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Presence of Spirochetes in the Urine and Prostatic Fluid of Patients with Relapsing Fever.

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So far as is known spirochaetes have never been demonstrated in the urine or prostatic fluid of patients with relapsing fever. A study has been based on patients suffering from the Chinese type of this disease.

Altogether 45 specimens of urine from 41 patients with *Spirochaeta recurrentis* in the peripheral blood have been studied. In obtaining specimens for examination, only clean glass jars were used and only the second portion of the urine was collected. In most cases, the external genitalia were cleaned with soap solution, water and finally with a dilute solution of bichloride of mercury just prior to the collection of a specimen. In all instances, the urine was examined soon after it had been collected. To facilitate the search for spirochaetes, 10 cc. of each specimen of urine were centrifuged at high speed (2,000-2,500 r.p.m.) for 20 minutes. Four drops of the sediment on 4 different slides were examined under the darkfield microscope before a urine specimen was declared negative. In the positive specimens, it was not necessary to examine more than one or 2 drops of the sediment to find the spirochaetes. The urinary sediment of 3 patients was instilled onto the conjunctivæ and oral mucosæ of 3 squirrels respectively and that of 3 other patients was inoculated intraperitoneally into 3 other squirrels to ascertain whether or not the spirochaetes present were viable and virulent.

In most instances the urine was also examined for its reaction, albumin, sugar, casts, and blood cells. The duration of illness and the age of patients were also noted in every case. All patients were males, and none of them had any obvious urethral disease or genital lesions.

The urine of 27 (65.9%) of the 41 patients studied showed spirochaetes morphologically indistinguishable from *Spirochaeta recurrentis* present in the patient's blood. Most of the spirochaetes found were dead or motionless, but occasionally living spirochaetes were also encountered. One of the 6 squirrels inoculated with urinary sediments developed relapsing fever 18 days later with numerous *Spirochaeta recurrentis* in the blood. The presence or

absence of blood cells and casts and the duration of illness did not appear to have any definite relation to the presence of spirochaetes in the urine, although it appears almost certain that whenever there is considerable hematuria during the febrile period, more spirochaetes are likely to be present in the urine than otherwise. In 2 patients many spirochaetes were found in the urine during the febrile period when the blood was positive, but none were found in the urine passed during the remission when the blood was already negative.

During the febrile period prior to specific treatment, 6 patients with relapsing fever were subjected to prostatic massage for 30 to 40 minutes, but only 2 of them yielded a few drops of prostatic fluid. These 2 patients were Chinese males in their thirties on the 4th and 5th day of the disease respectively and both were free from genito-urinary disease. Because of the small amount of the fluid available for study, the specimen obtained from one patient (on the 4th day of illness) was employed for direct examination under the darkfield microscope and that from the other patient was inoculated intraperitoneally into a splenectomized squirrel. Although the specimen subjected to direct darkfield examination showed no spirochaetes, the other specimen infected the animal with relapsing fever as evidenced by the occurrence 7 days later of fever and numerous *Spirochaeta recurrentis* in its blood.

Summary. The urine of 27 (65.9%) of 41 patients with relapsing fever contained spirochaetes morphologically indistinguishable from *Spirochaeta recurrentis*. In most instances the organisms were motionless or dead. One of the 3 squirrels inoculated with urinary sediment developed relapsing fever, showing that viable and virulent *Spirochaeta recurrentis* were present in the urine. Viable and virulent *Spirochaeta recurrentis* were also recovered from the prostatic fluid of one patient.