Book Reviews

Cellulose and Cellulose Derivatives. pt. II. Emil Ott, Harold M. Spurlin, and Mildred W. Grafflin, Eds. vol. V of *High Polymers.* Interscience, New York–London, rev. ed. 2, 1954. viii + 511–1055 pp. Illus. $12.

This is a continuation of what was so ably done in part I of this treatise. The principal chapters deal with the manufacture of cellulose from its natural sources, its conversion into paper products, and the chemistry of the cellulose esters, ethers, and the xanthate.

Although full consideration is given to the underlying chemical principles on which the respective industries are based, the nature of the subjects justifies considerably more attention to the technologic aspects than was found necessary in the preceding part. Like part I, this volume contains no index, and part III is required to make it especially useful for reference purposes.

Pulping, bleaching, and alkaline refining are adequately and splendidly treated for this type of book. It is to be regretted, however, that it was found necessary to abbreviate the discussions of the currently important prehydrolysis pulping procedure to a single paragraph. Were more space allotted, the section on the refining of wood cellulose would undoubtedly have included further reference to other important factors, such as the influence of chosen conditions during chlorination and the relative advantages of cold and hot alkaline procedures for the manufacture of the high alpha cellulose wood pulps.

The section that describes the actual conversion of wood pulp to paper is well prepared and serves the intended purpose. The various theories of beating are excellently presented. The influence of hemicellulose in the wood pulps is discussed and some reference is made to the role played by pentosans. With further expansion of the subject, the authors would undoubtedly have noted that type and history, as well as total amount of pentosans, are also determining factors.

The subject of cellulose reactivity is fully and admirably discussed and is up to date. Surely much more will be known of this interesting behavior by the time the next edition of this work is compiled. Calculation for theoretical arrangements of substituent groups is given in considerable detail, and the usefulness of statistical consideration as a guide to research programs is stressed. This study of increased accessibility by swelling and of partial loss of reactivity on drying has been, and will continue to be, a fruitful field.

The section on organic esters has been completely revised. It places new and major emphasis on such items as the role of sulfuric acid catalyst during esterification, the preferential esterification of primary hydroxyls, the importance of the ratio of primary and secondary hydroxyls present in the hydrolyzed ester, and the very important subject of ester stability.

Although much of the chapter that deals with xanthate and regenerated cellulose is necessarily a repetition of the material in the 1943 edition, the technologic progress made in the last decade, as well as the modern concepts that aim to explain more satisfactorily the practical knowledge of this industry, are presented in a clear and concise manner.

This second part fulfills the promise of the first and continues to mark *Cellulose and Cellulose Derivatives* as an excellent work that possesses both educational value and utility for the student and the professional practitioner.

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Treatise on Invertebrate Paleontology. Raymond C. Moore, Ed. pt. D, ***Protista 3: Protozoa*** (chiefly Radiolaria and Tintinnina), Arthur Shackleton Campbell and Raymond C. Moore. Geological Society of America; Univ. of Kansas Press, Lawrence, xii + 195 pp. 1954. Illus. $3.

This very meaty part of the *Treatise* considers the Actinopoda and Heliozoa by Moore; then the Radiolaria by Campbell; the Sporozoa and Ciliphora by Moore; and lastly the Tintinnina by Campbell.

The several groups considered by Moore are those most lacking in fossils or even unknown as fossils but are justified in being included. Some have rare fossils and others such as the *Sporozoa* must have a paleontologic history and played an important, although unknown, part in evolution. The very completeness of their inclusion is wise.

The two groups handled by Campbell are most important. It is the first time since Haeckel's Challenger Report in 1887 that the Radiolaria, both recent and fossil, have been studied as a group and the classification been brought up to date and emended in the light of recent knowledge and the Rules of Zoological Nomenclature, a very necessary and valuable study.

The subclass Radiolaria is divided into the order Porulosida with two suborders, 12 superfamilies, 57 families, 95 subfamilies, 474 genera, and 504 subgenera; and the order Osculosida with two suborders, 11 superfamilies, 46 families, 87 subfamilies, 427 genera, and 258 subgenera. In all, 901 genera and 762 subgenera are in the subclass. These are treated systematically with numerous genetic illustrations through some 133 pages of text. Some of the figures are very complete (for example, Fig. 8 has 65 drawings).

The suborder Tintinnina, one of the subdivisions of the ciliate protozoans that do leave fossils, is also by Campbell. Here he has brought together all the