the next six hours, leaving 15,887 alive at the end of the twelfth hour; 4,965 died in twelve and less than eighteen hours, leaving 10,922, or rather more than half the number of those who died, alive at the end of the eighteenth hour. If a man is to die of Epidemic Cholera, it is probable that he will die in the first day (twenty-four hours), as out of 19,232 males who died, 10,187 died within, and 9,945 survived that period. (*Martin.*)

On the 5th May, 1869, the first death from Epidemic Cholera was officially reported at Bathurst, River Gambia,

West Coast of Africa; out of a population of about 4,000 inhabitants, the total mortality from the 5th to the 15th amounted to 190; from thence to the 22nd the total deaths were 498; on that day there were 74 deaths; this was the largest number of deaths reported in one day, which was stationary on the 23rd and 24th. On the 25th it began to decline, but fluctuated a great deal. On the 4th June the total mortality had reached to 1,259; on the 17th June, the total deaths officially reported, and buried in the grave-yard, out of a population of less than 4,000 inhabitants, was 1,152, of which one was a European.

For the following tables showing the mortality of Epidemic Cholera, we are indebted to Sir R. Martin :—

Mortality of Epidemic Cholera of Hindus and Mohammedans to each month during seven years, from 1832 *to* 1838 *inclusive.*

Months.	Hindus.	Moham-medans.	Total.	Remarks.
In 7 Januarys	572	123	696	Mean Temperature, 66°2 Dry.
,, 7 Februarys	620	196	816	,, ,, 69°8 Rain.
,, 7 Marchs	1,873	439	2,312	,, ,, 80°0 Dry.
,, 7 Aprils	2,707	482	3,189	,, ,, 85°4 Dry.
,, 7 Mays	2,170	464	2,634	,, ,, 85°$\frac{7}{15}$ Rain.
,, 7 Junes	615	217	832	,, ,, 83°7 Rain.
,, 7 Julys	914	133	1,047	,, ,, 81°8 Rain.
,, 7 Augusts	806	146	952	,, ,, 82°0 Rain.
,, 7 Septembers	785	121	906	,, ,, 82°0 Rain.
,, 7 Octobers	1,030	198	1,228	,, ,, 79°$\frac{2}{15}$ Dry.
,, 7 Novembers	1,687	230	1,917	,, ,, 74°2 Dry.
,, 7 Decembers	1,425	161	1,586	,, ,, 66°6 Dry.
Total	15,204	2,911	181,115	

In the above table the mortality amongst the Hindu inhabitants of Calcutta, as compared with that of the Mohammedan, is $5\frac{1}{2}$ to 1, whilst the proportion of population is $2\frac{1}{2}$ to 1. The proportion of deaths is far greater in the hot than in the cold months, especially among Europeans in tropical climates; thus, of 491 cases of

Epidemic Cholera admitted in the General Hospital at Calcutta, amongst the Europeans during the hot months there were 220 deaths, whilst during the cold months the admissions were 311, and the deaths 152.

Table of Admissions and Deaths of Europeans from Cholera in the General Hospital, Calcutta, for each month during twelve years.

Range of Observation.	Total Admissions.	Total Deaths.
In 12 Januarys	28	11
,, 12 Februarys	8	5
,, 12 Marchs	56	34
,, 12 Aprils	86	57
,, 12 Mays	268	125
,, 12 Junes	138	38
,, 12 Julys	32	6
,, 12 Augusts	37	18
,, 12 Septembers	10	5
,, 12 Octobers	49	27
,, 12 Novembers	59	32
,, 12 Decembers	32	14
Grand Total	803	372

The following Table shows the Average Rate of Sickness and Mortality of Epidemic Cholera in Great Britain and British Possessions.

Stations.	Periods of Observation.	Aggregate Strength.	Admitted.	Died.	Rates per 1,000.	
					Admitted.	Died.
United Kingdom — Dragoon Guards	1830-46	98,985	171	54	1·7	·5
Gibraltar	1818-46	93,400	459	131	4·9	1·4
Malta	1817-46	61,998	209	47	..	·8
Ionian Islands	1817-46	26,494	none.	..	..	..
Bermuda and Newfoundland	1817-46	22,945	none.	..	..	..
	1825-46	7,678	none.	..	..	..
Nova Scotia and New Brunswick	1817-46	43,248	210	59	4·8	1·4
Canada	1817-46	154,736	356	127	2·3	·8
Cape of Good Hope	1818-36	29,344	none.	..	..	..
Windward and Leeward Command	1817-36	86,661	none.	..	..	..
Jamaica	1817-36	51,567	none.	..	..	..
St. Helena	1818-36	5,908	none.	..	..	..
Western Africa	1819-36	1,843	none.	..	..	..
Mauritius	1818-36	30,515	268	32	8·8	1·1
Ceylon	1817-36	42,978	788	257	18·3	6·
Madras—H.M.'s Regiments.	1826-43	117,588	4,195	1,232	35·7	10·5
East India Company European Troops. Bengal	1825-44	88,380	..	1,021	..	11·5
Bombay	1825-44	50,987	..	88	..	5·6
Madras	1825-44	101,210	..	432	..	4·3

The following Table also shows the Average Sickness and Mortality from Epidemic Cholera in the undermentioned places.

	Period of Observation.	Strength.	Cases of Cholera.	Deaths.	Rates per 1,000 of Strength.		Proportion of Deaths to Cases.
					Cases.	Deaths.	
United Kingdom — Dragoon Guards and Dragoons	1832	6,408	114	29	17·8	4·5	10 in 39·3
,, ,,	1833	6,379	32	14	5·0	2·2	10 ,, 22·8
,, ,,	1834	6,261	25	11	4·0	1·7	10 ,, 22·7
Troops generally*	1832	45,583	886	232	19·4	5·1	10 ,, 38·0
,, ,, *	1833	42,614	223	71	5·2	1·7	10 ,, 31·4
,, ,, *	1834	38,587	154	61	4·0	1·6	10 ,, 25·2
Gibraltar	1834	3,034	459	131	151·3	43·2	10 ,, 35·0
Malta	1837	2,159	209	47	96·8	21·8	10 ,, 44·5
Nova Scotia and New Brunswick	1834	2,071	210	59	101·4	28·5	10 ,, 35·6
Canada	1832	2,909	259	94	89·0	32·3	10 ,, 27·5
,,	1834	2,588	97	33	37·5	12·7	10 ,, 29·4
Jamaica	1850	756	51	29	67·5	38·4	10 ,, 17·6
Mauritius	1819	1,652	113	20	68·5	12·1	10 ,, 56·5
,,	1820	1,395	155	12	111·1	8·6	10 ,,129·1
Ceylon	1819	2,533	236	89	93·2	35·1	10 ,, 26·5
,,	1820	2,703	42	12	15·5	4·4	10 ,, 35·0
,,	1825	1,448	111	31	76·7	21·4	10 ,, 35·8
,,	1829	2,279	48	14	21·1	6·1	10 ,, 34·3
,,	1832	2,056	344	107	167·3	52·0	10 ,, 32·1

Between 1830 and 1846 the mortality by Cholera in every 100 deaths of Europeans in the Bombay Presidency was 10·320. In Bengal the death rate per 1,000 of strength was, in 1860, 12·46; in 1861, 23·48; in 1862, 8·21. In Bombay, in 1860, it was 9·22; 1861, 3·95; 1862, 4·63. In Madras, in 1860, it was 3·37; in 1861, 2·7; and in 1862, 3·67.

In the Department of the Seine, France, the following summary of the results of five Cholera Epidemics is recorded *(Journal de la société de statistique)* :—

	Deaths by Cholera.	Proportion to 10,000 Inhabitants.
Epidemics of 1831-2	21,670	228
,, 1849	25,052	179
,, 1853-4	11,873	76
,, 1865	6,626	31
,, 1866	5,700	26

* Special Reports.

Within the area of the metropolis of London, containing 3,000,000 inhabitants, who are variously distributed in density over an area of 77,997 acres, the mortality of the Epidemic of 1866 was 5,548, and extended over a period of twenty-three weeks. Comparing it with the outbreak of previous years, we find the following :—

Years.	Duration.	Deaths by Cholera.	Rates to 10,000 Inhabitants.
1832	23 weeks.	3,790	23
1849	23 ,,	13,565	59
1854	23 ,,	10,684	43
1866	23 ,,	5,548	18

The *Lancet* has given the following useful classification of the sub-districts of London, with the comparative death rates to 10,000 inhabitants, according to their elevation and water supply, which might bear useful comparison with the water supply of places in India and other tropical countries where Cholera is endemic :—

Companies furnishing the greater part of the Water Supply.	Epidemic Years.	Elevation in feet above Trinity High Water Mark.							
		Under 3 feet.	3–10	10–20	20–40	40–60	60–80	80 and upwards.	Not Stated.
Grand Junction	1849	63	55	37	38	14	17	13	..
West Middlesex	1854	55	76	50	45	22	41	12	..
Chelsea	1866	4	9	3	2	2	4	3	.
	1849	..	..	96	84	42	27	20	..
New River	1854	..	..	86	29	16	24	10	..
	1866	..	..	36	16	9	6	5	..
	1849	59	77	60	56	59	23	..	..
East London	1854	33	48	41	34	17	16	..	..
	1866	167	89	88	76	17	4	..	..
Southwark	1849	159	105	89	74	54	149	10	25
Lambeth	1854	113	122	55	102	28	15	21	19
Kent	1866	6	10	12	2	2	2	3	12
	1849	146	89	60	64	44	25	16	25
Total	1854	105	99	50	36	17	32	11	19
	1866	10	24	28	49	10	5	4	2

Treatment of Epidemic Cholera.

So rapid and fatal are the attacks of this disease, so varied are the views of the pathological conditions attendant on it, and so uncertain are numerous remedies in the hands of the various practitioners, that the opinion has gone the round, that had all the patients who suffered from this disease been left alone, the mortality would have been much the same as it has been.

In every epidemic visitation our knowledge as to its treatment increased greatly, and the attention of the profession is called upon now and then to consider the results of various rational, although empirical treatments, which have proved very beneficial in a great many cases; but we find after all, that our safest means lie in the prevention rather than in the cure of the disease.

There are three stages which are necessary to be borne in mind in the treatment of Epidemic Cholera—viz., 1. The Premonitory Symptoms or Stage of Cholerine; 2. Stage of Collapse; 3. Stage of Reaction.

1. The Stage of Cholerine.—The indications for treatment in the stages are—(a) *to arrest the preliminary diarrhœa and vomiting;* (b) *to relieve the irritation of the gastro-intestinal mucous membrane;* (c) *to restore the suspended secretion;* (d) *to equalize the circulation;* (e) *to relieve the nervous disturbances, and equalize the circulation;* (f) *to support the strength.*

It will at once be observed that the treatment necessary in one of these indications answers for the

treatment of the other, so that the several indications might be greatly reduced, and our treatment depends on the use of alterative and astringent.

To arrest the preliminary Diarrhœa, to relieve the irritation of the mucous membrane of the intestine, and to restore the suspended secretion, our remedy is centred in opium and the acetate of lead: and a small quantity of calomel has strongly been recommended by physicians of long-standing Indian practice. Opium is the most important and valuable remedy we have, but it should be cautiously administered at the commencement of the treatment; the first two doses might be large, from half to one grain, and then small and frequent doses; for when too large doses are given and persisted in, the secreting glands may be locked up, and the effects of other remedies thus impaired, or it might lead to congestion of the brain and other organs. Given in the manner before stated, it checks the diarrhœal discharges, allays the gastro-intestinal pain and irritation, and moderates the cramp and spasm. The acetate of lead acts by constringing the capillary vessels of the mucous coat, thus allaying the evacuation, and by exerting a decided sedative effect on those coats. Other tonic medicines might also be given, such as tannic acid, kino, catechu, chalk, &c., but the patient should be kept in the recumbent position.

The following pills might be given every half-hour or every hour; the practitioner using his own judgment as to the necessity of increasing or diminishing the dose, or repeating it according to the severity of the case:—

℞.—Pulvis opii . . . . . } āā gr. iij.
Hydrargyri subchloridum . . . . }
Plumbi acetas . . . . . ℈ij.
Acidum tannicum . . . . . gr. vj.
Acacia . . . . . } āā q. s.
Syrup . . . . . }
Misce, et divide in pil. xij.—One pill for the dose.

When opium is combined with stimulants, it has a very beneficial effect, especially in the early stage of the cholerine:—

℞.—Pulvis opii . . . . . gr. xij.
Camphora . . . . . gr. xxx.
Pulvis capsici . . . . . gr. iv.
Spiritus rectificatus . . . . . q. s.
Confectio rosæ gallicæ . . . . . q. s.
Misce et divide in pil. xii.

To relieve the *nervous disturbance and equalize the circulation,* it will be necessary to apply friction over the whole body, either by the hand or a flesh brush, and it will be more advantageous if some rubefacient is added.

To relieve the *vomiting and thirst,* cold drinks should be freely allowed—ice-water, cold effervescing draughts, carbonic acid water. Mustard cataplasm should be applied over the stomach.

To support the strength, diffusible stimulant is the best remedy to be employed—viz., camphor and ammonia, or with other ethereal preparations; small quantity of brandy diluted with water; port wine is of great service; but as soon as collapse comes on, they should be at once stopped, as they are likely to prove injurious.

2. Stage of Collapse.—This is a very dangerous stage for a patient, and the indications for treatment are—*first,* to promote reaction; *secondly,* to supply the loss of

watery fluid and salts from the flood; *thirdly*, to check excessive perspiration, and restore the heat of the body; and *fourthly*, to support the failing strength of the patient.

The most valuable mixture for the early production of reaction is that found in the *Military Field Companion*, modified by Messrs. Savory and Moore, viz.:—

℞.—Oleum anisi	} f ℥iss.
Oleum cajeputi	
Oleum juniperi . . . . . ana	
Æther	f ℥ss.
Liquor acid. Halleri (composition—acid. sulph., i.; spirit. rectific., iii.) . . .	f ℥ss.
Tinctura cinnamomii	f ℥ij.

Misce.—Ten drops to be taken every quarter of an hour in a table-spoonful of water.

To meet the second and third indications, large doses of salt and water may be administered, three table-spoonfuls of common salt to every quart of water, or the solution of bicarbonate of potash, or soda, about one scruple to each quart of water; warm salt water bath may be used, and the surface afterwards rubbed with alum and brandy, or friction with ice or ice water; stimulating liniments, hot bags of sand, and bottles of water, and the nitro-muriatic acid bath.

The fourth indication—viz., to support the failing strength of the patient—is fulfilled by administering weak broths with salt, gum water, toast and water, arrowroot with a small quantity of brandy; the stimulants already described should be used in very small quantities, and very cautiously; iced brandy and water in very small doses, often repeated, will be found very useful. A large quantity of stimulants aggravates the danger, helps to

exhaust the patient by increasing the excessive perspiration, and might induce inflammation in the subsequent stage.

3. Stage of Reaction.—At this stage, our chief remedy will depend entirely on the symptoms presented by the patient; if there is great *thirst*, with dry and hard tongue, cold drinks, lemonade, chlorate of potash mixture, should be given; or the nourishing drink of Dr. Andrew Buchanan, composed of a raw egg, beat up with half a pint of milk, to which is added a pint and a-half of water, and a little salt. If Diarrhœa supervenes, opium and acetate of lead should be administered, or Dr. Andrew Clerk's powder, composed of—

Hyd. c. cretâ	gr. ij.
Pulv. ipecac.	gr. ss.
Pulv. Doveri	gr. iiss.

Misce.—To be taken night and morning.

If the reaction runs too high, and common fever supervenes, tonics—such as quinine, the nitro-muriatic acid, &c.—should be given; but when it puts on a typhoid character, stimulants—such as the carbonate of ammonia, with tonics—should be cautiously given; and if there be any sign of inflammation, blistering, hot-water fomentations, various embrocations, and calomel with opium, might be used to reduce it.

Dietetic Treatment.—*During the Cholerine*, the diet should be light and easily digestible, consisting of boiled rice, milk, whey, light broth, and boiled mutton. *During collapse, or when the disease is firmly established*, the diet should be chiefly farinaceous and mucilaginous,

made up in the most easily digested style, always in the liquid form, consisting of light and well-diluted essence of beef, or chicken and mutton broth, milk and lime water. *During convalescence,* particular attention should be paid to the diet; all indigestible food should be avoided, but light animal food, and mucilaginous and farinaceous diet, should be persisted in for a long time.

In the report on the "Treatment of Epidemic Cholera" in the Provinces throughout England and Scotland in 1854, addressed to the President of the General Board of Health by the Treatment Committee, we find a summary of the different modes of treatment employed, which condemns the eliminant treatment altogether, and the stimulant principle, except as a resource in extreme cases; but which recommends the alterative treatment, especially as carried out by calomel and opium. It shows a still superior advantage in the astringent principle, as applied through the means of chalk and opium—the general per-centage of death following each plan of treatment being,—

Of Eliminants	71·7 per cent.
,, Stimulants	54· ,,
,, Alteratives (calomel and opium) . .	36·2 ,,
,, Astringent (chalk and opium) . .	20·3 ,,

That Committee remarked that, in order to judge more correctly of the value of the evidence, it is necessary to examine, as far as may be possible, the degree of severity of the cases brought beneath the test. The only means at our command (on the present occasion at least), to make this examination is to consider the relative proportion which the cases of collapse bear to the number of

deaths of their own classes respectively; examining, therefore, the collapse cases with the number of deaths, we find that calomel and opium stand highest in the scale of success, and the order of preference appears as follows:—

Calomel and opium	59·2 per cent.
Calomel (large doses)	60·9 ,,
Salines	62·9 ,,
Chalk and opium	63·2 ,,
Calomel (small doses)	73·9 ,,
Castor oil	77·6 ,,
Sulphuric acid	78·9 ,,

According to this result, the superior success of calomel and opium in severe cases appears a distinct fact elicited by the enquiry, also the relative advantages of those other modes of treatment which follow in their order of success. This order marks the use of calomel in small doses, of castor oil, and of sulphuric acid as actually to be deprecated in severe cases. Chalk and opium, as shown above, stands at the head of the list, in the general per-centage, both in hospital and in private practice; but in the comparison of the collapse cases with the number of deaths, the average declines to the fourth rank.

So fatal have been the epidemics of Cholera, and so diversified has been the mode of treatment recommended by different writers, that it will not be out of place here for me to give in detail treatments recommended and practised by different physicians. I shall, therefore, give three, which are—

1. *The treatment by judicious management.*—Professor Maclean, of the Royal Military College, Netley. This is

a most valuable method, and is that taught to all Army surgeons who pass through the course at Netley; it recommends the best hygienic condition to be secured for the patient in the tropics, the sick being attended in tents if possible, avoiding overcrowding. The sick should be well provided with ice to suck, and water to drink, and every means to be avoided which would exhaust the assistants and attendants; chloride of zinc or carbolic acid should be used as disinfectants, and the stool or other evacuations should not be emptied in the latrines or water-closets used by the healthy, but buried in pits strongly charged with a disinfectant agent; all soiled linen should be also charged with the same agent, and then plunged into boiling water outside the building or tent.

Extra warmth by blanketing should be applied, if grateful to the patient, but not if it causes restlessness; mustard or turpentine may be applied to the epigastrium and calves of the legs. If the vomiting be excessive, and the cramps troublesome, chloroform in five or six minim doses given in a little water will produce great relief. Chloroform may be applied externally over the epigastrium, sprinkled on a pad of lint covered with oiled silk or gutta-percha, or with spongio-piline. The cramps and vomiting may be quickly relieved by the use of large doses of alkali, the sesqui-carbonate of soda or the bitartrate of potash. Opium should be avoided as much as possible, it being regarded as most treacherous and dangerous; it might hinder the restoration of the secretions after collapse, or, if the quantity given was large, hasten cerebral symptoms which might end in coma.

When cuticular discharge is excessive, the patient

should be frequently wiped without disturbing him. If the vomiting be not excessive, ten drops of the following mixture, which should be used in the premonitory Diarrhœa, should be given—viz., oil of aniseed and oil of cajeput, of each one fluid drachm and a-half; Haller's acid solution and tincture of cinnamon, of each two drachms; but if the vomiting is excessive, chloroform mixture should be given. If the purging be excessive, acetate of lead with some capsicum should be administered without opium, or the pernitrate of iron in full doses. Nitrate of silver might also be tried.

Professor Maclean disapproves of the use of calomel as being injurious after accumulating in the system; stimulants are useful at their proper time and place, but during the stage of collapse they are useless. He recommends that as soon as vomiting ceases, the patient should be supported by proper means. At first, in his treatment, he begins with thin arrowroot, well boiled and flavoured with curaçoa if it be at hand, which might be often repeated, or given to the patient with soda water. As reaction proceeds, he substitutes strong beef tea, or, better still, essence of meat, using it in the same cautious way, spoonful by spoonful at proper intervals; later still, the patient will relish eggs beaten up with a little brandy, and flavoured with curaçoa.

The greatest caution will be required not to disgust the patient, nor to re-excite vomiting, nor to over-stimulate, and so to bring on cerebral symptoms during the febrile action. When patients are thus carefully nursed, he maintains that it is seldom that reaction is excessive. Nothing but mischief may be expected from over-anxiety

to hasten forward convalescence by too freely pressing food and stimulants on the patient. It requires a good deal of drilling and care to get orderlies and half-instructed nurses to understand this, and many cases go wrong from their over-anxiety to press both on those under their care. In a word, the treatment of Cholera may be summed up in two words—*good nursing*.

The difficulty is to obtain this when an epidemic rages; the man who, in such scenes, maintains his presence of mind, preserves order, regularity, and good hospital discipline, and so arranges as to secure to each patient a fair amount of this good nursing, will save a larger proportion of cases than by any other method.

When there are symptoms of cerebral disturbance, Professor Maclean recommends *ice* to be applied to the head, and cold sheets or cold sponging over the skin to restore its action, and if the secretion of urine be delayed, chlorate of potash should be freely used, and the turpentine stupes applied over the region of the kidneys.

2. *Treatment adopted by Drs. Hoffmeister and Richards* at Cowes, with apparently very good results, and which is to be recommended for trial.

During the evacuation stage.—Acetate of lead, three grains, with acetic acid and tincture of opium, fifteen minims, every one or two hours until purging is arrested. Sinapism to the epigastrium for relief of pain in that region and vomiting; ice and ice water *ad libitum* to allay thirst and sickness, with the addition of small quantities of brandy, one drachm sometimes, if much depression or failure of pulse. Small doses of chloric

ether and tincture of opium to allay cramps, and friction with brandy or turpentine.

During the stage of collapse.—Sesquicarbonate of ammonia, in four-grain doses, every hour or two hours; very small quantities, sometimes a drachm, of brandy and water, in equal parts, every quarter or half hour. In other cases the same doses of iced sherry or champagne, with ice to suck. Long earthenware bottles with hot water applied all along the spine constantly; hot bottles to hands and feet.

During the reaction period.—Beef tea, well salted, in table-spoonfuls at a time, and freely administered; milk and water, and milk arrowroot in small quantities. Diminution, and in some cases, cessation of stimulants, according to amount of reaction and pulse force. To relieve the pain and severe oppression at præcordia, and the pain between the shoulders so distressing in some cases during this stage—fifteen grains of bicarbonate of soda, fifteen minims of aromatic spirit of ammonia, five minims of tincture of opium and tincture of lavender, three or four times a day, or when the pain was severe, seems to give great relief; even so much is the relief obtained, that some patients declare "that one dose of it went directly to the desired spot."

Care is enjoined with regard to diet and exertion in the stage of convalescence. Camphorated chloroform (saturated solution), and also turpentine, each given in twenty-minim doses on loaf sugar, were apparently followed by marked benefit. They were given in the algid stage, when continual retching, and vomiting, and cramps, were at their height. The greatest care is to be

taken in the collapse period, to apply warmth continuously to the hands and feet, and all along the spine; the patient, as he lay partially on his side, should have his back supported by a long pillow of hot bottles.

3. *Rational Treatment of Cholera*, by Dr. John Gason, F.R.C.P., Ireland.—The principle on which this treatment is based is the consideration that the result of the depressing influence of the cholerine poison on the system of nerves, particularly on that of the great sympathetic, thereby interfering with the normal action of the sympathetic, produces a loss of balance of the power between the vessels of absorption and secretion, allowing the exhalants to pour forth uninterruptedly those fluids which enable the blood to circulate freely from its vessels. The consequence of this loss of the watery portion is a retardation of the blood in its vessels, its oxidation diminishes, and the dark appearance of the skin gradually takes place. The cause of death he believes to depend on the accumulation of the venous blood, which poisons the system and produces death by asphyxia.

"His treatment," says he, "is very simple; as soon as the 'alvine rice-water evacuation' commences, or as soon after as possible, he places longitudinally beneath the buttocks a towel, very tightly rolled up, on which a solution of chloride of lime has been sprinkled. [I should now use Calvert's perfumed solution of carbolic acid.] This roller should be in length about nine or ten inches, and in diameter one and a-half or two inches. It must be placed so as to allow the orifice of the rectum to come directly on the middle. The patient must be confined to the horizontal position, and no motion which will affect

the position of the roller permitted. Together with this a broad flannel bandage should be carried tightly round the body three or four times; the part next the skin, and particularly that portion over the abdomen, should be well sprinkled with chloroform."

All liquids must be withheld for the first few hours, notwithstanding the intense thirst of the patient, and gentle and continued friction should be kept up on the extremities, together with a moderate amount of heat. Chloroform, in doses of three drops, to be given on a small lump of sugar, every five or ten minutes, according to the urgency of the case. Occasionally a slice of fresh lemon may be put into the mouth, and the piece swallowed. If the acute symptoms abate, light broths may be given in tea-spoon doses every half-hour.

The roller beneath the buttocks should not be removed for at least twelve hours after reaction has set in, and then replaced immediately by a fresh one. The patient will frequently express an urgent desire to go to stool, but all entreaties to do so should be forbidden. If the roller be properly made and placed, no evacuation can take place, not even so much as could stain the towel beneath. In some cases, attended with great restlessness, it may be necessary to plug the anus, in addition to the use of the roller.

Under the above mode of treatment, he continued, the secondary stage will soon usher in, which, of course, will be treated according to circumstances; he stated also, that in none of the cases which he had treated in this manner was the secondary fever of any great moment, except in one, in which the disease had existed for several

hours before he was sent for, and the patient was living in a very polluted atmosphere. This case recovered. The severity of the secondary fever will depend for the most part on the amount of the loss of the alvine evacuations, on the system not being stimulated more than is absolutely necessary, and on the abstinence from opium.

It is hardly necessary, from what has been said, to add that death from Cholera ensues as the consequence of the loss of the serum of the blood, and that in this plan of treatment there is a powerful means of checking it in great part. In twenty-four hours after reaction, the whole of the serous secretion retained in the rectum will be re-absorbed. The flannel binder which encircles the body will be found to exert a powerful and wholesome pressure, and the chloroform with which it has been sprinkled will allay the spasms, which are sometimes so excruciating. Care must be taken that the feculent evacuations have ceased before the discharges are checked, unless choleraic symptoms appear urgent. There is no use in placing the roller beneath the buttocks when the system is almost drained of its serum. It should be employed during the *rice-water evacuation*, and at as early a period as possible.

Cleanliness both in person and in place should be rigidly attended to, as well as frequent change of bed linen, or at least its daily exposure to the air; instantaneous removal of all secretions, and the frequent cleansing of water closets and sewers.—*Lancet*, Dec. 23rd, 1869, p. 697.

Dr. Gason has since published successful cases by this method of treatment, but when the epidemic is accom-

panied with little Diarrhœa and vomiting, cramps, and spasms, and the patient appears to be struck down dead at once, this mode of treatment, of course, is of no avail.

It will be necessary, now, before closing the subject of the *treatment of Epidemic Cholera,* to review the value of each of the remedies or class of remedies commended by different writers, and I can only do this by quoting at some length that portion of the able Report of Dr. Gull to the College of Physicians, relative to the treatment of Epidemic Cholera. For more detailed account, see Report in full.

Treatment of the period of invasion.—It is well ascertained that in the largest proportion of cases, at least in European countries, the poison of Cholera produces its first effects on the system gradually, as indicated by Diarrhœa, varying in duration from a few hours to several days before the intense symptoms supervene. This period may be called the period of invasion.

The numerous communications received by the College establish the importance of recognizing the stage at its commencement, and render it highly probable that the morbid effects may then be often successfully combated.

The popular theory that the discharges are an effort of nature to throw off a *materies morbi,* is not only unsupported by any known facts of the disease, but, when applied to practice, is found to increase the violence of the symptoms.

At present no antidote or specific medicine is known to neutralize the cause of Cholera, or with certainty to arrest its early effects; but the communications received show that the Diarrhœa was, in a large number of cases,

arrested by various combinations of such remedies as generally suppress discharges from the intestines, and prevent the exhaustion of nervous energy.

Opium was an almost constant ingredient, and was given in conjunction with astringents, aromatics, and diffusible stimuli.

A recumbent position is proved by experience, and also from the nature of the case, to be a most important measure. It prevents exhaustion, favours the circulation, and lessens the frequency of the evacuations. It is highly probable that cases which otherwise resisted the action of medicines, would have easily yielded had the horizontal position in a warm bed been strictly enforced. Enemata were not, as might have been anticipated, of much service, since the small intestines and deodenum are the painful source of the effusion.

The indications of treatment in this stage are formed entirely from the mucous membrane itself, independently of any hypothetical derangement of the liver. This organ does not appear to be in any way the cause of the symptoms; the diminution of the bile in the evacuations, as they become more and more fluid, being an effect rather than a cause of the disease. The character of the fluid thrown out, the attendant symptoms, the absence of pain, the passiveness of the evacuations, and their occasional retention to a large amount in the intestines, indicate a depression of all the energies of the affected surface.

The amount of success obtained by early treatment is not yet determined; there is a general opinion that it was very great, but this must be received with some limitation,

as the facts on which it is founded are not unequivocal. By far the greater number of cases of Diarrhœa would probably never have passed beyond this stage, if no medicines had been administered; and on the contrary, in many instances the symptoms were uninfluenced by any treatment, and fatal collapse came on in spite of every effort to prevent it.

Notwithstanding this uncertainty, the general results of preventive measures were apparently very favourable, as shown by the small proportion of cases which passed into the severe forms of the disease subsequent to early treatment.

Treatment of impending and complete collapse.—In this division of our subject, we can do little more than point out, according to the evidence before us, what forms of treatment seem to have been of some service, or useless, or injurious; and, by thus clearing the ground, prepare the way for better directed efforts.

An enumeration of all the means proposed for the treatment of this stage would be useless; it is, therefore, only upon the principle of them that we shall make any report.

Use of calomel.—Calomel stands foremost, from having in this country been more fully used than any other remedy. The theory of the disease which has led to its employment is not supported by anatomical facts. The absence of bile from the evacuations appears to be merely a subordinate result. Calomel can be administered only on empirical grounds, for there appears to be no argument in favour of its exhibition, either from analogy or pathology.

The results in 365 cases treated by this remedy in small and frequent doses, were 187 deaths and 178 recoveries. The number given by Dr. Ayre to the College of Physicians do not sustain his favourable opinion of the treatment of Cholera by small doses of calomel. The deaths were 365 out of 723 unequivocal cases. Under various and opposite plans, the recoveries, even in severe cases, averaged from 45 to 55 per cent., according to the period of the epidemic; they should, therefore, exceed the highest of this number before they can be adduced in proof of the value of any particular method of treatment.

In general, no appreciable effects followed the administration of calomel, even after a large amount, in small and frequently repeated doses, had been administered. For the most part it was quickly evacuated by vomiting and purging, or, when retained for any longer period, was afterwards passed from the bowels unchanged. Salivation but very rarely occurred, and then only in the milder cases. We conclude that calomel was inert when administered in collapse; that the cases of recovery following its employment at this period were due to the natural course of the disease, as they did not surpass the ordinary average obtained when the treatment consisted in the use of cold water only.

Treatment by calomel, opium, and stimulants.—This is termed the rational method of treatment, and was intended to combine those remedies which seemed best fitted to fulfil the supposed indications of this stage. The calomel was given to restore the functions of the liver, and as an alterative of the morbid action on the gastro-intestinal mucous membrane; the opium to allay

irritation and arrest the discharges, and the stimuli to counteract the depression of the nervous system. Experience did not confirm the theory; the results were favourable, and not altogether so indifferent as when calomel was exhibited by itself.

Although *opium and diffusible stimulants*, brandy, camphor, and ammonia, were useful at an early stage of the disease, as collapse set in they not only failed to produce any favourable result, but often aggravated the symptoms.

It seems well ascertained that opium in large doses was at this period injurious, by increasing the cerebral oppression, and embarrassing the system during reaction. It was probably less and less applicable as the disease advanced to its characteristic development.

Stimuli, especially the various preparations of alcohol, did not act as restoratives in collapse, but even increased the irritability of the stomach, and added to the sense of oppression at the præcordia.

The expectations existed by the early success apparently obtained by the use of *chloroform* were not realized in its subsequent employment. It not unfrequently allayed the vomiting and cramps, but did not in any degree arrest the course of the disease.

The *perchloride of carbon* in five or ten-grain doses, and a *solution of camphor in chloroform*, acted as powerful stimuli, but the results did not indicate that they professed any specific therapeutic value. Although they produced symptoms of reaction, this apparent improvement was generally in severe cases, but transient, and their continued use seemed to exhaust the little remaining power rather than to restore the patient.

The use of cold water and ice.—The obvious requirements of the system and the urgent thirst were sufficient indications for the use of deluents, and the experience of the profession appears to be uniformly in favour of permitting patients to gratify their appetite for them. *Cold water* was generally preferred, and good results were often observed when it was taken freely in repeated and copious draughts, although it excited vomiting. In smaller quantities, and iced, it was refreshing to the system, and allayed the irritability of the stomach.

Ice was generally grateful to many patients in impending or approaching collapse, and probably acted favourably upon the mucous membrane, and served to arrest the discharges. The use of ice and cold water appears in most cases to relieve the burning thirst, while it favours reaction. Dr. Arnott administered a mixture of ice and salt in large quantities, and in the cases of two patients so treated, both recovered; but there is no further experience respecting this mode of treatment.

Treatment by salines.—Salines of low specific gravity were sometimes given instead of common water, the intention being to restore to the blood a fluid similar to that lost in the early stages of the disease. We have no evidence that they possess any influence over the local morbid action in the mucous membrane. It was not until this surface had in part recovered its function of absorption, that any good resulted from their employment. When given at an early period, and in a more concentrated form, they appeared to favour the discharges.

Emetics.—Emetics were sometimes given at the onset of the disease, with the intention of cutting short the

morbid actions by distributing the blood to the surface, and relieving the congestion of the intestinal mucous membrane. It is probable that when administered early, they were occasionally of service, but the results appear to have been too uncertain to admit of their forming any part of a routine system of treatment. In collapse they were inadmissible, being often followed by increased exhaustion; and even when they appeared to produce symptoms of reaction, this effect was of short duration.

Blood-letting.—Bleeding was employed in the premonitory stage of Cholera, for the purpose of arresting the discharges by relieving the congestion of the intestinal mucous membrane. This was not much resorted to in the last epidemic; and the communications to the College contain but little mention of it. The only reports in its favour by Annesley and other writers on the disease as it occurs in India, have not been confirmed by further observation; and hence, except in rare and exceptionable cases, it is not usually had recourse to in the premonitory stage, or at the onset of the more severe symptoms. Its general inadmissibility is to be inferred from its almost entire disuse in the last epidemic. Even in the consecutive fever, blood-letting in any form requires much caution. Leeching the epigastrium and temples, or cupping the back of the neck, were sometimes of service in obviating the cerebral congestion of this period; but if carried to any great extent, were injurious, by exhausting the patient.

The general inference, from all we have observed of the disease, and collected from the experience of others, is, that a large loss of blood in the consecutive fever is

injurious; but that occasionally good results follow its local exhibition, according to the indications of the symptoms.

Empirical treatment — Specific remedies. — Quinine, strychnia, arsenic, sesquichloride of iron, nitrate of silver, nitrous acid, chlorine water, sulphur, sulphuric acid, bichloride of mercury, charcoal, &c., &c. The failure of these methods of treatment, which, from being based upon some supposed indications of the disease, may be called rational, led naturally to the employment of almost every active medicine in the Materia Medica.

It is notorious that the results have been discouraging, notwithstanding the bold assertions to the contrary. The communications made to the College contain no data for determining the inquiry, nor is anything deserving the name of evidence in favour of the value of these means, to be gathered from the numerous journals and published treatises in England and on the Continent. This part of our report must, therefore, be defective, although an unlimited amount of time and labour has been bestowed upon a perusal and comparison of the statements brought before us.

External means—*Heat.*—The application of heat to the surface has been largely tried; the hot bath alone, or with mustard or salt, &c., the vapour bath, and the hot-air bath, have been principally employed. It appears to be the uniform experience of the profession, that in collapse these means are of but little value.

In the earlier stage of the disease, or when it is less severe, and the pulse indicates some degree of power, the hot and vapour baths may allay cramps, and prove grate-

ful to the patient; but when the nervous and vascular functions are greatly depressed, and the surface cold and clammy, although heat may be imparted to the body, it rarely excites reaction in the system itself; on the contrary, it is oppressive to the patient, and increases the exhaustion.

It is not found by experience that the degree of reaction which may be sometimes exerted by such means and by internal stimuli, is of any permanent advantage, nor was this to be anticipated from a consideration of the conditions of the system in the collapse of Cholera. The state of the blood and the extreme depression of the nervous power necessarily render abortive such attempts at restoring the excitation. The whole tendency of the evidence yet acquired from the treatment of this stage is towards a more restricted use of powerful excitants of the kind alluded to.

Cold affluxion.—On the Continent, in the former and in the last epidemic, cold affluxion was highly spoken of as a means of producing reaction. The patient was placed in a warm hip bath, and cold water poured or thrown over the head, back, and chest. This was done quickly, and the patient placed between two warm blankets. If the first application were followed by any improvement, the operation was repeated every three or four hours. The results appear to have been, on the whole, more satisfactory than from the hot bath.

The wet sheet.—The wet sheet envelope was more commonly used in this country. The effect varied according to the state of the patient; and in the milder cases it favoured reaction; but when the disease was

severe, it was useless or injurious. The sweating caused by it added to the exhaustion, and had no influence in arresting the intestinal discharges.

Stimulating Epithems.—In the milder cases, stimulating epithems of mustard and turpentine were of some use in relieving local symptoms, and for obviating nervous depression. Frictions, chloroform liniments, and warm fomentations allayed cramps. In severe cases, these means were quite ineffective.

Oxygen and Galvanism.—Two cases are reported in which oxygen was inhaled in the stage of collapse with asphyxia; at the same time, galvanism was employed to stimulate the respiratory functions. The effects upon the respiration were such as might have been anticipated. The heart's action was, for the time, increased; and there were slight symptoms of reaction, but no permanently favourable influence was exercised by these means upon the course of the disease in the majority of cases.

Saline injections into the veins.—This method of treatment was not much investigated during the epidemic. The results were, as in 1832-33, generally unfavourable. Their nature, however, cannot be determined by statistics collected from various sources; the operation in all their details is a delicate one, and requires not only a careful discrimination of the cases to which it is applicable, but also an exact attention to the physical characters and composition of the fluid to be injected, and other collateral circumstances: until these points receive greater elucidation, the results obtained can form no sound basis for an opinion respecting their merits.

Medicated venous injections.—The arrest of the functions

of absorption in the stage of collapse, and the consequent inertness of all medicines administered by the stomach at this period, naturally led to the suggestion of injecting them into the veins. The trials which have been made in this way are too few to admit of any deduction from them. In the former epidemic, laudanum, camphor, quinine, &c., were used unsuccessfully.

From the discovery of the circulation to the present time, various experiments of this kind have been exhibited by different observers, which prove that medicinal substances can thus with safety be employed.

Treatment of imperfect reaction.—Of those who resist the fatal influence of Cholera poison in the stage of collapse, a large number yet fall victims to its protracted effects; probably half the cases prove fatal after the first forty-eight hours of severe symptoms belonging to this category.

We may, therefore, infer that much care is required during the early period of reaction, since circumstances, in themselves apparently trifling, may at this time determine the issue. A strict observance of the horizontal posture, moderate external warmth, stimulating applications to the extremities, region of the heart, or epigastrium, and the administration internally of diffusible stimuli in small quantities, with the free use of ice, cold water, and other diluents, appear to constitute the principal part of the treatment as far as it is yet determined.

The cerebral oppression and delirium of this period are probably due to exhaustion and asphyctic condition of the capillary circulation, the blood being imperfectly aërated and deficient in water. The state of the brain

which gives rise to these symptoms is to be distinguished from that which occurs at a later stage from retention of the urinary secretions. It is not benefited by local or general depletion, but is slowly removed as the circulation is established.

Treatment of Consecutive Fever, or Uræmea.—The fruitless search after specifics, which occupies the mind in the preceding stages of the disease, is now tacitly given up, and we are content to be guided by the pathological indications, as in other diseases. But whilst our attention is directed to the local and more tangible complications, it must not be forgotten that they are effects of an agent which has remarkably depressed the whole of the vital powers, and, consequently, rendered necessary modifications in the activity of the measures otherwise adapted to their removal.

The real important indication for treatment is the depuration of the blood from the urinary excretions. The condition following collapse is favourable to their retention—viz., the blood is of high specific gravity, the circulation is embarrassed, and the lesions of the kidneys are frequent.

The treatment must include such as allay irritability of the stomach and promote absorption, restore circulation, and remove the lesions of the kidneys. Of these may be enumerated the use of ice and cold water, effervescing draughts, or weak solutions of the alkaline salts; the warm bath, emollient enemata, dry cupping to the loins, and counter-irritation over the stomach.

Stimuli are sometimes necessary for the purpose of counteracting the nervous depression; but their em-

ployment whilst the system is poisoned with urea obviously requires careful regulations. Stimulating diuretics, as squills, cantharides, &c., are not adapted to the great majority of cases. The spontaneous occurrence of profuse diuresis, when the intestinal mucous membrane recovers its functions, shows that the matters to be excreted are in themselves quite sufficient to properly stimulate the kidneys, if the conditions favourable to their action be present.

Occasional doses of minerals, followed by laxatives, were found to be useful, probably by quickening the circulation through the liver, and promoting absorption, as well as depurating the blood; but their use is necessarily limited whilst the excretive function of the kidneys is defective.

Muco-enterite.—During the consecutive fever the intestinal tract is frequently, in different parts, the seat of persistent congestion, with diphtheritic inflammation and ulceration. The termination of the ileum is most commonly thus affected, and is the frequent source of the bloody stools observed during reaction. In some rare instances limited sloughs of the mucous membrane result from effusion of blood into the submucous tissue. Such have been observed in the large intestine and in the stomach. The character of the local action indicates a want of reparative power.

The treatment of these lesions is probably that generally employed with success in other forms of gastro-enterite, such as gentle support, ammonia, serpenteria, and a moderate allowance of wine.

Prophylactic or Preventive Measures in Cholera.

This is the most important subject in the consideration of Cholera, and all the points which we shall have to consider should be insisted upon the population of a country by the Government when that country is threatened by Cholera.

During the outbreak of 1865, the Public Council of Hygiene and Salubrity of Paris (for the Department of the Seine), published a series of admonitory instructions and recommendations, which are of great value, and of which the following is an abstract :—

1. Tranquillity of mind.
2. Moderate, healthy, and regular nourishment.
3. Clothing which will prevent exposure to sudden transitions of temperature.
4. Free ventilation of dwelling-houses and avoidance of overcrowding.
5. Avoidance of physical and mental fatigue.
6. Attention to the earliest symptoms of Diarrhœa.

The instructions thus continue :—"It may be affirmed that, with rare exceptions, however sudden the attack may be, the Cholera is yet preceded by symptoms which may induce fear as to its development. The commonest of these symptoms is Diarrhœa, however slight ; and such is its importance that the removal of this symptom immediately on its development will suffice to prevent the malady. It would, therefore, be dangerous to let the Diarrhœa continue; and, consequently, as it may be arrested by very simple means, they may be resorted to before the arrival of the doctor, who ought always to be

sent for without delay. Those means are the following: —Partial or complete abstinence from food; the use of rice and its preparation; an infusion of camomile tea, and copious injection with a decoction of marsh mallow and unprepared starch."

When there are symptoms of Cholera, such as watery diarrhœa, vomiting, cramps, coolness and blueness of surface, &c., the following recommendations are given:—

"The instant any of these symptoms show themselves, a physician must be sent for; and, while awaiting his arrival, the means adopted must be the following:—The skin should be heated, and warmth obtained by placing a bottle of hot water, or heated bricks wrapped in sheets, at the feet of the patient and between the legs. He must be covered up in warm sheets and several blankets, between which hot irons, or a warming-pan, should be agitated up and down, so as to act upon the whole surface of the body. While these steps are in preparation, or even in progress, the limbs should be rubbed for a considerable time with force with the palm of the hand, a soft brush, or a piece of flannel—which latter may be moistened with camphorated brandy, brandy alone, or Eau de Cologne —and these should be done by two persons seated at each side of the patient, taking care not to uncover him. The drink given should be a hot infusion of linden tea, or peppermint tinctured with a few drops of brandy. Should these issues, however, appear to increase the vomiting of gaseous water, ice in small pieces may be advantageously resorted to, and sinapism drawn over the legs and thighs. It will always be well, if possible, to let the patient lie in a separate room, so as to place him in the

most favourable condition for salubrity. The precautions to be taken during convalescence will be intimated by the physician who may be called in."

Dr. Clark, of the 84th Regiment, anticipating the Cholera outbreak in Malta in 1865, drew up the following series of suggestions for the guidance of the officer commanding:—

"1. Perfect cleanliness of barracks and immediate neighbourhood.

"2. Careful inspection and purification of drains, privies, and ash-pits.

"3. Ventilation of barrack-rooms at all times, and airing of beds and bedding, with rubbing and brushing of walls and floors every second day.

"4. Care in selection of vegetables for consumption, and discouragement of eating ices.

"5. Use of Cholera-belts.

"6. Hot coffee to be issued to each man before leaving quarters in the morning; men suffering from Diarrhœa to go to hospital at once.

"7. Troops to be prohibited from visiting infected neighbourhoods.

"8. On Cholera appearing amongst any portion of the barracks then occupied, the same to be vacated at once, and the force attacked to be moved into other barracks, or camped out."

On August 31st, 1848, the following instructions were issued under authority of the Secretary-at-War, by the desire of the Director-General of the Army Medical Department, which is of great importance to medical officers serving in the army. It sets forth that: "These regula-

tions are to be in general orders, and are to be observed as such by all persons to whom they may apply. None of them are to be modified or disregarded, unless special reasons shall exist for so doing, and even not then without the consent of the Director-General—unless the delay which would be necessary to obtain that sanction were likely to be the occasion of injury either to individuals or the public. In the event of there being reason to anticipate the latter, the alterations considered necessary may be effected, but their nature and extent must be immediately reported by the medical officer who adopts or advises them."

When Cholera shall have been officially reported to be prevailing in the country, but distant from military stations, the following instructions are to have effect:—

1. Medical officers will exercise more than common vigilance in the discharge of their professional duties. They will devote more than ordinary attention to the interior economy of their corps, the constitution of the men, and to every circumstance however remotely affecting their health. They will be expected to be cognisant of every military arrangement involving the health of the troops, and to put themselves in communication with their commanding officers in any alteration of arrangement in the ordinary duties, which they may consider beneficial or likely to afford greater security.

2. Every possible precaution must be taken to guard against intemperance, crowding in small ill-ventilated rooms, use of unwholesome food, deficiency of clothing, bedding, fuel, &c.; and, if found to exist, measures must be taken to correct or remove them.

3. Medical officers are to attend the ordinary parades and observe the health of the men, without exciting suspicion.

4. Great attention to personal cleanliness is to be enjoined, and the men cautioned carefully to avoid unnecessary night exposure and damp, and to change their clothes when wet.

5. Special care is to be observed in the cooking of vegetables, and lamb, pork, and stale fish interdicted.

6. Roasted or baked meat is to be provided twice a week instead of boiled meat.

7. Drains, dust-holes, privies, and the removal of accumulated filth are to be specially attended to.

8. The barrack bedding is to be aired daily, but not in the open air in winter; and great caution to be observed as to the perfect dryness of fresh supplies.

9. As attacks of the disease seem to be frequently determined by exposure to wet, damp, unusual intemperance, and other irregularities, every means should be taken to prevent those.

10. At this period all ailments, particularly Diarrhœa, require the strictest attention; and the commanding officer should explain to the men the importance of immediately reporting themselves when they feel in any way unwell.

11. Where there is any suspicion of the approach of Cholera, immediate steps are to be taken to establish a separate ward in hospital, to which every case not strongly marked is to be sent on admission.

12. An abundant supply of hospital bedding, dresses, and medicine is to be kept in readiness.

When the disease has appeared among the military of a station, or the inhabitants in its immediate vicinity.

13. The avoidance of all unnecessary alarm cannot be too strongly enjoined; and it is hoped that medical officers, by their own example, will endeavour to allay apprehension in those suffering from, or in any way connected with, the disease.

14. On the appearance of Cholera in a corps, health inspections are to be made at morning and evening parades, and a daily inspection of every individual attached to the regiment.

15. Each soldier is to be provided with two Cholera-belts, as part of his necessaries. Flannel waistcoats, if thought necessary for individuals, are to be provided at their own expense.

16. Married men (if out of mess) should each be provided with a ration the same as the single men; and it is also desirable, in barracks in which the disease exists, that the women and children should have sufficient and regular meals.

17. Soldiers should be cautioned against intemperance; and drunkards, and all men of weakly or susceptible habits, should be limited to a certain quantity of liquor, at the discretion of the medical officer.

18. As a precautionary measure, but particularly in infected localities, drills, parades and duties generally, shall, as much as is consistent with discipline, be reduced to favourable hours and weather chosen for them; but above all, the number of sentries, especially at night, should be diminished, so that in no case should the men have less than three nights in bed.

19. Good fires are to be provided in the barrack-rooms, to increase ventilation, and to diffuse cheerfulness—which last should be promoted in every way.

20. Coffee or warm drink is to be provided for the men before morning and night duties; a hot evening meal enforced, and breakfast, if possible, supplied at the usual hour to every man before leaving his barrack-room.

21. In the event of the appearance of Cholera among the civil population in the neighbourhood, the troops should be confined to barracks and all intercourse prevented. When the disease prevails in a corps, it may be found beneficial to encamp it—a proper site being selected for the purpose.

22. During confinement to barracks, the minds of the men should, as much as as possible, be amused and occupied, and under proper regulation, occasional marches into the country, and foot-ball or other games in an adjoining field permitted.

23. Officers' servants are to lie under the same restrictions as others, and no person from the town to be admitted into barracks.

24. If practicable, a considerable reduction of the numbers in barracks should take place, as well to ensure a purer atmosphere and more thorough ventilation, as to make room for the accommodation of women and children, and if necessary, for a temporary hospital or observation ward. Over-crowding under any circumstances is to be avoided—great attention to cleanliness and ventilation, and the floor and passages dry rubbed—not washed.

25. Personal washing and that of clothes is to done in

sheds or store-houses appropriated for the purpose and not in the barrack-rooms.

26. The quality of the beer to be used by the soldiers is to be ascertained by a competent person, and the acid in porter or ale, corrected by chalk or carbonate of soda.

27. Where Cholera is present in the neighbourhood, the women and children are to be accommodated in barracks, or aired houses in the vicinity, and to be put under similar restrictions as to intercourse. When this cannot be done, soldiers with their families who are permitted to live out of barracks, are to be excluded therefrom, or placed in a temporary barracks until it is considered safe to admit them—their quarters during this separation being frequently inspected.

28. Where a house is hired for the women, they may be required to pay the usual rent, and coal supplied by Government at prime cost.

29. Diarrhœa, either as precursory, co-existent, or prevailing by itself should, as a measure of safety, be regarded as closely allied to Cholera; and where bowel complaints prevail in a corps stationed in an infected district, a square room should, if possible, be set apart for the accommodation of the healthy: any room thus vacated must be whitewashed, cleansed, and fumigated, so as to be ready for any similar occurrence. This applies still more strongly where Cholera actually exists in a corps. Cases of common Cholera are to be removed to the observation ward.

