

the general surface of the photosphere. In Fig. 18 we have the spectrum of a sun-spot as given by Young, exhibiting this thickening in the double line D, a line which, like F, is eminently susceptible to variations of pressure.

It is, however, erroneous to suppose that the solar atmosphere consists entirely of the red prominences already mentioned. These denote merely (as their name indeed implies) the most violently agitated portions of an atmosphere surrounding the whole sun. Lockyer has named this atmosphere the *chromosphere*, and it extends to an average height of about 4000 miles above the surface of the sun. In Fig. 19 we have a picture of the spectrum of the sun's photosphere below and of the chromosphere above.

One prominent constituent of the chromosphere is hydrogen, but we have here a very strange circumstance. Besides certain well-known hydrogen lines, we have in the chromosphere spectrum an orange-yellow line near D, which we cannot identify with the spectrum of any terrestrial substance. It is probably due to some unknown gaseous body which is mixed up with the hydrogen in the atmosphere of our luminary. Again, in the solar corona, we have a green line which we likewise cannot identify; but our opportunities of examining this region are so few and so transient that any conclusion we may come to with respect to its lines must be regarded as provisional.

BALFOUR STEWART

(To be continued.)

*BULLETIN OF THE UNITED STATES FISH COMMISSION FOR 1884*¹

TO those who are not already familiar with this publication, it is necessary to explain that the bulletin is a journal whose successive numbers appear at short but irregular intervals, each number containing a small collection of brief articles, notes, and reports, on subjects connected with the work of the Commission. At the end of each year the numbers that have been issued during its course are collected into a single volume and republished.

Some of the notes and articles in the volume for 1884 have but a very remote connection with fish or fisheries, broad as is the interpretation given to those terms by the American Commission. In most cases it may be conceded that the information given has some relation to the supply of human food derived from aquatic organisms, or at any rate some bearing on aquatic life. But it is difficult to see the connection between a report on the sanitary condition of the inhabitants of Old Providence Island and the subject of aquaculture. The Report referred to contains many interesting facts concerning the fecundity, education, and diseases of the people mentioned; it would form a valuable contribution to a medical journal, but the fact that its author was surgeon on board the *Albatross* when he acquired the knowledge of his subject is scarcely sufficient to prevent surprise at the appearance of a sanitary report in the Fish Commission Bulletin.

A considerable proportion of the volume is occupied with reprints and translations from journals and publications of other countries, and nearly all of these are interesting and useful. By the republication of these foreign papers the Bulletin becomes a guide to the knowledge of what is being done in aquicultural enterprise in all parts of the world. Among the reprints are several from British journals—for example, the articles which appeared last year in *NATURE* on the capture of fish larvæ by *Utricularia*, and an article on the sea-serpent by Richard A. Proctor, which is taken from the *Newcastle Weekly Chronicle*.

Dr. P. Brecchi's Report on the condition of oyster-culture in France in 1881, originally published in the *Journal Officiel*, is given in full; and there are also

¹ *Proc. of the U.S. National Museum*, vol. vii. 1884. (Washington, 1885.)

several other useful articles on the subject of oyster-culture. Mr. John A. Ryder contributes a description with illustrations of a new sand-diaphragm to be used in the cultivation of oysters in marine ponds, and a report on the condition of the oyster fishery at St. Jerome Creek. Lieutenant Francis Winslow reports on some experiments made in 1883 on the rearing of oyster larvæ. The experiments were not completely successful, and the problem of establishing a working system of oyster-culture on the east coast of America still affords scope for the energies of the Fish Commission.

Several articles and reports contain data from which may be ascertained the extent and success of the efforts which are being made to acclimatise various species of fish in waters far distant from their native homes. The introduction of American fish into French streams has been in many cases successfully accomplished by the Société Nationale d'Acclimatation. Details of the experiments are given in an article compiled from the monthly bulletin of the Society. Pisciculture and the acclimatation of new species in Germany is treated in several articles by Max. von dem Borne, who is the founder and owner of a large piscicultural establishment at Berneuchen. The bare record of the successful transmission of whitefish eggs to Nelson, New Zealand, and of American black bass to the river Nene in England, is contained in letters which are reprinted.

Reference to any particular article or subject in the volume, in spite of its extremely heterogeneous character, has been made perfectly easy by the number and completeness of the indexes with which it is provided. In the table of contents the names of all the contributors are given in alphabetical order. A topical synopsis follows, in which the various subjects treated in the articles and notes are given under five headings. Finally, at the end of the book, is an accurate and complete general index.

