

## CONTRIBUTED ARTICLES.

## KALA-AZAR.

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OF the various fevers which were formerly confused with malaria, but which are now distinguished from it by means of the methods of accurate diagnosis which modern science has placed at our command, the most important is probably Kala-azar. It was formerly regarded as a severe form of malaria, often assuming epidemic form, and of a particularly fatal character. About 1870 a severe epidemic of this disease spread northward from Bengal along the Brahmaputra into Assam, causing a huge mortality. Of the persons attacked, on an average 96 per cent. died. Between 1881 and 1891 this "Black Fever" (*Kala azar* or *Kala jor*) as it was called on account of the dark mottled appearance of the skin that is one feature of it, caused a decrease of 24 per cent. in the population of Nowgong, or of 31 per cent. if the indigenous Assamese alone are taken into account. Dr. Giles, appointed by the Government of India to investigate the matter in 1890, came to the conclusion that Kala-azar was caused by the intestinal parasite known as the *Ankylostoma duodenale* or now more familiarly as the Hookworm. Dr. Leonard Rogers was sent to Assam on the same errand in 1896, and reported that Kala-azar was a malignant form of malaria. Neither of these views, however, met with general acceptance. In 1900 Major (now Sir William) Leishman, making a *post mortem* examination at Netley Hospital on the body of a soldier who had died of fever contracted in India, found in the spleen certain minute organisms of a kind he had not observed before and quite different from the parasite of malaria. In 1903 he published a description of these micro-organisms, which led Donovan, an Indian Medical Service officer in Madras, to look for them in the blood of a class of fever patients whose cases had for some time been puzzling him, as they presented features different from those of other fevers. He found the newly discovered parasite in every one of these cases, and the relation between what is now known as the Leishman-Donovan body and Kala-azar was soon established beyond doubt by other investigators in Assam, Ceylon, Burma, China, Egypt and elsewhere.

The Leishman-Donovan body, like the *plasmodium malariae*, belongs to the very primitive order of protozoa, and from the first it was suspected that it was conveyed by some biting insect, in the same way as the malarial parasite is conveyed by the anopheles mosquito. There is good reason to believe that the "carrier" of the Kala-azar parasite is the bed bug, and also that as in the case of malaria the parasite undergoes one stage of its development in the stomach of the "carrier."

Apart from the finding of the parasite by the careful puncture of the spleen, the diagnosis of Kala-azar is rendered easy in most cases by the pigmentation of the skin which has already been referred to. The appearance of the skin is described as black and shining, somewhat like that which is produced

by lightly shading white paper with a black lead pencil. The skin has also the appearance of being stretched, and the hair tends to be dry and to fall out. As the disease advances there is great emaciation of the whole body, the abdomen becoming full and prominent. The cutaneous veins over the lower part of the chest and the upper part of the abdomen appear distinctly, while the vessels of the neck are seen to throb with each beat of the heart. Swelling begins in the feet and tends to spread upwards over the entire body.

Another prominent symptom is the enlargement of the spleen. This is not invariable but it is the rule and the increase takes place with remarkable regularity. In three months the spleen has usually reached halfway from the border of the ribs to the umbilicus and it reaches the umbilicus about the sixth month. The big spleen of Kala-azar is distinguished from that of chronic malaria by being of more rapid growth and of softer consistency. There is usually enlargement of the liver. The fever of Kala-azar in its initial stage resembles that of enteric fever, but its most characteristic feature is a double rise within the 24 hours. As a rule the temperature comes down in the morning and remains low till about midday. It rises in the afternoon, subsides towards evening, but usually begins to rise again late in the evening or towards midnight, to subside again in the morning. It is necessary to take the temperature every three hours in order to demonstrate this double rise.

On the blood being examined microscopically it is found that there is a marked diminution in the number of leucocytes or white corpuscles. There is general anemia, with low blood pressure and rapid action of the heart. There is a tendency to respiratory troubles, bronchitis and pneumonia. One of the many other respects in which Kala-azar differs from other fevers is that the tongue remains clear and the patient has a voracious appetite, but very poor digestive powers. He is very hungry owing to the waste going on in his tissues, but the impoverished condition of his blood enables him to eat very little. Cancrum oris is a common complication—another result of the poor blood failing to keep the tissues in repair,—and dysentery often intervenes to bring the patient's sufferings to an end. The disease, if untreated, proves fatal as a rule in 12 to 15 months, but some cases live for two years.

