hope for much more extensive, perhaps conclusive, evidence along this line when the medusæ of the *Michael Sars* are worked up.

Dr. Hjort believes that the zone marking the upper limit of the red and black forms is particularly rich quantitatively, a view to which I subscribe, having already argued that it is probably true for the medusæ. If his observation that there is a sudden rise in density as we go down through the intermediate layers, where sinking organic débris would tend to accumulate, be extended to the oceans as a whole, it must be one of the most important factors in the ecology of the mesoplankton. In this connection, of course, it is neither salinity nor specific gravity reduced to a standard temperature which is required, but the density of the water at the temperature *in situ*.

Among the mass of surface forms Dr. Hjort mentions especially the transparent fish larvæ, 90 per cent. of which were secured within 150 meters of the surface; of special interest being the occurrence there of pale larvæ of the black *Gonostoma elongatum*, and of deep-sea macrurids. On the other hand, the larvæ of other deep-water forms were taken at about the same bathymetric levels as the adults. In these cases the larvæ are not transparent, but show the pigmentation of the adult. Their color and vertical occurrence are correlated from the earliest stages.

The notes on horizontal distribution are valuable. Thus the captures have extended the ranges of several "rare" deep-water forms to practically the whole north Atlantic; others, however, especially several species of *Cyclothone*, seem to be limited to southern regions. The three centers of abundance for transparent young fish were south of the Azores, west of the Canaries, and off the Newfoundland bank. Among them many interesting stalked-eyed forms were taken, and large series of Leptocephali of at least 20 species.[3]

Finally we have an account of the trawlings. As yet the material is only partially worked up; and as the results may be expected to be of great general interest, it is best to delay our review of them till the final account appears, merely pointing out here the uniformity of the fish fauna at 500 fathoms, from the Wyville Thomson ridge to the Canaries, as opposed to its great diversity in shallow water. The work also supported earlier conclusions that there are some species of fishes and invertebrates south of the ridge separating the Atlantic from the Norwegian Sea, not found north of it, and *vice versa*.

In conclusion, every student of oceanic phenomena owes a debt of gratitude to Dr. Hjort and to Sir John Murray for the well-planned and successfully executed operations of the expedition. The methods employed deserve to be, and will be generally, adopted. To those of us who have participated in deep-sea investigation, it is a revelation that so much and such good work could be done from a vessel of only 226 tons, and that financial obstacle need no longer loom so large as it has in the past.

As Dr. Hjort points out, the Atlantic is still a "fruitful field for future investigation into the pelagic life of the ocean"; and he has himself opened many attractive vistas to other students.

Henry B. Bigelow

[3] Some of these, the larvæ of the European eel, have been described in an earlier paper (*Nature*, November 24, 1910).

## *SCIENTIFIC NOTES AND NEWS*

Dr. Abraham Jacobi, emeritus professor in Columbia University, was elected president of the American Medical Association, at the meeting held last week at Los Angeles.

Professor William G. Raymond, head of the department of civil engineering and dean of the College of Applied Science at the State University of Iowa, has been elected president of the Society for the Promotion of Engineering Education.

Harvard University has conferred the doctorate of letters on Dr. Josiah Royce, professor of philosophy, and the degree of master of arts on Dr. William B. Coley, professor of clinical surgery in Cornell Medical College,

on Professor Henry S. Graves, chief forester of the U. S. Forest Service, and on Major W. V. Judson, of the corps of engineers of the U. S. Army.

DARTMOUTH COLLEGE has conferred its doctorate of science on Professor Edwin B. Frost, of the class of '86, director of the Yerkes Observatory and formerly professor of astronomy at Dartmouth College.

AMHERST COLLEGE has conferred its doctorate of laws on Dr. Walter Wyman, of the class of '70, surgeon general of the U. S. Public Health and Marine Hospital Service.

THE degree of doctor of engineering has been conferred by the University of Illinois upon Mr. Ralph Modjeski, bridge engineer.

DR. R. A. MILLIKAN, professor of physics in the University of Chicago, has been given a doctorate of science by Oberlin College.

