but probably he obtained his freedom on making humble apology for his offence.

The general reduction of salaries which took place in May, 1628, resulted in Woodall's remuneration being lowered from 30*l.* to 20*l.* per annum. This sum appears to have been paid only in respect to his services in selecting surgeons for the Indies and fitting out their chests (for the contents of which he of course charged separately). But he had other claims on the company for attending their sailors who were brought home sick and the workmen who got injured in their service on the river or in Blackwall Yard. As we have already seen, in the Standing Orders of 1621 the Surgeon-General was required, either personally or by deputy, to be in constant attendance at the yard, not only for the purpose of rendering medical assistance but also to cut the hair of the workmen (imagine a modern Surgeon-General being required to undertake this duty !). For these services he was to receive two pence a month from each man's wages, and in addition he was at one time allowed the pay of a labourer. This regulation, however, appears to have been often evaded. In May, 1627, Woodall declared that he had received nothing for three years; whereupon the Court gave him 30*l.* in full discharge of all claims. He received another gratuity (20*l.*) in December, 1630, for his extra services during the past two and a half years; and a third (of 30*l.*) was granted three years later. At the end of 1630 the workmen and officers of the yard petitioned for the re-appointment of a resident surgeon, offering to pay their monthly twopences as before; whereupon Woodall was directed to provide for their needs, either personally or by deputy. But before long the monthly levy was again discontinued, for in April, 1634, when a fresh order was made for its payment, it was stated that Woodall had received nothing from the workmen for two years.

In 1633 Woodall had the distinction of being elected Master of the Barber-Surgeons' Company, of which he had been warden six years previously. The *Visitation of London in 1633-35* records that he had then four children living, three sons and one daughter. It also mentions that he claimed the right to use the arms of the family of Uvedall—a point on which the heralds offer no opinion.

Dark days had now come upon the company. Money was none too plentiful, and all outgoings were narrowly scanned. At Christmas, 1635, the list of officials was revised, and salaries were cut down. Woodall's name is not to be found in the new list, and the following entry on the Court Minutes of May 8th, 1640, shows that he was in fact left out in the cold:—

'Mr. Woodall at this Court peticioned that his wages might bee restored which was taken away from him ever since December, 1635, representing the cures hee hath performed since that time, having cured above 50 persons, and also that hee had contrived a booke of chirurgery for the good of the East India voyage: in consideracion whereof the Court was pleased by erection of hands to bestowe upon him 60 *li.* for all demaunds whatsoever from December, 1635, untill Midsommer next.'

Although no longer a salaried official, he was still employed in fitting up surgeons' chests, and several payments on this account are from time to time recorded. But he was now getting a very old man, and it is not surprising to read in the Minutes of June 23, 1643, that, 'Mr. John Woodall made his humble request to the Court that, in regard hee is growne old and beddrid and not able to followe his calling, and his children being growne to mens' estates, lying very heavy upon him, the which, with the many losses and misfortunes that have befallen him in his estate, inforced him to bee a suytour to the Court that they would bee pleased towards the repayre of his languishing necessities and his better support now in his declyning and dying dayes to bestowe somewhat upon him.' His appeal, however, did not meet with a very sympathetic reception, for the entry proceeds:—'The Court taking his said request into consideration, and understanding that upon the inquiry of some of the committees that hee is not in necessity, but hath a sufficient estate, did by erection of hands deny to bestowe anything upon him.'

This is the last reference to him in the records; and two months later he was gathered to his fathers.* Thus ended the career of the first—and for a long, long time the last—of the East India Company's Surgeons-General.

ARE "SEVEN-DAY FEVER" AND "THREE-DAY FEVER" FORMS OF DENGUE?

BY J. W. D. MEGAW, M.B.,
CAPTAIN, I.M.S.

IN Manson's "*Tropical Diseases*" and Rogers' "*Fevers in the Tropics*" will be found accounts of two types of fever which have recently been differentiated in India, and which are described as being distinct from any of the previously recognized forms of fever. Both of the books referred to are regarded as being the standard authorities on the subjects with which they deal, so that it is reasonable to assume that their teaching will be generally accepted, and that within the next few years most of the text-books of medicine will contain descriptions of two new diseases. These diseases are "Seven-Day Fever" described by Major Leonard Rogers, I.M.S., and "Three-Day Fever" described by Capt. McCarrison, I.M.S. My purpose is not to

* In Richard Smyth's *Obituary* (British Museum, Sloane MSS. 866, printed as Volume 44 of the Camden Society's publications), occurs the following entry:—
"1643, August 28. Old Mr. Woodhall, the Surgeon, died.

dispute the accuracy of the authors' accounts of these forms of fever, for they are models of accurate scientific observation, but I hope to bring forward evidence which will show that it is not necessary to introduce two new titles in the nomenclature of diseases, for the fevers in question appear to be really special forms of dengue.

My personal experience is limited to the seven-day fever, and so my argument will be directed specially to that disease, but as the three-day fever appears to be inseparably associated with the subject under discussion, it will be impossible to avoid a reference to it.

The history of the seven-day fever is briefly as follows:—Major Rogers in the course of his remarkable investigation into the fevers of Calcutta found that there occurred in the hot months of the year a short specific fever which had previously been variously diagnosed as "malarial" or "ephemeral" or "simple continued fever," and having satisfied himself that the disease was a specific fever quite distinct from malaria, he described it in the *Indian Medical Gazette* of November 1905, as a "peculiar type of influenza like fever." In a fuller account published in the same journal in March 1906, he regarded it as being in all probability a hitherto undifferentiated disease to which he gave the name "Seven-Day Fever."

Having suffered twice from the fever in two consecutive hot weathers in Calcutta,* and being struck by the many points in which the second attack corresponded to the text-book accounts of dengue, it appeared to me not improbable that the fever might be merely a form of that disease, and my reasons for so thinking were stated in a paper in the *Indian Medical Gazette* of November 1906. At a meeting of the medical section of the Asiatic Society of Bengal which was held shortly after the appearance of this paper, Major Rogers strongly controverted my views, and his arguments convinced the great majority of the medical men of Calcutta that the disease was quite distinct from dengue. Since that time, however, a considerable mass of evidence has accumulated which appears to justify me in asking for a reconsideration of the question in spite of the previous adverse verdict of my colleagues in Calcutta.

The additional evidence consists chiefly of the description of Dengue contained in the paper by Ashburn and Craig in the *Philippine Journal of Science* of May 1907, and of the paper by Lt.-Col. Fooks, I.M.S., in the *Indian Medical Gazette* of February 1908, in which he describes an "epidemic of dengue consisting of both a three-day and a seven-day type among the 15th Lancers at Sialkot." Reference will also be made to the report on the epidemic of dengue which occurred in Brisbane in 1905, and which was described in the *Journal of Tropical Medicine* for December 1905.

Perhaps the most satisfactory way of dealing with the points at issue is to take the table found at page 316 of Major Rogers' book on *Fevers in the Tropics*. In this table he states the points on which he relies for the differential diagnosis of seven-day fever and dengue. To the table have been added two columns, one of which consists chiefly of quotations from Ashburn and Craig's paper on dengue, and the other of extracts from the report on the Brisbane epidemic. As far as possible the actual words of the original authorities have been quoted, so that there may be no question of an unconscious twisting of the evidence by one who is prejudiced through having engaged in a controversy on the subject. For this reason too my personal views have been kept in the back ground as much as possible, but any one who may be sufficiently interested in the subject will find them stated in the paper above referred to, and I am glad to find that the further light thrown on the subject by recent contributions does not make it necessary for me to withdraw or even to qualify any of the opinions then expressed.

NOTE TO TABLE I.—None of the published accounts of dengue mention the existence of a racial immunity, so that the relative immunity of Indians in Calcutta would appear *primâ facie* to be a point in which seven-day fever differs from dengue: this point was dealt with in my original paper on the subject, and there does not appear to be any reasonable objection to the view then expressed that as the disease has been endemic in Calcutta for a considerable period, and as most of the natives are old residents, they have acquired immunity by previous attacks. The susceptibility of Europeans is explained by the fact that a much larger proportion of them has recently arrived from places where the disease is unknown. Europeans who have lived for several years in Calcutta are rarely attacked and the probability is that we have to deal not with a racial immunity but with an acquired immunity.

