Dengue, its history, symptoms, and treatment : with observations on the epidemic which prevailed in Bombay during the years 1871-72 / by José Gerson da Cunha.

From the Author.

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DENGUE,

ITS

HISTORY, SYMPTOMS, AND TREATMENT;

WITH

OBSERVATIONS ON THE EPIDEMIC WHICH PREVAILED IN BOMBAY DURING THE YEARS 1871-72.

BY

JOSÉ GERSON DA CUNHA,

M. R. C. S., & L. M. ENG.; L. R. C. P. EDIN., &c.

1872.

BOMBAY: THACKER, VINING & Co.
CALCUTTA: THACKER, SPINK & Co.
LONDON: W. THACKER & Co.

TO

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PROFESSOR OF MEDICINE, AND SENIOR PHYSICIAN TO THE

ST. MARY'S HOSPITAL, LONDON,

&c. &c. &c.,

AS A TOKEN OF GRATITUDE AND AFFECTION,

This Work is Dedicated

BY HIS OLD PUPIL, AND MOST OBEDIENT SERVANT,

THE AUTHOR.

PREFACE.

In these days, when an infinite number of publications are being incessantly brought out, the author deems it necessary for him to give a *raison d'être* of his own work, and of its issue at the present time.

The following pages were first written with the intention of reading them before a meeting of the Medical and Physical Society of this city, but as the materials while being collected exceeded the ordinary bounds of a mere prelection, it was thought better to publish them in a *brochure*.

The absolute want of a complete monograph on Dengue, which the author felt while carrying on his researches—for besides some meagre accounts of the malady in encyclopædias, and a few brief articles and lectures in medical periodicals and the systematic works on medicine, there is not a single book worth referring to on the literature of Dengue fever—is another reason for the publication of this work; and the actual dissemination of the disease throughout the country has urged the author to delay it no longer.

The special indulgence of the professional reader is requested by the author for both the substance and form of his work; the imperfections in substance are due to the fact that there exists nothing perfect in the matter to guide him in his present attempt, and to want of leisure to deepen his investigations;

in form, to the circumstance of his being a foreigner, and therefore scarcely expected to possess that facility of diction and that idiomatical accuracy which would characterize the work of one writing in his own language. However, the author is confident that he has done his best, and now has only to express a devout wish that the following pages may be useful to the profession, and through it to humanity.

Bombay, 15*th December* 1872.

DENGUE.

INTRODUCTORY REMARKS.

The notable epidemic of a peculiar exanthematous fever which has been prevalent in Bombay and throughout India from the middle of the year 1871 up to this day will have certainly attracted public attention, especially from its being a novel complaint to, at least, the present generation.

It was my privilege to be one of the first observers of this disease on this side of India, and the impressions it produced on my mind, and the researches I made in order to elucidate its history, pathology, and treatment, will be found embodied in the following pages. Though diffident of doing justice to the subject, these pages will present to the profession in a condensed form whatever I have been able to collect from available sources : and, in order to render the treatment of the subject more lucid, it has been divided into three parts—1*st*, the history of the disease ; 2*nd*, its symptoms, diagnosis, and pathology ; and 3*rd*, its treatment and prophylaxis. But before entering on it I believe it is incumbent on me to endeavour to explain the origin of the word "Dengue," the derivation of which has been the subject of numerous, sometimes ingenious, but not always sound speculations.

"Dengue" is an Iberian word : it is both an adjective and a noun, having its derivatives in *dengoso* and *denguice*, denoting prudery and affectation, from the stiffness of the joints and restraint of the movements, which are characteristic of this disease, imparting a ludicrous appearance to the sufferer. It

is supposed to have originated from the barbarous *Kidinga*, which among the Negroes and Arabs means cramp-like pains caused through the agency of the evil spirit, and to have been eventually refined into its present designation. The introduction of this strange term into the Spanish peninsula is easily accounted for by the long Moorish occupation of that part of Europe, as well as by the numerous Portuguese settlements along the African coast, whence that nation has certainly imported many words into its language. The resemblance or connexion between "Kidinga" and "Dengue" was once drawn attention to at a meeting of the Epidemiological Society of London, after the reading of a paper by Dr. Christie of Zanzibar on the epidemic which prevailed at that place in 1870 (*vide Lancet* of 17th February 1872). I shall have to refer to it again hereafter. Some philologists, however, deduce the etymology of "dengue" from a Castilian word analogous to the English "dainty" and old French "*dain*," both derived from the Latin "*dens*" and Sanscrit "*danta*," tooth; hence tasty, delicate, affected, &c.

The term appears to have crept into British nosology from the West Indies, where the Spaniards had familiarized it in designating the disease of which those islands have been the hotbed for more than a century. Its use was subsequently sanctioned by its admission by the Royal College of Physicians into their "nomenclature of diseases," where it is thus defined:—"An ephemeral continued fever or febricula characterized by frontal headache and by severe pains in the limbs and trunk, and sometimes by an eruption resembling measles over the body, occurring in the West Indies:" p. 5, 1868.

Besides the word "dengue," more than thirty-six other names have at various times and places been applied to that disease. To mention only a few: in Andalusia it is called "Tracazo," in Cadiz and Seville "Piadosa," in other parts of

Spain "Pantomima," in Brazil it is called "Polka;" in the West Indies and Spanish America it is sometimes denominated "Colorado." The Africans and Arabians, as already stated, call it "Kidinga," generally with the affix of "Pepo." It was also this grotesque appearance that suggested to French writers the designation of "Giraffe" and "Bouquet." The negroes of the island of St. Thomas have jocosely conferred on it the appellation of "dandy," "denga;" and in Philadelphia it was once named "breakbone" and "bucket" fever. These are some of its popular names.

It has also been variously described by writers of acknowledged merit on this subject under various scientific designations. Dr. Rush of Philadelphia described it in 1780 A. D. as "bilious remittent fever;" Dr. Cook of the West Indies as "epidemic eruptive rheumatism;" Dr. Stedman of the island of St. Thomas as "epidemic anomalous disease;" and Dr. Copland defines it under the name of "scarlatina rheumatica" thus :— "Severe pain coming suddenly in the small joints, followed by local swellings and chilliness or shiverings; to these succeed heat of skin, intense pain in the head and eyeballs, which soon become general, and on the third or fourth day scarlet efflorescence appears on the palms of the hands, spreads rapidly over the body, and continues two or three days, after which the symptoms subside, the malady being infectious and epidemic."

Dr. Mellis defines it as an "inflammatory epidemic fever," as he observed it in Calcutta; and other writers apply to it such Latin names as *exanthesis, arthrosia, plantaria, febris peculiaris epidemica,* &c.

These descriptions show how vague were the notions entertained regarding dengue, some writers scarcely distinguishing it from scarlatina, measles, and rheumatism, while other authorities of high standing have rendered "dengue" a classical name.

Among the latter class I may mention Dr. Aitken of Netley, who defines dengue thus :—"A peculiar febrile disease conjoined with sudden pains in the small joints, which swell, succeeded by general heat of the skin, intense pain in the eyeballs, and appearance of a cutaneous eruption on the third or fourth day. The disease is infectious, with an epidemic tendency." A writer on physical science says: "It is much to be regretted that a far greater degree of logical accuracy in the use of terms than is usually met with does not exist amongst even the ablest writers on physics, for many of the arguments adduced against the physical principles lie not against the principles themselves, but against the indefinite language in which they have from time to time been expressed." (Vide *Nature*, No. 137.) What is here said of physics is with greater force applicable to medicine, where many terms are misapplied, and this misuse has certainly led to great confusion of ideas. Where such confusion exists, it is well, if possible, to avoid it by fixing on a term and rendering its use universal. Such a term I should think is "red fever," a name of cosmopolitan acceptation, describing the malady by one of its essential and characteristic signs, without assuming any pathological kinship to other eruptive fevers, precluding the necessity of having recourse to such metaphorical designations as dengue, dandy, breakbone fever, &c. "Red fever" is the literal translation of *calentura roja* or *roxa*, used by both the Spanish and Portuguese writers of renown, or of what the French call *Fièvre rouge*. It is said that the British practitioners will object to this epithet being applied to dengue, on account of the venerable Sydenham and Heberden having named scarlatina "red fever" (*febris rubra*), and also on account of the protest of M. Thaly against its use, for the simple reason of there being no redness to be seen among the negroes, but only an interruption of tint, or a very apparent

variation of the skin. These reasons are not certainly strong enough to militate against the use of this name being conventionally received as a designation of a particular eruptive fever, to the exclusion of all others of the same class ; and this will not, I trust, hinder the name employed by the continental writers from being acceptable to the English practitioners.

HISTORY.