THE Jefferson Medical College has conferred the degree of Sc.D. on Dr. Victor G. Heiser, class of 1896, director of health in the Philippine Islands.

THE Royal Society of Arts has awarded its Albert medal for the current year to the Hon. Charles A. Parsons, F.R.S., for his experimental researches on steam engines of the turbine type.

DR. L. HEKTOEN, of the Memorial Institute for Infectious Diseases, Chicago, has been elected foreign member of the Norwegian Medical Society of Copenhagen.

DR. P. WALDEN, professor of chemistry at Riga, has been elected a member of the St. Petersburg Academy of Sciences, with the privilege of retaining for the present his chair in the Polytechnic School at Riga.

DR. SVEN HEDIN, the Swedish explorer, has been elected a member of the Paris Academy of Sciences.

PROFESSOR V. ESMARCH, of Göttingen, has resigned the direction of the hygienic institute on account of illness and has been relieved from giving lectures.

DR. ALBERT EULENBURG, professor of diseases of the nervous system at Berlin, celebrated the semi-centennial of his doctorate on May 31.

THE eighth volume of the "Contributions from the Jefferson Physical Laboratory" is dedicated to Professor John Trowbridge, the director emeritus. The volume contains twenty-six papers, and has the following dedication to Professor Trowbridge:

TO JOHN TROWBRIDGE

who projected a great physical laboratory for Harvard University and found the means to build and equip it, who by his foresight, invention and care has kept this laboratory among the foremost in opportunities for scientific achievement, and by his magnanimity has made it a place proverbial for good feeling, this volume is gratefully and affectionately dedicated by those who have profited by his labors and enjoyed his friendship.

UNDER authority recently given by congress, Surgeon General Wyman has designated the U. S. Marine Hospital at Wilmington, N. C., as a special research hospital for zooparasitic diseases. Professor C. W. Stiles, of the Hygienic Laboratory, has been ordered to divide his time between Washington, D. C., and Wilmington. He will have charge of the biological side of the investigations while Surgeon Charles H. Gardner will have charge of the more strictly medical side of the work. The new law permits the hospital to take in free patients, not to exceed ten in number at any one time, for study of infectious and contagious diseases. Dr. Stiles takes three assistants to Wilmington. A camp of six tents has been erected in the hospital grounds for quarters.

DR. OSKAR HECKER, observer in the Geodetic Institute at Potsdam, has been appointed director of the bureau of the International Seismological Association at Strassburg.

DR. LOUIS SIMONIN, assistant director of the Nice Observatory, has been appointed astronomer in the Paris Observatory.

DR. OTTO KLOTZ, of the Dominion Observatory, will attend the Manchester meeting, July 18–22, of the International Seismological Association as delegate for Canada.

MR. SIDNEY L. GALPIN, of the department of geology at Cornell University, is director of a party of Oberlin students doing summer work in geology in western Virginia.

DR. FRANK M. SURFACE, of the Kentucky Experiment Station, sailed for Europe on June 30 to spend six months in study and travel.

AN expedition to Newfoundland in the interest of the Gray Herbarium, Harvard University, under the direction of Professor Fernald, left Boston on June 30. Professor Fernald is accompanied by Professor Karl M. Wiegand, of Wellesley College, and Messrs. Edwin B. Bartram and Bayard Long, of the Academy of Sciences of Philadelphia, with Mr. Henry T. Darlington, a graduate student, as general assistant. Headquarters will be at Grand Falls on the Exploits River, and the explorations will be chiefly on the northeast coast of the island, thus supplementing the former explorations of Professors Fernald and Wiegand on the northwest coast.

A BRONZE statue of Dr. Traill Green has been erected at Easton, Pennsylvania, where he was a practising physician until his death in 1897 at the age of eighty-four years. He had also been professor of chemistry at Lafayette College and dean of the scientific department.

FUNDS are being collected for the purpose of erecting a monument to honor the memory of the late Professor Cesare Lombroso, at his native place, Verona, Italy.

PROFESSOR JULIAN WILLIAM BAIRD, dean of the Massachusetts College of Pharmacy and professor of chemistry, died on June 26, in his fifty-third year.

