geometric infinitesimals). Third order questions have been treated in a haphazard way in the standard literature. Even in the simple case of plane curves, the average student becomes familiar only with the interpretation of the first derivative as slope (tangent line), and of the second derivative as curvature (osculating curve). As regards the third derivative, his mind is usually blank. Even the elementary books should contain the definition of *deviation,* introduced by Transon over seventy years ago.

An excellent index and table of symbols will be appreciated by the student, and make the volume serviceable for convenient reference. The press work throughout is quite perfect.

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A Catalogue of the Fishes of Japan. By David Starr Jordan, Shigeho Tanaka and John Otterbein Snyder. Journal of the College of Science, Tokyo Imperial University, Vol. XXXIII., article 1. Tokyo, 1913. 8vo. Pp. 1–497, with 396 text-figures.

Japan possesses a wonderfully rich fish fauna. This is due to several causes: first, to the fact that she consists of a chain of islands with innumerable small, sheltered bodies of water which afford great variety of depth, physical condition of sea floor, etc.,—factors highly favorably to a diversity of fish life. Secondly, to her remarkable north-and-south extent, which gives her in addition to the regular north temperate fauna, in itself unusually rich in this instance, a subtropical fauna allied to that of the Philippine Islands, in the south, and a fauna merging into a subarctic one, in the extreme north. Thirdly, her eastern coast is touched by the *Kuroshiwo,* or warm black current, which harbors many tropical forms, some of them exceedingly rare, or in fact, only known from this current.

With such remarkable conditions, it is not surprising that ichthyologists should have been attracted to the study of Japanese fishes. Many of the writers of this and the preceding generation have taken a hand in describing portions of this fauna as materials were brought from Japan, so that an extensive literature has grown up about it. And there has been at least one extensive work on this fauna—that of Temminck and Schlegel, in two superb folio volumes, one of text and one of plates, published between 1842 and 1850.

But an entirely new chapter in Japanese ichthyology was opened when, in 1900, Chancellor Jordan and Professor Snyder, of Leland Stanford University, visited Japan for the purpose of studying the fishes. As a result of the collections then made, and of others made subsequently, including one by Gilbert and Snyder in the *Albatross,* in 1906, Jordan and his associates Gilbert, Snyder, Starks, Richardson, Fowler, Herre, Seale and Thompson, have worked unremittingly on this fauna, publishing paper after paper, until a long series, numbering several score, has now appeared. They have described hundreds of new species; figured, revised, re-studied, and thrown light on many of the darker problems relating to the fishes of Japan.

Early in the course of these studies it became patent to Jordan and Snyder that it was necessary to take stock of what had already been done on the Japanese fauna. Accordingly, in 1901, they published "A preliminary check-list of the fishes of Japan." This incorporated all the data then available, including two lists published by Japanese ichthyologists. The number of species listed was 686, many, however, only doubtfully referred to Japan. And now we have a new catalogue of the fishes of Japan from the pen of Jordan, Tanaka and Snyder. An idea of the enormous wealth of the Japanese fish fauna, as well as of the great stride that has been made in its study in a little over a decade, is shown in the fact that the present catalogue lists no less than 1,236 species (including the 6 given in the Additions and Corrections, pp. 429–430), or nearly twice the number known in 1901.

The catalogue—or check-list, as it might more correctly have been termed—enumerates the families, genera and species of the fishes occurring in the waters of Japan. Under each species is given a reference to the first describer, and generally, to a reviser; together

with the geographical distribution and one or more local Japanese names. Nearly one third of the species—396, to be exact—are illustrated, the admirable figures which have appeared in the publications of Jordan and his associates being reproduced. An excellent index to genera, species and Japanese names, covering 64 pages, greatly enhances the usefulness of the work. (This index, by the way, contains a number of misspellings—for instance, of *Scapanorhynchus, Etmopterus,* etc.).

A critic might perhaps find fault with the retention of a few superseded names, such as *Mitsukurina* for *Scapanorhynchus,* when it has been fairly well established that the former is identical with the fossil sharks which have long been known under the latter name; or with the omission of certain desirable references, to show that *Zameus*—to mention but a few instances—is a synonym for *Scymnodon, Deania* a synonym for *Centrophorus, Etmopterus frontimaculatus* probably a synonym for the Mediterranean *Spinax pusillus,*[1] etc. But in answer to such criticisms it may be said that the present list was obviously intended as a mere stock-taking of all the species that have been proposed, to serve as a basis for future work on the fishes of Japan; that it was not the purpose of the authors to give complete synonymies; and that these matters will be dealt with in the revisions of the various groups now being published by Jordan and his associates in America, or in the monograph by Tanak, which is appearing in part in Japan. Altogether the catalogue is carefully compiled, and will be invaluable to all students of the fishes of Japan.

The work was seen through the press by Dr. Shigeho Tanaka, lecturer in zoology in the Imperial University of Japan, and a co-author of the present work; and to him are due the thanks of all who will profit by this volume, for the great care he has exercised in guarding against typographical errors in the text.

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[1] See C. Tate Regan, "A Synopsis of the Sharks of the Family Squalidæ," *Ann. Mag. Nat. Hist.,* 8 ser., II., 1908, pp. 39–57.

Pflanzenmikrochemie. Ein Hilfsbuch beim mikrochemischen Studium pflanzlicher Objekte von Dr. O. TUNMANN, Privatdozent an der Universitaet Bern. Ein Bd., pp. 631, mit 137 Abbildungen im Text. Verlag von Gebrueder Borntraeger, Berlin. 1913. M. 18.50.

That of the writing of books there is no end is one of the few biblical quotations which even the average freshman in college will recognize. Moreover, the graduate student in science, when sent to the library for references, is apt to wish that there might be fewer books for him to consult. Yet it is with a peculiar delight that the phytochemist witnesses the renewed literary activity in his particular field of research. Synthetic chemistry had so completely overshadowed phytochemistry for a generation and more since the days of Kekulé's structural theories, that the phytochemist is once more beginning to feel that his particular aspect of chemical research is again coming to its own. With a general treatise such as that by Haas and Hill, with staetter and Stoll on chlorophyll, and with the volume on a special method of phytochemical technique like the one before us, all within less than a twelve-month, this unusual productivity must certainly be regarded as the heyday of phytochemical literature.

The general part of Tunmann's tome is devoted to the technique of microchemical research as applied to plants and covers sixty-three pages. Of the special part sixty-six pages are devoted to inorganic chemistry. Hence the bulk of the volume is devoted to the organic microchemistry of plants.

Inasmuch as this is the first general survey of its kind since the "Botanische Mikrotechnik" by Zimmermann made its appearance in 1892, one may gladly welcome an up-to-date treatise on this subject. Even the person who is not well acquainted with the work that has been done during the past few decades in this particular field, will be struck by the innumerable references to special "Arbeiten" with which the pages abound. The pharmacist in particular will be gratified