

Bi_2O_3 . This study shows the importance of repeating much of the work of earlier chemists. With the superior methods of manipulation and increased knowledge of to-day, much of the superstructure of the theory of inorganic chemistry rests upon a very insecure foundation of facts. In view of the decreasing affinity in the elements of the fifth group with increase of atomic weight, the existence of the oxid BiO is theoretically very probable, but that it really exists has not been shown experimentally. The same authors show that in an alkaline lead solution stannous chlorid precipitates all the lead as metallic lead.

J. L. H.

SCIENTIFIC NOTES AND NEWS.

THE ROYAL GEOGRAPHICAL SOCIETY.

THE annual meeting of the Royal Geographical Society was held in London on May 23d, Sir Clements Markham in the chair, and the annual dinner of the Society took place in the evening. At the annual meeting the medals of the Society were presented to Lieutenant Peary, Dr. Sven Hedin and others in accordance with the award that we have already announced. The President then delivered his annual address, in the course of which he said, according to the report in the *London Times*, that a very sympathetic reply had been received from the Prime Minister's private secretary to the appeal on behalf of a government Antarctic expedition. A meeting of very great interest was held in the beginning of the year by the Royal Society, in which eminent authorities were unanimous in insisting on the necessity of renewing Antarctic exploration, and on the duty of the British government to take a substantial share in it. A German expedition was being organized on a liberal scale, and funds were being collected throughout Germany for the purpose. Moreover there was reason to hope that the Norwegian government might send out an expedition also, perhaps under the leadership of Dr. Nansen, to carry out exploration mainly on land. Meanwhile the Belgian expedition, under M. de Gerlache, had been actively

engaged, and the expedition, liberally supported by Sir George Newnes, under M. Borchgrevink, was in an advanced state of preparation. After a brief reference to Mr. Jackson's account of the Jackson-Harmsworth expedition, to Lieutenant Peary's labors and to those of Captain Sverdrup, Colonel Fielden, Mr. Pearson, Mr. Arnold Pike and Sir Martin Conway, the President said that German and Swedish expeditions were in progress for Spitzbergen and Franz Josef Land. Germany was setting an admirable example in scientific exploration. Besides the Antarctic expedition referred to, the German government had made a grant of £15,000 for oceanic research, especially in the Atlantic and Indian oceans. In the North Atlantic much good work was done under the joint cooperation of the Swedish, Norwegian, German and British governments. He hoped that during the coming summer authentic and satisfactory information concerning the hazardous balloon expedition undertaken by M. Andrée might be received. After reference to the other papers and the results of other expeditions during the past year and to the most important publications of the year, the President briefly dealt with the subject of education.

He said that both at Oxford and Cambridge geography continued to improve its position. At Oxford the University bore the entire expense of the readership. After long and careful consideration, the Council decided to continue the Society's contribution to the Cambridge lectureship, on the understanding that the University would take it over at the end of five years, and that the lectureship would be elevated to a readership. The reader, Mr. Yule Oldham, sent a satisfactory report of the work during the past year. With regard to Oxford, Mr. Mackinder had given the Society an account of his labors both at Oxford and at Gresham College. The measures adopted by the Council last year for increasing the efficiency and extending the scope of the system of instruction conducted by Mr. Coles had quite fulfilled expectations. Last year (1896-97) 41 intending travellers received instruction from Mr. Coles, one of whom was granted the Society's diploma. In the present year (1897-98) 65 intending travellers had received instruction, an

increase of 24, and five of these had passed before the Committee and received diplomas, one of them being a lieutenant in the navy. Among the pupils there were 26 civilians, 24 officers of the army and navy, four in the colonial service, four civil engineers and two missionaries. The Society owes much to Mr. Coles for the pains and trouble he had taken, and for the time he had devoted to the work of teaching. This year the Society had reached and passed the four thousandth figure in the number of its Fellows. This was a landmark in their progress, while the most notable events in their history this year were the grant of diplomas and the creation of a growing number of trained scientific explorers.

LIQUID HYDROGEN.