No allusion to Dengue fever can be traced in the writings of the old Greeks and Romans; this disease either did not exist in their time, or was confounded with other exantheses. It is said, however, to be as old as Variola, which is considered by some to be as old as the first man, while others are of opinion that "the world had existed some thousands of years before it was visited by it."

This disease must have been long known in this country, if we may believe an old legend which I met with in the course of my researches. It is stated that a goddess gave birth to three children, who, the moment they saw the light of day, threatened to devour their own mother, and their voracity being insatiable they felt strongly inclined to devour each other. But as their very existence was menaced by such a suicidal course, they had recourse to flight. The remedy was, however, worse than the disease. Every country they traversed they ravaged; wherever they alighted they spread consternation and dismay; their progress was marked by desolation, populations decimated, cities converted into deserts, and, in short, life into death. These three impersonations of the destroyer Shivá, these three scourges of humanity, were called Zari-Mari, Devi, and Oothiá-Toothiá—*Anglicè*, cholera, small-pox, and dengue. Although mythical, there is little doubt that the tradition points to those complaints having existed in this country

at a remote period. Independently of this, there are good grounds for supposing that one at least of these complaints originated in the delta of the Ganges.

The earliest record we have with any shadow of authenticity about it comes to us from Egypt. In the seventeenth century a peculiar eruptive fever broke out at Cairo bearing a remarkable resemblance to dengue, which is thus described by M. De Thevénot: "In March 1658, after some days of high winds, a certain distemper broke out, which began with headache and fever and continued with a great rheum. The fever lasted not above two or three days at most, but it rendered men so feeble that all the limbs seemed to be broken, and if preservatives were not used the patients relapsed into a fever that continued three weeks or a month. All in Cairo, from the highest to the lowest, both aged and young, were seized with it, and everywhere there was nothing to be heard but coughing. This distemper was so contagious that it infected by the breath; it was called *Abou-Chamáá*, because of a certain song made some months before, which began with *Abou-Chamáá* and ended *Ha! ha! ha!* Now, seeing that this distemper caused great coughing, it was thought to resemble the song *Ha! ha! ha!* wherefore the Pasha prohibited the singing of that song with so much rigour that when the Sub-Pasha found any one singing it in the streets, though it were but a child, he ordered him to be laid down and bastinadoed, because it was fancied that the song was the cause of the distemper, which spread so far that afterwards we learned at Jerusalem, and in other places about, that they had been troubled with it at the same time—nay, the corsairs who took us had all had it at that time. It was said at Cairo that, ten years before, such another distemper had raged there, which they called *Makessa*, that made those who were troubled with it think their very bones were broken, and they were cured by eating oranges, which made these so dear at that time that one

orange was worth half a piastre so long as the disease lasted:" page 26.

We next learn that in 1764-68 dengue raged severely in Cadiz and Seville, and even infected a vessel cruising between the latter port and Cape St. Vincent, the infection being carried by the breeze, while some others further off escaped. It is also said that an affection supposed to be the dengue prevailed in Philadelphia in the year 1780, and was described by Dr. Rush under the name of "bilious remittent fever," while the people named it "breakbone fever." At the close of the last century it was observed by a French physician, Leblond, in Santa Fé de Bogotá, and is treated of in his "*Observations sur la Fièvre jaune et sur les maladies des tropiques*," Pariz, 1805, page 44. After this we hear no more of this complaint until the great outbreak of 1824 in India. It is said that it broke out in the month of May with unprecedented violence and severity on the east of Rangoon, where several crowded fairs are held throughout the year, and thence it was conveyed to Calcutta, Berhampore, Patna, Benares, Chunnaighur, Madras, and numerous other places, and into Guzerat. There are, fortunately, numerous records of this epidemic from both medical and lay writers. Dr. James Mellis wrote of it in the "Transactions of the Medical and Physical Society of Calcutta;" so did Dr. Twining in his "Observations on the Fever which prevailed in Calcutta in June, July, and August of 1824;" Dr. Cavell in his "Observations on the Epidemic of June," &c. Dr. Mouat observed it at Berhampore in March, April, and May of 1825, and describes it under the name of "epidemic fever," and says it prevailed not only at Berhampore, but in many other places in the vicinity, and that in some of the populous towns it was particularly severe. He states further that "it was characterized by the suddenness of its attack, the redness and watering of the eyes; the acute pain in all the joints, rendered excruciating on the slightest touch;

the scarlet or crimson efflorescence on the surface; and its sparing neither age, sex, nor habit of body."

Mrs. Fanny Parker, in her "Wanderings of a Pilgrim in search of the Picturesque," published in London, 1850, in a paragraph written in 1824 in Calcutta, describes certain symptoms which I believe have reference to this malady, although she does not give any name to the disease. The following is the passage I allude to:—"17*th July* 1824. On this day having discovered a young friend ill in Writers' Buildings, we brought him to our house. Two days afterwards I was seized with the fever, from which I did not recover for thirteen days. My husband nursed me with great care until he fell ill himself, and eleven of our servants were laid up with the same disorder. The people in Calcutta have all had it; I suppose out of the whole population, European and Native, not two hundred persons have escaped, and, what is singular, it has not occasioned one death among the adults. I was so well and strong overnight, we were talking of the best means of escaping the epidemic. In the morning it came and remained thirty-six hours, then quitted me; a strong eruption came out like measles, and left me weak and thin. My husband's fever left him in thirty-six hours, but he was unable to quit the house for nine days; the rash was the same. Some faces were covered with spots like those on a leopard's skin. It was so prevalent that the Courts of Justice, the Custom House, the Lottery Office, and almost every Public Department in Calcutta were closed in consequence of the sickness. In the course of three days three different physicians attended me, one after the other having fallen ill. It is wonderful that a fever producing so much pain in the head and limbs, leaving the patient weak and reduced, and covered with a violent eruption, should have been so harmless; after three weeks nobody appeared to have suffered, with the exception of two or three children,

whom it attacked more violently than it did grown-up people, and carried them off.

"11*th September* 1824. The fever has quitted Calcutta, and travelled up the country stage by stage. It was amusing to see, upon your return to the Course, the whole of the company stamped like yourself with the marks of the leech upon the temples. Its origin has been attributed to many causes, and it has been called by many names. The gentlemen of the *Lancet* are greatly divided in their opinions. Some attribute it to the want of rain, others to the scarcity of thunder and lightning this season. There was an instance of the same general fever prevailing in the time of Warren Hastings. Not a single instance has been heard of its having proved mortal to adults."

From the many records consulted by me relative to the times of Warren Hastings nothing can be gleaned concerning dengue. Dr. Copland, in his very concise article on Dengue in his "Dictionary," while referring to the epidemic of 1824-25 in India, says: "The accounts furnished by the East Indian physicians of the symptoms and treatment of this epidemic fever agree in the essential characters, but are desultory and very imperfect in many respects, and are mixed up with speculations, as usual, as to the influence of too much rain or too little rain, of electrical conditions, of terrestrial emanations, and of other supposititious causes in producing it, whilst the most obvious and true cause is entirely overlooked."

About this very time an epidemic of identical type appears to have broken out in the West Indies. It first visited the island of St. Thomas in 1826, where the negroes called it Dandy fever, from the constraint of movements and stiff gait produced by it. When imported into Cuba and Savannah, the name is said to have been changed by the Spaniards into

dengue, which it has retained ever since. The island of St. Thomas was again the scene of this epidemic in September 1827, which place is supposed to have been its breeding-ground for more than a century, but this lacks confirmation. From St. Thomas the fever travelled westwards to the rest of the islands, and proceeded to the Southern States of America, whence we have the fullest account of the epidemic from physicians who had little or no acquaintance with its previous appearance in those regions or in India. Eventually the fever advanced northwards during the winter, touched the ports on the Gulf of Mexico, and reached New Orleans in the ensuing spring. During the summer of 1826 it occurred, though in a mild form, at Savannah; Charleston also was severely visited with it. A few cases appeared in Philadelphia and New York, but it did not extend further north. It has been described by several authors, but with much difference in many particulars. Dr. Copland says that it does not clearly appear whether the difference was owing to the influence of climate, locality, or treatment adopted by the writers.

This fever made its appearance again at Savannah in 1827 and 1828, in which year it raged very seriously through most of the Southern cities, and it disappeared in winter to reappear again in 1831.

