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## A LEPTOTHRIX ASSOCIATED WITH CHRONIC HEMORRHAGIC NEPHRITIS \*

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In addition to cases of hematuria associated with known causes, such as tuberculosis, stone, tumor, etc., there occasionally occur cases of hematuria of obscure etiology, known as "essential hematuria," "renal epistaxis," or "renal hemophilia." On account of its clinical resemblance to such conditions, the case here reported is of interest.

A German girl, 15 years old, was admitted to the Durand Hospital with scarlatina. She had been well, except for measles and whooping cough, until her twelfth year; then she had been confined to bed for 2 weeks with her first attack of hematuria. She had been skating and had caught cold. The cold had been followed by sore throat, fever, pain in both lumbar regions, and bloody urine. Thereafter at intervals of 3 to 30 days, usually only a few days, she had had attacks of general malaise and aching in the lumbar region, followed by large amounts of blood in the urine.

Two years after the onset of hematuria she had had diphtheria, and during the 6 weeks of quarantine the bleeding had been severe. On being released from quarantine she had sought medical advice. A thorough examination, including cystoscopy and ureteral catheterization, had revealed nothing pathologic except blood coming from both kidneys. After a fruitless search for tubercle bacilli, a diagnosis of chronic nephritis had been made. The onset of scarlet fever had been preceded by an attack of hematuria.

On admission there was tenderness in both lumbar regions. The systolic blood pressure was 102. There was a fading scarlet rash.

The urine, which was dark reddish-brown and turbid, gave a heavy precipitate of albumin and showed in a drop of the uncentrifugated specimen many erythrocytes, blood casts, and an occasional finely granular cast. Polymorphonuclear leukocytes were comparatively few in number.

Repeated examinations for tubercle bacilli (simple smear and anti-formin preparations) gave negative results. Cultures of 2 c.c. of uncentrifugated urine in dextrose agar shakes made at the time of admission and again 9 days later, yielded the organisms to be described in about the same numbers.

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*Leptothrix*.—From 2 c.c. of urine there grew innumerable small colonies of gram-positive organisms, varying from short bacillary forms to long, tangled threads, the thread form predominating. The organism showed neither true nor false branching and did not have a sheath. It was anaerobic and grew slowly. On blood ascites agar, the colonies, as they first appeared, were transparent points, which by the end of a week had coalesced, forming a thin, brownish, opaque film. Growth on human blood agar was more luxuriant than on goat's blood and human ascites fluid agar. The blood was not affected by the growth of the organisms. On ordinary media the growth was too slight to give satisfactory cultural reactions.

*Yeast*.—From each 2 c.c. of urine there developed 3 to 5 large, fuzzy, white colonies of an aerobic yeast, which grew only on dextrose-containing media. Inoculated intravenously and subcutaneously into a rabbit, the yeast caused no lesions.

The leptothrix growth from 4 agar slants was injected into the marginal vein of a rabbit's ear. The animal died in convulsions almost at once. A second rabbit, inoculated with the growth of leptothrix from one agar slant, like the first rabbit died immediately. Attempts to produce disease in rabbits with smaller amounts of the leptothrix, injected intravenously and subcutaneously, failed. Animal experiments were then discontinued, as the organism had apparently lost its toxicity, even in dosage exceeding that in which it was fatal when first isolated.

The patient received the following doses of a vaccine from the leptothrix: on April 12, 1 million organisms; on April 14, 2 million organisms; and on April 24, 4 million organisms.

After the third dose, the patient reported that the urine, which had been macroscopically free from blood, became very bloody for 3 days. Tho she had previously had attacks characterized by general malaise and large amounts of blood in the urine at intervals of 3 to 30 days, another one did not occur during the next 16 weeks. The dose of vaccine was reduced; an injection of 2 million organisms was made on May 8; and again on May 15.

On microscopic examination red cells were still found in the urine after the fourth and fifth injections and the dose of vaccine was further reduced; injections of 500 thousand organisms each were made on May 22, May 29, June 5, June 19, and June 26, respectively.

After the ninth injection no erythrocytes were found in the urine; it still showed an occasional hyaline or granular cast. The patient meanwhile had gone back to work and had resumed active outdoor exercise. The urine remained free from red cells during the following 9 weeks that she was under observation. Injections of one-half-million doses at intervals of 1 to 2 weeks were continued. On July 31 the urine contained a few hyaline casts. On August 21 several hyaline casts and an occasional granular cast were found.

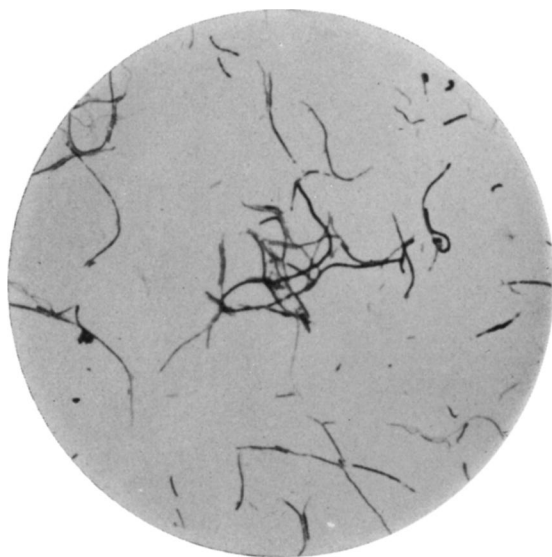


Fig. 1. Photomicrograph of *Leptothrix* in pure culture.

The exact classification of organisms of the group Trichomycetes, which have been observed in a variety of diseases, is made somewhat difficult by the confusion in nomenclature. The classification followed by us is that given by Lehmann and Neumann.<sup>1</sup>

Arustamow<sup>2</sup> isolated a leptothrix from the urine of a tabetic, but it is not clear from the abstract of the original article, which is Russian, that the organism was associated with any disease of the urinary tract. Flexner<sup>3</sup> isolated a pathogenic leptothrix from a puerperal infection of a rabbit. *Leptothrix* infections of the throat have been described (pharyngomycosis leptothrica, Chiari;

1. *Bakteriol. Diagnostik*, 1907, 2, p. 588.

2. *Centralbl. f. Bakteriol.*, 1889, 6, p. 349.

3. *Jour. Exper. Med.*, 1905, 1, p. 211.

mycosis tonsillaris benigna, B. Frankel), and it is interesting to note that in the case now reported the first attack of hematuria was preceded by a sore throat.

Our case may be summed up as a chronic nephritis, characterized by frequently recurring attacks of hematuria extending over a period of 3 years, and by *Leptothrix* in large numbers in the urine. The presence of the leptothrix in the urine is not proof that it caused the nephritis and hematuria with which it was associated. But the large numbers in which it was found, its toxicity for animals, and the marked improvement of the patient during vaccine treatment suggest a causal relation.