At the meeting of the London Chemical Society on June 2d Professor Dewar gave a short account of the first attempts made to determine the physical constants of liquid hydrogen. Among the most interesting points brought forward, according to the report in the *London Times*, was that just as in the middle of the last century chemists were startled by Cavendish's discovery of a factitious gas, namely, hydrogen, having a density one-fourteenth that of air, so now they were startled by finding in liquid hydrogen a liquid having a density of 0.07, or roughly one-fourteenth that of water. Hydrogen occluded in palladium has been found to have a density of 0.62. Whatever, therefore, be the form in which it exists in that metal it is more than eight times denser than in the liquid condition, and consequently must be in a state of chemical combination, and not merely in one of liquefaction. Liquid hydrogen is thus by far the most extraordinary liquid known. The lightest liquid hitherto obtained is liquid marsh-gas, which has at its boiling-point a density of about two-fifths that of water. Liquid hydrogen, therefore, has only one-sixth of the density of liquid marsh-gas, and the surprising thing is that having such a small density it is so well defined, so easily seen, and so capable of collection and manipulation in vacuum vessels.

Professor Dewar has determined the boiling-point of the liquid by means of a platinum resist-

ance thermometer—practically the only form available at such low temperatures. The result he has obtained is -238° C. at atmospheric pressure; in other words, liquid hydrogen boils steadily at 35° above the zero of absolute temperature. From all analogy it is inferred that the lowering of temperature that will be produced by forcing the liquid to boil *in vacuo* cannot amount to more than 10 or 15° . It is, therefore, possible to say with confidence that at the present moment science can project no method that will get nearer to the absolute zero than 20 or 25° .

The boiling-point of liquid hydrogen is really higher than suggested by theory and the work of other experimenters. The density of the vapor coming off from the boiling liquid is eight times denser than the gas at ordinary temperatures, whereas in the case of liquid air the vapor is only four times heavier. Liquid hydrogen again is 100 times denser than the vapor it is giving off, whereas the density of liquid oxygen is 255 times greater than that of its vapor. The atomic volume of liquid hydrogen at its boiling point is 14.3, while that of oxygen is 13.7.

It may be mentioned that the platinum resistance thermometer when immersed in the liquid hydrogen is cooled to within six platinum degrees of its zero point, so that if cooled these few degrees more—as it can be by means of the liquid boiling under reduced pressure—it must break down, becoming an infinite conductor with no resistance.

GENERAL.

BOSTON UNIVERSITY has conferred the degree of LL.D. on Alpheus Hyatt, professor of zoology and paleontology in the University.

PROFESSOR W. M. DAVIS and Professor E. L. Mark will take advantage of the sabbatical year allowed by Harvard University to spend the period in study and research abroad, while Professor W. G. Farlow will spend the winter in the West Indies. Professor H. F. Osborn, of Columbia University, is also enjoying a sabbatical year and is at present abroad.

THE Loubat prizes of Columbia University, awarded every fifth year, alternately for works on the history, geography and numismatics of

North America, and on the archæology, ethnology and philology of North America, were this year given in the latter group. The first prize of \$1,000 was awarded to Mr. W. H. Holmes, of the United States National Museum, and the second prize of \$400 to Dr. Franz Boas, of the American Museum of Natural History and of Columbia University. We hope to publish later the detailed report of the committee, which consisted of Professor H. T. Peck, Professor D. G. Brinton and Dr. W. J. McGee.

PROFESSOR JACOB REIGHARD, of the University of Michigan, will, during the present summer, make, under the auspices of the United States Fish Commission, a biological examination of Lake Erie. His party will include Professor H. B. Ward, of the University of Nebraska; Mr. A. J. Pieters, and others. During the month of July the party will be engaged in a laboratory established in the United States Fish Hatchery at Put-in-Bay Island, O. In August the work will be continued in a steamer chartered for that purpose.

PROFESSOR KREUTZ telegraphs that Encke's periodical comet has been observed at Mr. John Tebbutt's Observatory, Windsor, N. S. W. Professor Keeler announces the discovery, photographically, on June 11th, of a bright comet, by Mr. E. F. Coddington, of the Lick Observatory.

PROFESSOR RAMSAY has discovered another gaseous element in the air and called it krypton. It was first announced by M. Berthelot at a meeting of the Paris Academy of Sciences on June 6th, and was exhibited at the *conversazione* of the Royal Society on the 8th. The new gas is closely related to helium, and exists in common air in the proportion of about one to twenty thousand. We hope to give further details when the scientific publication of the discovery has been made.