The descriptions of the epidemic of 1827 given by Dr. Stedman, who practised in the island of St. Thomas, Dr. Dickson of Charleston, and Dr. Waring of Savannah, are valuable records of the characters of the epidemic, the descriptions being evidently made from actual observations of the condition of those who were afflicted with it. The former states that of a population of 12,000 in the principal towns of St. Thomas scarcely one escaped; that it appeared suddenly, and spread so rapidly as to cause great alarm, but it was soon discovered that, although a painful malady, it was not dangerous, for

out of that number he lost only two patients, and even these were old negroes; yet it left much suffering, and even disease, after the decline of more severe symptoms. The latter says that the disease was first imported into Charleston by the captain of a ship, who brought it from Havannah, and communicated it to his family, and that the transmission of the disease was traced from one subject to another; but the primordial importation appears to have been from a vessel coming from the coast of Africa to the island of St. Thomas though this fact was not satisfactorily ascertained at the time. (*Vide* "Some Account of an Anomalous Disease which raged in the Islands of St. Thomas and Santa Cruz in 1826 A. D.," by J. W. Stedman, Edin. Med. Surg. Journal, No. XXX., page 227; and "An Account of the Dengue as it appeared in Charleston, S. C., during the summer of 1828," in the Amer. Jour. of Med. Science, Vol. III., page 3; North American Med. and Surg. Jour., No. IX., page 374; and Bell's Library, 1839.) For a long time after this period nothing was heard of it until another epidemic of similar nature visited the Southern States of America in 1847-49, and Charleston suffered from it with special severity. As an illustration of the way in which all classes were attacked by this epidemic, Dr. Tanner mentions that the editor of the Southern Medical and Surgical Journal, in his issue for December 1849, apologizes for typographical errors by saying "The editor, publishers, and printers are all suffering from 'break-bone fever.'" This disease reappeared again at Mobile in 1844, and at Natchez in 1858. The population of the village of New Iberia, in Louisiana, did not exceed 250 in the year 1851, yet, according to Dr. Duperier, in six weeks 210 of the residents had gone through an attack of this fever, while 40 of the inhabitants of the neighbourhood had also suffered from it. In the island of Cuba it was observed and described by Dr. Arbolea in 1854, where it

presented the same characteristics as in the previous epidemics. (Vide *Historia de una Epidemia padecida em Curazao e Habana, por el Dr. Dom José Garcia Arbolea. Cadiz,* 1854.)

About this time we hear of an outbreak of the dengue in Calcutta, which was described by Dr. Goodeve, and called after him, "Dr. Goodeve's red fever," from his having written the best account of this complaint in India. This epidemic is well remembered by many of the oldest inhabitants, some of whom have testified to their having suffered from it; but it was then variously classified, and Dr. Goodeve himself thought it at first to be scarlet fever.

A few years later the dengue again made its appearance in Virginia in an epidemic form in 1859-61, and raged to such an extent that one practitioner alone, Dr. R. T. Lemmon, attended upwards of three hundred cases. Out of this number only ten died. Of the fatal cases, four were negroes over ninety years of age; one was a child who was teething and had convulsions; one was suffering from congestion of the lungs; one from epistaxis; and one from softening of the brain and stomach, with the symptoms of the yellow fever (*vide* Amer. Med. Times, Vol. II., page 120).

In 1865 this fever raged in Santa Cruz de Teneriffe and the Canary Islands, whence it was transferred to Spain, and prevailed, though in a mild form, in Andalusia and other provinces. (Vide *La Calentura Roja observada in sus appariciones epidemicas del os anos* 1865 *y* 1867. *Por D. Ramon Hernandez Poggio. Madrid,* 1871.)

It was also in the year 1865 that M. Thaly observed this affection in Goree, in Africa, spreading among all the soldiers of its garrison, amounting to 250, and a great portion of the population, both European and Native, hardly any escaping; and among such a large number of the affected only one died,

and this was an old woman, who died on the twentieth day of her illness, from sheer exhaustion.

To complete the above cursory historical sketch of the disease, we shall now consider the present epidemic and trace its origin.

The epidemic, which is still on the ascendant in various towns in India, was first introduced into Bombay from Aden, and into Aden from the East Coast of Africa.

It appears, from the valuable researches of Dr. Christie, embodied in his communications to the Epidemiological Society of London, and to the Medical and Physical Society of Bombay, that in July 1870, after the complete disappearance of cholera from the island of Zanzibar, a new form of fever, quite unknown to the bulk of the population, sprang up. Even the natives of India temporarily resident there were entirely unacquainted with it in their own country. Some people called it "Homah Mague," or "leg fever," on account of one of its chief symptoms, the severe pains in the lower extremities; and others, especially the Arabs from Oman, in the Persian Gulf, confounded it with "Bardiabis," or rheumatism; while those from Hydramaut, in the Gulf of Arabia, spoke of it as a disease with which they were familiar, and named it "Ndefú," to which, however, no distinct meaning can be attached in Arabic, and it was changed by the Suahalis of Zanzibar into "Madefu," which means "beards." The older inhabitants of Zanzibar recognized it as identical with the disease which they had seen about forty-eight years before, causing many deaths, especially among children, and was then called "Kidinga Pepo," now an obsolete phrase, allied to "Gunzi," or cramps. From the following description given by him, I believe it to be the genuine dengue, and that the modifications and such other differences which he found in it, and which made him doubt its identity, are rather referable to climatic and local causes than to any difference in the nature of the disease itself:—

The patient was seized very suddenly with pain and stiffness of the muscles, especially those of the palms of the hands and soles of the feet; fever followed, varying greatly in intensity, the skin became hot and dry, the tongue red and spotted, but generally clean, the face of a bright scarlet colour. This coloration was marked in every case, and usually accompanied by a puffy swelling so as to resemble erysipelas of the face; it was characteristic of the disease. There also occurred swelling and pain of the smaller articulations, besides much pain in the shoulders, back, &c. The symptoms were accompanied by very obstinate constipation. The first period of forty-eight hours was followed by a very complete remission of from two to three days. The fever returned on the fourth day, always with lessened intensity; on the fifth an exanthematous eruption, different from that of rubeola and of scarlet fever, and more like that of erysipelas, appeared and spread over the whole body in forty-eight hours. Then occurred swelling of the lymphatic glands of the head and face, and especially of the occipital glands; redness and even tumefaction and soreness of the mucous membranes of the nose, mouth, and, in severe cases, of the throat. During all this time the stiffness of the muscles and pain of the articulations continued, and on the seventh or eighth day there was desquamation of the cuticle, and the acute stage terminated.

Dr. Christie considers, as I have just observed, that this disease differs from dengue in several particulars when compared with the description given of it by the American and East Indian physicians, as well as with the symptoms detailed by Dr. Aitken in his monograph in "Reynolds' System of Medicine;" but we know it is very seldom that one meets with the same disease in different localities and times coinciding with scientific precision in all particulars, or presenting always the same unvarying and essential symptoms.

It disappeared from Zanzibar in January 1871, but it did not die out altogether; for we learn that it was imported into Aden about the month of June 1871. From this place we have two interesting communications on the subject by Surgeon Major J. Turner and Surgeon J. T. Welsh. (*Vide* Transactions of the Medical and Physical Society of Bombay, 1871.)

The former having no reasonable theory to put forward in opposition to dissemination of this disease by the Shumal, the dusty-wave whirlwind, which bursts with great violence from the south-west coast of Africa, sweeping the peninsula of Aden in its flight, chooses for his motto "the burden of the desert of the sea," from the prophet Isaiah. He also states that this Shumal exceeded by its subsequent virulence on man all other similar annual outbursts, and that every land from Hodeida, to the north-west of Aden, to Makula, to the north-east, and Mocha to the west, over which the Shumal swept, suffered from its effects very severely.

From the opinions of former writers Surgeon Major Turner deduces his own conclusion as to the "*casus morbi*" in relation to the dissemination of the epidemic, adopting the wave-theory of contagion, and attributing the diffusion of the dengue to the Shumal. In proof of this he adduces the fact of the jail and the Roman Catholic convent being exempted from the malady, the former being protected by its high walls, and the latter on account of its remaining sheltered by high rocks around it from the scorching blast of the great Sahara. He also states that "it has been facetiously surmised that the derivation of the name of the disease is *Aden Ague*, and that on the removal of two *a's* it becomes "dengue," and that this fever was known to have prevailed there to a great extent in the year 1826. Happily for us, we are not burdened with another theory about the "*fons et origo*" of the disease, which the writer considers to be involved in mystery.

Dr. Welsh is of opinion that dengue was imported into Aden from Zanzibar, and that it was transmitted along the coast of Africa to Berbera and thence to Aden by the Somalis, who are said to be decidedly migratory in their habits.

The epidemic both at Zanzibar and Aden appears to have caused great ravages, almost the entire populations being prostrated by it; and those who were considered to be exempt from its attack had to succumb at last, and even the writers of these communications were victims themselves. It lasted at Aden from June to August, when it quietly died out.

