

been fed for a few days, were markedly resistant to acetonitril; such mice recovered from the effects of ten to eleven times the ordinarily fatal dose of acetonitril. No such increased resistance to hydrocyanic acid or nitroprussiate of soda was caused by the thyroid feeding. Thyroidectin had an effect opposite to that of the thyroid, *i. e.*, it increased the susceptibility of mice to acetonitril, but this effect was not greater than that of dry normal blood and was less than that of peptone. Feeding with parathyroids had an effect opposite to that of thyroid, *i. e.*, it caused the mice to become more susceptible to acetonitril; the effect, however, was much less marked than that of the thyroid. Potassium iodid increased the resistance of mice to acetonitril, but the extent of this action was not at all comparable with that of thyroid.

In other experiments it was found that a protein diet (ham and cheese) caused an increased susceptibility of mice to acetonitril; a carbohydrate diet (rice and dextrose) increased the resistance to this poison. As a rule it required about four times as large a dose to kill the animals that were fed on a carbohydrate diet as it did to kill those fed on a protein diet. Animals kept on a very limited diet also showed a marked resistance to acetonitril; in most of such experiments it required about three times as much acetonitril to kill as was necessary to accomplish the same result on animals which had been kept on a normal diet.

The experiments are being continued.

4 (96). "**A case of spirochetal infection in man,**" with microscopical demonstrations: **CHARLES NORRIS.**

The author's object in presenting this case was to give the members of the society an opportunity of seeing spirochetes under the microscope. He did not discuss the clinical history of the case, which occurred in the service of Dr. Carlisle, of Bellevue Hospital.

In July, of this year (1905), the patient shipped as an assistant steward on the steamship *Denver*, of the Mallory line; he stayed five days in Galveston, sleeping on board, and returned on the same steamer to New York. Two days later he was taken with a chill, accompanied by fever, prostration, and pains in the bones. On admission he had a temperature of 102.4°. The fever continued for

two days. After four days of normal temperature, there was a rise of temperature to 105°, which was followed by a period of apyrexia for ten days, when he again had a relapse. At that time the examination of the blood by Dr. Heitlinger showed the presence of a few spirochetas. Ten days later there was another relapse and rise in temperature, associated with the presence of spirochetas in the blood. Inoculation of a monkey with blood containing the organisms gave rise to an infection, with the presence of spirochetas. The monkey has had three relapses thus far with rise of temperature, and the presence of spirochetas in the blood. Two additional monkeys have been infected with the blood of the first monkey.

The case reported is of interest from many points of view. It appears to be the first case of spirochetal infection reported in this country that was verified by microscopic examination of the blood. Another case, it is said, has been recently observed in one of the hospitals of this city.

The research work of the past few years, upon the tropic diseases of man and animals, has brought to light, especially in South Africa, the discovery of the etiologic agents of various hitherto little understood diseases.

Obermeier, in an epidemic of relapsing fever in 1868, in St. Petersburg, was the first to discover the presence of spirochetas in the blood of patients suffering from so-called relapsing fever. The observation was not published, however, until five years later. To Obermeier belongs the credit of having first demonstrated the so-called contagium vivum of infectious diseases in man. The association of spirochetas with another infectious disease was made by Sacharoff in 1890; he demonstrated the etiologic connection of *Spirochæte anserina* to the spirillum fever or septicemia of geese. In recent years, other spirochetas have been described in connection with disease processes. Thus, A. Theiler has described what he calls la spirillose du betail caused by a spirocheta which is found in the blood, where it produces an anemia, being present among cattle in a bad condition. Like the *Piroplasma bigeminum*, it lives in the blood of immune cattle, as the disease has been inoculated with the blood of such cattle. The disease is conveyed through the agency of the blue tick, which is the intermediate

host. Like the piroplasma, the infective agent passes into the egg and is inoculated by the larvas. Theiler believes that this spirocheta is a parasitic protozoön.

Two English observers, Dr. Todd and the late Everett Dutton, have found that the tick fever, or at least some cases of tick fever, are associated with the presence of spirochetas in the circulating blood. They believe that tick fever is clinically identical with relapsing fever, and that its pathogenic agents are spirochetas, which they consider are probably identical with the spirochetas of relapsing fever, as described by Obermeier. They believe that a tick, *Ornithodoros moubata*, transmits the spirillum from animal to animal, since they have seen the disease conveyed to a monkey by a tick, and they have evidence that young ticks, after their first feeding, if bred from infected mothers, are able to transmit the disease. They have not been able to trace the spirilli in infected ticks further than the stomach and malpighian bodies. In the light of Marchoux and Salambeni's work, upon the transmission of the spirillum disease of fowls by ticks, Ross considers it probable that the disease in man is also inoculated by infected ticks.

It is unnecessary to enter at this time into the discussion of the protozoön nature of this interesting group of organisms, except to recall that Schaudinn believed there is little doubt that the spirochetas of relapsing fever and of the septicemia of geese will be shown to be trypanosomes, and hence unrelated to the bacteria. Novy and McNeal, it will be remembered, have shown, in a communication to this society,¹ that Schaudinn's interpretation of what he has seen is subject to grave doubt. The spirochetal forms of the trypanosomes depicted by Novy and McNeal, have not the slightest resemblance either to the organisms of this case or to Obermeier's or Sacharoff's spirilli, as shown by the photographs of the latter. The question as to the identity of the organism of this case, with that of the spirillum of Obermeier cannot be settled off-hand. On account of the great variety in the clinical symptoms of the reported cases of relapsing fever observed during the epidemics, it is perhaps unreasonable to draw any conclusions, either for or against the identity of the organism of this case with that of relapsing fever.

¹ *Proceedings of this Society, 1904-'05, ii, p. 23.*

To settle this question, morphology gives us little help. Although the organism of this case resembles the descriptions of the morphology as well as the photographs, of the spirillum of Obermeier, in practically all respects, it must be remembered that the spirillum of geese is strikingly similar to that of Obermeier, and yet, in the animal reactions, the anserina may be sharply differentiated from that of Obermeier, as it is not infective for monkeys.

The organism of this case, like Obermeier's, is infective for monkeys. The following differences have, however, been noted: The disease transmitted to the monkeys that were inoculated by the author seems to have been much milder than the experimental spirillum infection of those animals, as reported by various observers. Relapses in monkeys have rarely been noted; by one observer, in only one out of eight cases. Other observers seem never to have observed relapses. In the author's experience, each of three monkeys has had relapses, the first Rhesus having already had three.

Dr. Ewing has also called the author's attention to the fact that the spirochetes of this case, as seen in the blood of the inoculated monkeys, as well as in the human blood, is similar to *Spirochaete refringens*.

Such a case directs attention to the probability of mild spirochetal infections, more or less constantly occurring, in sailors or travelers coming from southern climates into the port of New York. The author also called attention to the possibility that infection may be communicated, from person to person, through the bites of ticks and bed-bugs, and through wounds.

5 (97). "**The chromosomes in relation to the determination of sex in insects**": **EDMUND B. WILSON.**

Material procured during the past summer (1905) demonstrates with great clearness that the sexes of Hemiptera show constant and characteristic differences in the chromosome groups, which are of such a nature as to leave no doubt that a definite connection of some kind between the chromosomes and the determination of sex exists in these animals. These differences are of two types. In one of these, the cells of the female possess one more chromosome than those of the male; in the other, both sexes possess the same number of chromosomes, but one of the chromosomes in the male