very prevalent during the next three months, and had almost disappeared by the end of March. A large proportion of the native population suffered and many Europeans, but the proportion seemed to be greater in the purely native parts of the town. No medical man was affected.

The type of the disease seen in Penang differed considerably from that described by Drs. Stedman and Nightingale; indeed, I and others had at first some doubt as to the identity of the disease. Later it approximated more to the textbook descriptions, but certain symptoms were slight or absent throughout.

The incubation period seemed to be one or two days, or at all events the first case in a house was usually followed by a second within that time. Occasionally as much as ten days elapsed, but in these cases probably the infection was independent. In one house in which cases occurred, the first seven were within sixteen days of the first and the last sixty-seven days after.

Premonitory symptoms were entirely absent in my cases, except slight rigors in two children. The onset was always sudden, and the temperature with very few exceptions highest on the first day, frequently reaching 105° F. On the second day it was usually considerably lower, and on the third in the great majority of cases it fell to normal. It was usually highest in children, and in some adults never exceeded 100° F. Crisis was rare. Delirium and convulsions were frequent in children when the temperature exceeded 104°.

In the early part of the epidemic pains were usually entirely absent, or not more marked than they often are in malarial fevers. Later they were more common and severe, and in a few cases persisted after the other symptoms had vanished. Of my first 20 cases 5 complained of pain, one of them only after the temperature had fallen to normal, but in none of them was it severe. Of the last 20 pain was a fairly marked symptom in 13. In only one did it at all approach the condition described by Manson,¹ in which "the pain caused by muscular movements more than counterbalances the advantage a purgative might otherwise bring." Constipation, by the way, was almost invariable.

Congestion of the skin—the initial eruption—was well marked in a few cases, especially on the face, but in many was hardly perceptible. Injection of the conjunctivae, which in some cases was so extreme as to look like ecchymosis, was rather more constant; but that, too, was often very slight.

The rash appeared usually on the fourth, fifth, or sixth day; in nearly half the cases on the fourth. Occasionally it was seen as early as the second day, and in none after the seventh. In some cases it did not appear at all. It corresponded pretty closely with the description given in Manson's *Tropical Diseases*, but was brighter than that of measles, with which I had several opportunities of comparing it. It first appeared, and was most marked in most cases on the flexor surface of the forearms, and was faint or absent on the palms and soles. Occasionally on the second day it did not entirely disappear on pressure, but left a brown stain. Itching was seldom complained of, and I saw no desquamation, but many cases were lost sight of as soon as the fever was over. In one case there was a slight petechial eruption, while the usual raised spots did not appear. The appearance of the rash was in no case accompanied by a rise of temperature, and the few cases of secondary fever which occurred in my practice were after the disappearance of the eruption.

In a few cases I observed an eruption on the mucous membrane of the mouth, consisting of isolated greyish vesicles about $\frac{1}{8}$ in. in diameter, each surrounded by an area of congestion. They were most numerous on the inner surface of the lower lip, but also occurred on the inner surface of the upper lip and cheeks, and on the tongue, never on the outer surface of the lips. This eruption was painful and appeared on the second day of the fever. Enlarged lymph glands were seen in only two cases. Haemorrhage from the nose occurred in one, and was followed by a feeling of relief.

Owing to the mild type of the disease and the inconstancy of what are usually characteristic symptoms, diagnosis, especially in the early stages, was somewhat difficult. In no single case under my care did rheumatoid pains, rash, and secondary fever all occur. Facial and conjunctival congestion, when well marked, were useful guides, but occur to a slight

extent in other fevers. The course of the temperature was the most characteristic feature. Other fevers prevalent at the same time were malaria, febricula, measles, enteric, and small-pox, and of these the first two were the most difficult to exclude.

REFERENCES.

- ¹ An Epidemic of Dengue Fever, F. O. Stedman, M.D., B.S., *BRITISH MEDICAL JOURNAL*, July 12th, 1902. ² Climate and Diseases of Bangkok, P. A. Nightingale, M.D., *BRITISH MEDICAL JOURNAL*, September 20th, 1902. ³ *Tropical Diseases*, p. 204.

DENGUE FEVER IN BURMAH.

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An epidemic of this disease occurred in Burma during April, May, June, and July, and is still continuing. It is not unlikely that its source is the epidemic at Hong Kong, of which Dr. Stedman wrote in the *BRITISH MEDICAL JOURNAL* of July 12th, 1902. The disease appeared in Rangoon in April; it then travelled northwards up the Irrawaddy valley. In June Mandalay was visited, and towards the latter end of the same month it appeared in Bhamo, the northernmost town of any importance in Upper Burma. The epidemic has followed the important trade route.