About this time dengue made its appearance in Bombay, the first case observed by me having occurred on the 12th of August 1871. It being a novel malady, the following notes were taken by me at the time, which I think will not prove uninteresting :—

At 10 A.M. on that day I was called in to see one Thomas C., Eurasian, aged 7. His mother, who was putting up at a lodging-house frequented by sailors coming from different ports to Bombay, informed me that her son was playing the previous day with other children without complaining of anything, and that last night about 2 A.M. he suddenly got up and commenced to cry and complain of pains in his belly and limbs, and that he also felt chilly. He had vomited twice and his bowels were costive. Pulse 140, small and compressible; tongue clean, white in the centre, red at the tip and edges; skin hot, thermometer indicates 102-4°; mutters incoherently; face swollen and erysipelatous in appearance, eyes suffused; chest and the root of the neck are covered over with a crimson papular rash which resembles measles; no catarrhal symptoms; urine highly coloured, no albumen; sp. gr. 1015. Complains of pain in his back and fingers and toes; these articulations are a little swollen; also complains of intense headache, and cramps in the muscles of the abdomen. The slightest pressure, touch, or movement causes him pain. The salivary glands are rather swollen. I ordered a purgative mixture, cold lotion to the head, bland supporting diet, and stimulating embrocation to the abdomen and joints. *Vesp.*—Pyrexia as noted in the morning. Bowels opened three times. Rash is less distinct, and in only two places it has coalesced into two irregular blotches of red colour.

13*th*.—Temperature 102°, pulse 135, respiration 24. Rash presents two red patches on the chest; no appetite and no sleep. Gave him saline diaphoretic mixture.

Vesp.—Rash has disappeared. Temperature 100-2°.

14*th*.—This morning I found the child perspiring profusely; feels altogether better, but weak, and complains still of pain in the back and limbs.

Temperature 99-5°.

15*th*.—Is improving. Got a tonic, and nutritious food.

16*th*.—Feels better. Pulse 110, but is still in a state of prostration.

At about 7 in the evening I was sent for to see the child, said to have taken suddenly very ill. I hastened to the place, and found the child vomiting and with fever. Pulse 140. Tongue coated white, and dry; headache; suffusion of eyes; racking pains all over the body, especially in the joints, which cannot bend; all positions, sitting, lying down, or standing, are uncomfortable. Bowels again costive; gave him an effervescing saline mixture with chlorodyne and requested the mother to watch him carefully. Temperature 103° Fahr.

17*th*.—I was astonished to see both the palms of the hands covered with a red efflorescence like that of scarlatina. Pulse 120; temperature 100-5°. Gave him saline diaphoretic mixture with a grain of iodide of potash to each dose.

18*th*.—Fever has abated; pulse 100; temperature 99°; appetite a little improved; slept soundly; the eruption continues as yesterday and has spread over the body. Thermometer ranges between 98° and 99°.

19*th*.—Fever has left, pulse and temperature normal. Rash is fading away.

20*th*.—Eruption has disappeared. Feels weak, especially in the limbs, and complains of aching in the articulations. Gave him tonics, supporting diet, and wine, and stimulating liniments to the joints.

21*st*.—Is improving; is weak and complains of pain in the joints and muscles of the back and abdomen.

23*rd*.—Is convalescent. After this date I saw the child at my own consulting-room very frequently for other complaints; but of this disease he got no further attack. Other persons of his family have suffered from the same affection, as well as the neighbours; but the course of the disease was, with slight modifications, almost the same.

Thomas's is not a typical case, for, soon after, I had occasion to treat patients with all the characteristic symptoms of dengue; but that was my first case, and, as the disease was one with which I was unacquainted before, I took special care to note its most salient features.

Now as regards the evidence of the importation of this epidemic into Bombay we have not far to seek. In the communications alluded to, we notice that Aden was visited by an epidemic of this fever; that its earliest attacks occurred about the end of June; that it spread rapidly, and that 700 out of a strength of upwards of 900 forming the garrison of that place were attacked.

It is also believed, from a trustworthy source, as stated above, that this dire malady was imported into Aden from Zanzibar, at which place and along the neighbouring coast it had been prevailing for some time previously; and its introduction into Aden may be attributed to the free communication that existed between that station and the infected localities by means of native trading vessels.

Now from Aden to Bombay the communication was very easy. In the beginning of the month of August, it is said, the Indian Foreign Department received a report from Aden to the effect that dengue was prevalent among the European troops there, and that it had gradually extended into the interior. Soon after, or about the 26th of the same month, another communication was sent to Government in which it is stated that "the epidemic continues among both European and Native inhabitants; probably 80 per cent. of the population have already been attacked." On the 24th of October of the same year the Government of India received a letter from the Muscat Political Agent stating that "at Muttrah a species of epidemic fever apparently similar to that of Aden and Zanzibar

has been prevalent." These were the only official reports received by Government, and have the merit of being the first account of that epidemic that by degrees spread over the whole of India. Surgeon Major Fletcher, in the Madras Medical Journal, attempts to trace the way or medium by which dengue was eventually introduced into India. According to his statement, the S. S. "Dalhousie" was at Aden about the end of the last year, and, on a return voyage to Bombay, dengue broke out suddenly among the crew. It is clear, then, that the disease was contracted at Aden, where it was prevailing at the time epidemically. It is also said that during the voyage the fever was confined to the lascars, while the European portion of the crew escaped. This vessel was cleansed and painted in Bombay, but no attempt was made to disinfect it thoroughly. On the 26th of December 1871 a draft of 35 men of the Royal Artillery from England, and some volunteers, embarked on board the "Dalhousie" in Bombay and sailed for Cannanore, where they arrived on the 2nd of January 1872. On the voyage the captain and all the officers of the ship with one exception were attacked with dengue, as well as the European portion of the crew. They landed on the day of arrival; and the troops at Cannanore, who previously had no sickness among them, were soon infected, several men among them being suddenly seized with dengue, and by the 18th January nearly the whole of the detachment had been reported sick, only four men having escaped. They were at once isolated and kept in strict quarantine, and thus the spreading of the epidemic was checked, but only temporarily, so long as the *cordon sanitaire* lasted. It is curious to notice that on his arrival the Assistant Surgeon in charge of the detachment of troops on board the "Dalhousie" called on the General commanding, who contracted the fever, and the medical officer himself suffered from it two days subsequently to his carrying the contagion to the General in his

visit. Another gentleman, with whom he was residing, was also seized with the disease.

According to their reports, the substance of which has been already published in the *Lancet* and the *Indian Medical Gazette*, it would appear that the disease was imported into India in the latter months of the year 1871 and in January 1872; but my first genuine case of dengue, as reported above, was seen last year about the 12th of August, and I should account for its importation by the number of small native trading vessels sailing from the coasts of Africa and Arabia to India. This disease might have been thus conveyed to Bombay long before the arrival of the S. S. "Dalhousie."

There remains no doubt, then, that this disease was brought through human agency from the coast of Africa to Aden, and from both these places the dissemination of dengue was facilitated by the sailing vessels proceeding from that port to Bombay, and from here its general propagation throughout the whole of Hindoostan took place.

SYMPTOMS AND PROGRESS.

The invasion of dengue is often abrupt, and generally in the middle of the night. The period of incubation has been asserted to vary from a few hours to a week. Before the seizure there are the ordinary premonitory signs of languor or a sense of *malaise*, loss of appetite, and depression of spirits. In the majority of cases it commences with coldness of the surface, seldom amounting to regular rigors. The most characteristic symptoms of the incipient stage are severe pains in the back, limbs, and joints, which latter are attended with some degree of swelling; then follows fever with hot and dry skin, quick or natural pulse, hurried respiration, flushed face, and congested and watery eyes. The temperature of the skin is as high as