NOTE 2.—The fact that it is necessary to go back 36 years to find an instance of the prevalence of dengue in the winter months appears in itself to be a strong piece of evidence in favour of the universally accepted view that dengue is essentially a disease of warm weather just as seven-day fever is, and the argument founded on an isolated instance of the occurrence of dengue in the "cold weather" in Calcutta 36 years ago is hardly valid, seeing that our accurate knowledge of the seven-day type of fever is confined to the past few years. Besides, we have no evidence as to the meteorological conditions that prevailed in Calcutta during the epidemic of 1872, and it is probable that if we had information on this point it might not be necessary to quote even one example of

* Charts XI & IX are from these attacks.

TABLE I.

	COL. I. Dengue (Rogers).	COL. II. Seven-Day Fever (Rogers).	COL. III. Dengue (Ashburn and Craig, except where a note to the contrary is made).	COL. IV. Dengue (from the Brisbane Report).
Prevalence ...	At long intervals in epidemic form attacking a large proportion of residents.	Annually in sporadic form ...	'In certain countries dengue fever is endemic' (Scheuba, p. 39). In the Fort McKinley epidemic 492 soldiers were attacked out of 1,718 living in the affected barracks. (Ashburn and Craig).	'Dengue appears to be endemic in the Eastern Tropics.' 'More than three-fourths of the population (of Brisbane) have been attacked.' In St. Helena only 2·5 per cent. of prisoners were attacked. No reference.
Distribution ...	Specially attacks coast towns, but spreads far inland.	Only known near the coast so far	'Quite recently Miss Farrer, M.D., has sent me typical charts of seven-day fever seen by her in the Punjab.' (Rogers, p. 317). Also see Col. Fooks' paper referred to later.	
Race Incidence ...	Europeans and Natives equally attacked.	Very common in Europeans, comparatively rare in Natives.	*Vide* note (1) below	No reference.
Seasonal Incidence ...	Mostly in hot months, but may prevail in cold season (1872).	Prevails in hot and rainy seasons only.	'High temperatures therefore seem to be one of the conditions it demands.' (Manson on Dengue, p. 254) of his Tropical Diseases and *vide* note (2).	'From the end of December till June' (the hot season).
Relapses ...	Very common in the same year as the first attack.	Rare and not in the same year as first attack.	No true case of relapse seen in the Fort McKinley outbreak. 'The second attack was usually a malarial paroxysm.' (Ashburn and Craig).	'Second attacks have occurred at intervals up to 3 months. As a rule these have been severe and have followed mild attacks, but the contrary has been observed.'
Pains ...	Very severe and break-bone in character.	Moderately severe, as in influenza, and not break-bone in character.	'The sensation is often of weariness rather than of pain.' Pain frequently severe, infrequently excruciating and immediately disabling, in a few instances it is trifling and very rarely, it may be absent.' We have seldom had patients complain of pains in the bones.' (Ashburn and Craig.)	'The very severe limb pains of break-bone character have been observed in this epidemic, but only in comparatively few cases.'
Joint Symptoms ...	Very common and characteristic...	Absent or only present as slight pain.	'Joint pains are *not infrequently* complained of. In only one case did we see marked redness or swelling.' (Ashburn and Craig.)	(The pains) 'are certainly not in the joints'—they consist of a dull aching—more or less severe, the sensation suggesting affection of the bone ends or of the deep insertions of the muscles or ligaments.
Convalescence ...	Very tedious, lasting one to three months with persistent joint pains.	Rapid—no after joint pains ...	'In all our cases convalescence has been prompt, practically all the 'patients expressing a desire to return to duty as soon as the temperature fell.' (Ashburn and Craig.)	'The average number of days of absence from work was from 4·11 to 8·76 in the case of the employés of the various institutions in Brisbane. In the officers in the public service it was 6·5. No mention in made of persistent joint pains.'
Fever ...	Last two or three days, falling to normal by crisis. Occasional very short secondary rise. Markedly remittent.	Five to eight or more days, with typical saddle back remission to 100°F. to 99°F. only. Otherwise continued in type.	'We agree with Giuteras and Cartaya in contending that the fever usually lasts six days.' 'In typical cases the temperature has fallen 2°F. or more at the end of twenty-four hours. The fall may carry it to normal or only as low as 100—102°. There it remains till the 5th day when it again rises to a point almost as high as its early maximum. On the 6th day there is generally a sudden fall to normal. In some cases the drop in temperature is delayed till the beginning of the 3rd day, quite exceptionally the same high point may be reached on four or five successive days.' (Ashburn and Craig). Also note specially charts I, II, III and IV.	'On the 3rd or 4th day there is a remission of the temperature which sometimes falls to normal. A terminal rise succeeds the remission in typical cases. The temperature usually falls abruptly at the end of the 5th period of 24 hours after the invasion.'
Pulse ...	Rapid	Slow, specially in terminal rise ...	'In general it is not so slow as in yellow fever, but dengue shows a tendency to slow pulse.' (Ashburn and Craig) quoting from (Giuteras and Cartaya). Note also charts II and III.	'As a rule the pulse is slow in comparison with what would be expected from the rise of temperature.'

the prevalence of dengue at a time when the temperature was low. In an average year the cold in winter in Calcutta is by no means great, and it is quite possible that in an exceptionally mild cold weather the temperature conditions might be compatible with the existence of a disease which prevails during hot weather. Taking these facts into consideration it would appear that no real difference has been established between seven-day fever and dengue in the matter of seasonal prevalence, but on the other hand that all the evidence goes to show that both diseases are essentially hot weather diseases.

NOTE ON CHARTS I TO V.—These charts have been taken from the paper by Ashburn and Craig and from Major Rogers' book, they include curves which have been stated by the respective authors to be typical of the various forms of dengue and seven-day fever. In the case of chart I the two curves shown are both from Major Rogers' book, the dotted line being reproduced from a chart in his article on dengue, and the plain line from a chart in the article on seven-day fever. The resemblance is so striking that one finds it hard to believe that the charts refer to distinct diseases, and this feeling is certainly not diminished by a careful consideration of charts II, III, IV. In addition to comparing individual curves of the two fevers a "composite chart" has been prepared from the preceding four charts, this shows the average temperature at each stage of these examples of the two forms of fever. The correspondence between the curves is remarkable, seeing that there are only two periods in the chart at which the difference in the temperature is greater than 1°F. It is right to explain that the composite chart was an after thought, so that there is no question of the foregoing charts having been specially selected with a view to its preparation.

At first sight one is surprised that more use has not hitherto been made of composite charts, as it would seem that these furnish "Ideal" temperature curves but a moment's consideration will show that owing to variations in the period of occurrence of the characteristic rises and falls in the curves, there is a tendency to the levelling down of these important features; but if this peculiarity of composite charts be clearly recognized they would appear to be capable of doing good service in giving graphic representations of average temperatures at various periods in the course of diseases. It is merely as showing 'average curves,' and not 'ideal curves' that chart V is to be regarded.

Table I and charts I to V having dealt with all the features of the diseases that have been relied on for their differentiation, there still remain two points which, though not included in Major Rogers' table, are nevertheless of considerable importance in this connection.

The first relates to the bacteriology of the two diseases. Major Rogers in the course of numerous attempts to cultivate an organism from the blood of cases of seven-day fever obtained a bacillus six times, two of the specimens were examined at the Lister Institute and were reported on by Dr. G. Dean as 'not giving the reactions of any pathogenic bacillus known to him, though organisms had been met with in the fæces giving the same reactions.' Rogers 'obtained clumping with the organisms when mixed with the blood of patients suffering from the seven-day fever in dilutions up to 1 in 20 or 1 in 40, though the reaction was not sufficiently constant to furnish a reliable diagnostic measure:' he adds that 'it is just possible that the organism may be one accidentally present in the blood.' If it should be demonstrated that this organism is really the cause of seven-day fever, that disease would at once be proved to be different from dengue, as the researches of Ashburn and Craig have practically established the ultramicroscopical nature of the infective agent in that disease, but in view of the fact that Rogers himself is not by any means certain of the specific nature of the bacillus found by him it does not seem necessary to throw over an established clinical similarity between the two diseases in favour of a very problematic bacteriological differentiation.