In Bhamo, to which place my experience of the epidemic is limited, it has attacked all nationalities alike. Those living in better hygienic surroundings—namely, European officers and native troops—naturally have not suffered to such an extent as those of the crowded localities.

Infection.—There is no doubt that the disease is highly infectious and can be carried by one person to another without of necessity the carrier becoming a victim. The first case to come under my notice, a European, arrived on June 20th from Mandalay, where the epidemic was progressing. On June 27th he was well. On June 28th my daughter, a child aged 3½ years, was attacked and went through all the stages of dengue. As she had not been exposed to direct infection, I must have conveyed it to her. I escaped, but was infected at a later date.

Incubation.—Dr. Manson, in his *Tropical Diseases*, says, "One to three days." Cantlie, in Allchin's *Manual of Medicine*, says, "One to five days." The former authority thinks that five to seven days, as given by some observers, is an over-estimate. My experience in the present epidemic leads me to agree with Dr. Manson. The incubation period probably varies from twenty-four hours to three or four days, the average being three days. Dr. Stedman, in his account, quotes a case of twenty-four hours' incubation. Such a short period is probably rare. The child mentioned had perfectly recovered on June 6th. Her mother, who nursed her, was attacked on June 9th, and I, her father, on June 12th. Thus, in the mother's case, the incubation was not less than three days.

Symptoms.—The cases in this epidemic have been characterized by sudden onset and symptoms of remarkable similarity. A person previously well and perhaps at work would be suddenly attacked with the peculiar characteristic pains in the joints. Pain in the muscles and back, particularly in the lumbar region, is generally felt. The pain affects the smaller joints especially—wrists, ankles, finger-joints, and toe-joints. The knees and elbows are also affected. Sometimes shivering or a feeling of cold down the back ushers in the attack. Vomiting in adults is an occasional symptom at the onset, but is frequent in children. The initial rash described in books I have only seen in a few cases. In these it has consisted of little more than a hyperaemia of the skin of the face. In one child a peculiar mottled rash appeared on the trunk and arms on the second day of the disease, and afterwards extended to the legs and feet. Frontal headache, with congested, watery eyes, is characteristic shortly after the disease has set in. The painful joints frequently become swollen and tender.

Temperature.—The amount of fever varies considerably. The temperature rises steadily, and in twenty-four hours reaches 103° or 104° F. It remains high, with slight remissions, for one, two, or—rarely—three days, and then falls rapidly. In a child under my care the temperature remained at 103° to 104° for two days, and on the second night extreme restlessness

ness was followed by alarming delirium. The secondary rash—a most characteristic sign—has appeared almost invariably on the sixth day of the disease, first on the palms and wrists, and then on the arms, legs, soles of feet, and perhaps the whole body. It is best marked on the extensor surfaces of the arms and legs, especially above the knees. On the palms it is seen as numerous circular, dusky-red, discrete, slightly-elevated spots, about the size of a pea. In a few hours it can be seen on the arms, legs, and perhaps body, as elevated circular red spots, which at first are discrete, but after a time enlarge and coalesce. The rash is accompanied by great irritability. It begins to fade twenty-four hours after its commencement, first from the hands, wrists, and arms, then from the neck, face, thighs, and body. Forty-eight hours after its commencement it has disappeared. Desquamation in this epidemic has been trifling. The second rash has never been accompanied by more than a trifling rise of temperature. In a few cases the joint pains have recurred. Enlargement and tenderness of the superficial lymphatic glands have accompanied or preceded the secondary rash in a large number of my cases. In the textbooks this glandular affection is only mentioned as a complication or sequela, and Dr. Stedman does not mention it at all. I have found the superficial cervical, axillary, inguinal, and supracondylar glands at the elbow-joints affected in the above manner in at least 75 per cent.

Convalescence and Sequelae.—With few exceptions, after disappearance of the secondary rash, convalescence has been quick and no ill-effects have remained. Troublesome joint pains, with swelling and tenderness, have persisted in a small percentage of cases. In one patient under my observation, although the second rash disappeared on July 14th, swelling and pain in the ankles, wrists, fingers, and toes still exist (August 8th). For three days these pains were bad enough to render the patient almost helpless. It is now twenty-one days since the rash disappeared from my own body, and while I write I still feel twinges in my wrists and fingers. As at the onset, the joints most frequently affected are the wrists, ankles, and finger-joints. In this epidemic I have neither seen or heard of any deaths. The after-effects, so troublesome in adults, in this disease are rarely seen in children.