103° Fahr. The tongue is usually clean, and red at the tip and edges, the papillæ being a little enlarged or elevated, and showing a resemblance to the strawberry; the mouth is parched and dry, and there is a desire for cold drinks. Irritability of the stomach is usually present; and nausea, and sometimes vomiting, not unfrequently attends the disease from the commencement. The urine is large in quantity and red or limpid in colour, without albumen; its specific gravity is usually 1014; the bowels are generally constipated. There is distressing cerebral oppression with sleeplessness, mental anxiety, and perhaps delirium. An eruption of erythematous character usually appears at this period, which is named "initial;" it is of a diffused uniform or homogeneous redness. Painful swellings of the lymphatic glands in the neck occur in some cases, but there is no sore throat, nor any implication of the mucous lining of the mouth. These febrile symptoms, with distressing headache, which generally becomes aggravated towards night, continue unabated for a period varying from twelve hours to three days, perhaps on the average about a day and a half, after which it subsides, and a great apparent amelioration of the disease is experienced. It is not unusual to find the patient at this stage sitting up out of bed, and to be told that he is quite well; but the improvement is only delusive, and lasts two or four days, during which the patient still complains somewhat of rheumatic pains and of general weakness: for on the fourth or fifth day the fever returns with great lumbar distress, severe articular and muscular pains, epigastric uneasiness, and the tongue now becomes thickly coated. An eruption usually appears, more especially on the palms of the hands and upper portion of the body, and gives relief to the symptoms of internal irritation. This eruption, which is called "terminal," is extremely variable in character, being sometimes red and diffused as in scarlatina, sometimes in rough crescentic

patches of dingy red hue, as in measles, and occasionally also either papular, vesicular, or pustular, or there is a mixture of two or more of these forms. It disappears by pressing, to return on the removal of the pressure; it is also fugacious in character, for it is very seldom one meets with it preserving the same features at a marked spot throughout the period. The scorbutic tendency of the system also manifests itself in this disease by the red, spongy, and bleeding gums; and malarious influences often impress upon this fever a close analogy, in its symptoms and course, to the ordinary intermittent. The cutaneous affection is usually attended with heat and itching, and lasts from one to two days and then disappears, being followed by a bran-like or scaly desquamation. The complaint gradually subsides within eight or ten days, unless there is an incidental complication and recrudescence of a previous complaint, or intercurrent disease, leaving the patient with feelings of debility, and the persevering rheumatic pains, which are metastatic and recurrent, rendering the patient a cripple for a longer period, and protracting his convalescence.

It will not be improper, I believe, before closing this brief descriptive sketch of the disease, to call attention severally to three or four of the foregoing symptoms which may be deemed of particular importance.

Pyrexia.—Among all the symptoms of dengue, the greater number of which are very variable, pyrexia is the only stable element in this disease—the febrile stage is the part to attract our attention, whatever other forms the invasion may assume. Now the invasion of this malady is really very often sudden, though there are instances in which patients have had well-marked precursory signs of faintness, listlessness, anorexia, broken sleep, &c., for a week or more, but, as a rule, little to attract notice. The fever generally commences by chilliness and slight shiverings, though a distinct well-marked rigor is

not unfrequently observed. If the sufferer is overtaken with fever soon after a full meal, vomiting very generally occurs, and often even without a meal. The pulse is sometimes quick, but it is generally normal in number, though feeble, the rapidity of the pulse bearing no relation to the severity of the other symptoms. Temperature rises simultaneously with the first seizure of the fever, the thermometric range varying between 100 and 103° Fahr., falling immediately on the appearance of the eruption. Dr. T. E. Charles, of Calcutta, states that the maximum temperature observed by him was 105°, and that it was attained by a steady progressive rise. In hundreds of cases in which the clinical thermometer was used, I never met with a case in which the temperature reached this height. The fever often continues, while perspiration occurs at irregular intervals, and is sometimes profuse, and, I believe, generally brings relief to the symptoms. In children the invasion often commences with convulsion, as with young women hysteriform phenomena often attend the advent of the disorder; but nervous symptoms are, as a rule, absent. When fever is very intense, there is delirium sometimes. The chief peculiarity of the dengue fever is its remittency; there are no distinct matutinal remissions and vespertinal exacerbations, but there are distinct periods of increase and decrease of fever at indefinite times. This results also in sudden depression of temperature below the normal standard, for it is often as low as 96° and 97° Fahr.

Pain.—This is one of the characteristic symptoms of dengue. Early lumbar distress and subsequent rheumatic pains in the joints of the toes, in the region of the spine, and sometimes in the large joints, prelude an affection that is soon to be formulated or manifested by the cutaneous efflorescence. These pains may be neuralgic, myalgic, or rheumatic, but the disease is ushered in by them, so that they are ever preceding, and not succeeding nor exceptional; they are not intra-articular, there

being no synovial complication; they are confined to tendons, their sheaths, and other tissues surrounding joints—they are in fact more muscular than arthritic. There is, however, effusion of fluid, as evidenced by the occasional swelling of the joints accompanied by redness. They are always severest in the night and morning, and wear off in some degree towards evening. The pains are so severe that the slightest touch or movement causes a sharp cry. They are metastatic and recurrent; they shift, and after leaving for a time will often return to the same spot at longer or shorter intervals. Now this pain is quite pathognomonic of dengue, and the term "scarlatina rheumatica," applied by older observers to this disease, shows it to be one of its distinctive characteristics. This pain during the present epidemic has been universal, and so intense as to arrest the attention of even the most superficial observer.

In reference to this symptom Dr. Charles says: "In a few cases its exceptional severity has reminded me of the suffering caused by a bad attack of gout, and even when the intensity of suffering has fallen far short of this, it bore no resemblance to the pains complained of in any other form of fever which I have seen, except the very severe form of ephemera termed 'ardent' or sun fever, which is so common among Europeans who have recently arrived in India, and attacks them during their first experience of the hot winds in Northern India. In this fever the intense pain in the back and head is very similar to the pain of dengue when it affects similar situations." The vernacular names *Oothia-Toothia* and *Lotia* have special reference to this characteristic symptom. This symptom as it is the first to appear, so it is the last to leave the patient. It continues even for months to torment him; and I have seen individuals whose general health was quite sound remain perfect cripples for months, with some of the larger joints quite stiff and swollen;

but, notwithstanding its long duration, no ulceration of cartilages or disorganization of any joint has resulted.

Eruption.—The eruption is the most essential feature of dengue. It is not accidental, a mere epi-phenomenon. A distinguished writer in the British and Foreign Medical and Chirurgical Review, No. XLVII., January 1872, p. 152, is of opinion that its absence in certain cases, or in a certain group of cases, must be considered on the same footing as an "*exanthema sine exanthemate.*" Now the absence of this rash, as in *denguis latens*, has produced infinite confusion among some writers; for instance, Dr. Dickson, who, in spite of his belief in the exanthematous nature of dengue, thinks that a patient is liable to an indefinite number of attacks; and Dr. Turner, of Aden, who considers the fever to be neuralgic or rheumatic, acute or subacute, simply because the disease is ushered in by pains of the joints ever preceding the febrile symptoms, the eruption being exceptional, varied in type, and evanescent.

The course the rash takes may be divided into three distinct periods, viz: the period of invasion, during which the initial eruption makes its appearance, which is followed by the consecutive phenomena of pyrexia and remission; then the period of eruption, or eruptive period *par excellence*, during which the secondary fever sets in, and the terminal rash produces its remarkable cutaneous discoloration; and lastly the period of desquamation. The initial rash generally assumes erythematous or scarlatinal features, while the terminal one is nearly always measly in character. Both forms are fugitive in character, and unless the patient is observed just at the time of the first seizure, the eruption passes unobserved by the medical attendant, and hence has arisen the denial by some writers of two distinct periods of cutaneous discoloration. Sometimes, however, the first or initial rash is altogether

absent, and then the second or terminal rash is more distinct or severe, and *vice versâ*. All parts of the body may be affected by it; it chooses in preference, however, the root of the neck and upper part of the chest, face, and palms of the hands. We have already remarked that the character of the rash is very variable, taking on sometimes the aspect of lichen urticaria, vesicles, bullæ, furunculus, or simulating in some cases scarlatina, in others measles; uniform and homogeneous, or in large crimson blotches smooth or slightly elevated, owing to the congestion of the minute sub-cuticular vessels, but on the average it is intermediate between scarlet fever and measles.

There is another very remarkable peculiarity in the dengue eruption—its eruptive period is in most cases without fever, which is quite the reverse in other exanthematous fevers. The initial rash is also peculiar to this fever, and seems to have attracted the special notice of earlier observers; for Cavell cites a case in which two hours from the commencement of the disease, he says, "the skin was covered with a bright scarlet blush;" also Dr. Mouat writes, describing the early symptoms, "the whole surface became suffused or flushed, the face scarlet." Again, Twining states that "the whole countenance appeared bloated and swollen," and in the reference to the terminal rash says, "seemingly quite distinct from the bloated suffusion of visage attending the first day of the disease." There are no statistical data to prove the proportion in which this initial rash occurs, but Dr. Charles thinks that it was absent in about one-third of the patients he had seen. I could never ascertain this very precisely, especially among the dark-skinned people, in whom the efflorescence is of a peculiar bronze colour, and sometimes only made perceptible by the test of the pressure of the finger, by which all trace of colour is obliterated for the moment, to return instantly on the removal of the pressure.

Occasional Symptoms, Complications, and Sequelæ.—Among occasional symptoms I should mention catarrh, great nervous prostration, epistaxis, ptyalism, swelling of the lymphatic glands, and orchitis. Catarrhal symptoms hold the foremost place among these occasional symptoms, from their comparatively frequent occurrence.