30. The regimental hospital is to be appropriated to the treatment of Cholera, and the ordinary cases of sickness accommodated in barracks; or when this cannot be done,

in a hired house; the authority of the Director-General for the latter arrangement being previously obtained.

31. The appearance of Cholera in places where troops are stationed is immediately to be reported to the Director-General, without waiting for its being officially announced by the local Board of Health.

32. From the moment that a case of common or spasmodic Cholera occurs, a daily report is to be forwarded to the Director-General until further orders.

33. A full report of each case among the troops, with details of previous habits, intercourse, diet, exposure to cold, wet, &c., and other particulars, is to be forwarded to the Director-General until further orders.

34. Daily reports of the progress of Cholera among the civil population where troops may be stationed, will be required from medical officers.

35. Cases among women and children in barracks are to be admitted into hospital, those in quarters to the civil hospital under such regulations as may be adopted in parishes; for the former a separation ward, or barrack-room is to be held in readiness.

36. Cases among those specified in the regulations as entitled to medical attendance to be admitted into hospital.

37. Medical officers are to visit their hospitals frequently, and to state the hours of visit in the monthly sick report. They will be required to be always available for any sudden calls of the service, and when Cholera prevails in the corps, are not to leave the barracks except on imperative duty.

38. Smoking permitted to those habituated to it.

39. Corpses are to be removed to the dead-house

without delay, buried as soon as possible, and conveyed in a covered cart—not on men's shoulders.

40. *Post-mortem* examinations not to be discontinued, but performed under such modifications as the occasion will readily suggest.

41. Bodies of patients dying of Cholera to be sprinkled with chloride of lime, and some of the powder should be put into the coffin.

42. Medical officers are not to visit civilian patients in town, and are to conform to the regulations and instructions as other officers.

43. In infected places Divine service should preferably be performed in barracks, instead of marching the troops to church.

44. The old clothes of recruits are to be washed and fumigated; or if necessary, destroyed and new clothes issued.

45. The clothes and beddings of Cholera patients are to be immersed in cold water for forty-eight hours, then washed and steamed in boiling water, and dried in the open air.

46. The place whence a patient is taken is to be thoroughly washed, the bedding and bedstead removed, and fumigation made by chlorine gas, if possible, if not, by nitric acid gas, or fumes of vinegar.

47. The barrack bedding is to be removed with Cholera or suspicious cases to the hospital or observation ward.

48. Provisions brought from town should be delivered at the barrack-gate.

49. Deserters, recruits, and men from escort or furlough,

on rejoining, should be separated from the other soldiers for a period varying from seven to twenty-one days, according to the circumstances.

50. Attention is called to Her Majesty's Orders in the Book of Instructions for Regimental Hospitals, on contagious diseases, extraordinary sickness, inspection of barracks and quarters, ventilation and fumigation.

51. For the purification of drains, privies, clothes of recruits, &c., chloride of lime will be issued by the Ordinance Department, on the requisition of the commanding officer.

52. Bearers are to be applied for to the Ordinance Department, and a horse and covered cart hired for the conveyance of the sick, should the distance from the hospital require it.

In India, the General Order of Sir Hugh Rose, Commander-in-Chief, has been in force since 1862. (Quoted at length by Martin).

The instructions of the Secretary of State for War to commanding medical and other officers of the Army for their guidance at a time when there is reason to anticipate an outbreak of Cholera, or when it is actually prevalent among the troops, published in September, 1866, will be found in page 298 of the author's work on "Climate of Western Africa, and Hints for Europeans in Tropical Climates."

Dr. Baly laid down the three following considerations as of paramount importance when considering the means by which the onward progress of Cholera may be stayed:—

1. The undoubted influence of locality and of the

sanitary condition of towns and dwellings, on the degree of severity with which the epidemic visits them.

2. The equally certain influence of season and temperature, together with some unknown condition of the atmosphere, on the general prevalence and rate of extension of the epidemic.

3. The share taken by human intercourse in determining not only the progress of the epidemic, and the direction of its advance across a continent, but also its extension from continent to continent, and most probably its communication from one town to another in the same country, and from one locality to another in the same town.

Under the first consideration, he recommends the improvement of the drainage in low parts of the town, the opening of close courts, the thinning of buildings in the more crowded parts, the putting a stop to the burial of the dead in large cities, the keeping of even the smallest sheets constantly free from filth, the covering of drains and sewers, and the abolition of cesspools, and other sources of foulness in the air and soil, by improving the dwellings of the poor in respect of ventilation, giving them the means of maintaining a due warmth in their rooms, without excluding the external air, promoting the general substitution of good water-closets for open privies, in inculcating cleanly habits among the poor, and affording them that most important requisite—an abundant and constant supply of good water, by means of which they may attain cleanliness; by adopting these measures, it cannot be doubted that the ravages of the disease would not only be lessened among the people

dwelling in the localities thus improved, but also greatly weaken the force of the epidemic over a far wider space. These measures should be taken by the authorities before the visitation of the pestilence.

Under the second consideration, he thinks the most efficient means of destroying the Cholera poison is free ventilation, especially in winter, as there is every reason to believe that in fresh cold air the poisonous matter soon becomes inert. He recommends the removal of all obvious dirt, "and the thorough cleaning of every surface of wall, floor, or ceiling with the unsparing application of lime and of disinfecting fluids, the washing of furniture and exposure of it to the open air, the destruction of foul clothes, even of those worn by the inmates of the house who are yet healthy, as well as of those which belong to the sick; all these measures might reasonably be enforced during winter, since at that season so great a result as the entire eradication of the pestilence, might possibly be attained;" it must be remembered that if Cholera be maintained in only a single district throughout the heavy tropical rainy season, or the winter and spring months, there is a great probability of its ultimately increasing in that district, and then spreading widely in the ensuing dry season or summer, in spite of all efforts to restrain it.

The spread of an epidemic of Cholera is mainly dependent on human intercourse; and the means by which it is carried from one country to another are—foul ships and barges, in which there are a want of cleanliness, defective ventilation, and overcrowdedness; by bodies of troops; by dirty vagrants, by foul clothes. Means should be adopted for inculcating and enforcing attention to clean-

liness and free ventilation in the whole mercantile marine; the special application of measures of this kind to ships coming from ports where Cholera prevails, as far as practicable, is imperatively called for.

Dr. Baly recommends the four following measures to be adopted on the arrival of ships having persons ill of Cholera on board, or having had deaths from that disease during the voyage:—

1. The removal of the sick to a hospital-ship moored at a distance from the other shipping in the harbour, or to a special hospital in an isolated and airy situation on shore.

2. Permission to the rest of the crew to land after exchanging their dress for fresh clothes provided from the shore.

3. The thorough exposure of all articles of dress and baggage to the air, and disinfecting agents before they are removed from the ship.

4. The thorough cleansing of the ship itself, with the free use of disinfecting agents in every part of it, but especially in the parts occupied by the crew and passengers or their baggage.

B.—VISCERAL DISEASES.

I.—ORGANIC DISEASES OF THE LIVER.

1.—HEPATITIS.

Next to paludal fevers, diseases of the liver form the most frequent pathological lesions observed among Europeans, and even natives in tropical climates. Almost all the tropical diseases are more or less connected with some morbid state of the blood, and the liver, receiving such a large quantity of that fluid for elaboration and transformation, necessarily receives these morbid poisons, and consequently suffers materially whenever the system is affected by these diseases. Liver complaint is thus a frequent and constant pathological lesion in all paludal fevers, tropical indigestion, Diarrhœa (especially the chronic form), Dysentery, and Cholera (as an after effect). It behoves us, therefore, in the treatment of any patient in the tropics always to examine and watch carefully the changes which might be going on in this important organ, so that we may be able in time to detect any diseased state, and prevent more serious injury.

I shall now describe one of the most troublesome diseases of the liver, which, if early treated with adequate

means, can be speedily cured, but which, if left for any length of time, not only places the life of the person in jeopardy, but entirely ruins his future existence—I mean *Inflammation of the Liver*. In former years this disease committed great havoc amongst Europeans in tropical climates, but at present much greater care is exhibited by persons who visit the tropics, and the nature, mode of prevention, and therapeutic treatment of tropical diseases are much better understood by physicians now than formerly, so that we very seldom meet with those formidable cases which writers of former years have detailed.

Symptoms and Progress.

The symptoms of inflammation of the liver are in many cases obscure and very insidious; but in other cases, they are very urgent, and call for immediate attention. This difference is dependent on the seat and degree of the inflammation: when it is acute and situated on the superficial or peritoneal portion of the liver, the symptoms are almost always well marked and urgent; but when it is deep-seated and in the parenchymatous structure, the symptoms are less severe; in the chronic form of Hepatitis they are very obscure.

There are two general forms of hepatic inflammation which we shall describe, they being constantly observed in the tropics—viz. 1. Acute Hepatitis, divisible into *Perihepatitis* and *Suppurative* Hepatitis. 2. Chronic *Diffused* or *Interstitial* Hepatitis.

Symptoms and progress of Perihepatitis.—This disease is generally found among soldiers and sailors, or persons

leading a very loose life, who, after a hard day's drinking and exposure to the solar heat are sometimes picked up in the streets in tropical towns exposed to the damp and chill of the night air. When thus brought on, the symptoms of the disease are sufficiently diagnostic—the patient complains of shivering, rigour, sense of cold, and constriction of the skin, tension and oppression referable to the right hypochondriac and epigastric regions, accompanied with difficult respiration, and pain described as very sharp, acute, and severely lancinating, especially when the peritoneal coat is involved; pain is also complained of in the right shoulder, which sometimes extends to the wrist, no change in the volume of the liver, but a feeling of fulness and weight.

Symptoms of severe pyrexia now show themselves or supervene the local disorder; the stomach becomes irritable, nausea and vomiting come on, the tongue is loaded, thirst is severe, breathing heavy and oppressed, the eyes and skin of a dusky sallow or yellowish condition, skin hot, dry, and constricted, and the pulse much accelerated.

There is often a short dry cough, and occasionally the patient complains of great difficulty of breathing; the bowels are very often loose, the evacuation of an unhealthy character, containing either a deficiency, an excess, or a vitiated supply of bile, but generally it is of a pale muddy consistence, sometimes, however, the bowels are constipated; the vomited matter is generally bilious, but occasionally it consists of mucus and the ordinary contents of the stomoch; the urine is high-coloured, scanty, and sometimes contains bile.

The disease runs but a brief course, the spirit is very much depressed, and sometimes an hypochondriacal state of the mind supervenes. After continuing for a week or ten days, the patient gradually returns to his former health, but more frequently suppuration takes place, and more urgent symptoms supervene. These severe symptoms of the disease, if seen early, as is always the case, yield very readily to active and proper treatment; but care must be taken that the inflammation is thoroughly subdued before we relax our treatment, as the disease is prone to terminate in suppuration or Chronic Hepatitis.

Symptoms and progress of Suppurative Hepatitis, or inflammation of the glandular or parenchymatous structure of the liver. In this form the inflammation might be circumscribed, attacking only isolated patches or may be diffused throughout the whole organ; in either case, the symptoms are not so formidable as in the first variety; and there are cases where it is difficult to tell the mischief that is going on; there is a sort of sub-acute deep-seated inflammation without any very active or urgent symptoms, the patient only complains of being out of sorts, and might only say that he is suffering from "slight liver." But sometimes the symptoms are well marked, especially when the whole of the organ is involved, although not urgent; there may be moderate feverish symptoms, the pains not very severe, but obtuse and aching, stationary or diffused, or there may be no pain at all, but epigastric uneasiness, or it might only come on in fits. The urine is scanty, and very much loaded with bile and albumen of a brown colour, and smells of sulphuretted hydrogen; the skin and conjunctiva are of a yellow colour, and the

liver much enlarged when examined. At the commencement of the disease, the peripheral portion of the organ is infiltrated with "grey matter, and a juice or serum, rich in albumen, flows from the cut surface of the gland, and the capsules are rough and opaque;" in some cases, especially where the liver is only congested, without any destruction of glandular cells, the quantity of urea in the urine is normal, but when suppurative inflammation of a severe form has affected a considerable portion of the liver, producing withering and obliteration of the liver-tissue, the quantity of urea is much diminished, and the quantity of albumen which the liver-cells ought to have converted into that substance is very much increased in the urine.

It is not very difficult in many cases to tell the situation or *locale* of the inflammation, although sometimes the precise spot may be wrongly guessed at. When there is much cough during the disease, with difficulty of respiration, the inflammation is likely to be in the convex portion of the liver, from which it can very easily extend to the diaphragm and lungs; when there are gastric symptoms, with nausea and vomiting, the inflammation might be traced in the lower surface of the left lobe; and when the intestines sympathize greatly and there is Diarrhœa, the under surface of the right lobe might be presumed to be affected.

When the inflammation is in the substance of the liver, its position might be ascertained by the pain and tenderness—inflammation of the right lobe occasioning pain and tenderness in the right side, and pain in the right shoulder; if of the left lobe, there is pain

and tenderness in the epigastrium, and pain in the left shoulder.

The pulmonary symptoms predominate when the inflammation is limited to the upper portion of the liver, and the intestinal when to the lower; and if the left lobe be much affected, the stomach suffers. According to Mr Twining, a greater tension of the right rectus muscle than the left, or of other parts of the abdominal parietes, indicates a tendency to inflammation and abscess in the substance of the right lobe; and when there is abscess in the left lobe, he observed a similar condition in the left rectus.

Symptoms and Progress of Chronic Diffused or Interstitial Hepatitis.—This form of Hepatitis is synonymous with cirrhosis, and occurs principally among old topers —men who have been long in tropical climates, and are hard drinkers; it is frequently an original disease in the tropics, coming on after frequent attacks of malarious fevers, or after long exposure to malarious poison succeeding diseases of the spleen, at a time when the organ is constantly subjected to the irritating effects of alcohol. In these cases its course is very insidious, so that it may produce a permanent injury on the constitution before detected: it is sometimes a sequela of Acute Hepatitis. When it occurs in the former case, it appears in the form of Dyspepsia, with heartburn, constipation, and flatulence; and when the liver is put under the process of manual examination, it is found to possess some tenderness, by which the nature of the disease might be detected.

The symptoms most characteristic of Interstitial Hepatitis are uneasiness in the region of the liver, with a sense

of weight, fulness, and tenderness on pressure; the stomach is disturbed, its action feeble; sometimes there is vomiting, at other times only nausea; the epigastric region is tender and distended, and there are in severe cases hæmorrhages from the stomach or intestines; the bowels irregular—either constipated at first, or the alvine evacuation is disagreeable in odour and irregular in substance; it is generally distended with flatus, the increase of which produces great difficulty in breathing; the taste in the morning is disagreeable or bitter, the tongue is loaded; there is generally a short dry cough, and the patient suffers from general emaciation; the skin and conjunctiva of the eye are of a yellowish hue; the urine bilious, acid, and high coloured; and in some cases, when passed through the urethra, it causes pain; the liver, which at first was enlarged, is now reduced in size, or atrophied, at which time the whole system becomes jaundiced, and the vessels of the abdomen enlarged. The individual may die from exhausting diarrhœa, from pulmonary inflammation, acholia, or peritonitis.

When Chronic Hepatitis, unconnected with alcoholic irritant, is the sequela of Acute Hepatitis, it generally ends in suppuration; its chief seat is in the substance of the liver. Sir R. Martin, describing the features of this form, says, that the "disease is sometimes preceded by a perceptible falling off in the general health, such as emaciation, dry cough, and embarrassed respiration, loss of appetite, the complexion gradually assuming a muddy, sallow hue; but it more generally comes on in the midst of apparent health. We seldom, indeed, see the patient until inflammation has actually commenced, when he

generally complains of a feeling of abdominal uneasiness, but more particularly of the epigastric region, and that of the liver, with some degree of fever, preceded by slight rigour or ague. But all these symptoms may be so slight as too often to attract but little of the patient's attention. Perhaps he consults his physician on account of *Diarrhœa*, supposed to result from errors in diet; medicine affords some relief, and the patient proceeds in his ordinary occupation for days—or, when the action is less active, for weeks—though under great depression of the mental and corporeal energies, till at length his altered appearance, hacking cough, permanent dry skin, invincible, rough, furred tongue, and morbid taste, all expressive of a suppressed and depraved state of the secretions, attract some more serious notice on his part, and that of his family. The real nature of the disease may still remain a secret to both patient and physician; and it may not be till actual tumour of the liver, a marked succession of rigours, or profuse and clammy sweats, announce in unmistakable terms the formation of abscess, that either party becomes awake to the impending danger; and then it is too late. A sense of uneasiness, hardly amounting to an obtuse dull pain, a sense of weight and oppression, may, or may not, exist in the region of the liver, according as the disease is centred more or less deeply in its substance or in its upper convexed surface. When the former exists, the symptoms are more than usually obscure and insidious; in the latter case, they are somewhat more of an acute nature. In this form of Hepatitis it is seldom that we discover any pain in the shoulder."

In tropical cirrhotic induration of the liver, the result

of alcoholic irritation, accelerated by malarious poison and exposure, it generally results in atrophy of the liver. At first the areolar framework of the liver becomes much increased, as well as the serous membrane covering it; the hepatic cells are loaded with fat or amyloid degeneration, and ultimately all the glandular structures become destroyed, the functions of the liver impaired and almost suppressed, and the organ itself reduced to a mass of connective tissue.

Pathology and Morbid Anatomy.

In the more simple form of Inflammation of the Liver, manual examination shows that the vertical dulness is increased; instead of being four inches, which is the normal measure, it may increase half an inch or more, according to the degree of the inflammation, especially when it is situated in the parenchymatous structure of the liver. When the inflammation is thus deep-seated, the organ, when removed in a *post mortem* examination, is observed to be more or less congested with blood, soft and rather friable, presenting a granular appearance, and a deep light colour; a clean incision with a sharp knife shows a "light-coloured reticulum, or mesh, studded with red, or brick-red granulæ, and the divided ends of blood vessels and biliary ducts." The inflammation is situated sometimes only in the surface of the organ, which is red or brown in colour, or studded with brick-coloured, greenish-brown spots and streaks, which are sometimes even black. The investing membrane is found to be very vascular and thicker, and at a subsequent stage

covered with a semi-fluid, or thick exudation of coagulable lymph, which afterwards becomes organized, and forms the means of adhesion between the liver and the abdominal parietes. In some cases this coagulated lymph is scattered all over the liver, enormously increasing its size at first, and afterwards it contracts and reduces it beyond the natural size. When the acute hepatic inflammation has advanced considerably, it very often terminates in abscess, either in the substance or on the surface of the liver.

In the *Interstitial Hepatitis,* when the disease has fully developed itself in one who had been accustomed to hard drinking, if the liver be examined at the early stage, it will be found to have increased in consistence, and its connective tissue much developed. The hepatic cells contain fat or amyloid substance ; blood and serous fluid are infiltrated in the substance of the liver. After the disease has advanced for some time, the liver is much reduced and nodulated, the hepatic cells are destroyed and replaced by pigment granules, or the results of fatty degeneration; the connective tissue vastly increases, commencing in the minute ramifications of the vessels ; it destroys the hepatic substance (*acini*), and occupies the whole of the gland substance ; the capillaries of the portal veins are destroyed, obliterated, or compressed, the larger vessels bulging out and narrowed in parts ; the hepatic artery is enlarged, and the capillaries much developed; no change can be discerned in the hepatic veins, and the bile ducts are destroyed.

Causes of Hepatitis.

The first and most important cause of liver diseases in tropical climates is long and continued heat and vicissitude of climate. Where the temperature of the atmosphere is very hot, and where at certain seasons the hot monsoon is very prevalent, disease of the liver is very common. In these places at those seasons the temperature of the air far exceeds that of the body by several degrees; the healthy action of the lungs, therefore, is very much interrupted, their eliminative powers are imperfect, and, consequently, much effete matter circulates in the blood, and the liver and skin are called upon to exert increased action. Whilst in this condition, the least exposure to vicissitude of temperature—such as an exposure to a very high temperature, followed by cold and damp air, or exposure to cold after being heated and perspiring as from a ball room, checks the secretion of the skin and the internal organs, leading at once to congestion of the liver.

This is one of the most fruitful causes of hepatic diseases in tropical climates. "In India in the hot weather," writes Dr. Massy, "the liver and skin eliminate much of the effete matter from the system. The rare condition of the atmosphere, and the diminished necessity for supporting animal heat, where the temperature of the air exceeds that of animals in health, render the lungs much less influential in this respect than in colder climates. The secretion from the skin by sensible and insensible perspiration is very great, it is not easy to determine its

amount. Seguin shows it to be about 33 ounces in 24 hours. In India it would doubtless exceed this in the hot weather. The composition of cutaneous excreted organic matter is not very accurately determined; no doubt, between the sebaceous and watery excretion much organic matter is eliminated. The skin, moreover, in a hot climate, is most powerful in cooling the system from the evaporation of its secretion, during which much heat is evolved from the body. It regulates, in a great measure, the temperature of the system, the amount of secretion being, for the most part, dependent upon the temperature of the air. This is another function of the highest importance in tropical climates less exercised in colder latitudes. The cutaneous capillary circulation is so much increased during the hot season in India, that its effects in the form of prickly heat, boils, and irritation of the skin, especially when evaporation is somewhat checked during the rains, are some of the most tormenting minor annoyances to which the European is liable." The difference in the temperature during the course of the year, leading to difference in the amount and degree of secretory process, is of itself a cause of disease, more or less according to the variety of susceptibility, of the various systems subjected to it.

Writers on climatology agree that the best climate is that in which an individual could bear exposure during the greater part of the day, or greater number of hours at all seasons; the converse of this is equally true. In tropical climates we find it impossible, without incurring great risk, to expose oneself any length of time. The heat is so great, and the temperature undergoes such

fearful vicissitudes, that at one time the secretions are greatly increased, at another time they are much decreased, or torpid. The system is thus subject to sudden irregularities, and Europeans, on this account, are very much subject to the diseases referable to the secretory organs, and even the natives are by no means exempt from these morbid lesions. The excessive and prolonged heat, together with the inactive life and indulgence at the table, predispose the system to congestive and inflammatory disease of the liver.

In tropical climates, hepatic diseases are more frequent at the beginning of the cold weather, and generally run to a dangerous and even fatal form; prior to this state of the weather, the eliminative function of the skin has been carried to a great extent through the great heat; but at this time, being subject to the cold damp air and chills, it becomes less active, and its derangement reacts on the liver; its secretions become much diminished (proved by the whitish or clay-coloured condition of the stool), an insidious sub-acute inflammation is set up, which may terminate in tumid induration, or in abscess. "For seven hot months in India, by night and by day the skin has been throwing off enormous quantities of fluid: so exhausting is the process, that it blanches the European and gives him an anæmic appearance, which seems to be allied in a minor degree to that condition of quantitative deficiency of blood cells, with probable alteration of the fluid portion, as described pertaining in anæmia, but which is quite consonant in this minor degree with health in a hot climate; differing widely from those in whom the quality of the blood is deranged from the proportional relation

obtained in the healthy state, between the red and white corpuscles, in which an undue proportion of the latter prevails, a condition by nomeans associated with health." The system ultimately becomes accustomed to this drainage by the continued eliminative process of the skin, when on return of cold weather, or during the rains, the liver is called upon to sudden and increased action, the result is first, simple derangement of its function, which is apt to be followed by inflammation and other morbidness.

Intemperance in the use of wine and ardent spirits is a very fruitful cause of Hepatitis. I have known cases where, without any exposure to vicissitudes of climate, individuals after a hard life have been attacked with Dyspepsia, acute and severe pain in the right hypochondriac region, extending to the right shoulder, and other symptoms showing inflammation of the liver, which have been subdued by mild purgatives and strict rest. Some have maintained that intemperate habits lead to cirrhosis and fatty degeneration of the liver only, but we often meet with acute or sub-acute inflammation with abscess in persons who are intemperate in the use of ardent spirits; and this is often the case when this habit is accompanied with a sedentary or inactive life.

It must also be borne in mind that the liver is the channel through which alcohol is conveyed by the portal vessels into the system; here the increase of the carboniferous matter acts more as an irritant: it seems at first to increase its eliminative function, as when the skin is less active in the cold weather, this state undergoes a reaction, and the liver falls into a state of torpor; the continued irritation leads to inflammation and its conse-

quences. Of ten cases treated in the regimental hospital at Lucknow, there was a proportion of five occurring in hard drinkers, writes Dr. Massy; four of them were large and powerful men, rarely in hospital, and not more exposed than the other men of the regiment to the influence of the climate. It would seem, he thinks, that spirits borne by the portal veins into the liver, whether separated into the bile or carried on in the circulation, are very irritating to this organ. Even in Europe there are sufficient evidences of the same thing; but in tropical climates their effect is much more marked, which must be due to the peculiar rarefied condition of the atmosphere leading to imperfect action of the function of the liver, and the consequent imperfect oxidation of the blood, thereby calling the liver into greater activity, or the proneness to hepatic disease in tropical climates, and the peculiar tropical condition the liver is always in, render the excessive amount of alcohol irritating and more liable to produce active Hepatitis and congestion. It must, however, be stated, that many hard drinkers in tropical climates have been exempt from either functional or organic diseases of the liver; and when those who are beginning to live a hard life are cautioned against it, a reference is made to them. They are only exceptions to the general rule, for many of these hard drinkers suffer from Interstitial Hepatitis, or amyloid fatty degeneration of the liver; others become the "subjects of Hepatitis and abscess," this latter condition not being found "associated with persistent indulgence in the inordinate use of spirits in temperate climates is reconcilable with the fact of the rarity of hepatic abscess originating in such climates." On men addicted to hard

drinking, abscess of the liver is very frequently the termination of Hepatitis.

Another frequent cause of Hepatitis may be found in miasmatic influence unconnected with any specific cause; this might be the result of successive attacks of bilious remittent and intermittent fevers; in these diseases the blood recedes from its external ramifications, especially during the cold stage, and excites congestion of the internal and important glandular structure, especially those whose functions are principally governed by the sympathetic nerves, the long continuance of which leads to an insidious sub-acute inflammation. The spleen and liver are the organs principally affected in this way.

All practitioners in the tropics must have observed among persons who inhabit places much subject to miasmatic influences, a greater predisposition to derangement of the liver independently of any fever, either of the intermittent or remittent type. The morbific poison seems to have a direct influence or effect on the internal vascular organs; at first the spleen undergoes changes, becoming imperceptibly enlarged; this reacts on the liver, and increases the derangement which the specific poison is setting up. Under the head of Intermittent fever, I have remarked that the action of malaria on the system is to be traced in the sympathetic specially: if this view be correct, its effect on the spleen and liver, which are principally supplied by them, and whose healthy action are dependent on the healthy condition of the sympathetic nerves, can be easily explained. Malaria may, therefore, be assumed to have had a primary effect on the sympathetic nerves in the abdomen, which govern the

functional working of the vascular organs; and their derangement affects these organs—the spleen, liver, pancreas, and the mesenteric lymphatics.

Various other causes, which might occasionally be met with in tropical climates may be the cause of Hepatitis, such as the presence of gall-stone, direct injury to the liver, too rich and stimulating diet, the condition of pregnancy, excessive use of mercury, violent bodily exertion, gouty or rheumatic metastises, pyæmia, tropical typhoid, violent mental emotions, either of fear, anger, &c., continued mental depression, suppression of usual discharges, various morbid conditions in other organs, such as diseases of the heart or liver impeding the circulation of the blood, diseases of the stomach and intestines, tumour pressing on the ductus communis choledochus, sedentary habits, certain disease of the brain, and over-active circulation in the stomach and bowels.

Diarrhœa and Dysentery have been regarded as among the principal causes of inflammation of the liver leading to the formation of abscess; to this point I shall again refer, when we come to the subject of abscess of the liver.

Hepatitis appears in every age, but it is less met with in females and children; in the tropics they are not so much exposed to miasmatic influences nor to intemperate habits, but cases of Hepatitis which are found among them, especially in females, may be due to too rich animal food or sedentary habits.

Diagnosis and Prognosis.

The symptoms of Hepatitis are similar in many cases to those presented by various diseases, such as inflammation

of the stomach, or rheumatism of the intercosta, or of the right shoulder; it is, therefore, of importance that we should be able to distinguish this disease. Sometimes we meet with neuralgic pain in the liver, so that it behoves us to be very particular in our diagnosis, for should we treat the patient for Acute Hepatitis, we might use energetic means which might materially affect the system without relieving any of the symptoms.

The first diagnostic test we should employ is that produced by pressure upon the under surface of the liver, and this manipulation is effectually performed by placing the patient upon his back with his shoulders elevated and his knees drawn up and the planter surface of his feet resting on the bed so as to relax the abdominal muscles. Beneath the edge of the ribs just push the fingers backwards, then upwards with the points flexed, compressing the liver against the diaphragm. If the liver be inflamed, whether externally or internally, this pressure will produce pain and tenderness. But if on pressing directly backwards the patient complains of tenderness and pain, and none at all when the pressure is directed upwards, we have evidence that there is no hepatic derangement, but that the colon is inflamed.

If the liver be much enlarged and project considerably below the ribs, the application will be found not answerable, as we cannot properly press the organ against the diaphragm, nor will it be requisite, as by pressing backwards we might be able to tell the state of the organ.

Another diagnostic sign is that of the size of the liver. In many cases I have only been able to tell that there is a state of incipient slow inflammation of the liver with

enlargement going on in patients who are suffering from or complaining of Dyspepsia, and residing under direct malarious influences, by percussion; the natural dulness of the liver is about four inches, and any sensible enlargement beyond that size, allowing for individual peculiarities, shows a derangement more or less; the liver I have observed in these cases to be increased in the generality treated to four and a-half and four three-quarter inches in dulness. This dulness might be increased upwards towards the nipple, or downwards below the ribs, or both; it is necessary, therefore, that we should be particular in making out the dulness occasioned by the lungs, which slightly, in the former case, overlap the liver, before we give an opinion.

Again, we must always bear in mind that in rare cases, although the liver might be healthy, it might be found in abnormal positions, thus—it may be pressed upwards in the chest by abdominal tumours or dropsy, and may fall much below the ribs in consequence of relaxation or stretching of the suspensory ligaments. Dr. Wood relates four cases, in which the liver, although healthy in all respects in itself, could be distinctly felt occupying the lumbar regions, and could even be taken between the thumb and fingers of the examiners. In one, the descent could be traced to a very large scrotal hernia, which had existed in early life; in another, it was probably owing to adhesion formed between the lower surface of the liver and the uterus from an injury, and consequent peritoneal inflammation, during pregnancy. In both the symptoms connected as it was with occasional uneasiness in the side and epigastrium, occasioned much

solicitude, which was relieved when the nature of the affection was understood. In his third case, it was in a false position, and was mistaken for abdominal tumour produced by rupture of the suspensory ligament through a fall. In the fourth case, there was a displacement, and when the patient was placed on his back it retired, and the case easily diagnosed. Percussion also will easily give the true significance by detecting the outline of hepatic dulness above and below.

When there is pain in the shoulders, it might either be due to rheumatism or hepatic affection; when the former is the case, the pain is acute and increased, on moving the shoulder, or on application of pressure on the painful part; when the pain is hepatic, it produces a dull aching sensation, unincreased by movement of the parts, but increased by pressure of the liver. Neuralgic pains over the liver might be detected by there being no other signs of hepatic disease, by the individual possessing a rheumatic or gouty diathesis, and by his complaining of pains in one or other of the different joints or fibrous aponeuroses.

Pneumonia of the lower lobe of the right lung might be mistaken for Hepatitis; but this can easily be distinguished, considering the absence of the diagnostic symptoms of the latter—pain on pressure with pain in the shoulder, the absence of yellowness of the skin and conjunctiva, the colour of the urine and alvine evacuation, and by the symptoms which pneumonia presents.

The *decubitus* is also another diagnostic sign of great importance; when a patient is suffering from pneumonia, he feels great pain and difficulty on lying upon the

affected side, but in Hepatitis the contrary is the case; the patient either lies on his right side, or on his back, inclining to the right; or when the disease is very acute, he obtains relief only by sitting up and bending his body forwards. Lying on the left side produces great uneasiness, and a painful drooping sensation.

Auscultation has been recommended as a means for discovering encroachment of enlarged liver on the lung; a loud sound very audible to the patient, occasioning vibration of the thoracic walls, sensible to the hand, is supposed to be due to the thin edge of the lung being compressed by the enlarged liver against the pleura.* The sound is between a crepitant râle and a beating, which Dr. Walshe considers to occur near the end of the act of inspiration.

The prognosis is favourable when the fever gradually abates, the urine and alvine evacuation loaded with bile, when there is plenty of biliary diarrhœa, and free perspiration; but unfavourable, when the fever and pain are intense and persistent, rigours are severe and abscess formed, when hiccup continues, and the extremities are cold.

Results of Acute and Chronic Hepatitis.

In the acute form of the disease, when the case is seen early and brought under judicious treatment, the disease generally terminates favourably in resolution, the febrile symptoms gradually snbside, the enlargement and pain disappear, and the patient is restored. But this is not

---

* Thompson on "Diseases of Biliary Organs."

often the termination, the acute form might persist in the midst of all treatment, and then results in simple Chronic Hepatitis, which might ultimately yield to proper remedies; this is most frequently the case in tropical climates when the patient is still subject to the influence which makes the system liable to the occasion of a new attack.

When acute inflammation is caused by dysentery, pyæmia, and other poisons, it terminates almost invariably in suppuration, forming either diffused or circumscribed abscess, in diffused Chronic Hepatitis and cirrhosis, in induration or other organic changes, sometimes even in gangrene.

Simple chronic might result in resolution, in permanent enlargement or induration, and sometimes in contraction; it sometimes proves fatal by wearing out the strength and interfering with the general function of the organ; diffused Chronic Inflammation of the Liver or Interstitial Hepatitis generally terminates in cirrhosis.

Treatment of Hepatitis.

The treatment of hepatitis, both in the acute, simple, chronic, or diffused chronic form, is of very great importance in the consideration of liver diseases of tropical climates; both promptitude and caution is requisite in every case. I have seen a great many cases, coming early under treatment, recover completely without any injurions effect on the system; but others again, I have seen which by a slight deviation in the prescribed diet and regimen, got severe relapses, and the disease terminate in fatal abscess; it is necessary, therefore, that the

physician should carefully explain the danger the patient is liable to, if his directions are not followed, and should lay down stringent dietetic rules for his guidance.

Treatment of Acute Hepatitis.—The indications are to reduce the existing inflammation, and this is fulfilled by the use of—

1. *Purgatives.*—It will be found that cologogues followed by a brisk saline purgative, are the most desirable in the commencement of the disease; they act by relieving the portal veins of their engorgement, and also by their revulsive action on the liver; full dose of *colocynth* or *rhubarb* with two or three grains of calomel either in powder or pill should be administered, followed in half an hour or an hour's time by a brisk saline purgative, such as *sulphate of magnesia* and *senna,* or the *bitartrate of potash,* or a full dose of Lamplough's Pyretic Saline. When the bowels have been constipated before the attack, and are obstinate, *one grain of Podophyllin resin,* with *three of rhubarb* and *one grain of extract of hyoscyamus,* I have found to be preferable; it might be followed by a saline, if necessary. In former years we find that writers on therapeutic medicine regard mercury as the panacea of almost every disease. "Calomel," writes Sir R. Martin, "assists powerfully in draining off accumulations, and in promoting increased secretion, that it proves of such value in aid of blood-letting. It is, in fact, by the double action of purging and increasing secretion at the same time, that calomel relieves the loaded and inactive vessels of the diseased gland; not to speak of the other acknowledged physiological influences of this mineral, such as its increase of all the secretions

and excretions of the body, its influence on the capillary circulation, its febrifuge effect, the peculiar specific power ascribed to it by physicians and surgeons, as an antagonist to inflammations, whether general or local, its stimulant power over the absorbent functions, its power of unloading at the same time that it gives new impulse to the vascular system, its peculiar power in removing viscid and tenacious intestinal secretions, its antiphlogistic, solvent, and alterative effects on the blood, these are the actions and uses ascribed to mercury by the ablest British practitioners and authors." But of late years, actual experiments on the effects of mercury in the secretion of the liver do not bear out the statement that it has a specific effect in increasing its flow; on the contrary, they prove that the secretion was evidently below the normal quantity after its administration, and for some time afterwards. In anæmic Europeans, who have lived for a long time in tropical climates, the free use of mercury is positively injurious to the system, and should be as much as possible avoided; but in healthy European soldiers or sailors it is of service in small doses to follow local depletion, after the first violence of the acute inflammation has been subdued. When it is ascertained that the liver is congested as the result of the inflammation without the formation of pus, small doses of calomel in combination with opium at bed-time are very serviceable in favouring the absorption of the effused liquid; but when pus has formed, the use of mercury is wholly counter-indicated.

2. *Blood-letting.*—This is an important remedy in the treatment of Hepatitis, but unfortunately it has been sadly abused; it might be applied both locally and generally.

In constitutions which have long been under the deteriorating influences of tropical climates, I deprecate the employment of the latter form, as it may lead to permanent injury; general blood-letting, in tropical climates, should be avoided as much as possible, except in cases of Traumatic Hepatitis, and in robust, plethoric persons, where there is great tenderness, with enlargement of the liver, and urgent Dyspepsia. But I have had cases where the reduction of the system by general depletion would have been most injurious, but where local and timely blood-letting by the cups, followed by blisters, have had the most desirable effect. I prefer local depletion by the cups or leeches, especially the former, than to take blood from the arm in the treatment of Hepatitis in tropical climates; the result I find to be immediate on the affected part, with less exhaustion to the system; the pain much reduced, the tenderness and weight much relieved; and the patient rapidly recovers, should the treatment commence early, and the patient be strictly forbidden to indulge in much food and wine. The local depletion should be followed by two or three grains of calomel and opium at night, and a brisk saline purgative in the morning.

But there are many eminent physicians in tropical climates (East and West Indies), who recommend powerful general depletion. Sir R. Martin says, that when there are no symptoms indicative of suppuration, general blood-letting, repeated as symptoms may demand, should be had recourse to, and be used copiously, according to the age, health, and length of residence of the patient in the tropics, particularly India; he regards the only

criterion of adequate loss of blood in the sense of local and general relief with softening of the skin. A full dose of ten grains of calomel, with five of James' powder, he recommends to be administered at bed-time, after the general blood-letting, followed early in the morning by strong saline purgative or a full dose of compound jalap; "this course should be pursued," he continues, "using leeches to the sides, mercurials with antimonials, purgatives and diaphoretics, with diuretics daily, so long as they are called for by fulness or tenderness of the hepatic or epigastric region."

Dr. Cameron, in a paper published in the *Lancet*, recommends in acute inflammation of the periphery of the liver, or in acute parenchymatous congestion, bleeding in the recumbent position, "not to any ideal limit, but till the patient either faints or till he can breathe with perfect freedom, lie on either side, and bear pressure; look not to the quantity," he writes, "but to the effect; never fear syncope, it will do good rather than harm." The circulation having been thus reduced and the liver emptied, he keeps it so by cutting off all fluids that can possibly be abstained from; limiting the patients to four ounces of tea morning and evening; should pain return, he recommends bleeding again and again, rather than leech. The bowels should be kept constantly loose by a combination of rhubarb, neutral salts, and colchicum.

3. *Diaphoretics.*—Diaphoretics are excellent in almost every case, and they are very usefnl adjuncts after cupping or leeching. In the tropics, Hepatitis is accompanied by more or less febrile symptoms, and when the disease occurs in individuals who are or have been much exposed

to malarious influences, I have always seen powerful results obtained when the diaphoretics are mixed with quinine. The following is the prescription I often employed:—

℞.—Quininæ disulphas	gr. iv.
Pulvis antimon. potas-tartratis . . .	gr. iij.
Pulvis rhei co.	ʒj.
Pulvis zingiberis	gr. vi.
Potassæ nitras	ʒj.

Misce—divide in pil. xij., made up with gum liquid.—One to be taken every half hour.

When the disease is of recent date and uncomplicated, this remedy is of very great service, even without the use of cupping or leeching, although when employed in conjunction, it is beneficial. Blistering the hepatic region or painting with strong iodine paint should always be resorted to. The rationale of this treatment is the following:—the quinine puts a stop to or quiets any malarious influence that may tend to keep up the inflammation in the system, lowers both the pulse and the temperature, and thus favours resolution; the tartar emetic increases the secretion of the liver, assists in lowering the temperature and keeping the skin cool by causing sweat without vascular excitement, increases the secretion of urine, and has a sedative effect on the nervous system; the rhubarb keeps up a mild but regular drain, and favours the use of a more moderate saline purgative; the nitre has a diaphoretic, diuretic, and slightly purgative effect, and it is also said to possess an antiphlogistic effect on the blood diminishing its fibrine.

In India, Mr. Cutcliffe, civil surgeon, in Meerut, gives

the following diaphoretic powder in acute uncomplicated hepatitis :—

Antimon. potas-tartrat	gr. ij.
Potas-nitratis	℥ij.

To be divided into eight powders, one of which to be given every half hour until the pain subsides, and then it might be given every one or two hours.

Ipecacuanha in large doses should be given two or three times a-day, from twenty to thirty grains, when there are any dysenteric symptoms, it will be found invaluable; but if the constitution has been greatly reduced by malaria, by intemperance, by syphilis, or by a scorbutic taint, it will be injurious, on account of the powerful depressive effect it has on the system. Its use should be accompanied by free leeching of the right hypochondrium, the quantity of each dose diminished every second day; leeches should be applied to the anus if the symptoms are aggravating; as in the treatment of dysentery its use might be preceded by a small dose of opium, about twenty minims, or mustard cataplasm over the hepatic region and the stomach; ipecacuanha here acts as in dysentery, by quieting and equalizing the circulation; it produces nausea and profuse sweating, and unloads the liver of any quantity of bile that it may possess; aided by castor-oil or other mild purgatives, such as rhubarb, its effect is enhanced.

By this diaphoretic treatment, the hot and dry skin, the accelerated pulse and circulation, the hepatic pains and the general feverish state of the whole system will in a short time subside; and if uncomplicated, in many cases

the patient returns to his former health after a few days illness.

Treatment of Chronic Hepatitis.—Both in the simple and diffused chronic disease, we should as much as possible employ moderate and less energetic means; great benefit will be derived from local blood-letting by cups and leeches, by blisters, and the application of rubefacient lotions and ointment, and by hot water fomentation. Strong iodine paint applied over the liver twice a-day until it blisters, I have frequently used myself with great benefit, and when the pain is persistent and excruciating, a seton placed under the skin is advantageous.

I have found the *nitro-muriatic acid,* either externally or internally, or both, of service; it acts as a powerful tonic, and an alterative of the liver; and when there is evidence of suppuration, its effect is powerful. *Iodide of potassium,* in from five to ten grain doses, three times a-day, acts as a powerful alterative also, but strict rest of the body must be enjoined.

Some physicians recommend the use of mercury in these cases in small and repeated doses, so as to produce a slight and continuous effect on the gums—the blue pill is the form preferred; and when there is constipation, combined with rhubarb or jalap; or when diarrhœa, with opium or Dover's powder. When there is restlessness and opium contra-indicated, it might be combined with hyoscyamus or conium; and when there is acidity of the stomach, it might be combined with chalk or carbonate of soda.

Taraxacum is a good adjuvant with the other treatment, especially when there is a disposition to constipation, and

when the liver is enlarged; it acts as an alterative and resolvent, and as an aperient and tonic. I have often given it in the following formula:—

℞.—Extractum taraxaci	℥j.
Acidum nitro-hydrochloricum . . .	♏xv.
Tinctura cardamomi co.	f ℥ss.
Infusio calumbæ	f ℥ij.
Aqua pimentæ	f ℥iij.

Misce—fiat mistura.—A sixth part for a dose.

Dietetic treatment in Acute and Chronic Hepatitis.—At the very commencement of the acute disease the diet should be low, consisting only of farinaceous and mucilaginous liquids, without wine or animal food until the febrile symptoms, as well as pain and uneasiness in the hepatic region, have subsided, and the biliary secretion restored; and as convalescence advances, the diet should be gradually improved; but the patient should not be allowed to go suddenly to his accustomed habits when in health. When suppuration has been established, the diet should be nourishing and supporting to the strength, but small in quantity, and should consist of milk, soft boiled eggs, broth, &c., with a moderate allowance of animal food.

In the chronic state, the stringency should be slightly relaxed, and nutritious diet, but in small quantity at a time, should be allowed from the commencement. The diet should be principally farinaceous, nutritious, and not stimulating, consisting of milk, light boiled animal food in small quantity, without coffee or spice of any kind.

During convalescence a moderate exercise without

agitation of the liver, and a change of climate, when protracted, are the two last important treatments in this disease.

2.—HEPATIC ABSCESS.

This disease, the sequela of suppurative or violent inflammation, especially of the parenchyma of the liver, forms the most fatal form of tropical diseases of the greatest importance.

Symptoms and Progress.

The symptoms of abscess of the liver are, in the majority of cases, very insidious, and cannot be detected until the disease has involved a large portion of the organ, indeed, there are cases where after death from entirely different diseases, the liver has been examined and found to contain several abscesses, varying in size from a pea to an orange, of which the individual during life has never complained, except, perhaps, of slight disorder of the digestion or dyspepsia.

There are cases in which insidious chronic inflammation is running a course to the formation of an abscess, but where there is not the least symptom manifested in the system that may lead to its detection; nay, the invasion and continuance of structural lesions may go on without any fever, pain, or tenderness to indicate its nature, but merely perhaps a slight feeling of indisposition or uneasiness in the hepatic region.

The symptoms of hepatic abscess, when well marked,

are characterized by rigours, chilliness, or shuddering, occurring at regular or irregular intervals with copious sweat, distinct irritative or hectic fever, increased frequency of pulse, which is soft and weak in character, a furred rough tongue, a throbbing pain over the region of the liver, and a feeling of weight also, copious cold sweat at night, scanty and high-coloured urine, a very feverish and irritable temper, or a depressed state of the mind, decubitus on the right side, great debility and exhaustion. The secretion of the bile may be increased or suppressed, and vomiting of bilious matter may be present.

In many cases there is also to be noticed more or less rigidity of the right side of the abdominal parietes and tension of the right rectus muscle, but this is not an undeviating symptom of congestion with incipient deposit into the texture of the liver, as Mr. Twining affirmed. When the abscess is very extensive, the symptoms are very much exaggerated, affecting greatly the respiration, and producing great restlessness; but when small and circumscribed, these symptoms are seldom noticed.

In advanced stages, the most convincing proof of the existence of hepatic abscess is obtained by examination of the region of the liver. When deep-seated and small, much satisfactory evidence cannot be obtained; but when more superficial, a circumscribed swelling may be noticed, soft and doughy to the touch; or if pus has been formed, and free evident fluctuation manifested, we have an undoubted diagnostic sign.

The tendency of abscess of the liver is to open outwards, especially when it occurs in its most frequented position—viz., the right lobe; it generally makes its way

gradually towards the surface, and if adhesion take place between the hepatic and parietal peritoneum, may be discharged at any point below or between the intercostals near the liver, causing a bulging at first in the intercostal space.

When the diaphragm becomes involved in the inflammation, and the convex position of the liver is the seat of mischief, the abscess may burst spontaneously through that muscle into the cavity of the pleura, occasioning fatal dyspnœa; but this is sometimes prevented by adhesion of the pleura with the diaphragm by the deposit of lymph, in which case, the abscess either pushes its way upwards and forwards and opens between the intercostals, or discharges itself into the substance of the lungs. Abscess of the liver, in these cases, instead of discharging in the substance of the lungs, might, by first causing adhesion of that substance (after it had been rendered a consolidated mass by inflammation) with the pleura, empty itself into the bronchial tubes, causing suffocation or fatal inflammation, or might be expectorated. These extreme cases are seldom met with in the tropics, where the constitution is so easily debilitated and exhausted, that death very soon terminates the sufferings of the patient.

But these are by no means the only modes by which abscesses of the liver find their way out of the system; when situated on or near the lower surface, they may burst into the stomach and so be emptied by vomiting; the patient, at first, would feel as if something had given way, and then be seized with a sudden fit of vomiting, which would greatly relieve him; the vomited matter is generally described as disagreeable, and in some cases,

offensive. Sometimes the abscess opens into the colon or deodenum, or through the gall-bladder into the deodenum, and evacuated by the bowels. Sometimes, through insufficient adhesion between the members of the peritoneum, the abscess opens itself into the cavity, causing extensive peritoneal inflammation and death in a very short time; but these cases are rare.

Pathology and Morbid Anatomy.

In a *post-mortem* examination of the liver after death from hepatic abscess, we may discover abscess either in the parenchyma or on the surface; also more or less adhesion will be discovered between the liver and other parts, according to the situation and progress of the abscess.

When the abscess is situated in the parenchyma, the suppurative inflammation leads to the softening of the substance of the liver, then puriform or seropuriform infiltration takes place, the softened parts become absorbed or remain as dead tissue, and the pus increases and forms itself into an abscess. This parenchymatous inflammation, according to Dr. Budd, "commences in the lobular substance of the liver, and is often confined to it; the capsule of the liver, the trunks, the vessels, and the ducts being perfectly healthy. But if the inflamed part reach the surface of the liver, adhesive inflammation is generally set up in the portion of the capsule immediately above it, and coagulable lymph is poured out, which causes permanent adhesion between that portion of the liver and the parts with which it is in contact;" the

tissues in the neighbourhood of the abscess are generally more vascular and redder, and there are sometimes instead of one, two or more abscesses.

There is great variety in the size of abscesses found in the liver, being from that of a pea or filbert to a cavity containing several ounces; the quantity of the purulent matter of the abscess is as that found in other phlegmonous abscesses, such as those of the cellular tissues; the contents of the abscess are sometimes contaminated with bile, and consequently present varieties in colour and consistency, thus, reddish, greenish, or blackish; then watery, semi-liquid, or nearly concrete; in many cases the dead remaining substance of the liver already described, is found in it. Respecting the sizes of hepatic abscesses, there are cases on record in which the liver appears to have been converted into a purulent mass, enclosed in the investing membrane. The pus of one of these abscesses has been known to weigh eleven or twelve pounds. They are more apt to occupy the right than the left lobe. Sometimes the pus is contained in a cavity, which appears merely to have been hollowed out of the substance of the liver, the parenchyma of which forms its walls. In a great many cases, the pus is surrounded by a smooth pyogenic membranous sac formed by the exudation of coagulable lymph, which constitutes the encystic abscess of authors. When abscess is formed in the surface of the liver, it may be caused by a deposit of pus beneath the peritoneal covering. Sometimes in the examination of the liver, we meet with cicatrices consisting of fibrous or cartilaginous substance either in the surface or interior of the liver, each possessing "radii extending

to a greater or less distance from the centre," and these have been regarded as cicatrices of abscesses.

Causes of Hepatic Abscess.

Every circumstance which leads to the production of Hepatitis predisposes to the formation of hepatic abscess, thus, exposure to high temperature followed by cold and damp, malarious influences, direct injury, gastric and deodenal irritation, and all those circumstances which have been related under the heading of Hepatitis.

But hepatic abscess, in cases of extensive injury to the distant members of the system which have no direct connection with the liver, such as amputation of the leg, is considered to be produced by inflammation of the coats of the vein (phlebitis) leading to the circulation of purulent matter into the blood, which becomes arrested in the liver, and forms a nucleus for a more extensive purulent or suppurative inflammation; this is the only way we could account for abscess in the liver found in an otherwise healthy individual under such circumstances, and this consideration is strengthened by the well-known peculiar contermination of the blood with cancerous exudation when cancer or fungus hæmatodes exist in distant organs which is communicated through it to the liver.

