ment of the Exposition and will comprise everything which is, can or might be exported, from locomotives and heavy machinery to the smallest novelties.

There will also be a department of foreign manufactured goods, but it will not contain a single exhibit shown by a foreign manufacturer. This department will consist of collections of samples of goods made in the commercial countries of Europe and successfully sold in all foreign markets in competition with American goods and in foreign markets in which American trade has not yet been developed. These samples will be exhibited side by side with American products of the same class, and will show our manufacturers just what competition they must meet abroad, as well as the peculiarities in the demands of every foreign market.

A third department of the Exposition will show how American goods must be packed, labeled and shipped in order to meet the requirements of foreign trade, which vary according to the degree of development or civilization in each country of the world.

In October a Commercial Congress will be held in Philadelphia in connection with the meeting of the International Advisory Board of the Philadelphia Commercial Museums. There is every reason to believe that at least 800 representatives of foreign firms will be present at the sessions of the Commercial Congress and in attendance on the Exposition, in addition to the official delegates and those representing commercial organizations.

The Exposition will be under the joint auspices of the Philadelphia Commercial Museums and the Franklin Institute. Sanction and support has been given to the Exposition by the National Government, Congress appropriating $350,000 to aid it. The City of Philadelphia has given $200,000, and the State of Pennsylvania $50,000, and $100,000 is being raised in Philadelphia by individual subscriptions.

The main buildings, which are now under construction, cover eight acres of ground, and the available exhibition space will be at least 200,000 square feet Outside of the space occupied by the main buildings there will be within the Exposition grounds, which comprise a tract of fifty-six acres of land on the bank of the Schuylkill River, within fifteen minutes' ride of the City Hall, ample space for the erection of detached structures for special exhibits.

SCIENTIFIC NOTES AND NEWS.

Vice-President Branner, of Stanford University, will conduct an expedition to Brazil during the summer to work upon the geology of the stone and coral reefs of the coast. These reefs, more or less broken, extend from Ceará to the Abrolhos, a distance of more than a thousand miles. Dr. Branner did much work upon these reefs while he was connected with the Geological Survey of Brazil, but the field observations were never finished and the results of the work were not published. He hopes to complete his work during the summer vacation. The expenses of the expedition will be paid chiefly by Professor Alexander Agassiz, and the results will be published by the Museum of Comparative Zoology at Harvard.

Princeton proposes to send a small party to observe the total eclipse of the sun which is to occur on May 27, 1900. A friend of the University has provided the necessary funds, and the special apparatus that will be needed is already being constructed. The station to be occupied is not yet finally selected, but will probably be near the boundary between North and South Carolina, where it is crossed by the track of the moon's shadow, running northeastward from New Orleans to Norfolk, Va.

The Iron and Steel Institute of Great Britain has conferred the Bessemer Gold Medal for 1899 on Queen Victoria in commemoration of the great progress made in the iron and steel industries during her Majesty's reign.

The Academy of Sciences at Halle has elected Dr. Hans Lenck, professor of mineralogy at Erlangen, to membership.

Sir James Wright, C.B., late Engineer-in-Chief of the British Navy, to whom many of the improvements in British warships are due, died on April 16th in his 86th year.

The death is also announced of Sir William Roberts, F.R.S., the eminent London physician,

at the age of 69 years. He gave the Goulstonian, Lumleian and Croonian lectures and the Harveian oration before the Royal College of Physicians, and contributed in many ways to the advancement of medical science and education.

WE regret also to record the deaths of Professor Karl Scheibler, the chemist at Berlin, aged 72 years; of Dr. Josef Wastler, docent in geodesy in the Technical Institute at Graz, and of Dr. H. A. Wahlforso, professor of chemistry at Helsingfors, at the age of 60 years.

A CABLEGRAM from Constantinople states that in order to develop the agricultural resources of the empire, the Sultan has consulted with the United States Minister, Mr. O. S. Straus, in regard to securing the services of two American agricultural experts, who will be attached to the Ministry of Mines, Agriculture and Forests.

MR. JOHN HAMILTON has been appointed Secretary of Agriculture for the State of Pennsylvania by Governor Stone in the place of Mr. Thomas J. Edge, who has been compelled to resign. It is said that this change has been made for political rather than for scientific reasons.

A CIVIL SERVICE examination for the position of Computer in the Division of Forestry, Department of Agriculture, at a salary of $1,000 per annum, will be held on May 16th and 17th. The examination is chiefly on computation in forestry.