There is no catarrhal implication of the mucous lining of the throat, or, if there is any, it is very insignificant; but the mouth is often affected, and the palpebral conjunctivæ always present some redness; also the Schneiderian membrane and that of the bronchi is affected, and then it becomes a complication as real as that of the digestive tract, to which I will refer hereafter. I beg to draw attention to these symptoms from their occurrence also in measles and scarlatina, which may turn away one's thoughts from dengue altogether. Among the cases of dengue observed at Zanzibar, Dr. Christie noticed almost always an aphthous eruption of the mucous membrane of the mouth, and in some cases even that of the throat. I have on no occasion observed this eruption, nor that great tumefaction of the nose and lips to which he alludes; although it is not rare to see cases among native vegetarians with marked scorbutic swellings of the gums and of the whole mouth sometimes.

Dr. Charles thinks that when severe catarrh occurs in dengue "it is a specific one, but that it is usually determined to one or other point by the general conditions which prevail at the time, quite independent of the dengue poison." This is a fact observed by me too.

The old observers have also described ptyalism as an occasional symptom of this complaint, but it has been very rarely seen in the present epidemic; and when more than the ordinary quantity of saliva is secreted, it may be accounted for by attributing it to the enlargement of the salivary glands, espe-

cially the parotid and the submaxillary, which enlargement often gives rise to slight salivation.

The lymphatic glands also get often enlarged, and are a source of great irritation and pain, the groins and the neck being their usual situations. The testes have been sometimes seen inflamed, and in one instance the patient was so careless as to allow the inflamed testicle to proceed on to suppuration, which eventually brought on pyæmia and placed his life in jeopardy. He recovered, however, after a long period of suffering.

Epistaxis has been observed by Dr. Charles, who thinks that although it is not a symptom of dengue he has often seen it occur during the epidemic. I met with only two cases, and both during the stage of convalescence.

Nervous prostration is a symptom of more frequent occurrence, and often assumes more alarming proportions than other symptoms. In this respect dengue resembles influenza, giving rise, with little apparent cause, to excessive debility. The patient becomes quite helpless, his skin is generally below the normal standard of temperature, pulse slow; there is drowsiness with a tendency to stupor, especially among children; but fortunately it is very rare to see this condition passing into collapse.

Among complications we have pneumonia, hepatitis, jaundice, bronchitis, diarrhœa, rheumatic ophthalmia, erysipelas, carbuncle, and tetanus. Bronchitis and diarrhœa, as mentioned above, are certainly determined by the general conditions which prevail at the time. At the end of the monsoon, when diarrhœa is more prevalent, it is unusual to meet with dengue with bronchial catarrh, although bowel affections are common; and at other times when sore throats and cold are prevalent, catarrh is sure to attend on dengue. This also holds good of ague, which, when prevalent, renders dengue fever periodical. From pneu-

monia I have had no occasion to lament the loss of any patient, but of hepatitis with jaundice I had one fatal instance.

Among the sequelæ of dengue, one of a most persistent character is rheumatic pains, which concentrate themselves in joints, and often shift and recur most capriciously several times. They may continue for six months even, after the attack of dengue is over. Next to rheumatism follows cutaneous irritation, which continues to harass the patient long after the period of desquamation is over, with itching, tingling, and burning of the skin.

An irritable state of the mucous membranes of the intestinal canal, and deafness, as a result of an affection of the eustachian tubes, have been recorded by others; but this must be very rare indeed.

DIAGNOSIS AND PROGNOSIS.

As in all other eruptive fevers, the invasion of dengue is always attended with difficulties in discriminating it from allied fevers. At an advanced stage, however, the difficulties vanish, and its characteristic symptoms differentiate it from various febrile exanthems. The diseases that most resemble dengue, and may be confounded with it, are scarlatina, measles, rheumatism, influenza, and yellow fever.

From scarlet fever it is distinguished by the severity of the rheumatic or neuralgic symptoms; by the absence of the nephritic disease and dropsy so often consequent upon scarlet fever, as well as of the internal affections so frequently complicating the latter; by its having attacked, according to Dr. Copland, persons who had previously had scarlet fever; and by the crucial, infallible test of comparing the temperature charts of the two diseases, which, although during the initial stage

may show a certain resemblance, yet as the disease advances become quite dissimilar. And even during the pyrogenetic stage there is some dissimilarity between the two exanthemata, for the thermometer rises gradually in dengue, occupying more than twenty-four hours to reach a temperature of 103° Fahr., while the rise in scarlatina is much more rapid, perhaps occupying a fourth only of that time. The *fastigium* or the stage of fully developed fever in scarlatina is prolonged for days, while in dengue, as soon as the high temperature of 103° Fahr. is reached, an immediate fall takes place, and this really constitutes a sharp, well-defined line of demarcation between the two diseases. The stage of deflorescence in dengue is very rapid by an abrupt crisis, while in scarlatina it occurs by lysis, and consequently extends over several days. Fortunately, in India it is very seldom the practitioner has to form the differential diagnosis between dengue and scarlatina, on account of the very rare occurrence of the latter.

From measles it is distinguished by the initial eruption, which has no corresponding manifestation in measles. Also here the thermometric range of the two maladies, even at their commencement, helps us to distinguish one from the other. In dengue the temperature rises invariably during the first day of the disease, while in measles the thermometer always stands low until the time the rash makes its appearance. There is also that well-marked stiffness or pain at the onset of the disease which is so rare in measles. Besides, in dengue there is comparative, if not complete, absence of the characteristic catarrh of measles. This exact delineation of the difference between dengue and various allied exanthems is to be obtained only in typical cases, for very often the diagnosis is attended with difficulties where we meet with cases of *denguis latens* and *denguis mitis*, in which we do not get all the characteristic signs of the disease.

From rheumatism it is distinguished by the character and time of the appearance of the eruption; by the absence of peculiar rheumatic perspiration of strongly acid reaction; by its propagation by infection, and by the protection which a full evolution of this exanthem affords from a second attack; by the absence of cardiac complications; and by the cerebral oppression and cephalalgia following the pains in the large joints in rheumatism, while in dengue they precede the arthritic pains of both large and small joints. Dengue resembles influenza on account of the prostration it produces and the rapidity with which it attacks a large number of people; but it differs in all other respects. The strawberry tongue of dengue is an almost unerring guide in the recognition of this disorder, and the puffiness of the skin of the forehead at the edge of the hair, which precedes the appearance of the rash, and the injection of the palpebral conjunctivæ seen by everting the lower eyelid, are also of assistance.

It is scarcely possible to mistake dengue for roseola, in which the patches of discoloration are larger, more irregular, and more varied in their form; the eruption disappears after four or five days' febrile indisposition, is not preceded or followed by any peculiar inflammation or pain, and is never communicated by contagion. From erythema, the diffused redness of the skin without any distinguishable efflorescence, the trifling amount of constitutional disturbance, and its being symptomatic of some other affection, render the discrimination sufficiently easy.

In America, the West Indies, Spain, and Africa *denguis maligna* is sometimes confounded with yellow fever; but the differential diagnosis between the two diseases is very easily formed, and there is nothing in dengue approaching the fatality that attends yellow fever.

This clearly indicates that the prognosis in dengue is always favourable, unless there is a complication. If we examine the mortality tables we are sure to find that the deaths said to be caused by dengue are always attributable to some intercurrent disease, or the recrudescence of some former complaint, which was accelerated to a fatal termination by the prostration of the vital powers produced by dengue.

PATHOLOGY AND CAUSES.

There being no fatal cases from dengue except from pre-existing lesions, or from coincident or intercurrent diseases having no necessary connection with dengue, the medical practitioner is denied the light that autopsy or the study of the morbid appearances is calculated to throw on the nature of the disease. The fluids of the body affected with dengue have been examined and found to contain nothing abnormal. The urine is natural, and so is the blood. However, Dr. Charles states that he had the blood of his dengue patients examined under the microscope, and the only appearance observed in the specimens of dengue blood differing from healthy blood was a considerable relative increase in the number of minute bioplastic bodies. The action of the osmic acid did not prevent the protoplasm from taking up carmine, and individual bioplasts appeared to adhere to each other by means of some gelatinous molecular investment. But similar appearances have been observed in other eruptive fevers, and there is nothing in it peculiar to dengue. In reference to the rheumatic pains of dengue, Dr. Copland thinks they depend on the alteration of the organic sensibility, with a consequent change of the capillary circulation in the synovial and other tissues of the joints, as well as in the vascular layer of the skin.

The causes of dengue are not yet well known to us. Are the minute microscopical bioplasts found in the blood of dengue patients, which according to Dr. Lionel Beale are to be regarded as the result of living material extrinsic to the organism, which has somehow found its way into the system, the real factors of dengue? These bodies are said to be identical with those found existing in the blood of every specific disease. Are they, then, what Hallier calls the ultimate elements of the individual fungi peculiar to the blood of such diseases?