PROFESSOR NERNST, of the University of Göttingen, has recently devised a new form of electric lamp that promises to be of the very highest importance. It differs from the ordinary lamp in that it has a filament composed of magnesia mixed with rare earths, instead of the ordinary filament in a vacuum. The vacuum is not necessary in the new lamp. The filament of

Nernst's lamp is non-conducting when cold, but on being warmed it conducts, and then glows with a very brilliant light. The advantages are that it suffers no decomposition in the air and requires very much less current (about one-third) than the old electric lamp. The problem at present seems to be to find a convenient method for warming the filament, as that cannot be done directly by the current.

MAJOR GIBBON left England on May 26th, with seven other members of his party, for South Africa, with a view of traversing the continent from the Cape to Cairo. He expects to make a journey of about 12,000 miles in eighteen months. The party has the support of the Royal Geographical Society and of the government.

News has been received from M. de Behagle, the African explorer, in which he was on March 2d about to ascend to Mobai to meet M. Liotard, Governor of Upper Ubangi, who had accompanied the Marchand mission and was descending to Brazzaville. On his return to Wadda he intended to go north in the direction of Lake Chad.

PROFESSOR WARREN K. MOOREHEAD, of Columbus, O., has returned from a trip to southern Arizona, where he has made valuable archæological discoveries in the Slado Valley.

A MEETING of the general committee to make arrangements for the Bristol meeting of the British Association was held on June 6th. It was reported that the sum of nearly \$20,000 had been collected locally for the reception of visitors. It is expected that there will be about 2,000 members present.

THE second of the *conversazioni* of the Royal Society, to which, as usual, ladies were invited, was held on June 8th. The most remarkable exhibit was Professor Ramsay's new gas krypton, the spectrum of which was shown along side of those of sodium and helium. Though part of the exhibits were similar to those shown at the *soirée* a month or so ago, there were several new exhibits of interest.

THE British Institution of Civil Engineers held its annual *conversazione* at its rooms in London on May 26th. There were many ex-

hibits of scientific and technical interest, and various demonstrations were given during the evening.

THE annual Congress of the Institute of Public Health of Great Britain will be opened at Dublin on August 18th, under the presidency of Sir Charles Cameron. A health exhibition will be held in connection with the Congress, which will include, in addition to sanitary appliances, bicycles and tricycles and motor cars.

THE sixty-sixth annual meeting of the British Medical Association will be held at Edinburgh, on Tuesday, Wednesday, Thursday and Friday, July 26, 27, 28, 29, 1898. The President is T. G. Roddick, M.D., professor of surgery in McGill University, Montreal, and the President-elect, Sir Thomas Grainger Stewart, M.D., LL.D., F.R.S.E., professor of practice of medicine and clinical medicine in the University of Edinburgh. The address in medicine will be delivered by Thomas Richard Fraser, F.R.S., professor of materia medica and clinical medicine in the University of Edinburgh; the address in surgery by Thomas Anandale, Regius professor of clinical surgery, University of Edinburgh, and the address in psychological medicine by Sir John Batty Tuke, lecturer on insanity, School of Medicine of the Royal Colleges, Edinburgh. The scientific business of the meeting will be conducted in sixteen sections.

THE triennial meeting of the German meteorological Society was held this year during the week after Easter at Frankfort-on-the-Main. In the absence of the President, Professor Dr. Neumayer, Director of the Deutsche Seewarte, presided. He reviewed the progress of meteorology during the past twenty-five years and concluded that Antarctic exploration affords a profitable field for meteorological and magnetic investigations. Among the dozen papers presented one of the most interesting was a study of the amount of sunshine in North America as compared with that in Europe, by Professor Dr. van Bebber. Two honorary members were chosen: Dr. Rykatcheff, Director of the Central Physical Observatory at St. Petersburg, and Professor Dr. Neumayer, who now retires from the direction of the Society,

which he assisted to form in 1883. Eight corresponding members were elected: Messrs. Paulsen, of Copenhagen; Snellen, of Utrecht; von Konkoly, of Buda-Pest; Hepites, of Bucharest; Pernter, of Vienna; Lancaster, of Brussels; Sapper, of Guatemala, and Rotch, of Boston, U. S. A.

AT the coming convocation of the University of the State of New York the leading chiefs and sachems of the Iroquois, representing the Five Nations, will be present on Wednesday, June 29th, at a formal commemoration and ratification of the election of the University as the permanent wampum keeper of the Iroquois League, and of the deposits in the fire-proof State Capitol of these most precious relics of the famous Five Nations. Brief speeches will be made by representatives of the different tribes, and some of those most familiar with the history and traditions of the Indians say that the event will be, probably, the last general gathering of the Five Nations, and will, therefore, be specially significant.

