oratory. But with these matters readers of SCIENCE are well acquainted. The list of publications for the year numbers forty-six.

The work of the division under Mr. W. deC. Ravenel was the most extensive in the history of the Commission. More than one billion fry were distributed. Mr. Ravenel's report is illustrated with many photographic reproductions and plans of the twenty-nine stations. Mr. C. H. Townsend's statistical tables will prove of inestimable value to those who in the future may wish to follow the rise and decline of the different fisheries. The capture of one hundred and forty bowhead whales by the Pacific fleet in the Arctic Ocean produced an eventful, even if only temporary, elevation in the curve of decline of the whale fishery. It is with a feeling of sorrow that one reads of the slaughter of four thousand sea elephants on Kerguelen Island.

The articles published in the appendix are of both general and scientific interest. Several have a tropical flavor. The papers of Mr. W. A. Wilcox, Mr. C. H. Townsend and Mr. J. N. Cobb are mainly economic. Messrs. Evermann and Kendall have prepared an acceptable check list of the fishes of Florida. New genera and species of fishes from Porto Rico are described by Messrs. Evermann and Marsh. Dr. Moore gives an interesting account of his 'Inquiry into the Feasibility of Introducing Useful Marine Animals into the Waters of Great Salt Lake,' and Dr. Rathbun contributes 'A Review of the Fisheries in the Contiguous Waters of the State of Washington and British Columbia.' The scope of this paper is limited to the fishery questions of the region that are of international concern. While such papers have an immediate interest, their value really increases as time goes on, for they give a record of the more primitive biological conditions, without which it would be quite impossible in the future to determine the changes that have been wrought in the natural productiveness of a region by the occupancy of man.

H. C. BUMPUS.

Report on the International Cloud Observations. Prepared under direction of WILLIS L. MOORE, Chief of Weather Bureau, by FRANK H. BIGELOW, Professor of Meteorology. U. S. Department of Agriculture, Weather Bureau. Report of the Chief of the Weather Bureau for 1898–99. Vol. II. 4to. Washington, D. C. 1900. Pp. 787. Charts 79.

The Report on the International Cloud Observations, just published by the Weather Bureau, is one of the most detailed and elaborate studies of clouds that has yet been issued. Professor Bigelow, who has been in charge of the reduction of the observations, has not limited his investigations to the tabulation and simple discussion of the heights, velocities, and directions of movement of the different clouds, but has gone far into the thermodynamic and hydrodynamic problems which grew out of his study of the cloud observations. As he himself says in his preface: "In order to submit these results to a careful discussion, it has been necessary to prosecute a critical comparative study of several important theories heretofore proposed by meteorologists, so that comparison between observations and theoretical computations can be suitably carried out. Accordingly, a standard mathematical system has been constructed, including in a definite notation the constants, the thermodynamic and the hydrodynamic formulæ pertaining to the atmospheric physical processes and motions, by means of which the work of the several authorities can be reduced to one set of typical equations. The theories of the American and German schools of meteorology have been contrasted, and the results derived from them have been compared with the facts obtained from these cloud observations." This quotation may serve to give some idea as to the thoroughness with which Professor Bigelow has done his work. Indeed, the report is the most comprehensive and important of the Government meteorological publications of recent years.

There are in all fourteen chapters, the first two of which relate to the methods of taking the observations, and of computing the heights, directions and velocities. Chapters 3 to 7 contain summaries of all the observations made with nephoscopes and theodolites, and the discussions of these observations. The subjects treated in the last seven chapters are as follows: 'The Typical Local Circulations over the United States,' 'Diurnal Oscillations of the Barometric

Pressure in Relation to the Diurnal Winds,' 'A System of Fundamental Constants and Formulæ and Reduction Tables,' 'The Theory of Cyclones and Anticyclones,' 'Discussion of the Cumulus and Cumulo-Nimbus Clouds,' 'Reduction of the Pressure and Temperature Maps at Sea-level, 3,500-foot Level, and 10,000-foot Level,' 'The Amount of Heat that would Convert an Adiabatic Atmosphere into the State Actually Existing.'

The reading of this report cannot be lightly undertaken. Indeed, the very completeness of it and the elaborate mathematical discussions which find a place in it, will undoubtedly prevent many persons from attempting to find out what the volume really contains. We do not wish to be understood as saying that work of the sort that Professor Bigelow has here given us is unimportant, or out of place in a thorough study of the observations with which he has had to deal. Far from it. But we cannot help feeling, and feeling strongly, that the observers of the Weather Bureau, both regular and voluntary, and the public generally, should have the chief results of the international cloud observations in this country put before them in a simple, compact form. We hope that the chief of the Weather Bureau may look at this matter in the same light, and may perhaps sanction the publication of a Weather Bureau *Bulletin*, of say 100 pages, in which the results of Professor Bigelow's painstaking research, which are of most general interest, may be set forth.

Professor Bigelow is to be congratulated on the completion of this report, which stands on a far higher plane than most of the meteorological work published in this country.

R. DEC. WARD.

Plane Trigonometry. By DANIEL A. MURRAY, Ph.D., Instructor in Mathematics in Cornell University. New York, London and Bombay, Longmans, Green & Co. 1899. Pp. xiii + 301.

The author has aimed to 'avoid the extremes of expansion and brevity.' Only such topics are fully treated as make up the usual course in plane trigonometry. The thickness of the volume is largely due to the presence of an appendix of historical and other notes, a long list of exercises for practice and review, a table of answers, a four-place and a five-place table of logarithms of numbers, a five-place table of logarithms of the sine, cosine, tangent and cotangent, a four-place table of logarithms (augmented) of trigonometric functions, and a four-place table of values of trigonometric functions. These components constitute little less than half of the book. The other and larger half contains an unusually full exposition of principles. The composition is throughout careful and scholarly. While acquiring a knowledge of the elements as here presented, the student can hardly fail to become aware of the larger aspects of the science.

As regards arrangement and disposition of matter, there is, of course, always room for difference of opinion. Doubtless many teachers would for example prefer to have the notion of the radian introduced at an earlier stage; and there are not wanting reasons of some weight for preferring to present the general ratio definitions of the functions in connection with the conventional system of coordinate axes boldly in the *beginning*, instead of reserving this most commanding point of view, as is here done, for so advanced a stage as Chapter V. However, in things pedagogical, *quot homines, tot sententiæ.*

It remains to say that while paper and typography are good, the book deserves to be more substantially bound.

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BOOKS RECEIVED.

A de Bary's Vorlesungen über Bakterien. Edited by W. MIGULA. Leipzig, W. Engelmann. 1900. Pp. vi + 186. M. 4. 60 Pf.

Outlines of Human Physiology. F. SCHENK and A. GRÜBER, translated by Wm. D. ZOETHOUT with a preface by JACQUES LOEB. New York, Henry Holt & Co. 1900. Pp. viii + 339.

Leçons de physiologie expérimentale. RAPHAEL DUBOIS. Paris, G. Carré and C. Naud. 1900. Pp. vi + 380.

SCIENTIFIC JOURNALS AND ARTICLES.

THE *Journal of the American Chemical Society* for December contains the following articles: 'The Production of Alloys of Tungsten and of