SIR RUPERT BOYCE, Holt professor of pathology in the University of Liverpool, known for his important contributions to our knowledge of nervous and tropical diseases, died on June 16, aged forty-nine years.

DR. K. POLSTORFF, associate professor of pharmacological chemistry at Göttingen, has died at the age of sixty-six years.

DR. CHARLES G. WELD has bequeathed to the Boston Museum of Fine Arts his collection of Japanese paintings and lacquer work which has been in the custody of the museum as a loan collection and to the Peabody Museum at Salem all the property now in the custody of that institution, including the collection from the South Seas, and the sum of $25,000.

THE death is announced of Dr. Heinrich Stilling, professor of pathological anatomy at Lausanne.

M. PEDRO CHRISTOFFERSEN, a Norwegian, of Buenos Aires, has offered to pay the expenses for the provisions and other outfit of the *Fram*, Captain Amundsen's ship, both during the ship's stay at Buenos Aires and during the oceanographic expedition to the Antarctic seas now being conducted by Captain Amundsen. He will also bear the expenses of outfit when the *Fram* returns in August next in order to fetch Captain Amundsen and his companions in the coming spring.

MR. GEORGE ROBERT WHITE, of Boston, has subscribed the sum necessary to rebuild and considerably enlarge the laboratories connected with the Gray Herbarium. The new structure will be a two-storied thoroughly fireproof wing, sixty feet long and thirty broad, extending from the central portion of the building toward the conservatories. The lower story will contain two laboratories for work in systematic and geographic botany, while a portion of the upper will be equipped for the herbarium of the New England Botanical Club. Mr. White's gift includes $21,500 for construction and $10,000 for equipment. The cases and, so far as possible, the other furnishings will be of steel. Through an anonymous gift of $25,000, announced some weeks ago, the herbarium will also be provided with a library wing, to extend from the main building toward Garden Street and to cover a portion of the site formerly occupied by the Gray residence, recently removed. Plans for these two extensions, prepared by Mr. W. L. Mowll, have been approved by the corporation and construction will begin as soon as practicable. Mr. Casimir de Candolle, of Geneva, has given to the Gray Herbarium a cast of a

bust of his father, Alphonse de Candolle, in remembrance of the constant friendship between his father and Asa Gray. The bust is by Hugues Bovy.

THE Arnold Arboretum of Harvard University announces the publication of the first volume of "The Bradley Bibliography," a guide to the literature of woody plants, including books, and articles in the proceedings of learned societies, and in scientific and popular journals, published in all languages to the end of the nineteenth century, prepared at the Arnold Arboretum by Mr. Alfred Rehder, under the direction of Professor Charles Sprague Sargent. The work will extend to between 4,000 and 5,000 quarto two-column pages and will consist of five volumes, as follows: I., Dendrology—General; II., Dendrology—Taxonomic Arrangement; III., Economic Products and Uses of Woody Plants—Arboriculture; IV., Forestry; V., Index of Authors and Titles.

THE *Geographical Magazine* gives some details in regard to the piercing of the Lötschberg in the Bernese Alps, completed on March 31 by the junction of the galleries driven from the north and south which marks an important step towards improved communications across the Alpine barrier of central Europe. The project forms the natural complement of the piercing of the Simplon, in supplying a further link in the future trunk line of communication from northwestern to southern Europe, besides giving to Berne (in the interests of which city the scheme was first set on foot) its needed access to the more westerly of the two great international routes across Switzerland, between which it has hitherto lain isolated. The northern entrance to the tunnel, at Kandersteg, is reached by a prolongation of the line up the Kander Valley from Spiez on the Lake of Thun, and the southern, at Göppenstein, is linked with the Simplon at Brieg by a section descending the Lötschenthal at the Rhone Valley. The total length is 14,536 meters (9 miles), or but slightly shorter than the St. Gothard, though over 5,000 meters shorter than the Simplon, these being the only two existing tunnels by which it is exceeded. The length is nearly half a mile greater than was provided by the original scheme, a departure from the straight line having been necessitated by the catastrophe of 1908, which flooded the workings and entailed the loss of twenty-five lives, rendering nearly a mile of the boring useless. In spite of this delay, the piercing of the mountain, begun on October 15, 1906, occupied less than four and a half years, the rate of progress per day being greater than in the case of any of the previous great alpine tunnels, though closely approached in that of the Simplon. While not in any way affecting the communications between Paris and the south, and only in a minor degree those of the Rhine and southwest Germany, the new route will effect an appreciable shortening of the journey from London (and northeastern France) to Milan and other parts of Italy by the Calais-Belfort route, particularly when the projected tunnel, 4 miles long, under the Jura north of the Lake of Bienne has been completed; the saving will be most noticeable in the case of Genoa. The date fixed for the opening of the Lötschberg route, on which electric traction will be used, is May 1, 1913.