It has been assumed by Dr. George Budd, that most of the abscesses of the liver which we find associated with Dysentery, Diarrhœa, and other ulcerations of the stomach and bowels, are to be attributed to metastatic influences;

that the ulcer leads to the production of some acrid substance, which infects the blood, and is carried into the liver, and then arrested in the minute capillaries, where it commences to generate suppurative inflammation. This theory of the formation of abscess of the liver by dysenteric and diarrhœal pyæmia cannot be satisfactorily elucidated in tropical climates where hepatic abscess is so frequent. Before admitting it as the most probable hypothesis, there are certain considerations, which must be negatived in all cases where *post-mortem* examination in dysenteric patients proved that there was abscess of the liver, or in all cases in which abscess of the liver is diagnosed after the patient had for some time complained of or been treated for Dysentery.

It will be necessary to ascertain whether the patient had previously been exposed to the causes which lead to hepatic derangement—whether he had previously complained of disorders of the liver, whether he was a temperate man, or what life he had led whilst in the tropics, whether he had suffered from continuous and low intermittent and bilious remittent fever, at what period was the hepatic lesion observed after the supervention of the Dysentery, whether it was a sudden attack or whether it came on insidiously, or not noticed at all until after death, and whether in an epidemic of Dysentery, in the field, abscess, or extensive lesion of the liver, is a predominant morbid phenomenon. It will be seen, if closely examined, that the above questions are necessary to be ascertained before we can unhesitatingly pronounce a case of hepatic abscess to be of dysenteric origin. Under the head of Hepatitis, we have shewn how very

insidiously and obscurely chronic inflammation of the liver with the formation of abscess might be going on without our being able to detect it, or without the patient himself feeling the least inconvenience. Sir Ranald Martin recorded a case of a magistrate in Calcutta, who died suddenly; he had just returned from a hog-hunting party feeling slightly indisposed, and a week afterwards died; he had no fever, nor the least indication of danger —he was strong, powerful, and apparently healthy, but *post-mortem* examination revealed seven distinct and separate abscesses, varying from the size of a common nut to that of an orange. Had Dysentery preceded, and death supervened in this condition of the system, there would have been an *à priori* reason that the hepatic abscesses were from pyæmic sources. And I am much of opinion that a large proportion of hepatic abscess must be referred to climatic rather than pyæmic origin, and I may go still further and state that in most of the cases of Dysentery which present *post-mortem* hepatic abscess, the disease of the liver is, in my belief, the primary disease, and forms a predisposing cause of Dysentery; and where Hepatitis and hepatic abscess apparently supervene on an attack of Dysentery, the irritable state of the intestines can only be supposed to sympathize with, and perhaps aggravate, the previously diseased liver.

Individuals in tropical climates who have suffered repeatedly from a diseased state of the liver, I have often found to be most prone to Dysentery; the constant effect of the hepatic disorder tends to vitiate the secretion of the liver and other organs, and leads to a general relaxed

condition of the system, but more especially the intestines; and when exposed to the exciting causes of Dysentery, the individual very seldom escapes; and this, in a great measure, will account for hepatic abscess so often being discovered in the livers of persons who die in the tropics of Dysentery. Thus, out of 51 cases examined in Madras, there were 26 of hepatic abscess; and in Bombay, 12 were found in 30 cases. Whilst the 2nd Dragoon Guards were stationed at Lucknow, during 1859, 1860, 1861, Dr. Massy writes that "hepatic affections occurring to men in the regiment were seldom accompanied by Dysentery, and in proof of the uncomplicated nature of cases admitted under the head of Dysentery, 270 cases of this disease were treated in the regimental hospital in the three years; of these, five died and one was invalided; two of the five died from Apoplexy, when patients in the hospital for Dysentery. In none of the five was disease of the liver found after death. All the others returned to their duty cured. In a few of these Hepatitis was associated with Dysentery; but in none was persistent hepatic disease established." Dr. Budd* considers that abscess of the liver is only associated with sloughing ulceration in Acute Dysentery, and with chronic ulcers attended with thickening and induration of sub-mucous areolar tissue. To the first statement, I hardly think that we ought to admit it as a fact; those who have seen sloughing Acute Dysentery as it occurs in armies in the field after long exposure to climatic influences and privation, will bear me out in the consideration that when such

* "Diseases of the Liver." By George Budd, M.D.

a dysenteric condition supervenes after the ordinary attack of Dysentery, the life of the patient is so short that there can scarcely be sufficient time for the formation of such a lesion in the liver; and were it even to occur, it would do so suddenly, and with well-marked symptoms. I have had under treatment in camps, cases of severe Acute Dysentery with sloughing ulcerations without any manifest signs of hepatic disease, and in those cases where hepatic abscess co-exists with Dysentery, the previous habits of the patients have led me to believe that the former disease was primary in its origin and independent of the Dysentery, although the presence of the ulceration in the intestines might operate in accelerating it. I have often seen and treated cases of Chronic Dysentery, where there must have been that condition of the sub-mucous areolar tissue described by Dr. Budd, and also associated with various diseased states of the liver, but the individuals have all been under the powerful influence of malaria, have had long residence in the tropics, have been exposed to variations of temperature, and some of them have been hard drinkers, but I cannot say that I have been able to connect the primary disease with the chronic affection of the intestines; further, I have had cases where *post-mortem* examination revealed several abscesses in the liver, but where the person had suffered from constant constipation, a condition the reverse of that peculiar state of the intestines.

In the investigation of the subject of pyæmic origin of hepatic abscess from Dysentery, it is necessary, in order to obtain accurate and impartial information on the subject, to inquire whether in an epidemic of Dysentery

among soldiers in the field, abscess or extensive lesions of the liver are predominant morbid phenomena? On the very threshold of the investigation there are many difficulties to be surmounted; we have to consider whether the soldiers have been exposed, and to what degree, to the influences of causes which might bring on hepatic diseases; and, if in the tropics, how long have they been resident there, and what where their habits and modes of life. We might in some measure obviate these difficulties by examining such evidences as are given in places at a distance from the tropics.

During the late Crimean War, Dysentery was very prevalent amongst the troops, but Hepatitis was of very rare occurrence, as the return shows. In the examination of the bodies of those who died of acute, as well of sloughing Dysentery, the liver was found in most of the cases healthy; out of sixty cases of which Dr. Lyons gave a minute detailed description of the pathological lesions discovered after death, there was only one found of abscess of the liver. Had the expedition been in India, or in other inter-tropical countries, where both Dysentery and Hepatitis are endemic, the proportion of cases would have been far greater, proving at once that there are strong presumptions for referring the origin to climate rather than to pyæmic sources.

Dr. Massy, in a paper in the "Army Medical Report," 1863, gave short abstracts of eleven cases of abscess of the liver, ten of which proved fatal, and in none of which was he able to show any ground for believing that they were of pyæmic origin; in some of these cases the patient had suffered previously from Acute Dysentery; but he

justly remarked that, "When Hepatitis, resulting in abscess and Dysentery, is coeval or nearly so, the exclusive dependence of the abscess upon a pyæmic origin, for the latter would seem by no means determinate. Men die of hepatic abscess unassociated with Dysentery; they also die of all forms of Dysentery in the absence of hepatic disease. And where Hepatitis, ending in abscess and Dysentery, co-exists, it appears reasonable to suppose that a greater degree of hepatic disease may run into abscess without the necessity of pyæmic, or any analogous contamination of the blood." He observes that, in India Hepatitis and Dysentery are liable to be produced by similar causes, and both diseases may often co-exist in one and the same person in a very serious degree, and yet he may recover. Frequently, however, when hepatic disease and Dysentery are co-eval, death occurs very speedily, and on a *post-mortem* examination, evidences of both diseases are discovered, being abscess of the liver and ulceration of the bowels.

In tropical climates, children of both European and native descent, especially the former, suffer very frequently from Dysentery, but it is rare to hear them complain of Acute Hepatitis; and still rarer on *post-mortem* examination after Dysentery, to meet with hepatic abscess. This subject is of very great importance, and requires further investigation.

Diagnosis and Prognosis.

The diagnosis of this disease is, in the majority of cases, very difficult, and the disease cannot be detected at its

origin, except when some local evidence exhibits itself in the region of the liver; so difficult, indeed, is it that Dr. Budd remarked, that "physicians who have had most experience in this disease confess their inability, in many cases, to distinguish it from other diseases of the liver; and, in some cases, even to pronounce that the liver is the seat of disease at all." We must rest on the special symptoms already described—viz., the rigours, throbbing pain over the region of the liver, the irritative hectic fever, and, when the abscess is large, by a perceptible tumour in the right hypochondriac region.

The prognosis in most cases is unfavourable; but if the state of exhaustion be not very great, and if the direction of the abscess be between the ribs or the abdominal parietes, and the fever and inflammation not excessive, the individual has some chance of recovery. When, however, the disease is attended with severe constitutional irritation, when the hectic fever is high and there is exhaustion, and when the discharge is through the stomach or bowels, the prognosis is very unfavourable, we might regard it as almost certain death when the abscess is discharged in the peritoneal cavity; although cases are on record, or supposed to have occurred, where, when the quantity is small, the matter is circumscribed and confined without producing any serious injury to the constitution.

Mortality in Hepatic Abscess.

In many cases of hepatic abscess, death takes place before the abscess is opened, through the exhaustion and irritation it occasions in the system. Of fifty-seven cases of

hepatic abscess reported in the "Medical Journal" of Madras for 1844, the following were the terminations, as recorded by Sir R. Martin:—

Recovery took place	in 17 cases.
Of these the trocar entered the abscess .	,, 8 ,,
No pus obtained	,, 3 ,,
Pus obtained on the 6th, 7th, and 11th day	,, 3 ,,
No pus mentioned	,, 3 ,,
Death occurred	,, 40 ,,

The following are the proportion of recoveries to deaths in eighty-one cases of hepatic abscess, the contents of which had been evacuated by an operation (Waring, Madras Army):—

Recoveries	15,	or 18·519 per cent.
Deaths	66 ,,	81·481 ,,
Total . . .	81	100·000 ,,

Sir R. Martin considers that there is far more chance when the abscess opens in the bowels. One married lady he remembered to have recovered rapidly after vomiting the contents of an enormous abscess; and I know a case of a gentleman also, who recovered completely after vomiting the contents of an abscess. He saw four cases of recovery when the abscess opened into the lungs; and in his experience the majority died in whom the pus was discharged through the external integument. But some observers have given the following per-centage of mortality when the abscesses point or empty themselves at the following directions—stomach and abdomen from 10 to 30 per cent.; lungs about the same; externally a less per-centage.

Treatment of Hepatic Abscess.

The treatment of hepatic abscess is still a subject of controversy among tropical physicians; and indeed, the number of fatal cases in every mode of treatment must lead every practitioner to bestow greater care and thought, as well as judgment, when once he ascertains that abscess has been formed. Mercury, as we have stated, should be avoided in Hepatitis; but our chief object should be to support the strength of the patient against the exhausting effects of the disease by administering, in small but repeated doses, the nitro-muriatic acid with bitter tonics; nutritious diet; and by encouraging open-air gestation. When great uneasiness is felt in the hepatic region, the treatment, both locally and internally, as recommended in Hepatitis, should be employed.

When the abscess opens in the stomach or bowels, the patient is generally much relieved; and in these cases we should continue to support the strength, whilst, at the same time, prevent anything that may excite the nervous and vascular functions. When we ascertain that the abscess is making its way out, but has not as yet a point, we should favour this by ordering a warm linseed-meal poultice to be applied every half-hour or twenty minutes; when the abscess has sufficient point, and it is believed that adhesion has taken place between the peritoneum of the liver and the abdominal parietes, which is generally exhibited by thinness of the integument over the tumour, it should be opened either by the trocar or the lancet.

There are two modes by which an abscess might be opened—one by caustic-potassæ, recommended by Mr. Twining; and the other by a cutting instrument. When the tissue surrounding the abscess is thin, the trocar and canula would be sufficient; but sometimes it is so thick that a larger opening is required for the discharge of its contents; care, however, should be taken that pus does not escape into the abdominal cavity. Bégin and Recamier have recommended that the patient should be "laid on his back, with the upper part of his body bent forward, and the thighs flexed upon the abdomen; an incision from two to three inches long is to be made over the abscess, dividing the skin, the subcutaneous adipose tissue, the muscles, and the aponeurosis; the peritoneum is then laid open, as in operating for hernia, by slitting it up in a grooved director to the same extent as the primary incision; the wound is then to be dressed with charpie, and to remain untouched for three days; at the end of three days the dressing is to be removed, when the capsule of the liver will be found so firm that the abscess may be opened without the danger of pus passing into the abdominal cavity."

"There is one danger," argues Dr. Budd, "against opening abscesses, which might lead to the entrance of air into the cavity of the abscess; decomposition of the pus takes place, and an acrid substance formed in consequence, setting up the inflammation—viz., that the substance of the liver might be firm, so that the walls of the abscess do not collapse when the pus is evacuated." Dr. Budd, therefore, thinks it "generally best when an abscess of the liver projects at any side to allow it to

open itself. Nature performs the operation better than the surgeon. When the abscess opens of itself, it is usually by very small apertures, like those of worm-eaten wood, which never close, and the matter generally oozes out as the sac contracts. No air gets mixed with the matter of the abscess, and no violence is done to its walls, and consequently no fresh inflammation is set up. The discharge is very gradual, and as small in quantity as it can be. There is less shock to the system and less drain from it than when the abscess is opened by the knife. The prominent part should be poulticed, and the matter allowed to escape in the poultice, but should not be squeezed or pressed out." This is an excellent plan, and one which will be found of great utility in practice.

Of 300 fatal cases of hepatic abscess Mr. Waring considers that operation might be applicable in the following proportion:—

Total number of cases	300
Case of plurality of abscesses in them . . .	108
	192
Of 177 cases, in which abscess was solitary, there was more or less extensive ulceration of the large intestines in	76
	116

So that, out of the whole number of 300 cases, the operation could only be undertaken with any reasonable hope of success in 116, that is, in little more than 1 in 3, and this number must even be still further diminished "by taking into account the cases in which abscesses, though solitary, communicated with the lungs, colon, or some

other viscera, or those in which other organic diseases exist."—(Martin.)

Dr. Cameron has lately urged the claim of exploring the liver in search of hepatic abscess, and he considers that if the abscess be not hit upon, the puncture thus made would do good, and is often followed by disappearance of enlargement. Professor Maclean objected to this mode of treatment on the following grounds:—

1st. Of his knowledge of the little success that attended the measure in South India, in the hands of Inspector-General Murray (who revived, if he did not originate the practice), and the medical officers who were induced by him to perform the operation.

2nd. Because many abscesses in the liver tend naturally to discharge themselves through the lungs, or into the stomach or bowels,—points of issue, which give a much larger proportion of recoveries than an external opening, whether that opening be made by Nature or by the trocar of the surgeon; clearly, because in the latter case it is impossible to exclude the free admission of air into the suppurative cavity.

3rd. Because abscesses of the liver are frequently multiplied, and because it is impossible for the most experienced physician to say beforehand whether the case be one of simple or multiple abscess.

4th. Because, in an extensive field of personal experience, ranging over twenty-two years of service in Southern India and the malarious rivers of China, from Canton to Nankin, he has seen only unsatisfactory results follow the practices.

3.—CHRONIC HYPERTROPHY AND INDURATION OF THE LIVER.

Dr. Graves has described Hypertrophy of the Liver as that state in which there is an increase of size in the organ, with induration and imperfect secretion, but without any remarkable tenderness.

This form of disease of the liver is generally the result of other diseased states, it is a frequent termination of acute, but more especially simple, chronic inflammation, sometimes of congestion of the liver. It may be found among individuals in tropical climates who have escaped the malarious diseases incidental on residence in the tropics—such as intermittent and remittent fevers; and this mode of origin can only be accounted for by the peculiar effect which malaria possesses on the organs of the abdomen, more especially the liver and spleen.

Symptoms and Progress.

In simple hypertrophy of moderate size there are scarcely any marked symptoms; there will be noticed slight inconvenience and weight in the right hypochondriac, but this condition is also diagnostic of other diseased states of the liver. In the ordinary form, the progress is very gradual, the patient complains of slight feverish sensation in the morning, a dry, foul tongue, with disturbance of the stomach and bowels; he has a morbid taste, no appetite, but increased feeling of thirst, with dryness of the alimentary mucous membrane; the patient falls into a

low dyspeptic condition; the skin becomes unnaturally dry, and assumes a sallow complexion; he is very nervous. The enlargement of the liver gradually increases, and there is a distention, and perhaps doughy enlargement of the abdomen; the liver descends below the ribs, extends to the epigastrium, ascending obliquely upwards into the chest; the hepatic functions are disturbed; sometimes a dull heavy pain is felt in the right hypochondrium; the urine vitiated and scanty; there is a general cachectic condition, accompanied with emaciation; pressure on the chest leads to irritation of the lungs, and consequently the complaint is, in most cases, accompanied by a dry, hacking cough. By the pressure of the enlarged organ on the large abdominal veins—especially the vena cava—causing embarrassment of the circulation, dropsical effusion in the abdominal cavity, or ascites, generally ensues, in which case a distinct fluctuation is felt all over the bowels, and in some instances there is distinct jaundice.

Increased hepatic dulness is to be discovered on percussion; this condition is very easily defined when the abdomen is soft and flexible, but difficult when it is distended, or when there is much deposit of fat in the abdominal wall. There is always an excited or distended state of the heart's action, caused by the "constant exertion of its muscular texture in propelling the blood through an indurated mass so near to the heart, and of so large a size as the liver;" there is, in consequence, hurried and imperfect respiration, and if the disease be not removed, permanent structural changes take place in the heart, and cardiac dropsy may follow from it.

The kidneys sometimes sympathize with this condition of the liver; the quantity of urine is slightly decreased, as well as its specific gravity; when heated or when nitric acid is added to it, coagulation takes place, or it shows some turbidity, proving the existence of albumen; when examined under the microscope, casts of uriniferous tubes and isolated epithelial cells may be discovered in many cases; it often contains a large amount of lithate of ammonia, sometimes bile, and at other times not the slightest trace is to be discovered.

The bowels might also suffer from this condition. In many cases the enlargement produces simple irritation of the stomach, with much vomiting; sometimes only a feeling of nausea; with some individuals it is accompanied with severe diarrhœa, the evacuation being light and clay-coloured, whilst with others, there is habitual constipation.

Associated with induration of the liver, there is sometimes atrophy or diminution of the bulk of that organ, instead of enlargement. This is only to be attributed to contraction of the fibrine, which had been effused around the blood-vessels during the inflammatory state, and which so diminishes and obliterates their calibre, that no blood passes through them. When induration of the liver is accompanied with enlargement, it leads to a more severe state of cachexia and emaciation; the blood is found to contain an excess of colourless corpuscles. Diarrhœa, hæmatemesis, and sometimes spitting of blood, form additional symptoms dependent on the congestion of the mucous membrane of the intestines, the result of pressure on the large abdominal veins.

Results.—The first effect of this condition on the system is a general disorganization of the functions of the abdominal viscera. They become torpid and depraved, and the abdominal cavity is filled with serum, thus forming local dropsy, which is sometimes followed by general anasarca. In the pulmonary region, we observe that the lungs are slightly displaced, that there is serous fluid in the cavities of the pleura and pericardium; enlargement of the heart is a frequent result, as well as functional derangement of the kidneys. The previous enlargement may be succeeded by atrophy, and if the habits of the person be intemperate, by cirrhosis.

Pathology and Morbid Anatomy.

In this disease there are structural changes in the substance of the liver, which is considered to consist of an enlarged state of the fibrous element, causing a compressed and altered condition of the lobules, whilst the cells degenerate in various forms (Hughes Bennett). Anther writer (Handfield Jones) regards this thickening as the result of slow fibroid degeneration; but there are evidences also to prove that when hypertrophy and induration are the result of inflammation, fresh fibroid lymph is deposited in the texture of the liver, forming a "granular or nodulated texture of low vitality."

The liver, when examined, is found to be firmer and denser than in health; in recent formation it is of darker and redder colour than in health, but light, pale, and yellowish white in chronic induration. In some parts, contraction with puckering is observed, especially towards the anterior margin, giving it the appearance of cirrhosis.

According to Frerichs, during the enlargement and growth of the cells, when a section is made through the gland, they stand out distinctly from the cut surface.

Diagnosis and Prognosis.

It is in many cases difficult to detect the enlargement of the liver, except in those cases where the enlargement is very great; a plan similar to that adopted for the detection of Hepatitis should be employed. If there be any bulging forward or outward or inequality of the sides, Mr. Twining suggests to stand at the foot of the patient and run the eye from below upwards along the body, and this will be detected. In a thin individual, if the liver descend below the ribs, its outlet might be detected by the application of the finger.

The best mode of examination is to place the patient on his back, let the lower limb be drawn up and the shoulders elevated, the abdominal muscles are then sufficiently relaxed for the examination to be pursued. Percussion also is a valuable diagnostic sign; if the dulness extend below the edge of the false ribs, posterior to the angle, or considerably below it anterior to the angle, or beyond the mesial line towards the left side, or above the sixth rib, the liver, unless displacement should be obvious, may be considered as enlarged; the existence of pneumonia may interfere with the diagnosis, but the sound on percussion in this disease is clearer than in hepatic enlargement; pleurisy and abdominal tumours, such as enlargement of the omentum, morbid growths on the peritoneum, &c., might lead to the same result, but these are easily distinguished.

There is a morbid condition of the stomach and bowels which has often been mistaken for hepatic enlargement in the tropics, as well as in England (Martin), and which presents symptoms similar to that disease—viz., tenderness in the right side and epigastrium, increased by pressure, with tumidity of the abdomen; but if there are no other symptoms but these diagnostic of hepatic disease, physical examination will soon prove the liver to be in a normal state.

The prognosis is generally favourable, but the patient remains in a state of prolonged emaciation.

Treatment of Chronic Enlargement and Induration.

When the patient suffers from constipation, a mild saline laxative will be required, especially during the use of the acid bath in combination with colchicum and taraxacum. "Mercury," writes Sir R. Martin, "I believe to be improper, it injures the stomach and bowels already too often over-drugged, without exciting any secretion from the organ chiefly affected, and on which the mineral, from repeated use, has lost its influence; indeed, in the great majority of instances, the system is in such a cachectic state as to render mercury on any account inadmissible;" in fact, I think the too free use of mercury has *per se* led to enlargement of the liver. Taraxacum is of very great value in this affection; given as in the following, its efficacy is very much enhanced:—

℞—Extractum taraxaci . . . . . gr. xxxvj.
Extractum aloes socotrinæ . . . . gr. xij.
Extractum colchici aceticum . . . .
Pulvis ipecacuanhæ rad. . . . . } āā gr. v

Misce—fiat pilulæ xij.; two of which to be taken every hour.

When ascites is present with albuminuria, great benefit will be derived by painting the abdomen with strong iodine paint, and the administration of iodide of potassium with a diuretic internally. Dr. Jenner employs strong tartar emetic ointment to the right hypochondrium as a local and counter-irritant remedy.

But by far the best treatment of this disease, like most chronic diseases of the liver, is the administration internally and externally of muriatic acid; a treatment which was first brought into prominent repute by Dr. Helenus Scott, of the Bombay army, in 1796, and which received the strong recommendations of such eminent tropical physicians as Annesley, Sir J. M'Gregor, and Sir R. Martin; externally it is given in the form of a bath; and Dr. Christian remarked, which I endorse from experience of its use, that even in irremedial cases of chronic enlargement of the liver, it proves useful in clearing the tongue, improving the appetite, abating thirst, and sometimes in retarding the progress of disease. In recommending the use of the remedy, Dr. Scott said he knew of no other means that was capable of producing effects, at once so salutary and so considerable, so free from injury, with so little inconvenience or disturbance; . . . that the system should be charged with it for a longer or a shorter time, according to circumstances. In short, and as a general rule, he found the bath advantageous and salutary in all cases where mercury is useful, and with the additional advantage, that the acid treatment is attended by neither injury nor disadvantage. I invariably administer it, when I prescribe it, with the tincture of bark. Sir R. Martin considers the external

application of acids in the form of bath is by far the most effective mode of using the nitro-muriatic acid, but he observes that where the internal exhibition is preferred, a far longer time is necessary for the cure. "For," says he, "the depression of the products of inflammatory effusion into the viscera, whether the subject be anæmic or otherwise, the use of the bath proves of the most excellent effect, and its resolvent power is often accelerated and increased by alternating its use with the alkaline renal depurants, or with taraxacum and bicarbonate of soda, as eliminants, and as a means to saponify the ducts." I shall here append *verbatim et literatim* the directions given by that eminent physician for preparing and using the nitro-muriatic acid bath, as published in the *Lancet* of 9th December, 1865, page 641 :—

"Take of pure concentrated hydrochloric acid by measure three parts; strong nitric acid, three parts. Mix the acids very slowly and carefully, so as to avoid any evolution of heat or steam; after half-an-hour add the distilled water, five parts. Mix the whole carefully."

The Sponging Foot Bath.

1. Of this, the diluted nitro-muriatic acid, three ounces by measure are to be added to each gallon of water to form a bath.

2. Two gallons of water may suffice for an ordinary foot bath.

3. The bath thus prepared may be made to keep in use for a few days by adding to it once each day half an ounce of the dilute acid and a pint of water, in order to make up for waste in evaporation.

4. A portion only of the bath—say one-fourth—is to be well heated for use, and added to the remainder, so as to make the whole up to 96° or 98°.

5. Glazed earthenware or wooden vessels should be used for baths, and the sponges and towels kept in cold water, lest the acids corrode them.

Manner of Using.

6. Let both feet be placed in the bath, while the inside of the legs and thighs, the right side over the liver, and the inside of both arms are sponged alternately; or let the abdomen be swathed in flannel soaked in the bath fluid. The process should be continued for half an hour morning and evening.

7. While using the bath, a gentle aperient—as Cheltenham water, or Epsom salts, in some bitter effusion, or else Pullna water—should be taken every other morning. And should there be dryness of skin, a vapour bath at 100° or more, used twice a week, will be found of much service in stimulating and opening the pores, and in purifying the surface of the body.

The General Bath.

8. In urgent cases a general bath to envelope the whole body should be used, the proportion of the dilute acid and water being continued as above stated, adding one ounce of the dilute acid and two pints of water every day to make up for the waste in evaporation.

9. The acid mixture forming the bath should be heated in earthen vessels, such as large pipkins; and the tem-

perature of the bath should be measured by the thermometer at from 96° to 98°, as the body will be chilled by a degree of warmth which feels comfortable to the hand.

10. When the general bath is used, the patient before going into it should be covered with blankets, until a gentle perspiration is induced.

11. When in the bath a covering—a blanket—should be drawn over the head and shoulders to confine the steam, and enable the patient to inspire it.

12. Before quitting the bath the bed-clothes, under-vest, and drawers, should be ready warmed, the body to be dried while standing in the bath, and the dressing to be performed immediately in a room well warmed.

13. When the acid bath excites irritation of the skin, the quantity of the dilute acid may be diminished; and where the irritation of the gums with general malaria occurs, the use of the bath may be relinquished for a time, resuming its application, if necessary, when the above symptoms have subsided.

14. The bath should be made of well-seasoned wood, the pieces dovetailed; and if nails or screws be used, they should be well covered, and the crevices be made water-tight by putty, a layer of paint being placed on the out-side.

15. The bath should be no larger than is absolutely needed to contain the person, with as much fluid as will cover it up to the neck. The height and breadth of the person should be carefully measured.

The following dimensions were used by a person 5 ft. 4 in. in height: inside length at top, 5 ft. 4 in.; inside

length at the bottom, 4 ft. 1 in.; inside breadth at the foot, 1 ft.

Dr. C. J. B. Williams considers the effect of nitro-muriatic acid to be "to supply to the blood the oxygen necessary for the formation of fibrine or deutoxyde of protein; the respiration in its weakened state being unable to furnish a due amount."

The continued use of this acid causes, however, some slight transitory disorder in the system, thus irritation of the mucous membrane, increased action of the secreting glands, harmless irritation of the gums and fauces, and eruption of pimples on the skin, caused by irritation on the skin.

When immersion or sponging could not be advantageously employed, through the emaciated and weakened state of the patient, "a swathe damped in the solution worn around the body, and covered with oil silk," may be used, and continued to any length of time with great advantage.

Diet.

The diet of the patient should be light and nourishing, but by no means rich and stimulating; eggs and milk, with farinaceous substances, should be used; very little animal food with fat should be allowed twice a-day; cod liver oil may be taken. The individual should be made to understand that his speedy recovery is in a great measure dependent on his strict observance of the dietetic rules, as any error might reproduce the disease any day. He should be very particular in his drinks; all malt liquor, as well as strong drinks, should be avoided, and

the French light wine, *e.g.*, claret, or Rhenish wine, should be allowed, as these help digestion without heating the abdominal viscera; but where they cannot be obtained, water will be the best drink. In case, however, the patient is very weak, a little port wine mixed with water may be sparingly taken, but no strong and heating drinks or malt liquors on any account to be allowed.

General Treatment.

Exposure to the air, carriage exercise, a pull in a boat on a smooth sea, will be found of great service to the weakly; in fact, every passive exercise, where the least exertion is required will be found of great advantage in the treatment of the disease. A short and quiet ride on horseback morning and evening to those who could bear it is excellent. Individuals in tropical climates who suffer from this complaint should always have a flannel bandage round their abdomen, to keep that portion in equable temperature. They should avoid, as much as possible, exposure to the damp night air, and their dress should be warm according to the season. For the purpose of ablution they should use warm water; or, in the hot season should expose the water in the sun, and take their bath in the middle of the day.

II.—FUNCTIONAL DISEASES OF THE LIVER.

1.—CONGESTION OF THE LIVER.

Hyperæmia, or Congestion of the Liver, is one of the most frequent disorders of that organ in tropical climates, which generally terminates, *ceteris paribus*, in rapid resolution. It consists in an enlarged and distended condition of the organ, caused by a preternatural vascular turgescence. I have before stated, that during a prolonged stage of intermittent fever there is a preternatural fulness of the blood-vessels of the liver and spleen, leading to distention, and, consequently, congestion of those organs, which, when early attended to, leads to rapid recovery. There are two conditions, which exaggerate or modify the symptoms of this disease—viz., when the disease consists of an active or sub-acute congestion, rivalling the ramifications of the arterial system; and when of a passive congestion, in connection with the portal and hepatic veins.

Symptoms and Progress.

On exposure to the causes which bring on active congestion, the individual complains of epigastric uneasiness,

fulness, tension, and depression or weight; this is soon followed by dulness, languor, drowsiness, with great depression of spirit; he has no appetite, his bowels are constipated or loose, and there is generally present a slightly bilious taint in the skin and eye.

The individual feels unwell, but cannot point out exactly the cause of his illness; he complains of a sort of dyspeptic sickness, or "*seediness.*" When the disease increases, and the liver becomes much enlarged, more aggravated symptoms manifest themselves, "the countenance and complexion will exhibit pallor, or else a dusky, livid, sallow hue, according to the temperament of the patient or the duration of the disease—paleness, with a sense of cold and shivering, being more characteristic of the immediate result of external cold and chill. The tongue will generally be found coated, the bowels constipated, the intestinal and visceral excretions depraved, the appetite defective, with occasional nausea, or even vomiting, and more or less headache;" the patient sighs deeply, or takes frequent deep inspirations, which produce much relief; the pulse is frequently irregular, sometimes slow and oppressive; at other times quick and feeble. At this stage, if the disease be not attended to early, much structural injury will result, which will give rise to serious organic changes.

In many cases these symptoms appear rapidly, and sometimes disappear as rapidly, without leaving any permanent trace of their previous existence from the cautious measures used by the patient. Passive congestion of the liver is sometimes unattended with any general vascular excitement, pain, or uneasiness in the right side; with

either not any or very moderate appearance of the symptoms as noticed in the acute congestion; in most cases, however, the individual observes a slight weakness in his digestion—a febrile excitement, readily induced after exposure to cold, to which he is very much susceptible; a slight despondency of spirit; a tenderness on percussion on the hepatic region; constipated bowels, and a dull pain or uneasiness on the right shoulder.

Causes of Congestion of the Liver.

Prolonged exposure to heat acts as a direct stimulus to the liver, and keeps it in a state of excessive action, engendering active congestion; any circumstance which excites irritation in the liver leads to the disease: thus, sudden changes of temperature; exposure to cold when heated and perspiring, causing chills; malaria, without at first inducing remittent or intermittent fever, has an indirect effect on the organ, probably by its action on the sympathetic ganglia of the abdomen; violent bodily exercise, especially in the sun; an excess in the use of spirituous and vinous drinks, and long-continued and violent mental emotions.

Passive congestion may arise from anything that obstructs the flow of blood through the liver—obstruction to the return of blood to the heart; tumour pressing upon the ascending vena cava; valvular disease of the heart; over-full and stimulating diet, or excess at table, followed by indolent and sedentary life, which increases the circulation in the stomach and bowels, without a similar increase in the circulation of the liver.

Morbid Anatomy and Pathology.

On a *post-mortem* examination of the liver it is found to be enlarged, either wholly or in part; in the latter case this is traceable principally on the upper convex surface, encroaching on the right side of the chest. The liver has a deep red, yellowish white, or red and yellow colour when cut across, and bleeds sometimes profusely at this process; the biliary ducts are distended with bile, and the hepatic veins over-distended with blood, interrupting circulation of all kinds in the liver; these conditions ultimately produce a curious alteration of the colour of the liver, which is observed in the congestion previous to cirrhosis, which gives the condition known as *nutmeg liver* to that organ by pathologists; "in its most marked forms a deep red congestion produces patches and streaks, which occupy the central parts of the lobules and are partially surrounded by patches of a grayish or dirty white colour, and are devoid of blood. The light-coloured parts may be caused either by fatty degeneration of the cells, which, enlarging, compress the capillaries and expel or prevent their being filled with blood; or it may lead to an increase from deposit and condensation of the Glissonian capsule in the early stage of that morbid condition known as cirrhosis;" when the congestion is not relieved in time, structural changes might take place in the parenchyma of the liver, which very often becomes softened, and the whole function of the liver is, as it were, paralyzed.

When there is stagnation in the portal veins, the central portion of the hepatic lobules, which in health is

red, is found pale, and the lobules surrounded by arterial vessels, giving that portion a reddish appearance; this portal congestion, called inter-lobular congestion, may lead to serious results, and Hepatitis or inflammation of the intestines may be set up; the proper action of the heart and large arterial vessels is interrupted; and congestion, both of the lungs and of the cerebral organs, may supervene. When the central portion of an hepatic lobe retains colour but increases in size, the hepatic veins are principally engaged in the lesion, and the congestion is said to be inter-lobular. If the congestion last for a long time, other abdominal functions will be found similarly affected, and in such cases a general impairment of the functions and engorgement of nearly the whole of the abdominal viscera will be observed on careful examination.

Diagnosis and Prognosis.

The *diagnosis* of this disease in its passive state is not very easy, but when the enlargement is great, percussion will always reveal it to a certainty; when, however, active congestion exists, the tumid fulness and uneasiness on the right hypochondrium with the bulging of the parts, aided with percussion, will soon indicate the disease.

The *prognosis* is on the whole favourable, but it is unfavourable when there is organic disease set up by the pressure of the congestion, as for example, various structural changes, extensive congestion of the lungs from the exhausted state of the action of the heart and the great blood-vessels, and congestion of the brain leading to cerebral disturbance.

Treatment of Congestion of the Liver.

In the treatment of this disease some able writers have recommended strict antiphlogistic remedies, such as venesection and leeching, but I must confess that these extreme measures I have not found generally requisite. We ought from the first to attend particularly to the dieting of the patient, which should be light and farinaceous but not rich, and taken in small quantities—the patient should drink only water, unless very weak, when he should take a little port wine and water.

A good brisk saline purgative should be given at the very commencement of the disease, such as sulphate of magnesia, and the bitartrate of potash; or Plumber's pill, followed by a strong dose of the pyretic saline of Lamplough, which last should be repeated every morning, or as the patient may require it, and so relieve fully the portal circulation; a mixture, containing small quantities of tartar emetic, nitrate of potash, and taraxacum, should be administered three or four times a-day; small doses of quinine should also be given occasionally.

A mustard cataplasm, followed by warm fomentation or warm poultice over the region of the liver, or a strong iodine paint, are excellent and beneficial applications. A warm bath should be taken every evening before going to bed. During *convalescence* care should be taken that the individual be not exposed to wet and cold or sudden chills by night. A moderate exercise, either on foot or horseback, should be taken, and a strict prohibition of excess both in eating and drinking be enforced.

2.—EXCESSIVE SECRETION AND ELIMINATION OF BILE.

Symptoms and Progress.

This is a disease which frequently attacks Europeans and others at their early residence in the tropics, and is brought on by an increased excitement of the liver through climatic influence; for instance, exposure to extreme heat, such as that of the mid-day tropical sun.

The patient, perhaps, may feel a loss of appetite, a coppery taste in the mouth during the whole of the day, or only in the morning, abdominal pain or mere uneasiness, a slight or decided feeling of nausea, especially in the morning, at which time he occasionally vomits a little bile. On the examination of the stool it is found to be of a deep bilious colour, and if these symptoms are not quickly arrested, bilious Diarrhœa sets in. In many cases, this bilious Diarrhœa has a most salutary effect, removing the tendency to turgescence which had previously existed in the liver. Sometimes there exists no uneasiness or abdominal pain, or nausea, during the course of the disease, but the person suffers from copious bilious Diarrhœa. In few cases when this Diarrhœa is suddenly arrested, severe Jaundice has supervened without any manifest enlargement or local uneasiness symptomatic of the disease of the liver. When this increased excitement continues for a long time, it might lead to active congestion, and then the flow of bile might diminish.

Causes.

This state of the liver might be produced by all the causes which we have examined under the head of Hepatitis, such as sudden exposure to damp and cold, intemperance in the use of malt and spirituous liquors, congestion of the portal circulation, miasmatic influences, intestinal irritation. But the most frequent cause among Europeans who go to tropical climates, whether East or West Indies or Africa, is exposure to high ranges of temperature. An experienced and able tropical physician considers this to be well founded to the following extent:—

First.—That the exaltation of function is not of long duration, and is very much confined to the earlier years of residence, declining thence.

Secondly.—That, to a certain degree, such increase of secretion is salutary.

Thirdly.—That it is in part from the sudden suppression of secretion through cold, that congestion and inflammatory state of the liver are engendered, rather than through any serious injury from increase of secretion—a process consisting more of acclimatization than of disease, and one which Nature adjusts in the progress of residence in the tropics.

One great cause of increased secretion of bile in hot countries will, in many cases, be traceable to too rich and highly carbonized food. I have previously stated that intemperance in malt and spirituous drinks is an exciting cause; the liver in these cases must be considered as acting vicariously for the lungs, the blood is surcharged with carboniferous matter, which the lungs, through the

rarefied condition of the air and other causes, could not sufficiently purify; the liver, therefore, comes to its assistance, in eliminating it from the blood by secreting more profusely.

3.—DEFICIENT SECRETION OF BILE.

This disease will be found to occasion a great deal of anxiety among persons resident in tropical climates; very frequently we meet with individuals during the cold harmattan months, or the cold seasons of the tropics in December, January, and February, giving a smart blow to the region of the liver, complaining that it is torpid and inactive. The quantity of bile secreted by a healthy individual has not been satisfactorily arrived at, and as yet, experiments have not furnished us with the best means of ascertaining it. According to Blondol, an adult man secretes about 200 grammes or 7 oz. in the twenty-four hours; later experiments made by Bidder and Schmidt go to prove that it secretes much more in the course of the day—viz., not less than 56 oz. (avoird.) But all observers agree that the rate of secretion is not uniform, and that a considerable reduction in the secretion is observed when food is withheld for some time.

Symptoms and Progress.

There is a feeling of general malaise, vertigo, melancholy, inability to apply the mind to the least exertion; the person is very irritable and peevish, the sleep much

disturbed and unrefreshing; when long continued, the patient has an anæmic, sallow look; the person suffers from a vitiated state of the digestive system, belches acid sour fluid from the stomach; his urine is scanty and high-coloured, containing an excess of urea and uric acid; in some cases, a trace of bile is found in the urine; the evacuation is at first of a light yellow colour and scanty, then it becomes clay-coloured or whitish and very offensive; constipation is of frequent occurrence, and this is supposed to be produced by a diminution of the peristaltic movement of the intestines through the non-existence of bile, which is one of its principal excitants. Sometimes, however, the deficiency is great, or there may be entire cession of bile which passes into the canal; the evacuation then consists of mucus or copious watery discharge instead of constipation, and in these cases the disease might terminate very seriously in Diarrhœa or Dysentery.

Causes.

Hepatic torpor might be the result of other diseased conditions of the organ, such as congestion, or it might be the sequelæ of excessive excitement. It very often depends upon an impoverished or altered condition of the blood, or some nervous agency, such as bodily inactivity, mental anxiety, "sympathy with an enfeebled stomach, the diversion of nervous energy elsewhere, the repulsive influence of other affections;" the liver might be so over-loaded with material from the blood that the cells become over-distended and their functions paralyzed for a time, causing the secretion of bile to cease.

4.—VITIATED SECRETION OF BILE.

In many cases the secretion of the liver has been found to be very much perverted independently of the existence of other disease, such as fever. It sometimes becomes acid, in which case it keeps its usual colour, but produces spasmodic pains in the abdomen, with disturbance in the digestive and assimilative process in the stomach and bowels. Sometimes, however, the bile is altered in appearance, it has been found to be blackish, or of a greenish hue; but this should not lead us to consider the green bile that is discharged from the stomach in some cases to depend on the morbid secretion of that substance from the liver, because, when the reaction of the intestinal canal is very acid, the acids have the power to convert the bile into a greenish colour.

Treatment of Excessive, Deficient, and Vitiated Secretion of Bile.

Excessive Secretion.—Our chief means here is to endeavour to remove the cause which keeps up the condition; the patient should rest quietly in bed, should not expose himself to high ranges of temperature, should have on warm clothing so as to keep up an equable temperature all over the body, and should pay particular attention to his diet. A mild, not rich diet, with demulcent and subacid fruits are recommendable; cold and unstimulating drinks, such as claret and hock, are the best. When there is abdominal pain, relief will be found in the application of leeches, warm fomentations, warm baths, or mustard poultice.

When the skin is hot, and there is reason to fear that congestion might be the result, an effervescing diuretic draught will be found advantageous, such as a mixture of taraxacum, and the bicarbonate of soda, with other alkali. If the disease still persists, a mild saline aperient should be administered, even when *bilious Diarrhœa* exists. Of the treatment of this latter condition I must refer the reader to the article on bilious Diarrhœa, where it has been fully discussed.

Deficient and Vitiated Secretions.—The treatment of these two complaints is exactly the same, and in most cases simple; we should at first remove all the causes which may tend to keep up the existing state of things, and then employ remedial means which will stimulate the liver, and produce a solvent power over any viscid bile or fat which may accumulate in the cells preventing their healthy action—this is obtained by the use of the alkaline salts in combination with some bitter tonics. Of the alkalies, potash has a more immediate effect on the kidneys, whilst soda has on the liver, so that the bicarbonate of soda has been found to exercise a very beneficial result; "the salts of soda," writes Dr. Budd, "act more especially on the liver, increasing the secretion of bile, of which soda is a natural constituent, and one little esteemed as diuretic. In indigestion, soda is more generally useful than potash, probably from its more direct effect on the liver." The bicarbonate of soda is best given in combination with the fluid extract of taraxacum. In cases where there is Diarrhœa or Dysentery, and the alkali is disagreeable to the stomach, the taraxacum might be beneficially administered with some dilute acids,

the nitric or hydrochloric, with a little opium instead of the alkali.

During the course of this disease, the patient (as resident in tropical climate) often becomes emaciated, sallow and melancholy looking, or a general anæmic condition supervenes. The salts of iron and bitter tonics with alteratives should be persisted in, which will gradually give tonicity to the general system, whilst at the same time improving the impaired state and diminished secretion of the hepatic region.

The bowels might be very much constipated, and the best purgative in these cases is aloes, which should be given in combination with the other remedies—taraxacum, alkalies, and chalybeates. Particular attention should be paid to the diet and habits of life.

When *torpor* is associated with organic changes in the liver, with enlargement and induration as well as enlargement of the spleen, our best remedy is the nitro-muriatic acid, taken either internally or externally—*vide* chronic hypertrophy and induration.

5—ICTERUS (JAUNDICE.)

Jaundice—morbus arquatus, aurigo, or morbus regius—is an affection which consists in the absorption and circulation of bile through the blood into various tissues of the body, and consists in the yellowish colour of the skin, conjunctiva, and the urine, attended usually by whitish or clay-coloured stools.

Symptoms and Progress.

In some cases the disease commences with a sudden appearance of yellowness in the conjunctiva or white of the eye, and of the skin; but in most cases there are preliminary symptoms indicative of epigastric and hepatic derangement. There is a feeling of languor and listlessness, much depression of spirit, and an hypochondriacal state of mind for some days; the individual feels an inability or unwillingness to the least exertion; a derangement in the epigastric organ, no appetite, a frequent feeling of nausea, a bitter taste in the mouth, especially in the morning, which may terminate in vomiting or disagreeable retching; an indescribable sense of uneasiness, fulness and pain in the epigastrium and right hypochondriac regions; there is also a tendency to costiveness, and weight or sinking in the abdomen.

There is great somnolescence and disquietude; the tongue is furred, sometimes yellow; the yellowness of the skin generally shows itself first in the conjunctiva of the eyes and the roots of the nails, then on the face and neck, and afterwards on the upper part of the chest, and then the whole body—more intense where the skin is thinnest; but this is not invariably the case, as it might be very intense in parts where it used to be very light, and might also appear in different shades in different parts of the body. Sometimes the discoloration is somewhat of a greenish tinge, caused by some altered condition of the blood, and from the same cause the discoloration might be almost black.

The bowels are in most cases costive, but easily moved by purgative medicines; sometimes there is troublesome Diarrhœa; the stool is whitish or clay-coloured, although there are cases on record where it is high-coloured, or does not show any marked difference from healthy stools; there seems to be an impediment in the natural conversion of the food into substances necessary for the nutrition of the body; the food itself is easily decomposed and liable to fermentation, "the consequences of which are that nutrition is checked, and the patient becomes emaciated and languid, and also that the stool, besides being pale, is offensive, sourish, and apparently in a state of fermentation." In some instances the digestion is not at all disturbed, the appetite being quite natural; there are cases where the yellow matter of the bile in this disease is secreted by the salivary and sudorific glands, and the vision is so affected, that all objects seen by the patient appear to be tinged with yellow.

The condition of the patient might be judged from the length of his residence in the tropics and his age, as it is apt to be more severe and intense if he has made a long residence and is over middle age. The pulse varies greatly, being sometimes slow, sometimes natural or irregular, and at other times quick and hard, especially when there are evident signs of active congestion of the liver, in which case the skin is generally harsh and dry, and communicates a feverish heat to the feet. There may be present severe head symptoms, caused by the action of bile in the blood on the brain; this drowsiness is not an unfrequent symptom, and in rare cases we meet with stupor, coma, or delirium.

The urine at the very commencement of the disease is unchanged, but it soon becomes slightly tinged yellow, which gradually becomes of a deeper hue, then orange coloured, darker yellow, deep brown, and ultimately brownish black. I have seen cases when in the last condition the urine is thick and viscid and almost black, but the margin looks yellow. Muriatic acid, when applied to the urine in this condition, gives it a deep green colour, and stains linen yellow. The investigation of that able pathologist, F. Frerichs, has shown that important changes occur in the substance of the kidneys; their parenchymatous structure is infiltrated with pigment matter, which, in some cases, interferes with its healthy action by assuming the form of hard coal-like masses; the cells of the tubuli uriniferi are distended with yellow, brown, and greenish pigment, and according to Hughes Bennett, in severe cases, casts of urinal tubes are frequently seen in the urine; these contained cells deeply tinged with bile pigment. Frerichs has found that the deep layer of round epidermic cells of the skin contains a yellowish or deeply brown granular pigment, as well as the secretory cells of the sweat glands.

When, however, the Jaundice is occasioned by impaction of gall-stones in the ducts, the symptoms are more intense; there is severe, intense, excruciating pain, or a dull aching pain in the right hypochondriac and epigastric region, extending to the right scapula, disappearing in sudden fits or paroxysm, and attended with rigors or shiverings, and violent fits of vomiting of a sour fluid, anxiety and a restless hurried respiration, fainting, and great exhaustion and prostration. The persistency of the

obstruction leads to a sallowness of the skin within twenty-four hours; commencing on the forehead it extends all over the trunk and extremities, and the pain gradually subsides; but if the obstruction be not removed, inflammation and ulceration of the liver take place, and sometimes perforation, and the patient dies either of exhaustion or of peritonitis.

One frequent accompaniment in the symptoms of Jaundice is an hæmorrhagic tendency communicated to the system; in the Jaundice blood there is a deficiency of fibrine, one of its principal constituents, and consequently it partakes of the character of preternatural fluidity, and, therefore, in Jaundice, extravasation of blood is apt to take place in different parts of the body, giving rise to purpura or scurvy.

In tropical climates this disease generally runs a favourable course, sometimes disappearing without any treatment, and convalescence is generally first indicated by the appearance of bile in the stool; then the skin, eyes, and urine gradually lose their yellowish colour, the last depositing a reddish sediment; the spirits become more active and cheerful, the appetite improves, and the weight and uneasiness in the epigastrium disappear. The surface becomes very itching, having a sensation of heat and pricking, and sometimes an appearance of pectechiæ and maculæ, and when the saffron hue is disappearing, slight desquamation follows. In cases where a fatal termination is indicated by the severity of the symptoms, head lesions make their appearance, caused by the circulation of biliary constituents in the blood through the brain, which interrupt its functions;

the patient lies in stupor and coma, or is delirious before death.

Causes of Icterus or Jaundice.

This disease is very common in the tropics, and is produced by all those circumstances which we have already described as capable of inducing congestion of the liver or inflammation of that organ—such as sudden exposure to cold when the skin is heated by producing congestive inflammation of the liver, which is one of the most prolific sources, great heat, sudden or violent passions, or emotion of the mind; inspissated bile, malaria or miasmata, hysteric excitement, severe action of some operative medicines which might act by sympathy, too much indulgence in malt liquors with sedentary life.

The liver might itself be healthy, but there might be disorganization in the organs contiguous with it, and the bile is absorbed from the distended ducts or gall-bladder; such as obstruction on the common biliary duct, either by thickening of its coats, pressure of tumours, interruption by gall-stone or worms, hardened fæces in the intestines, inflammation of the deodenum, tumours of the pancreas, mesenteric glands, or deodenal pylorus, pressure of the gravid uterus, paralysis of the *ductus communis choledochus*. Catarrhal inflammation of the ducts, Dr. Barlow considers to be about the most frequent cause of simple Jaundice; thus, Jaundice "may be of varying intensity, both as regards the colour of the skin and the urine, and the paleness of the stools. When there is thickened mucus obstructing the common duct, the Jaundice becomes complete, and the same must occur when the

ducts become obstructed from thickening or adhesion;" errors in diet may lead to a very harmless form of Jaundice. I know cases where, after an excessive use of malt liquors by persons with healthy livers, the disease supervenes, but such cases were rapidly cured.

Sometimes Jaundice might depend upon deficient or suppressed secretion or non-elimination of bile; in these cases the liver is not affected with any organic disease, and the ducts are mostly perfectly free, except sometimes contracted by spasmodic action. This form of Jaundice is dependent on the belief that there exists in the blood a certain quantity of yellow colouring matter of the bile during health—viz., the green bile pigment, or *biliverdine* and the *cholesterine*, a diminution or suspension of the secretory action of the liver in a degree greater than that in which the colouring matter is produced leads to its accumulation in the circulation and its elimination by different secreting organs. This is a theory supported by Drs. Budd, Harley, and Wood,* and the arguments of the last named are the following :—

The liver he regards as an eructory, by which noxious matter in the blood is thrown off; among these deleterious substances is the yellow principle on which the colour of the bile depends, and which is probably formed in the systemic circulation; but at all events, found preformed in the blood. The secretory functions of the liver through some morbid agency are impaired or suspended; the pigment matter consequently accumulates in the blood, and if not thrown off by some other avenue, it produces a

* "N. A. Medical and Surgical Journal."—Oct., 1826.

derangement of all the vital processes; "nature has provided a remedy for this evil by rendering almost all the other secretory functions sensible to the stimulus of the yellow matter in excess, and capable, under this stimulus, of separating it from the blood. Hence it passes off by the skin and kidneys, and is deposited in the various tissues, giving its own colour to the secretion and to the tissue; while the want of colour in the fæcal stools may be owing either to its deficient secretion, or to some obstacle to its passage after it has been secreted; though even where the latter cause exists, it is still probable that the Jaundice, in great measure, results directly from the former; the obstacle to the excretion operating to suspend or impair the secretory process." In the majority of cases, he adds, there is no reason whatever for the suspicion that there exists any obstacle. According to Dr. Harley, Jaundice, from retention or non-elimination, may be caused by—

1st. Innervation—mental emotion.

