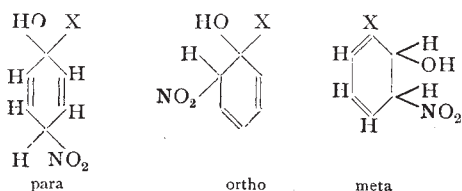


Flürscheim, and Obermüller are shown to be fundamentally untenable or self-contradictory. The author concludes :—

“Das Endergebniss unserer theoretischen Betrachtungen ist kein erfreuliches; alle Versuche, welche bis jetzt gemacht sind, um die Gesetzmässigkeiten, welche den Ort bestimmen, wo ein zweiter Substituent im Kern eintritt, zu ergründen, sind vollkommen fehlgeschlagen; ja selbst ist es nicht möglich gewesen, die Tatsachen in einer empirischen Regel zusammenzufassen.”

After discussing the position taken up by the third entrant group in chapter v., the author develops his own views on the mechanism of substitution. These views, which are published here for the first time, are so eminently simple and rational that chemists may be interested in the following brief outline. Following Kekule's idea that substitution is a succeeding phase of an additive process, Prof. Holleman considers that such a process as nitration, for example, of a compound containing a substituent X produces in the first place one or more of the following three substances :—



from which the elements of water are subsequently detached. The nature of the predominating compound or compounds will be determined by the accelerating or retarding influence of the substituent X, just as addition of bromine to an olefine will be determined by the substituents already present. If X accelerates the reaction of ortho and para, substitution will be the main result, if it retards, meta substitution (where the double link is unconnected with the X complex) will be the primary effect. If X has no marked effect meta and ortho, meta and para, or all three may be formed.

A work of this kind, which, the author tells us, necessitated the careful perusal of upwards of a thousand original papers, ungrateful and laborious as the task of compilation may have been, will always remain a standard book of reference, for which chemists will feel fully grateful to the author.

J. B. C.

FERMENTS AND FERMENTATION.

Micro-Organisms and Fermentation. By A. Jörgensen. Translated by S. H. Davies. Fourth edition, completely revised. Pp. xi+489. (London: C. Griffin and Co., Ltd., 1911.) Price 15s. net.

IN this translation of the fifth German edition (dated January, 1909) of his well-known textbook, the author has incorporated the main results of investigations made since the appearance of the previous English edition about ten years ago. Although the book has been, to a considerable extent, rewritten, its original characteristics are retained.

Five of the six sections of the work have been

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enlarged, whilst the sixth, dealing with the pure culture of yeast on a large scale, has undergone marked reduction in volume, possibly because it forms the subject of a separate publication by the author. The illustrations have been increased in number from 83 to 101, nearly all of those found in the previous edition being again given; most of the figures are good, but those numbered 12, 13, and 51 would undoubtedly bear improvement, while Fig. 80 fails to bring out the peculiar bean- or kidney-shape of the spores of *Saccharomyces fragilis*. The bibliography has been revised and supplemented; it is, however, questionable whether a bibliography placed at the end of the book is more convenient than references given as footnotes to the text. One new feature, which will be welcomed by all readers, is the provision of an alphabetical index of subjects.

As the author is a member of the Danish school of micro-biologists, the book would naturally be expected to give, as in reality it does, a prominent place to the investigations of Hansen and his followers on the micro-organisms met with in the brewing industry. At the same time, the more important researches carried out during recent years in Germany and elsewhere are not, as a rule, lost sight of, although no reference is made to the valuable work of Sclator on alcoholic fermentation, while the meagre notices given to the results obtained by Ehrlich and by Harden and Young might have been replaced profitably by more extended discussions.

The first chapter, headed “Microscopical and Physiological Examination,” deals with such subjects as staining, sterilisation, antiseptics, nutritive substrata, and pure culture methods. In this section the space devoted to technique is very small, and a more detailed description of the methods employed in the author's laboratory would have been of value. In the part dealing with nutritive media, no mention is made of “eau de touraillons,” which furnishes an excellent basis for such media, and is largely employed by some of the French investigators. Attention is directed to the stimulating action of small proportions of various poisons on the growth of micro-organisms, but no reference is made to the very thorough researches of Javillier on the influence of zinc on the growth of vegetable organisms, including moulds.

Chapter ii. treats of the biological examination of air and water, chiefly from the point of view of brewery requirements.

In chapter iii., the functions and conditions of growth of zymogenic bacteria are described. A paragraph is given to the nitrifying bacteria, but nothing is said of the very important class of nitrogen-fixing bacteria.

The moulds form the subject of chapter iv., which also deals incidentally with enzymes and with the influences of various external conditions on micro-organisms in general. The occurrence and life-history of most of the commoner moulds are studied, and reproductions are given of some of the excellent drawings made by Brefeld and de Bary.

The fifth chapter, occupying nearly two hundred pages, is concerned with the yeasts, and deals, in addition, with non-sporulating or *Torula* forms, as