THAT the sulphur in our soils, hitherto considered of little importance to the fertility of the same, is of vast importance, and is also being rapidly depleted due to improper methods of agriculture, is the gist of a bulletin published by the University of Wisconsin, embodying the results of experiments conducted by Professor E. B. Hart and Mr. W. H. Peterson, of the department of agricultural chemistry. Sulphur has been considered relatively unimportant as compared with phosphorus and nitrogen content of soils. Tests made by Professor Hart and Mr. Peterson show, however, that low results were due to the analytical methods employed by the early investigators, and according to more accurate determinations the sulphur content of our soils is of vast importance. Continuous cultivation, in connection with insufficient fertilization, annually results in a heavy loss of sulphur. Combined with the losses of sul-

phur through drainage and the low original sulphur content of the soil, it appears that this loss can not be compensated by the sulphur obtained from the atmosphere. The surface eight inches of the normal soil contains only enough sulphur trioxide for about 100 normal crops of barley. The fact that the subsoil also has a low sulphur content, shows that the upward movement of capillary water can not bring much sulphur to the surface. In a word, it is necessary to apply fertilizers containing sulphur to maintain the crop yields of such soils. The conclusions derived from these experiments show that the sulphur content of a number of the common farm products, as previously determined, has been too low and that much sulphur trioxide is removed by crops from the soil—more than has been supposed. In fact, soils cropped continuously for half a century with infrequent applications of fertilizers have lost as high as 40 per cent. of their original sulphur.

At the suggestion of Dr. Paul G. Woolley, dean of the medical faculty of the College of Medicine of the University of Cincinnati, and with the active cooperation of Dr. John H. Landis, health officer, and Dr. William H. Strietmann, assistant health officer, the board of health of the city has voted that students of the college may have a complete service in all departments of the health department of the city. This cooperative work will begin in the junior year and each student will in his last two years complete a practical course in public health and sanitation. This work will include the usual chemical and bacteriologic work of health departments; water supply, and sewage disposal; disposal of the dead; sanitary, tenement, and house inspection; meat, vegetable and dairy inspection; school inspection and vaccination; tuberculosis field work including dairy work; and actual epidemiologic work including tracing of cases and sources of infection; and finally statistical work, and methods of making and filing reports.

There was an increase of $220,665,617 in the value of metals produced in the United States in 1909 over the value in 1908, as shown by an advance chapter from "Mineral Resources of the United States, 1909," on "The Production of Metals and Metallic Ores in 1908 and 1909," by Waldemar Lindgren, just issued by the United States Geological Survey. In 1909 the total production had a value of $870,445,230; that for 1908 was valued at $649,779,613. Pig iron led in 1909, both in quantity and in value, the output being 28,638,883 short tons, valued at $411,544,773, of which 27,689,883 tons, valued at $397,907,510, was derived from domestic ores. Refined copper, gold, silver and lead, in value of production, followed in the order named. Our own mines produced 57,449,584 short tons of iron ore in 1909, as against 40,301,336 short tons in 1908. Copper ores came next, with 28,025,092 short tons in 1909 and 22,358,857 tons in 1908; zinc and zinc-lead ores were next, with 10,679,608 short tons in 1909 and 8,157,963 tons in 1908; gold ores followed, with 9,241,827 short tons in 1909 and 8,991,751 short tons in 1908; lead ores were fifth in order of total production, with 5,811,687 short tons in 1909 and 5,082,853 short tons in 1908.