AT the annual meeting of the California Academy of Sciences officers and trustees have been elected to fill the various offices in the Academy for the ensuing year as follows: President, Willam E. Ritter; First Vice-President, Chas. H. Gilbert; Second Vice-President, H. H. Behr; Corresponding Secretary, J. O'B. Gunn; Recording Secretary, G. P. Rixford; Treasurer, L. H. Foote; Librarian, Louis Falkenau; Director of the Museum, Charles A. Keeler; Trustees, William M. Pierson, George C. Perkins, C. E. Grunsky, William H. Crocker, George W. Dickie, E. J. Molera, James F. Houghton. The yearly report of the President, William E. Ritter, showed the past year to have been one of earnest activity in the various working departments. The necessity is urged of concentrating the efforts and the funds of the Academy toward making complete the natural history collections of the State. Especial stress is laid upon the desirability of exploring the waters of the Pacific that wash the California coast, and collecting into the storecases and exhibition galleries of the Museum the scientific treasures of these waters. The report mentions the gratifying commendation which the improved style in which the *Proceedings* are issued calls forth from both at home and abroad. Here may be mentioned the highly appreciated gift of $1,000 given to the publication fund by Mr. C. P. Huntington. The report of the Librarian gives the number of volumes in the library as nearly 10,000. The crowded meetings held twice each month evince the public interest in the popular scientific lectures, which are open to all. The principal event of the year was the definite movement, appropriately initiated by the Society of California Pioneers and heartily participated in by the Academy, to secure from the State Legislalature funds for the erection of a statue to the late James Lick, to whom the Academy owes an ever-growing debt of gratitude for his beneficent gift to the institution.

THE fourteenth annual meeting of the Association of American Physicians will be held at the Arlington Hotel, Washington, D. C., on May 2d, 3d and 4th.

THE annual meeting of the Iron and Steel Institute of Great Britain will be held on May 4th and 5th. Sir William Roberts-Austen, the President-elect, will give an inaugural address, and a program has been arranged that includes papers by representatives from the United States, Austria, Russia, Spain and Sweden.

THE Council of the Royal College of Surgeons has decided to celebrate the centenary of its foundation between March 22 and June 30, 1900. The College is also considering the advisability of applying for power to grant at the time diplomas of honorary fellowships, of which not more than fifty shall be conferred.

PLANS are being made for the establishment of an institute of bacteriology and experimental medicine at Bucharest.

THE Prince of Monaco is building at Monaco a Museum of Oceanography to contain the col-

lections made by the expeditions of the yacht *Princess Alice*. It will contain not only exhibition rooms, but also laboratories for the use of men of science who wish to work upon the collections. The Museum will, in addition, represent the relations of meteorology to navigation.

THE conferences established three years since by Professor Milne-Edwards for the instruction of explorers and travelers have been resumed in the Paris Museum of Natural History. A number of the professors of the Museum take part, explaining the methods of collecting and preserving plants, animals, etc., of making maps and photographs, hygienic precautions, etc.

THE *Critic* of May publishes, over the name of Professor O. C. Marsh, the portrait of Professor F. A. March, of Lafayette College, the eminent philologist. The account of the late Professor Marsh accompanying the portrait opens as follows: "This excellent portrait of the distinguished paleontologist, whose unpaid service at Yale College did so much to strengthen the position of that University in the educational world, was made in this city only about a year ago. Professor Marsh himself was greatly pleased with it."

AT the last monthly general meeting of the Zoological Society, London, Lieutenant-Colonel L. H. Irby in the chair, it was stated that there were 83 additions made to the Society's menagerie during March, amongst which special notice was directed to a kiang, or wild ass of Tibet (*Equus hemionus*). Only two examples of this scarce animal had been previously exhibited in the Society's gardens—namely, in 1859 and 1885. There had also been received an example of Pel's owl (*Scotopelia peli*), a rare species of owl from the Niger territory, presented by Lieutenant E. V. Turner, R.E., and a Cape jumping hare (*Pedetes caffer*), presented by Mr. William Champion, F.Z.S.

IN an important paper read by Mr. Charles Heycock before the Royal Institution, recently, a study of the method of union of the constituents of alloys is followed which indicates that the same laws control as in solutions. Gold, for example, dissolves in melted silver, and the temperature of solidification is reduced in proportion to the weight of gold introduced, until a limit is approximated with twenty per cent. gold. This 'law' is verified in the case of a number of alloys mentioned, but not with a few others (as *Sb* in *Bi*). The rate of lowering of temperature in the cases illustrating solution is inversely proportional to the molecular weights of the dissolved metal.