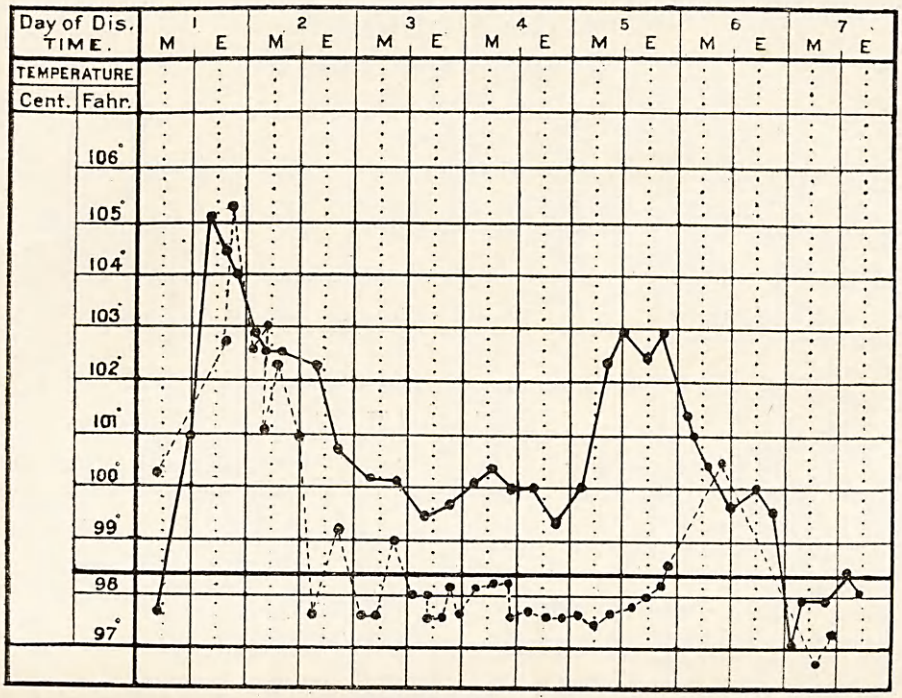
The other difference in the accounts of the fevers which must be alluded to relates to the proportion of cases in which a rash has been observed: Ashburn and Craig believe that they have seen a rash in about three-fourths of their cases, while in the Calcutta series recorded by Rogers a rash was reported in only seven per cent. In estimating the significance of this discrepancy there are several considerations which have to be taken into account. The first of these is that all authorities agree that the rash of dengue is very variable and is often so faint and so ephemeral as to be overlooked if not carefully searched for, so that it may possibly have been missed in those cases in the Calcutta series in which it was not conspicuous. Another point is that in Calcutta prickly heat is almost universally present to a greater or less degree at the season when the seven-day fever prevails, so that a rash of any kind when it is slight, is either altogether masked or has its features so much obscured that it is not of much value from a diagnostic point of view. Further, Major Rogers himself regards seven per cent. as rather an underestimate of the frequency of the rash. But even when all these factors are allowed for it must be admitted that there appears to be still an unexplained margin, and we have to consider.

On the one hand the argument against the identity of the two fevers that is based on a difference, in the percentage incidence of the rash; while on the other hand there is in favour of their identity the admitted fact that in both diseases there *does occur a similar rash which makes its appearance at the same period of the disease.*

ARE "SEVEN-DAY FEVER" AND "THREE-DAY FEVER" FORMS OF DENGUE?

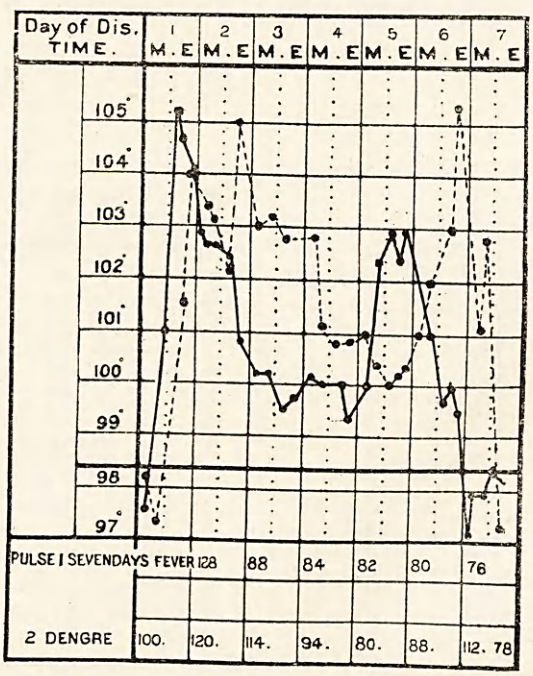
By Captain J. W. D. MEGAW, M.B., I.M.S.

CHART I.



Dotted Line—Dengue Chart (Rogers Fevers in the Tropics, p. 246).
Continuous Line—Seven-Day Fever (Rogers, p. 304).

CHART II.



Dotted Line 'Deal Dengue Curve' (Ashburn & Craig).
Plain Line—Seven-Day fever with Typical Saddle back Temperature (Rogers)—Same as shown in Chart I.

ARE "SEVEN-DAY FEVER" AND "THREE-DAY FEVER" FORMS OF DENGUE?

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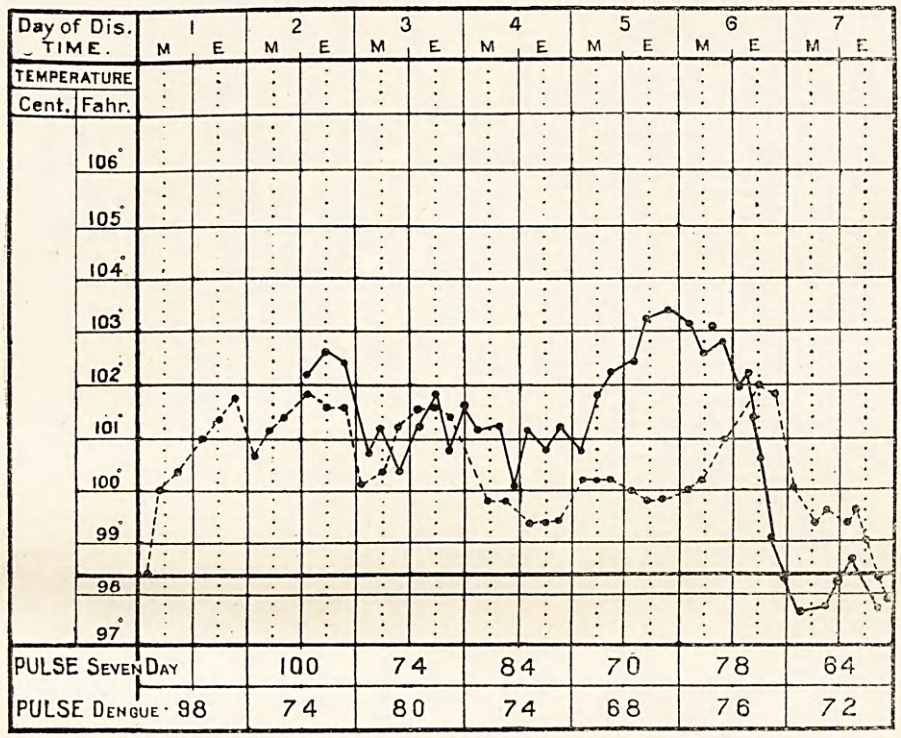
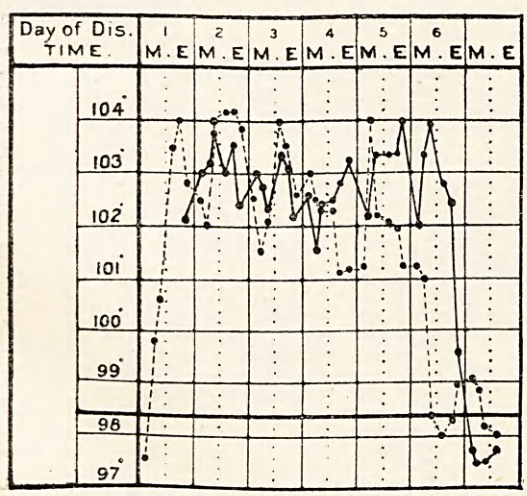
CHART III.



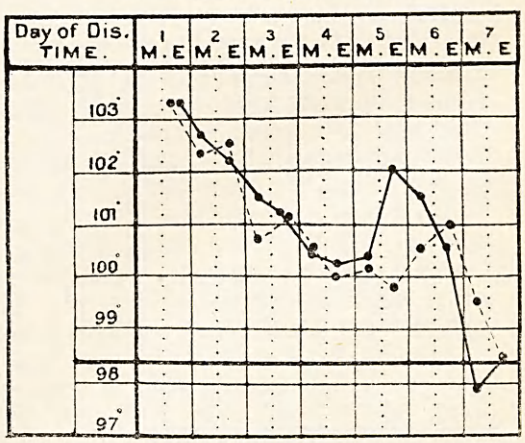
Plain Line—Seven-Day Fever (Rogers, p. 305). Dotted Line 'Typical of Dengue' (Ashburn & Craig).