LORD LISTER, President of the Royal Society, has consented to perform the opening ceremony of the new laboratories of physiology and pathology erected and equipped at University College, Liverpool, by the Rev. S. A. Thompson-Yates, at a cost exceeding £25,000. The opening is fixed for October 8th, when Victoria University will confer on Lord Lister the honorary degree of Doctor of Science.

FREDERICK C. SAYLES, first Mayor of Pawtucket, R. I., has offered to present the city with a free public library in memory of his wife, Deborah Cook Sayles, and has purchased for \$22,500 a site for the same on Summer street.

WOMEN physicians will hereafter be eligible to all official positions in Russia. They will receive the same salaries and pensions as men.

THE Audubon Society of Illinois has secured the conviction of a dealer in Chicago who had in his possession native song birds. It was claimed that the birds were taken in Mexico and elsewhere, but the conviction was obtained in spite of the fact that the place of capture could not be proved.

RECENT issues of the London *Times* announce the deaths of three English men of science, and

give obituary notices, from which we copy. Mr. Osbert Salvin, the eminent ornithologist, died on June 1st at his residence, Hawksfold, near Haslemere. The son of the late Mr. Anthony Salvin, the well-known architect, he was born in 1835, and received his education at Westminster and Trinity Hall, Cambridge, where he graduated as a Senior Optime in the Mathematical Tripos of 1857. Immediately after taking his degree he, together with Mr. W. H. Hudleston (then Simpson), joined Mr. (now Canon) Tristram in his natural history exploration of Tunis and eastern Algeria, where they passed five months. In the autumn of the same year Mr. Salvin proceeded to Guatemala, where, chiefly in company with the late Mr. G. U. Skinner, the celebrated collector of orchids, he stayed till the middle of 1858, returning to Central America (henceforth always to be associated with his name) about twelve months later. He again went out in 1861, accompanied by Mr. Frederick Godman, and continued the explorations he had already begun, but was home again in 1863. In 1865 he married Caroline, the daughter of Mr. W. W. Maitland, of Loughton, in Essex, and with her subsequently undertook another voyage to Central America. In 1874, on the foundation of the Strickland Curatorship in the University of Cambridge, he accepted that office, which he filled until 1883, when, on his father's death, he succeeded to the property at Hawksfold, and moved thither, though there was hardly a week in which he did not pass some days in London, for, with Mr. Godman, he had conceived the idea of bringing out a 'Biologia Centrali-Americana,' being a complete natural history of the countries lying between Mexico and the Isthmus of Panama. This gigantic task, by far the greatest work of the kind ever attempted, taxed all their united efforts, and those of the many contributors they enlisted, and is still in progress. Before beginning this, Mr. Salvin had edited the third series of 'The Ibis,' of which he was one of the founders, and had brought out a 'Catalogue of the Strickland Collection' in the Cambridge Museum. He contributed also the *Trochilidæ* (humming birds) and *Procellariidæ* (petrels)—on which last group he was the acknowledged

authority, to the British Museum 'Catalogue of Birds,' and almost his latest labor was that of completing and arranging the late Lord Lilford's 'Coloured Figures of British Birds,' while the Royal Society's 'Catalogue of Scientific Papers' enumerates 47 published by Mr. Salvin alone, 23 by him and Mr. Godman jointly, and 54 by him and Mr. Selater, all before 1884. Mr. Salvin was a Fellow of the Royal, the Linnæan, the Zoological and the Entomological Societies, on the Councils of all of which he frequently served.

THE death occurred on June 6th at Cambridge, in his 81st year, of the Rev. Percival Frost, F.R.S., D.Sc. Born at Hull, while his father practiced as a solicitor, he was educated at Beverley, Oakham and Cambridge, where he was second wrangler and first Smith's prizeman in 1839, Fellow of St. John's College from that year to 1841, mathematical lecturer at Jesus College from 1847 to 1859, mathematical lecturer at King's College, Cambridge, from 1859 to 1889. He had been a Fellow of King's College since 1882, in which year he was also elected a Fellow of the Royal Society. Dr. Frost was the author of treatises on 'Curve Tracing,' 'Solid Geometry,' 'The First Three Sections of Newton's Principles,' as also of numerous papers published in the *Cambridge Mathematical Journal*, the *Oxford and Cambridge Journal of Mathematics*, and the *Quarterly Journal of Mathematics*.