Dengue possesses all the characters of a febrile exanthem analogous in its evolution to other exanthemata, yet it is a disease *sui generis* in having an exanthematous eruption breaking out at definite stages of its progress, combined with severe rheumatic or neuralgic pains. It is both infectious and epidemic.

Its infectiousness has been denied by some writers, and Dr. Jules Rochard, in an article published in the *Nouveau Dictionnaire de Médecine et de Chirurgie Pratiques*, edited under the direction of Dr. Jaccoud, states that dengue is an essentially epidemic disease peculiar to tropical countries, and classified as contagious only by *the greater part of the medical writers* who have observed it. All writers, then, do not agree in bearing medical testimony to its infectiousness, although all who observed this epidemic in the Western hemisphere have considered it infectious, and Drs. Stedman and Dickson especially, who have given very accurate and tolerably complete accounts of it, concur in this opinion. Dr. Copland says: "The introduction of the disease from one island to other, and the propagation of it from persons and places to others, were so frequently and so incontrovertibly proved that no doubt as to the fact of its infectious nature was entertained." He also states further about the nature of the disease as follows:—"But how did it originate? for there was nothing in the medical

topography, the season, the weather, or the climate of St. Thomas, where it first appeared in the West Indies, to account for the occurrence." Dr. Dickson is of opinion that this eruptive fever is contagious, and remarks further that in the cases in which eruption on the second stage did not appear, the patient was not exempt from a second, third, and an infinite number of attacks of the disease, whilst those "who were properly covered with the eruption about the sixth day were protected from any future attack."

In India I believe there is none who can tell us exactly how the scourge originated and propagated itself, except in the way I have described in the history of the present epidemic, for there was nothing abnormal in the medical topography nor in the season to account for it, and it was prevalent at all places and at all times. As far as my experience goes, and that of some of my medical friends whose opinion I have asked, one attack of dengue in this country has always afforded protection against another, and what Dr. Dickson states must have been really peculiar to Charleston when the malady was observed by him. I am also convinced that dengue is infectious, as the following case out of some hundreds will prove. On the 3rd August 1872 I was sent for, to see Mrs. R., a European, residing in the Fort. I saw this lady at 10 A.M., when she had an attack of genuine dengue with fever, initial rash, rheumatic pains, &c. On inquiring into the origin of the infection, the following facts were brought to my notice, and confirmed by all the members of the family. On the previous night, at about 8 P. M., a Moonshee came over to teach Persian to her husband, and told them that he was suffering from dengue. Mrs. R., thinking very little about the contagiousness of the disease, occupied at supper the chair in which the Moonshee had sat the same night. This took place at 10 P. M., and in the morning of the next day, at about 5 o'clock, she was dis-

turbed in her sleep by an attack of fever and pains. This seems to me an evident proof that dengue is infectious, the period of incubation short, and its propagation very rapid. As regards the epidemic character of the disease, it is universally admitted.

TREATMENT AND PROPHYLAXIS.

The study of the natural history of dengue, like that of all other specific fevers, precludes the possibility of abridging its course. Although evacuants of the kind of purgatives and emetics may cause a temporary remission, they can never cut short the pyrexial period. All our treatment therefore confines itself to giving relief to urgent symptoms and carrying the patient through the attack, preventing and combating complications as they may occur. This is not a mere expectant treatment, for the supervision the medical attendant exercises over the patient is activity itself, and it is very seldom one meets with cases requiring no interference with the processes of nature; for one of the essential symptoms of dengue—pain—asks for relief, and we are in a position to afford it.

The general pyrexia can be alleviated by our ordinary fever mixtures; but one that I have found most useful is that of citrate of potash with nitrous ether, which seldom fails to cool the patient by inducing perspiration and accelerating the discharge of urine, which discharge is generally the precursor of remission. Where special symptoms call for evacuants, a mild emetic or gentle purgative often gives relief, but their use must be restricted to those rare cases: for evacuation aggravates, by the movements rendered necessary by it, the pains we seek to alleviate. As a routine measure, then, purgation and emesis are quite unadvisable, and so is the old antiphlogistic treatment, which was so freely resorted to in this country in the epidemic of 1824—administer-

ing calomel, antimony, and employing the heroic lancet. This is to be condemned only, I say, as a routine measure, for in appropriate cases even these so much abused therapeutical agents have their own useful, and not unfrequently necessary, applications.

As a specific for this fever, in some respects at least, belladonna has been propounded by the Calcutta physicians, but it has not proved so successful on this side of India. Dr. Charles says that it diminishes the suffering in dengue most materially, and it is little short of marvellous how case after case yields as soon as the drug is given. He usually prescribes ten minims of the succus or tincture, to be repeated every hour till relief is obtained, or the third dose is taken. More than two drachms is seldom required in any case; and when the extract is administered he prescribes one-third or one-half of a grain in pill or mixture form two or three times in the day. He does not advise us to use atropine frequently, but when we wish to employ it hypodermically he thinks it well to use Dr. Harley's solution, of one grain of the sulphate of atropine in an ounce of water; of this five minims, or $\frac{1}{96}$ of a grain of the drug, being for a child of twelve, and eight minims a full dose for most cases. He says further: "In my own practice I restrict the use of atropine in dengue to cases in which the pain is very intense and has lasted for some time before I see the sufferer, and I use it then because the relief it affords is so rapid. I always, however, dissuade enthusiastic followers from using it more extensively, as I think its place as a therapeutic measure should be limited to the position I have attempted to assign to it."

Belladonna is administered for accomplishing two ends, viz., to relieve pain, and to soothe other symptoms of restlessness, distress, and anguish, which, even in cases where the pain is not severe, are often very prominent features of the attack.

Drs. Verchere and Raye of Calcutta consider belladonna as a specific in dengue, "in this much, that in cases where the pupils are enormously dilated, the dilatation diminishes under the influence of the drug; it is therefore presumable that it acts beneficially in relieving or moderating the intense headache of the first thirty hours of attack. It does not appear to have any effect on the muscular or articular pains, but it puts the patient to sleep, and thus tides over many painful hours. It has no effect in shortening fever." (See the "Indian Medical Gazette," June 1872, p. 132.)

Dr. Charles, however, says, in reference to the influence of belladonna in headache, as follows:—"Belladonna does not relieve headache materially. For this symptom I have found a sponge-bag filled with ice, if kept on the pillow in loose contact with the head, to be the best palliative," &c. Here doctors differ. The former thinks belladonna relieves headache, and not the muscular or articular pains; while the latter thinks quite the reverse, and says in reference to these pains, "you will find nothing alleviate all this so well as belladonna."

In this conflict of professional, and therefore authoritative, opinion, I am unable to decide, for I met with little or no success in the administration of belladonna to my first dengue patients, and being unwilling to carry on my *experimentum in corpore vili*, I desisted from further attempts in determining its influence in this fever, and prescribed instead tincture of aconite, which appeared to me much more effective than belladonna. I have given the tincture of aconite from five to eight drops three times a day, either alone in water, or combined with quinine and chloride of ammonium when dengue and ague go together, or only with the intention of lowering the temperature, an effect which these drugs produce; and although Dr. Charles thinks that remissions are normal characters of

dengue, and occur without the assistance of medicine, still the use of these medicines I have found always to be beneficial to sufferers, and there is scarcely any need to resort to the cold-bath treatment for hyperpyrexia, as worked out by Dr. Wilson Fox, after the administration of such drugs.

In cases in which the cerebral oppression is great, and cold and frigorific lotions give no relief, I have seen a few leeches applied to the temple cause a cure; and when various hysteriform phenomena attend the disorder, especially among young women, both this headache and nervous disturbance are best combated by valerian, camphor, musk, assafœtida, ether, ammonia, and even by Dover's powder repeated in moderate doses, and bromide of potassium in doses of ten grains three times a day.

Convulsions are common in children during the course of dengue. This, though alarming, is not a dangerous symptom. Bromide of potassium and conium should be given, the latter in a fair dose, say, two drachms of the *succus conii* in twenty-four hours for a child a year old. For putting down the excitement of the motor centres and to restore sensibility there is no drug so valuable as conium.

Laying the children in a cool room with but little covering, applying cold lotions to the head, and, when the urine is suppressed for more than twelve hours, plunging the child into warm water up to the navel, and supporting the strength with good feeding, have proved successful in putting a stop to convulsions. When convulsions depend on the irritation caused by the cutting of the teeth, and by ascarides in the intestines, appropriate treatment must be resorted to before a speedy mending of the symptoms can be expected.