Diagnosis.—The sudden onset, the pain and stiffness in the fingers and other joints, with frontal headache and suffused eyes, are so characteristic that there has been little difficulty in quickly arriving at a correct diagnosis. The appearance of the rash of course drives away all doubt. The Burmans and natives of India here seem familiar with the disease, and distinguish it at once from malarial or any other fever. The Burmans call it "Tok-kive-ana," "the tying or drawing together disease." The first word, "tok," means to tie together, as the hands and feet, one hand with another, or hands and feet together. "Kive" means to draw together at the ends, as a bow. They have a theory that the disease visits the country every thirty years.

Prevention.—On account of the infectiousness of the disease it is important to segregate those attacked. The medical man and attendants should be especially careful to change their clothing and to use every effort to disinfect their persons before mixing with other people. In this epidemic I know of two instances in which the doctor probably carried the disease. In one instance the victim was a patient with enteric fever. In the tropics among the natives it is impossible to carry out the principles of segregation satisfactorily. They look upon the disease as trifling. In the case of Europeans, however, much can be done to prevent its spread.

Treatment.—The treatment resolves itself into combating the fever and palliating symptoms. The patient should be confined to bed, put on light diet, and should remain in his room until the second rash has disappeared. For the pain and headache and also to reduce the temperature I have found phenacetin with caffeine beneficial. In addition to this, I prescribe a simple diaphoretic mixture containing nitrous ether and potassium nitrate every four hours. Sodium salicylate is also useful in the febrile stage. If the temperature rises to 104° or 105°, sponging or bathing with water at 98° or 99° F. should be resorted to, and is most comforting to the patient. This is an efficacious way of treating the pyrexia in children when accompanied by delirium. During con-

valescence a tonic containing a few grains of quinine, three or four times a day, is required. The after joint pains should be treated with sodium salicylate, potassium iodide, and belladonna internally, and stimulating liniments externally.

THE TREATMENT OF AGUE BY THE HYPODERMIC INJECTION OF QUININE.

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In the different medical periodicals papers have from time to time appeared of late whose perusal would lead the readers to believe that this method of using quinine was some new thing. The writer of a recent note on the subject, although he has not been using quinine hypodermically for more than a very brief period, and that in only a very few cases, seems under the impression that he is more or less the inventor of the method, and is not sure whether it should not go by his name. It is but another instance of how the work of the profession in the tropics is a closed book to our brethren in Europe.

It is five and twenty years or more since Colonel Terence McGann, I.M.S., began the treatment of ague by the hypodermic use of quinine. It is about six years since Colonel Benson, I.M.S., read a paper at the Medical Congress in Calcutta detailing many hundreds of cases so treated by himself; and in the Victoria Hospital, Bangalore, in which large numbers of ague cases are treated, quinine is but rarely given by the mouth. So it will be seen that this so-called new method is a very old one indeed. But this note would hardly have seen the light if it had not been that one of the most distinguished of malarialogists has advocated the intramuscular use of quinine, and that I have myself been recently a victim to this procedure. It was done quite accidentally, the quinine entering the substance of the triceps brachialis. This was followed by considerable swelling, and the arm was useless for several days. A 5-gr. dose had been used. At the same time a similar dose was injected into my other arm but strictly subcutaneously, and this caused me no inconvenience whatever. So my advice is, avoid the intramuscular use of quinine.

The following is the method of using quinine hypodermically, which is, I believe, mostly practised in India.

Either the hydrobromate or the bisulphate is used. The former is the more soluble salt, but the latter is possibly the more powerful, and is freely soluble in warm water, in the proportion of 1 gr. in 4 minims of warm distilled water. A solution of the bisulphate of this strength requires to be warmed before use, so as to dissolve the crystals that have been deposited on cooling. This warming is done by placing the bottle containing the solution for a few minutes in half a cup of hot water. The dose usually administered to an adult man or woman is 5 gr., but for men of large stature 10 gr. is not too much in a severe attack. But 10 gr. may be used for any adult if the fever refuses to fall with the smaller doses. Osler uses 30 gr., but I never saw a case requiring such a dose, and I fear it would kill most of the patients who come under my care. Doubtless, however, Osler selects his cases carefully. Having warmed the quinine solution the skin of the part to be operated on is disinfected with perchloride of mercury or carbolic acid. The back of the upper arm or flank is the best place to choose.

The next step is to wash out the syringe repeatedly with hot water and smear the needle with carbolized oil. By thus heating the syringe all tendency for the quinine to be precipitated in the needle is avoided. The solution is then injected quickly into the subcutaneous tissues, avoiding, of course, the position of important vessels or nerves. The injected quinine will be found to form a bleb under the skin, which should be at once dispersed by gentle friction with a finger smeared with carbolized oil. If this precaution be not taken a painful lump will be left at the seat of the injection, which will remain there for months. When done as thus described the hypodermic injection of quinine is hardly more painful than that of morphine. Indeed it is very often absolutely painless. Why it is sometimes painful, even when carefully injected, I