2nd. Disordered circulation in the liver—active and passive congestion.

3rd. Destruction of the hepatic cells by whatever cause—cancer, tubercle, atrophy both acute and chronic, fatty and amyloid degeneration.

4th. Destruction of the hepatic parenchyma.

The Jaundice may be the result of excessive production or too great activity in the functional operation in the liver without any disease; with this form there is bilious vomiting and purging, produced by causes which lead to temporary irritation of the liver, such as bilious fever and Diarrhœa.

Sometimes Jaundice appears in a place epidemically, and very fatal; in these cases, Dr. Budd considers it to be due to disintegration of the secretory cells of the organ. I know of no instance where Jaundice has occurred epidemically in tropical climates; but in these cases it is said that the skin and conjunctiva are bright yellow, and the urine dark, the stool pale or dark brown, accompanied with drowsiness, severe irritation of the stomach with bilious vomiting, pain in the head with quick and excited pulse, violent delirium, coma and death, and the liver when examined is generally smaller than natural. Dr. Bright does not, as Dr. Budd, consider this form of Jaundice to depend on disintegration of the hepatic cells, but on diffused inflammation of the liver. He states that the surface of the liver appears variegated, of a light yellow and dark red purple in patches; certain portions project above the rest, which a section shows to be of a softer consistence, or perhaps undergoing a process of disintegration.

Pathology and Morbid Anatomy.

Few persons in tropical climates die of simple Jaundice, indeed, when uncomplicated with other disease, we seldom hear of a case, and consequently it is seldom that we have opportunities for posthumous examination. When that occurs, all the tissues of the body are coloured yellow, even the fat and brain; an inflammatory or congestive state of the liver and of the biliary ducts, deposition of coagulable lymph within the capsule of Glisson, with enlargement of the absorbent glands aud effusion of

lymph into the areolar tissue about the gall ducts are present. We may also find morbid lesions in the organs in the neighbourhood of the liver, or a gall-stone in the common biliary ducts.

Diagnosis and Prognosis.

The diagnosis is very simple and obvious to the sight, and is recognized by the yellow colour of the skin and the conjunctiva of the eyes, the white or clay-coloured stool which in most cases exists, and the deep saffron colour of the urine which stains the linen. In tropical climates we must be careful to examine the colour of the face, as most Europeans who have lived there in malarious districts frequently present a sallow complexion, not unlike Jaundice; if he is suffering from this disease the urine is of a deep colour, and when hydrochloric acid is added to it, it will become deep green.

There are two methods by which biliary acids in the urine which characterises Jaundice produced *by reabsorption* may be detected.

1st. *Dr. Harley's method.*—To a couple of drachms of the suspected urine add a small fragment of loaf sugar, and afterwards pour slowly into the test tube about a drachm of strong sulphuric acid. This should be done so as not to mix the two liquids. If biliary acids be present there will be observed at the line of contact of the acid and the urine—after standing for a few minutes—a deep purple hue. This result may be taken as a sure indication that the Jaundice is due to obstructed bile ducts. On the other hand, the absence of this phenomenon and the

occurrence of merely a *brown* instead of a *purple* tint, although in the earlier stages of Jaundice equally indicative of suppression, is no indication of the cause of the suppression, which must be gleaned from other circumstances.

2nd. *Dr. Felix Hope's method.*—Decompose the icteric urine to be examined with an excess of milk of lime, and then boil for half an hour; filter, and evaporate the filtered compound nearly to dryness; decompose with a great excess of concentrated hydrochloric acid, and then keep the whole (before being again filtered) at the boiling point for half an hour; to avoid spurting of the fluid, it is necessary to renew the volatilized hydrochloric acid from time to time, leave the liquid to get completely cold, and then add six to eight times its volume of water; filter the dark brown turbid solution thus obtained, wash out with water the residue on the filter, until the same runs through quite colourless; dissolve the brown resinous mass in the filter in 90 per cent. alcohol. Decolorize by boiling with animal charcoal, filter and evaporate to dryness in the water bath; the residue is a yellow, resinous mass, which, if bile acids be present, must consist for the most part of *choloidic acid*. In such a case, it melts by warming, and emits the peculiar musk or soap odour. Lastly, dissolve in a very little caustic soda and some drops of warm water, add a very small piece of sugar and allow three drops of concentrated SO_3 slowly to fall into it. At first the fluid becomes milky and turbid, and resinous flakes separate, which stick pertinaciously to the glass; but afterwards, by the addition of more SO_3, these again dissolve, and produce a beautiful purple, red, or dark violet fluid.

The prognosis is favourable in an uncomplicated case, and where the cause is under our control and is easily removable, such as spasms, accumulated fæces, &c. The disease may prove fatal when it is complicated with structural diseases of the liver, when it shows a determination to and a complication with the brain, when sugar appears in the urine with a diminution of the biliary acids, when the system has been reduced by phthisis, irregular tropical living, or other severe diseases, and when hectic appears. Destruction of the hepatic gland-cells is discovered by the presence of *tyrosine* and *leucine* in the urine, and the diminution or total disappearance of the biliary acids; these two abnormal substances are demonstrated by the evaporation of 1 oz. of urine to the consistence of syrup, and putting it aside to crystallize, the former appears in needle-like crystals or spiculated cells, which appear as a rolled-up hedgehog with its bristles sticking out in all directions; and the latter in flat, circular, oil-like discs, without crystalline structure, soluble in water and boiling alcohol, but insoluble in ether.

Mortality in Jaundice and in other Hepatic Diseases.

Jaundice may only last for a week or ten days, but it generally continues for three or four weeks. Of the effective strength of British regiments in the East Indies, 13 per cent., according to Dr. Annesley, are attacked with hepatic disease; but according to Colonel Tulloch's Report, only $2\frac{1}{5}$ per cent. of the effective strength in the windward and leeward command; and in Jamaica only 1 per cent.

Dr. Stewart gives the following results of cases of hepatic diseases treated successfully by chloride of ammonium in the hospital of the 2nd Batt. 21st Fusiliers, from September 1st, 1869, to December 31st, 1870.

Disease.	Admitted.	Discharged.	Died.
Hepatitis	46	46	0
Simple enlargement of liver	4	4	0
Abscess of liver	9	9	0
Total	59	59	0

COLONEL TULLOCH'S TABULAR REPORT.

STATIONS.	Period of Observation.	Aggregate Strength.	Inflammation of the Liver and Jaundice.		
			Attacked.	Died.	Proportion of Deaths to Admissions.
Windward & Leeward Command	20 years	86,661	1,946	161	1 in 12
Jamaica	20 ,,	51,567	539	51	1 ,, 11
Gibraltar	19 ,,	60,269	759	22	1 ,, 34
Malta	20 ,,	40,826	857	47	1 ,, 18
Ionian Islands	20 ,,	70,293	1,168	58	1 ,, 20
Bermudas	20 ,,	11,721	168	6	1 ,, 38
Nova Scotia and New Brunswick	20 ,,	46,442	384	10	1 ,, 38⅔
Canada	20 ,,	64,280	488	12	1 ,, 40⅔
Western Africa	18 ,,	1,843	150	11	1 ,, 14
Cape of Good Hope	19 ,,	22,714	496	25	1 ,, 20
St. Helena	9 ,,	8,973	171	24	1 ,, 7
Mauritius	19 ,,	30,515	2,508	122	1 ,, 20½
Ceylon	20 ,,	42,978	4,382	213	1 ,, 11
Tenasserim Provinces	10 ,,	6,818	488	29	1 ,, 17
Madras	5 ,,	31,627	3,372	190	1 ,, 17¾
Bengal	5 ,,	38,136	2,412	174	1 ,, 14
Bombay	5 ,,	17,612	1,084	62	1 ,, 17½

From the above it appears that the greatest mortality is to be found in the colder climate; thus, whilst

in Canada there was 1 in $40\frac{2}{3}$ deaths, in Nova Scotia and New Brunswick 1 in $38\frac{2}{3}$, in Western Africa there was only 1 in 14, St. Helena 1 in 7, and Bengal 1 in 14.

I shall here select and report in full one case of peculiar interest, in which Jaundice of a very severe type appeared in a patient with scarcely any apparent cause. L. B., æt. 42, of very temperate and regular habits, had been in China, and several times in tropical Africa; is a tall, spare-built man, and states that two weeks ago, the 27th December, 1865, he had suffered incessantly from bilious Diarrhœa, without any cause that he knew of; he subsequently began to strain, and fearing lest it might turn to Dysentery, he stopped it by taking astringent medicines; two days afterwards, on the 29th, he had severe rigours which came on as if he were about to have an attack of intermittent Fever, but lasted for only half an hour and terminated by slight heat and perspiration, which alternated with each other; three hours afterwards he had an attack of rigour and feverishness, his pulse was rather small, and beat 90 to the minute. He felt very languid and unable to do anything; the rigours again appeared in the afternoon of the next day with severe feverish symptoms, and although he took quinine, it ran the same short and unsatisfactory course; soon afterwards his eyes became yellow, and the colour of his skin and his urine became of a deep saffron colour.

Symptoms on examination.—There were severe nausea and vomiting, the tongue coated brown especially in the centre, moist, the appetite bad, and the bowels costive. The skin was of a deep yellow colour, as well as the

conjunctiva; there was no pain in the epigastrium, but slight uneasiness on pressure in the hepatic region, no decided pain, percussion did not show any enlargement of the liver, nor did manipulation show the existence of any tumour near it. The skin was hot and dry; the heat appeared in transient flushes; it was of a deep yellow colour. The pulse was 90, weak, and the heart's action regular; there was no enlargement of the abdomen, which was particularly flaccid; the urine was very high-coloured, and resembled London Porter.

Ordered.—To have a tepid bath and be placed between blankets, a mild aperient with tonic and sedative to be taken at bed-time, viz.:—

℞.—Pil. rhei co.	. . . . .	gr. viij.
Quin. disulph.	. . . . .	gr. ij.
Morphi. acetat.	. . . . .	gr. ¼.

Misce—fiat pil. ij.—To be continued every night.

30th.—The colour of the skin had increased considerably and was deeper than ever; the urine thick, and as dark as the darkest stout, the appetite was extremely bad, there was no pain in the abdomen or hepatic region, urine albuminous and contained abundant casts of tubuli uriniferi; the tongue was very much furred, of a yellow-brown colour; the bowels were slightly open, and the stool contained bile. Pulse 100, weak, and the rigours came on regularly every night, and sometimes twice in the day.

Ordered.—The pills to be continued, and the following mixture also taken:—

℞.—Potassæ acetas	ana	f ℥ss.
Extractum taraxaci		
Spiritus ætheris nitrosi		f ℥iij.
Aqua pura		f ℥vij.

Misce—One ounce, or one large tablespoonful, to be taken three times a day.

Jan. 4th.—The colour of the skin still yellow, the urine high-coloured but copious, very wakeful at night, the conjunctiva had slightly lost its deep colour, no rigours for the last two days, the appetite was extremely bad, and he could live only on slops. The stool still contained a quantity of bile, and no pain or uneasiness in the hepatic region.

Ordered.—Pills to be discontinued, but diuretics to be continued, and at bed-time ten grains of Dover's powder to be taken.

9th.—Patient continued to improve, the colour began to disappear in the face and eyes; urine, although still coloured, is looking gradually healthier, but there was much languor and weakness. The medicines to be continued.

14th.—Patient was convalescent, but still weak and languid; his appetite much improved, nutritious diet and tonics were ordered to be taken, and on the 18th he was pronounced well.

5th February.—Patient, having exerted himself a great deal in partridge shooting for two days, had a relapse, which was soon cured by the use of the nitro-muriatic acid tonic with tincture of bark.

Commentary.—This disease occurred in a very temperate man, and without any assignable cause; the

weather had been previously hot, but had become very cold through the blowing of the harmattan winds, internal congestion seems to have been the result, and Diarrhœa was the first affection which showed itself; this was very judiciously stopped as it might have run on to Dysentery; yet still it was followed by rigors, feverishness, and subsequently by a violent attack of Jaundice. There was scarcely any pain in the hepatic region, although there was constipation, and when the bowels were loose the stool contained a large quantity of bile; the quantity of bile in the urine was excessive, and the urine itself was almost limpid in consistence. The patient had severe rigors, which came on sometimes three times within the twelve hours, and lasted from half an hour to an hour; there was no regular perspiration with it, and no regular cold stage, and after covering with blanket it gradually subsided. Tonics (nitro-muriatic acid and bark, as well as quinine), aperients, diaphoretics, and diuretics, were the treatment employed, which ultimately terminated in recovery. Patient imprudently exerted himself, and exposed himself to night air, sitting up late at night, and the consequence was that he had a relapse. Four years ago he had a similar attack.

Treatment of Jaundice.

When Jaundice arises from simple functional derangement, the treatment is very evident; in these cases there are no pains in the right hypochondriac region, no rigours or fever, and no spasmodic pains; the disease may be cured of itself, that is, may run its course to

recovery; but we might assist nature by keeping the bowels free, by administering a saline (sulphate of magnesia, or Lamplough's pyretic) purgative, with warm bath and a diaphoretic at bed-time. Or if the symptoms are more severe and persistent, a diuretic and an emetic might be with great advantage added to the treatment as in the recorded case.

When, however, the Jaundice depends on congestive inflammation, which is running a rapid course, and there is tenderness in the epigastrium with great constitutional disturbance, furred tongue, harsh dry skin, full and moderately strong pulse, cupping or leeching over the liver with fomentation and strict rest will soon relieve the immediate symptoms; after which, diaphoretics and diuretics should be given, and a purgative composed of colocynth and calomel followed by a brisk saline aperient.

The *diet* should be principally farinaceous, with diluent drinks—soda-water and good claret—fat, in the shape of butter and cod-liver oil should be permitted if there be great emaciation; fruits also, as they are pleasant to the patient. When convalescence has been established and the patient is very weak, the bitter tonics, such as gentian, quassia, and columbia, with port or claret, and gentle exercise should be taken.

When the Jaundice depends on a torpid state of the liver, associated with languid and feeble digestion, diaphoretics, warm bath and the bitter tonics described above, are the best remedies indicated.

In obstinate cases of Jaundice, or where it has become chronic, great benefit will be derived by the persevering use of the *nitro-muriatic acid bath*, which has already been

described. When in the course of treatment with the acid the patient shows head symptoms, such as drowsiness, a tendency to delirium or apoplexy, active purgative with blister to the nape of the neck should be persistently used until the alarming symptoms subside. If the sleep has been much disturbed, conium and hyoscyamus should be given in preference to opium.

When the Jaundice is dependent on the passage of gall-stones, *large doses of opium*, one, two, or three grains, or *chloroform*, or better still, the *hydrate of chloral in drachm doses* should be given to relieve the pain and relax the spasm, and the warm bath and warm fomentation should be constantly used; alkalies also should be freely taken. M. Durante recommended thirty-minim doses of a mixture composed of two parts of sulphuric ether and three of oil of turpentine, on account of its solvent power on the calculi. The *diet* in these cases should be principally vegetable, and when meat is taken it should be entirely freed from fat.

III.—DISEASES OF THE SPLEEN.

1.—CHRONIC SPLENITIS WITH HYPERTROPHY—AGUE-CAKE.

By the term Chronic Splenitis here adopted, I include that state of the spleen found amongst those who reside in malarious districts of tropical climates, commonly known by the name of *Fever-cake* or *Ague-cake*, however produced, and which is described by Twining as *engorgement*, and by Martin as *endemic congestion of the spleen*. Before proceeding any further in the consideration of the nature of this disease, we shall briefly examine the structure and functions of this ductless gland.

The spleen is placed in the left hypochondrium, between the large extremity of the stomach and the false rib, covered below by the colon, and resting upon the upper end of the left kidney, and is consequently beyond the reach of morbid impression from external circumstances. In a healthy condition it weighs from 4 to 10 ounces in an adult man. Besides the peritoneal coat which covers it externally, it has a proper fibro-cellular coat, composed of white and yellow elastic fibre, and, therefore, susceptible of distension and retraction; from the interior of this coat, fibrous bands run transversely intersecting each other, uniting with the coat of the arteries, and forming a regular network; the irregular spaces left are

filled up by the parenchyma of the spleen and small bodies known as splenic corpuscles.

This parenchyma is composed of a homogeneous mass of nucleated, colourless corpuscles and cells, imbedded in a granular plasma in different stages of evolution; increased towards the end of the digestive process and diminished gradually afterwards. The splenic corpuscles or malpighian bodies are white and spherical, sessiled and attached to the small splenic vessels, ramifying in the organ, and supplied with minute vessels, containing a substance exactly similar to the colourless parenchyma. Diffused amidst the colourless parenchyma are some coloured cells, consisting of unchanged blood corpuscles, and blood discs in various stages of retrograde metamorphosis with several gradations in size and colour; some being golden yellow, others brownish red or blackish. Some of the coloured corpuscles are broken up into pigment granules, or the pigment matter crystallizes into the form of a rod. According to Carpenter, the office of the colourless parenchyma is "not only to serve as a storehouse for the surplus albumen that finds its way into the circulation on the completion of the digestive process, but also to exert an assimilating action upon it, whereby it is rendered more fit for the neutralization of the tissues;" and of this assimilating action, he considers the generation of fibrine to be one of the results. He suggests that one special function of the red corpuscles is "to assimilate or prepare that peculiar combination of material which is required for nutrition of the nervo-muscular apparatus;" and, consequently, he believes that "the disintegration of these corpuscles in the splenic parenchyma

may answer the two-fold purpose of regulating their total proportion in the mass of the blood, and of diffusing through the liquor sanguinis the materials which the nervous and muscular tissues are to draw from it for their development."

The spleen is supposed to be a sort of *diverticulum* for the reception of superfluous blood, and Dr. Gray, who has recently investigated the subject carefully, considers its special office to be to balance both the quantity and the quality of the blood, and pronounces it specially adapted for this function "by its connection with that part of the vascular system which is concerned in the introduction of new material into the circulation." Considering it as a diverticulum, we can easily account for its being considerably increased during the cold stage of malarious fever, especially the intermittent, whose cold stage is generally prolonged; hence also the changes which attend it in severe attacks of typhus and typhoid fevers, where it is more or less enlarged and softened, of a mahogany, brown, or yellow-fawn colour; and when the softened mass is examined under the microscope, it is found to consist of a great many molecules or granules, free nuclei, compound granular cells, fusiform corpuscles, and fragments of fibrous tissue. Dr. Parkes regards one of the functions of the spleen to be that which it possesses with most of the abdominal glands, especially the liver, viz., the conversion of albumen into urea and uric acid.

Symptoms and Progress of Splenitis.

This disease, which comes on as the result of malarious diseases, or the effects of malarious poison in the blood, is generally so insidious that it escapes notice at the outset.

It occurs generally among European children of the poorer class; among Europeans who have resided for a long time in malarious districts, and have frequently suffered from intermittent or bilious remittent fevers; among natives in the same district much exposed to the influences and the vicissitudes of the weather; but I have found it to occur in by far the greatest number of cases among the offspring of white and black parents, or that of two mulattos. It might appear as a primary disease occurring as a sub-acute inflammatory affection, producing dull pain, great uneasiness in the region, increased by pressure, or might be the result of congestion. I have known cases where women have suffered from malarious fevers during pregnancy, and the fœtus at birth have presented enlarged spleens; or when the father or mother suffers from the enlarged organ, and resides in malarious districts under malarious influences, the fœtus at birth also has an enlargement of that organ, or it appears soon afterwards, and grows so quickly that in three or four years it reaches an enormous size. The size of the spleen in many cases is considerable, reaching down on the pelvis from below the ribs, extending anteriorly to the navel and superior anteriorly interfering with the functions of the stomach and heart. In a case which I had under treatment, appearing in a lady of 38 who had it from infancy, the weight of the spleen could not have been less than between 15 or 20 lbs., but might have been more; her abdomen was of an enormous size, yet still the functions of the ovaria were not impeded, she became pregnant, and was safely delivered of a healthy child.

The symptoms characteristic of fever or ague-cake are

a sallow, dull countenance of a dirty-lemon or greenish colour, the mind very much affected, being apathetic, manifesting a perfect indifference to everything—the conjunctiva of the eye bloodless, the lips and tongue pale and blanched; the frame looks sickly, and slightly wasted; the bowels are irregular and the abdomen full; there are symptoms of dyspepsia, so that the individual loathes his food. When the organ becomes so large as to affect its neighbouring viscera, the symptoms become more remote, there is dry cough, palpitation of the heart, shortness of breath at the slightest exertion, and general anæmia.

The condition of the blood is much altered, being greatly depraved, containing a less quantity of fibrine, a diminution of the coloured corpuscles, and an increase of the white corpuscles; and, consequently, the system has a preternatural hæmorrhagic tendency, which may come on spontaneously; hence, we frequently meet with obstinate bleeding from the bowels, and bleeding from the nose and mouth. In a case lately under treatment, where the patient had ague-cake for nearly thirty-five or forty years, and was living in a very malarious district, the person suffered from excessive bleeding piles, his colour was grayish, and he was covered all over for months with large boils, which terminated in unhealthy troublesome bleeding ulcers; both of his legs were covered with one mass of sores, caused by the depraved condition of his blood; he became very irritable, unable to exert himself to any degree, and was extremely weak.

When chronic enlargement of the spleen has lasted for any length of time in an active state, besides the results already described, the patient is very apt to suffer from

dropsical effusions, which might terminate his life; also from sloughing ulcers on the legs from the most trivial injury; from pains, and not unfrequently collection of matter in the extremities; and in females from amenorrhœa. M. Piorry,* in describing the colour and appearance of patients suffering from severe cases of splenic disease, says that when the spleen has been long affected the skin presents a dull aspect; a grayish coloration presenting sufficiently well a light-coloured creole shade, but with colour less warm, and more ashy. It is in the integument of the face especially, that coloration is most remarkable; it is not the yellow-ochre colour of the icterus, nor yet the discoloration of chlorosis, but a special shade, which has been strangely called *bluish icterus*.

But it cannot be said that we only meet with cases of chronic inflammation or congestion of the spleen amongst Europeans in tropical climates, as I have, in many cases, met with the acute inflammatory disease among native children suffering from intermittent fever; not that the fever or the malarious poison is the active cause of it, but they place the organ in a congestive state, and with the exposure through their badly-clad condition and their careless habit of lying on a damp floor or mud, the mere congestion very frequently assumes an active inflammatory character; they complain of a sharp throbbing pain in the region of the spleen, or of a vague pain or uneasiness deeply seated in that region, increased by pressure; one little fellow whom I had under treatment for this disease had a knack of placing his hand beneath the margin of the enlarged

* "Traité de Diagnostique et de Lemerologie," p. 287.

spleen pushing it upwards and forwards, pressing it against his ribs and then crying out for the pain produced; the left shoulder sometimes participated in this uneasiness.

The pain is increased by coughing or lying on the left side; nausea and vomiting are amongst the most frequent symptoms, with uneasiness in the epigastrium; the inflammation, with the weight and fulness which is occasioned by the condition, generally affects the surrounding viscera, and consequently we meet with palpitation of the heart or irregular action; dyspnœa, and a dry irritating cough and constipation. The liver and kidneys sometimes sympathize with the spleen, and more complicated symptoms are then present; when pus has formed, rigors and cold night sweats are frequent.

There are various degrees of chronic enlargement of the spleen met with, which vary in size from the exposure to miasmatic influences, the length of residence in tropical climate, and the birth of the individual. In some cases it is very moderate and does not extend beyond the margin of the false ribs, but in other cases it is so large that it rests on the pelvis and extends to the mesial line in front.

Causes of Ague Cake.

The principal cause in the production of endemic enlargement or congestion of the spleen is frequent attacks of intermittent and remittent fevers; during the cold stages of these diseases, we have seen that the blood recedes from the surface and accumulates in the large internal vessels and organs; the spleen being composed of elastic as well as non-elastic fibrous tissue, is capable of being greatly distended with blood at this stage, which

becomes partially relieved on the cessation of the fever, the amount of reduction being in direct ratio to the healthy condition of the fibre; repeated attacks tend to weaken their activity or elasticity, and consequently lessen the completeness of the discharge. The retained blood ultimately produces organic changes in the structure of the spleen, and permanent enlargement is the result; this condition of course decreases or increases according to the effect produced by remedial agents. In the infant the enlargement increases more rapidly than in the adult, and we find them least capable of supporting the disease, because in them cell development is very active, and interchanges in the tissue necessary for their healthy growth are imperative, which this condition of the spleen interrupts, impairing the functions of assimilation, secretion, and respiration.

Independently of malarious fevers in districts where much miasmata is generated, in great proportion we find the inhabitants subject to enlargement of the spleen, occasioned entirely by the action of the poison; if our argument, that the primary effect of malarious poison is on the sympathetic system of nerves, be acceptable as correct, the explanation of this will be evident when we consider that the solar plexus of the nerves, which derive its sympathetic branches from the semilunar ganglion, supplies the organs which receive the greatest disturbance in malarious fevers; from it are derived the hepatic and splenic plexuses, each supplying respectively the liver and spleen, and governing the functional actions of these two principal organs which are most commonly affected during a prolonged cold stage. The malarious poison

may, therefore, be considered as affecting the sympathetic nerves, which communicate directly with these organs.

Chronic Splenitis has also been produced by prolonged congestion of the portal circulation, such as exposure to damp and cold, severe mental depression, overfull and stimulating diet, and excess in intoxicating liquors.

Pathology and Morbid Anatomy.

The pathological condition of the spleen after death does not generally show much; the peritoneal coat is sometimes found adhering to the neighbouring viscera, the fibro-cellular coat or tunica propria is found either homogeneously increased in its natural size, or is very friable and indurated, depending on excessive interstitial exudation of the plasma, probably of a character unfit for healthy nutrition. The whole of the structure of the spleen is variously enlarged, being sometimes excessive, sometimes very moderate, as we have before said; it is hard and oblong and soft to the touch. The substance is sometimes of a dark purple colour, and when softened consists principally of granular cells depending on degeneration of the splenic parenchyma.

In very severe cases where active inflammation had been set up, the examination of the spleen might lead to the discovery of a collection of purulent matter. Besides the above, we may meet with endocarditis, inflammation of the interior lining membrane of the heart, together with vegetations on the aorta and valves, coagula and other appearances. The blood is generally very much depraved, deprived of its fibrine and red corpuscles, and containing

an extraordinary quantity of the white corpuscle, producing the scorbutic condition noticeable in the disease.

Diagnosis and Prognosis.

The diagnosis of this disease is very evident, almost at sight, or by manipulation. The tumour is in the left hypochondriac region, in extreme cases extending to the pelvis, epigastrium, and even beyond the umbilicus, or it might be just below the false ribs; generally hard and smooth to the touch, having an alternated edge in front or internally, sometimes notched, and a smooth rounded edge externally. The enlargement is generally of an oblong shape, and placed just below the integument. Sometimes enlargement of the omentum and the left lobe of the liver, or tumours of the abdominal parietes might deceive us, but the position of the tumour and percussion will guide us in our diagnosis.

The prognosis is in the generality of cases very favourable, as there are many persons with enlarged spleen who have never suffered from any inconvenience, and they live to a very great age. But this is not always the case, especially when the individual is continually exposed to malarious influences. The symptoms are very unfavourable when the blood is so depraved, and the constitution so reduced that vomiting and irregular action of the heart, bleeding from the intestines and purging—a susceptibility to the occurrence of sloughing ulcers from the slightest injury, and to the collection of purulent matter in the joints, as well as restlessness and delirium—are induced. The person may be considered in imminent danger if proper remedies be not used.

Mortality of Chronic Splenitis.

In 1863, out of a force of 66,525 men stationed in the Indian Empire (Bengal, Madras, and Bombay) the admittance into hospital for Splenitis was 593, of which there were only 4 deaths, viz., 1 in 148½ died.

In 1861, out of a force of 57,082 men serving under the same command, the admittance was 372, and the deaths 2, viz., 1 in 186 died.

In 1862, the total strength was 64,355, the admittance was 451, and the deaths 3, or 1 in 150⅓ died.

In these observations Bengal seems to be more exposed, or to have suffered more from splenic diseases than the other Presidency, as shown in the following table:—

RESPECTIVE AVERAGE STRENGTH.

Dates.	Bengal.		Madras.		Bombay.	
1861	42,575		12,621		11,329	
1862	37,453		10,739		8,860	
1863	42,371		10,696		11,386	
	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
1861	341	3	57	...	52	...
1862	302	2	28	...	42	...
1863	457	3	36	...	10	...

The two following tables are from Sir R. Martin's work on the "Influence of Tropical Climate on European Constitution." We find in the first the number of admittances and deaths from Splenitis in the army during

several years; it will however, be observed, in the first place, that there must have been great error in the register, as many diseases which are complicated by the Splenic disease, such as Fever and Dysentery, are returned for these diseases, but not for the primary affection. The second table is a summary of the inquiry made by Mr. Dempster, of the Bengal Medical staff, who examined the spleen of a large number of the inhabitants living along the Great Ganges canal, which now unites the Ganges and the Jumna.

STATIONS.	Period of Observation (inclusive).	Aggregate Strength.	Number Admitted in Hospital.	Number Died.	Proportion of Deaths to Admissions.
Windward and Leeward Command	1817-36	86,661	104	3	1 in 34⅔
Jamaica	1817-36	51,567	59	...	0 ,, 59
Bahamas	1817-36	535	5	...	0 ,, 15
Honduras	1822-36	320	...	...	...
United Kingdom Dragoon Grds. and Dragoons	1830-36	44,611	5	...	0 ,, 5
Gibraltar	1818-36	60,269	21	...	0 ,, 21
Malta	1817-36	40,826	21	1	1 ,, 10½
Ionian Islands	1817-36	70,293	133	4	1 ,, 33¼
Bermudas	1817-36	11,721	2	...	0 ,, 2
Nova Scotia and New Brunswick	1817-36	46,442	19	...	0 ,, 19
Canada	1817-36	64,280	25	...	0 ,, 25
Western Africa	1819-36	1,840	166	7	1 ,, 23¾
St. Helena	1818-21 1836-37 (6 years)	5,908	1	...	0 ,, 1
Cape of Good Hope (Cape District)	1818-36	22,714	49	...	0 ,, 49
Cape of Good Hope (Eastern Frontier)	1822-34	6,630	5	...	0 ,, 5
Mauritius	1818-36	30,515	17	...	0 ,,17
Ceylon	1817-36	42,978	50	...	0 ,,50

How Irrigated.	Branch and Division.	Distance of Examination from Canal.	Per-centage of enlarged Spleens. Adults and Children of all Classes.	Per-centage of Adults suffering from Fever.			Average depth of water from surface of grounds in feet.
				1844	1845	1846	
Irrigated from the Western Jumna Canals	Delhi Branch....	Within half a mile of the Canal	58	51	45	41	11
		Distant more than half a mile	49	51	49	40	18
	Rohtuk Branch..	Within half a mile of the Canal	44	47	38	27	28
		Distant more than half a mile	29	34	35	27	48
	Bootana Branch ..	Distant more than half a mile.....	16	41	36	22	102
	Hansi Branch ..	Within half a mile of the Canal	39	50	41	22	92
		Distant more than half a mile.....	18	41	31	16	118
Irrigated from the Eastern Jumna Canals	Northern Division	Within half a mile of the Canal	20	27	39	27	8
		Distant more than half a mile.....	22	37	47	30	13
	Central Division .	Within half a mile of the Canal	59	63	54	31	8
		Distant more than half a mile.....	47	60	53	33	14
	Southern Division	Within half a mile of the Canal	25	48	40	17	24
		Distant more than half a mile.....	18	47	30	14	34
Irrigated from Wells in the high land of the Dooab	.....	....	8	37	31	20	24
Unirrigated	Sikh States	Connected with the Canal.....	44	47	52	26	..
		Unconnected with the Canal	29	43	61	30	..
	Delhi Territory	Unconnected with the Canal	11	32	28	11	88
	Northern Dooab .	High or Bungor Land*	3	32	30	13	46
		Ganges, Khadir†	21	41	42	28	25
		Near Head of Eastern Jumna Canal	6	35	43	27	..
	Naturally Malarious Localities..	Mijuf gurh jheels‡	44	42	59	57	15
		Valleys of Jumna and Hindun	34	46	42	31	14

* Bungor, the highland firm bank of the river bounding the Khadir.

† Khadir is the belt of the moist, low, and often fertile land found alternately on one or either sides of large rivers in these provinces. During the rainy season much of this land is submerged, and in it the river frequently alters its channel.

‡ Sheets—shallow pools of water, often very extensive during the rainy season.

Treatment of Ague Cake.

We must be guided in our treatment entirely by the state or condition of the tumour, whether it is only an indolent enlarged mass, or whether it shows signs of acute or sub-acute inflammation or congestion. When the former is the case, the indications for treatment will consist in—

1st. The use of such cathartics as will have a powerful revulsive action on the intestinal canal.

2nd. The use of tonics and alteratives.

3rd. Local applications.

In the second condition, besides the above—

4th. Depletion to a certain extent.

5th. Application of proper remedies to the diseases induced.

6th. Proper regulation in diet and regimen.

The first indication, viz., the use of cathartic remedies is very important in the treatment of this disease, as it is almost always accompanied by habitual costiveness; if the person has not been reduced to helpless debility and anæmia, the following brisk cathartic, composed of *jalap*, *aloes*, and *senna*, will greatly relieve the weight and tension induced:—

℞.—Pulvis jalapæ	℈j.
Infusum sennæ	℥iss.
Aloe socotrina	gr. iij.
Potassæ tartras acida	℈ss.
Pulvis zingiberis	gr. v.

Misce—fiat haustus.

When the liver is slightly enlarged, and there is little bile in the evacuation, two or three grains of calomel may be added to the mixture. It should be repeated

every other day, so as to keep the bowels always in gentle laxation; when the disease is accompanied by fever, *tartar emetic* will be found a suitable adjunct; I have found it aid the action of the purgative and increase the revulsive action on the bowels. When the patient is very much debilitated, a mild course of laxatives will be required; the dose of the above mixture will require to be greatly reduced, and beneficial results will be obtained without any reduction of strength.

The second indication consists in the use of *tonics* and *alteratives*. Of the tonic remedies, the *compounds of iron* first call our attention. I have often seen most decided effects follow from their use when the tumour is recent and not very large, but has so affected the constitution that the skin is sallow and dry, and the appearance anæmic, and there is great muscular debility. They seemed to have a direct effect on the spleen, the enlargement of which they reduce; they improve the digestion, and strengthen the whole system. The *tincture of sesquichloride of iron*, or *the pernitrate of iron*, I have frequently used in combination with quinine. In Bengal the *sulphate of iron* is used with equal benefit, given in combination with the cathartics either in powder or in the following, recommended by Mr. Shulbred, formerly surgeon to the native Hospital of Calcutta, half a century ago.

℞.—Pulvis jalapæ . . . . . }
Pulvis rhei . . . . . }
Pulvis calumbæ . . . . . } āā ℥j.
Pulvis scammoniæ . . . . . }
Potassæ bitartras . . . . . }
Ferri sulphas . . . . . ℥ss.

Misce—fiat pulvis.—Of which a quantity to move the bowels twice or thrice a day should be taken every other morning.

The sulphate of iron is given also in the liquid form, as in the following, after Dr. Twining:—

℞.—Pulvis jalapæ	
Pulvis calumbæ	
Pulvis rhei	āā ℥j.
Pulvis scammoniæ	
Potassæ bitartras	
Ferri sulphas	℈j.
Tinctura sennæ	f ℥iv.
Aqua menthæ sativæ	f ℥x.

Misce—A fluid ounce and a half for adults twice a day, at 11 a.m. and 6 p m. ; reduced for childre n in proportion to their age. To be continued for three or fou weeks, unless found disagreeable, or the patient becomes feverish.

Carbonate of iron has been found of great service, as well as chalybeate springs. The sulphate of quinine is another tonic very much indicated when the person resides in low, damp, malarious districts, and has had several attacks of, and is subject to, intermittent fever. When even the person escapes the fever but continues to reside in such a district, its administration will be found useful, and its efficacy is much enhanced by giving it in combination with the preparations of iron; from eight to ten grains must be given for a dose, and prolonged until reduction takes place. Other bitter tonics have been used, but with less efficacious results; but they may be employed as adjuncts to the most powerful remedies, such as extract of gentian, quassia, and calumbia.

Alteratives.—The most efficacious alteratives in this disease are the preparations of iodine; not that, when taken internally, iodine has a specific action on the organ, but from its general solvent power on tumours. The

iodide of potassium, or tincture of iodine, is the preparation generally used. Bromide of potassium has the same property as iodine. Common salt has the repute, according to M. Piorry, of effecting the reduction of the enlarged spleen; it does so whether in its normal state or when it is enlarged by disease. He recommends, or gives in his practice, from two to six drachms, dissolved in ten times its weight of water.

Local applications.—The iodine paint is a favourable remedial application, it is made of iodine, iodide of potassium, and spirits; it should be applied twice a-day, unless the skin be very tender or blistered.

R.—Iodinii	℥j.
Potassii iodidi	℈ij.
Spiritus vini rectificati	f ℥j.

Misce—fiat pigmentum.

When there is a suspicion of acute inflammation going on, and the patient is not much reduced in strength, and his system does not assume that scorbutic or cachectic condition whereby local irritation might induce sloughing ulcers, the application of a blister is serviceable.

But of all the local remedies, the greatest benefit will be derived from the local application of the *ointment* of the *biniodide of mercury*, especially when the enlargement is stubborn to all remedial agents. "In no case," writes Professor Maclean, "has it been inefficacious; in some the effect of the remedy has been very striking, reducing the enlarged organ with great rapidity to nearly its normal dimensions." This result he obtained from the most unpromising cases—from men whose constitution had been dilapidated by long residence in malarious districts.

I have employed the biniodide of mercury pretty extensively in the tropics, but not with such happy results as Professor Maclean—possibly because the circumstances were different, my cases being invariably confined to persons residing in malarious districts. In recent enlargements, or enlargement of a small size, the remedy reduces the spleen rapidly—sometimes within a month—to its natural size, and it remains so for a long or short period, according as the individual is exposed to malarious poison, and the number of attacks of ague he may have had subsequently. The enlargement, which commences after the reduction by the remedy, is not so gradual as the primary disease, but is rapid until the spleen attains its former size, when it becomes somewhat stationary, and increases gradually.

When the enlargement has lasted for several years (and in some of the cases which I treated, it had existed for various periods between twenty and forty years), the effect of the ointment I have not found quite decisive—perhaps on account of the enormous size of the organ, which, judging from outward appearance, would weigh some ten, others fifteen, and one about twenty pounds. After the second application, I find generally a perceptible diminution in size, the difference by measurement being in some cases around the abdomen an inch-and-a-half; in others two inches; and in others, again, two-and a-half-inches; the appetite improved, the complexion becomes brighter, and the individual expresses himself as feeling lighter and better, and entertains a hope that he, or she, will be ultimately cured. During their external treatment I give internally the pernitrate of iron, and

sometimes the bromide of potassium. After a time the application seems gradually to produce no effect, and after one or two attacks of malarious fever, the spleen returns to its former size. I have observed the application of the strong ointment to produce considerable pain; and in cases where the skin is very thin and tender, the pain is excruciating and unbearable; in one case it set up severe dysenteric symptoms with tormina, tenesmus, and bloody mucous stools. The officinal preparation of the ointment is—

℞.—Hydrargyri iodidi rubri . . . . } āā ℥j.
Unguentum simplicis . . . . . }

Misce.—This is very strong; half the quantity of the iodine would answer for ordinary cases.

Mode of application.—Let a small piece of the ointment, about the size of a nutmeg, be placed over the enlarged gland, with a spatula, or the shank of a spoon, and well rubbed in for three or five minutes, and the patient be ordered to expose his side to the direct rays of the sun as long as he can endure it, until it begins to smart: half the quantity is then applied over the tender surface. It will then blister; this should be dressed in the simple form; after two weeks the process is to be repeated, and three or more applications will be found, in a stubborn case, necessary. The remedy should be aided by the internal use of chalybeates and quinine.

When the liver is also enlarged, the local use of the nitro-muriatic acid as a bath has been strongly recommended by many tropical physicians. There is no remedy which can at all be compared in power and efficacy to the persevering use of this bath, using the combined acids

internally at the same time with bitter infusions, and keeping the bowels freely opened. Here, owing to the hepatic complication, quinine and chalybeates prove ineffectual to the cure of the splenic, while they injure the hepatic disease." (Martin.)

Other local remedies have been tried with marked effect, such as friction with croton oil, warm bath, the use of a flannel bandage around the abdomen to keep an equable temperature, iodine ointment, and tartar emetic pustulation.

The fourth indication, viz., *depletion* to a limited extent is required, but only when there are symptoms of acute inflammation going on, which must be speedily arrested; when there is sharp, throbbing pain in the spleen, extending to the left shoulder, interfering with respiration and the action of the heart; when there is great tension and tenderness in the splenic region, with a feeling as if the substance would burst ; or when the pulse is strong and bouncing, and the patient in hot fever ; otherwise it should never be practised. Even in these cases general blood-letting is counter-indicated, as it might lead to subsequent great reduction of strength; but local depletion by cups and leeches should be employed, and followed by brisk cathartics as already described ; or the French method of applying the leeches to the anus might be used when there is no hæmorrhagic tendency.

The fifth indication is the *application of remedial means to the diseases induced.* One of the most frequent concomitants of splenic enlargement of long standing, where the individual still resides in malarious districts, is a *hæmorrhagic tendency;* bleeding from the anus is fre-

quent and distressing, the breaking out of boils all over the body, especially on the lower extremities, which bleed occasionally, the skin becoming preternaturally thin and tender, easily bruised by the slightest friction, and bleeding profusely.

In these cases, the most useful remedy will be obtained in the combination of tonics, aperient and astringent, as will be seen in the following:—

℞.—Magnesiæ sulphas	℥iv.
Ferri sulphas	gr. viij.
Quiniæ sulphas	gr. xii.
Acid. sulphuricum dilut.	f ℥iss.
Syrupus zingiberis	f ℥i.
Tinctura ejusdem	f ℥ij.
Aqua pura	f ℥viij.

Misce.—One-eighth part to be taken twice a day.

Should this not speedily stanch the bleeding, the sulphuric acid should be increased.

One remedy, which has a powerful effect in restoring the broken down constitution, is the persistent use of a combination of cod-liver oil, quinine, and iodide of iron; these substances have a very decided tonic and alterative effect on the system, and purify the blood to such a degree, that the anæmic condition is corrected. In the tropics, where the stomach is generally in a condition repugnant to nauseous remedies, I have found it difficult to keep patients long in its use, as both that organ and those of digestion soon become deranged; Fox's palatable cod-liver oil, I have tried and found agreeable to the taste, and after a long use there is not that repugnance exhibited as with the ordinary oil; its nutritive and tonic properties are equally good. When it could be obtained, the palatable cod-liver oil, with quinine

and half a drachm of syrup of iodide of iron added to each dose, will answer the purpose.

Dropsy is not an unfrequent concomitant in extreme cases of this disease, and when it does occur, powerful diaphoretics, diuretics, and mild aperients should be used in combination with the tonic remedies.

The following diuretic mixture is generally effectual:—

℞.—Spiritus ætheris nitrosi	ana ℥iv.
Potassæ acetas	
Acetum scillæ	
Tinctura digitalis	f ℥ss.
Aqua pura	f ℥viiss.

Misce—Fiat mistura.—One ounce to be taken three times a day.

Diet and Regimen.—The diet should be light and easily digestible, and when there is acute congestion, it should be farinaceous, or consist of vegetables with a little milk; fat and oil should be permitted, but very little meat. When the tumour is in the chronic passive condition, and the healthy composition of the blood much impaired, nourishing diet, consisting of light animal food, with vegetable diet, will be required to keep up the strength and supply materials to the blood.

Moderate exercise should be taken in the open air; but the exertion should not be such as to fatigue the body; violent exercise, or occupation requiring great straining should be avoided, as rupture of the spleen or inflammation might supervene, increasing the severity of the symptoms. The clothing should be warm, so as to keep the parts from too sudden effects of cold air; removal from malarious districts, and a change of air to a purer atmosphere, such as a long sea voyage, will be found to be one of the greatest adjuvants in the treatment.

PART III.

CONSTITUTIONAL AND OTHER DISEASES.

GENERA.

I.—ANÆMIA.

ANÆMIA—A WANT OF BLOOD.

II.—BERIBERI.

BERIBERI—THE BAD SICKNESS OF CEYLON, OR THE SLEEPING SICKNESS OF AFRICA.

III.—CHRONIC RHEUMATISM.

RHEUMATISMUS CHRONICUS—CHRONIC RHEUMATISM.

IV.—DELIRIUM TREMENS.

EBRIOSITAS—TREMBLING OR DRUNKARD'S INSANITY.

V.—SUN-STROKE.

INSOLATIO—SOLAR APOPLEXY.

VI.—GOITRE.

BRONCHOCELE—DERBYSHIRE NECK.

VII.—GUINEA-WORM.

DRACUNCULUS VEL FILARIA GUINIENSES—GUINEA OR HAIR WORM.

VIII.—YAWS.

FRAMBŒSIA—YAWS.

IX.—BARBADOES LEGS.

ELEPHANTIASIS ARABICUM—ELEPHANTIASIS OF THE ARABIANS.

1.—ANÆMIA—A WANT OF BLOOD.

Anæmia* is most generally the result of nearly the whole of the tropical diseases already described, and in many cases it may be present in individuals who have been for some time in the tropics without suffering primarily from any severe form of tropical fever or other acute or chronic disease. Its symptoms are generally very much aggravated when it is the result of severe wasting disease.

Symptoms and Progress.

The symptoms of Anæmia in tropical invalids are generally well marked; the patient has a most ghastly appearance, with a general paleness of the whole surface of the body; the face is sallow, waxen, and sometimes puffy; the conjunctiva of the eyes very pale and whitish, but sometimes has a bluish tinge; the veins are plainly seen through the skin; the ends of the fingers are almost translucent; the mucous membrane of the gums and other regions of the mouth of a pale whiteness; the tongue pale and much relaxed; the individual is very peevish and irritable; "the mind is irresolute, feeble, and

* *A*, privative; *ἁιμα*, blood.

despondent; the memory impaired;" and the patient sometimes complains of vertigo and dizziness.

The circulatory system is generally very much disturbed; the heart's action is irregular and feeble; the impulse is weak; palpitation is of very frequent occurrence and easily induced; it is sometimes irregular and intermittent. In most of these cases I have noticed the pulse beat regularly, from 75 to 80 in the minute; in some cases, however, it is very frequent and small, but ordinarily it is full and feeble; the least exertion excites it and makes it very tremulous.

The respiration is generally quick and very easily accelerated at the slightest exertion, "the abdomen in many cases is timid, non-elastic, and congested; the skin is harsh and constricted to the touch, and of a temperature generally below the natural standard; the digestion is feeble and depraved; the processes of depuration are imperfectly performed;" there is much thirst; and in prolonged cases, the feet and ankles become œdematous.

The nervous system seems to suffer greatly; besides vertigo and dizziness, the individual is subject to fainting fits; in extreme cases, however, singing in the ears and other symptoms of extreme debility supervene, and convulsions may result. Sometimes, pains in the abdomen are complained of, increased by pressure, sometimes in the epigastric region, but more frequently in the right hypochondriac region; these pains are neuralgic in character, and may depend on a "morbid sensibility of the nervous system," induced by the loss of blood. In a very severe and prolonged case, the patient very often becomes delirious at night.

Connected with this disturbed state of the nervous system are several murmurs or pulsations which are only peculiar to anæmic patients; these are the arterial murmurs, which are soft, blowing, somewhat sharp sounds heard in the carotid and subclavian arteries, but these are not constantly met with in anæmic patients in the tropics; commonly the cardiac murmur is heard, varying in character and force, of a bellows murmur synchronous with the ventricular sound of the heart; "the position where these systolic cardiac murmurs is best heard is of some importance, as indicating anæmia rather than disease of the heart. They are heard towards the base of the heart in anæmia, rather than towards the apex, as in organic diseases of the valves." A third kind of *anæmic murmurs* or pulsation is that heard over the large veins, such as the jugular; the murmurs are generally of a humming, buzzing nature, which are increased when respiration is interrupted.

The excretory system is generally in a very unsatisfactory state; the action of the kidneys is incomplete, the urine scanty, pale and neutral (the free acids being lessened); the pigment matter much diminished, the bowels costive; the alvine evacuation contains little or no bile; the action of the liver is feeble and much diminished; the stomach sometimes enlarged and dyspeptic; the skin dry and harsh, but in some few cases, I have noticed occasional profuse perspiration.

Pathology and Morbid Anatomy.

The term anæmia has been justly regarded as deceptive in its application in this disease, as it signifies *a want o*

blood; whilst it should properly be *spanæmia** or *poverty of blood;* there being a deficiency of certain of the constituents of the blood.

The blood of the tropical anæmic patients, when examined, is found to contain a diminished quantity of the red corpuscles; there is a morbid alteration in its various constituents. "The altered appearance of the blood," writes Mr. Twining, "in many of those fevers which arise from exposure to the malaria of the jungles, is very remarkable, and merits careful investigation. Connected with this morbid condition of the blood, there appears occasionally some corresponding disorder of the solids, and particularly of the vascular system, which favours prolonged and profuse oozing of blood from leech bites;" it coagulates sparingly, leaving a large quantity of serum, which is but slightly coloured. When Anæmia is produced by severe hæmorrhage, not only are the red blood corpuscles diminished, but the fibrine is also diminished to a certain extent; but the albuminous and fibrinous constituents are more easily elaborated from the constituents of the body than the red corpuscles, so that they are always relatively in excess.

Certain murmurs already described are heard in the great blood vessels, and slightly in the heart. Dr. Hughes Bennett and Dr. Ogier Ward believe that the seat of these anæmic murmurs is in the jugular veins, and rest their argument upon the four following reasons:—

1st. That the continuous murmur is often consistent

---

* σπανος and ἁιμα.

with distinct carotid impulse, which alternates with repose.

2nd. That it may be interrupted by pressing the vein above the stethoscope.

3rd. That the two murmurs may be occasionally heard by employing a small-ended stethoscope, and shifting it slightly to the right or left.

4th. That it is increased by any cause which accelerates the flow of blood through the jugular vein, as during the act of inspiration; and when in upright posture, it is diminished when there is an impediment to the venous circulation, as during expiration, the recumbent posture, and when the veins are swollen or turbid.

Dr. Hughes Bennett, however, admits that in some cases arterial murmur is heard, but the separation from nervous murmur is very difficult.

According to Andral, these murmurs are produced by diminution of the red corpuscles when it falls below 80 parts in 125. But according to Dr. Davies it is produced by friction of the inner surface of the veins "which is more or less audible, according to the readiness with which their parietes take up vibration, and the facility with which the latter are conducted to the outer surface of the body;" they are therefore frequent in quick circulation with thin blood, and absent in slow circulation with full blood.

The whole of the tissues of the body seem to suffer from Anæmia; the muscles are thin and flabby; the veins are empty; the blood is watery, with very little clot; the heart pale and dilated; the liver, spleen, and kidneys are very pale and flabby. Associated with this condition there

may be many diseased states of the system discovered in the post-mortem examination.

Causes of Anæmia in the Tropics.

