but there were never any indications of growth or cell division.

There has been but a single claim for isolation of this species. Kutscher identified one of his pure cultures as *Sp. volutans* Ehbg., but his identification was questioned by Migula.[7] According to Migula, the organism isolated by Kutscher should be designated as *Sp. giganteum* (Kutscher) Migula. This has caused considerable confusion since many workers employed Kutscher's organism in their studies on the cytology and physiology of bacteria, and referred to the organism as *Sp. volutans*. The illustrations by these workers bear little or no resemblance to the true *Sp. volutans* Ehbg. There seems, therefore, no reason to believe that this species has yet been isolated.

A cytological study of the several species has been completed and will be published elsewhere. The pure cultures have been deposited in the American Type Culture Collection.

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OXIDATION OF SULFANILIC AND ARSANILIC COMPOUNDS BY NASCENT HYDROGEN PEROXIDE

OTTENBERG and Fox[1] have reported that colored products appeared following ultra-violet irradiation of dilute solutions of sulfanilamide. The blue-violet products seemed of particular interest. Fox, Cline and Ottenberg[2] as well as Rimington and Hemmings[3] emphasized that the formation of the blue derivative involves an oxidation of sulfanilamide, since the presence of oxygen is necessary for the formation of the blue-colored irradiation product.

Oxidation of sulfanilamide by chemical means to a blue product had not been accomplished, when Fox, Cline and Ottenberg published their article.[2] In the meantime I[4] have reported that, under certain experimental conditions, solutions of sulfanilamide treated with oxygen form hydrogen peroxide and a blue-violet compound which is reversibly reducible and oxidizable. The hypothesis was advanced that the formation of this blue-colored substance may be due to the influence of nascent H_2O_2. In further experiments being published in detail elsewhere it was found that nascent hydrogen peroxide as formed on autoxidation of hydrazine solutions (Gilbert,[5] Schales[6]), in presence of cupric ions oxidizes sulfanilamide promptly to blue-violet derivatives. These substances are reversibly reducible and oxidizable, and, when freshly formed, extractable with amyl and butyl alcohols and other organic solvents. They are comparatively stable in those solvents but unstable in water, losing extractability and changing color.

Among related compounds studied arsanilic acid behaves in a manner comparable with sulfanilamide. The blue-violet butyl alcoholic extracts obtained from sulfanilamide and arsanilate showed an absorption spectrum practically identical in shape (maximum absorption at about 590 mμ). The identity of the two blue compounds is probable. It would be expected that if these compounds had retained their characteristic side-chains there would be a greater difference in the absorption spectra. If the oxidation products are identical the side-chains must have been lost. It is suggested that therapeutically or toxically active derivatives formed *in vivo* also may lack the characteristic side-chains of the original substance.

Rosenthal and Bauer[7] recently published in this journal the extremely interesting observations that on oxidation of sulfanilamide by means of ultra-violet irradiation or ferric chloride and hydrogen peroxide the sulfonamide group is split off. My studies of the spectroscopical behavior of the blue oxidation products obtained from sulfanilamide and from atoxyl lead to a similar conclusion.

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SCIENTIFIC BOOKS

THE CALCULUS

Introduction to the Calculus. By ARNOLD DRESDEN. xii + 428 pp. New York: Henry Holt and Company. 1940. $3.40.

THIS book, as its title indicates, is designed as an introduction to the calculus, presumably for students of sophomore age. It is particularly noteworthy, inasmuch as it is the first serious attempt among American text-books to introduce the subject in a rigorous and logical manner. The first two chapters, about sixty pages, of the book, are devoted to the essentials of the

[7] W. Migula, "System der Bakterien." Jena, 1900.

[1] R. Ottenberg and Ch. L. Fox, Jr., *Proc. Soc. Exp. Biol. and Med.*, 38: 479–481, 1938.

[2] Ch. L. Fox, Jr., J. E. Cline and R. Ottenberg, *Jour. Pharmacol. and Exp. Therap.*, 66: 99–106, 1939.

[3] Cl. Rimington and A. W. Hemmings, *Biochem. Jour.*, 33: 960–977, 1939.

[4] G. Barkan, *Proc. Soc. Exp. Biol. and Med.*, 41: 535–537, 1939.

[5] E. C. Gilbert, *Jour. Am. Chem. Soc.*, 51: 2744–2751, 1929.

[6] O. Schales, *Ber. Dtsch. Chem. Ges.*, 71: 447–460, 1938.

[7] S. M. Rosenthal and H. Bauer, SCIENCE, 91: 2369, 509, May 24, 1940.