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THE TYPE SPECIES OF THE GENUS
MICROCOCCUS

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Some statements regarding the characteristics of the type species of the Genus Micrococcus as made by Abd-el-Malek and Gibson (1) should be corrected before they cause confusion. These concern the species Micrococcus luteus (Schroeter) Cohn. In their description of this species as a gelatin-liquefying yellow organism Abd-el-Malek and Gibson (1) have followed the incorrect characterization by Lehmann and Neumann (2) and apparently have ignored Schroeter's original description and the nomenclatural rules governing such cases.

A review of the original literature shows that Schroeter's work, done in 1872, was not earlier than the period of pure cultures; indeed it was Schroeter that introduced the use of slices of sterile, cooked potato in this work. On exposing this solid culture medium to the air of the laboratory, he secured colonies, many of which must have been in pure culture. The yellow spherical bacteria obtained in this way were named Bacteridium luteus (sic). Moreover, Cohn working with Schroeter found that this organism grew in his culture solution in which ammonium tartrate was the only source of nitrogen. In these few characters the nature of this species is much more definitely established than Abd-el-Malek and Gibson apparently realized. During the next 17 years in which cultural methods developed rapidly Schroeter, still working with Cohn, continued to study this species on new culture media, especially gelatin, so that when he redescribed this species in 1886 (3) he added other

pertinent characters, the most important being that it does not liquefy gelatin.

While several authors who list this bacterial species add nothing pertinent to this description, it is noteworthy that Eisenberg (4) and the Franklands (5) followed Schroeter in describing the organism as a non-liquefying, yellow micrococcus. Eisenberg who evidently studied freshly isolated cultures notes some additional characters such as growth at room temperature.

With this species well established, Lehmann and Neumann bring the first **discrepant** note into the description of the species in stating that it liquefies gelatin. It is this incorrect statement that Abd-el-Malek and Gibson have accepted, as have others who have not looked up the original description of the species. The source of this error on the part of Lehmann and Neumann, continued into their latest edition (6), is not difficult to find, for these workers prepared their descriptions from their own studies of cultures, many obtained from the Kral Collection. Those of us that have used Kral cultures and have studied his catalogues know that he frequently sent out named cultures identified by some one other than the original author. Frequently these identifications would have been repudiated by the original investigator if he or she had been consulted. This certainly would have been the case with this species if Schroeter had been consulted. Lehmann and Neumann regard the species named by Schroeter Micrococcus luteus as identical with Micrococcus flavus liquefaciens Flügge 1886, and identify the non-liquefying yellow coccus with Micrococcus sulfureus Zimmerman.

Migula (7) describes Schroeter's Micrococcus luteus as non-gelatin-liquefying. Chester (8) follows Lehmann and Neumann in describing the species as liquefying gelatin (but he notes the Frankland's statement that it is non-liquefying). Because Bergey followed Chester in many of the descriptions given in the first edition of Bergey's Manual (8) this edition lists the species as a liquefier.

Meanwhile Winslow and Winslow (10) had published the first extensive monograph of the Coccaceae. They recognize

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Micrococcus luteus as a non-liquefying, yellow chromogen, that does not reduce nitrates and grows in media containing ammoniacal nitrogen only. Unfortunately, in selecting Micrococcus flavus as type species for Micrococcus they do not observe the nomenclatural rule that the type species of a genus must be one of the species placed in the genus by the author when he first proposed the genus. Buchanan (11) (1917) corrects this and selects Micrococcus luteus as the type species, a selection later accepted by Winslow et al (12) and by Bergey throughout the various later editions of Bergey's Manual.

Hucker (13) likewise accepts Micrococcus luteus as the type species and describes it as do Winslow and Winslow (10) in accord with Schroeter's original description. His work was completed about the time the first edition of the Manual appeared and he called Dr. Bergey's attention to the fact that early authors all agree in regarding Micrococcus luteus as a non-liquefying, non-nitrate reducing yellow coccus. The fourth essential character of utilization of ammoniacal nitrogen was not added until the third edition. For all who follow the accepted rules governing nomenclature, these must be the characters of the type species of the genus.

Summary. The type species of the genus Micrococcus is M. luteus (Schroeter) Cohn. It is a non-liquefying, non-nitrate reducing, yellow-pigmented coccus capable of utilizing ammoniacal nitrogen as sole nitrogen source.

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ADDENDUM

After the above was written, Dr. G. J. Hucker made his personal records of the cultures that he studied available to me. Two of his cultures were sent to the American Type Culture Collection and are now being distributed from the collection as No. 379 and No. 398. The first of these cultures was received from Kral under the label Micrococcus luteus, isolated from water in 1892. This culture was not regarded by Dr. Hucker as M. luteus. In fact, he identified it as a Sarcina and carried it in his collection under the number S46 to indicate this fact. It is a gelatin liquefier.

On consulting the 1900 Kral catalogue, I find their culture of M. luteus listed in a way that indicates that it came from Lehmann and Neumann. Presumably the culture sent to the Kral collection under this name was isolated and identified by Lehmann and Neumann during the period when they were studying cultures in preparation for the publication of the first edition of their Manual. This would explain their statement that the culture was a gelatin liquefier. On the other hand, ATCC culture 398 (carried in Dr. Hucker's collection as No. 426) was isolated from water and found to have characters that agreed with the characters given in Schroeter's original description of the organism. This culture apparently would make a good culture to select as the type culture for the type species of the genus Micrococcus.