1. *The causes are a sequela to other tropical diseases, such as intermittent, remittent, and yellow fevers, dysentery, diarrhœa, cholera, and various forms of affection of the liver and spleen.*

Every physician in the tropics must observe how difficult it is to rally some patients who have suffered from one or other of the diseases already described; they become extremely weak, and of a deathly pallor with disturbed circulation, and although the best prescribed means are administered, these seem for a long time not to produce any material result. This is more so when the patients are allowed to remain in those localities where the primary poison is still rife. The blood becomes very much impoverished through the poison in the system, the blood corpuscles are much diminished, and, consequently, there is diminished oxygenation of the blood; the circulation is very much quickened; there is diminution of the animal heat, and Anæmia is the result.

2. *Abstraction of blood, either by leeches or general blood-letting.*

Some years ago it was a general thing to bleed freely in almost all diseases of the tropics. When leeches are used, several are applied at once, or at various times. Sir R. Martin relates a case where from December, 1849, to January, 1851, fully 1,200 leeches, *at the least,* were applied on one patient; and in another case there were no less than 3,000 leeches applied on a patient within the

space of six years. If we believe Annesley, that the Indian leech abstracts an ounce and a quarter of blood, besides what flows from the lutes, the quantity of blood abstracted must have been enormous. This has a most powerful effect in reducing the system, especially one which has suffered previously from wasting intertropical diseases; Anæmia follows in consequence.

3. *Malaria of itself, without any actual tropical diseases.*

This is sometimes the case in persons who have resided for a long time in malarious districts; this is called the *paludial cachexia,* or, according to Sir R. Martin, "*cachexia loci.*" The malaria here acts directly in impoverishing the blood, and the functions of the whole body then suffer. European females of the higher class, though far less subject to the more formidable of the tropical diseases than males, are very liable to become anæmic; and this, as Sir R. Martin justly remarks, depends on the long and continuous disturbance of the nervous vascular and secreting functions by malaria.

Anæmia, therefore, as an independent constitutional disease, may be produced by the following conditions, as given by Aitkin:—

1. Copious loss of blood, such as hæmorrhage, or venesection, or oft-repeated small losses of blood.

2. From loss of other fluids of the body besides blood, especially of such as contain albuminous, fibrinous, mucilaginous or caseinous substances, such as the excessive secretion of milk in protracted suckling, suppuration, profuse blennorrhœa, leucorrhœa, and diarrhœa.

3. From insufficient and improper nutriment, or from disturbance in the absorption and assimilation of food,

and the process of sanguification; or from repeated temporary interruption to oxygenations of the blood, as by imperfect ventilation of sleeping-rooms or coal mines.

4. It may result from the co-operation of many influences—for example, excessive bodily and mental labour; continued excitement; pain, care, grief, hardships; many acute and chronic diseases, some of which augment the consumption of blood, while others impede its formation.

In the tropics I have known excessive smoking to have led to a condition closely bordering on Anæmia.

Diagnosis and Prognosis.

In the male subject true Anæmia is very easily distinguished; but in the female it may be mistaken for another form of Anæmia, called Chlorosis. Bequèrel has endeavoured to draw a distinction between these two forms. Chlorosis is connected with a disturbed condition of the nervous system, produced by uterine disorder; anæmia, by whatever cause which impoverishes the blood. In Chlorosis the blood is not always depraved; and, if it be so, it forms only a symptom of the disease. In Anæmia, on the other hand, this condition of the blood is constant and pathognomonic. In Chlorosis there is no relation between the intensity of the symptoms and the poverty of the blood; in Anæmia this is essentially the case. In Chlorosis the functional sounds are heard in the veins; whilst in Anæmia they are heard in the arteries. In Chlorosis the duration and progress of the disease is seldom dependent on the causes which produce it; in Anæmia this is always the case. (Bennett.)

The prognosis of tropical Anæmia is generally favourable; but when the quantity of blood abstracted is very large, and the patient continues to remain in the original malarious district without taking a change, a fatal result may not unfrequently be the termination. There is a great want of energy manifested in the nervous system; the patient loses his memory, dozes all day, becomes slightly delirious; his heart flutters, his respiration disturbed; restlessness and furious or low muttering delirium supervene, and the patient dies exhausted.

Treatment of Tropical Anæmia.

There are three considerations which are necessary in the treatment of this disease, viz., 1st, the use of such remedies as will increase the tone of the system, and rapidly supply the lost blood cells; 2nd, the general management of the patient as regards food, exercise, &c.; 3rd, the employment of means to relieve the nervous excitement.

In the first consideration, our best remedy lies in the use of appropriate chalybeates. The preparations of iron have a wonderful and decided effect in restoring the solid constituents of the blood, especially its red particles, and consequently it is our principal remedy in Anæmia.

The *sulphate of iron*, in combination with bitters, I have often found to answer admirably in the tropics, given in from five to ten grains three or four times a-day.

R.—Ferri sulphas . . . . . ℥j.
Extractum gentianæ . . . . . ℈ss.
Extractum cinchonæ . . . . . ℥ij.
Misce—Fiat massula et divide in pilulas xij. One to be taken three times a-day.

In females, however, who have sometimes derangement of the uterine organs connected with the malarial cachexia, one drachm of the *pilula aloes cum myrrhâ* should be added to the mass, and the extract of cinchona might be omitted.

When the patient is suffering from Chronic Diarrhœa, and an astringent as well as tonic remedy is required, a solution of the tincture of perchloride of iron in ten to twenty minim doses is an excellent and reliable remedy, especially when administered in combination with infusion of quassia and tincture of calumba, it checks the diarrhœa, improves the appetite, and gives tone to the system. When, as in delicate females and children, this remedy is found to irritate the stomach, the *saccharated carbonate of iron,* in the form of *mistura ferri composita* (one or two ounces a dose) or in the form of the *pilula ferri carbonates* (five to twenty grains in twenty-four hours) makes a valuable substitute. (Aitkin.)

In cases where the Anæmia is produced by exposure to malarious districts, and where it is a sequel to malarious fevers, the most valuable preparation is the *citrate of iron and quinine,* given in ten-grain doses, either in the form of pills or mixture; I have most frequently given it in the latter form, either singly or in combination with *rhubarb,* and the compound *infusion* of gentian when there is a tendency to constipation.

In the *general management of the patient* we should be careful that all the functions of the body are properly attended to; where there is habitual constipation or a tendency to that, the bowels should be kept open with aloetic pills; or the compound rhubarb pill may be taken

every night. If the appetite be bad, suitable means must be given to improve it; the patient should be kept in cheerful company, and any circumstance which might produce despondency should be kept away from him.

Exercise.—Gestation in the open air will be found a great adjunct to the remedies which the patient is taking; but great care must be observed that he be not exhausted. Exercise must be moderate, either on foot or horseback, but it should be in pure, good air, in mountainous regions, where the sea-breeze mingles with the pure mountain air.

Diet.—The diet should be light, easily digestible, and very nutritious; but the patient should be temperate in its use. A moderate allowance of good port wine, or good cognac, is to be granted daily to the patient.

The room in which the patient sleeps should be well ventilated and airy; but the temperature must be kept as equable as possible. It will be found necessary in many cases to combat the *severe nervous derangement* which is produced by this disease. As sometimes the patient suffers most severely from spasms, at other times from neuralgia, great relief will be obtained by occasionally administering some anti-spasmodic remedies, such as the *compound tincture of valerian,* and the *tincture of assafœtida,* or some narcotics, as the *hydrate of chloral, conium,* or *chlorodyne.*

A cold shower bath every morning is an excellent tonic and restorative in anæmic cases.

When the Anæmia is very great, and accompanied with great prostration of strength, the greatest advantage will be obtained by employing *blood as an article of diet.*

In fact, it is most beneficial in all debilitating diseases; in the prostration produced by tropical fevers; in the weakness of Chronic Dysentery and Diarrhœa, and in that anæmic state which is very often the result of disease of the large glands of the organism, viz., the liver and spleen.

Dr. Emil. Querner, of Philadelphia, recommends the following mode of making a good dish of blood. *Take of one quart of fresh drawn calf's blood, one pint of milk, three eggs, salt, pepper, and marjoram.* Stir the whole together properly, and then bake in an oven. The blood of any cattle or poultry might be used; oxen, calves, goats, sheep, chickens, turkeys, guinea-fowls, and geese will furnish excellent blood diet; if when the blood is fresh drawn, it be whipped and put in a stoppered bottle, it will keep for several days.

II.—BERIBERI.

THE BAD SICKNESS OF CEYLON, OR THE SLEEPING SICKNESS OF AFRICA.

Beriberi is a peculiar diseased state of the system found in inter-tropical countries, sporadically in Africa and America under certain conditions, but endemically in the Malabar coast, Ceylon, and in Northern India. It has been described by Farrell, Dick, Ridley, Wright, Evezard, Christie, Hunter, Waring, Malcolmson, Geddes, and Trail. The term Beriberi was applied to a disease of a complicated nature, with a predominance of Anæmia, by the Malabar physicians, and is derived from the Singalese *beri,* weakness; and *beriberi,* extreme weakness.

Symptoms and Progress.

The most characteristic symptoms of the fully developed disease is extreme and universal weakness, great prostration of the powers, anxiety and oppression at the præcordia, great difficulty of breathing, numbness of the extremities, and general Anasarca. The disease generally commences very insidiously, after a long residence in places where it is endemic, and manifests itself in a mild case by slight stiffness and numbness of the lower

extremities, and a gradual swelling of the feet and ankles, which pits on pressure; there is little or no constitutional disturbance, the skin is soft and moist, but slightly increased in temperature; the pulse is not increased, but fuller and stronger than natural, though it sometimes presents no deviation to the natural standard; the bowels irregular, the tongue coated with a whitish fur, unhealthy and flabby, and the appetite good. These symptoms may remain stationary for a time, but subject to increase by atmospheric variation. If the weather become wet and damp, and the individual is exposed to it, or sleeps in a damp, unventilated mud hut, or lies on damp ground, the active symptoms of the disease manifest themselves; the lower extremities, instead of being only stiff and benumbed, feel heavy and rigid, then become paralyzed, and progression is entirely impeded; the œdemia extends from the lower to the upper extremities; soon afterwards there is general Anasarca with the face bloated; there is numbness over the whole of the sentient surface, as well as the mucous membrane of the mouth; the skin is hot and dry, the aspect scared; the urine high-coloured and scanty, having a specific gravity of 1025 to 1040, of an acid reaction, very hot when passed through the urethra, and at an advanced stage of the disease entirely suppressed. The bowels are generally constipated; there is always a sense of pain and tightness at the pit of the stomach referable to the ensiform cartilage; the breathing becomes very difficult and catching, so much so that lying produces almost suffocation, and in consequence there is great anxiety and restlessness; there is pain in the region of the heart, with a rapid, full arterial, and

diffused cardiac pulsation; the pulse is irregular, variable, and fluttering; but in some cases, where there is marked effusion of serum in the brain, the pulse is slow and full, and head symptoms, such as restlessness, headache, and delirium, manifest themselves; and the individual may die suddenly, either from syncope or from venal embolism.

The disease may terminate favourably, leaving in some cases a trace of its unpleasant symptoms, and convalescence is marked by impairment of the memory, fluttering of the heart, inducing occasional fainting fits, violent palpitation, extreme weakness and faintness, and violent beating of the large arteries. A chronic or asthenic form of the disease is generally observed among persons who have suffered previously from the acute type, or who, labouring under a cachectic anæmic condition, are exposed to the morbific influence in places where it is endemic; the symptoms are more sub-acute, the dropsical effusion is more general; the most prevalent form is ascites, the bowels obstinately constipated; the impulse of the heart weak and flabby, although the pulse is small and quick; the urine is scanty and high-coloured, the appetite impaired; there is a slight bellows sound heard in the heart which is not persistent, more or less extensive œdema of the upper and lower extremities which pit on pressure, and partial or total paralysis of the extremities. The individual may even recover from this condition so as to be able to move about, but the œdema still remains; in one chronic case that I saw, the dorsa of both feet were very much œdematous, so that the toes were almost covered; the œdema extended beyond the ankle, the gait was very unsteady, and there was great weight in walking

about; the mind was very much impaired, and the individual spent most of his time in sleeping; there was a great deal of listlessness, the appetite was generally bad, and the bowels obstinately constipated.

Pathology and Morbid Anatomy.

The phenomena of Beriberi are decidedly those of Anæmia in its exaggerated form, but of a very peculiar nature; its attack and advance in the system is *sui generis* and insidious, and may be the result of exhaustion and debility. It is a disease of damp and moist cold atmosphere, occurring sporadically in various parts of the tropics among people on the alluvial banks of rivers, who sleep in damp, ill-ventilated huts.

Posthumous examination exhibits serous effusion in every part of the body, in the pleura and pericardium, the areolar tissues of the heart and lungs, the ventricles and surface of the brain, the peritoneal cavity, the areolar tissue of the whole body, congestion of the blood-vessels, and effusion of flux in minute quantities in the substance of the spinal cord, causing the peculiar gait, and paralysis of the extremities depending on the quantity effused. According to Waring, the kidneys are enlarged, softened and anæmic; the heart enlarged, flabby, pale, and softened; and the lungs œdematous.

Causes—Predisposing and Exciting.

Whatever tends to reduce the constitution of the person into an anæmic condition predisposes to the disease—*vide* chapter on Anæmia. Long residence in a place where the disease is endemic; it generally shows

itself between the eighth and tenth month of residence; the aged and debauched are very liable; persons in sedentary occupation such as tailors, shoemakers, and soldiers; insufficient food both in quantity and quality; the effect of malaria on the system. The exciting cause may be traced to the soil, as the disease is principally endemic in places where the soil abounds in saline materials, such as magnesia, lime, chlorides, alumina, and iron. When water, impregnated with these substances from the soil, is used, all the conditions necessary for the development of the disease being present in the system, some in-bred morbific matter is developed leading to the phenomena of Beriberi.

Diagnosis, Prognosis, and Mortality.

This disease was supposed by Ranking to be granular disease of the kidneys with albuminuria, but the characteristic phenomena of the complaint prove it to be different, which Evezard gives as debility, cold extremities, palpitation, dyspnœa on the least exertion, frequent small and quick pulses, bruit occasionally heard in the neck, scanty urine, torpid bowels, and death-like pallor of the tongue : the condition of the kidneys after death, as well as the peculiar nature of the effusion, is very much against its being kidney disease. The prognosis is favourable when the disease occurs in the strong and robust—in one who has not lived a life of debauchery—in the young; when the symptoms are subacute, the œdema and numbness are gradual, and when there is not a preternatural disturbance of the functions of the body; unfavourable when all the symptoms are exaggerated,

the pulse weak, irregular, and easily compressible, the bowels obstinately constipated, the tongue dry and furred dark brown, the breathing heavy, quick, anxious, and interrupted with sighs and groans, and coma or delirium supervenes.

Beriberi is one of the most fatal diseases in tropical countries where it is endemic, and death generally takes place most suddenly, either by syncope or by embolism. In Northern India, amongst Europeans, the ratio of deaths is above 26 per cent. to 14 per cent. of Sepoys; but in the Indian jails, it is, according to Waring, 36·5 per cent.

Treatment.

In India, a thick soft black electuary, sold in India by the name of *Treeak Farook*, whose composition is unknown, is very much prized. Very little fluid should be used when employed. It is more useful in the chronic or asthenic cases where there is paralysis. Dr. Malcolmson recommends the following prescription :—

℞.—Pulvis rhei	ʒijss.
Treeak farook	ʒss.
Confectio aromat.	ʒss.
Mellis	q. s.

Misce—et divide in pil. xlviij. sumat. ij—iij. nocte maneque.

Slight purging takes place daily, and after a few weeks all the symptoms gradually subside—the œdema, numbness and paralysis, palpitation of the heart, anxieties, &c.

Other diuretic remedies and drastic purgatives are also recommended : such as acetate of potash in gin, extract

of elaterium with extract of gentian, or the following mixture :—

℞.—Tinctura Scillæ	f ℥ij.	
Tinctura camphoræ c̄ opio	ana f ℥iv.	
Liquor ammoniæ acetatis		
Decoctus Scoparii	f ℥viij.	

Misce—One sixth part to be taken three times a day.

Tonics are of great use—such as the perchloride of iron, and the remedies recommended in Anæmia. Nux vomica in doses of two grains daily has been successfully employed; spirits of nitrous ether, ammoniacal wine, frictions with warm camphorated oil, and a very nourishing diet, are all useful remedies.

III.—CHRONIC RHEUMATISM.

Rheumatism is an affection which is accompanied by an increased development of lithic acid in the blood, producing a peculiar inflammation of the fibrous tissues in almost every part of the system, but principally about the joints. It has a tendency to shift from one joint to the other, and might attack internal viscera, at which time it becomes dangerous to life.

There are three forms of Rheumatism described by authors, viz.—the *Acute*, *Sub-Acute*, and *Chronic*. In tropical climates Acute Rheumatism is seldom met with, but the Sub-Acute and the Chronic forms are the two most prevalent. In the first the local inflammation is less violent, unaccompanied with fever, and in the second there is but slight local inflammation. I shall, however, consider these two forms as one,—viz., Chronic Rheumatism, as, in the tropics, these two very easily pass from one into the other.

Symptoms and Progress.

In the tropics Chronic Rheumatism most commonly arises as a primary disease, commencing with a dull aching pain in one or two joints, with slight inflamma-

tion, or pain and soreness in some particular muscles; there is little or no fever, but a feeling of general uneasiness, and no great functional derangement. The local pain might be slight at first, the patient remaining in comparative ease except when the joints are moved, and then he complains of it being excruciating. Sometimes this pain is only felt at night, the individual being relieved during the day. The joint not unfrequently becomes enlarged by the effusion of synovial fluid in it, producing bulging which is not very tense or elastic; this occasionally takes place in the knee. This pain often shifts from one joint to the other within the course of the day, and when continued for any length of time produces stiffness and deformity. In severe cases the joints become frequently fixed, the knee or elbow semi-flexed, the fingers straight or bent, which often lead to atrophy of the muscles.

There is always more or less increase of the heat of the affected part, which fluctuates with the degree and intensity of the pain, but not at all to be compared with the temperature in Acute Rheumatism. Sometimes Chronic Rheumatism, when the subject of it has been too long exposed to the cause of the disease, attacks the smaller joints of the hands and feet, leading at first to distortion of various degrees, and then to a deposit of lithate of soda, as in the case hereafter quoted.

Chronic Rheumatism may attack the muscles, or the aponeurotic sheath covering them, leading to a feeling of soreness at first, which increases, when the muscle is moved, to a dull aching pain; in others the patient first becomes sensible of the complaint by a very severe,

sharp, lancinating pain, which seizes the muscle upon some occasion when it is suddenly called into action, as upon attempting to rise from the sitting posture, to turn in bed, or to lift a burden. The pain is sometimes so excruciating that the patient is unwilling to repeat the motion, and when the part is necessarily moved, as in respiration, coughing, &c., the suffering is very great.

In cases of severe Chronic Rheumatism of long standing, the muscles generally waste away, shrink, and become atrophied. In the ordinary form the disease is apt to shift from the joints to the internal organs, and may lead to severe and dangerous complications, causing what is known as *Metastasis*. There is generally strong constitutional tendency and weak local affection, so that it is very apt, from slight causes, to attack any of the internal organs, such as the heart, the stomach, &c. When the disease attacks a particular muscle or aponeurosis, it receives names according to the seat. Thus, when it attacks the fibrous sheet, or the walls of the chest, it is called *Pleurodynia ;* when the muscles in the loins form the seat of the disease, *Lumbago ;* when the muscles in the abdominal parietes, *Gastrodynia ;* when the muscles in the back of the neck, *Torticollis* or *Wry Neck ;* and when the muscles on the back of the thigh, *Sciatica*. I shall consider each of these affections, as they are of frequent occurrence in the tropics, and may be confounded with other diseases of a more serious nature.

Pleurodynia—Rheumatism in the Walls of the Chest.

In this complaint the intercostal muscles and their fibrous expansions are affected, causing pain which is

sometimes severe and acute, at other times dull and disagreeable, shifting from one side to the other. Commencing in the infra-maxillary and infra-mammary regions of the left side, it is soon felt in the right, and sometimes on both sides. A patient often presents himself complaining of catching breath, severe pain on moving the chest either by inspiration or coughing, with no great constitutional disturbance, but pain on pressure over the ribs or inter-costal spaces. The pain is sometimes very excruciating, and associated with pains in other parts of the body.

Pleurodynia, when severe, greatly resembles Pleurisy, especially in its congestive stage; and, in some cases, as when it is accompanied with slight fever, the diagnosis becomes very difficult, and for some time uncertain. It is distinguished from Pleurisy by the absence of severe constitutional disturbance, and by the physical signs which are characteristic of Pleurisy; by the increase of the pain at the motion of the affected parts, "as in raising the arm, or twisting suddenly round, or by a sudden inspiration or expiration, by the effect of sudden and slight percussion with the joints of the fingers, and by the immediate increase of the pain on the removal of pressure;" the respiration is more abdominal, and the affected side is in consequence less expanded from the pain which is induced, and the disease is generally associated with other rheumatic affections. Pleurodynia might be complicated with disease of the chest, in which case we must be very careful in our diagnosis.

Gastrodynia—Rheumatism of the Abdominal Walls.

In Gastrodynia there is severe pain in the walls of the abdomen, which does not produce any constitutional disturbance, but which might be mistaken for *Peritonitis*; the pain is much relieved by gradual pressure, but sudden action of the abdominal muscles induces excruciating pains; there is an absence of rigors, vomiting, and other constitutional symptoms diagnostic of Peritonitis; pressure suddenly removed causes pain, as well as percussion with the point of the fingers; these are characteristic signs which will distinguish Gastrodynia from Peritonitis, the principal pains being generally at the insertion of the abdominal muscles into the crista of the ilium.

But sometimes the *diaphragm* becomes the seat of the affection, then the pain is deep-seated, increased greatly by inspiration, and shoots from the stomach to the spine; respirations are performed with difficulty, being short and catching. Any attempt to swallow food produces vomiting and pain, and disease generally proves a serious complaint.

Torticollis—Wry-neck or Stiff-neck.

This disease is very common among the poorer class of native population in the tropics, and is produced by lying on mud-damp floors during the rainy season and in the cold months of November, December, and January. The rheumatic poison attacks generally one side of the neck, the sterno-mastoid muscle in particular, causing the head to recline obliquely on one side—the affected side; the pain, when the patient is quiet, is dull and aching,

but when movement of the head takes place, becomes very severe. Not unfrequently both sterno-mastoid muscles are affected at the same time, and the head is carried quite erect, the face looking steadily forward. In old people this chronic inflammation might last for such a length of time that the muscles become almost permanently stiffened, requiring the most rigid treatment to overcome them.

Lumbago—Rheumatism of the Lumbar Muscles.

Lumbago is a rheumatic affection of the mass of muscles occupying the loins or small of the back, extending to the ligaments of the sacrum. The pain is at first dull and aching, extending sometimes up the spine, at other times around the abdomen; it gradually becomes sharp and excruciating. Movement of the trunk increases considerably this pain, progression is very much impeded, so that the individual is obliged to move by the aid of an assistant, or on crutches, bending forward on the hips; sometimes the pain is accompanied with slight febrile symptoms; most frequently, however, in miasmatic districts I have seen Lumbago take the intermittent type, subsiding and appearing at regular intervals, causing most unbearable and lancinating pains, accompanied with febrile disturbances, and after lasting for a time, gradually subside, and the individual is able to walk about. When at its height the pain is most agonizing, as if a knife were thrust through the parts affected; it is sometimes serious when it lasts for any length of time, especially in a delicate subject, and I

have seen a patient faint away three times in one night when suffering from the agonizing pain.

Lumbago is therefore more serious when it is under the influence of malaria, as it similates malarious fevers, and exaggerates their symptoms immeasurably. It may be distinguished from the pains of malignant fevers by the increase of pain on the motion of the body, and on pressure; from disease of the kidneys, by the absence, first, of pain towards the groin; secondly, of severe constitutional disturbances,—viz., rigor, vomiting, &c.; thirdly, of retraction of the testicle; fourthly, of irritation of the urinary passages; and fifthly, by the want of change in the character of the urine, which is characteristic in diseases of the kidneys; from disease of the spine, by the character of the pain which is less on pressure; and by derangement in the functions of the lower extremities.

SCIATICA—RHEUMATISM OF THE MUSCLES OF THE BACK OF THE THIGH.

This is a rheumatic affection of the fibrous tissues covering the muscles of the back of the thigh, preventing the individual from walking: sometimes this affection extends to the hip-joint, causing considerable pain and uneasiness. This disease is not generally of long duration, and is easily amenable to treatment; sometimes the pain can be traced along the course of the sciatic nerve, at which time the poison is supposed to have affected the *neurilema* of the *sciatic nerve,* hence its name; the pain in this instance is dull and aching, and

very steady; motion of the limb increases it, and this sign distinguishes it from Neuralgia.

Chronic Rheumatism is sometimes associated with a syphilitic taint in the system, and the symptoms are generally very much aggravated; the small joints are greatly affected, and pain is complained of both in the joints and the bones. The following case will elucidate more clearly the effect of such a combination: C. C. L., æt. 30, a Brazilian merchant, who had been seventeen years (1860) in the tropics, complained of pain and uneasiness in the joints of his hands, arms, and shoulders.

History.—Patient states that about six years ago he felt great pain all over the joints of the upper and lower extremities, with pains in the bones of the legs and arms which he cannot attribute to any cause; these pains were accompanied by semicircular eruptions all over the body, which, when opened, relieved the pain, but were very difficult to heal. On enquiry, he stated that in 1848 he had been a little imprudent, and had had swellings on both sides of the groin, and by the use of blue ointment, they disappeared without opening. This was followed by a severe pain in the breast and back, which prevented him from breathing and raising himself, with an eruption over his body; by the use of sarsaparilla he was cured; about a year after the first eruption—in 1852—he again had another eruption all over his body, which was cured by the application of sulphur ointment. Soon afterwards, he suffered from pains in the joints and bones, for which he was salivated, and made to use sarsaparilla; by this treatment he was so much relieved that he never complained of any sickness for two years—until the begin-

ning of 1860—when it made its appearance in an altered form; he had been exposed to wet and damp, and suffered severely from pains in the smaller joints of the arm, with great pain and puffiness in the synovial membranes.

Symptoms on Examination.—There were pain and swelling on the right hand between the carpel, metacarpal, and phalangial bones; supination and pronation were accompanied with great pain; the synovial membranes of the carpo-metacarpal joints were considerably stiff, painful, and slightly swollen; the metacarpal bones were kept flexed on the palm of the hand; the synovial membrane of the last carpo-metacarpal joints suffered more than the rest; there were greater swelling and much puffiness, especially towards the external parts; great pain was felt on pressure, or on attempting to handle anything. The veins of the arms were very much engorged, the dorsal arch of veins was very visible; the patient complained of occasional sharp pains in the knee, shoulder, and ankle joints, especially at night. The face was slightly sallow.

Digestive System.—The tongue was slightly coated, appetite impaired, bowels very costive; patient had formerly bleeding piles, but at the time of examination, there was no hæmorrhage from it.

Circulatory System.—The pulse was 85, strong and full, the venous system of the affected part much engorged; slight pain in the heart, otherwise healthy.

Pulmonary System.—Healthy.

Genito-urinary System.—The urine was high-coloured, depositing a lateritious brick-dust sediment; no pain or uneasiness in the region of the kidneys.

Nervous System.—There was great pain in the head; no sleep at night through pains all over the body.

An aperient draught was ordered, consisting of sulphate of magnesia, tincture of senna, a few grains of calomel and tincture of cardamum, and the following mixture to be taken three times a-day :—

℞.—Potassii iodidum	℥iss.
Spiritus ætheris nitrosi	f ℥iij.
Tinctura cinchonæ co.	f ℥ss.
Tinctura colchici	f ℥j.
Aqua pura	f ℥xxiv.

Misce, a wine-glassful to be taken night and morning.

July 23rd. The pains in the loins had disappeared; patient much better, appetite returning; there was slight constipation, as well as flying pains about the joints, especially those of the shoulders and knees; the bowels had not been free since last aperient draught, which is to be repeated, and the medicine continued.

25th. Complained of severe pain and uneasiness in the right shoulder joint, which obliged him to keep his arm continually in a raised position; could not endure any of the movements of the joints, as the pain was then most excruciating; no pain in the smaller joints of the hand, but they remained still very stiff. The aperient draught to be repeated, and the following mixture to be taken :—

℞.—Sodæ bicarbonas	ana ℥iij.
Potassæ nitras	
Ammoniæ carbonas	℥ij.
Tinctura opii	f ℥j.
Aqua pura	f ℥xxv.

Misce—A wine-glassful to be taken three times a day, and forty minims of the liquor morphiæ hydrochloras to be taken at bed-time.

30th. Felt much better, pains had much reduced; slept well at night, appetite improving, bowels disposed to be constipated. Mixture to be continued daily, and the aperient draught to be repeated occasionally.

August 6th. Gradually improving, but complained of slight pain in the elbow joint of the left arm. Mixture to be continued.

10th. Felt quite well.

Pathology and Morbid Anatomy.

Rheumatism has a peculiar affinity for the fibrous and sero-fibrous sheets in the system. Thus it is found to affect the fibrous sheets of the muscles and nerves, ligaments, fasciæ, aponeuroses, tendons, the serous membranes around the joints, the periosteum, bursæ, the diaphragm, perichondrium, the serous membranes of the brain and heart; and these textures, as remarked by Dr. Fuller, are the albuminous and gelatinous tissues in the economy, from the decomposition of which, during the wear and tear of the system, are formed those secondary organic compounds which are believed to be infinitely connected with the development of Rheumatism and its ally, *Gout*, in the body—viz., *lithic* and *lactic acids*.

Rheumatism has its origin within the constitution, the materies morbi are developed in, and prey on, the system; and the following circumstances, recorded by Dr. Fuller, who has given the subject great consideration, will suffice to prove this point:—

First. The earliest and most frequent victims of the disease are apt to experience symptoms clearly denoting functional derangement.

Second. Rheumatic patients are sensitive to atmospheric vicissitudes, prone to perspire, and their perspiration has a sour, disagreeable odour, whilst the urine, though usually clear when passed, not unfrequently deposits, on cooling, a red brick-dust sediment of lithates and lactates, forming the *rheumatic diathesis.*

Third. The heart of such persons is irritable, and prone to take an inflammatory action, and its nutrition is apt to become perverted.

Fourth. A change of the mode of living has been observed to induce the rheumatic diathesis.

Fifth. The long continuance and frequent recurrence of symptoms also point to a constitutional origin of the materies morbi of Rheumatism.

These materies morbi in the blood have been considered by many to be an excess of the *lithic acid,* which is associated with certain deranged conditions of the digestion, or, according to Dr. Prout, of *lactic acid ;* indeed, during an attack of this disease, the sour perspiration has been found to contain a large quantity of lactic acid. There is an "undue balance between the excess of lithic acid and the power of excretion," by the skin.

The effects of rheumatic poison on distant and independent organs, prove that there must be some poisonous material in the circulatory medium, and the experiments of Dr. Richardson also go to prove that an excess of lactic acid in the system similates very much the effects of rheumatismal attacks in the system. He injected lactic acid into the peritoneum of a cat and two dogs, the effects were irregularity of the action of the heart, and death. In a *post-mortem* examination the peritoneum was

found healthy, the initial valves were thickened and inflamed, and coated with firm fibrous deposits on its free borders, the tricuspid and aortic valves were swollen and inflamed, the endocardial surface was intensely vascular. It is therefore, evident, that there must be some poisonous state of the blood, and Dr. Aitkin gives the four following conclusive reasonings in proof of this statement:—

1. The symmetrical development of the local symptoms—a phenomenon which is obtained in all disorders connected with a vitiated condition of the circulatory fluid.

2. The constancy of premonitory fever, with a large number of local symptoms and lesions of internal organs, occurring simultaneously.

3. A series of observations by Chomel tend to show that the internal inflammation in Rheumatism, like those of Small Pox, Typhus, Scarlatina, and the like, are referable to an alteration of the animal fluids, and more especially of the blood.

4. The phenomena of Metastasis, when it does occur, point to a morbid matter in the blood itself, as an explanation of the occurrence.

The most constant morbid condition of the blood in Rheumatism is the abnormal relative proportions which become developed between the fibrine and the saline elements; the mean of the *fibrine* to the saline elements being in the relative proportion of 7·163 to 8·478. In normal blood, the fibrine rarely exceeds 3 in 1,000. *Post-mortem* examinations of persons who have died of Rheumatism exhibit thickening of the synovial membranes of the joint; when the cartilage is lost, the ends of the

bones are enlarged and eburnified; the serous cavities are found to be filled with fluid, or to contain an unnatural quantity; the affected muscles softened and flabby; and when the heart is attacked, evidences of inflammation are manifested in the endocardium and in the large arteries.

Causes of Chronic Rheumatism.

Predisposing Causes.—A peculiar constitutional tendency to the disease, which subjects the individual to its attack, however small the cause may be: this is called the *rheumatic diathesis.* The male sex, from their constant exposure to all kinds of weather; persons between the ages of ten and forty; debility, and a previous attack; a lanky frame; and an hereditary predisposition.

Exciting Causes.—The main cause of Rheumatism is exposure to wet and cold; or exposure of the body during perspiration, and when it is much heated; or leaving wet clothes unchanged for any length of time; or sleeping upon damp ground, or sitting in a damp cold room; all of which causes, in a temperate climate, are sufficient to produce severe acute disease, but in the tropics only lead to subacute or chronic complaint. Natives of the tropics, especially the poorer classes who are badly clad, also soldiers, suffer dreadfully from this disease in the rainy season.

Diagnosis and Prognosis.

Gout is the only disease in the tropics that Rheumatism might be mistaken for, but the diagnosis is distinct *from Gout.* Rheumatism is found among the lower class, and

people subject to privations; Gout among the wealthy and indolent. In Rheumatism, lactic acid is excreted by the skin; in Gout, soda is in excess, and uniting with lithic acid forms lithate of soda, which may be detected in the blood. In Rheumatism the large joints are painfully attacked; in Gout, the smaller joint, as a rule. In Rheumatism, there may be serous effusions in and around the joints, which are very soft; in Gout, there is a disposition for exudation of lithate of soda in the cellular tissue of the skin, forming *tophaceous deposits*.

The character of the various forms of this affection has been given under their different heads, and the diagnostic signs between them and the disease they similate such as Pleurodynia, Gastrodynia, &c.

The *prognosis* of Chronic Rheumatism is very favourable; the disease seldom terminates fatally, except when Metastasis takes place, and then death might be very rapid, as it may suddenly seize on the muscular coat of the heart, suspending its action on the membranes of the brain, or the muscular structure of the stomach.

Treatment of Chronic Rheumatism.

Our first object should be to relieve the bowels thoroughly; then to employ such eliminant remedies which would remove the poison from the blood; thirdly, to apply various local remedies to ease the pain.

The best aperient that could be employed is that which produces a great evacuation at one time; a pill containing *three grains of calomel* and half *a grain of opium* taken at bed-time, or *a podophyllin pill*, as already described,

followed in the morning by the following draughts, should be administered every third day :—

℞.—Pulvis rhei compositus	℥ss.
Soda tartarata	℈j.
Vinum colchici	ℿ xv.
Oleum carui	gtt. x.
Aqua pura	℥j.

Misce—fiat haustus.

This remedy, whilst it opens the bowels freely, increases also the excretory power of the kidneys. If the patient be very weak, the dose might be lessened ; but the above will be found sufficient for the majority of cases, administering it every third day, or twice a week.

2. *The use of eliminants which would remove the poison from the blood.* Much has been written on this subject, and many remedies have been recommended, but it has been found, that what is suitable in one case may be entirely useless in another. As Dr. Fuller most justly stated in his remarks on the general treatment of Rheumatism, "the bleeding, which in the young, plethoric, and robust, may be necessary to allay excessive vascular action and cause free secretion, may, in the weakly, induce irritability of the heart, and a subsequent attack of cardiac inflammation. The opium, which in one person may prove of the greatest service in promoting free perspiration and in allaying the general irritability of the system, may, in another, check the biliary and other secretions, and thus prevent the elimination of the rheumatic poison. The continued use of calomel, and the constant purging, which may be beneficial to one patient by removing large quantities of unhealthy secretion, may unnecessarily

exhaust the strength of another and tend very greatly to impede recovery. And so in regard to every remedy which has been proposed. What is useful at one time, proves useless, or positively injurious, at another; and the conclusion is forced upon us that what is wanted is far less the discovery of untried methods of treating disease than of discriminative causes for the proper use of those we possess."* Of all the remedies which have been recommended, the use of *alkalies* I consider to take the first place; they diminish the pain, tranquillize the pulse, increase the alkalinity of the blood, reduce the local inflammation, and make convalescence rapid; and of all the alkalies the *nitrate of potash*, either alone or in combination with the bicarbonate of soda, unquestionably produces very quickly the salutary results above indicated. If given in draughts, from a scruple to two drachms should be administered at once in a dose, and three or four times in a day, so as to bring the system rapidly under its influence; in Chronic Rheumatism much smaller doses might be given in combination with colchicum and tincture of senna, so that the bowels can be kept gently opened, but where Metastasis is apprehended, the dose should be large, and given every three or four hours. Dr. Aitkin recommends the following mixture:—Acetate of potash, half a drachm; bicarbonate of potash, one drachm; and nitrate of potash, ten grains; sugared water or lemonade, one and a half ounce; to be taken every two hours, until the pains in the joints begin to yield in severity. In the ordinary forms of Rheumatism met with

* Fuller on Rheumatism, page 73.

in the tropics, I find the mixture prescribed in the case recorded at page 529, to be efficacious, and in many cases sufficient, although in others I have increased the dose of the nitre and bicarbonate of soda to twice the strength.

A diaphoretic, such as *ipecacuanha* and *opium*, in the combination of *Dover's powder*, is an excellent remedy, especially when combined with good *warm bedding*, for "Bedding in blankets," writes Dr. Chalmers, "reduces by a good three-fourths the risk of inflammation of the heart run by patients in rheumatic fevers, diminishes the intensity of the inflammation when it does occur, and diminishes still further the danger of death by that or any other lesion, and at the same time it does not protract the convalescence."* *Colchicum* when given singly does not produce very beneficial results in those cases where the Rheumatism assumes the gouty form; when it is administered in any large quantity, the bowels must be kept continually opened. Guaiacum will be found of great service in old standing cases, especially when there is little or no perspiration; but when there is profuse perspiration, its use is contra-indicated. It is given in combination with salts of potash and rhubarb, and the ammoniacal tincture is more effective. The following mixture I have found to act powerfully in many cases :—

℞.—Tinctura guaiaci ammoniata . . .	f ℥j.
Mistura acaciæ	f ℥iv.
Pulvis potassæ nitras	℥iv.
Pulvis ipecac. compositus	℥j.
Syrupus croci	f ℥ss.
Aqua pura	f ℥viiiss.

Misce.—Two table-spoonfuls to be taken three times a day.

* Chambers' Lectures, chiefly Chemical, page 147.

In those cases where a syphilitic taint can be traced, one most effectual remedy is the *iodide of potassium*. It acts quickly, giving the patient immediate relief. It is indicated when there is pain in the periosteum of the bones, and vague pains all over the body; and should be given in doses of from five to ten grains three or four times a day; or, as in the prescription (p. 529), in combination with colchicum and cinchona.

Local Remedies.—Blisters and *mustard* poultices are excellent remedies when the disease is located in one or few parts.

Warm fomentation soothes and eases the parts, especially when it is made of an anodyne solution. Every kind of liniment has been used with more or less advantage; the camphorated appear to be superior. Salines have been strongly recommended for topical application, and this is best done by the use of the spongio-piline, according to the following manner: Let gloves or caps be cut out of it so as to cover neatly the inflamed or painful part, and let its spongy surface be well moistened with water, and then squeezed out. "Nitrate of potash, or the salts to be employed in powder, is then freely and plentifully sprinkled over the moistened surface, or rubbed in, to secure its solution, and the thorough impregnation of the epithem; it is then applied to the inflamed part, and lightly secured by a roller." No fresh addition of nitre is required, if sufficient quantity be applied at the first time, but about every five or six hours the spongy surface is to be re-moistened. Anodyne plasters, such as aconite and belladonna, are advantageous.

I have found the latter very beneficial in many cases in the following composition :—

℞.—Extract. belladonnæ	℥ij.
Sinapis contrit.	℥ss.
Tinct. opii	♏xx.

Made into a plaister on brown paper. It is to be applied and kept well secured to the part for three days.

Sometimes in old chronic cases relief is obtained by taking a long journey, or vigorous exercise; this acts as an alterative to the affected parts. Diet should be light, easily digestible, and very nutritious.

IV.—DELIRIUM TREMENS.

This is a form of delirium which is met with principally amongst drunkards, associated with imperfect and perverted nutrition of the brain, and consists in an abnormal condition of the blood, caused by the presence of alcohol. It is characterized by fantastic hallucinations, the horrors, tremors of the tendons and muscles of the hands and limbs, and a great want of sleep.

It is a disease which should be particularly guarded against in the tropics, as, unfortunately, Europeans—especially soldiers and sailors—in the tropics, are not as a rule temperate in their habits. The effect of tropical heat on the nervous system is very depressing and exhausting, particularly when combined with humidity of the atmosphere, and, consequently, the same quantity of alcohol which could be indulged in with impunity in temperate climates, cannot, without great risk, be so used in the tropics.

Symptoms and Progress.

This disease might come on after long and continuous debauch, without any intimation, or it may occur after a sudden temporary withdrawal of the accustomed stimu-

lants; in which latter case, as Dr. Gardiner has shewn, it might be only the result of the commencement of the disease. The premonitory symptoms are extreme nervous depression, or a feeling of sinking of the vital energies; a very anxious and agitated countenance, a slowness of the pulse, a cold and clammy skin, imperfect respiration, frightful dreams, impaired digestion, vicious appetite, furred tongue, and a disposition of the bowels to constipation. The pulse is feeble, easily compressed, varying from 90 to 120; the mind weak and confused, the sleep much disturbed, and the individual rises with great agitation. Slight muscular exertion produces great fatigue and profuse perspiration, the hands tremble in the act of taking anything, and the person occasionally suffers from nausea and vomitings in the mornings. This state may continue for a longer or shorter time—from twenty-four to forty-eight hours, when the delirium sets in with great fury.

In the young and robust, the symptoms show excessive irritability of the nervous system, the person becomes very violent, and wanders about with terrible weapons to defend himself from some imaginary foes; he mutters incessantly, uses foul language, sees dreadful objects before him (venomous serpents, leopards, or loathsome vermin) and he imagines himself the subject of attack, he also sees little hobgoblins of all possible shapes flying about his apartments, he becomes more and more violent, his tongue is very tremulous, and furred brown, or in many cases might be clean; his head is hot, respiration but imperfectly performed, pulse ranges from 120 to 130, full and throbbing; the heart's action is violent, he is

sleepless and restless, and hears voices at a great distance speaking to him, he replies, and then struggles and attempts to fly. In some cases the individual has some special object of terror which forms the prevailing idea of his delirium, "one person is pursued by justice, another flies from a creditor or an avenging enemy, another is attacked by robbers or assassins. Voices are heard conspiring the destruction of the patient, he sees a gun pointed at him through the window, or a knife glittering in an imaginary hand within the curtains. He hides from pursuit, defends himself against assaults, struggles violently against persons aiming to seize or bind him, perhaps jumps out of a high window to escape, screams for aid or implores pitifully to be spared, occasionally even seizes a pistol or a sword, and commits manslaughter in supposed self-defence." I have met with cases where after a long march under noon-day sun, a debauch is indulged in, and Delirium Tremens was the result; in these cases there are excessive irritation of the nervous and engorgement of the vascular system, and the delirium assumes the type of maniacal fury, and the patient dies very early of coma.

Amongst old topers, who have been long in the tropics and whose constitutions seem to be seasoned with alcohol, the delirium in most cases is generally mild. The patient is quiet sometimes, melancholic often, hesitates when he speaks, his countenance is anxious and suspicious, he is not violent, but has vague delusions, is more easily managed, and takes his medicine without trouble, when offered him. He often imagines that he is considered mad by those who are about him, and endeavours in

some cases to persuade them that he is not so, he might give rational answers when his attention is strongly fixed, but as soon as reference is made to the peculiar object of his delirium, he at once betrays himself.

There is a third kind of case, not often met with; the peculiarities are that the disease is seen amongst old drunkards, who are careful to take now and then small quantities of some sedative medicine. They generally avoid opium, but hyoscyamus seems to be the favourite prophylaxis. Of four cases which lately came under my notice after long and continuous hard drinking, the individuals were left in a semi-delirious, stupid state for weeks, they were not decidedly mad, but became so suddenly. They were very terrified of everything, very quiet, lying down as if endeavouring to sleep, they spoke quietly but much nonsense, and they were not furious; the pulse was feeble and frequent, there were tremors of the whole body, and the skin was cold and clammy. A small quantity of sedative medicine was sufficient to put them into a deep sleep, from which, when they awoke, they appeared feeble, pale, and hungry, quite recovered from their delirium, but not from their thirst after liquor. In the four cases, I had been watching for the disease, so that as soon as it manifested itself, I was prepared to combat it. No doubt had the cases been allowed to remain any length of time, the delirium would have been furious.

The following is Craigie's general description of the symptoms of Delirium Tremens, which he considers as always associated—more or less—with derangement of several other functions.

The patient is generally void of all appetite, or may even be squeamish, and vomit at intervals. Sometimes he is thirsty, and calls loudly for liquor of various kinds, but often he is indifferent to the sensation of thirst. In several instances great aversion, and even dread of food and drink is evinced, and it is impossible to persuade the patient to partake of either. The tongue is at first covered with moist, white, grey, or slate-coloured fur, and when protruded is tremulous. The bowels constipated and less sensible than in the state of health to the action of medicine, and when they are emptied artificially, the discharges are very dark-coloured—the first-generally consistent, the latter liquid, dark and offensive. There are generally fulness and distention, and not unfrequently tenderness and pain in the epigastric, umbilical, and right hypochondriac regions, giving the patient the sensation as if they were drawn tightly together. The skin is bathed about the head and neck with a clammy, unctuous, cold moisture, and hot elsewhere; the feet are cold, dry, and unperspirable.

The pulse varies from 96 to 110 or 120, sometimes 130; and though sometimes small and oppressed, is often full, voluminous, and throbbing. The carotid and temporal arteries beat most violently; those of the wrist less forcibly, and the anterior and posterior tibial arteries pulsate feebly enough. The action of the heart is generally unusually violent, and the cardiac heat is diffused over the whole chest, the respiration is occasionally panting and irregular, but not necessarily—otherwise morbid.

At the same time the restlessness is extreme. The

patient is in constant agitation of mind and body; speaks almost incessantly, yet seldom adheres above a minute to one subject, and is constantly changing place, and looking for some new object. He cannot sleep, and dreads being left alone from the apprehension of the spectral visitations. With this restlessness, the upper extremities, and especially the hands, are in constant tremulous motion, so that they cannot be kept for two seconds in the same position, nor can the pulse, in many cases, be accurately numbered at the wrist. Though this tremulous motion of the arms, wrist, and hands, is general, it is not constant; and instances of the mental disorder, agitation, spectral illusions, and sleeplessness, have been observed to take place without any tremors in the hands. Tremors are very rarely seen in the young or middle-aged to any very great extent, or in those whose muscular motions are not otherwise unsteady, and are seldom well marked in first attacks of the disease. They are principally observed in cases of confirmed dram-drinkers, whose motions are always unsteady in the morning and early part of the day, until they take a certain proportion of their habitual stimulus.

Sometimes, the case, instead of terminating favourably by the individual falling into a deep sleep, manifests unfavourable symptoms, and the patient sinks into a fearful state of prostration, becomes incoherent and extremely restless, with the pulse feeble and frequent, the pupils contracted or dilated, and with excessive tremors all over the body; then he becomes comatose or convulsive, with *subsultus tendinum*, low muttering, delirium, and death.

Morbid Anatomy, Pathology, and Nature.

Alcohol, when taken in large doses, is dangerous to life, and when in small doses, and habitually taken, is cumulative. This latter effect the observations of Dr. Ogston have fully confirmed. The results of his investigation are thus summarized by Dr. Aitken :—

1st. The nervous centres present the greatest amount of morbid changes, the morbid appearances within the head extending over 92 per cent. of those examined.

2nd. The changes in respiratory organs succeed in frequency those of the nervous centres, yielding a percentage of 63·24 of those examined.

3rd. Morbid changes in the liver are next in order of frequency, and are due to enlargement, granular degeneration, the nutmeg-like congestion, and lastly, the fatty state.

4th. Next to changes in the liver come those in the heart and large arteries.

5th. Next are those of the kidneys.

6th. Least frequent of all are morbid changes in the alimentary canal.

The following are the results of the examinations of the bodies of forty-four persons, published in the "British and Foreign Medico-Chirurgical Review" for 1854 :—

1. *Cranium.*—Abnormal appearances within the cranium in 43 cases, 97.7 per cent. of the whole.

2. *Chest.*—Abnormal appearances in the respiratory organs in 33 cases, or 75 per cent. of the whole. Simultaneous abnormal appearances in the head and respiratory organs, in 32 cases. Abnormal appearances

in the pericardium, heart, aorta, or pulmonary artery, in 26 cases, or 59 per cent. of the whole. Abnormal appearances within the chest in 38 cases, or 86 per cent. of the whole.

3. *Abdomen.*—Abnormal appearances in the stomach in 24 cases, or 54.5 per cent. of the whole.

Intestines.—Abnormal appearances in the intestines in 8 cases, or 18.18 per cent. of the whole.

Liver.—Abnormal appearances in the spleen in 18 cases, or 40.9 per cent. of the whole.

Kidneys.—Abnormal appearances in the kidneys in 28 cases, or 63.6 per cent. of the whole.

Entire absence of morbid appearances existed in none of the cases.

The effect which is produced by the introduction of alcoholic liquors into the stomach is very striking. They coagulate all albuminous articles of food or fluids that they come in contact with. "As an irritant they stimulate the glandular secretions from the mucous membrane, and ultimately lead to permanent congestion of the vessels, to spurious melanotic deposit in the mucous tissue, and to thickening of the gastric substance. By the veins and absorbents of the stomach the alcohol mixes with the blood, and immediately acts as a stimulant to all the viscera with which it is brought in contact. The functions of the brain are at once stimulated, and ideas follow in more rapid succession; the liver is excited to secrete an excess of sugar by the immediate action of the stimulant on the tissues;" the heart's action is increased, respiration becomes more frequent; symptoms of pulmonary congestion manifest themselves; the motion of

the blood is retarded; the appetite, after a time, becomes bad, and Dyspepsia, with water brash and flatulency, is occasioned; constipation follows from deficient action of the muscular coat of the intestines; and there is an increase of fat in the blood, giving the serum a milky appearance.

The effects of alcohol according to Bocker are: 1st. To diminish the excretion both of the solid and fluid constituents of the urine. 2nd. Not to increase the cutaneous perspiration. 3rd. Not to augment the fæcal excretion. 4th. To diminish not only the absolute quantity of carbonic acid exhaled by the lungs, but also to the relative proportions of it in the products of respiration. And the researches of Dr. Aitken, as corroborated by many observers, have proved that the blood becomes surcharged with unchanged and unused material, and contains at least 30 per cent. more of carbon than in the normal state. The order of events by which this state comes about is somewhat as follows:—Alcohol is directly absorbed by the blood-vessels, without undergoing any change or decomposition. Part of it is eliminated very slowly as alcohol by the lungs, by the liver, and in the brain. Another portion is decomposed, its hydrogen enters into combination with oxygen to form water, which, with acetic acid having been produced, carbonic acid and water are formed. Oxygen is thus diverted from its proper function, the exhalation of carbonic acid at the lungs is diminished, both absolutely and relatively, and less urea is excreted by the kidneys than is consistent with health; but the pulmonary aqueous vapour is not lessened. The water of the urine is diminished, the

chlorine is greatly lessened as well as the acids and bases; the blood is, therefore, under the toxic influence of alcohol, which produces a constant irritation of the nervous system, especially the brain substance, the continuance of which leads to the development of Delirium Tremens. Alcohol has been detected in the blood, urine, bile, fluids in serous membranes, brain matter, and liver.

Causes of Delirium Tremens.