MR. HENRY PERIGAL, the Treasurer of the Royal Meteorological Society, died on June 7th at the advanced age of 97 years. Mr. Perigal was for some time a clerk in the Privy Council Office, and afterwards in the old Victualling Office. Subsequently he joined the firm of Messrs. Henry Tudor & Son, of Threadneedle street. He was the author of various works on astronomy, bicyclic and other curves, kinematics and the laws of motion, probable mode of constructing the pyramids, etc. He was a Fellow of the Royal Astronomical, Royal Microscopical and Royal Meteorological Societies, as well as a member of several other scientific associations, and until within two years of his death was constant in his attendance at their meetings.

THE University of Pennsylvania Press has published a 'Syllabus of Lectures on the Vertebrata,' by the late Professor E. D. Cope. It is stated in the preface that the book is a corrected and extended edition of 'The Syllabus of Lectures on Geology and Paleontology,' Part III.: 'Paleontology of the Vertebra,' published in 1891, and was originally designed for use in the extension lectures of the University. The book includes an introduction of thirty-five pages on the 'Life and Works of Cope,' by Professor Osborn, and a portrait of Cope as frontispiece. A limited number of copies of this work is offered for sale, in cloth for \$1.25, or with a paper cover for \$1.00.

THE first of the four volumes of Huxley's Scientific Memoirs has been issued. The work, which Professor Michael Foster and Professor Ray Lankester are editing, is being published by The Macmillan Company as a contribution to the Huxley memorial. A portrait of Huxley, taken in 1857, serves as a frontispiece of the volume, which contains 600 pages.

MESSRS. G. P. PUTNAM'S SONS have just issued, as the first volume of their 'Science Series,' 'The Study of Man,' by Professor A. C. Haddon. They have arranged for the following volumes of the series in addition to those already announced: 'Rivers of North America,' by Professor Israel C. Russell; 'Whales,' by F. E. Beddard; 'Bacteria,' by Dr. J. H. Gladstone; 'History of Botany,' by Professor A. H. Green; 'Planetary Motion,' by Dr. G. W. Hill, and 'Infection and Immunity,' by Dr. George M. Sternberg. The title of Professor Young's book has been changed to 'Meteorites and Comets,' and that of Professor Brinton's to 'Ethnic Psychology.'

M. MOURLON, of the Belgian Geological Survey, writes that the favorable reception met with by Volume I. of the series B of the *Bibliographia geologica*, cataloguing the publications since the 1st of January, 1896, and Volume II., soon to be ready, leads the Survey to publish Volume I. of the series A, or retrospective series, giving the titles of geological publications published prior to 1896. The first volume of this series will comprise the titles of all geological publications of the library of the Geological Survey,

and will consequently constitute the first part of the catalogue of this library (drawn up according to the decimal classification). Authors are requested to send copies of their publications in order that they may be included in the Bibliography.

UNIVERSITY AND EDUCATIONAL NEWS.

THE late A. S. Van Wickle, of Hazleton, Pa., has bequeathed \$45,000 each to Princeton University and to Brown University and \$30,000 to Lafayette College.

CHANCELLOR MACCRACKEN, of New York University, has announced an anonymous donation, thought to be from Miss Helen Gould, of \$50,000 to New York University.

MT. HOLYOKE COLLEGE receives \$5,000 by the will of the late Elijah A. Morse, and Tufts College \$2,000 by the will of the late Mrs. Eugenia Stowe, of Meriden, Conn.

THE Board of Trustees of the University of Rochester has adopted resolutions admitting women to the institution when \$100,000 shall have been raised for the purpose.

AT the recent commencement exercises of the University of Nebraska 88 students were admitted to the degree of Bachelor of Arts, 44 to the degree of Bachelor of Science, 39 to the degree of Bachelor of Laws, 40 to the degree of Master of Arts, and 2 to the degree of Doctor of Philosophy. The University long since abandoned the practice of conferring advanced degrees upon any other basis than that of resident work under the direction of the faculty.

It is reported that President Andrews, of Brown University, has been offered and will accept the superintendency of the public schools of Chicago.

THE following promotions have been made at Johns Hopkins University: Dr. Joseph S. Ames to a full professorship of physics; Dr. J. Elliott Gilpin and Dr. Harry C. Jones to be associates in chemistry and physical chemistry, respectively, and Dr. Luis E. Livingood to be associate in pathology. The Bruce fellowship was awarded to Gilbert A. Drew, of Iowa, who this year receives the degree of Ph.D. in biology.