CHART IV.



Dotted Line—Case of Dengue (Ashburn & Craig).
Plain Line—Seven-Day Fever (Rogers, p. 306).

COMPOSITE CHART V.



Dotted Line—Average of Dengue Charts I—IV.
Plain Line—Average of Seven-Day Fever Charts I—IV.

Probably all who have much experience of fevers will agree that the occurrence of a similar rash, even though it be in a very different proportion of the cases, is a strong piece of evidence in favour of the identity of the two fevers.

Having dealt with the controversial side of the question, it may be of interest to review the main features of the two diseases as stated by Rogers, Ashburn and Craig, and as in the previous table the actual words of the authors are quoted as exactly as possible.

TABLE II.

	The main features of Seven-Day Fever. (Rogers.)	The main features of Dengue. (Ashburn and Craig.)
Onset ...	Almost invariably quite sudden. Rigor or chill in 60 per cent.	Usually rather sudden. Chilliness is at times but not usually complained of.
Initial 'rash'...	The face is flushed, the palpebral conjunctiva shows a vivid red coloration.	The skin is usually much injected, specially over the head and neck, injection of the conjunctiva is a common sign.
Pains at onset and headache.	Pain in the back is an early and constant symptom, only slightly less frequently in the limbs as well. Headache is very constant and distressing.	The onset is usually manifested by pains in the loins, often also in the legs, with headache, fever.
Tongue ...	Shows marked furring of the dorsum with red raw edges.	Heavy yellowish central coat with red tip and edges.
Gastro-intestinal Symptoms.	Vomiting in one-fourth of the cases, nausea in 18 per cent.	Nausea and vomiting occurred in a few cases.
	Diarrhœa occurred in one-fourth of the cases, the bowels were regular in half and constipated in one-fourth of the cases.	As a rule slight constipation was present.
	In one-fifth of the cases there was some degree of abdominal distension or pain.	Not rarely there is abdominal pain.
Respiratory Symptoms.	Conspicuously absent	Catarrhal symptoms such as coryza or bronchitis were not present.
Pulse ...	A most constant and characteristic slowness in proportion to the temperature is found.	The tendency to slowness is most apt to be manifested by a relatively small rise in the pulse rate.
True rash ...	Recorded in 7 per cent. Usually mottled. In a few cases a diagnosis of measles was made. Almost always appeared from the fourth to the sixth day: no marked desquamation follows it and the rash usually fades before the temperature falls.	We think that we have seen the rash in 75% of our cases. The most common eruption more nearly resembles that of measles than any other well-known eruption. In most cases it appears on the fourth or fifth day, and disappears by the time the temperature falls. In a minority of cases there is a fine desquamation which will not be noticed unless carefully watched for.

TABLE II—(*contd.*)

	The main features of Seven-Day Fever. (Rogers)	The main features of Dengue. (Ashburn and Craig.)
	I think that 7 per cent. is rather an underestimate as it may sometimes be of short duration and so not recorded.	The rash frequently is faint in appearance and of ephemeral duration.
Temperature curved.	*Vide* charts I to V note the essential correspondence between the various types.	
Duration of Fever.	Six to seven days in 76 per cent. of the cases.	The fever usually lasts six days.
Blood changes.	An occasional slight reduction of the red, but a much more marked one of the leucocytes which commonly numbered only from 2,000 to 4,000 per cubic millimetre. The most essential feature of the leucocyte changes is a considerable reduction in the percentage of the polynuclears with a corresponding increase in the large mononuclears and lymphocytes.	The red blood count is normal. Dengue is characterized by a well marked leukopenia—the polynuclears being decreased as a rule, while there is a marked increase in the small lymphocytes.
Mortality ...	Nil. ...	We have seen no deaths, and have heard of none during the epidemic we have studied.
Convalescence.	Convalescence is very rapid.	In all our cases convalescence has been prompt.

The above tables and temperature charts will probably convince every one that there is no single point in which a reliable distinction can be drawn between seven-day fever and dengue, and that much stronger evidence of their being dissimilar is required before seven-day fever can be admitted to rank as a new disease.

THE THREE-DAY FEVER OF CHITRAL.

In considering the further point as to whether the three-day fever is not also a form of dengue, the issue is considerably narrowed by the fact that Capt. McCarrison who originally described this disease has himself instituted a critical comparison between it and dengue (*Indian Medical Gazette*, January 1908), and after carefully weighing the evidence he comes to the conclusion that "in the two conditions there is so much that is similar and so little that is dissimilar that the surprise at the absence of certain features in Chitral fever is in no way diminished but rather accentuated by the more detailed contrast between the two diseases."

He considers, however, that his 'failure to find in Chitral fever either a rash or a terminal

fever renders it impossible to class the two conditions as identical.'

It will be necessary to state briefly some of the main features of the three-day fever as described by McCarrison who observed the disease in the Chitral garrison, which consisted chiefly of Indian soldiers. In an outbreak a few cases are first seen, then the epidemic spreads suddenly and dies out after attacking all those who are susceptible. The disease is not directly contagious, and can only be acquired in an infected locality. No organism could be found in the blood. The leucocytes are diminished after the second day of the fever and there is a relative increase in the mononuclears. Inoculation experiments were carried out, but only in the case of Hindustanis and Punjabis, and as these were afterwards found to be immune, no deductions could be drawn from the results. The incubation period is from a few hours to five or six days. Immunity which lasts for one or more years is conferred by an attack in 80 per cent. of the cases. Almost all Europeans and Goorkhas are susceptible, especially the younger men, Madrasis are less susceptible, Punjabis are relatively immune. The comparative immunity of the Punjabis is regarded as affording evidence that the disease is widespread in the Punjab, and this point is of interest in connection with the explanation of the nature of the relative immunity of the native of Calcutta to seven-day fever and other forms of dengue.

SYMPTOMS OF THREE-DAY FEVER.

The temperature rises to 102° or 103° within 24 hours and then declines by about 2 per cent. daily, reaching normal within 72 hours after the on-set: it is quite exceptional for any further rise to occur. The onset is marked by a feeling of chilliness, there is severe frontal headache, pain in the eyes, limbs, joints, and all over the body. There is pharyngeal catarrh in two-thirds of the cases and often as sore throat. The tongue is furred at the centre and red at the edges, constipation is the rule. There is epistaxis with the fall of temperature in 30 per cent. of the cases. Except for a flushing of the face and injection of the eyes at the onset, such as occurs in dengue and has been described as the primary rash of that disease, no rash has been seen, though it has been carefully sought for by McCarrison and others. Convalescence is slow, there being marked prostration.

The above is a very brief summary of the main features of three-day fever, but it will be sufficient to show that McCarrison is justified in the conclusion regarding the nature of the disease that has already been quoted, for most of the existing accounts of dengue lay stress on the secondary fever and the rash as being essential features of the disease. In my paper in which the reasons for considering seven-day fever to be a form of dengue were stated, short forms of the disease were described, lasting less than four days and showing no secondary fever, and the reasons for regarding these as being of essentially the same nature as the seven-day cases with terminal rise were that the onset symptoms and seasonal prevalence were exactly the same, and that the short cases were connected up with the longer forms by a complete series of intermediate types. These short forms of the Calcutta fever appeared to be of essentially the same nature as the three-day fever, and so my opinion was strongly in favour of the three-day fever being a form of dengue, but the confirmation which would carry complete conviction was still lacking till the appearance of the paper by Lt.-Colonel Fooks, I.M.S., in the February number of the *Indian Medical Gazette* of this year. In this paper is described an outbreak of dengue in a Native Cavalry Regiment in Sialkot in the Punjab; the epidemic was remarkable for the fact that out of 140 cases 65 were of the three-day type essentially similar to that described by Capt. McCarrison, except that on the sixth or seventh day from the onset there was generally a secondary rise in temperature slight in degree and "of very brief duration and extremely liable to be overlooked, unless specially looked for." The remaining 75 cases were of the seven-day type and were obviously essentially similar to the cases of seven-day fever described by Major Rogers.

Among the points made by Lt.-Col. Fooks in his account are:—

1. "A mottled secondary rash occurred in a few cases and was followed by slight desquamation."
2. "The mild form of seven-day fever came midway as it were between the other two types, the remission of the temperature being more marked, it evidently being an attempt at an intermission."
3. "The most severe and prolonged cases were most common in men debilitated by malarial fever or fasting, malarial parasites having been found in 16 out of the 20 most severe cases, but ever in the milder seven-day cases or in the three-day cases."
4. "Sand flies were regarded as the probable means of carrying the infection."
5. "There is no doubt but that these cases of both seven-day and three-day fever were dengue."