The causes of Delirium Tremens may be regarded as *predisposing* and *exciting*. In the former case we find debility produced by diseases of the tropics, such as the various malarious fevers, Diarrhœa, Dysentery, Cholera, Hepatitis, &c.; long marches under the heat of the sun; sedentary habits; indulgence of depressing drugs, such as tobacco, opium, &c.; a want of sufficient quantity of nourishing food; excessive mental occupation; great fatigue and anxiety, followed by long continued loss of sleep; and severe surgical operation or injury.

The exciting cause of Delirium Tremens is the abuse of spirituous liquors, either taken in large doses at a time, or in small but frequent drachm doses. It has long been argued that the disease only comes on after the withdrawal of the constant stimulus, but this theory has been proved most fallacious by Dr. Peddie and others; and the experiment of the cumulative effects of alcohol in the system by Dr. Ogston of Aberdeen, has set the question at rest. When an habitual drunkard suddenly ceases to drink, and this is followed after a time by delirium, the solution is that the system had become surcharged with

alcohol from the dissipated habit, whose toxic influence on the blood had made itself felt by producing a severe nervous depression in the system of the individual, leading to a distaste, and sometimes actual dread of liquor.

Diagnosis and Prognosis.

Delirium Tremens can be easily distinguished from the *delirium produced by fever*—from the history of a case; from the latter being more incoherent and with less hallucinations, less tremors, and greater prostration; from *acute meningitis of solar heat*, by the presence in the latter of headache, febrile and inflammatory symptoms, the absence of incoherence, fantastic imaginations, and tremors; from insanity, by the history of the case, by the absence of spectral illusions and muscular tremors, and the presence of greater incoherence, except in monomania, when the patient is more rational.

The prognosis is favourable when the disease is brought early under treatment; when it is the first attack; when it is uncomplicated with other diseases. It is unfavourable where the disease has lasted a long time before coming under treatment; when the patient has suffered from previous exhausting disease; when he has suffered from a previous attack; when it is complicated with cerebral congestion, as in a fatal case lately under treatment, in which a gentleman exposed himself under the direct rays of the sun, in a long march in the tropics, previous to which he had been in the habit of taking an excess of ardent spirits. On his arrival at his destination, he again commenced his former habit, but soon fell into

furious delirium, under which he succumbed within four days; when it supervenes upon a severe operation or wound; and when it presents the following symptoms:— convulsions, stupors, much incoherence, subsultus tendinum, muttering delirium, very frequent pulse, cold clammy skin, and a dry tongue.

Mortality in Delirium Tremens.

The mortality from Delirium Tremens is comparatively great; but writers differ greatly in their calculations. Of 1,241 cases treated in the Philadelphia Hospital, from May, 1834, to November, 1839, one in ten died; according to Calmeil, the rate of mortality is 5 per cent., but M. Bougard puts it down at 19 per cent.

Sir Alexander Tulloch has given the following tables of its prevalence and mortality amongst European troops in various commands:—

Stations.	Aggregate Strength.	Admitted.	Died.	Proportion of Deaths to Admission.
West Indies	86,661	1,426	175	1 in 8
Jamaica	51,567	191	42	1 „ 4½
Cape of Good Hope	22,714	13	3	1 „ 4⅓
Mauritius	30,515	514	50	1 „ 10¼
Ceylon	42,978	35	7	1 „ 5
Bermudas	11,721	102	9	1 „ 11
Nova Scotia and New Brunswick	46,442	207	18	1 „ 12
Upper and Lower Canada	64,280	296	18	1 „ 16
Gibraltar	60,269	44	5	1 „ 9
Malta	40,826	38	5	1 „ 8
Ionian Islands	70,293	192	30	1 „ 6½
United Kingdom	44,611	27	4	1 „ 6¾
Bengal, 1836 to 1840	36,286	672	14	1 „ 48
Madras, 1832 to 1836	31,267	496	21	1 „ 24
Bombay, 1836 to 1840	18,073	113	15	1 „ 7½
Tenasserim Provinces, 1836 to 1837	7,000	34	5	1 „ 7

In 1853, the same authority gave the following percentage of mortality of British troops:—

Great Britain, Infantry	17·6
Great Britain, Cavalry	13·8
Bermuda	15·0
Canada	7·94
Gibraltar	13·6
Malta	8·8
Nova Scotia	9·1

Dr. Henry, Inspector-General of Hospitals, gave the following interesting report on the statistics of Delirium Tremens among the troops in Canada during 30 years:—

Number of cases during 30 years	1,769
Number of deaths during same period	143

RATIO OF CASES TO STRENGTH:—

During the *first* fifteen years	as 1 to 175
During the *second* fifteen years	as 1 to 75
During the *whole* thirty years	as 1 to 93

RATIO OF DEATHS TO CASES:—

During the *first* fifteen years	as 1 to 16
During the *second* fifteen years	as 1 to 12
Dnring the *whole* thirty years	as 1 to 12½

As regards *age*, the greatest mortality is between 25 and 40, as proved by the analysis of sixty-four fatal cases; the causes of death being—by exhaustion (often with coma), 33; by coma, 18; by fits (sometimes apoplectic, sometimes epileptic), 11; died on the night-stool, 1; found dead in bed, 1.

The following are the ratios as regards age (Aitken):—

	Cases.	Deaths.	Per cent. of Deaths.
Ages from 20 to 25	34	4	9·1
„ „ 25 to 30	66	16	24·2
„ „ 30 to 35	48	11	22·9
„ „ 35 to 40	76	7	9·2
„ „ 40 to 45	62	6	9·6
„ „ 45 to 50	23	4	17·2
„ „ 50 to 55	7	0	—
„ „ 55 to 60	5	1	—

Treatment of Delirium Tremens.

In the consideration of the pathology of this disease, we have endeavoured to prove a fact which is admitted on all hands, that Delirium Tremens is the result of the presence of alcohol in the system, and that it has a tendency after a certain time to be eliminated from the system, and that death is principally produced by *exhaustion*. The indications for treatment are, therefore, 1st. To assist nature in getting rid of the toxic element in the system. 2nd. To support the strength of the patient by stimulant and nutrient. 3rd. To procure tranquillity to the nervous system, and sleep.

Before commencing any particular treatment, we should ascertain whether or not the bowels are freely opened; if constipation has existed for some time, the bowels should be well opened with a cholagogue cathartic, which will aid in a great measure the subsequent treatment.

The remedies which seem to answer the first indication are:—1. *Antimony*, given in small and repeated doses, produces a sedative effect in all the various tissues of the body, and is supposed to aid in the elimination of the poison from the body, but how this effect is produced is not certain. Half or quarter of a grain should be given every two hours; and aromatic and stimulating cathartics should now and then be administered with the medicine. 2. *Digitalis:* this remedy has lately been extensively used with marked advantage and effect. I have met with cases which, having resisted every treatment, yield soon after this drug is administered; and there is no doubt that

it is one of the most powerful means we have at our command. It is a good eliminant, promoting the action of the absorbent glands, and producing a sedative influence over the vascular system. It has been found most efficacious in old topers who have resided for some time in the tropics, and whose constitutions are enfeebled. It is given in large doses at a time, from two to four drachms within the twenty-four hours, and the patient watched; this might be required to be repeated, and then its sedative effect is followed by a deep sleep.

Another treatment is that recommended by M. Calmeil, and practised by Dr. Laycock, of Edinburgh, viz., to allow the poison to be eliminated by nature, whilst the patient is supplied with plenty of nourishment. I have seen cases where it acted well, but it is not to be relied upon. This treatment was first practised by Dr. Kuhn, who places the patient in a dark cell.

2. *To support the strength with stimulant and nutrient.*

Stimulants.—When it was supposed that Delirium Tremens was produced by the withdrawal of the alcoholic drinks, it was often recommended that the accustomed liquor should be restored and gradually withdrawn; but this treatment is very injurious, as it is adding injury to injury, fuel to fire; but in most cases, we find stimulant necessary to prevent the patient from subsequent exhaustion, which might take place at any stage of the disease. The spirit of sulphuric ether, and the aromatic spirit of ammonia, are two excellent remedies, which, when early employed, will obviate the necessity of alcoholic stimulants, and will act as diffusible stimulants to the whole system, while they do not at the same time prevent the

eliminant action of remedies employed. Dr. Wood recommends opium in small but repeated doses; he says it affords a gentle support to the brain, quiets nervous disturbance, and favours the return of sleep. When there is much debility, and the disease has remained for a long time, porter—of all the alcoholic liquors—will be found the best, being less stimulating, but tonic and nutritious, except in extreme cases, when small quantities of brandy may be given.

Nutrient.—Good, nutritious, and light diet is much called for in Delirium Tremens; it is better in the liquid form, as it is then more easily digested; eggs, milk, essence of beef, broth, and such light diet, should be given in small quantities, but frequently; they should be well mixed with cayenne pepper, which stimulates and promotes the digestive functions of the stomach, which is always languid and feeble during this disease.

3. *To procure tranquillity to the nervous system, and sleep.*

Sleep is considered a happy occurrence in all cases, and to procure this, large doses of *opium* have been from time to time administered; it is found to be positively injurious to the patient, and in most cases, when persisted on, it has proved fatal, as it locks up all the excreting organs, and consequently gives greater toxic power to the alcohol in the blood. If administered at all, it should not be given at the commencement of a case, but after it has lasted for some time, and its effects should be well watched; it should be discontinued as soon as the pupil is found contracted. The quantity taken should not exceed one and a half to two drachms, and the bowels should

be kept continually opened. Dr. Wood recommends two grains of opium, half a grain of sulphate of morphia, or an equivalent quantity of one of the liquid preparations every two hours, until a narcotic impression is evinced; but owing to the weak state of the digestion, solid opium should not be given, as it has a tendency to accumulate, and then produce a sudden effect.

The effect of *digitalis* in producing sleep, has already been considered; one of the safest remedies we have is *chloroform*, as it quickly allays nervous irritability, and may lead to a tranquil sleep. It may be given internally and externally; internally, in one-drachm doses, repeated every two or three hours until sleep is induced; it neither accumulates in the system nor locks up the secretion, and, therefore, forms a valuable narcotic.

Hydrate of chloral.—This is one of the most important hypnotics, or producers of sleep, in our possession; it produces a light and refreshing slumber, without any oppression of the cerebrum; if taken in very large doses, unpleasant symptoms may be the result. It has been employed with excellent results in Delirium Tremens, and in those cases in which I have employed it, it had a marked and speedy effect in calming the nervous irritability. It is given in half a drachm to one drachm doses, every half hour, until sleep is procured. When used in combination with *bromide of potassium*, the cure is both quick and safe.

Personal restraint should be avoided as much as possible, as it quickly exhausts the patient by the struggles induced; freedom of movement should be allowed, but the attendant should keep a strict watch over him.

Prophylactic Treatment.

This consists in the exhibition of such remedies in the potation as would induce nausea and vomiting: *tartar emetic* or *ipecacuanha* in doses sufficient to produce severe vomiting should be secretly added to the favourite liquor of the person. Dr. Gilbert, of Lurgan, administered tartar emetic; he put it secretly in occasional doses from five to ten grains, as soon as convenient after the person commenced drinking strong liquors, in tea or in any other proper vehicle. It gradually produces such nausea, vomiting, and fear of death, as completely to frighten the person from going on in his drunken course of life, for that time at least; and much to the joy of friends, ultimately produces in many instances, what nothing would effect, a complete change of life, one from drunkenness to temperance. When ipecacuanha is used, half a drachm may be given at once.

Natives of the tropics soak fresh beef secretly in the liquor the drunkard specially delights in, and when it is taken, it produces severe nausea and vomiting, and a general distaste for any spirituous liquor. I have employed this means, and found it efficacious for two or three months, even in persons who were confirmed drunkards; they could not face or endure the smell of their most favourite drink, but turn away from the sight of it with disgust. In one instance, the person, a confirmed drunkard, was unable to sit in the same room where gin was being drunk, without feeling a sensation of nausea and vomiting, although he had taken the remedy a month before.

V.—SUN-STROKE.

THIS fatal disease of the nervous system has been variously described under the following names:—*Heat Asphyxia, Coup de Soleil, Ictus Solis, Erythismus Tropicus, Heat Apoplexy,* and *Insolatio.* It is an affection of the nervous system, associated with vertigo and headache, or the gradual accession of listlessness and torpidity, with a desire to lie down. These febrile phenomena may culminate in more or less sudden and complete insensibility, without the power of sense or motion; the breathing rapid, and getting more and more stertorous as death approaches. Convulsions of the extremities usher in a complete state of coma, in which the patient gradually sinks. The approach of death is indicated by the failure of the heart's action, the fluttering of the pulse, the irregularity of the respiration, and the fatal event may supervene within five minutes or a few hours after the disease has become fully expressed. Death is either by syncope, apnœa, or by a combination of the two. In cases where recovery takes place, various sequelæ are apt to supervene, such as forms of paralysis, more or less complete choreic movement, melancholia, and other forms of insanity. (Aitken.)

Symptoms and Progress.

The symptoms of this disease are generally very decided, it sometimes comes on suddenly, when the patient is seized with an uncontrollable fit of laughter, which is followed by insensibility and a speedy death; frequently it comes on during the day or night, whilst the individual is lying down seemingly asleep, but breathing with great difficulty, being stertorous or noisy, from the vibration of the uvula and the velum pendulum palati; sometimes, when roused in this comatose state, he starts up and endeavours to escape, staggering about and struggling violently when laid hold of, evidently much alarmed and anxious to escape from some imaginary object of terror, but in a very few minutes becomes insensible; the individual sometimes comes to the hospital himself or assisted by his comrade, exhibiting symptoms of debility, nausea, vertigo, incontinence of urine; this condition is soon followed by insensibility and other symptoms of Sun-stroke.

The symptoms of fully developed Sun-stroke, which are considered (Barclay*) as generally constant and regular, are the following:—the person lays on his back, without sense or motion, breathing rapidly, and as death approaches, more and more stertorously; his eyes, fixed and slightly turned upwards, becoming gradually more and more glassy, the pupils greatly contracted, the conjunctiva of a pink hue, gradually becoming deeper, his face pale, skin dry and burning to the touch; heart's action very

* "Army Medical Report," for 1859; page 274.

rapid and forcible, the impulse being perceptible from a considerable distance; the pulse frequent and sharp, but not strong, giving the idea of a thinner fluid than blood circulating beneath the finger; frothy mucus, sometimes clear, at other times of a brown colour, is very often ejected from the mouth and nose, and generally in large quantities. If the disease does not yield to treatment, the heart's action begins to fail, the pulse becomes fluttering, the breathing more and more stertorous, and in a period varying from a few minutes to a few hours death closes the scene; sometimes convulsions appear from the very commencement, beginning generally from the upper extremities, and sometimes do not extend further, the patient either becoming rapidly insensible or recovering. In by far the greatest number of cases, the convulsions extend to the whole of the voluntary muscles, ceasing from two to fifteen hours, and again returning, and are of the most violent description. In some cases, the nervous irritability was as severe as in *hydrophobia*, and the patient, as far as his mental faculties were concerned, seemed to be in a state resembling *somnambulism;* although to a certain extent unconscious of what was going on about him, and quite incapable of understanding or answering a question, his whole appearance being indicative of the greatest terror; a few drops of water on the ground is sufficient to throw the sufferer into the most violent convulsions. Coma generally supervenes, in most cases, before death.

If by treatment consciousness be restored, the first symptoms are relaxation of the pupils, and a gradual but general awakening of all the functions of the body; but

a relapse into insensibility might again occur. The kidneys are called into action, and a sensation is felt as if fluid were running down the course of the urethra, which is accompanied by frequent micturition; sometimes the kidneys are so highly congested that hæmaturia is the result; but retention of urine from the commencement of the disease is a very prevailing premonitory symptom.

In some individuals the heat first produces an eruption on the skin, or prickle heat, which may be more or less severe, and before the attack commences, the cutaneous eruption gradually disappears; the skin is rough and scaly, and not moistened by perspiration; the bowels obstinately constipated; the appetite more or less entirely lost; sleep interrupted, and wakefulness gradually increased; there is frequent and severe vertigo, with nausea and copious and frequent discharges of limpid urine, but sometimes there is incontinence of urine. We often notice severe headache, extreme debility and weariness, furred and dry tongue, and very hot skin, a frequent sharp and easily depressed pulse, as being the premonitory symptoms in an attack of *coup de soleil.*

In fatal cases the heart's action first begins to fail, the pulse flutters, the breathing becomes irregular, catching, constricted, and very stertorous, with a sense of constriction, weight, and suffocation over the sternum; the face swollen, the eyes enlarged, the colour dark and livid; convulsive movements of the muscles of the extremities supervene, and coma closes the scene.

When the patient is recovering health, the skin, from being hot and dry, becomes cool and moist, with free perspiration all over the body; the breathing is easier, the

muscular rigidity subsides, consciousness is restored, and the patient gradually becomes strengthened and restored to his wonted health.

In slight cases, as in that of a sergeant-major who was engaged in mounting heavy guns on a fortification, under a noon-day tropical sun, whom I saw just after he was struck down, the following symptoms may be observed:—The face flushed, skin hot and dry, hair somewhat bristly but dry, lips dry with great thirst, eyes prominent and fixed, rolling about when opened, and the bowels constipated; there was unconsciousness for two and a-half to three hours, the breathing rough but not stertorous, sensibility was partially lost, the iris acted sluggishly, and there was slight tremor in the extremities. Recovery commenced by perspiration or moisture over the forehead and arms, gradually consciousness returned, and the patient muttered a few words; the pulse full but not fast; the flushes in the face disappeared, and then he looked wildly around, unconscious of what had taken place, and soon after became quite rational.

There are three varieties of Insolatio:—viz., 1. Cerebro-spinal or miningial; 2. Cardiac; 3. Pulmonary apoplexy.

1. *Cerebro-spinal.*—In this form the premonitory symptoms are heat of skin, which is ardent and stinging; great thirst, giddiness, congestion of the eyes, nausea, and frequent desire to micturiate. Headache is not very common, but the patient may fall into a wild state of laughter (this is a very unfavourable symptom); a disposition to commit suicide is manifested in some temperaments; then he falls insensible, his breathing becomes stertorous and heavy, conjunctiva pinky and congested,

the heart tremulous, pulse compressible and feeble, and convulsion and death from asphyxia or apoplexy when coma precedes it. (Maclean.)

2. *Cardiac.*—There are no marked premonitory symptoms; the person falls as if by a shock of lightning, becomes extremely weak, and expires from failure of the heart's action, or death by syncope.

3. *Pulmonary Apoplexy.*—In this form the individual is picked up drunk, lying in the sun, in a state of coma; the pupils dilated, and face flushed; death by both apoplexy and syncope.

Insolatio may prove fatal in a few minutes, or may last for days. On recovering, the system has to encounter very unfavourable sequelæ. 1. Choreic spasms of the muscles of the arms and forearm. 2. Various nervous affections; epilepsy or epileptiform convulsions, especially in those who have hereditary predisposition to the disease, or those who suffered from it when a child; this latter form is curable. 3. Mental weakness, which may be permanent.

Pathology and Morbid Anatomy.

This disease is a nervous affection, which is accompanied by cerebral, spinal, and sympathetic prostration, and brought on by over-stimulation of the nervous system by intense heat, which implicates the vascular system; the effect of the heat is sudden, and may run rapidly on to death. In a slower case, the appearances after death, as remarked by Professor Longmore, were excessive engorgement of the lungs, with obstruction of the pulmonary circulation; there was, in a case, less marked

and constant cerebral congestion; but the vessels of the pia mater and choroid flexus were very much engorged; there was no serous or sanguineous effusion on the brain, except, perhaps, in the cavities, and the sub-arachnoid spaces. In the case reported by Dr. Murphy, the veins of the brain were full, and the arachnoid membrane opaque; there was slight congestion of the posterior part of both lungs.

In many cases of Insolatio, the blood is more or less vitiated; it is more fluid than normal blood, especially when fatal results take place quickly.

There are four different ways in which death may take place, as pointed out by Dr. Barclay.

1st. The affections of the nervous system alone, more particularly those which occur during active exertion in the sun, when the intense heat acts on the surface with the greatest power, producing at last a condition similar to severe concussion, and more or less immediate death by syncope.

2nd. Death may be prolonged, when pulmonary complication may occur from destruction, more or less complete, of the pulmonary circulation, and death by asphyxia ensues.

3rd. There may occur cerebral congestion, and death by coma. These states may, and generally do, co-exist together; and symptoms of either may predominate.

4th. Recovering from the immediate effects of these conditions, the patient may die two or three days afterwards; a febrile attack succeeding, with serous effusion within the cranium.

Insolatio might come on at any time and place, in the

barracks, under the heat of the sun, or on board ship, but it is more frequent when in the horizontal position. It occurs generally during the day, but it does sometimes occur at night; out of sixteen recorded cases, ten occurred between the hours of 2 and 5 o'clock p.m.; and five between 5 and 9.30 p.m. It might also be produced by artificial heat, but the hot winds, which deprive the skin of its moisture and enervate the system, predispose it to the attack.

Causes of Sun-stroke.

The causes are predisposing and exciting. The former are various—viz., improper dress and accoutrements; exhaustion produced by any means, such as prolonged exertion, which occasions great waste of tissue, stops the action of the skin, and leads to obstinate constipation, thus detaining much impurity in the blood; bad ventilation and over-crowding, by vitiating the air and ultimately the blood; and lastly, some electric influences. (Maclean.)

Dr. Aitken records the following six causes as predisposing an attack of Insolatio.

1. Plethora and unacclimatization.

2. Debility, caused by whatever means, particularly such as lower the tone of the nervous system or increase its irritability—*e.g.*, excessive fatigue and exposure in extreme temperature, prolonged marches, and bad ventilation in tropical temperatures.

3. A febrile state, from whatever cause. As a general rule, Dr. Barclay found that plethoric men incur greater danger from exposure than others.

4. Intemperate habits.

5. Exposure to an atmosphere highly charged with electricity.

6. During the hot season, the temperature would seem to have ranged from 96° to 120° Fahr. in the shade. Extremes of atmospheric heat, chiefly observed on the Coromandel Coast, Central India, the North-western Provinces, Scinde, and the Punjaub.

The exciting cause of Insolatio must be referred to the long-continued elevated temperature of hot climates; for the effects to be produced, the temperature must be very hot, dry, and rarefied; the atmosphere vitiated with foul exhalations; the constitution fatigued and debilitated by excessive physical exertions; the variation of the heat of the day and night slight; a continuous and prolonged high atmospheric temperature, so that when the thermometer ranges beyond 98° Fahr. in a crowded barrack, apoplexy is apt to occur; sometimes an electric condition of the atmosphere, a peculiar state in which "the hairs of the head stand on end, in which a man exposed to its influence becomes irritable, suffers from headache, and is restless without knowing exactly what is the matter with him. Such a state of atmosphere will generally be found to exist in localities where cases of Insolatio occur, whether such localities be the crowded barrack, the still more crowded cantonment, the tented field, or the march in column through the still valley, the deep gorge, or the thick forest." (Crawford.)

Diagnosis and Prognosis.

This disease might be mistaken for the ardent or congestive fever of tropical climates, which it resembles in

many of its symptoms, but the rapidity of its progress and its peculiar symptoms—viz., vertigo, nausea, great prostration, incontinence of urine, with insensibility and more or less convulsion—will distinguish one from the other. It may be confounded with cerebral apoplexy and with coma, but in Sun-stroke the pulse is fast and sharp; the skin is very hot and dry, and no paralysis or hemiphygia; in apoplexy the pulse is slow and intermitting, the skin cold and moist, and there are paralysis and hemiphygia after the disease.

The *prognosis* in the main is very unfavourable, as one-half of the cases may prove fatal. The following are very evil symptoms:—Prolonged and complete insensibility; intense heat of skin; lividity and convulsions of the extremities; and failing of the pulse. In Dr. Barclay's cases 42·7 per cent. died, and in those of Dr. Butler 43·3 per cent.

Treatment of Sun-stroke.

The treatment of Sun-stroke should be quick and energetic, as the disease is apt to run rapidly to a fatal termination; it may be divided into local and internal.

The *local treatment* consists in the application of a *cold water douche* to the head from the height of from three to five feet, and along the chest and spine, while the whole body is being sponged with cold water; the clothes should be removed, and the body exposed to a current of air, and the hair cut short; the *cold douche* might speedily restore consciousness, but insensibility might again return, so that its application must be particularly watched. In some cases, whilst the douche was being applied, there was convulsion of the upper and lower

extremities; the respiration was heavy, and the brachial, carotid, and femoral arteries, as well as the abdominal aorta, pulsated greatly; the eyes fixed and prominent; face was pale; then the heat of the surface became gradually reduced, the pulse fell, and the patient, when loudly spoken to, could hear.

But sometimes, whilst the douche is being used, the circulation seems to fail, and then the patient becomes comatose; it should at once be discontinued, and cold water sponging should be applied over the head, spine, and chest, with the head properly raised up. A large mustard cataplasm should be applied over the epigastrium, or a blister, if the case is not very urgent, and another blister at the back of the neck. Should insensibility recur, another blister should be applied to the vertex, and, if necessary, repeated. A mustard plaster should, at the same time, be applied to the calves of the legs, chest, and sometimes to the soles of the feet; a slight galvanic current might, with advantage, be passed through the spine.

Internal Remedies.—A purgative enema should be given as soon as the use of the douche is stopped, or whilst it is being used, consisting of turpentine and sweet oil; at the same time one or two drops of castor oil should be put on the tongue with a feather, and if these do not lead to copious evacuation, the enema might be repeated and some saline adjuvant mixed with it.

When there is hæmaturia, with a highly congested state of the kidneys, Dr. Todd has found a single full dose of quinine sufficient to stop it, but it is apt to return. But *quinine* is one of the best internal remedies

we have for the treatment of Insolatio, given in five to ten grain doses. Staff Assistant-Surgeon Hamilton has found it reduce the temperature 3°. Dr. Waller first recommended it, and other tropical physicians have tried it most successfully in many cases; Dr. Waller recommends that quinine should be given freely, "with the confident assurance that a success unparalleled in the history of the disease from any other mode of treatment will be the result." (*Vide* report of 31 cases treated by him, in the *Indian Medical Gazette*, July, 1869.) The quinine should be administered hypodermically when the patient is insensible; otherwise Warburg's Tincture should be administered, as it relieves the bowels. During convalescence, the diffusible stimulant, aromatic spirit of ammonia, camphor mixture, and chloric ether, should be given; and if the bowels incline to constipation, saline diaphoretics, with small doses of quinine, will be useful; "the skin frequently remains dry, and the pulse rapid for some days, and the patient often possesses a heavy look for a still longer period;" where there is great irritability of the nervous system in the convulsive cases, the *inhalation of chloroform* is recommended by Dr. Barclay. Convulsion may cease after a few inspirations, followed by sleep, and the patient recovers, or life is prolonged; but in a few instances consciousness is restored for a long time, then coma supervenes, and death. Sometimes the bowels become fearfully tympanitic; a turpentine fomentation should be applied externally, and the bowels kept free.

Diet.—The diet from the commencement should be very light, consisting of milk, sago, tea, arrowroot, and lemonade; very weak brandy might be administered in

the form of enema when the pulse is weak and torpid, and the patient is apt to be comatose, but great caution is very necessary in its administration.

The *prophylactic treatment* consists in having the barracks or apartments open, lofty, and airy, the clothing light, the head-dress well ventilated and provided with suitable protection for the head, neck, and spine. A large supply of water should always be at hand; and during the very hot and sultry weather, temperance should be strictly enjoined.

VI.—GOITRE.

Goitre, Bronchocele, Derbyshire Neck, or Cynanche Thyroidæ, is a specific inflammation of the thyroid gland, leading to enlargement of its tissues, and produced by the continuous use of water which is impregnated with the soluble salts of lime.

Symptoms and Progress.

This disease might commence very gradually, and the swelling at the beginning may have the form of a simple tumour; but at other times the disease commences with severe inflammation. In a case of that kind which came under my notice, in a boy of eighteen—he had lately arrived in the district where the disease was prevalent, and had remained there for three months—previous to the commencement of the disease, he was perfectly well: in the morning he complained of severe fever, the thyroid gland began to be swollen, and was so much enlarged that the patient was actually choked; his eyes were prominent, there was great difficulty of breathing, and running from the nostrils; the tumour was soft and yielding and spread laterally, and extended from the chin to about the lower part of the neck; the voice was

cracky; the swelling was very rapid, but, under treatment, it gradually reduced: but when I last saw him, which was six months afterwards, there was a tolerably large swelling, and the whole gland was completely involved.

But, in the ordinary form, the disease comes on insidiously, and the growth is very gradual; it produces no pain, is firm and elastic, or soft and flabby. After a time the growth becomes rapid, forming in some cases an immense lobulated tumour, hanging down on the forepart of the neck; or it may increase uniformly upwards to the jaw and downwards to the chest, producing great inconvenience both in respiration and deglutition. The female population are much more subject to it than the male; it mostly commences when they are between the ages of ten and fourteen, and sometimes increases rapidly after puberty.

The swelling might be partial, involving only one or other of the lobes, or the isthmus only may be enlarged, while the lobes are perfect. Sometimes both the lobes are affected, whilst the isthmus is perfect; but, in the majority of cases, the whole of the glands are affected, and the distinction of lobes lost, one enlarged mass being only seen. In some cases this original lobulated appearance is preserved. The next frequent seat of enlargement is the right lobe.

Pathology and Morbid Anatomy.

The bronchocele tumour might consist of simple enlargement—the glands enlarging partially or throughout its whole extent—surrounded by a dense cellular mem-

brane. In this case the tumour is of a firm and hardened consistence, or of a number of cysts, the stroma being cellular. In the latter case the tumour is soft and yielding, and composed of numerous cells more or less capacious, sometimes forming enlarged cavities, and contains thick, viscid, glairy, gelatinous fluid. When the disease has advanced to a great degree, calcareous matter is deposited in the stroma, giving it a hard osseous density; the tumour in these cases never grows to a very great size, and the capacious cells which are formed may be filled up by various kinds of fluids of different consistence. Sometimes cysts might form on its surface, independent of, but associated with, the thyroid enlargement, sending cauliflower-like excrescences into its interior; or the cells may be developed in the interior, containing a dark, grumous, bloody-looking fluid, which, when inflamed and ulcerated, assumes the form of a malignant disease. The disease is endemic in several districts of India, Europe, America, and in Africa. In India it is common in Secrora, near Lucknow, along the line of the Himalayan range, and in all that district of Oude which stretches towards Nepaul and the Goruckpore district beyond the Gogra. In the jungles of the Teraie, at the base of the Nepaul hills, the disease is very frequent; and in Nepaul itself, among the inhabitants of the *Cis* and *Trans*-Himalayan regions, it is constantly met with. All along the line of the Teraie, on the Goruckpore, Goitre is so prevalent that one in ten persons is afflicted with the horrible disfigurement. The kingdom of Oude is geologically made up of the *diluvial detritus* of the Himalayan chain, which abounds in limestone, and the soil of the district contains abundance of

lime, which is taken up by the waters that percolate through it from the rivers and from the rains and floods. The lime thus taken up, and held in solution with carbonic acid gas, is frequently found deposited round nuclear fragments of flints or stones, and is then known by the name of kunker, so that wherever kunker abounds these soluble salts of lime, silica, alumina, and sometimes magnesia and protoxide of iron will be found. At Hissaropore, near Secrora, in the kingdom of Oude, animals (dogs) are affected with the disease.

In Europe this disease is seen at the foot of the Alps and Apennine Mountains; in England, in Norfolk and Derbyshire—hence the name *Derbyshire neck;* in America, it is found in the South, in the countries near the Magdalen River, and in Bogata, about 6,000 feet above the level of the stream; in North America, in Blue Ridge; in Virginia, in the mountains of Pennsylvania, New York, and New Hampshire; in Africa, it is endemic in M'Carthy's Island, in the River Gambia, and in other districts in the interior. This disease is generally associated with *Cretinism,* an idiotic condition, which is accompanied with deformity and infirmity of various organs of the body, in which the brain is also involved. The mind is variously affected, from a mere "*obtuseness of thought*" to a complete and perfect "*obliteration of all intelligence.*" They are goitrous, and supposed to be the offspring of goitrous parents after two generations, both parents being goitrous: they are found all over Europe; their stature diminutive, the development of the brain interrupted and abnormal. A cretin head is of great size, but flattened at the top, and spread out laterally; while the countenance

is vacant, and void of intelligence. The nose is flat, the lips are thick, and the tongue is large; the skin is dark-coloured, coarse, and rough; the abdomen is sunken and pendulous; the legs are short and curved. The development of the bones of the cranium in many cases is arrested and stunted, and in others abnormal.

Causes of Bronchocele.

This subject has very recently been properly investigated; and to the soil we must look for the primary cause of the disease.

The proximate cause of Goitre is in the unwholesome water used by the inhabitants of countries where the disease is endemic; the water is generally hard, and impregnated with calcareous salts, sulphate and carbonate of lime. The disease exists principally where magnesian limestone forms the geological strata of the country; and whether the water is obtained from deep wells or from the river, it produces the same effect. Dr. M'Clelland examined 126 villages in the province of Kemaon, in India, south of the Himalaya Mountains, scattered promiscuously over an area of 1,000 miles; these villages were situated on or close to limestone rocks, agreeing in aspect, altitude, and climatology. The following were the results obtained (quoted from Aitken):—

1. *Five* of these villages were built upon hornblende and mica slates, or on silicious sandstone, or on green sandstone. They contained 290 inhabitants, not one of whom was a *cretin*, or was affected with *Goitre*.

2. *Seventy-one* of the villages in the same district were built upon clay-slate. These contained 3,959 inhabitants,

and among them there were 22 persons with Goitre, or 1 in 200 of the population. There was not a single cretin.

3. *Thirty-five* villages, having a population of 1,160, were built upon Alpine limestone, and in them 390 persons, or more than *one-third* of the inhabitants, had Goitre; while 34 of them were cretins, or about 1 person in every 35.

Even natives in goitrous districts have attributed the disease to the water they drink, and point out certain wells, as in Oude, which quickly give it when the water is drunk, so that they have been obliged to abandon them. The water of these wells, when examined, is found to be highly impregnated with lime.

Diagnosis and Prognosis.

Goitre may be mistaken for aneurism of the carotid artery, when there is a circumscribed enlargement of one of the lobes, extending over the common carotid, and receives pulsation from it; or when there is an enlargement of the thyroid arteries, and there is pulsation through it. In such a case one is apt to be puzzled as to its nature. The *first* point for consideration is the condition of the tumour, which, although it affects one lobe, affects also the isthmus, more or less; *secondly,* in carotid aneurism, the portion that is firmly fixed is that under the sterno-mastoid muscle, whilst in Goitre it is in the median line; *thirdly,* on asking the patient to make an attempt to swallow, the tumour in Goitre moves with the pharynx and trachea, and the pulsation ceases; but in aneurism the tumour is stationary and pulsating.

The prognosis of the disease is generally most favourable; it is not fatal to life, but produces great inconvenience, disordering the position of the head, impeding respiration and deglutition by pressing upon the windpipe and æsophagus.

Treatment of Goitre.

The first consideration is the removal of the Goitre patients from the district, or of changing the drinking water; and the next is the removal of the poison from the system. The best remedy for this purpose is the use of an ointment composed of finely powdered biniodide of mercury and melted lard or simple cerate; it is besmeared over the enlarged tumour, and rubbed with an ivory or bone spatula, or paper knife, for five or ten minutes, the person sitting with his Goitre exposed to the sun as long as he can endure it. The ointment is likely to have a blistering effect, without surface vesicles; it should be repeated about two days afterwards. The patient should not touch it, but let the ointment be gradually absorbed. The result is generally very marked and satisfactory. Dr. Macnamara, of the Bengal Army, published, in the "Indian Annals of Medical Science," the results of upwards of 23,000 cases thus treated. "I have often," says he, "seen tumours of this kind, extending from the chin to a line drawn from between the mammæ, disappear after two applications of this drug."

The value of this remedy was discovered by two military officers—viz., Major Holmes and Captain Cunningham, of the Bengal Army, who were serving along the line of the Teraie, where Goitre is so prevalent that one person in

ten of the population is affected with it. They first used iodine uncombined, but the effect was unsatisfactory, and then they tried the compound salt—*biniodide of mercury*. Captain Cunningham "prepared an ointment by melting three pounds of lard, or mutton suet, to which, when strained and nearly cool, nine drachms of biniodide of mercury, finely triturated, were added. This ointment was applied to the Goitre with an ivory spatula. With this it was rubbed in for fully five minutes. The patient was then made to sit with his Goitre exposed to the sun as long as he could endure it. Some blistering follows this exposure, and in the afternoon the ointment was again applied 'with a tender hand,' and the patient sent home. Except in Goitres of extraordinary size, no other application was necessary." This treatment was remarkably successful: 60,000 patients were treated and cured in this manner—from 500 to 600 daily. Cases of failure were exceptional. The old officinal preparation of *unguent. hydrarg. biniodide* can be used with equal result.—(See page 493, "Chronic Inflammation of the Spleen.")

Iodine and its preparations, especially the iodide of potassium, have received their praises. I have frequently used them, but with unsatisfactory result. I have also applied strong iodine paint over the tumour. When the tumour is firm and stationary, the result is very small and inconsiderable; but when it is large, hanging down on the chest, it has but very little effect on it. When the tumour is soft and fast-growing, the use of iodine, pure and alone, or in combination with iodide of potassium, and the application of iodine paint, may serve to stop the growth and reduce the swelling; but after arriving at a certain size,

its effects become stationary, and the tumour remains stubborn. The iodine, with iodide of potassium, has been recommended as of value in the treatment of Goitre: it is called *Lugol's Solution*, and consists of *one part of iodine* (five grains), and *two parts of iodide of potassium* (ten grains), and water (one pint); so that each four ounces of the solution contain one grain of *pure iodine*.

The surgical interference with the disease, when by pressure it has become very inconvenient and other remedial means failed, consists in entirely removing the tumour, which is a very hazardous operation, and, from its great vascularity and abundant arterial supply from both thyroid arteries, could not, without great risk to life, be performed. Ligature of the thyroid arteries has been had recourse to by some surgeons, with varied results; but there is great danger and difficulty in the operation, and the result is generally uncertain, as the tumour is likely to receive a copious supply from other sources. A seton, consisting of a thin double wire, has been passed through the tumour, and left there for some time (a week). This has been successful in many cases, and, when carefully performed, is unaccompanied by danger.

If the tumour be cystic, the fluid might be removed by tapping, tincture of iodine being injected into it to close up the cavity; or a few threads of silk passed through the substance of the tumour, and retained there.

VII.—GUINEA WORM.

Filaria, Mendinensis, Dracunculus, or Guinea Worm, is a disease peculiar only to certain districts in different tropical quarters of the globe. It is most common in places where there is great scarcity of water, or where there is an abundance of stagnant pools; thus it is peculiar to certain parts of Asia and Africa. In the former continent it is found in various parts of Sennaar, India, Persia, and Arabia; and in the latter it occurs in Egypt, Nubia, and Abyssinia, in Senegambia, and in the various districts on the Gold Coast, including Apollonia, Ashantee, Ahanta, Wassaw, Denkera, Abrah, Assin, Akim, Winnebah, Accra, Aquapim, Aquamboe, Crobboe, and Adangme; beyond the Volta, in the Dahomian countries, it occurs sporadically in Aungla or Awoonah, and in Sumah or Abosumah. The Guinea Worm is endemic in places where the geological formation of the country is decidedly volcanic in its origin, and where the soil is composed of trap and metamorphic rocks, undergoing rapid disintegration and intermixing with alluvial deposits.

Symptoms and Progress.

The question of the symptoms of Guinea Worm involves the questions of its accession, incubation, and maturity.

Accession.—This period of the worm is never known, for a person may expose himself to the influence which will lead to the production of the disease without at all noticing any visible change on the cutaneous surface of the parts likely to be affected, yet after a few weeks or months the usual symptoms of Guinea Worm begin to make their appearance. In some cases the patient might be attacked with several worms at once, as in cases which have come under my notice, one appearing a few days after the other, and two or more simultaneously. Mr. Forbes mentions cases where fifteen worms were at one time exposed.

In an account published by me in the Blue Book—"Army Medical Department, for 1868"—there were twelve cases of Guinea Worm out of a detachment of thirty-four rank and file; the highest number of worms manifested in one individual was ten; and, of the twelve men, each presented an average of five worms; the most frequent parts of the body attacked were the ankle, leg, and foot. The following table shows the number of worms which appeared in different parts of the body:—

	No. of Worms.
Upper Extremity:—	
Arm and Forearm	4
Lower Extremity:—	
Thigh	4
Knee	7
Leg	11
Ankle	15
Foot	10
Toe	3
Trunk of the Body:—	
Abdomen	3
Back	1
Scrotum	1
Hip	3
Total Number of Worms	62

The pointed rigid extremity of the young worm, "a long cone, ending in a point so inconceivably fine that the point of a cambric needle is a large marlinspike in comparison with it," accounts for the ease with which it makes its lodgment quietly in the tissues of the body through the sudorific ducts.

Incubation.—This period is very various; in some cases—*i.e.*, those in which the worm receives imperfect pabulum from the surrounding tissue, or when the constitution is not adaptable to its speedy growth—it remains in the subcutaneous cellular tissue for a long time, even months or years, before it manifests its local effects. It is of such frequent occurrence on the West Coast of Africa, that American captains or supercargoes, who remain there for several months or years, travelling from one place to another, sometimes through mud and swamps, do not observe the least sign that they have contracted the disease until they leave the Coast and approach the colder climate of America, when the peculiar swelling characteristic of the worm appears; in fact, many arrive in America and remain there for some months before the disease begins.

But there are often cases where a person can trace the occurrence of the worm to certain exposure of very recent date, so that this latent period of the worm is most uncertain; sometimes it extends to months, and even years, at other times only to a few weeks. During this period it resides quietly in the connective tissue, increasing in growth, without producing any irritation in the tissues around.

The period of accession and incubation may be con-

veniently regarded as the dormant stage of the animal; we have now to consider its period or *stage of excitability* or *maturity*. This is the period at which the patient is made cognizant that he has contracted the disease, prior to which there is no marked constitutional disturbance, progression is by no means impeded, and the person goes about unconscious of the existence of the worm. It is now known that this is the hatching period of the worm, a period when both itself and its progeny are in full maturity; and the uneasiness caused by the overloading of its proligerous capsule, by myriads of young filaria, induces it to endeavour to make its escape or unload itself. This process is instinctive. The worm first enters the system through the sweat glands as a very minute worm, imbeds itself in the subdermoid cellular tissue, receives its pabulum from the fluid in the surrounding parts, grows very rapidly in some cases, slowly in others, becomes filled with embryo, and then endeavours to make its escape.

At this stage of the worm's existence, the individual invariably suffers an attack of fever, sometimes slight, at other times very severe; in some, the stomach suffers from severe irritation, leading to bilious vomiting; in most cases, especially at first attacks, the skin itches a great deal, occasioning a small pimple or blister; this is, in general, a certain sign in a Dracunculus district, especially when accompanied with a swelling. The worm generally commences its operations at night, when the patient is perfectly quiet, by producing a slight inflammation on the portion of the skin where it intends to make its exit; the point itches dreadfully, and on attention

being drawn to it, it is found to be raised into a small vesicle or blister; this gives some pain, and on rubbing it the surface is laid open, and in many cases a portion of the worm—the anterior end—protrudes from it. The fluid of the vesicle at this stage is clear and limpid; but if unopened for two days, "the contents become turbid, and sometimes bloody, from the rupture of the proligerous sac, and the discharge of the young filaria amongst the serum." As the worm protrudes from the ulcerated surface, if it is at once secured and tied round a small stick or a crow quill, and then gradually withdrawn from the system without breaking, the parts are freed from its effects, if there is no other worm; but it is seldom so easily cured, as in a great many cases it is broken, or retreats before secured, and the dreadful symptoms, characteristic of the worm, in a few hours begin to appear.

The worm at this stage produces a very severe, extensive, and destructive inflammation in the cellular tissue in the neighbourhood of and beyond its abode; the former outlet is now closed up; severe and intense pain is felt over the affected part; the foot increases twice or three times its natural size, is very tender to the touch, and in very severe cases, progression is entirely prevented. In these cases there is generally no great constitutional disturbance; the tongue may be slightly coated, or there may be a slight feverish state of body, but nothing further, except when there has been very great neglect, and death of tissue has taken place; then the constitutional disturbance becomes commensurate with the extent of the destruction of tissue. When matter has been fully formed, the point of exit is generally indicated, and im-

mediate relief is obtained; when opened, shreds of Guinea Worm escape through it from time to time. In some cases a perfect worm escapes with the gush of pus which takes place; and if the inflammation is very severe, shreds of cellular tissue slough out and are discharged. Sometimes the pus becomes surrounded by a pyogenic membrane, enclosing the worm entirely, and when opened it gushes out with the matter. When once a foot is attacked with Guinea Worm, it becomes more susceptible to the disease than previously.

Sometimes Guinea Worm produces excitement on one part of the body at one time, and after remaining quietly for some days or months, produces excitement in another part; this will lead us to a peculiar habit of this worm, which I have termed the *iter* or *journey of the Guinea Worm.* It is not an uncommon thing for a patient to trace out the course the worm pursues in the system. Sometimes this journey is very painful, and causes irritation and inflammation; at another time this process is performed without producing the least inconvenience, and generally at night, when the patient is still; and after remaining in its abode some time, it may begin to produce its characteristic irritation, or may make another move; very often it is impeded in its progress, when it at once commences to set up inflammation. It is not uncommon to meet with individuals who once had Guinea Worm in the ankle, which was quieted by poulticing and rest, having worm in the middle of the leg, and when the direction is through the calf it reaches the thigh and there remains; in a great many cases a cord-like feeling may be traced with the fingers along the course of the

worm. In the "Indian Annals," Dr. L. W. Stewart, of Madras, relates a very interesting instance of the migratory character of the Dracunculus, which happened to an officer who had extracted a worm fifteen inches long from his scrotum: "Ten days afterwards he experienced an unpleasant sensation in the posterior aspect of the left thigh. Day by day the sensation shifted lower down, till it reached the popliteal space. A few days later the sensation was experienced in the calf. Hitherto, nothing was visible; but at the end of sixteen days from the first sensation in the thigh, the convolutions of a Guinea Worm could be distinctly traced at the outer side of the ankle-joint. Dr. Stewart now wished to cut down and extract the parasite, but the evening was too dark, and he delayed till the following morning. By the morning visit, however, the parasite had again fled, and had taken up a position in the deeper muscles of the foot; not a trace of the worm could be recognized in the place which he had evacuated. Many abscesses now formed, and severe inflammation of the foot resulted, which confined the patient for three months, before he was free of this wandering parasite."

Pathological and Morbid Anatomy.

The Guinea Worm attacks the skin either in the form of a minute worm, when it passes through the pore or sweat-duct, or in the form of a minute larval embryo in contact with a broken surface of the body. The young Guinea Worm presents the following structure: A head, and a hair-like, finely-pointed tail; the body constitutes three-fifths, and the tail two-fifths of the whole length.

The anterior extremity has a blunted end, with an oval orifice communicating with a cavity occupying about one-half of the whole length of the body, and terminating cæcally. The minute worm which attacks the body occurs principally in muddy banks, in the bottom of tanks, and in soft, muddy pools; it is computed to be from 1-60th to 1-25th of an inch in length. On entering the body, it is imbedded in the soft and yielding cellular and adipose tissue, from whence it extracts its food. In very fat individuals, who are not of active habits, the worm grows very rapidly, and sometimes within a few weeks it begins to produce local irritation, and endeavours to make its escape; in thin, slender, active persons the reverse is the case.

All our observations have failed in discovering the male Guinea Worm; in the human system the female animal is only found, and the microscopic embryo which fills their uterine sac has shown us no signs of sexual difference, under the highest power. The embryo, after its exit from the system, undergoes certain morphological changes, becomes impregnated by a male animal before it again enters the system, and remains in a quiescent state until the embryo becomes properly developed.

The full-grown worm varies greatly in length, and on account of its extreme elasticity it is difficult to arrive at a correct measurement; the average length is about 20 inches, and the average diameter in the largest part is about 1-8th of an inch. Ewart places the average length at 25·25, the shortest at $12\frac{3}{4}$, and the longest at 40 inches. "Clot Bey records their length at from 6 inches to 4 feet in Egypt. Carter gives their

dimensions in India at about 28 inches long and 1-9th of an inch in diameter. Busk gives the dimensions at from 4 to 6 feet, and 1-12th of an inch in diameter." When first removed from the body, the full-grown worm looks like a white cord, small at both ends and large towards the middle, especially the middle third from the tail. The worm may be divided into two parts, a head and a tail. The head terminates abruptly in a cruciform mouth, by which it extracts food from the surrounding tissue; the tail tapers, and terminates in a hook-like process of very delicate texture. The body of the worm is divided into two chambers—viz., the alimentary canal, which is placed in the centre, and by far the smaller, chamber; and the larger one, situated between the alimentary canal and the outer coat of the worm, which is filled with a white, milky fluid, holding in suspension myriads of microscopic embryo. When kept in spirit, this milky fluid becomes coagulated, and so the worm partakes of the character of a whipcord.

The composition of this milky fluid is undetermined; it is coagulated by heat and alcohol or any spirit, and removed from the proligerous matrix of the zoösperm by constant application of water; white flaky particles are sometimes discharged with it from the capsule. This is of great pathological importance, for either the milky fluid consists, in large quantity, of phosphate and carbonate of lime, or the proligerous membrane has the power of generating these substances. It sometimes happens that the worm, after committing a great deal of mischief in a part, remains quietly under the skin, sets up a moderate amount of inflammation, under which it succumbs and re-

mains in that position for years, in the form of a small tumour, producing no other disturbance than that of a mere inconvenience to the parts. On removal, it is observed to roll up in fantastic forms; the worm is found to be contracted, through the action of its muscular coat, into one-half or a third of its length; the external coat becomes adherent to the surrounding cellular tissue; the longitudinal and transverse bands of muscular fibres are very much developed; the alimentary canal is destroyed, and the proligerous capsule irregularly enlarged to twice or three times its size; the external surface of the worm is irregular, as it bulges here and there, giving a very rough feel to the touch.

On opening the sac, it is found to be filled with a large quantity of white, bony particles, scattered all over the entire length of the worm, completely filling its cavity, varying in size from a sago to a minute granule; they are hard, of irregular shape, with very rough edges. There is no milky fluid in the cavity, which, although very much enlarged, is completely filled up with this bony substance.

Staff-Surgeon Mosse removed a tumour of this description from the arm of a lad who had it for several years. He said that eight years ago he had five worms on both his legs, and it was about that time that he observed the swelling in the arm, which was never very painful.

Very recently, Dr. Bastian, of University College, read an elaborate paper on the anatomy of the Guinea Worm in the Linnean Society, which was published in their *Transactions* for 1863. The following is the summary of his observations, as quoted by Dr. Aitken:—

"The anterior end of the worm may be recognized by a 'punctum' in its centre, 1-2000th of an inch in diameter, surrounded by rugæ in circles, the external of which was 1-271st of an inch in diameter. Above and below are two papillæ opposite each other, with a transparent area in the centre of each. These are rather oval, 1-475th of an inch in diameter, with a transparent area of 1-1900th of an inch. Besides these, two lateral tubercles exist, much smaller, more indistinct, and further from the punctum than the upper and lower papillæ. They are 1-1900th of an inch in diameter.

"It is difficult to obtain a good view of the head, for, as it is the first part to protrude through the skin, it is usually rubbed off or destroyed by the treatment adopted for extraction.

"Great varieties in form are presented by the tail or posterior end of the worm. The remains of the attenuated extremity of the young *Filaria*, being more or less persistent in the form of a hook or spikelet, were believed at one time to be the penis of a male; and such specimens as showed such spikelets have been mistaken for male Guinea Worms. All these forms, as Busk showed, have been found in specimens containing living young ones (proligerous). All are females that have yet been found, and no males are known to have existed in the human body. The strength of the tissue of the *Dracunculus* is such, that a loop of the parasite will suspend a weight of $11\frac{3}{4}$ ounces (Scott), and it is elastic to a remarkable degree. On opening the body, two longitudinal muscular bands are seen on the dorsal, and two on the transverse rugæ, marking the whole extent of the worm; and these

are approximated or apart, as the worm is contracted or extended. The body of the worm contains an alimentary canal, which commences at the '*punctum*,' and terminates in the concavity of the tail end. It is of a yellow colour, nearly uniform in size throughout its extent, and in its course through the body winds several times round the genital tube. (Bastian). No outlet has yet been detected. It is distinct from the tube containing the young. (Forbes).

