ON THE PRESENCE OF SUGAR IN THE CEREBRO-SPINAL FLUID FROM CASES OF MENINGITIS.

By F. H. JACOB, M.D., M.R.C.P.,

HONORARY PHYSICIAN TO THE NOTTINGHAM GENERAL HOSPITAL AND TO THE HOSPITAL FOR SICK CHILDREN, NOTTINGHAM.

WHETHER the reducing substance be dextrose, saccharose, pyrocatechin, or a mucinoid matters not for the purpose of this short paper. There is in normal cerebro-spinal fluid a chemical substance which reduces Fehling's solution, and this is absent in some cases of meningitis and present in others. There appears in the literature of the subject considerable confusion as to the cases in which it is present or absent, and considerable uncertainty as to its value.

My own experience, based, it is true, on only a small number of cases, has led me to a definite conclusion on this subject, and I consider such examination to be of definite value.

The method adopted is to boil together equal portions of cerebro-spinal fluid and Fehling's solution in a narrow test tube and allow it to rest in a sloping position. In the course of an hour there will be a marked yellow deposit forming a band on the lower side of the tube, and with a little practice one can form a fairly accurate opinion as to whether such band is normal in amount or diminished; where sugar is absent no deposit will occur.

My results are as follows:

1. In 9 cases of tuberculous meningitis sugar was present in apparently normal amount in 1 case; was present in diminished amount in 7 cases; was present in markedly diminished amount in 1 case—this was taken only two hours before death.

2. In 7 cases of pneumococcus meningitis sugar was absent in every case.

3. In 3 cases of streptococcus meningitis sugar was absent in every case.

4. In 9 cases of cerebro-spinal meningitis sugar was absent in 2 cases and present in diminished amount in 7 cases.

5. In 7 cases of poliomyelitis sugar was normal in amount in 1 case and slightly diminished in 6 cases.

6. In 3 cases of mixed septic meningitis, secondary to middle-ear disease, sugar was absent in all 3 cases.

Andrew Connell, in a fine paper in the *Quarterly Journal of Medicine*, January, 1910, gives the results of the examination of the cerebro-spinal fluid for sugar in 133 cases of cerebro-spinal meningitis, testing them in every stage of the disease. He comes to these conclusions:

The results prove that sugar is absent from the fluid during the acute stages of cerebro-spinal fever. This finding was invariable, and it depended, as previously shown, on the presence of active acid-forming meningococci. . . . Sugar, however, is not absent at all stages of cerebro-spinal fever, and during the chronic periods of the disease Fehling's solution may be reduced in the presence of living organisms. It may be said, however, with certain reservations, that the reappearance of the sugar is an indication that the disease is in process of cure.

He also examined 122 specimens from 69 cases of tuberculous meningitis. He states his results thus:

In tuberculous meningitis sugar was found to be present in the great majority of the cases, and at all stages of the disease; 122 specimens were examined. An active reduction on boiling of the Fehling's solution occurred in 15, a partial but decided reduction in 102, and no reduction at all in only 4 instances. Complete absence of sugar was observed in only 2 cases. It was noted in the last week of illness, three times in one case and once in the other, and in each case at other times there was a slight reduction of Fehling's solution.

I would state the conclusions thus:

1. In pyogenic meningitis, pneumococcus, streptococcus, and mixed infection sugar is invariably absent.

2. In cerebro-spinal meningitis sugar is absent in the acute stage, but may return in some degree as the infection recedes.

3. In tuberculous meningitis sugar is present, except in very rare cases shortly before death, in which stage difficulty of diagnosis rarely exists.

4. In poliomyelitis sugar is present.

These findings seem sufficiently definite to be of real value.

THE SCIENCE COMMITTEE

OF THE

British Medical Association,

THE ANAEMIA OF ANKYLOSTOMIASIS.

BY

WILLIAM NICOLL, M.D., D.Sc.,

ERNEST HART SCHOLAR.

The Blood Volume in Hookworm Disease (Ankylostomiasis).

IN regard to the first subject of research the conclusions I venture to draw from my experiments are:—

1. Hookworm disease in dogs is not analogous to hookworm disease in man. In the latter the disease is essentially chronic and progressive, gradually leading to a fatal termination. No great degree of resistance appears to be acquired, although some individuals are apparently less susceptible to infection than others. Again, individuals of all ages are equally liable to acquire infection. In the dog, however, the disease is very acute and rapidly fatal. While all dogs appear to be liable to a greater or less degree of infection, only young dogs (under six months) succumb to the disease. In older dogs infection cannot be pushed beyond a certain point, even with long continued administration of infective material. In those a certain degree of anaemia is slowly produced, but it is also gradually recovered from, and the animal may regain its normal state, even although it remains infected with the worm, which infection, it may be added, may last over two years.

2. The anaemia in young dogs was characterised by great loss of weight, emaciation, prostration, intestinal hæmorrhage, greatly reduced temperature, and accelerated and irregular cardiac beat. These symptoms were present to a less extent in older dogs suffering from a minor degree of anaemia. In the latter the erythrocytes were rarely reduced in number to any great extent, but the hæmoglobin fell in some cases as low as 50 per cent. of normal. In the acute disease of young dogs, however, the erythrocytes were observed under one million per c.mm., and the hæmoglobin 10 per cent. In both cases the blood picture was characterised by the large number of erythroblasts, not infrequently of large size, and polychromatophilia. Eosinophilia was not a constant sign either of infection or of disease, and, in fact, was observed only on few occasions.

3. Infection is generally accompanied by fairly profuse intestinal hæmorrhage, which is most marked in the early stages, and tends to disappear later.

4. The blood volume of dogs suffering from the minor degree of hookworm anaemia is not materially altered, but, if anything, is somewhat diminished. The oxygen capacity of the blood per unit of body weight is also, on the average, somewhat decreased. In the acute stage of the disease the blood volume appears to be decidedly reduced.

5. In the early stages of infection the worms attach themselves to the lower reaches of the ileum, but in the course of time they are found further forward.

6. Cats are much less easily infected than dogs, while monkeys and man were found to be insusceptible to infection with the dog hookworm.

FLIES AND OTHER INSECTS AS CARRIERS OF INFECTION.

By WILLIAM NICOLL, M.D., D.Sc.,

ERNEST HART SCHOLAR.

The Length of Life of the Rat Flea.

RAT fleas (*Ceratophyllus fasciatus*) were removed from their host and kept under various conditions of light, temperature, moisture, etc., in order to determine their length of life without feeding. Altogether sixty-four experiments were performed, involving a total of 463 fleas. The average length of life at ordinary temperatures was found to be 6·8 days, but the maximum in one experiment was over forty days. Two per cent. of the fleas lived for over three weeks, and 10 per cent. for over a fortnight. They live longer in winter than in summer, the difference being about two and a-half days on an average. At