It is interesting to note that Lt.-Col. Fooks found almost exactly the same types of fever in the Sialkot outbreak as were described in my note on the Calcutta fever, and the agreement is the more remarkable as he obviously had not seen any of the papers relating to the Calcutta fever.

But the most important point in connection with the epidemic described by Lt.-Col. Fooks is that, it appears to remove the two difficulties which were encountered by McCarrison in his attempt to reconcide three-day fever with dengue, for in the outbreak the three-day cases with either no secondary rise or with a slight and short

secondary fever were linked up with the longer forms of typical dengue by a complete series of intermediate forms, charts of which are given in Lt.-Col. Fooks' paper, and from the accounts there seems to be no reason to doubt that the short fever cases in the Sialkot outbreak were the same disease as the three-day fever of Capt. McCarrison. It may be pointed out in this connection that Rogers, probably following some recognized authority on dengue regards the short form without secondary rise as the typical form of dengue, so that everything points to the disease being variable in this respect, not only in different epidemics but in some cases in the same epidemic. With regard to the other difficulty on which McCarrison lays stress, *viz.*, the absence of a rash in any of his cases, it is evident from Lt.-Col. Fooks' account that the rash was by no means a striking feature in his outbreak of dengue, for he says, that a rash was observed in a few cases, and it may fairly be assumed that it was more likely to be seen in those cases that showed a secondary fever than in the short cases with no secondary fever, it is thus fairly clear that the rash is not a point on which great stress can be laid, especially when we consider the comparatively small number of cases in which it was seen in dengue in Calcutta, and the stress that all the authorities lay on its great variability and the likelihood of its being overlooked owing to its being frequently of short duration and slightly marked.

Bearing in mind that McCarrison after an exhaustive analysis of the features, of three-day fever and dengue was, only prevented from considering them similar by his failure to find evidence of a secondary fever and a rash in three-day fever, I think we may fairly assume that as in the case of seven-day fever no difference of—has been established, which can be regarded as of sufficient importance to justify the separation of the disease from dengue.

It is obvious that the existing text-book accounts of dengue must be imperfect and misleading, otherwise two of the ablest investigators of Indian diseases would not have described special types of dengue as new diseases. It would therefore appear to be a natural corollary to this paper to append a short account of dengue which would embody the more important recent additions to our knowledge of the disease, and at the same time would attempt to avoid the more serious imperfections of the existing descriptions.

A SHORT ACCOUNT OF DENGUE.

Definition.—Dengue has been called "The Influenza of the Tropics," and though this name is altogether misleading in so far as it implies any relationship between influenza and dengue, still its association with dengue would probably lead to a correct diagnosis of many cases that would otherwise not be recognized for in many of its most striking characteristic dengue is more suggestive of influenza than of any other disease familiar to European physicians.

Owing to the extreme variability of dengue and to the fact that no causal organism has been discovered, it is impossible to give a satisfactory definition of the disease, but the following will apply to the great majority of cases.

"Dengue is a short specific fever lasting as a rule from two days to a week, it occurs in warm weather either as an endemic or as an epidemic disease: there is generally marked pain in the loins and after, also pain in the larger joints. In its symptomatology and rapidity of spread it often resembles influenza distribution.

Dengue is widespread in the tropics, there is reason to believe that it occurs in an endemic form in many parts of the plains of India and in Egypt and possibly in other places in the tropics where its existence has not been hitherto recognized. When it exists in the endemic form it tends to break out once a year in the hot season, and owing to the great variation in the susceptibility of the individuals in an endemic zone it tends to show a great degree of variability in severity: it also attacks newcomers from places where the disease is not known, with greater frequency and intensity than the indigenous population.

On the other hand, in countries where the disease has not occurred for a number of years previously, and where in consequence practically the entire population is highly susceptible, the disease rapidly affects the vast majority of the inhabitants and assumes a severe and fairly uniform type. Most of the existing accounts of the disease relate to such epidemics and so do not apply to the endemic type of the disease.

Ætiology.—None of the various organisms which have been described, whether bacterial or protozoal, can be regarded as even probable causes of the disease. Ashburn and Craig have shown that the fever can be produced in susceptible persons by the intravenous injection of the blood of a patient suffering from the disease, and that the blood is still infective after passing through a filter fine enough to retain the micrococcus melitensis. Cultural and microscopical examinations have failed to show any organism, so that it may be assumed that the causal factor is ultramicroscopical. The same authors have shown that the disease is capable of being transmitted by the mosquito by direct transfer of the infective agent from a patient to a susceptible person. Both McCarrison and Fooks strongly suspect the sand fly of being the means of conveying the infection in Upper India, as the transfer of the causal organism would appear to be direct and purely mechanical, there is reason to believe that any blood-sucking insect might carry the infection.

A high temperature appears to be an essential factor in the spread of the disease.

Altitude in itself does not inhibit the disease, in Syria it prevailed at 4,000 to 5,000 feet above the sea level, and in Chitral the three-day type was seen at an altitude of 6,500 feet. Dengue is specially common in seaports and in towns situated on large rivers: possibly owing to the facilities for the introduction of the infection and to the existence in such places of a floating population which is usually more susceptible than the indigenous population, and thus maintains the infection.

In seaports too, the infection is less likely to die out in the cold weather owing to the comparatively high temperature that prevails in winter in maritime climates.

Racial Incidence.—All races seem to be equally susceptible, but there are cases in which there is an apparent special susceptibility of certain races, for instance, in Calcutta where Europeans suffer much more than Indians, but here the immunity of the Indians is almost certainly due to their having lived in a place where the disease is endemic, so that they have acquired an immunity. In some outbreaks Europeans have appeared to be less susceptible than natives, but this is probably explained by their having escaped the infection.

Immunity.—Natural immunity is exceedingly rare, and neither age nor sex nor race would appear to have any influence in this respect. As in the case of all specific infections an attack confers immunity, though this may be of very short duration. In most cases the immunity lasts long enough to prevent a second attack from occurring during the same epidemic, but sometimes such second attacks do occur within two or three months after the first, and in countries where the disease occurs annually it is quite common to see a second attack a year after the first, and third or fourth attacks are not rare at intervals of a year. As a rule these become progressively milder and eventually residents in affected areas probably acquire either a complete immunity or at least an immunity which is sufficient to prevent the disease from assuming anything, but the mildest form. Possibly it is by modified attacks which are so mild as to be unrecognizable that the immunity of residents in endemic zones is maintained.

Incubation Period.—Generally from one to six days: the commonest being three to four days.

Symptoms.—Owing to the great variability of the disease not only in different epidemics, but in different individuals in the same epidemic it is impossible to give a definite picture by which all cases of the disease can be recognized, but the following may be regarded as the usual course of the disease.—

The onset is sudden, often with a feeling of chilliness, the face is flushed and the conjunctivæ injected. There is a fronto-lateral headache and pains of considerable severity in the loins, there will also as a rule be pains of a less severe nature in the neighbourhood of the large joints. There is complete loss of appetite, the tongue is furred but the margin and tip are red. If the temperature is taken frequently it will be found to rise rapidly to 102—104°F., reaching the maximum within twenty-four hours of the onset, it then declines by about two degrees daily, so that by the end of the third day it had reached normal: when this occurs the attack may be at an end, the pains subsiding with the fall of the temperature and only some degree of prostration being left. On the other hand the temperature may not quite reach normal but may still be distinctly elevated till the fifth or sixth day when it rises further to almost the same height as at the early stage, and with this rise there is an exacerbation of the symptoms.

In cases where the temperature has reached normal before the end of the third day a secondary rise will often be seen on the fifth to the seventh day, but it may be slight and of short duration, and so is probably often missed.

In cases where the secondary rise occurs whether after a complete or incomplete fall of temperature the final fall to normal is by crisis on the sixth or seventh day from the onset. On the fourth to the sixth day a rash somewhat resembling that of measles may be seen, but even when present it is often very slight and very brief in duration, so that it cannot always be relied on as a diagnostic feature. The pulse at the onset is accelerated to a degree corresponding to the rise in temperature, but in the later stage of the disease there is a tendency to slowness of the pulse, especially during the secondary fever when it may be scarcely more rapid than normal, even when the temperature is considerably raised.