For the relief of pains, I know of nothing so efficacious as turpentine stupes, or turpentine embrocations, either alone or

in combination with compound liniment of camphor, cajaput oil, and olive oil. The following formula is one that I have always prescribed with great benefit:—

R. Linimenti Terebinthinæ, ℥ii.;
Linimenti Camphoræ Comp. ℥i.;
Olei Olivæ, ℥iii.;
Olei Cajaputi ℥i. Misce.
For external use.

Turpentine is as powerful an agent in combating the disturbing pains of dengue as it was in Acrodynia, once epidemic in Paris in about 1828 A. D. Also kerosine is said to be useful, and many Indian vegetable oils. Combinations containing opium, aconite, chloroform, and belladonna are also used with success.

The endermic application after Trousseau's method, and hypodermic injection of morphia, are also very useful in relieving the muscular and articular pains.

When pains concentrate themselves in joints, and render them stiff for months, the internal administration of iodide of potassium and colchicum are indeed of great use in their treatment. When the iodide fails, the bromide of potassium often succeeds. Also galvanism and electricity are sometimes beneficial for these pains, and the continuous current has been found more effective than any other form.

For the distressing itching and disagreeable sensations that afflict the patients about the period of the terminal rash, Dr. Charles says there is nothing so good as a free application to the skin of a drachm of camphor in fifteen drachms of mustard-oil.

Those rare cases in which dengue is attended with a yellow condition of the skin, and other signs of hepatic congestion, are best dealt with by an ipecacuanha emetic. In Teneriffe and

in Africa bilious and typhoid conditions not unfrequently, we are told, complicate it, and render the prognosis less favourable; and although in India it is very seldom one meets with these conditions, it is well to be aware of them, and guard against their production by proscribing or interdicting the employment of the lancet and evacuants, especially in this country, where the softness of the pulse and the general depression are so prominent, and where these remedies, instead of benefiting, check and prolong the evolution of the complaint: for it is well known that in spite of the natural duration being only eight days, after these measures have been once enforced and executed, the malady becomes sufficiently grave to endure three weeks, and even longer, and relapses are not uncommon.

Now as regards the regimen of dengue patients, and especially their diet, it is necessary that I should make a few remarks. It being found that sudden changes of temperature and slight gastric derangements are apt to bring back the violent pains of the joints, with abdominal uneasiness added to them, we must certainly guard against both sources of discomfort. As regards clothing, the lighter the covering is the better, with additional clothing whenever the temperature of the air falls suddenly. As strict attention to diet is required in pyrexia, in addition to the refrigerant diaphoretic and neutral mixtures already mentioned, we should administer demulcents, lemonades, and other acidulated drinks, as of tamarind, &c.; various tisanes, especially that of the lime-flower, or that which the French call *tilleul*, and infusion of the Indian aromatic grass called vulgarly "lemon-grass." During this stage Dr. Charles says that a coffee-cupful of strong soup taken every six hours is better digested than any other food. For those who object to the use of soup, milk and rice-conjee will answer very well. Aërated and iced waters may be given freely. Sponging of the

body with cold water containing some Florida water or toilet vinegar will help in producing the fall of temperature, which may be assisted by reducing the warmth of the apartment by keeping near the patient vessels filled with ice.

During convalescence, tonics should be administered whenever the stage for giving them arrives, and to combat anorexia, so common in this complaint, the best drug is the compound tincture of gentian; and again strychnine—$\frac{1}{16}$ of a grain combined with fifteen drops of dilute phosphoric acid—is said to be especially valuable when the nervous system has had its nutrition impaired and the brain refuses to work. As soon as the stomach allows, a generous and supporting diet, with such wine as the patient may prefer (but avoiding those beverages which have the slightest suspicion of acidity), combined with other appropriate restoratives, should be administered. Whenever relapses occur, quinine given in five-grain doses twice a day is found to arrest futher paroxysms of fever, and also, if only a suspicion arises of dengue fever being complicated with ague, quinine will be always found the safest thing to counteract the malarious influence.

Where there is want of sleep, a dose of chloral hydrate and a mustard foot-bath have almost always proved successful. If the violence of the articular pains is the cause of insomnia, an opiate in the form most appropriate to the particular case should be given. Dr. Wood of Philadelphia thinks camphorated tincture of opium is one of the most efficacious anodynes and hypnotics in this strange exotic.

Very sensible, and therefore popular, as the saying is, "Prevention is better than cure," it requires still the energy and the prestige of the profession to inculcate its necessity into the minds of the people. For specific diseases especially, the preventive measures are of far greater importance than the curative ones.

To recommend means to preserve health; to seek protection for those exposed to infection; and to recognize and combat those complex circumstances that favour the spread of contagion, are the paramount duties the medical man has to discharge towards society. The question of course arises, What are these circumstances, and how are we to combat them? The chief object demanding our attention, then, is the prime factor itself—the germ, the toxic principle, whatever its nature may be, which, once introduced into the system, gives rise to those effects or phenomena we call disease. We have to learn how the predisposed individuals are invaded by this poison, and how this poison concentrates and multiplies itself, and then spreads its contagion whenever circumstances favour its propagation. During ages such disorders have been for long intervals entirely absent. Has the germ remained dormant for these prolonged periods for want of certain favourable circumstances, and until it was again brought to act on those predisposed to its influence? Or has it arisen *de novo* under a combination of causes that had existed some time previously and disappeared again? The former view has, I think, more supporters than the latter, because the probability of the reproduction of the disease by the combination of circumstances that give birth to it, is less easy of acceptation than that of the germ being preserved in a dormant state and then being revived and disseminated, and giving rise to the disease in an endemic or epidemic form. Or, in other words, although the disease is perpetuated by the preservation of the infectious principle, yet the latter may have remained latent or concealed until it unexpectedly breaks out developed into full efflorescence, without the causes of this result admitting of any demonstration.

To return, however, to dengue. Its infectious nature once acknowledged, it becomes our duty to use every means to prevent its diffusion where, we confess, we are unable to impede its origination.

Dengue is as preventible a disease as it is curable.

Having once admitted that India is not the habitat or the breeding-ground of dengue; that the disease does not originate *de novo*, but is a mere recrudescence of its latent germs; having, as I believe, abundant evidence that the disease is eminently contagious, or communicable from the sick to the healthy, and capable of being spread rapidly by people coming from infected quarters, assisted by other agencies along the highways of human communication; and regarding the disease as belonging to that zymotic class of diseases which includes typhoid fever, cholera, scarlatina, small-pox (a classification applicable to all such diseases as are received by contagion, as a rule run a definite course, and propagate themselves by *materies morbi* given off from the bodies of the affected, which attaches itself to the cutaneous, pulmonary, or intestinal exhalations or secretions, the special vehicle varying with each disease, changing from a mild into the most virulent form—becoming what is called *siderary* in relation to plague, and *malignant* in reference to scarlatina, measles, &c.), there is every reason *à priori*, I say, to suppose that dengue fever is as preventible as its congeners by appropriate prophylactic measures.

Now these preventive means are, isolation of the infected, and preservative treatment of those exposed to infection. A *cordon sanitaire* or quarantine to check the advance whenever the disease breaks out, and the segregation of the attacked at a spot not exposed to the prevailing wind, are measures best counselled by logical reasoning and proved experience. I have no desire to dogmatize, but within the limits at my disposal all I can do is to act suggestively and indicate that line of procedure which seems to offer the most practical path for us to pursue in order to deal successfully with this dreaded malady—for the wonder is, that a disease with so much severity of symptoms is so seldom fatal—and there is no want of arguments

à posteriori to prove that eventual accumulation and intensity of the dengue poison may render the disease virulent, or be attended with such phenomena as have already been observed in Africa and Teneriffe; it may assume in fact a type of malignancy if we do not heed this warning while it has hardly ceased to be rife among us, attacking 80 per cent. of the populations of every country and place it has visited. I am not an alarmist, but still less am I a sceptic not to believe in the deceitful nature of zymotic diseases, and their susceptibility to change suddenly from a mild into a fatal type.

Besides adopting the preventive means of segregation, those exposed to infection should always strive to preserve their health in good sound condition. For this purpose, repose of body and mind, cleanliness, and regular feeding are advised. Medicinally the use of saccharo-chirettine and the use of nearly infinitesimal doses of the extract of belladonna, say $\frac{1}{10}$ of a grain twice a day, are supposed to exert protective influence and render the patient insusceptible of dengue infection, independently of the law or principle for which Hahnemann and his disciples are contending. My observation and experience are as yet insufficient to enable me to decide as to the efficacy of this prophylactic in preventing an attack of dengue in those who are susceptible to its action, but I would notice the fact of its very general use, and of the belief that its use has been found beneficial.

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