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MIESCHER'S OR RAINEY'S CORPUSCLES IN ACTINOMYCOSIS.

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THESE structures have been described by many observers but there has always been a doubt as to their nature.

Claus in his text book of Zoology, translated by Sedgewick (1884) figures them and describes the appearance shown as an animal inside a muscle fibre. In a portion more highly magnified a number of rod-shaped bodies are shown and small round particles, which are called spores. Ziegler alludes to them and says: "They are cylindrical or tube-like bodies, found not infrequently in the muscles of the pig, ox, sheep and mouse. They contain an innumerable multitude of small oval or reniform corpuscles. Nothing is known of their effect on the human system."

By far the most voluminous account is given in Leuckart's "Parasites of Man," translated by Wm. E. Hoyle, M.A., 1886. He says, in speaking of coccidium oviforme, "whether structures somewhat similar to the above, these 'Miescher's tubes' (synchybium Mieschierianum, Zopf) are to be referred to the class sporosoa, is more doubtful, since no phenomena of movement have yet been observed in any developmental stage.

"Since, however, they usually rank with the psorosperm-saccalis, in accordance with a division, which I was the first to give (this work, first German edition) and have indeed many points of resemblance with these forms; a brief discussion of their nature is necessary."

He states they are of common occurrence in pigs, oxen, sheep

presented by the author.

and even deer. They were first noticed by Miescher in the muscles of a mouse.

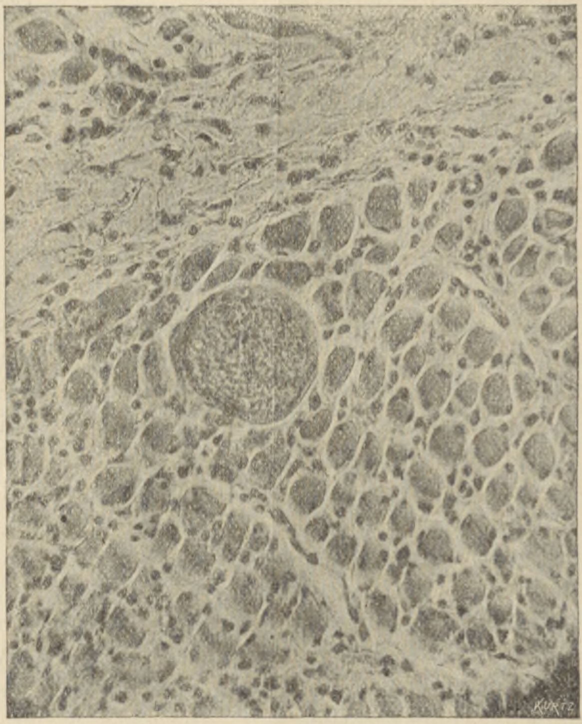


FIG I.—TRANSVERSE SECTION OF ACTINOMYCOTIC TONGUE OF COW, SHOWING MIESCHER'S CORPUSCLES.

They "appeared as cylindrical tubes filled with countless kidney-shaped bodies." He also states that "similar tubes were seen by Hessling in the muscle of the roe and other mammalia inside the muscular fibres, and surrounded on all sides by the striated sarcous substance. His observations and

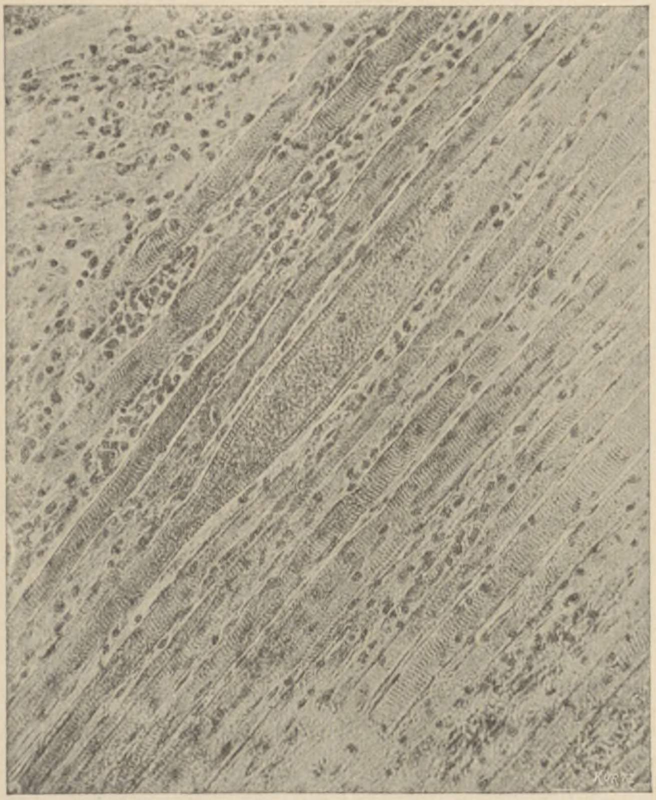


FIG. 2.—LONGITUDINAL SECTION OF ACTINOMYCOTIC TONGUE OF COW, SHOWING MIESCHER'S CORPUSCLES.

