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THE STATUS OF THE GENUS MICROCOCOCCUS COHN, 1872¹

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Several recent authors have questioned the status of the genus Micrococcus as proposed by Cohn, 1872 (Heft 2, page 151). A careful review of the proposals that have been made regarding the nature of the genus Micrococcus is given by Buchanan (General Systematic Bacteriology, 1925, pp. 373-377).

The first paragraph of this review reads as follows, and is quoted verbatim because it gives an excellent summary of the way in which the name Micrococcus came into bacteriological literature: "Micrococcus. This name was first used by Hallier (1866) to indicate a growth form of a mold in accordance with his conception of pleomorphism. He did not use the name in a generic sense, and the genus should therefore not be ascribed to him, as has frequently been done by various authors. Cohn (1872, p. 151) adopted the name and defined it as a genus containing very small spherical or oval organisms, with colorless or light colored cells, without motility, remaining after cell division united into rosary-like threads, many-celled families or slimy masses. The first organism to which the name was given was Micrococcus prodigiosus (Ehr.) Cohn. This organism is now generally removed from this genus

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because of its shape. The next organism was named M. luteus (Schroet.) Cohn. This form may well be considered the type of the genus as it has been adequately described."

Later Cohn (1875) split his former genus into two, creating the new genus Streptococcus Cohn. His revised definition of Micrococcus included those organisms with "spherical cells, amorphous, cells without phycochrome, very small."

It will be noted that during the period between 1872 and the time when liquefiable solid culture media came into use, no one questioned the inclusion in Cohn's emended genus Micrococcus of certain species that were later shown to have the ability to grow out into distinct rods. Two of these species were Cohn's so-called Micrococcus prodigiosus (presumably Serratia marcescens Bizio, 1823), and Micrococcus violaceus (presumably Chromobacterium violaceum Bergonzini, 1881), and other species that would have been recognized as rods if studied by modern methods. Cohn and Schroeter studied their organisms as grown on slices of cooked potato and on coagulated egg albumen. Colonies appeared on these solid culture media when they were exposed to air. Many of the colonies on potato and egg white media were mixed cultures but some were pure cultures. These were preserved in the early days in broth cultures.

It was Zopf (1885, page 51) who divided the cocci of Cohn into the genera Micrococcus, Streptococcus, Merismopedia, Ascococcus and Sarcina. Zopf defined Micrococcus as made up of cocci not in packets and as producing large quantities of capsular material. He speaks of cells being irregularly arranged in grape-like clusters. Zopf regarded the generic name Staphylococcus Rosenbach, 1884, as a synonym of Cohn's Micrococcus, 1872.

Zopf places 14 species in the genus Micrococcus, several of which would be accepted today as true micrococci; but he, like Cohn, still included certain organisms that are now regarded as short rods. The elimination of these short rod forms did not really take place before Migula emended the description of Micrococcus in such a way as to eliminate motile forms, and to limit the genus to organisms where the individual cells occurred as spheres, these being frequently united into twos and fours, division taking place in two perpendicular planes.

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Throughout all of this period one of the species described by Cohn in 1872 was retained in the genus by all authors. This species, which was a true Micrococcus, was named Micrococcus luteus by Cohn. Breed (Internatl. Bull. Bact. Nomen. and Taxon., 1952, 2:85-88) points out that the description of this species given by Cohn and Schroeter is adequate to permit rather positive identification of this species. Following sound principles governing the selection of type species for a genus, Buchanan (1916) designated this species as the type species of the genus Micrococcus Cohn. This designation of Micrococcus luteus as type species fixes the nature of the genus and has been accepted by later authors, such as Winslow et al., 1917, and in various editions of Bergey's Manual between 1923 and 1948.

It is not surprising that under these circumstances authors that are unfamiliar with the principles followed by taxonomists in fixing the nature of genera by the use of the type species concept should have found this history so confusing that they have contended that the genus Micrococcus Cohn, 1872, should be regarded as so poorly described as to be unrecognizable.

It is therefore recommended that the Judicial Commission on Bacteriological Nomenclature review the status of the genus Micrococcus Cohn, 1872, type species Micrococcus luteus (Schroeter) Cohn. Breed 1952 recommended that culture No. 398 of the American Type Culture Collection be accepted as a type culture for the genus Micrococcus but Gibson (Internatl. Bull. Bact. Nomen. and Tax., 1953, 3:129-133) has questioned the selection of this culture on the ground that he was unable to grow this organism in Cohn's ammonium tartrate solution. Recently a review has been made of the original description of the growth of Micrococcus luteus in Cohn's ammonium tartrate solution, whereupon it was discovered that Cohn reports that no growth took place in this solution for six weeks, and then only a slight turbidity appeared near the surface. Cultures have recently been made (1955) in Cohn's ammonium tartrate solution and held for six weeks, whereupon growth took place just as described by Cohn. On repeated transfers of these organisms, first to slants to make sure that the growth was due to the organism originally inoculated into the tube and then into other tubes of tartrate solution, cultures of No. 398 have grown in Cohn's ammonium tartrate solution

within ten days to two weeks. This culture appears to be a typical culture of Micrococcus luteus.

In light of these results it is recommended that culture No. 398, Micrococcus luteus of the American Type Culture Collection be designated as the type culture for the genus Micrococcus.