The *Proceedings* of the United States National Museum is published on the same plan as the *Bulletin* of the U.S. Fish Commission. In the "advertisement" to the volume before us (vol. vii. 1884, Washington, 1885) we are told that the series was commenced in 1878 to provide a means for the prompt publication of descriptions of the new and interesting material which was being sent to the Museum by the activity of the collectors employed in its interest. The articles are published in signatures, one of which is issued whenever printed material to the extent of sixteen pages has accumulated. The produce of each year is issued as an annual volume. The articles consist of papers by members of the scientific corps of the Museum, of papers by others founded on the collections in the Museum, and of interesting extracts from the correspondence of the Smithsonian Institution. The more extensive and complete publications of the Museum are issued in the series of *Bulletins*. Both series are published at the expense of the Interior Department, under the direction of the Smithsonian Institution, and with the supervision of Mr. Spencer F. Baird, director of the National Museum. The present volume, containing a large proportion of articles on fishes, has been edited by Dr. Tarleton H. Bean, curator of the Department of Fishes.

A considerable number of new species of fish are described in this volume. Dr. Bean describes a new species of *Coregonus* from Alaska, two new species obtained by the Fish Commission, and two from Jamaica. Mr. David Jordan contributes notes on a collection of fishes from Pensacola, Florida, with two new species, one of *Exocoëtus*; and nine other short papers on collections of fishes from Mexico, Florida, and the Mississippi. The same naturalist, in collaboration with Ch. H. Gilbert, gives four, with Seth E. Meek two, and with Joseph Swain six, notes on fishes. The volume contains several additions to the natural history of the Commander Islands in the Behring Sea. One of these is a refutation, by Leonhard Stejneger,

of the story reported by Nordenskiöld, that a sea-cow (*Rhytina gigas*) had been seen alive in 1854. There are two plates: one of the Saccopharyngoid *Ophiognathus ampullaceus*, the other of some new shells from Alaska. The index is as complete as usual in American books of this class.

NOTES

THE following is a list of the names which the President and Council of the Royal Society will recommend to the Society at their forthcoming Anniversary Meeting on the 30th inst. for election into the Council for the ensuing year:—President, Prof. George Gabriel Stokes, M.A., D.C.L., LL.D. Treasurer, John Evans, D.C.L., LL.D. Secretaries: Prof. Michael Foster, M.A., M.D., The Lord Rayleigh, D.C.L. Foreign Secretary, Prof. Alexander William Williamson, LL.D. Other Members of the Council: Prof. Robert B. Clifton, M.A., Prof. James Dewar, M.A., Prof. William Henry Flower, LL.D., Archibald Geikie, LL.D., Sir Joseph D. Hooker, K.C.S.I., Prof. Thomas Henry Huxley, LL.D., Admiral Sir A. Cooper Key, G.C.B., J. Norman Lockyer, F.R.A.S., Prof. Henry N. Moseley, M.A., F.L.S., Prof. Bartholomew Price, M.A., Prof. Pritchard, F.R.A.S., William James Russell, Ph.D., Prof. J. S. Burdon Sanderson, LL.D., Prof. Arthur Schuster, Ph.D., Lieut.-Gen. R. Strachey, R.E., C.S.I., General James Thomas Walker, C.B.

WE greatly regret to announce the death, on Tuesday, of Dr. W. B. Carpenter, at the age of seventy-three years. His death, it would seem, was the result of an accident a few hours before. The funeral will take place to-morrow (Friday) at Highgate Cemetery. We hope next week to refer at length to the scientific work of Dr. Carpenter.

A VERY remarkable article appears in the *Nation* of October 29, on "The Private Endowment of Research," remarkable as appearing in a paper like the *Nation*, published in a "practical" country like America. "Society," the *Nation* says, "may not be prepared to interfere with the breeding of great men, but when they have once been sporadically produced there is no reason why it should not concern itself with their careful preservation. In a state of nature there is a sure process for securing the supremacy of the most perfect individuals of a race, but the qualities which make the human being great are not always qualities which fit him for taking part in the vulgar struggle for existence. . . . Huxley has well said that any country would find it greatly to its profit to spend a hundred thousand dollars in first finding a Faraday, and then putting him in a position in which he could do the greatest possible amount of work." To expose a man of genius, according to the *Nation*, "to the same harsh treatment which is good for the hod-carrier and the bricklayer, is to indulge in a reckless waste of the means of a country's greatness. But instead of the rarely-gifted being treated more favourably by the present highly scientific generation, they actually receive less consideration than they have done in many past ages of the world. . . . The waste of water-power at Niagara (the article concludes) is as nothing compared with the waste of brain-power which results from compelling a man of exceptional qualifications to earn his own living. The owner of a great estate admits that the important charities of his town have a well-founded claim upon his purse; it would not require a very great change of heart for him to feel a vivid sense of shame if a few scholars are not carrying on their researches at his expense."