The Main Features of the Disease.—Having briefly described the course which an ordinary attack of the fever may pursue, the main features of the disease will next be considered in turn.

Prodromal Symptoms.—These are usually absent, a feeling of malaise is said to precede the onset in some cases, but it is not easy to clearly distinguish between prodromal symptoms and symptoms associated with the actual onset.

Onset.—In most cases the onset is definite, the patient suddenly becoming aware that he is ill, but a gradual onset is not uncommon. Among the earliest symptoms are headache, a feeling of chilliness and pains in the loins.

Temperature.—Most of the common types of temperature are illustrated in the accompanying charts, but it must be remembered that considerable variations from the recognized types are common, so that dengue cannot be excluded as a possibility merely because the chart does not correspond to one of the typical curves.

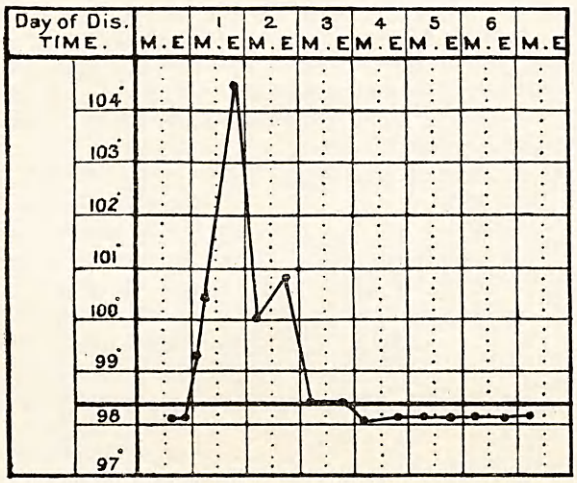
The great majority of the cases will fall into one of the following classes:—

1. *The Evanescent Type.*—Here the rise in temperature is so slight in degree and so short in

ARE "SEVEN-DAY FEVER" AND "THREE-DAY FEVER" FORMS OF DENGUE?

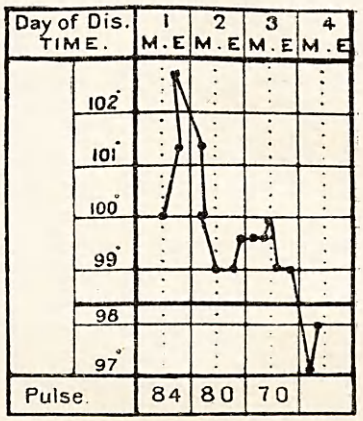
By Captain J. W. D. MEGAW, M.B., I.M.S.

CHART VI.



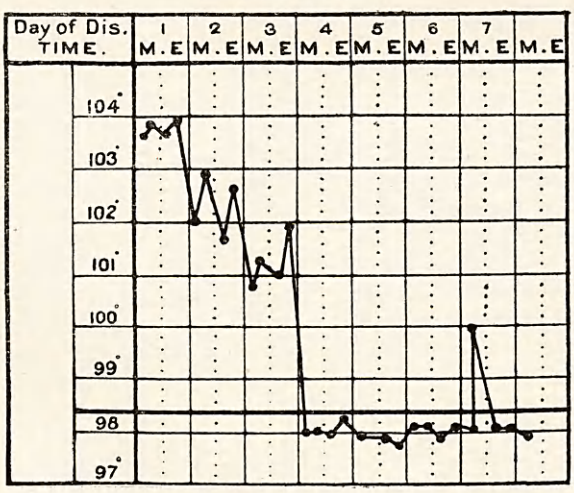
Typical Short Fever Type ('Three-day fever of Chitral'—McCarrison).

CHART VII.



Short Fever Type (Calcutta, Aug. '06).

CHART VIII.



'Short Fever Type' with slight Secondary Fever (Sialkot Epidemic—Fooks).

duration that it is usually overlooked. This form will naturally be incapable of definite diagnosis till a vital test of the disease has been discovered, but during the period of prevalence of dengue a good many cases of 'febricula' are often seen in which the occurrence of headache, with slight pain in the loins lasting for one or two days, could most reasonably be accounted for as modified attacks of dengue occurring in persons who had become almost immune by previous attacks; in these cases it is probable that the temperature always rises slightly if only for a few hours, but it is possible that some of the attacks may be absolutely a febrile as suggested in my previous paper. Evidently Ashburn and Craig are alive to the possible occurrence of this type of the disease, for they say "there is no one symptom that can be said to be pathognomonic, or even constant, if we expect fever. *We do not state positively that even fever is constant.*"

2. *The Short Fever Type.*—This type, as in the instance of the three-day fever of Chitral, may be the prevailing form of the disease in some epidemics, but it may also be common in outbreaks where the prevailing type is of six or seven days' duration. It lasts from 36 hours to 84 hours, and as in the great majority of cases fever is present on three consecutive days, it might fairly be called the "three-day fever type of dengue." See charts VI, VII and VIII.

3. *The Interrupted Fever Type.*—This is simply the short fever type with the addition of a further rise of temperature of one or two days, duration coming on the fifth or sixth day from the onset. See chart IX.

4. *The Saddle Back Type.*—This form is due to the prolongation of the primary fever so that the secondary rise in temperature is superimposed on the end of the primary fever. The term was first used by Major Rogers to describe the characteristic curve seen in many cases of the fever in Calcutta. See chart X.

5. *The Continued Fever Type.*—This is a rare form in which the primary fever is continued without any definite diminution, so that if a secondary fever does occur, it is merged into the end of the primary fever in such a way as to be indistinguishable. See chart XII.

The last three forms are almost invariably of six or seven days' duration and they are probably strictly speaking relapsing forms, the relapse occurring with considerable regularity on the fifth or sixth day. There are thus really two main types of the fever, the simple or short type and the relapsing or long type, but the latter may show a variety of forms according to whether the primary fever has or has not subsided before the occurrence of the relapse. For practical purposes the types which should be borne in mind are the short type, the interrupted type, and the saddle back type, as the vast majority of actual cases will fall into one of these classes.

Exceptional features of temperature are the prolongation of the fever to as much as ten days, or even a fortnight, and the occurrence of hyperpyrexia which may be fatal, especially in children.

It should be noted that the height of the temperature at the early stage of the disease does not give any clue to the probable duration or severity of the attack, as the initial rise tends to be much the same in both the long and short types, and is in fact, almost the only constant feature of the disease. There is a tendency to subnormal temperature after the crisis, especially in patients who have been treated with large doses of quinine, and this subnormal temperature may be associated with a considerable degree of depression or even with alarming collapse.

Pulse.—Great acceleration of the pulse is only seen in the earliest stage of the disease, and is almost confined to patients who have walked about instead of at once taking to bed. Throughout the attack the tendency is for the pulse to be slower than would be expected from the temperature, so that during the secondary fever it is not uncommon to have a pulse of 70 with a temperature of 102°. During convalescence the pulse is usually slower than normal.

Headache.—This is the most constant symptom; it is usually severe and is sometimes distressing; it is commonly referred to the orbital region of the head and seems in many cases to be definitely associated with the ocular muscles as attempts to move the eyes may be attended by considerable pain.

Pains.—These are usually described as of two kinds—muscular pains in the loins and joint pains chiefly in knees and elbows. There is, however, probably no essential difference in the nature of these pains: they appear to affect chiefly the tendons of muscles and the connective tissue elements generally in the neighbourhood of joints, and are often more like the stiffness following on unwonted exercise than actual pain.

The lumbar pain is the most constant, it sets in at the onset, and is most severe when the temperature is at its highest point, disappearing with the fall of temperature and returning with the secondary rise. It is not markedly relieved by any posture, though when standing the patient finds a slightly stooping attitude the least uncomfortable.

The joint pains are generally present, they affect the structures round the knee and eblow joint most commonly, but other joints may also be affected, they are not so severe as the lumbar pains, and there is rarely any redness or swelling of the joints. The deep-seated bone pains which are described in most of the older epidemics and which have given rise to the name "Break-bone Fever" have rarely been seen in the more recent outbreaks. Probably the fact that such picturesque titles as "Dandy Fever" and "Break-bone Fever" appeal strongly to the imagination may be responsible for much of the confusion regarding the nature of some of the forms of the disease, as there is a natural tendency to assume that the

features from which the name of a disease has been derived are essential points in that disease and so the absence of very severe pains has often been considered proof that a disease was not dengue. The pains nearly always disappear with the fall of the temperature, though exceptionally they do persist, and in some of the older epidemics it seems to have been the rule rather than the exception for these pains to continue for a considerable time after the termination of the fever.