SIGNOR MARCONI has successfully communicated from the South Foreland, Kent, to the French armed despatch vessel *Ibis* while sailing in the English Channel.

THE scientific library of the late Dr. Stainton, F.R.S., the entomologist, has been sold at auction at London. The following works were included: 'Annals de la Société Entomologique de France,' from the beginning in 1832 to 1892—£35; J. Curtis, 'British Entomology,' 1824–39—£11 5s.; Transactions of the Entomological Society of London, from the beginning in 1836 to 1892, 38 volumes—£32; P. Millière, 'Iconographie et Description de Chenilles et Lépidoptères Inédits,' 1859–74—£10 5s; G. A. W. Herrick-Schäffer, 'Systematische Bearbeitung der Schmetterlinge von Europa,' 1843–56—£27 10s.; and J. Hübner, 'Sammlung Europäischer Schmetterlinge,' Augsburg, 1805, etc., £24.

IN his presidential address before the Chemical Society, London, Professor Dewar, as reported in the London *Times*, discussed the means that might be used for measuring the range of temperature between the critical point of hydrogen and the zero of absolute temperature. The electrical resistance thermometer was of great delicacy, but it depended on a knowledge of the law connecting resistance and temperature and involved the necessity of extrapolation. At such temperatures, however, conditions occurred which could not be anticipated, and hence no confidence could be put in the results given by the curve. Platinum, for instance, which was frequently used for the construction of such thermometers, approached its zero of resistance when immersed in liquid hydrogen, and theoretically only required to be cooled five or six degrees further to become a perfect conductor of electricity. Such a reduction should be effected by making the hydrogen boil under exhaustion, but, in fact, the

lowering of temperature indicated by the platinum thermometer in such circumstances did not exceed one degree. Hence the platinum must have come to a limit. Two pure platinum thermometers which Professor Dewar had tried both behaved in this way. Next he experimented with a resistance composed of an alloy of rhodium and platinum, which gave a different temperature altogether. According to it the boiling point of hydrogen was *minus* 246° as against *minus* 238° shown by the pure platinum arrangement, and it, too, failed to indicate the expected lowering under exhaustion. A thermo-junction of iron and German silver was next tried without satisfactory results, and another junction of lead and iridium-platinum proved equally ineffective. Thus he was brought to an air thermometer and the use of hydrogen itself under diminished pressure to determine its own boiling point. In the instrument he had constructed the gas had a tension of 273 mm. at the temperature of melting ice, so that a difference of one millimeter, corresponded to one degree of temperature. The boiling point of hydrogen was by this thermometer given as about *minus* 252°, but various corrections had to be made, and in particular the possibility of the hydrogen being contaminated with a slight impurity of air or oxygen allowed for, so that it was uncertain what exactly was the true boiling point. Assuming it to be *minus* 252°, or 21° on the absolute scale, Professor Dewar went on to illustrate the difficulties of nearer approach to the absolute zero itself. By exhaustion the experimenter could not practically get more than 6° lower, and at that point he was barred and blocked with no means of bridging over the remaining 15°. Even supposing that a new substance was discovered as volatile in comparison with hydrogen as hydrogen was in comparison with nitrogen, that under exhaustion would only give a temperature 3½° above the zero, and it would require a second hypothetical substance as volatile compared with the first as the first was compared with hydrogen to enable the experimenter to come near the extreme of temperature he is aiming at.

THE report by Sir William Crookes, F.R.S., and Professor Dewar, F. R. S., on the composition and quality of daily samples of the water supplied to London for the month ending February 28, 1899, says: We have again to record an excess of rain. The rainfall at Oxford during the past month was 1.92 in., the average fall for the last 30 years is 1.76 in., giving an excess of 0.16 in., and making the excess for the first two months of the year 0.85 in., or 21.6 per cent. on the average fall. It is interesting to observe the effect of the rainfall on the number of microbes in the unfiltered Thames water. No rain fell on the 1st, 2d or 3d, and the average number of microbes in the Thames at Hampton up to the 4th was 6,510 per c.c.; it then rained every day until the 15th, during which time the average number of microbes, including the 16th, rose to 38,354 per c.c.; after the 15th no more rain fell, and the average number of microbes from then to the end of the month fell to 14,914 per c.c. This large increase in the number of microbes in the river, due to rain, originates not merely from the washing of the surface of the land, but is also largely due to atmospheric microbes brought down by the rain. As far as our experiments go they are perfectly harmless. During the month the London waters, chemically and bacteriologically, have maintained their high character as an efficiently filtered river supply.