Rainey's proved that the occurrence of these bodies inside the muscle fibre was constant. He states they have not been found elsewhere, although numerous observers have devoted close attention to them.

In describing the minute appearance he says, "Inside the cuticle, embedded in a tough, somewhat homogenous, matrix lie a countless number of microscopic (0.01mm) kidney-shaped or bean-shaped bodies."

Further on he says, "These structures are not equally scattered throughout the protoplasm of the tube but are arranged in groups."

He also states that a pig proved to be free from these tubes was fed with them, and was afterward found to be infected with them.

The above account gives, as far as I know, all that has been made out concerning these structures. In examining some cases of actinomycosis bovis, I found that many of the muscle fibres of the tongue contained structures which appeared to be identical with those described and figured by Claus and Leuckart. On reading their descriptions, I found the statements so ambiguous I determined to work the matter up thoroughly. The material used was the tongue of cows affected with actinomycosis, hardened in the usual manner with a mixture of chromic acid and spirit. A large number of sections were made and the mycelium and rays found throughout, but the rays were more frequent in the tissue under the epithelium, where they had caused local inflammatory action.

In all the specimens I have examined the rays are very small, and nothing like the size figured by many recent writers.

I have found that almost every section contained one or more muscle fibres, either cut longitudinally or transversely, having in its interior the so-called Miescher corpuscle. The accompanying illustrations, made with a Beck $^4/_{10}$ inch, giving a magnification of 130 diameters, show very well the appearances presented.

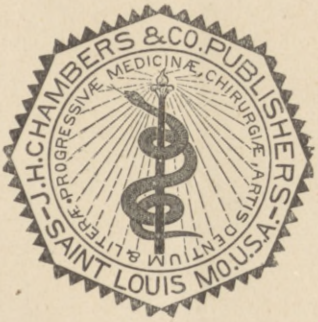
In the ordinary specimen stained with logwood, these corpuscles present a granular appearance, but with a $^1/_{12}$ oil immersion some rod-like structures could be made out. I tried other staining agents but could not bring out any thing more definitely. I then had recourse to double staining and found that some of the substance in the corpuscles gave a different chemical reaction to the rest. I tried various combinations, and I may mention here that double and treble staining has been of the utmost value to me in solving many difficult points in minute histology and pathology. I read a paper on this subject before the Royal Microscopical Society in 1880, and since then I have had occasion to modify some of the processes but the method is the same. I have to use colors that will not combine in the sections, but will differentiate various elements. I find picro-carmine still the best ground stain and I always stain deeply with it, before trying other colors, in this way the connective tissue, muscle, fibres, etc., are colored red to begin with. Having stained in this manner the sections of cows' tongue, I found that the contents of the corpuscles were still uncolored. My object was to find out a stain which would color the rod-like bodies which were dimly visible, with a high power in the corpuscles. After a number of trials I found that I obtained the best result with an aqueous solution of Spiller's purple 2%, this gave the rods a decided color and did not stain the surrounding granular matter. I was now able to study them with the highest powers and I found that they were quite distinct from the granular matter surrounding them. On examining some of the inflammatory nodules in the sub-epithelial tissue I found that the rays were highly colored exactly the same as the rod-like bodies in the corpuscles inside the muscle fibres, and on comparing the two they appeared to be identical. I noticed that the mycelium in the sections had a faint yellow tinge from the picro-carmine, and on closer examination I found the same in the granular matter of the corpuscles.

From a careful examination of specimens prepared in the manner described I have drawn the following conclusions:

1. The so called Miescher's or Rainey's corpuscles are produced by the growth inside a muscle fibre of the ray fungus of actinomycosis.

2. That the kidney-shaped or bean-shaped bodies described by Leuckart and others are the rays of the fungus.

3. That the granular matter in which these seem to be embedded is the mycelium of the fungus.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