

## CURRENT LITERATURE

### BOOK REVIEWS

#### Actinomycetes

The last decade has witnessed the publication of a considerable number of lengthy papers dealing with one or more species of the genus *Actinomyces*. None, however, has equaled, either in volume or in scope, LIESKE'S<sup>1</sup> recent book, in which are incorporated the results of seven years of research, besides considerable information obtained from the very extensive bibliography, of which nearly 400 titles, representing only a part of the total, are cited. The largest section of the volume is devoted to a treatment of the physiological properties of the Actinomycetes, including their reactions to nutrient and tonic compounds, their production of odors and pigments, their enzymatic activities, as well as a discussion of variations of different strains of *Actinomyces* arising in response to changed conditions, or quite spontaneously under uniform conditions. The spontaneous variations with respect to chromogenesis, sporulation, oxygen requirements, thermal relations, and production of odors, the author regards as being in the nature of mutations. The two final sections of the book deal with the relation of the group of organisms to animal and human diseases, and to the diseases of higher plants. In connection with the latter, the galls of alder roots are discussed, and a certain amount of evidence, unfortunately not altogether conclusive, is adduced to show that the causative organism is a species of *Actinomyces*.

In the Preface, the author expresses the justifiable hope that the book may have been made to embrace both the botanical and the medical provinces of bacteriology. He sees in the methods of medical bacteriology a more highly developed technique, from the use of which botanical investigations might profit. Accordingly it is not surprising that the research reported in the book, not excluding the section on morphology, is the product of the established type of medical bacteriological technique, although the latter thus far can hardly be credited with having revealed much concerning the structure of any group of microorganisms. The material to be studied appears largely to have been crushed or smeared on the slide, fixed by heating, and stained by Gram's method. The author concludes that septa are absent from the aerial sporulating filaments, which in view of the fact that the stains used fail to show the walls of fungi, even when these are clearly visible in unstained preparations, need occasion no astonishment. It is to be regretted that some stain known

<sup>1</sup> LIESKE, RUDOLF, *Morphologie und Biologie der Strahlenpilze (Actinomyceten)*. 8 vo. pp. ix+292. pls. 4 (colored). figs. 112. Leipzig: Gebrüder Borntraeger. 1921.

to affect wall material, as, for example, Delafield's haemotoxylin applied for several hours, was not tried. The process of sporulation is held to be similar to the division of bacteria, and is generally referred to as a breaking up ("Zerfall") of the filaments, both aerial and submerged. It appears difficult to understand why the irregular degenerative structures developed in submerged material, shown in fig. 49, should be designated as spores at all. In fig. 44, showing the development of aerial spores, sporulation is represented as involving the filament below the point of insertion of a branch, a condition which perhaps it might be not at all easy to find realized in any preparation. A new type of spore is also described, the "Vierhyphenspore." The development of the latter is initiated by the proliferation of two short branches at right angles near the tip of a filament. The four elements about the intercalary portion then assume symmetrical positions with reference to it, and yield their contents to the intercalary portion, the latter thus becoming the spore. Although nuclear fusions were not observed, the author believes it probable that some sort of sexuality may be present, the figures observed appearing to show some similarity to the so-called zygosporangia of certain microorganisms. In spite of the remarks of the author, the figures illustrating these structures do not impress the reader as anything especially distinctive, and he is left to wonder why the author saw here a character recalling the fungi, when he failed to find fungus characteristics in the incomparably more distinctive sporogenous apparatus.

In general the author seems inclined to minimize the significance of such fungus-like characteristics as are revealed even on smear preparations stained according to GRAM. He recognizes in the Actinomycetes a group of organisms occupying an independent position between the fungi and the bacteria, but more closely related to bacteria, particularly to those of the acid-fast type. As to a taxonomy of species, he offers little in the way of encouragement to followers of precedent. The concept of species he holds to be utterly impossible to apply here, all strains showing an exceptional degree of variability under different conditions, and the presence of intergrading strains bridging over whatever differences may be observed between extremes. Moreover, the different strains are said to change their physiological and morphological characteristics in relatively short periods of time, a circumstance that would rob any attempt at classification of any except a slight historical interest. Even the recognition of group species, certainly not a very happy conception at best, is held to be futile for the same reasons. One might desire the author to have extended his observations on the tendency toward mutation, to include besides characteristics like color of thallus, spore color, or abundance of sporulation, in respect to which it is almost impossible to get any group of fungi to behave in a consistent way, possible significant changes in structure. As the direction of relation of the spiral sporogenous hyphae, for example, has been reported to be an invariable specific characteristic, it would have been interesting to learn whether or not this too is subject to change by mutation.

The volume contains an abundance of illustrations, including a large number of microphotographs of excellent quality, as well as four plates of colored figures very well executed and reproduced.—CHARLES DRECHSLER, *New York Botanic Gardens.*