Eruptions.—Two eruptions are usually described, a primary and a secondary, but most authorities tend to regard the primary eruption as simply a hyperæmia. Whether this primary hyperæmia should or should not be regarded as an eruption seems to be entirely a matter of terminology, the tendency at present seems to be against considering it as a true eruption, but in any case it is often a very marked feature of the disease, occurring as a uniform bright flush of the face, neck, and upper part of the trunk, and to a less degree of the rest of the body. In children the flush is specially noticeable and in some cases may give rise to a suspicion of scarlatina. In adults there may be no marked redness of the skin, but the conjunctiva is nearly always redder than normal.

Secondary Eruption.—This is generally considered to be the true rash of the disease, but unfortunately it is often altogether absent, or if present it may be so slight and evanescent as to be very readily missed. In the Philippine epidemic it occurred in about 75 per cent. of the cases, in the Australian in about 50 per cent., while in the Calcutta cases it was recorded in about 7 per cent., though this figure is probably an underestimate. In Sialkot Fooks saw the rash in a "few cases," while in the short form of fever in Chitral McCarrison was never able to detect any rash.

When it does occur it appears on the fourth, fifth or sixth day, it may last for a few hours or as long as two days, it is very variable in character but most commonly consists of small red spots larger than those of scarlatina and smaller than those of measles and very slightly raised above the surface of the skin, it more nearly resembles the rash of measles than any other eruption, but is of a somewhat brighter red colour. It is found chiefly on the chest, but also on the back and extremities: it is most marked in children. Various types have been described, such as scarlatinal mobilliform, urticarial and petechial. A slight degree of desquamation is common, but has to be carefully looked for in most cases. Hyoperæmia of the palms and soles is often described, associated with some degree of itching and subsequent desquamation. In places where the disease is endemic and where only a small proportion of the population is affected it is quite common for cases of dengue to be diagnosed as measles or German measles, and in one case in Calcutta the diagnosis was "spurious scarlatina."

Respiratory System.—The nares are often stopped up probably owing to hyperæmia of the mucosa; the pharynx is congested, and in some epidemics a defininte sore throat is common. Bronchitis occurs only as a complication, but there seems to be a predisposition to catarrhal conditions, probably due to the hyperæmia of the mucosæ. Epistaxis is frequent in some epidemics at the crisis.

Alimentary System.—The tongue is nearly always coated with a creamy fur, the tip and edges remaining clean, the appetite is lost and as a rule there is a tendency to constipation, though diarrhœa may occur at the crisis.

Some degree of nausea or even vomiting may occur especially in the first two days, and at the same time there is often a feeling of oppression in the epigastrium.

Lymphatic System.—A very slight degree of enlargement of the lymphatic glands is common. Dr. Hossack of Calcutta has seen cases in which suspicions of bubonic plague have been aroused.

Nervous System.—The headache is probably intraorbital rather than cerebral in origin. Insomnia is naturally a feature of the cases in which the pains are severe, but on the other hand most children and many adults are somnolent throughout the course of the disease. Delirium is rare when it occurs, it is usually asscciated with an exceptionally high temperature. Mental depression is a common feature in convalescence.

Vascular System.—There is a tendency to cardiac weakness at the time of the crisis and during convalescence, but this is rarely of importance, except in elderly and debilitated persons. In some epidemics there is a distinct liability to hæmorrhages, epistaxis at the crisis being the commonest manifestation; while hæmatemesis, hæmoptysis, hæmaturia and cerebral hæmorrhage have been recorded in a few cases in the Brisbane epidemic.

Blood Changes.—The outstanding feature of the blood count as described by Ashburn and Craig, Rogers and McCarrison in the marked diminution in the total number of the leucocytes. This diminution is seen after the second or third day of the fever and affects only the polymorphonuclears, both the large and small mononuclears being if anything increased in actual numbers, so that in a differential count there is a marked diminution of the polynuclears and a decided increase in both kinds of mononuclears, though the large mononuclears as a rule do not show the marked increase till a later stage than the small. The red blood disks show no marked change. From the unanimity of the authorities referred to as to the diminution of the polynuclears it would appear that this feature is likely to be of diagnostic value in doubtful cases.

Genito-Urinary System.—There is very little tendency to albuminuria, less indeed than would be expected in a condition with so marked a febrile reaction.

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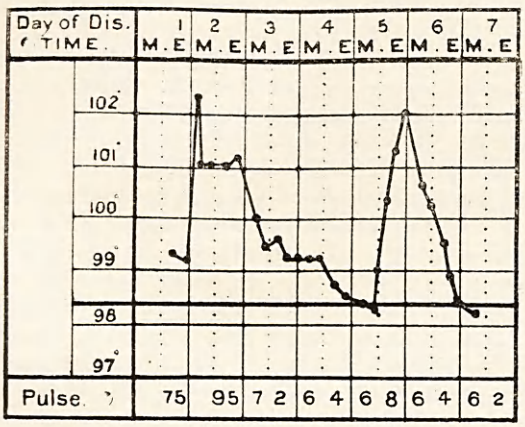
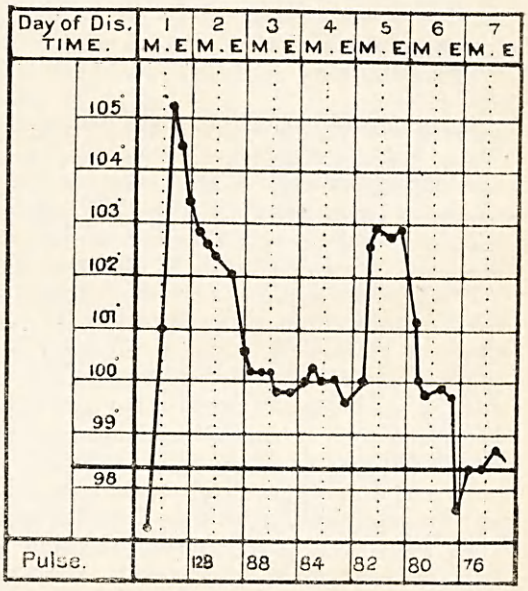
CHART IX.



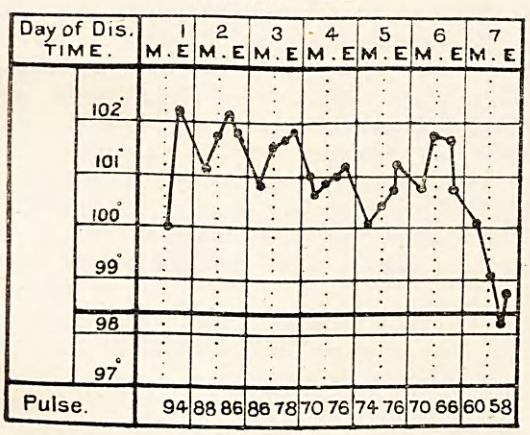
Typical Mild Attack of Dengue showing Secondary Fever (Calcutta, July, '06).

CHART X.



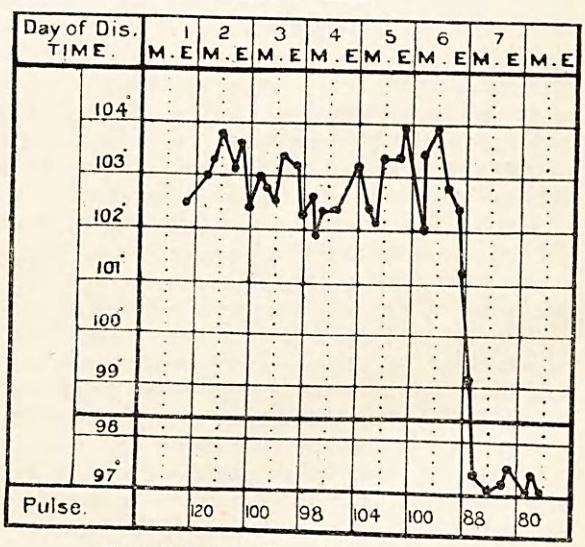
Showing 'Saddle Back Curve' (Rogers, Calcutta).

CHART XI.



Low Continued Type with Slight but Distinct Terminal Rise (Calcutta, July, '05).

CHART XII.



High Continued Type (Rogers, Calcutta).

Complications.—These are few and unimportant, bronchitis is the commonest, but pneumonia and pleurisy have been recorded in a few cases.