"The genital organs consist of a large uterine sac or tube, occupying nearly the whole length of the worm, and terminating abruptly at either extremity in a much smaller tube (probably ovarian), about three-quarters of an inch in length. No vagina or vulva can be discovered. (Bastian).

"The whole extent of this uterine sac or capsule is crowded with innumerable young, and, with the exception of a transparent half-inch or so of the worm, the whole extent of the parent seems to be a *uterus*, a *matrix*, or a proligerous capsule, carrying countless offspring, to which no parturient female of any animal can be compared for productiveness; and from the fact that no inlet has ever been discovered to the genital organ, and from various other circumstances, Mr. Bastian has endeavoured to show that this innumerable progeny has been produced by a process of parthenogenesis, similar to that with which we are so familiar in Aphis."

The attempt of the worm to relieve itself from the tissues of the body is instinctive; the general cavity, being loaded with myriads of embryo of matured size, produces excitability and a feeling of great weight in the worm, which causes it to endeavour to get out of the

system. If the worm be removed entire, the person is said to be perfectly cured; but should it be broken in the process, the remaining part recoils in its subcutaneous or sub-muscular recesses, the embryo, with the milky juice discharged in the tissue, acting as a powerful irritant, causes intense inflammation, by which the whole of the discharged embryo and the full-grown worm are discharged from the system. Guinea Worm does not only occupy the superficial cellular tissue, but also the deep-seated ones between the muscles; this, in most cases, regulates the character of the inflammation. When removed from the system alive, the worm moves very sluggishly, by an undulation of its central portion, the head and tail remaining apparently unmoved.

When persons are placed completely under the endemic influence of Guinea Worm, they are generally attacked in various parts of the body, either at the same time, or as soon as one gets well another appears. The following twelve cases occurring among a detachment of native troops stationed at Accra, will illustrate this fact:—*

1. Private S. had *one* worm in the posterior portion of the left hip, *one* in the middle of the left arm, *one* in the inner portion of the right malleolus, *one* in the superior aspect of the right foot above the fourth toe, and *one* in the inner malleolus of the left foot—five in all.

2. Corporal W. R., *one* in the external malleolus of the left foot, *one* in the heel of the left foot, *one* in the back of the right knee, *one* in the plantar aspect of the second toe of the right foot, *one* in the middle half of the back

* Army Medical Department—Blue Book, 1869, p. 335.

of the right leg, and *one* in the calf of the left leg—six in all.

3. Private K., *one* in the middle of the superior aspect of the right arm, *one* in the external portion of the middle of the right leg, and *one* in the external malleolus of the right foot—three in all.

4. Private S. T., *three* around the external malleolus of the right foot, *one* in the external half of the right leg, *one* in the external part of the right hip, *one* in the inferior aspect, *one* in the lower third external portion of the right thigh, and *one* in the upper third external portion of the same leg—eight in all.

5. Private B., *one* in the middle of the right foot, *one* in the lower third of the front of the right leg, *one* in the upper half of the back of the left leg, *one* in the external portion of the right hip, and *one* in the superior aspect of the large toe—five in all.

6. Private A., *one* two inches above the heel—one.

7. Private R., *one* in the left side of the middle half of the back, and *one* in the middle of the right leg—two in all.

8. Private A. H., *one* in the middle of the plantar aspect of the left foot, *one* in the middle of the right arm, and *one* in the plantar aspect of the large toe of the right foot—three in all.

9. Private S. G., *one* in front of the upper third of the right foot, *one* in the back of the leg (middle portion), and *two* in the inner and upper third of the thigh—four in all.

10. Corporal B., *four* around the knee of the right foot, *one* in the right inner malleolus, *one* in the inner side of the right foot, *one* in the inner side of the middle half of

the right thigh, *one* in the external malleolus of the left foot, *one* in the middle of the inner side of the left leg, and *one* in front of the left knee—ten in all.

11. Private C., *three* in the external portion of the left ankle-joint, *one* in the lower third of the left arm, and *two* in the right side of the abdomen in the hypochondriac region—six in all.

12. Drummer P., *two* in the external malleolus of right foot, *one* in front of the right ankle, *one* in the inner malleolus of right foot, *one* in the lower half and back of the right thigh, *one* in the back of the left knee, *one* in the back of the upper portion of the left leg, *one* in the external malleolus of the left foot, *one* in back of the left lumbar region, and *one* in the scrotum—ten in all.

Causes of Guinea Worm.

The causes of Guinea Worm have long been a disputed point amongst scientific men, and inhabitants of Guinea Worm districts. If the inhabitants of some districts where the disease is endemic are questioned as to the cause of the worm, they at once reply that it is not known for certain; but as the best view or the best hypothesis is that which embraces all known facts respecting the subject in question, so I shall here detail and review the different causes which have been alleged to have induced the disease, and then point out, from direct and circumstantial evidences, what is the most likely source of this pest.

I shall divide the causes into predisposing, or *causes which lead to the susceptibility of the system to the disease*; and exciting, or *immediate causation*. I shall, however,

both on account of the importance of the latter, and also the bearing of the predisposing on the exciting cause, give the first consideration to the latter.

There are three views which have been maintained as the exciting causes of Guinea Worm—viz., that it is derived—

I.—*From the drinking-water that is used by the inhabitants.*

II.—*From hereditary transmission.*

III.—*From direct contact with the earth.*

We shall now consider the value of each of these causes. Those who maintain that drinking water was the cause, support their argument by the following considerations :—

1.—*That Guinea Worm is only found where water is scarce—in fact, where the people use tank-water.*

This is not literally true, although it is principally found in places where water is not plentiful, as in Syria, Arabia, various parts of India, and northern regions of Africa ; but it is also found in the tropical regions of Asia and Africa, where water is also abundant. In great numbers we meet with it among the coloured population in the West Indies ; and in Western Africa, where I made it a point of special observation, it is very common in regions below the River Volta, where the people obtain good water in abundance by only digging a well three or four feet in depth. It should also be remembered that the poor class of the population in some places where the disease is endemic do not drink tank-water, but well-water, so that the argument of the drinking of tank-water being the cause falls to the ground, since the

disease is more prevalent amongst the lower than the higher class.

2.—*That the embryo worm could be seen in a larval state in the water drawn from the tank, which may lead to the deduction that the embryo, being very minute and disseminated in the water, is taken into the system, and distributed amongst the chylopoetic viscera, and thus transmitted into the system.*

It is a positive fact that when water is drawn from a tank that has not been cleansed for a long time, several small species of worm are seen very active and twisting about in the water. Some of these are the larval state of some insects; others are a peculiar worm known as Tank Worm. We meet with the larval state of the mosquitoes in great numbers. By being passed through the filter, the whole of these are removed. If we admit that the worm is taken up by the blood-vessels which form a network in the chylopoetic viscera, some of the embryo, at least, will first be distributed in the liver; and as this organ is composed of a number of very minute vessels, a few must be arrested, and thus undergo the different changes necessary for the development of the worm: but we have never heard of Guinea Worm in the liver. I have seen it attack the side, external wall of the thorax and abdomen, but never the internal organs.

Guinea Worm, therefore, in the system, cannot claim, as its original source of production, the tank-water which is drunk by the inhabitants.

3.—*That the Guinea Worm sometimes attacks far and distant, as well as important, organs, which cannot be from actual contact*—e.g., *the eye, tongue, &c.*

When the Guinea Worm is found in the neighbourhood of the eyeball, it must have originally attacked the external surface of the parts near the organ, and cannot be said to be interrupted in the minute blood-vessels in the eyeball and then undergo development. The history of the case will always clear up this part of the question. That Guinea Worm has been found in the interior of the eye, lodged in beds made for itself, and only making periodical movements, at that time causing irritation and slight inflammation without destroying vision, can scarcely be believed, on account of the destructive character of the worm. It is most likely that many of those who detail such cases confound it with the entozoa peculiar to the eye—viz., the *Filaria oculi;* for the latter is perfectly harmless when compared with the former.

The tongue has also been the seat of Guinea Worm. According to Dr. Scott, the socket of the eye, the mouth, the cheeks, and the tongue have formed seats for it; and, according to M. Dubois, the nose, ears, and eyelids.

4.—*That it invariably attacks the lower class of the inhabitants, who drink bad water.*

The lower class of the people in the Gold Coast drink water that is accumulated during the rainy season in stagnant pools, or that obtained by digging a well a few feet into the earth, and which is very brackish, muddy, and unhealthy; they very seldom use tank-water. On examining the well-water, we do not find so many embryo organisms as in the tank-water. More leeward, in the country of Awoonah or Aungla, the people obtain

very good water from wells of the depth of from three to six feet, and yet they are affected with Guinea Worm. At Dix Cove, Apollonia, and Axim, where the inhabitants live on river and spring water, Guinea Worm appears to be more common in the first of these places than in any other parts where the disease is endemic.

It cannot be urged, therefore, that the drinking of bad water is the source of the worm, since it has been shown that people who have very good water, either from well or from spring, suffer alike with those who drink bad water, where the disease is endemic.

The drinking-water, therefore, is not the source of Guinea Worm, as it is prevalent in places where water is abundant, and where the inhabitants do not use tank-water.

II.—Hereditary Transmission.—In making observations on Guinea Worm, as it occurs amongst the inhabitants of the Gold Coast, one is sometimes told that it attacks children a few months or weeks after birth; and they account for it as being transmitted through the mother. This view, I am of opinion, is untenable, since the embryo worms are so large that they cannot be taken up by the absorbents, transmitted into the blood, and conveyed into the fœtal and maternal system *in utero*. Hereditary transmission, therefore, is impossible.

III.—Immediate Contact with the Earth or with an Infected Individual.—Every argument goes to prove that this is the direct source of Guinea Worm. That this is the case is proved—

1.—*It occurs only among those who walk barefooted, either constantly or occasionally.*

In discussing the subject with the educated natives, some generally object to immediate contact, on the ground that Guinea Worms occur on some who do not walk on their bare feet; but if we trace their minute actions we find that they either were accustomed in their youth to go without shoes, or only used them occasionally; that the disease was not engendered after they made shoes a constant part of their dress. Most of those in this class who have got Guinea Worm have travelled a good deal in the interior, and at seasons when the road is covered with mud and water. All authors agree that Guinea Worms exist in moist earth and mud; but the peculiar condition of the young worm before it attacks the system is as yet unknown. "It is probable that the hair-like worms found by gardeners in India coiled up together may be the *filaria* of the Guinea Worm in sexual congress, whose progeny, as *zoösperms* or as filiferous females (like the Tank Worm of Carter), make their way into the body. It is known that the *Gordius aquaticus*, when young, enters the bodies of large water-beetles; and at a certain stage of life, it leaves its abode in the beetle and goes into the water, where it becomes a variety of *Tank Worm*. It appears that there are white and brown Tank Worms—nay, that there are no fewer than seventeen species of minute *filaria;* and some say that all Tank Worms are white at first, but become black after a time in the water." (Aitken). But the difficulty is to determine the phase of existence of the young filaria after they have quitted the body of the parent, and lived an independent existence.

To ascertain this, I buried live Guinea Worms con-

taining embryo in boxes filled with earth, and watered them every morning, and after a time examined the earth, but I obtained no satisfactory result. This experiment will be repeated as opportunity is afforded.

2.—*That it occurs among Europeans who travel about.*

That Guinea Worm attacks some European residents in the tropics has been used by some as a strong argument against direct causation, since Europeans are supposed to be always with, or very seldom without, their shoes. But Europeans who remain for a long time, and whose occupations require them to travel from place to place, become after a time careless of themselves, and unwittingly expose their bodies to the influence of the disease. Many a time during their travels have they been obliged in some places to walk on bare feet, or with shoes perfectly saturated with mud and dirt, not knowing that the element of a most painful disease could be transmitted into the system through it. In no case have I known of careful European English officers having been attacked with Guinea Worm, although some have been for several years in places where the disease is endemic; and this is entirely due to the care they took of themselves. But merchants of long residence and free habits, and supercargoes of merchant vessels, have been attacked.

3.—*That it occurs principally on the lower extremity.*

The part of the body in which this worm is most commonly found is in the lower extremities, the foot and ankle more particularly. Out of 300 cases noted, not less than 206 were on the foot; the next in frequency was the leg, then the testicle, and then the thigh: the face, back,

breast, and tongue, being rarely affected in Africa. In India, it frequently occurs in the back amongst water-carriers.

The following statement, made from the observations of 300 cases, will show the frequency with which the different parts of the body are attacked :—

300 Cases.

Foot, including the ankle	206 cases.
Legs	38 ,,
Thighs	16 ,,
Testicle	19 ,,
Abdominal Walls	8 ,,
Breast	2 ,,
Face	2 ,,
Tongue	1 ,,
Back	1 ,,
Arms	7 ,,
Total	300 cases.

This is easily accounted for. In India it occurs in the lower extremities of those who are accustomed to go into tanks, or dried-up wells which yield a very small quantity of water, where they remain till they can be supplied; they stir up the mud, which is the abode of the *filaria*, from which some make a lodgment in some part of their feet. In other parts, it is obtained from walking through mud and swamp, and also from washing in stagnant pools, disturbing the minute worms from the bottom of the water. Some length of residence is required for development. In the latter part of 1862, two companies of the 2nd West India Regiment landed at Cape Coast Castle, from Sierra Leone; not one had the Guinea Worm. After remaining there for twenty months, most of the cases of admittance

into hospital from that disease during the Ashantee Expedition of 1864, were entirely among that corps. In India it is exactly the same.

Dr. Forbes, whilst examining several tanks in India, in the neighbourhood of Dharwar, found numerous *filaria* on their banks, and in half-dried beds, "some of them very much resembling those produced by the Guinea Worm when infesting the human limb. Their vermicular motion in the water is exactly the same; their general appearance is the same; and they are active and equally numerous. The point of a penknife inserted into the mud will raise up abundance for examination. They are most numerous where the water assumes a variegated appearance, with a pellicle floating on its ochry surface; the fine, soft, impalpable mud just above water-mark contains most, and the best time to find them is about three or four o'clock in the afternoon. Two kinds may generally be detected in the soft mud: one kind is seven or eight times the size of the Guinea Worm young *filaria*; the other exactly resembles them."

4.—*That when it occurs in the upper part of the body, it does so among those who sleep on the ground.*

Besides the lower part of the leg, Guinea Worm is sometimes met with in other parts of the body. We not unfrequently meet it in the thigh, testicle, walls of the abdomen, and sometimes in the upper extremity; this, of course, is not likely to have been produced by Guinea Worm in the foot. It is easily accounted for when we consider the habits of the people. In some parts of the tropics, and where the disease is endemic among the lower class, we find them recline on small mats spread

on the ground, which in many cases is very damp. Should the embryo worm be about the spot, which is not unlikely, especially where the worm has prevailed in the family for many years, its access to the most dependent part of the body is very easy; its entrance is insidious, and it does not show itself until it is about to make its exit. Again, this class of people, as a general rule, are not upright pillars of sobriety, and in some of their bacchanalian fits they sometimes lie for hours on damp ground in almost perfect nudity, and on their face; so that the attack in the various parts of the body may easily be accounted for, and also shows that walking or standing in mud is not the only way an attack may be occasioned.

Washing in muddy tanks, or stagnant muddy pools, is another fruitful source. Mr. Mitchell, in the *Madras Times* (Supplement) of 18th December, 1861, and 13th January, 1862, relates cases where he could date the accession of Guinea Worm from gentlemen bathing in tanks contrary to his advice.

But it is not all mud worms that are the essential *filaria;* for, in countries where it is not endemic, the inhabitants may walk in mud and swamp, may bathe in stagnant pools, without any ill effect, although there are several minute worms in them, but these are not that particular species of *zoösperm* which produces the Guinea Worm.

5.—*That a similar worm, called in some parts of Western Africa,* Ground Itch, *but in the West Indies,* Chiga, *attacks the body by actual contact, and produces severe but moderate inflammation and an ulcer.*

At Sierra Leone and its neighbourhood, in the Gambia,

and in the West Indies, this disease occurs, but it is not very general. Like the Guinea Worm, it generally attacks the sole of the foot, especially between the toes, or at the groove in the plantar surface of the toes. It is a very small worm, which pierces through the skin unobserved. The period of its activity is in the rainy season, when every place is damp; in the dry season the worm could be discovered in some places, making a conical hollow in the ground, the small apex in the earth and the broad base on the surface. This opening is surrounded by very fine earth, and if care be taken in the search the worm could be detected in its recesses.

The period of attack is not generally known, but after a time the part itches a great deal, and becomes inflamed, and if hot fomentation and warm Soursour *(Abutilon esculentum)* leaves be applied to it, the inflammation soon subsides; a small ulcer opens, the worm escapes, the parts are healed, and the patient never suffers again from it. But if care be not taken from the beginning, it remains for a long time as a troublesome ulcer, and heals very slowly, interfering with the general health of the individual.

Here is now a minute worm that attacks by actual contact a certain class of people—viz., those who walk barefooted—presenting similar symptoms as the Guinea Worm. The period of entrance is in both cases unknown, both are excited by cold, and are more prevalent during the rainy season than at any other time. Each produces the same symptoms of irritation or itching, which terminate in an ulcer. They differ in the degree of inflammation, in the size of the worm, and in the after

effect. The Guinea Worm attacks the soft and yielding flesh, preferring to habitate in the soft and yielding meshwork of cellular tissue situated between the true skin and the adjacent parts, and also between the muscles; whilst the "*Ground Itch*" attacks the unyielding hard derma that covers the sole of the foot, preferring, however, the more yielding part towards the base of the toes.

Direct contact, therefore, is the sole manner by which Guinea Worm enters the body; but there are cases where gentlemen are affected with it in parts where it is impossible for them to account for it, such as when it occurs in the scrotum or testicle, among men who neither wash in muddy ponds nor sleep on the floor. In these seemingly unaccountable cases, I am of opinion (although it is opposed to the views of M'Gregor, Bruce, Paton, and others) that the disease is contracted by contact with an infected individual. Females most likely impart it in this way; and if the worm or the larvæ of this worm come into contact with a broken surface or with a highly dilated sudorific duct or pore, it will soon find its way into the subdermoid cellular tissue, and after extracting nourishment from the surrounding tissues, increase gradually or rapidly in size, according to the condition of the patient, until its excitable stage arrives, when it leaves the body.

Prevalence of Guinea Worm—Period of the Year.—Guinea Worm is most prevalent during the rainy season in all those places where I made my observations. Its prevalence commences with the commencement of the rainy season. When the weather is hot, uniform, and dry, individuals are generally free from it. I have ob-

served its prevalence also during the constant blowing of the harmattan winds, when the weather is cold. The cold season, therefore, seems to be the period of irritation, although it may come on at any other season. I believe we may explain it from the supposition that during the hot season the temperature of the body is uniform, especially in the lower extremity, which is the most constant abode of the worm; but during the cold weather (the worm occurring principally among those persons who go barefooted, exposing themselves to wet and cold) the worm feels the change, the temperature of its medium becomes changeable, now hot, now cold, which leads it, especially when loaded with eggs, to endeavour to make its escape and discharge them. It then causes severe inflammation and a blister over the part where it intends to make its exit. In India it occurs variously in different parts, but most frequently at the commencement of the rainy season, and reaches its maximum in the middle of the rainy season, as in Bombay, Matotoongha, Kirkee, and vicinity. In the West Coast of Africa it is prevalent also at the commencement of the rainy season, in the Gold Coast, and Bight of Benin. In the Gambia, Senegal, and Northern Africa, it is more prevalent in the cold months of December, January, and February; as is the case at Sattimungalum, in the Carnatic villages, according to Dubois (a French missionary).

Locality and Propagation.—Guinea Worm is more prevalent in places where water is scarce, and where the soil is generally of a secondary formation, consisting of traps of igneous origin. But this is not absolutely the case, as I have known Guinea Worm to be endemic in

soils which consist of dark alluvial loam, without igneous origin, and where the rocks consisted of red sandstone. But here the number of cases were very few, and the disease is more a rarity, although it is indigenous to the country.

Scott, Chisholm, Carter, and many others agree that this worm abounds in countries of volcanic origin, where the soil is composed of decomposed trap, of argillaceous consistence, holding moisture percolated by sea-water or impregnated with salt. And this is a very correct view, for I have met with it in the greatest abundance in places where trappean rocks of volcanic origin were undergoing extensive decomposition.* The young embryo worm, after being relieved from the parent, who must die when its young is full-grown, undergoes various changes which as yet are unknown, examination of it in this stage being so difficult; they undergo quite a different stage of existence, metamorphic changes take place in them, sexual organs become developed. How many phrases or generations the worm undergoes is unknown, but the impregnated female *filaria* or *zoösperm*, the progeny of the sexual filaria, and not that of the full-grown female Guinea Worm removed from the body, seems to be the animal which attacks the human body, and is known as *Dracunculus*.

Results of Guinea Worm.

In places where Guinea Worm is prevalent (as in various parts of the East Indies, or on the Gold Coast of

* The author's work on "The Physical and Medical Climate of Western Africa," "Geological Nature of the Soil of the Gold Coast," p. 127. Churchill, London, 1867.

Western Africa, &c.), the population are remarkable for the number of distortions and deformities of various kinds met with, and the most fruitful source is to be traced to this detestable pest. They are—

1.—Distortions of the Lower Extremities.—*(a) Contraction of the Calf upon the Thigh.*—This takes place when the Guinea Worm attacks the calf. It sometimes is so mild that no contraction takes place; but when it is severe, and when two or more worms are present, the calf becomes so much swollen and tense that the individual is unable to walk. The leg contracts on the thigh, and, if proper means be not applied, this stage continues for a long time; the muscles being kept in that contracted position, and the irritation producing great changes in the minute structure of the muscular substance, the contraction becomes permanent. But the contraction may not only depend on the changes in the muscular fibre, but may depend upon that of the fibrous expansion on the posterior portion of the knee through the irritation. But in both contractions the distortion is easily remedied if early attended to.

(b) Talipes Equinus.—This disease commonly comes on when the abscess produced by the worm affects greatly the muscles of the calf, crippling the Gastrocnemei. It is a very troublesome attendant, and remains so after the worm has been removed. When very severe, the *tendo Achillis* will be required to be divided before any cure can be effected.

(c) Permanent Swelling in the Internal Malleolus.—This is the invariable effect of Guinea Worm when it attacks the region of the ankle-joint, which is the most

frequent place. The skin and subdermoid tissue become œdematous, and constant irritation makes the tissue permanently hypertrophied. When, however, the Guinea Worm has been destroyed and removed, and the parts remain undisturbed for a long time, it gradually diminishes, until the swelling is almost entirely removed.

2.—Mortification of a Part of the Lower Extremities.—*(a) Mortification of the Toes.*—It is not an unfrequent thing to find this worm invading the dorsal aspect of the foot, in which case the inflammation sometimes affects one or more of the tarso-metatarsal or metatarsophalangial joints; and in not a few instances the toes have mortified and undergone spontaneous amputation.

(b) Mortification of the Foot, requiring Amputation.—Cases like these are not unfrequent, especially in persons in whom Guinea Worm commences in the ankle, and who have not had proper attendance. It is the habit of the natives, in treating this affection, to apply to the ulcer as hot a compound as they can make up. Cayenne pepper is one of the most frequent ingredients, and when applied to the sore, it increases the inflammation. The lower class of the people are filthy in their habits, so that the sore sometimes is never washed for weeks. The consequence is, after a time the joints become involved, and the parts much tumefied; the whole of the back of the leg is involved; the coats of the vessels share the same fate; circulation to the foot is interrupted, the temperature falls, and sensibility is lost; the tissues about the ankle slough out, and the dead foot hangs by the tendons which run from the leg. I had a case of this kind in which I was obliged to perform amputation of the leg.

(c) *Mortification of the Leg.*—This generally follows the mortification of the foot, when the ankle and the lower part of the leg are involved, and proper care is not taken to prevent the mortification extending to the middle of the thigh. In these cases it will be found that the Guinea Worm had made its journey to that distance, and had produced some change, more or less, or positive mischief in the parts; the gangrenous matter extends to that distance, and destruction and death of tissue is the result. In a case of the kind that I saw, which occurred in a child, the lower third of the tibia was laid bare, the foot was quite detached, and the line of demarcation was situated nearly at the middle third. Amputation was performed above the knee-joint, and the patient recovered.

3.—Enlargement of the Testicle and Scrotum.—Hydrocele.—Enlargement of the testicle is caused when the Guinea Worm affects that organ, or tissues in its immediate neighbourhood. When the worm is in the latter position, it may produce merely a very mild inflammation, leading to simple enlargement of the fibrous tissue covering the testis; but its seat is generally in the loose cellular tissue, in which it moves freely and travels about, sometimes without causing any great pain or inconvenience; and in such a case, when extracted, it produces no injurious effects in the testicle, for it maintains its natural size, whilst the cellular tissue around it and the muscular fibre become thickened.

Sometimes, however, it does not run such an easy course, but produces a severe inflammation, which leads to the effusion of lymph in the cellular tissue, which ultimately becomes organized; the serous membranes covering the

testicle—viz., the *tunica albuginia* and *tunica vasculosa*—become united through the inflammation; the testicle greatly and permanently enlarged, and very painful, especially when it involves the Epididymis. Sometimes the inflammation of the serous membrane is not high, and slight *Hydrocele* is the result, but in all cases the scrotum suffers more or less enlargement with the testicle.

4.—Enlargement of the Breast and Atrophy or Destruction of the Galactophorous Glands.—The breast is a very uncommon place for Guinea Worm to attack; and when it does attack this part of the body, it produces severe agony to the patient. Out of three hundred cases collected by me, it occurred only in two. Guinea Worm in the breast may be merely a simple inflammation of the cellular tissue, without affecting the gland; but most generally the glands are involved, and abscesses formed in different parts. It occasions great pain, redness, and tenderness; the tissues are infiltrated to a great extent, matter accumulates and is discharged, when relief is obtained. Should the Guinea Worm at this time be removed or discharged, the ulcer quickly heals up, after discharging for some days a large quantity of matter. The swelling gradually reduces, but the breast maintains a size one-half (or more) larger than the other. Sometimes some of the glands are destroyed or atrophied, a few healthy ones still remaining, but in every case the breast is incapable of performing its functions satisfactorily.

5.—Elephantiasis Arabicum.—Along the Gold Coast of Western Africa we notice this disease to be very prevalent in some parts, whilst in others it does not exist, or is not traceable. Where it exists it is seen from its very

mild, which is the beginning of the disease, to its most hideous form. In the extreme eastern district—viz., Dix Cove—the disease is very prevalent. The town is surrounded by a great number of small hills, except where it faces the sea, and contains a population of about 5,000 souls; and from the number of cases met with among them, it might without error be computed that one out of every ninety persons is an elephantiasis subject.

The natives are supplied with water from two streams running between the central hill. It is very impure, especially during the dry season, when it forms small lakes or stagnant pools, at which time it is muddy and of a white colour. The soil of Dix Cove is argillaceous; the clay forms in some places black alluvium, whilst in others white, intermixed with red. The wealthier class of people use tank water, which is far more healthy and wholesome.

These people with elephantiasis, on being asked the cause of the disease, invariably reply that they do not know, but that they previously had Guinea Worm, and that after its cure the foot began to be enlarged. In my own opinion, it is not to the Guinea Worm that we must look for the immediate cause of it, for then it ought to occur in every place where that disease is to be found; but to the nature of the soil, which imparts certain of its constituents to the water which is used by the inhabitants. The Guinea Worm serves as a stimulus to the epidermis in making it susceptible to the unhealthy virus which has been taken into the system by the drinking water, and which determinates the disease to the already affected part. But I muest rmark that there is constitutional predisposi-

tion for the disease, as it is not every one in the same district who has had Guinea Worm that has Elephantiasis; but every one who has Elephantiasis on whom I made observations had previously Guinea Worm.

6.—Elephantiasis Scroti.—This is seen in those cases where the Guinea Worm attacks the testicle, or loose cellular tissue between the testicle and the scrotum. The latter is generally very hard, and has a tendency to increase, but the size is generally smaller than that of the true *Elephantiasis scroti*.

Diagnosis and Prognosis.

Respecting the diagnosis of this disease, it must be said that, in places where Guinea Worm is prevalent, the patient most generally informs you of its nature; but occasionally one meets with cases where there is some difficulty. An extensive swelling, with severe pain, and inability to move the affected part, commenced with severe itching and a small vesicle, more commonly in the lower extremity, and the protrusion of a small portion of the worm; all these symptoms, in a place where Guinea Worm is rife, are characteristics which will greatly aid in the formation of our opinion of the nature of the disease.

If the Guinea Worm had been for a long time producing its inflammation, the matter might be surrounded by a pyogenic membrane; and if we are not told by the patient, it will be very difficult to decide positively, as it presents none of the characteristics enumerated above, but only those of a simple abscess. By opening it with a lancet, we may have a gush of matter with a perfect worm discharged, or it may come out in shreds. Some-

times a hard tumour will be found, and on removal transformed Guinea Worm might be discovered. I have met with cases where I can only derive my information from the patients.

The prognosis is always favourable, unless when great carelessness leads to severe sloughing. When death of the foot occurs, by neglect or through any cause, the symptoms are very unfavourable. After amputation, death may be caused by exhaustion, from the unhealthy state of the constitution.

Treatment of Guinea Worm.

The first step in the treatment of Guinea Worm is the complete rest of the affected part, and then the speedy extirpation of the worm, as when removed the patient immediately receives great relief. In a first attack this is easily accomplished, as the worm gradually protrudes through the blistered surface; and if at once secured and extracted, the patient suffers no more from it The best mode of securing it is to draw the worm a little out and roll it round a crow-quill, and have it tied with a thread, and by gradually rolling it around this it is wholly extracted. Amongst the natives the worm is secured by a thread, and tied round the ankle or leg, as the case may be, and gentle traction applied every morning until the worm is wholly removed. This may be continued for days, and even weeks.

But things do not always take so smooth a turn; for in eighty-nine cases out of a hundred the worm either breaks or recedes into the cellular tissue, and then produces that destructive inflammation which is peculiar to

the worm. It is at this stage that remedies are useful and called for by the patients; at this stage that enormous swelling is apt to occur, with great pain; and if the proper course be not adopted, great mischief may be the result to the neighbouring tissue.

The remedies for Guinea Worm may be divided into *palliative* and *radical*.

Palliative Treatment.—The palliative remedies are emollient poultices, leaves of various plants applied externally, and salt water dressing. The palliative treatment, therefore, is external. The affected part is to be well sponged with warm water, and a large poultice applied in a warm state. It acts by bringing the swelling into a head, and favours the discharge of matter and slough of cellular tissue which are the results of destructive inflammation. It is a very soothing application, and invariably used in the hospitals. Linseed meal, bread, and Indian corn poultices are used in places where they can be obtained; but an excellent serviceable poultice is made from the starch of the Jathropa Manihot, or Common Cassada or Cassava.

Among some natives salt water is in great repute, and is very much valued at certain stages of the disease—*i.e.*, when an ulcer has been formed and the worm is still protruding. The effect of this is to remove the young worm from the sac, and thus expedite the cure. In India, cold fresh water is used in the same way. According to Forbes, after the vesicle had been opened, a stream of cold water is daily poured on the part. "Under these circumstances, the young were daily ejected from the proligenous tube of the parent parasite, and continued to

be so for fifteen to twenty days. After this time a watery fluid only was emitted, without any young, but sometimes containing particles of a white, flaky appearance, which continued two or three days longer. The Guinea Worm then became flaccid, and was discharged spontaneously, without pain or swelling." The worm likes water, and after being extracted soon dies, and gives out her immense brood of young.

Native Plants.—In some parts of the tropics the natives have recommended the leaves of various plants. On the Gold Coast of Western Africa the Chrynopedia inflata is used. The leaf is finely ground, or a small quantity of watery extract is obtained from it and applied over the surface, and then a large poultice is put over it; sometimes only the leaf is applied. The alleged effect is that it expedites the removal of the worm. I have not had sufficient opportunities of testing the effect, and therefore cannot vouch for the truth of the statement.

Radical Treatment of Guinea Worm.—This consists in the use of assafœtida. This remedy, although it has a nauseous taste, appears to have a direct influence on the worm in the tissue, by at once destroying it, and, of course, reducing the high inflammatory action which might be going on in the affected part. I have seen cases where patients were suffering from the most excruciating pains, which entirely prevented them from moving about, being for the time perfectly crippled, who took the remedy; and no sooner was the physiological effect manifested than the pains were dispelled, and the individual was enabled to walk about with ease and freedom.

Post-mortem examinations have revealed cases where Guinea Worms have died in the system, and remained in it for years without causing the slightest pain; and the internal membrane became incorporated with the surrounding tissue and organized. The radical cure then is that medicine, that would destroy the worm in the system before matter is formed, and I think that we have this remedy in assafœtida.

I must confess that my attention was first drawn to the use of this remedy, by the good effect which its employment had on a family who had suffered fearfully from this worm. After using it for some time, they were perfectly freed from it, and for upwards of nearly fifteen years never had another attack.

There are two main results obtained by the use of assafœtida—viz., *rapidity of cure*, and *total annihilation of the worm;* and there are three stages in which the use and effect of this medicine are to be considered:—

1st.—At the early stage of the inflammation.

2nd.—When but little matter is formed, and deep seated.

3rd.—When the inflammation has been destructive, and much matter formed.

In the first stage, the use of assafœtida at once destroys the worm and puts a stop to the inflammation that is going on. The person feels perfectly well again. He may be free for years from any attack, unless a fresh worm enters; but the old worm is entirely destroyed, and either undergoes gradual reduction by the absorbents, or becomes harmlessly imbedded in the cellular tissue. This, in fact, is the simplest and easiest cure I have seen effected.

In the second stage, the irritation and inflammation are

equally and as rapidly cured as in the first; but the matter still remains in the system, and must be let out at some future period. The patient feels perfectly well, and goes out of the hospital to his usual occupations. Perhaps he takes a very long walk, or receives a wound on the part; inflammation at once takes place, differing in type from that produced by the Guinea Worm; the matter accumulates in large quantity towards the surface, and requires to be discharged; and when so done, shreds of the worm and cellular tissue are removed, and the patient quickly recovers.

In the third stage, where the inflammation has produced destructive inflammation, and much unhealthy matter has formed, although the remedy has been used, and both the maternal and embryo worms have been destroyed, yet still the pain remains; the parts continue to be very tender; and unless the fetid matter is discharged, the patient will not be able to make use of his limbs for weeks. When the severe inflammation attacks the posterior portion of the foot, in the mass of cellular tissue in front of the *tendo Achillis*, it is necessary to make a free incision, so as to give free egress to the slough of cellular tissue, before the patient can be perfectly free.

Sometimes, after the worm has caused such destructive inflammation, it moves from that portion to another, there to inflict on its victim intense pain. Should the assafœtida be given whilst it is in this position, it dies; and if under the skin, and matter not being formed, I have seen on the application of a poultice a small circular portion sloughed out, and the part of the worm just below could be removed with a forceps.

When Guinea Worm has been destroyed by the use of the assafœtida, I have in many cases seen it coiled under the skin; and from its difficulty of undergoing putrefaction in the human system, it remains there for months, or even years, without causing the least disturbance, giving to the touch the feeling of a whip-cord. By the continued action of the absorbent, it gradually diminishes, until nothing of it is observed. But if inflammation had been caused and matter been formed before its death, be it at whatever distance from the skin, it has a tendency outwards, and must be eliminated from the system.

Lately, Dr. Stewart, Surgeon of the 18th Royal Irish Regiment, serving in Secunderabad, has recommended the cutting down upon the worm, dissecting it carefully, and separating it from its bed—that is, where the parasite's course could be ascertained by the eye or finger under the skin. A curved instrument, or a large ligature needle, is then passed beneath it; gentle traction is now used, and a continuous stream of cold water is poured over the tract from a height which expedites the extraction. The first case in which this treatment was adopted was in a man who noticed a whipcord swelling beneath the integument of the scrotum. The parasite was felt and seen coiled up in most fantastic loops. A prominent loop was selected near the centre, the skin was carefully incised and dissected, and the animal laid bare, the loop hooked up, and the animal removed by gentle traction. The process was aided by the stream of water, which seemed to paralyze the worm, or make it quickly quit its abode. The length of the worm was nearly three feet, and it contained myriads of young worms in various stages

of development. No inflammation or suppuration followed.

This process could be performed with advantage where the cellular tissue is loose, and there are no muscles or important tissues intervening; but in by far the majority of cases it will be found perfectly useless.

VIII.—YAWS.

Frambœsia, or Yaws, is a disease indigenous on the West Coast of Africa; it is purely tropical, and is characterized by a tubercular eruption of a circular nature, resembling when in clusters, raspberries or mulberries; from which it derives its name from the French—*framboise,* raspberry. From the West Coast of Africa it has been carried to the tropical countries of America, and to the English and French West Indian Islands.

Symptoms and Progress.

Sometimes this disease commences with severe febrile symptoms, languor and listlessness, pains in the head and joints, loss of appetite, irritability of temper, and after a few days small spots, which in Europeans or persons with light skins are red, resembling musquito or flea bites, appear principally on the face, axilla, or the neighbourhood of the upper part of the inner thigh; at other times these spots appear without any previous illness, or any constitutional disturbances; the small swelling gradually increases, until it attains the size of a pin's head; every day it is observed to be increased, the flesh around it looking very unhealthy; it might now give a little pain, or

the constitution may be disordered. In about seven or eight days, it exudes a thin, sanious fluid, which concretes on the surface of the tubercle, forming dry scales or scabs, on the side of which a thin unhealthy fluid exudes in small quantities, and dries up and unites with the rest.

The surface continues to be covered with the scab for a week or ten days, if not disturbed; during which time an unhealthy fungoid excrescence grows beneath, having a granulated appearance, which shows itself when the scabs are removed; the vegetations are firm, spreading, and of a disagreeable look; the colour is whitish or whitish red, secreting an ichorous fluid, which concretes into crust; the skin is hard and firm, and seems to be infiltrated; the excrescent surface spreads by degrees, until it forms an unhealthy-looking mass. It is not painful in ordinary circumstances, except when it occurs on the palm of the hand, or the sole of the foot. In some subjects only few tubercles are seen, and of large size; and if one or two tubercles are united, they occupy an enormous space; when there are numerous spots, they are small, and scattered about; this is very disagreeable to the patient.

The fungus-like vegetation takes a longer time to arrive at maturity, sometimes two months, and even three. The crops arise at different times; sometimes when the first are full grown, others are in a medium state, and others are just appearing. After maturity, it is stationary for many weeks, discharging an ichorous fluid; one of the vegetable excrescences is generally larger than the rest, which has been called the *mother* or *head Yaw;* at first it is broad and elevated, but afterwards becomes depressed, having

vegetation on its edges; its form is like an unhealthy ulcer, exuberant and whitish, secreting a thin acrid fluid which excoriates the adjacent skin.

The Yaws runs a definite course, like the exanthematous eruptions; after being stationary for a time in its matured condition—which varies with the age of the individual and the condition of his constitution—it gradually begins to decline. It remains longer in those whose constitutions are weak; in the aged and infirm, and in the indolent and phlegmatic; it is shorter in children, in the vigorous, and in those who take much exercise and increase the action of the skin. The decline is first observed on the raised up surface, which gradually becomes level, the vegetation appearing less and less; the unhealthy whitish look has a slight reddish appearance, until its surface becomes level with the surrounding skin; the hard surrounding integument becomes soft and yielding, the surface gradually closes, and the disease disappears, leaving a small smooth scar, which after a time disappears. The mother Yaw leaves a large scar, which is more or less smooth. The most external and free parts commence to heal first; the disease is more common among adults than children; it very seldom attacks the palm of the hand or sole of the feet as primary ulcer, but often as secondary complaint, in the latter.

Pathology and Morbid Anatomy.

The eruption of this disease is sometimes localized, appearing in well developed form in the face, axilla, and in the groins; in the female, in one or other of the pudenda; in the male on the scrotum, and in the folds of

the nates. These are the parts first affected, but the disease soon makes its appearance in other parts, scattered over the abdomen, and on the legs. Sometimes it appears on the scalp, and involves the root of the hair, which might lead to discolouration; the secretion commingles with the hair, and forms an unhealthy mass of incrustation. The secretion of the vegetation is clear and sanious, not pus-like; that of the *mother Yaw* has the same appearance, but is very acrid and excoriating. The disease sometimes terminates in five or six months, at other times it may continue for three, four, or even six years, especially when it occurs in adults. The male sex are much more subject to it than the female, and children much more than adults.

Yaws is a contagious disease, it is sometimes epidemically current in places where it is endemic, affecting whole families; the disease is communicable by the sanious fluid which it discharges; it might remain in the system undeveloped for a long time, as in mothers who never had the eruption, but give birth to infants affected with it; cases like these are very frequent. It has a period of incubation, which varies greatly in different individuals, according to the condition of the constitution; appearing early in those who are ill-fed and wallowing in filth and dirt, and late in those who are vigorous. Some constitutions are proof against the disease—viz., those of sanguine temperament, who live principally on animal diet, and are very clean in their habits. When once an individual is attacked, his constitution becomes proof against any further attack. This disease is communicable by other means than

through the fluid, viz., by using the shoes or slippers of one who had suffered from the eruption, and was labouring under the after effects.

The after effects of Yaws which has been neglected, or which had attacked a grown-up person, is very serious; it debilitates the constitution to a fearful degree, weakens the joints, and prevents the individual from performing physical exertion to any great extent. A strong powerful man may be thus made weak as a child; after this exhaustive condition has continued for a long time, the individual gradually regains his strength, but he is never the same man. The foot now begins to suffer, the hard sole becomes chapped, furrowed, and split up into several pieces; the furrows running from the centre to the circumference; the hard skin appears to be cut through to the soft parts covering the flesh, so that by the least pressure it becomes painful and bleeds frightfully; the heel of the foot is the part mostly affected. The disease is easily communicated by the furfuraceous excoriation of, or the perspiration from, the sole of the foot. One who has got this rough crabby foot, if he use another man's shoe, is apt to communicate to him, although not the eruptive Yaws, yet the same furrowed feet, having the asme character and painful feel, but not the constitutional debility.

Causes of Yaws.

The immediate cause of this disease is contagion, *i.e.*, the contact of the unhealthy virus on an individual, exactly like vaccine virus. It may exist in a family for years, attacking one member after another. Its predis-

posing causes are filth, bad air, the want of animal food, tropical climate of Western Africa, the West Indies, and some parts of America. It is more common among the black than the white population. The period of incubation varies, but is estimated by Dr. Thomson at two months.

Diagnosis and Prognosis.

The characteristic symptoms of the eruption are such as can easily be recognized and distinguished from any other contagious disease; its course is peculiar, and its appearance distinctive.

The prognosis is generally favourable; the disease may last for many years, but however short, it leaves a lasting effect on the constitution.

Treatment of Yaws.

This disease runs a definite course in the system, and the treatment must be guided by the symptom presented; perfect cleanliness should be enjoined; the diet should be generous, and composed principally of animal food. Tonics and alteratives should be given at the commencement of the disease; I have always found the *arsenical preparations* to have the best effects; the mineral acids, as well as the extract of sarsaparilla and antimonials, are valuable remedies. The use of mercury has been proposed; if used early, it cuts short the disease, but increases the constitutional effect, also the pains in the joints and bones, and the weakness is apt to return. Iodide of potassium and the alkalies are excellent when the ulcers are indisposed to heal. The iodide of potassium might be given in combination with the liquor arsenicalis.

The local treatment consists in the application of various remedies; in Western Africa, the natives wash the ulcer with soft cloth until it bleeds, and then strong caustic is applied—either sulphate of copper or nitrate of silver; it gives some pain, but destroys the obstinate excrescences. An arsenical paste, consisting of *ten grains of arsenious acid, two scruples of sulphuret of mercury, and ten grains of powdered animal charcoal,* has been recommended by some physicians; but it should be cautiously used, and a small quantity at a time applied. Topical application of *creosote* has been used with good result, the strength is ℥j to ʒj of lard or simple cerate. Gentle exercise, nourishing and generous diet, and warm clothing should be recommended.

IX.—BARBADOES LEGS.

ELEPHANTIASIS OF THE ARABIANS.

The *Elephantiasis Arabicum*, or *Barbadoes Legs*, is a disease of tropical climates, and consists of a chronic hypertrophy and induration of the subcutaneous tissue, with ulceration of the true skin and deformity of the affected part. Its principal seats are in the lower extremities below the knee-joint and in the scrotum.

Symptoms and Progress.

At the commencement of the disease there seems to be an obstruction in the veins, and an interruption of the venal circulation from the parts to be affected, which leads to acute inflammation of the lymphatic vessels; a hard, irregular, knotty cord-like swelling is felt, and observed throughout the course of the lymphatics of the leg; the parts become painful, the pain is diffused over the surface, erysipelatous in character; the foot is slightly swollen, the glands of the groin also swollen, and sometimes painful. There is at times hard fever, bilious vomiting, the pulse frequent from 100 to 110, soft or

hard, the appetite affected, the bowels constipated, the spirits low, severe headache, the patient might become delirious, and the diseased foot increased in temperature. After continuing for some time, varying from three days to a week, the symptoms gradually begin to abate; the intensity of the fever is much reduced, the pulse resumes its natural standard, the foot gets smaller, but knotty and indurated; the individual feels great weight on it when he attempts to walk about; the size is somewhat larger than the other and indurated, and the active disease disappears.

The individual may remain in this condition for months or years without a fresh attack, but it is likely to be renewed, and the local symptoms to recur with greater violence, the constitutional symptoms not being so severe; the swelling left is larger than in the first attack, and by the repetition of the paroxysm the enormous swelling characteristic of the disease is attained. Sometimes there are little or no constitutional effects, the swelling of the foot is only observed to be gradually but slowly increasing; progress is not impeded, but accompanied with heaviness and discomfort.

When the scrotum is the seat of the affection, the genital organs are concealed in it, with the exception of the prepuce, which is thickened and weighty and placed in the lower centre of the tumour, and through which the urine is discharged in scattered streams; it grows to an enormous size with altered and enlarged veins. I saw one which reached below the knee, hanging down like a huge mass, very hard in consistence, attached by a narrow neck.

When in the leg, the swelling may be uniformly diffused over it or in separate lobes; the dorsal aspect swells up considerably, overlapping the line of union between it and the plantar surface, which is never affected. Sometimes all around the edges, especially towards the heel, are warty growths, hard and almost bony; they are marked with minute but deep furrows which intersect each other, giving them a rough grublike appearance. The toes do not generally suffer from the disease, so that the neighbouring fleshy epidermal swelling overlaps them in some cases. In some instances the tumour exudes a thin fetid liquid, which concretes into scales resembling ichthyosis; but in other cases the swelling ulcerates and discharges a fetid pus, which relieves the pain, but exhausts the patient, eliminating a noxious substance from the body.

Pathology and Morbid Anatomy.

This disease is peculiar to the warm climates of the East and West Indies, and Africa. It is found in Rio Janeiro, Barbadoes (hence its name), Guiana, Ceylon, and Ahanta, West Coast of Africa. The epidermis and true skin are very much thickened; its fibrous structure becomes dense, firm, and almost rigid; the areolar tissue is expanded and thickened, and filled up with an oily gelatinous-looking "cacoplastic" matter; the bones in the old cases are involved, enlarged, and heavy. The limb is generally permanently enlarged, and has a huge elephant-like appearance, almost insensible to the touch, but continues painful.

Causes of Elephantiasis Arabicum.

This disease is neither contagious nor transmittible by hereditary taint; it is more frequent in males than in females; and more in adults than in children; it is attributed by Dr. Horner, of Rio Janeiro, to heat and moisture of the climate, by unhealthy exhalations contaminating the air. In Ahanta and the Gold Coast of Western Africa, it is excited by the irritation of Guinea Worm in the parts; and I firmly believe that the composition of the soil and the water used by the inhabitants must have some effect in producing the disease.

Treatment of Elephantiasis.

The disease should be taken in hand at its very commencement, and then there will be some hope of success; purgatives, alteratives, and tonics should be administered; the limb should be kept elevated, and bathed in warm water; it should be tightly bandaged in flannel; a change of climate, if it can be effected, will aid in the treatment.

In the more chronic form the disease might be palliated, but it is very seldom that a cure can be effected; astringent lotions, mercurial ointments, friction with ointment of iodide of potassium, have all been tried; the milky juice of the *Hebra Brasiliensis*, or *Assacon*, is said in Brazil to be useful. When all remedies fail, and the patient suffers very great inconvenience and desires to be released from the huge appendage, extirpation of the scrotum has been practised in many cases with good result.

APPENDIX

HINTS FOR THE PRESERVATION OF HEALTH IN TROPICAL CLIMATES.

1.—GENERAL OBSERVATIONS ON TROPICAL HYGIENE.—2. RULES FOR THE REGULATION OF THE DRESS, DIET, DRINK, EXERCISE, SLEEP, BATHING, AND THE PASSIONS.*

In every part of the globe, an individual attempting to reside in a climate which is opposite to or varies from that to which he has been accustomed, must conform to certain rules and regimen, regulating his habits to that of the climate he intends to reside in, and if he expects to keep his health, must endeavour to profit by the experience of those who have resided for some time in it. Europeans fresh from Europe are very generally found to praise the climate in the tropics as the best in the world; especially if they have been in the south of Europe, you will hear them say that it is quite as good, if not better; and they will unnecessarily expose themselves to a great many

* Climate and Meteorology of Western Africa, p. 269.

injurious climatic influences, and pooh-pooh any advice to the contrary offered them by persons whose long residence and experience in such matters should carry with it great weight. Such individuals have generally within a few weeks or months to pay most dearly for their folly, and should they be lucky enough to outlive their opinions, soon tell a different tale. I knew an eminent judge who had resided for some time in the south of Spain. On his arrival on the Gold Coast, finding that the south-west sea breeze was very bracing, and the air tolerable but bearably hot, he walked about from one part of the town to the other under the noon-day sun. He could not endure the slow pace of a carriage, which in that part of Africa is drawn by men; and on one occasion he jumped out and raced with the native drivers. What was the result? He soon took fever, congestion of the brain followed, and he became a victim of the climate—or rather of his infatuation—within six weeks after his arrival.

How true, then, are the remarks of Captain Williamson (who resided for some twenty years in India), when writing of the folly of some new arrivals, who unnecessarily exposed themselves to the injurious influence of the climate. "Nothing," said he, "can be more preposterous than the significant sneers of gentlemen on their first arrival in India—meaning thereby to ridicule or to despise what they consider effeminacy or luxury. Thus several may be seen walking about without chattahs* during the greatest heats. They affect to be ashamed of requiring aid, and endeavour to uphold, by such a display of indifference, the

---

Umbrellas.

great reliance placed on strength of constitution. This unhappy infatuation rarely exceeds a few days; at the end of that time, we are too often called upon to attend the funeral of the self-deluded victim." One cannot be too cautious, especially on the first arrival in tropical climates; one has so to moderate all habits of life—drink, sleep, exercise, &c.—as gradually to adapt his constitution to the necessitudes of the climate. A mistake at the commencement may lay the foundation of the most serious and complicated diseases in future years. What madness will it be considered if a native of a tropical climate, in residing in the temperate zone, carries there with him his tropical habits! A few days alone will suffice to bring him to the consciousness of his folly, and reduce him to the dust from whence he came. What is injurious in the one case is also injurious in the other. A native of a temperate climate, on making the tropics his abode, should gradually adapt himself to the climate, and should particularly observe the minute points in tropical hygiene.

Besides, the death of every new-comer tells very much against the climate of the country. The individuals themselves are seldom blamed for it; the deadly nature of the place receives all the blame which their bereaved friends can give; and the progress of the governing influence is checked. The country becomes the sufferer in another way. It is deprived of the civilizing influence which radiates from them. It prevents others from attempting to reside in it; and generally only the most reckless and desperate will venture to do so.