The history of the treatment of Kala-azar is almost as interesting as that of the discovery of the disease. It has been mentioned that one feature of the disease is the diminution in the number of the white blood corpuscles, and it is a well-known fact that inflammatory processes in the body are accompanied by or cause an increased production of white corpuscles which when greatly in excess form pus. It has been observed that the first effect of cancrum oris and of other inflammatory complications of Kala-azar is to cause a decrease in the size of the spleen and a general improvement in the patient's condition. If this inflammatory process could be arrested in the early stage it might be regarded as a positive benefit, but too often it hastens the death of the patient by following its course without control. This fact,

however, has suggested the idea of producing a local inflammation by the subcutaneous injection of turpentine or some other mild irritant. It is curious that this is a form of treatment for Kala-azar and other cases of enlarged spleen common not only among the people of India but in many other Eastern countries as well. It is a very common sight in India to see a scar over an enlarged spleen, produced by the application of a burning rag that had been dipped in oil. Sometimes the actual cautery is used; a seton is inserted or certain leaves are rubbed into the heated skin. Then the fact that in Kala-azar the alkalinity of the blood is reduced, has led to the use of soda bicarbonate and other alkalies. Under treatment by these various methods cases of Kala-azar were occasionally cured, but the treatment that has proved most successful is the intravenous injection of the soluble salts of antimony. It is claimed for this method of treatment, indeed, that it has reversed the rule: while recovery was formerly exceptional, it is now exceptional for a case in which this treatment is begun at an early stage not to recover.

The latest addition to the literature of Kala-azar is a small book by Dr. Ernest Muir of the Kalna Mission Hospital in the District of Bardwan, published by Messrs. Butterworth, Calcutta, and sold at the modest price of two rupees in order that it may be within the reach of Indian medical practitioners of all ranks. To this useful book the reader may be referred for a full and careful guide to diagnosis and a very interesting and encouraging account of the most approved method of treatment. As regards spleen puncture, Dr. Muir emphasises the need of careful antiseptic precautions when this small operation is undertaken and admits that there are cases in which it should not be performed; but he also says that in his own experience spleen puncture has been possible as a means of making certain the diagnosis in 99 per cent. of the cases, and also that the operation has been performed over a thousand times in Kalna Hospital without any harm resulting.

Dr. Muir also maintains that Kala-azar can be cured by the production of leucocytosis, in the way already referred to. Instead of turpentine for intramuscular injection, he prefers what he calls T. C. C. O., which consists of one dram each of turpentine, creasote and camphor, in  $2\frac{1}{2}$  drams of olive oil. In former days several patients were cured in this way at Kalna, and have remained well from four to eight years. He still uses this method as an adjunct to the intravenous injection of tartar emetic. He does not recommend that the latter treatment should be begun in the acute stage of Kala-azar. It is better to rely at first on one or two injections of T. C. C. O. which frequently cause a more or less rapid diminution of the acute symptoms. We are all military in our phraseology nowadays, and Dr. Muir aptly compares the T. C. C. O. injections to the preliminary artillery attack on the enemies' trenches which prepares the way for the infantry represented by the antimony. In the *Indian Medical Gazette* for May 1918 Sir Leonard Rogers reported that in several cases in Calcutta the intravenous injection of tartar emetic had been followed by serious symptoms and that in three cases the patients died. This disaster he attributed to the solutions having become decomposed, through insufficient care having been taken in the preparation

of them by the subordinate staff. He recommended that the sodium salt (sodium antimonyl tartrate) should be used instead of the potassium salt (tartar emetic) as being less liable to decompose, and having adopted it on this ground he came to prefer it as being less irritating locally and less toxic. On this account it may be used more freely, in larger doses and at shorter intervals. Sir Leonard still believes that with proper care tartar emetic may be used with safety, and Dr. Muir uses both the sodium and potassium salts. His routine practice is, where the acute stage is passed or where there has not been any acute stage (for Kala-azar is sometimes a slow, insidious disease from the first) and where such complications as very low blood pressure, inflammation of the lungs and bronchi, diarrhea and dysentery are absent, to inject one and a half cubic centimetres of a two per cent. solution into a vein in the arm thrice weekly on alternate days, raising the dose by a half cubic centimetre every week as long as there is no coughing, vomiting, giddiness or a febrile reaction of over 2 degrees, or any sign of the above mentioned complications. In children of six the initial dose and the increase should be at half the above rate. In no case should more than 5 c.c. be given in one dose. As long as a febrile reaction follows an injection it may be regarded as a sign that there are still a considerable number of parasites to be destroyed. When no febrile action follows the injections, which is generally the case before the end of the first six weeks of treatment, the remaining injections must be considered as devoted to the destruction of the few lingering parasites, any single one of which would doubtless be sufficient to begin the disease over again. Dr. Muir's rule is to continue treatment for  $3\frac{1}{2}$  months in less advanced and 4 months in more advanced cases. Of complications heart failure in cases of low blood pressure is most to be dreaded. In these cases the careful use of digitalis is indicated, antimony should be reduced or stopped, and the patient kept recumbent. A tonic of iron, quinine and arsenic, with magnesium sulphate if there is constipation should always be given. A very interesting appendix to Dr. Muir's book gives an analysis of 150 cases of Kala-azar treated in the Kalna Mission Hospital from the beginning of June, 1917, to the end of May, 1918. In 133 cases the Leishman-Donovan parasites were found in smears taken from spleen punctures; in 17 cases it was considered either unsafe or unnecessary to take spleen punctures. 18 patients died under treatment, and 4 left hospital before treatment had time to take effect. Of the remaining 128 cases, all had been free from fever for a month before they discontinued treatment, and 123 had been free from fever for two months before they left hospital. An analysis of the cases according to age shows that Kala-azar is far more common in children than in adults. 97 of the 150 patients were not more than 12 years old.