Convalescence.—In most of the recent epidemics recovery has been rapid and complete, so that it is not uncommon for the patient to return to work as soon as the temperature falls. In the Brisbane outbreak the average period of absence from duty in the case of the public servants who suffered from the disease, was about seven days. In some epidemics convalescence is described as being prolonged, great prostration with marked persistence of the pains being marked features.

Mortality.—Except in the very young or very old, or in patient debilitated by some previously existing disease death is extremely rare. Even when the statistics refer to the total number of persons attacked the case mortality rarely exceeds one per thousand.

Differential Diagnosis.—In the presence of an epidemic there is not likely to be much difficulty in diagnosis, but in places where the disease is endemic and where modified forms are common it will be frequently impossible to make a positive diagnosis, as there is no feature which can be absolutely relied on to distinguish dengue from other short specific fevers. The important point is that there does exist in many parts of India and probably in most tropical countries a specific short fever which is not malarial and in which quinine instead of being useful is distinctly harmful. The diagnosis from malaria will always be easy when a blood examination is made by a competent person, but it will often remain impossible to the medical man who does not use the microscope. The quinine test is not of much value as the fever, owing to its short duration, will appear to yield to the administration of quinine, and the only result of giving this drug will be to aggravate the patient's discomfort and to leave the doctor in doubt as to whether the disease was malarial or not, and in consequence he will be unable to tell whether a prolonged course of quinine is necessary.

From influenza it is easy to distinguish dengue as the latter shows no marked respiratory symptoms and is a disease of the hot weather.

From yellow fever of a mild type, it is impossible to distinguish some cases of dengue, but the difficulty will only arise in exceptional cases, each of which must be dealt with on its own merits.

From early typhoid there will in some cases be a difficulty in diagnosis, but the more sudden onset of dengue can generally be relied on, and if the safe rule of waiting for a clear seven days before diagnosing typhoid be followed there will practically never be a mistake, as it is exceedingly rare for dengue to show a maintained temperature after seven days. The drowsy aspect of the patient on the sixth or seventh day of dengue combined with the maintained high temperature in some cases has led to the diagnosis of typhoid. From the other exanthemata such as measles, German measles and scarlatina, the diagnosis may only be possible by a careful consideration of all the symptoms and of the character of the rash, and in doubtful cases the leucocyte count may prove to be of considerable value. From rheumatic fever dengue is readily distinguished by the absence of marked redness or swelling of the joints.

Prophylaxis.—In view of the general consensus of opinion that dengue is conveyed by the bite of some insect, such as the stegomyia and the sand fly, residence in insect-proof houses or removal from an infected area are the two most practical methods of avoiding the disease, and though the affection cannot be regarded as very serious, still it is sufficiently unpleasant in itself and is liable to cause such a dislocation in business as to make it worth while to consider the possibility of preventing its spread. If the earliest cases could be detected at once and kept in insect proof rooms it might be possible to prevent the insects of the locality from becoming generally infected, and thus the spread of the disease would be checked.

Treatment.—This should be on the same lines as in other short specific fevers. Rest in bed and a milk diet constitute the only treatment necessary in the majority of cases, but if the pains are very severe and the headache distressing there is no objection to phenacetin or antipyrin provided, the heart shows no signs of enfeeblement. Aspirin in ten grain doses is said by some to be the most useful drug for the relief of the pain. Gentle massage and application of belladonna liniment may alleviate the joint pains. In convalescence tonics are called for and a change of to a bracing climate will hasten a complete recovery. Quinine is the drug that has been most largely used in this fever, but as has already been stated it is distinctly harmful when given in full doses. Too much stress cannot be laid on the extreme importance of a microscopical examination in all cases of fever where there is any doubt as to the diagnosis, but at the same time it must be laid down as an absolute rule that where it is impossible to have a thoroughly reliable blood examination, all doubtful cases should be treated with full doses of quinine, for while it is extremely rare to see a fatal issue which can be attributed to the administration of quinine in a non-malarial case, every one who has much experience of fevers in the tropics must have seen a good many cases of malaria where life has been sacrificed through the failure to give quinine in sufficient doses. If, therefore, diagnosis between malarial and non-malarial fevers is to be made by guessing, more lives will be saved by regarding all doubtful cases as malarial.

Concluding Remarks.—The chief aim of the foregoing paper is to show that the term

"Dengue" can properly be applied to the fevers in India known as "Seven-Day Fever" and "Three-Day Fever," and probably it will be generally agreed that this object has been attained, but there is another object which is probably of greater practical importance, *viz.*, to suggest that in most parts of the plains of India and perhaps in many parts of the tropics generally, dengue exists as an endemic fever assuming a great variety of forms. While it cannot be claimed that there is definite proof of the truth of this suggestion, there are many facts which support it, perhaps the most important of these being the marked degree of immunity that is shown by many of the inhabitants of the plains of India in presence of an outbreak of dengue. If further observation should show this suggestion to be well founded, the whole subject of fevers in the tropics, and more especially in India, would be considerably simplified, and the management of these fevers would be placed on a more satisfactory footing. In conclusion, it is only fair to point out that much of the material on which the argument of this paper is founded was not available to Major Rogers and Captain McCarrison when they expressed their views as to the fevers described by them, and the close degree of correspondence between their accounts and the recent descriptions of dengue is merely a proof of the accuracy of their observations which have done so much to clear up the confusion hitherto existing with regard to the short forms of fever in India.

A CASE OF ATROPINE POISONING.

BY G. D. FRANKLIN, B.A., M.B., B.C. (CANTAB.),
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MIR ABBAS, a Persian, aged 45, was admitted to the hospital of H. B. M.'s Consulate-General, Meshed, on the 14th of September 1908, suffering from double cataract.

The right eye was operated on, on the day of admission, by the ordinary 3 millimetre flap or combined operation. Recovery was uneventful. The result was only fair, some capsule remaining. The left cataract was extracted in its capsule on the 29th of September, with a very good result.

Atropine was instilled in the right eye on the evening of the 9th of October with a view to a needling operation. The iris did not respond and atropine was again applied on the evening of the 10th, but without effect. On the morning of the 11th a further application of atropine was made.

At midday, on the 11th the patient was found to be suffering from a mild form of delirium. His temperature was normal. His pulse was about 120, weak and fluctuating. The extremities were cold. There had been no motion of the bowels since the day before, nor had any urine been passed. He was not conscious of his surroundings, and did not realize apparently, nor reply, when spoken to. He either lay down or sat up in bed looking straight in front of him. He continually went through the motions of drinking holding out his hand to take an imaginary cup, drinking from it with intense seriousness and then handing it back.

A diagnosis of atropine poisoning was made on the above symptoms and a hypodermic injection of morphia administered. The bladder was emptied by catheter.

The patient gradually improved and his condition was apparently normal the same night.

The strength of the atropine solution was grains four to the ounce which I use in all cases twelve hours or more prior to cataract extraction and two or three times after the operation. Several other cases were treated with the same stock of atropine solution at the same time as this case.

The interesting point about this case lies in the fact that atropine had previously been instilled in this patient's eyes both before and after the two cataract operations, without any unfavourable results. After a few days' interval three ordinary applications of the drug caused the symptoms detailed above, which are described as typical of poisoning with belladonna or its alkaloid.

Veratrum Viride in Puerperal Eclampsia.—The convulsions in puerperal eclampsia constitute the most striking manifestation of this disease, of which the exact nature and origin are still unknown. Moreover, the convulsive fit is itself a source of great danger to the patient, especially when frequently recurring, after brief intervals, and producing important circulatory disturbances. Thus the increased blood pressure, produced by the convulsion, acting upon blood-vessels, already altered by the eclamptic poison, may cause their rupture, and so lead to cerebral hæmorrhage. Again, pulmonary œdema and aspiration pneumonia not uncommonly result from the convulsions, and are among the common causes of death in eclampsia. In these circumstances, any drug, which will control this most dangerous symptom of eclampsia, is likely to have a good effect on the disease itself. This result has been secured by the hypodermic administration of the fluid extract of veratrum viride in small and repeated doses. The character of the pulse must be taken as the guide in its administration. Where the pulse is full and strong, above 80 beats per second, veratrum should be administered. On the other hand, where the pulse is rapid and small, and the arterial pressure is but slightly elevated, veratrum viride is contraindicated A recent Italian writer has treated 100 cases of eclampsia in the last ten years in this manner, with a maternal mortality of 12 per cent., and a fœtal mortality of 43·37 per cent., whereas, in the preceding ten years, before the introduction of the use of veratrum viride, he had a maternal mortality of 23·68 per cent.—(*Practitioner.*)