The subject of tropical hygiene has been ably considered

by many writers on tropical diseases; and in the following considerations I intend to adopt the plan proposed by Dr. Johnson, and most elaborately improved by Sir R. Martin, and regard tropical hygiene in the light of DRESS, FOOD, DRINK, EXERCISE, SLEEP, BATHING, and the REGULATION OF THE PASSIONS.

Before considering these various points, I shall here quote the summary of the precautions sent by the French Minister of War to the troops in the East (Danube), to be observed for the preservation of their health, as I think valuable hints might be obtained from them for the guidance of habits in the tropics :*—

"The Council of Health has been charged by the Minister of War to examine the precautions most proper for maintaining the health of the troops in the country to which they are called to make war. The Council has drawn up detailed instructions, from which the following particulars are extracted as necessary to be observed with the greatest care :—

"1. It is necessary to be always so clothed as to be proof against the sudden chills to which one is liable, at all seasons, from the abrupt changes of temperature which very frequently happen in nearly all parts of this country.

"2. In summer the best protection against sun-strokes, which are often very dangerous, is never to leave shelter without having the head covered.

"3. Cleanliness of person, clothes, and dwellings is imperiously required by the nature of the climate.

---

* Published in the British and Foreign Medico-Chirurgical Review, p. 424, April, 1855.

"4. Wherever practicable, the face, and particularly the eyes, should be frequently washed daily, after exposure to dust.

"5. The feet should not be washed with cold water, especially when heated after a march.

"6. The greatest care is needed for protection against the freshness of the nights, even when the heat is extreme. It is dangerous to remain clad only with the shirt during the night. At the bivouac, and in the tent, the soldiers should be very carefully covered.

"7. When the camp is pitched near a marsh, a tank, pools of stagnant water, or a valley, the chief openings of the barracks or tents should be in the opposite direction. In these bivouacs every possible means should be employed to counteract the invariably noxious vapours exhaled by such foci of infection. At night the openings of the barracks, with the exception of those indispensable for ventilation, should be closed.

"8. It is wrong to sleep in immediate contact with the ground; perfectly dry substances, not easily permeated by moisture, should be interposed. For this purpose fresh branches or vegetable matter should never be used.

"9. Water drunk in large quantity is always injurious. If, after a fatiguing march, a stream of water is met with, thirst must be sparingly satisfied, and the water reserved for subsequent use.

"10. When only a small quantity of water is procurable, instead of swallowing it, the mouth should be gargled as long as possible, and the water rejected as soon as it is warm.

"11. When reduced to the necessity of drinking stagnant water, it should, by way of precaution, be strained through a cloth, to separate leeches, imperceptible from their smallness, and which it is very dangerous to swallow.

"12. A mixture of wine and water, brandy and water, or infusion of coffee and water, is always an excellent drink, taken in moderation. It should be mixed at the time of use, and not prepared beforehand, as it in that case becomes heated, changes, and no longer fulfils its purpose.

"13. When salted meat and fish are substituted for fresh meat, they should be soaked before cooking, and when practicable, mixed with a certain amount of vegetables.

"14. Condiments in small quantity are good seasoning; in excess they irritate the stomach, and render thirst more difficult to bear.

"15. Saffron increases the digestibility of rice and flour. It is particularly useful with maize.

"16. Food should always be taken before a march.

"17. Before and after guard-mounting it is very useful to drink a moderate quantity of warm water, with a little brandy or infusion of coffee in it. Night guards should always be well clothed.

"18. Sickness should at once be reported to the medical officer.

I.—Dress.

Materials which keep up an equable temperature of the body are the best adapted for the tropics. Linen is very cold, and transmits heat through everything beneath it; and when wet by any source, either by perspiration or rain, communicates a cold sensation over the whole of the body. Woollen fabrics, being bad conductors of heat, feel very uncomfortable, when the temperature of the surrounding medium far exceeds that of the body; and when it is a little below, it will be found to be too slow a conductor of the heat of the body. Cotton, therefore, is the material best suited for tropical climates. "The cotton dress," says Sir R. Martin, "from its slowness of conducting heat, is admirably adapted for the tropics. It must be recollected that the temperature of the atmosphere, *sub dis*, in the hot seasons, exceeds that of the blood by many degrees; and even in the shade it too often equals, or rises above the heat of the body's *surface*, which is always, during health, some degrees below 97°.

"Here, then, we have a covering which is *cooler* than linen, inasmuch as it conducts more slowly the *excess* of external heat to our bodies; but this, though a great advantage, is not the only one.

"When a *vicissitude* takes place, and the atmospheric temperature sinks suddenly far below that of the body, the cotton covering, faithful to its trust, abstracts more slowly the heat *from it*, and thus preserves to the wearer a more steady equilibrium. To all these advantages must be added the facility with which the cotton absorbs perspiration. While linen so circumstanced

would feel wet and cold under a breeze, and even occasion a shiver, the cotton dress, as stated, would maintain an equable warmth."

1. A cotton undershirt should always be used; and if drawers be worn, those made with cotton are best.

2. Cotton socks, as a general rule, should be always worn. If about to travel a long distance, and there is a probability of walking through swamp, woollen stockings, not very thick, are preferable.

3. Shirts made of cotton, with linen fronts, should be worn. The warm Crimean shirts (flannel) should only be used on special occasions, *i.e.*, when travelling or in an expedition. When worn for every-day purposes, they look dirty, are rather too hot, and feel heavy. The wool irritates the skin and increases the perspiration, the converse of which being what we require.

4. Collars should, when we can socially do so, be avoided. The shirt band should be very free.

5. Chemises and night-gowns or shirts made of cotton material should be preferred to linen. The rule is, cotton should always be next to the skin.

6. At night use cotton sheets for covering, or if linen, lie on cotton. When the temperature is high and the bed-linen hot, cover with a thin flannel blanket.

During the hot season at M'Carthy's, when the temperature at bed-time is 100°, I have found sleeping between linen sheets to be unhealthily warm, for the simple reason, that linen easily conveys the heat to the body. Woollen and cotton are cooler, which is proved in the following experiments:—"Let two beds be placed in the same room during the day, when the thermometer

stands at 90°, and let one be covered with a pair of blankets, the other with a pair of linen sheets." On removing both coverings in the evening, the bed with the blankets will be found cool. Being non-conductors of heat, they prevent the external heat from penetrating; whilst the linen bed and the linen being good conductors, transmit the heat to everything beneath them.

7. Whatever hat is worn, the crown should be well protected, or covered with several folds of white turban. It is best when ventilated.

8. An umbrella should always be used when obliged to go out of doors during the heat of the sun.

9. The boots should be provided with thick soles, especially during the rainy season. When wet and damp, they should be immediately changed.

10. The body linen should not be changed too often; twice a-day is quite sufficient, especially amongst new arrivals.

"To change morning and evening is enough for all and every purpose, even in the hot and rainy seasons; and to change oftener is simply injurious. The property which *frequent* change of linen has in exciting the cuticular secretion, accounts for the superior health which accompanies cleanliness in our own climate, and, on the contrary, for many of the diseases of the indigent and slovenly, which are so frequently connected with or dependent on irregularity or suppression of the cuticular discharge. But though this is true, by the injudicious, nay, injurious habits, of too frequent change of linen in a tropical climate, the fluids on the surface of the body, already in excess, are thus powerfully solicited, and the

action of the perspiratory vessels, with all their associations, morbidly increased, instead of being restrained."—*Sir J. R. Martin*, "Influence of Tropical Climates," &c.

11. When caught in rain, and the linen becomes wet and damp, it should be immediately changed, and the body sponged with hot water and vinegar or lime juice.

12. In places where Dysentery or Diarrhœa is prevalent, a cotton or flannel waistband should be worn, especially at night, to keep the bowels from sudden impression of cold.

II.—Food.

As it is necessary to change the food when one resides in the polar regions, so as to increase the heat of the body, so it is necessary, when we attempt to reside in a tropical climate, to moderate the quantity and select the quality of our food. Since the heat predisposes to congestion and the development of febrile excitement, we should so regulate our diet as to moderate the former, whilst at the same time we neutralize the latter.

1. Before getting out of bed, or before going out of doors, a cup of tea, coffee, or chocolate should be taken.

2. The breakfast and dinner hours should be stated and regularly kept.

3 At breakfast the viands should be very simple and plain, especially amongst first arrivals, consisting of eggs, either boiled or poached, a little fish, unbuttered bread, and tea or coffee.

4 If the dinner be late, shortly after noon, about two o'clock, a little bread and butter might be taken with a glass of porter, or still better, draught ale

a glass of sherry or port wine might be taken for a change.

5. The dinner should be at about four, or half-past four; but when this is inconvenient, it should not be later than seven o'clock. It should be the principal meal, and should not be too heavy, in order to ensure a natural and refreshing rest.

6. Suppers ought always to be avoided in the tropics, where a good rest at night is essential for the preservation of the health and vigour of the mind and body.

7. When dinner is taken early, tea or coffee should be taken at seven or eight, and will be very much relished.

8. Excess in eating and drinking should be particularly avoided; excess will be known by a general feverish sensation after the meal. Dr. Clark truly states that much of the suffering of the Europeans on the Gold Coast is occasioned by over-feeding.

9. The sub-acid fruits—such as oranges, pine apples, and grenadillas, will be found very agreeable and refreshing. But the European on his first arrival should carefully watch the effects of the various delightful tropical fruits which he eats, as they act differently on different constitutions. He should gradually select those which best agree with him. Thus the mangrove is said to be stimulating and heating, and might, in an unseasoned European, bring out pustular eruptions or boils; the plantain, even when ripe, is astringent, and consequently not well adapted for those who are habitually constipated. Oranges (sweet) are always wholesome taken in the morning or afternoon, and so is the banana.

10. Unripe fruits should be avoided, especially in places where Dysentery, Diarrhœa, or Cholera is rife.

11. Condiments or spice should not be used by new comers in the tropics; they should not force their stomach, with an already good appetite, to increased and unnecessary action. When, however, by long residence the tone of the general constitution and of the stomach begins to fail, then their use will be beneficial.

III.—Drink.

It is a physiological fact that a man in good health does not require the use of wine or spirits, or any stimulating liquor. It produces no beneficial result in his constitution, and in the tropics acts rather injuriously, even in small quantity, by increasing that febrile state of excitement which is the consequence of the heated atmosphere. Indeed "during the first two years of residence, at least, the nearer we approach to a perfect *aqueous* regimen in drink, so much the better chance have we of avoiding sickness; and the more slowly and gradually we deviate from this afterwards, so much the more retentive will we be of that invaluable blessing, Health." It has become the habit of some men in the tropics, on opening their eyes in the morning, to have a "good stiff shot of brandy" the first thing before rising; and I have seen cases where a bottle of brandy has been nearly consumed before breakfast. Nothing is so injurious to the constitution as this habit. It does not at all satisfy the thirst, but leaves a desperate degree of craving for the bottle—which, in many cases, never ends until delirium tremens supervenes.

Sir R. Martin has given a most instructive example of the different effects of aqueous and spirituous drinks and liquors in increasing or decreasing the thirst, which we will here quote *in extenso*, as it may prove beneficial to many who have made up their minds to reside in the tropics :—

"We will suppose two gentlemen to be sitting in a room, in the East or West Indies, just before the setting in of the sea-breeze, both complaining of thirst, their skins hot, and the temperature of their bodies 100°, or two degrees above the natural standard. One of them, pursuant to the instructions of Dr Currie, who never was in tropical climate, applies to the negus, beer, or brandy-and-water cup, and after a draught or two, brings out a copious perspiration, which soon reduces the temperature to 98°. It will not stop here, however, nor will the gentleman, according to the plan proposed; for instead of putting the bulb of the thermometer under his tongue, to see if the mercury is low enough, feeling his thirst increased by the perspiration, he very naturally prefers a glass or two more of the same stimulating draught, 'to support the discharge'—still however, 'stopping short of intoxication.' Now, by these means the temperature is reduced to 97° or 96½°, in which state even the slight, and otherwise refreshing chill of the sea-breeze checks more or less the cuticular discharge, and paves the way for future maladies.

"Let us now return to the other gentleman, who pursues a different line of conduct. Instead of the more palatable and stimulating drinks he takes a draught of plain cold water. This is hardly swallowed before the temperature of the body loses, by abstraction alone, one degree of heat at

least. But the external surface of the body, immediately sympathizing with the internal surface of the stomach, relaxes, and a mild perspiration breaks out which reduces the temperature to its natural standard, 98°. This simultaneous relaxation of the two surfaces completely removes the disagreeable sensation of thirst; and as the simple 'antediluvian beverage' does not possess many Circean charms for modern palates, there will not be the slightest danger of its being abused in quantity, or of the perspiratory process being carried beyond its salutary limits. Nor need we apprehend its being neglected, since from the moment that the skin begins to be constricted, or morbid heat to accumulate, the sympathizing stomach and fauces will not fail again to warn us, by craving the proper remedy."

1. New arrivals in the tropics should refrain as long as possible from all heating drinks, especially in places where good water can be obtained.

2. If not subject to constipation, cold tea will be found agreeable and refreshing.

3. Where vegetables are not plentiful, weak lemon juice is necessary now and then; when taken in the afternoon it diffuses a coolness all over the body.

4. Sherbet will be found salutary, and any quantity may be taken, as it is wholesome and grateful.

5. Any quantity of ice might be taken; it is not only agreeable and salutary, but it revives the spirits, strengthens the body, and assists digestion.

6. When aqueous regimen cannot be kept, the best and lightest wine that could be safely used is good claret, which should be taken with water.

7. For those of weak constitution a glass of porter in the afternoon is very strengthening, and in the tropics is better than bottled ale.

8. Brandy is unnecessary; it increases the febrile excitement of the body to a marked degree, which is followed by a corresponding depression of the vital functions. It should only be used when prescribed by the medical attendant.

9. When, after long exercise before dinner, or hard bodily exercise, it is found on sitting at the table that the appetite is gone, take a glass of sherry and bitters, and this will excite the action of the stomach.

10. Warm tea or coffee after severe marches in the sun will be found a refreshing beverage. (Martin).

11. A newly-arrived European in the tropics should never attempt to imitate the old residents in the use of the magic bowl. He must always consider, that what the old topers can take with seeming advantage, will prove death to him.

12. During seasoning, when a course of temperance has been fully entered on, under no consideration must an occasional debauch be committed, as the system is very much subject to endemic and epidemic tropical diseases. (Martin).

IV.—Exercise.

Exercise to the extent in which it is taken in a temperate climate, is here to be avoided, as it will soon prove injurious to the constitution. The object of exercise in a cold climate is to keep up a just balance of the circulation, to support and maintain the functions of the skin,

and to promote the different secretions of the body; but the perspiration, biliary, and other secretions, being already in excess in equatorial regions, a perseverance in "the European habit of exercise" would prove highly injurious, and it often does so, by promoting and aggravating the ill effects of an unnatural climate." Debility follows, then diminished action of the skin and visceral secretions, and then an "inequilibrium of the blood." Again, it is injurious to take no exercise at all; for it is equally necessary for the due performance of all the functions of the body, that a certain amount of exercise should be taken.

1. New arrivals, in places where there are good roads, should take gentle exercise on foot every evening. It should on no account be fatiguing.

2. In the damp and rainy season exercise in the morning should never be taken. Due time should be allowed to the sun to disperse the malaria which accumulates on the surface of the earth.

3. In houses where there are long piazzas or verandahs, a walk within them in the morning will be found strengthening and agreeable, and not at all injurious.

4. Passive exercise on horseback is strengthening to the young; and with new arrivals will give a gentle impulse to the functions of the whole body.

5. Dancing, except for a short time in the cold months, is injurious. Every dancer in the tropics knows too well the feeling in the whole system, after a dance continued throughout the night.

6. Passive exercises, in carriages or palankeens, is very

serviceable to those who have long resided in the tropics, and whose circulation is very languid.

7. With children, hoop-racing is an agreeable and bracing exercise, as it exercises both the mind and the body.

8. Shampooing is both useful and salutary, it invigorates the circulation after fatigue or long inaction, and excites the insensibility of the cuticular secretion. (Martin).

9. Before dinner, one hour's repose is very salutary, and places the stomach in a condition most favourable for the reception of food.

10. On no account must exercise be taken under the rays of a noon-day sun, or when the sun's rays can be felt.

11. Walking out in the night should always be avoided; it is injurious in every respect.

Dr. MacCulloch, in his work on Meteorology, says truly that "no one fears a summer evening, or even a mild winter night, unless, indeed, he finds a dew. Yet here lies the very danger. A land of meadows, and parks, and ponds, and rivers, and woods, is a thousand times more hazardous than all the nights of all the winters that ever were. This is the real night air to be feared, even though the grey mist should not rise or the dew should not fall. To take a pleasant evening walk by the banks of the river, or the lake, to watch the trout rise at the evening flies, to attend the milking of the cows in the green meadow, to saunter among wet groves until the moon rises, listening to the nightingale—these, and more

of such rural amusements and delights, are the true night air, the malaria, and the fever."

12. The swing is an exercise which will be found grateful and salutary, especially if done in-doors when it is rainy. It will relax the cutaneous vessels, and produce a determination to the surface, and be consequently very beneficial, especially to those who are suffering from torpidity. (Martin).

V.—Bathing.

Mr. Erasmus Wilson, in his excellent "Treatise on the Skin," has laid the aphorism of health to be, "by food, by raiment, by exercise, and by ablution, to maintain and preserve an agreeable warmth of the skin." Cleanliness, says the sacred writer, is next to godliness. In no climate is there a greater necessity for the performance of good ablution than in intertropical countries. The enormous calls on the cutaneous vessels, which result in an excessive discharge of their secretion, lead to an accumulation of extraneous matter on the surface, which, if not removed, produces a mischievous effect on health. The stomach is at first disturbed, and then a series of disturbances take place, which involve most of the viscera of the body. Regular ablution, therefore, is a necessity in the tropics; but there are certain rules which must be laid down for the observance of those who reside in the tropics.

1. In the tropics a bath should be taken once at least every day.

2. The best time for taking a bath is an hour or half an

hour before breakfast; the body is then cool, and the stomach in excellent condition for the morning repast.

3. When a bath is taken twice a-day, the second bath, which must always be cold, should be taken an hour or half an hour before dinner. It is very refreshing, especially after a hard day's work, removes the sensation of thirst in the stomach through sympathy with the skin, and, in a great measure, mitigates nervousness.

4. With the *temperate* and *healthy*, the cold bath should always be taken. It is delightful and advantageous in keeping the skin cool and moist, and reducing the sense of internal fulness.

5. Amongst the *intemperate*, the cold bath is dangerous, and should not be indulged in. The tepid bath will be found more serviceable.

6. To persons suffering from visceral diseases, the tepid or warm bath is the only safe bath that could be used with advantage; and once a-day is quite sufficient.

7. During the cold weather, and at the blowing of the harmattan, to persons who have suffered from enlargement of the spleen and liver, from dysentery and chronic diarrhœa, a warm bath is a necessity.

8. The relative temperature of the baths should be as follows:—"Cold bath, from 60° to 75°; tepid bath, from 85° to 92°; warm bath, from 92° to 98°; hot bath from 98° to 112°.

9. During the hot weather, when the temperature in the sun ranges from 120° to 140°, the cold water should be kept in the sun for some time, and an agreeable tepid bath will be obtained.

10. Amongst habitual topers, and those who are in the

habit of keeping late hours; whose abdominal viscera, in consequence, are in an irritable state, and the balance of whose circulation is disturbed, the cold bath immediately aggravates the symptoms, and leads to fearful congestion. The warm bath is a necessity.

11. Before using the cold bath, it is necessary to wait until one is *cooled down* first. Amongst the delicate it is beneficial to be first immersed in a warm bath before plunging into the cold, which will produce a healthy reaction. (Martin.)

12. We find it the habit of many to take a bath a few minutes after their meals. This is injurious, and should be avoided, as it interferes with the process of digestion, and might result in functional derangement of the stomach.

VI.—Sleep.

Good sound sleep is necessary for the enjoyment of good health in the tropics. Those who have habituated themselves to going late to bed, predispose their constitution to every form of disease, and put a limit to their earthly existence. It must be remembered that temperament has a great influence in the extent and manner of our sleep. The great physiologist, Dr. Carpenter, says, "A plethoric habit of body, sustained by full diet, usually predisposes to sleep, provided that the digestive powers be in a vigorous condition. Persons of this constitution frequently pass nine or ten hours in slumber, and maintain that they cannot be adequately refreshed by less. On the other hand, thin, wiry people, in whom the nervous temperament predominates, usually take comparatively little sleep, notwithstanding the greater activity of their

nervous system when they are awake; but their slumber, while it lasts, is generally very deep. Persons of 'lymphatic' temperament, heavy, passionless people, who may be said to live very slowly, are usually great sleepers. But this is rather because, through the dulness of their perceptions, they are less easily kept awake by sensorial or mental excitement, than because they really require a prolonged cessation of activity."

1. Regularity in the hours of going to sleep is very important in the tropics. Between nine and ten will be found the best time.

2. The apartment should be cool, and every means adopted to keep it so; but the individual should be completely kept from draught, and from the sudden changes of temperature and the humidity of the atmosphere which is peculiar to the tropics in early morning.

3. Every circumstance by which the sleep can be disturbed should be obviated. Thus, in places where mosquitoes and sandflies are prevalent, proper curtains should be used.

4. It is always most preferable and desirable to go to bed with a clear head. The habit of much drinking at night disturbs the sleep and renders it unrefreshing.

5. Those who are habituated to late hours and bacchanalian riots, will find themselves much relieved from the after consequences of the imprudent habit, by bathing their heads with cold water before going to sleep.

6. Reading late at night, in the tropics is a habit not to be encouraged; for the nervous system has enough of excitement during the hot and busy hours of the day, and requires repose at night.

7. When there is a feeling of tension, heat, headache, throbbing, and other unpleasant sensations in the head, we should lie down quietly, and endeavour to get sleep; for it is certain that something wrong is going on in the brain, and rest and quietude are most likely to relieve it.

8. Sleeping until too late in the morning, when the sun has ascended to a great distance above the visible horizon, produces lassitude and want of energy in individuals in the tropics.

9. Rising at daylight, and enjoying the fresh and cooling breeze of the morning, in a verandah, or beyond the reach of malaria, is very healthy and invigorating.

10. During the blowing of the hot simoom, in the hot season, in the tropics, or the sirocco of the east, when no dew falls, sleeping in open verandahs is not only safe but advantageous. On the other hand, during the rains, the harvest, and harmattan, such a habit will be found most destructive to life; in fact, there are many cases in the tropics where men, whose names I might mention, have continually exposed themselves in this way, contrary to all advice of their friends, and thus laid the foundation of acute diseases, which have proved their death-warrants.

11. The dyspeptic, namely, those who suffer from flatulency, heartburns, and griping pains, are occasionally troubled with nightmare, which disturbs their rest. They should take carbonate of soda and a little peppermint; and always keep their bowels regular.

12. Late suppers, cheese, and other flatulent food, and all indigestible fruits, should be avoided at night. This rule is particularly incumbent on the dyspeptic.

VII.—Regulation of the Passions.

Moseley, quoted by Martin, has said that in the inhabitants of hot climates there is a promptitude and a bias to pleasure, and an alienation from serious thought and deep reflection, unless sickness obtains an absolute control over the body. "The brilliancy of the sky and the beauty of the atmosphere," he observes, "conspire to influence the nerves against philosophy and her rigid tenets, and forbid their practice among the children of the sun." The effects of great heat on these "children of the sun" I have considered at some length in my work on the Climate of Western Africa, Chapter III. page 66; but I think Sir Ranald Martin has hit the right string, when he says that the "removal of religious and moral restraint, the temptations to vice, the facility of the means, and the force of example, are the real causes of this bias to pleasure."

That able observer has truly and feelingly pointed out where the real cause of this *propensity* is to be found. "The monotony of life," he says, "and the apathy of mind so conspicuous in hot climates, together with the obstacles to matrimony, too often lead to vicious and immoral connections with native females, which speedily sap the foundations of principles imbibed in early youth; and involve a train of consequences not seldom embarrassing, if not embittering every subsequent period of life. It is here that a taste for some of the more refined and elegant species of literature will prove an invaluable acquisition for dispelling *ennui*—the moth of mind and body."

1. A strict moral principle is beneficial in the tropics.

2. The Christian religion has a more beneficial influence on the minds of men in the tropics, than either Mohammedanism or any other religious tenets.

3. Slothful and squalid habits should be avoided. The saying is true that "a *slothful, squalid-looking population invariably characterizes an unhealthy country.*"

4. Every substance or circumstance which induces nervousness and excitability of the nervous system, should be avoided.

5. Persons accustomed to licentious indulgences are to be avoided, especially on first arrival.

6. Always keep the mind occupied in doing something; never sit down and allow the thoughts to go astray.

7. Agreeable society should always be courted, as it relieves the mind a great deal. The society of *real* ladies will be found preferable to any other.

8. The occupation of lofty buildings, or buildings in elevated portions of a town or city, has a very beneficial effect on the mind. The converse is also true.

9. In order that the moral principles might be more easily kept, the new arrival should watch over and prevent any laxity in habits or principles acquired in his early religious training.

10. The companionship of persons of irritable and violent temper should, as much as possible, be avoided; as in the tropics such habits are peculiarly catching, and have an injurious effect on the health.

11. Too hot diet, or hot condiments taken in excess, have an injurious influence on the passions.

"The use of certain kinds of food and drink may tend to confirm or impair certain moral habits. Sometimes it may operate directly, and by the immediate impressions which it produces; at other times by the different states of health or disease which it occasions, or by the changes in the fluids and solids which result from it; for all these different alterations in the system soon manifest themselves more or less distinctly in the ordinary dispositions of the will and understanding." (Canabis).

12. A poor diet and a simple vegetable diet affects the passions injuriously, and therefore should be avoided.

"The poor diets prescribed by the legislators of various religious orders have never had the effect of diminishing the venereal appetite, but have on the contrary, inflamed these propensities the more, or disordered the imagination in diminishing the physical forces; and thus men have been rendered more feeble, more unhappy, and more easy of domination." (Canabis).

INDEX.

PAGE

Abscess of the Liver—*vide* Hepatic Abscess 413
Ague, Description of—*vide* Intermittent Fever 1
Ague-Cake—*vide* Splenitis Chronic 477
Aitken, Dr., on Morbid Appearances in Acute Dysentery . . 223
„ Causes of Constitutional Anæmia 507
„ Absorption of Alcohol in the System . . . 548
Algid—a Type of Yellow Fever 129
Anæmia, Definition, Symptoms and Progress of 501
„ Pathology and Morbid Anatomy of 503
„ Causes of Tropical 506
„ Diagnosis and Prognosis of 508
„ Treatment of Tropical 509
„ „ and General Management of 510
„ „ Exercise, and Diet of 511
"Anne Marie," Ship carrying Yellow Fever 148
Anorexia, a Symptom in Dyspepsia of 177
Annesley, Mr., on Indian Leeches 506
Ardent Continued Fever 102
„ „ Symptoms and Progress of . . . 102
„ „ Causes of 107
„ „ Pathology and Morbid Anatomy of . . 108
„ „ Treatment of 109
Bache, Dr. Hewson, on Microscopic Character of Black Vomit . 131
Bain, Dr., on Cholera Epidemics 325
Baly, Dr., on Pathological Changes in Cholera 320
„ Determinating Causes of Cholera 328
„ Means for staying onward Progress of Cholera . . 382
„ Measures to be adopted on Arrival of Vessels with Cholera 385
Bancroft, Mr., on manner of the Bile entering into the Blood in Yellow Fever 125
„ Nature of Black Vomit 131

PAGE
Barbadoes Legs, Symptoms and Progress of 628
„ Pathology and Morbid Anatomy of . . . 630
„ Causes and Treatment of 631
Barclay, on Symptoms of Sun-stroke 559
Bastian, Dr., on the Anatomy of Guinea Worm 589
Bathing, Rules for Regulation of, in Tropics 650
Bathurst, River Gambia, Statistics of Death from Cholera in . . 300
Beguin, Method of opening Abscess of Liver 431
Bennett, Dr. Hughes, on Healthy Digestion 181
„ „ Anæmic Murmurs 504
Beriberi, Definition, Symptoms, and Progress of 513
„ Pathology, Morbid Anatomy, and Causes of . . . 516
„ Diagnosis, Prognosis, and Mortality of 517
„ Treatment of 518
Bile, Excessive Secretion and Elimination of 452
„ „ Symptoms and Progress of . . . 452
„ „ Causes of 453
„ Deficient Secretion of 454
„ Symptoms and Progress of 454
„ Causes of 455
„ Vitiated Secretion of 456
„ Treatment of Excessive, Deficient and Vitiated Secretion of . 456
Bird, Dr. George, on Association of Abscess of Liver with Dysentery, Diarrhœa, &c. 421
Black Vomit, Description and Nature of 130
„ Microscopic Character of 131
„ Specific Gravity and Test of 133
Blair, Dr., on Prognosis of Yellow Fever 141
„ Treatment of Yellow Fever 156
Blane, Gilbert, on Degree of Heat for Development of Yellow Fever 115
Bocker, on Effects of Alcohol 548
Bontius, Description of Cholera in 1629 290
Break-bone Fever, Description of—*vide* Dengue 164
Briquet, M., on the Action of Quinine 39
Bronchocele—*vide* Goître 570
Brow Ague, A Malarious Attack of 6
Bulam Fever, Commissioners on 149
Calomel, as a Treatment in Yellow Fever 156
Cameron, Dr., on Exploration of the Liver 433
Carbo-azotic Acid in Remittent Fever 96
Cayenne Pepper in Remittent Fever 110
Chalmers, Dr., on Warm Bedding in Chronic Rheumatism . . 537
Chiga, Description of 360

PAGE

Chlorodyne, Formula and Mode of Preparation of 99
Chlorosis, its Diagnosis from Anæmia 508
Cholera, Definition and General Survey of 290
„ Probability of an Attack of 294
„ Classes of 301
„ English, Description of 301
„ Epidemic, Symptoms and Progress of 303
„ Vomiting and Purging in 306
„ Collapse in 309
„ State of Skin and Blood in 311
„ Report of Twelve Cases of Epidemic in 314
„ Pathology and Morbid Anatomy of 329
„ Predisposing Causes of 326
„ Specific or Determinating Causes of 327
„ Mode of Propagation of 337
„ Diagnosis and Prognosis of 338
„ Treatment, (1) Stage of Cholerine 345
„ „ (2) Stage of Collapse 347
„ „ (3) Stage of Reaction 349
„ „ Dietetic 349
„ Report on Treatment by Committee of Board of Health 1854, on 350
„ Treatment by Judicious Management, Professor Maclean . 351
„ „ Rational Means, Dr. Gason 356
„ „ Drs. Hoffmeister and Richards . . . 354
„ Report of Dr. Gull on Value of Various Authors' Remedies for 359
„ Treatment—Empirical—Specific Remedies . . . 366
„ „ External Means 366
„ „ of Imperfect Reaction 369
„ „ Consecutive Fever or Uræmia . . . 370
„ Prophylactic Measures in 372
„ Dr. Clark of 84th Regiment, Suggestion on . . . 374
„ Secretary of State Instructions on 374
„ Dr Baly on Means for staying onward Progress of . . 382
Christison, Dr., on Salt Provisions 229
Clark, Dr., of 84th Regiment, Suggestion on Outbreak of Cholera in Malta in 1865 374
Cobweb, a Remedy in Intermittent Fever 44
Cockle, Dr., on Origin of Cholera 325
Colitis—*vide* Dysentery or Bloody Flux 206
Congestion of the Liver—*vide* Hyperæmia 446
Constipation, General Remarks, Symptoms, and Progress of . . 196
„ Causes of 199

PAGE
Constipation, Treatment of—Medicinal 201
„ „ Mechanical 204
„ „ Dietetic 205
Copland, Dr., on Distinction between Yellow Fever and Malarious Fevers 140
Craigie, Dr., on Ascent of Yellow Fever above Sea Level . . . 115
„ Symptoms of Delirium Tremens 543
Cruickshank, on Epidemic Cholera of 1814 292
Cunningham, Captain, on the use of Biniodide of Mercury in Goître 577
Cynanche Phyroidœ—*vide* Goître 571
Dandy Fever—*vide* Dengue 164
Decubitus, as a Diagnostic Sign 405
Delirium Tremens, Definition of 540
„ Symptoms and Progress of 540
„ Morbid Anatomy, Pathology, and Nature of . 546
„ Causes of 549
„ Diagnosis and Prognosis of 550
„ Mortality, Sir A. Tulloch 551
„ „ Dr. Henry 552
„ Treatment of—General 553
„ „ Prophylactic 557
Dempster, Mr., Table Summary of Splenic Cases in Great Ganges . 489
Dengue, Symptoms and Progress of 164
„ Causes, Pathology, and Morbid Anatomy of . . . 167
„ Diagnosis, Prognosis, and Treatment of 161
Derbyshire, Neck—*vide* Goître 571
Diarrhœa, Definition of 270
„ Symptoms and Progress of 270
„ Varieties of, Arranged Pathologically 201
„ Chronic, Symptoms and Progress of 276
„ Pathology and Morbid Anatomy of 277
„ Causes of 279
„ Treatment of 279
„ „ Medicinal 285
„ „ Dietetic 287
Docker, Surgeon, on Ipecacuanha in Dysentery 246
Dress, Regulation of, in Tropics 630
Drink, Regulation of, in Tropics 644
Dropsy, as a Sequela in Splenitis, Treatment of 498
Dysentery, Definition, Symptoms and Progress of 206
„ Varieties of—Inflammatory 213
„ Chronic or Subacute—Inflammatory 214
„ Scorbutic or Asthenic—Inflammatory 214

PAGE

Dysentery, Pathology and Morbid Anatomy of 220
„ Morbid Appearances in Acute 223
„ Causes of—Predisposing 227
„ „ Exciting 231
„ Mortality of 234
„ Diagnosis and Prognosis of 239
„ Treatment of 241
„ „ Therapeutic—Narcotic 242
„ „ „ Sudorific, Ipecacuanha . 243
„ „ „ Astringents . . . 251
„ „ „ Counter-irritants and Local Remedies . . . 254
„ „ „ Laxative 257
„ „ „ Enemata 259
„ „ with Hepatic Complication . . . 260
„ „ Scorbutic Taint 261
„ „ Malarial Taint 263
„ „ Therapeutic of, Chronic Taint . . 263
„ „ Dietetic 265
„ Management of Convalescence in 268
„ Effects of Change in 269
Eales, Mr., Formula of Treatment in Ague 38
Ebriositas—*vide* Delirium Tremens 540
"Eclair," H.M.S., Epidemic of Yellow Fever in 147
Elephantiasis Arabicum—*vide* Barbadoes Legs 628
„ „ as a result of Guinea Worm . . . 611
Exercise, Regulation of, in Tropics 647
Face-ache, as a Malarious Attack 6
Febris Intermittens—*vide* Intermittent Fever 1
„ Remittens—*vide* Remittent Fever 59
Ferguson, Dr. William, on Yellow Fever in Expedition to St. Domingo in 1796 137
„ „ Mortality of Yellow Fever in St. Domingo 144
Fever-Cake—*vide* Splenitis Chronic 477
Filaria—*vide* Guinea Worm 580
Food, Regulation of, in Tropics 642
Forbes, Dr., on Tank Worm in India 602
Frambœsia—*vide* Yaws 620
Fuller, Dr., on Constitutional Origin of Rheumatism . . . 530
Gilkrest, Dr., on Distinction between Yellow Fever and Malarious Fevers 140
Goître, Definition, Symptoms and Progress of 571

PAGE

Goître, Pathology and Morbid Anatomy of 572
„ Causes of, Geological Strata 575
„ Diagnosis and Prognosis of 576
Gout, as Distinguished from Rheumatism 533
Ground Itch, a small Earth Worm 603
Guinea Worm, Introduction of 580
„ Symptoms and Progress of 580
„ Period of Accession of 581
„ „ Incubation of 582
„ „ Maturity of 583
„ Pathology and Pathological Anatomy of . . . 586
„ Causes of 594
„ „ (a) Drinking Water 595
„ „ (b) Hereditary Transmission . . . 598
„ „ (c) Immediate Contact 598
„ Locality and Propagation of 606
„ Results of 607
„ Diagnosis and Prognosis of 613
„ Treatment of, Palliative 615
„ „ Radical 616
Hæmogastric Fever—*vide* Yellow Fever 114
Hæmorrhagic Type of Yellow Fever 128
Hallier, Professor E., on the Vegetable Origin of Choleraic Poison 336
Halsted, on Passive Exercise to the Stomach 189
Harley, Dr., on Jaundice from Retention or Non-elimination . . 465
„ Test of Biliary Acids in Jaundice 467
Hemicrania, as an Aguish Attack 6
Hepatic Abscess, Symptoms and Progress of 416
„ Pathology and Morbid Anatomy of . . . 419
„ Causes of 421
„ Diagnosis and Prognosis of 427
„ Mortality of 428
„ Treatment of 430
Hepatitis, General Considerations of 386
„ Symptoms and Progress of 387
„ „ (1) Perihepatitis . . . 387
„ „ (2) Suppurative . . . 389
„ „ (3) Chronic Diffused or Interstitial 391
„ Pathology and Morbid Anatomy of 394
„ Causes of 396
„ Diagnosis and Prognosis of 402
„ Results of Acute and Chronic 405

PAGE

Hepatitis, Treatment of 407
„ „ the Acute form of 408
„ „ the Chronic form of 414
„ Mortality in Diseases of 469
Homes, Major, on the use of Biniodide of Mercury in Goître . . 577
Hope, Dr. Felix, Test of Biliary Acids in Jaundice 468
Humboldt, on Degree of Heat and Elevation for Yellow Fever . 115
Hunger, its Causation 177
Hydrocele, a result of Guinea Worm 610
Hyperæmia, Symptoms and Progress of 446
„ Causes of 448
„ Morbid Anatomy and Pathology of 449
„ Diagnosis and Prognosis of 450
„ Treatment of 451
Icterus—*vide* Jaundice 458
Indigestion, General Remarks on 175
„ Symptoms and Progress of 175
„ Pathological Anatomy of 181
„ Causes of 182
„ Diagnosis from Chronic Gastritis and Prognosis of . 185
„ Treatment, Indications of 186
„ Dr. Leared's Dietary 191
Insolatio—*vide* Sun-stroke 558
Intermittent Fever, General Observations on 1
„ Symptoms and Progress of 3
„ Pathological Anatomy of 9
„ Predisposing Causes of 16
„ Exciting Causes of 18
„ Diagnosis and Prognosis of 32
„ Treatment, during Paroxysm 33
„ „ during Intermission . . . 37
„ „ Dietetic in Malarious Fevers . . 50
„ „ Prophylaxis of 52
Jackson, Robert, Rules for Blood-letting in Marsh Malaria . . 86
„ on unfavourable Prognostic Symptoms in Yellow Fever 143
Jaundice—Definition of 458
„ Symptoms and Progress of 459
„ Causes of 463
„ Pathology and Morbid Anatomy of 466
„ Diagnosis and Prognosis 467
„ Mortality in 469
„ Treatment of 474

PAGE
Laird, Dr., on the use of Turpentine in Yellow Fever . . . 158
Lamplough's Pyretic Saline in Malarious Fevers 38
Lawson, Robert, on Pandamic Causes in Regulation of Fever . . 153
Leared, Dr., on Dietary for Indigestion 191
Leucocythæmia, as it occurs in Ague 11
Leukæmia, a Symptom in Ague 11
Liver, Inflammation of—*vide* Hepatitis 386
„ Congestion of the—*vide* Hyperæmia 446
„ Chronic Hypertrophy and Induration of the . . . 434
„ Symptoms and Progress of 434
„ Pathology and Morbid Anatomy of 437
„ Diagnosis and Prognosis of 438
„ Treatment of Chronic Enlargement and Induration of the . 439
„ Dietetic Treatment of the 444
„ General Treatment of 445
Livingstone, Dr., on Remedy in African Fever 39
Louis, on the Death of Matthias 123
Lugol's Solution, Composition of 579
Lumbago, Causes of 525
McKinlay on the Treatment of Yellow Fever 162
Maclean, Professor, on Distinction between Yellow and Remittent Fevers 129
„ „ on Exploration of the Liver 433
M'Clelland, Dr., Results of Examination of 126 Villages on Limestone Rocks 575
Malaria—Asseptic Effluvia in Malarious Fevers 73
Malarious Fevers, Dietetic Treatment in 50
„ „ Prophylaxis against 52
Martin, Sir J. R., on Blood-letting in Marsh Remittent Fever . 86
„ Summary of *Post-mortem* Appearances in Yellow Fever 135
„ on Treatment of Scorbutic Dysentery . . . 261
„ on Uses of Nitro-muriatic Acid in Hepatic Enlargement 440
Mason Good, Description of Yellowness of Skin in Yellow Fever . 124
Massy, Dr., on Ipecacuanha in Dysentery 246
„ on Excretory Power of Liver and Skin . . . 396
„ on Association of Hepatic Abscess with Dysentery . 424
Mathei, on Ascent of Yellow Fever above Sea-level . . . 115
Nazaire, St., Yellow Fever in 148
Nitro-muriatic Acid, as Foot Bath 441
„ „ as General Bath 442
Obstipatio—*vide* Constipation 196

PAGE
Ogston, on Cumulative Effect of Alcohol 546
Ozone, Effect of, in Malarious Fevers 49
Pareira, on Quinine in large doses 43
Parkes, Dr., on Elimination of Nitrogen from the Human Body . 51
„ on Symptoms of Indigestion 179
„ on Impurities of Water leading to Diarrhœa . . 285
Passions, Rules for Regulation of the 655
Perihepatitis, Symptoms and Progress of 387
Piorry, M., on Colour in Splenic Diseases 482
Plague, Diagnostic Sign from Yellow Fever 139
Pleurisy, Diagnosis from Pleurodynia 522
Pleurodynia, Causes and Diagnosis of 522
Pym, Sir W., on Mortality of Epidemics of Yellow Fever in West Indies 144
Querner, Dr. Emil, on Mode of making a Dish of Blood . . . 512
Recamier, Method of Opening Abscess of Liver 431
Remittent Fever, General Observation of 59
„ Symptoms and Progress of 63
„ Predisposing Causes of 73
„ Pathology and Morbid Anatomy of . . . 76
„ Diagnosis and Prognosis of 78
„ Treatment of 79
„ Management during Convalescence . . . 100
Rheumatism, Chronic, Definition, Symptoms and Progress of . . 521
„ Pleurodynia, Causes and Diagnosis of . . 522
„ Torticollis or Wry-neck, Causes of . . 524
„ Lumbago, Causes of 525
„ Sciatica, Causes of 526
„ Report of a Case of 527
„ Pathology and Morbid Anatomy of . . 530
„ Causes of 533
„ Diagnosis and Prognosis of 533
„ Treatment of 534
Salisbury, Dr., on Cryptogamic Plants in Malarious Fevers . . 75
Sanderson, Dr., Nature, &c., of Zymotic Principles - . . 26
Scarlatina Rheumatica—*vide* Dengue 164
Sciatica, Causes of 526
Scybala, Description of 208
Sleep, Rules for the Regulation of, in the Tropics 652
Smith, Dr., (U.S.) Doses of Turpentine in Yellow Fever . . . 159
Someral, on Epidemic Cholera 291
Spanæmia, Observation on 504
Spleen, Diseases of the 474

PAGE
Spleen, Description of Structure and Function of 474
Splenitis, Chronic, with Hypertrophy 477
„ Symptoms and Progress of 479
„ Causes of 483
„ Pathology and Morbid Anatomy of 485
„ Diagnosis and Prognosis of 486
„ Mortality of Chronic 487
„ Treatment, Cathartics 490
„ „ Tonics 411
„ „ Alteratives 492
„ „ Local Applications 493
„ „ Biniodide of Mercury 495
„ „ of Hæmorrhagic Tendency in . . . 496
„ „ of Dropsy in 498
„ Diet and Regimen in 498
Steward, Dr., on Treatment of Guinea Worm 619
Sun-stroke, General Observations of 558
„ Symptoms and Progress of 559
„ Varieties of 562
„ Pathology and Morbid Anatomy of 563
„ Causes—Predisposing and Exciting 565
„ Diagnosis and Prognosis of 566
„ Treatment, Local, &c. 567
„ Prophylactic Treatment 570
Sympathetic, Nerve System in Malarious Systemic Poison . . 27
Talipes Equinus, as a result of Guinea Worm 608
Torticollis, Causes of 524
Tropical Hygiene, General Observations in 633
Tulloch, Sir A., on Mortality of Remittent Fever 79
„ Tabular Summary of Mortality in Remittent, Intermittent, and Yellow Fevers 146
„ on Prevalence and Mortality of Dysentery . . . 235
Turpentine, as a Remedy in Yellow Fever 158
Typhus Fever, Diagnostic Sign from Yellow Fever 139
Urine, Condition of, in Ague 8
Varieties of Yellow Fever 126
Virchow, Professor, on Elementary Cells in Blood 12
Walther, on Fluid in the Air Passages in Cholera 324
Warburg's Fever Tincture, Effects and Composition of . . . 42
Ward, Dr. Ogier, on Anæmic Murmur 504
Water-brash, a Symptom in Indigestion 179
Williamson, Capt., on Tropical Hygiene 634
Wilson, Dr., on Insidious Yellow Fever 122

PAGE

Wood, Dr., on the Causes of Jaundice 464
Wry-neck, Causes of 524
Yaws, Definition of 621
„ Symptoms and Progress of 621
„ Pathology and Morbid Anatomy of 623
„ Causes of 625
„ Diagnosis, Prognosis, and Treatment 626
Yellow Fever, Definition of 114
„ Symptoms and Progress of . . . 115
„ Varieties of 126
„ Pathology and Morbid Anatomy . . . 129
„ Causes, Predisposing 136
„ „ Exciting 138
„ Diagnosis and Prognosis of 139
„ Mortality of 144
„ Contagious and Infectious Nature of . . . 147
„ Dr. M'William's Views on 151
„ Influence of Pandamic Causes in Regulation of . 153
„ Treatment of 155
„ „ Calomel and Saline, in . . . 156
„ „ Turpentine in 158
„ Dietetic Treatment of 160
„ Treatment during Convalescence 162

KING'S COLLEGE HOSPITAL LIBRARY Medical School

WORKS BY THE AUTHOR.

PHYSICAL and MEDICAL CLIMATE, and METEOROLOGY of the WEST COAST of AFRICA. With Valuable Hints to Europeans for the Preservation of Health in the Tropics. 1 vol. 8vo, 10s.

LONDON: CHURCHILL & SONS.

OPINIONS OF THE PRESS.

(From the *Athenæum.*)

"Dr. Horton does not go into the question as to whether colonies of Englishmen could thrive or develop in this part of the world; but, with the intelligence of a well-educated medical man, he enters upon the question of the general conditions of human life on the West Coast of Africa, and in the most convincing manner shows that to a considerable extent, the causes of death and diseases in this part of the world are as much under the control of human intelligence as the fever-breeding courts and alleys of London, or the plague-stricken slums of Constantinople.

"The public, and especially that large portion of it whose occupations lead them to take an interest in the health of the inhabitants of our tropical possessions, owe a large debt of gratitude to the author of this book for the indefatigable industry he has displayed in giving this learned and interesting account of the climate and meteorology of the West Coast of Africa."

(From the *African Times.*)

"It contains much valuable information and advice, and will, we have no doubt, be a permanent authority, as regards the West Coast, on the matters of which it treats."

(From the *Medical Times and Gazette.*)

"There is enough of valuable original matter to render this, the only work on the climate, &c., of Western Africa, of great value to all interested in the preservation of European life in that malarious region."

(From the *Lancet.*)

"Dr. Horton's book will prove of value to all who are interested in the health of the West African colonies; and it will be most useful as a work of reference."

(From the *True Whig*, a Liberian Paper.)

". . . The arguments of which show an abundant and co-extensive amount of research, and an independent and original turn of mind which presents deductive facts that seem to be self-evident truth."

GUINEA WORM, or DRACUNCULUS: Its Symptoms and Progress, Causes, Pathological Anatomy, Results, and Radical Cure. 2s. 6d.

POLITICAL ECONOMY of BRITISH WESTERN AFRICA; with the Requirements of the several Colonies and Settlements. (The African View of the Negro's Place in Nature.) 1s.

LONDON: W. J. JOHNSON, 121, FLEET STREET.

(From the *African Times.*)

"The pamphlet, of which the proof-sheets are now before us, is indeed well worthy of perusal, both here and in Africa."

(From the *Hastings and St. Leonard's News.*)

"Whilst the negro's enemies are so active in traducing him—enemies among the friends of slavery and the teachers of pseudo-sciences—it is satisfactory to know that there are educated Africans, like Mr. Horton, capable of speaking up for their injured race. The pamphlet named above is written by one who well understands what he is writing about. It is

the voice of an African who knows his place in nature, and has ability to make good his claims. The facts and figures of Mr. Horton contrast strongly with the guess works and fiction of the Bond-street travellers and theorists, who have succeeded in making themselves ridiculous of late by their wrong-headed efforts to appear great and wise at the expense of the libelled Africans."

WEST AFRICAN COUNTRIES AND PEOPLES, BRITISH and NATIVE: with the Requirements necessary for Establishing that Self-Government recommended by the Committee of the House of Commons and a Vindication of the African Race. 7s. 6d.

LONDON: W. J. JOHNSON, 121, FLEET STREET.

(From the *African Times.*)

"The book is a valuable one—is a book that is very much wanted; that it is calculated to remove many misconceptions as regards the people and countries of which it treats; that it ought to do much toward clearing away the thick haze of prejudice in which the West Coast countries have been shrouded; and that it must, we think, convince every unprejudiced reader that those people and countries have a future of great importance to the civilized world, and of deep, soul-stirring interest to the Christian, who is praying, hoping, watching, and striving for the extension of the great Redeemer's kingdom.

"The earlier portion of the volume is devoted to an *exposé* of the gross errors and mis-statements and absurd reasonings that have been in vogue relative to the West African races and the countries they inhabit. We are glad to have these scientific and vulgar falsehoods and aberrations of intellect brought thus unitedly before us and demolished by real scientific facts; and a clear and lucid reasoning upon them in defence and favour of his long-maligned and deeply-injured race, that establishes the truth, for which we have always contended, that the present indisputable mental superiority of the civilized European over the uncivilized African is merely one of degree, not one of kind—the result of circumstances, and not of

natural diversity. This work, by a native African, ought to do much to rehabilitate in European estimation the race to which he belongs. It shows nice powers of observation, great diligence, a clear appreciation of facts, and a mental daring that does not shrink from the great problems of the future of the various divisions of his race, on which the light of Christian civilization is only now beginning to shine, and who are for the most part placed under circumstances most unfavourable to its increase. . . . . No library that pretends to a collection of books on Africa ought to be without this interesting and valuable volume."

(From the *True Whig*, a Liberian Paper.)

"It is a work of rare, curious, and interesting merit."

(From the *Record*, August 21, 1869.)

"One of the most striking vindications of the African race is the very fact that this volume has been penned by one of them, Mr Horton being himself an African, who after attaining various academical and literary distinctions in England and France, holds the responsible position of Staff Assistant-Surgeon of Her Majesty's Forces in Western Africa. He shows his appreciation of the true hope of his long down-trodden land by dedicating his work to the Rev. Henry Venn, of the C. M. S. His treatment of his subject embraces an account of the various West African countries, a discussion of African nationality, and a comprehensive view of the requirements of the colonies and settlements, the whole closing with advice to the rising generation of his country folk. . . . . To Christian philanthropists the practical lesson of Dr. Horton's book is, '*Persevere.*'"

LETTERS ON THE POLITICAL CONDITION OF THE GOLD COAST since the Exchange of Territory between the English and Dutch Governments on January 1st, 1868: together with a short Account of the Ashantee War, 1862-64, and the Awoonah War, 1866.

LONDON: W. J. JOHNSON, 121, FLEET STREET.

6