*Nature* announces that an International Association of Chemical Societies has been formed as the result of a conference of delegates from the chemical societies of England, France and Germany, held in Paris on April 5 and 26. The three leading societies of the countries named had been invited by the president of the Chemical Society of France to cooperate in this movement and to nominate delegates to represent their respective societies at the inaugural meeting. The representatives of the Chemical Society of London were Professor P. F. Frankland (president), Professor Meldola and Sir Wm. Ramsay. The Chemical Society of France was represented by Professors Béhal, Haller and Hanriot, and the German Chemical Society by Professors Jacobson, Ostwald and Wichelhaus. With the exception of Professor Meldola, who was unable to attend, all the delegates were present at the opening meeting, when the association was formally founded

and the statutes framed and adopted. From these statutes we learn that the objects of the association are to be promoted by the appointment of committees charged with the consideration and investigation of questions submitted by the council, by the publication of the results of such investigations and by the holding of conferences and congresses. It was decided at the opening meeting that the first international committees should be appointed for dealing with the questions of nomenclature in mineral and organic chemistry, and with the unification of the modes of stating physical constants. The next meeting of the association is to be held in Berlin on April 13, 1912, with Professor Ostwald as president, and the 1913 meeting is to be held in Great Britain.

## *UNIVERSITY AND EDUCATIONAL NEWS*

THE governor of Pennsylvania has approved a bill giving an appropriation to the Schools of Mines, Engineering, etc., of the University of Pittsburgh, amounting to $400,000.

HARVARD UNIVERSITY has received from the class of '86 $100,000 to be used without restriction for the purposes of the college.

PRESIDENT TAFT, upon recommendation of the secretary of the interior, has forwarded to the senate the nomination of Professor Philander P. Claxton, professor of education in the University of Tennessee, as commissioner of education to succeed Dr. Elmer E. Brown, who recently resigned to accept the chancellorship of New York University.

DR. MICHAEL F. GUYER, of the University of Cincinnati, has been appointed professor of zoology in the University of Wisconsin.

PROFESSOR J. A. FERGUSON, of the Pennsylvania State College, has been appointed professor of forestry in the College of Agriculture of the University of Missouri. The College of Agriculture owns fifty thousand acres of forest lands in the southern part of Missouri. It is planned to utilize these lands as an out-door laboratory for the instruction in practical forestry.

FRANK LOXLEY GRIFFIN, Ph.D. (Chicago), assistant professor of mathematics at Williams College, Williamstown, Mass., has been appointed professor of mathematics at Reed College, the new institution at Portland, Ore., which is to open September 18, 1911.

THE REV. ALAN S. HAWKESWORTH has resigned from a lectureship in higher mathematics and semitic languages in the University of Pittsburgh.

PROFESSOR GEORGE D. HUBBARD, head of the department of geology at Oberlin College, has charge of the work in geology and geography at Ohio State University during the summer session.

W. H. LONGLEY, Ph.D., instructor in biology in Yale University, has been appointed assistant professor of biology in Goucher College.

WILLIAM CUMMING ROSE, Ph.D., formerly assistant in the Sheffield Scientific School, Yale University, has been appointed assistant instructor in physiological chemistry at the University of Pennsylvania.

## *DISCUSSION AND CORRESPONDENCE*

### DOUBLE MATING OF SILK-WORM MOTHS

IN SCIENCE for May 19, 1911, Professor Kellogg reports certain double mating experiments with silk-worm moths, of which he invites criticism. His account leaves one with the general impression of a "perturbation in the order of inheritance" due to the presence of spermatozoa furnished by two different males. Several possible explanations are suggested by Kellogg, none of which however is advocated. For example, he inquires:

> Do the eggs in double-mated females receive more than one spermatozoon and are these spermatozoa often the representatives of both races used in the double mating? Or can the egg be in any way influenced by the mere presence in the spermatheca of spermatozoa representing both of a pair of allelomorphic heritable characters? Can fluids carrying the spermatozoa have any influence during fertilization? Can the spermatozoa of one type influence those of the other type during their enforced companionship for several hours or days in the female spermatheca?