THE following papers (among others) will be read at the Society of Arts during the present Session:—Apparatus for the Automatic Extinction of Fires, by Prof. Silvanus P. Thompson; The Load Line of Ships, by Prof. Francis Elgar, F.R.S.E.; Technical Art Teaching, by F. Edward Hulme, F.L.S.; The

Treatment of Sewage, by Dr. C. Meymott Tidy; Calculating Machines, by C. V. Boys; The History and Manufacture of Playing Cards, by George Clulow; Domestic Electric Lighting, by W. H. Preece, F.R.S.; The Scientific Development of the Coal Tar Industry, by Prof. R. Meldola, F.C.S. The First Course of Cantor Lectures will be on "The Microscope," by John Mayall, Jun., on November 23, 30, December 7, 14, 21; the Second Course will be on "Friction," by Prof. H. S. Hele Shaw, on January 18, 25, February 1, 8; the Third Course will be on "Science Teaching," by Prof. F. Guthrie, F.R.S., on February 15, 22, March 1; the Fourth Course will be on "Petroleum and its Products," by Boverton Redwood, F.C.S., on March 8, 15, 22, 29; the Fifth Course will be on "The Arts of Tapestry-Making and Embroidery," by Alan S. Cole, on April 5, 12, 19; and the Sixth and concluding Course will be on "Animal Mechanics," by B. W. Richardson, M.D., F.R.S., on May 3, 10, 17, 24, 31. The two Juvenile Lectures on "Waves" will be given by Prof. Silvanus P. Thompson on Wednesday evenings, December 30, 1885, and January 6, 1886, for which special tickets will be issued.

Science contains accounts by Profs. Mendenhall and Paul of the attempts made to obtain records of earth tremors from the explosion at Flood Rock at the entrance to New York harbour. Arrangements to secure observations were made by the Geological Survey, together with representatives from the Naval Observatory and Signal Service. The apparatus used by the Naval Observatory party was that usual in mercury observations, and three seismoscopes, one chronograph, and a number of chronometers. Unfortunately the firing of the mine was delayed for fourteen minutes, and this prevented good observations being taken at many places. The reports so far received indicate that out of seventeen stations (three occupied by geological survey parties and fourteen co-operating with them) five watched till the disturbance came, and got more or less satisfactory observations. At one of these the rock was directly in sight, and the others were so near that the observers felt sure that it had not escaped them. Four observed and timed some slight disturbances between 11h. 3m. and 11h. 7m., and, attributing them to the explosion, ceased watching for more, and either missed it entirely or were taken by surprise; two heard nothing at all up to about 11h. 10m., and so ceased observing and missed it, and six were yet to be heard from. It will thus be perceived that the results with regard to earth-tremors, which there was every reason to expect from this colossal explosion, have been greatly diminished by the long delay in firing the mine.

PART II. of the Report of the Trinity House Committee on the recent experiments with electricity, gas, and oil as lighthouse illuminants at South Foreland, which is now issued, contains some interesting details in connection with the trials. The first portion is devoted to illustrations of the arrangements made at the South Foreland for exhibiting, observing, and measuring the lights. The second section consists of the report of Prof. W. Grylls Adams, F.R.S., of King's College, London, on the electric light apparatus employed in the production of the light shown from A tower. Following upon Prof. Adams's report is a detailed description by Baron A. de Méritens of the magneto-electric machines supplied by him for the experiments. This communication shows the principles of construction of the machines and the mechanical disposition of the magnets. Section IV. is a detailed record of the photometric observations made by Mr. Harold Dixon, of Balliol College, Oxford, and referred to by him in his report in Part I. The record consists principally of tables showing the work done on each night. Following this are some remarks upon the pentane standard devised by Mr. Vernon Harcourt, and adopted as the basis of measurement throughout the trials. Some interesting experiments to ascertain