PROFESSOR E. RAY LANKESTER has written a letter to the London *Times* stating that £3,240 have been subscribed toward a second expedition of Mr. J. E. S. Moore to Lake Tanganyika, and that in addition £500 have been offered on condition that a further sum of £500 be collected. This insures the sending of the expedition regarding the scientific importance of which Professor Lankester writes: Some ten years ago the discovery of a true medusa—similar to some marine jelly-fish—in the waters of Lake Tanganyika led naturalists to entertain the notion that this vast and remote inland sea might retain within its area other evidences of a former connection with the ocean. The medusa (which swarms in the lake at certain seasons) was duly described by Mr. R. T. Günther in my laboratory at Oxford, and named *Limnocnida Tanganyikæ*. So great was the interest felt in the suggestions to which its presence gave rise that I obtained two small

grants from the Royal Society and the British Association, and was fortunate enough to induce Mr. J. E. S. Moore to undertake, in 1896, a journey to Lake Tanganyika in order to collect the fish, shell-fish, medusæ and sponges which occur in its waters. The result of Mr. Moore's careful study of his collections (especially by the examination of the internal anatomy of the whelk-like shell-fish obtained) has been to show that there is in Lake Tanganyika an ordinary fresh-water lake fauna similar to that of other lakes, but that side by side with this there is a second fauna of marine character to which Mr. Moore has given the name 'halolimnic' (oceano-lacustrine). Not only this, but Mr. Moore has shown that the molluscs of the halolimnic fauna of Tanganyika have an extraordinary resemblance to forms occurring in the fossil condition in the inferior oolites of Europe. I have recently placed in the northeast recess of the central hall of the Natural History Museum in Cromwell-road a case showing a series of these Tanganyika shell-fish side by side with examples of the oolitic shells with which they so closely agree. Close to these are placed the fishes brought home by Mr. Moore, of which 26 were new to science. Mr. Moore, in his former visit to Tanganyika, was not able to do more than 'scratch round some 150 miles of the shallow coast line of a lake over 350 miles in length' (to use his own words). Naturally one is led to believe that a more thoroughly equipped expedition with the use of a steamer on the lake (which Mr. Moore had not the chance to obtain) would yield results of proportionately increased importance. It is not merely as adding new forms to our collections that such an exploration is to be desired. The great geological problems of the history of this lake basin and its connection possibly with the Nile or a northward sea, possibly with an ancient estuarine Congo, are what stare us in the face. There are deposits in the valley north of Tanganyika and in its immediate vicinity which must be examined and infallibly yield evidence on these subjects. There are also the northward lakes of Kivu and the Albert Edward Nyanza, the waters of which have never been sampled for their living witnesses of geological history.

UNIVERSITY AND EDUCATIONAL NEWS.

We announced last week that Mr. Astrakoff, the Russian engineer, had left, under certain conditions, 1,000,000 roubles for the foundation of a university for women at Moscow. This trust has been accepted by the Moscow municipality and an annual subsidy of 3,000 roubles has been voted.

The medical library of the late D. Sigismund Waterman, of New York, has been bequeathed by him to Yale University.

A friend of Princeton University whose name has not been disclosed has given $100,000 to establish a chair of politics. It is reported that the chair is for ex-President Cleveland.

Professor H. P. Hutchins, Dean of the Law Department of the University of Michigan, has been elected President of the Iowa State University.

Dr. Henry L. Wheeler, instructor in organic chemistry in the Sheffield Scientific School of Yale University, has been promoted to an assistant professorship.

At Colorado College Dr. Florian Cajori, formerly professor of physics, has been transferred to be head of the department of mathematics, and Dr. S. J. Barnett has been promoted to the professorship of physics.

Major Ross, known for his work on the malarial parasite, has been elected lecturer in the newly established School of Tropical Medicine at Edinburgh.

Dr. Oskar Doebner has been promoted to a full professorship of chemistry and pharmacy in the University of Halle. Dr. Kunz-Krause, of Lausanne, has been appointed professor of physics in the veterinary school at Dresden. Dr. Beck von Managetta, of the University at Vienna, has been made professor of botany in the University at Prague. Dr. Sommer and Dr. Cohen have qualified as docents in geometry and physics respectively in the University of Göttingen. Professor Heinrich Ritthausen, professor of agricultural chemistry in the University at Königsberg, has retired.