established at Kief, is closed by Imperial Order for political reasons.

THE same periodical gives some information as to the journey made last summer by Capt. Pevtsov with a Cossack detachment which protected the caravan with corn, sent by Russian tradesmen from the Lake Zaisan, *viâ* Bulun-Tokhoi, to the Chinese town Gu-chen (Dzungaria, N. lat. 43° 50′, E. long. 90° 14′). The results of this journey are,—a survey of the route, 560 miles long, with maps of the towns, astronomical determinations of the positions of seven points, magnetical observations, barometrical measurements of heights, a complete geological exploration along the route, a collection of about 1,000 species of plants, and a zoological collection numbering 34 mammalia and 123 birds.

THE Geological Survey of Finland, which was undertaken on the scheme of that of Sweden, but was interrupted in 1868, will be continued this year.

A TELEGRAM received by the St. Petersburg Academy of Sciences, announces that the mammoth found in the neighbourhood of Tomsk is very well preserved. A piece of its flesh with fat has been forwarded to the Academy, which, as we learn from a private source, proposes to send M. Poliakof for the exploration of the remains.

THE Russian Geographical Society has undertaken the publication of an historical sketch of geographical explorations in Northern Asia, with accounts of all expeditions, an index of works on Northern Asia, and a map showing the routes followed by all important exploring parties. The work will appear in 1879, that year being the tercentenary of the crossing of the Ural Mountains by Yermak, the conqueror of Siberia.

IN a recent communication to the Belgian Academy, M. van Monckhoven describes some improvements in the photographic reproduction of ultraviolet spectra of gases. He employs two large Geissler tubes placed parallel and communicating together by a capillary tube at right angles to them. The spectroscope consists of three 60° prisms of Iceland spar, cut so that the bisector plane of each of their dihedral angles is parallel to the optic axis of the crystal. With such prisms the ordinary and extraordinary spectra do not encroach on one another. The axis of the capillary tube is then made to coincide exactly with that of the collimator of the spectroscope, and the intensity of the light, which can be utilised during passage of the current from a Ruhmkorff coil, is found to be very much greater than if the tube were placed, as usual, perpendicularly to the axis of the apparatus. The author recommends using a plate of quartz in place of one of the large tubes of glass, so as to prevent too great absorption of rays of high refrangibility. To give an idea of the exactness with which even the most refrangible bright lines are reproduced, M. van Monckhoven presented three plates representing the solar spectrum, the bright lines of hydrogen combined with those of aluminium (of which the electrodes were formed), and the bright lines of a solar protuberance.

WE have received from Prof. E. S. Holden, of the United States Naval Observatory, a list compiled by him of the principal telescopes in the possession of public institutions and private individuals. The list, though imperfect, is a long one, and we regret that the pressure on our space prevents us from printing it. Those who would like to possess it will find it in the *Popular Science Monthly* for March. Among reflectors we notice that Lord Rosse's is still unsurpassed; it has an aperture of 6 ft. and a focal length of 55 ft. Mr. Ellery's, of Melbourne, has a 4 ft. aperture and a focal length of 32 ft.; that of the Paris Observatory an aperture of 1·20 metre and a focal length of 7 metres. Of refractors the two largest are now constructing; that for Yale College Observatory (by Clark and Sons) will have an aperture of 28 in., and the one for Vienna, constructed by Grubb, an aperture of 27 in. The refractor belonging to Mr. Newall, of Gateshead, has an aperture of 25 in. and a focal length of 29 ft.; the corresponding dimensions of the Pulkowa refractor are 14·93 in. and 270·6 in.; Lord Lindsay's, 15 in. and 15 ft.; that of Greenwich, 12·5 in. and 16·6 ft.; the largest in the Paris Observatory, 12 French in. and 5 metres; Rutherfurd's, of New York (a photographic refractor), an aperture of 10·5 French in.; Secchi, of Rome, 7·5 French in., and 14 French ft. Altogether Prof. Holden enumerates upwards of 140 telescopes that are at work on the heavens, and remarks, with some justice, that "it is a melancholy fact that the return from so many instruments is not so great as it should be, and it suggests the question as to whether future benefactors will not do better to provide astronomers to use the telescopes already constructed than observatories in which to put new ones."

TO those who take a practical interest in the ventilation of houses we would recommend a pamphlet by Mr. James Curtis, C.E., entitled "Fresh Air in the House, and How to Secure It" (Ward, Lock, and Tyler). Mr. Curtis has evidently studied the important subject of ventilation carefully, and his practical suggestions will be found useful to those anxious to secure a regular supply of fresh air in their houses.

IN the note on Mr. Shrubsole's discovery (vol. xv. p. 561), the word *chalk* should be *chert*.

THE additions to the Zoological Society's Gardens during the past week include two Green-winged Doves (*Chalcophaps indica*), a Hamilton's Terrapin (*Clemmys hamiltoni*) from India, presented by Mrs. M. A. Moore; three Water Ouzels (*Cinclus aquaticus*), European, presented by Mr. G. B. Davies Cooke; an Indian Python (*Python molurus*) from India, presented by Mr. C. A. F. Bowell; six River Lampreys (*Petromyzon fluviatilis*) from British Rivers, presented by Mr. A. H. Cocks, F.Z.S.; a Virginian Deer (*Cervus virginianus*) from North America, a Rock Cavy (*Ceradon rupestris*) from South America, deposited; two Raccoon-like Dogs (*Nyctereutes procyonides*), four Common Foxes (*Canis vulpes*) born in the Gardens.

UNIVERSITY INTELLIGENCE

OXFORD.—An examination will be held at St. John's College on Tuesday, June 12, and the two following days, to elect to two Foundation Scholarships for Classics, and to the Holmes Scholarship, which will be given for Natural Science. The subjects of examination in Natural Science will be Chemistry and Physics; there will be also a pass paper in Classics; there is no restriction of age. The scholarship is tenable for five years, and is of the value of 100*l.* per annum.

The Boden Professor of Sanskrit (Mr. Monier Williams) proposes to give two public lectures (open to all members of the university and their friends) in the large lecture room of the museum, on Wednesday, May 23, and Wednesday, May 30, at three P.M. The subject will be "The Sacred Places, Religious Creeds, and Superstitions of Southern India and Ceylon," and the lectures will be illustrated by diagrams and objects of interest (including a model of the Parsee Towers of Silence) brought from India.

CAMBRIDGE.—The "Rede" Lecture will be delivered in the Senate-house on Friday, May 25, at half-past two in the afternoon. The lecturer is Sir C. Wyville Thomson, and the subject of the lecture will be "On some of the Results of the Expedition of Her Majesty's ship *Challenger*."

LONDON.—At Tuesday's Convocation of the University o London a resolution was proposed thanking the Senate for their decision to admit women to degrees in medicine. To this an amendment was moved that it was undesirable to take this course before the House had considered the advisability of admitting women to degrees in all faculties. This was carried on a division

by 142 to 129, and was afterwards adopted as a substantive motion by 144 to 116

EDINBURGH.—Lord Zetland has intimated that with the sum, amounting to between 4,000*l.* and 5,000*l.*, which he has received as compensation for the abolition of patronage in Orkney and Shetland, he intends to found several bursaries in connection with the Faculty of Arts in Edinburgh University. His lordship, in so disposing of the money, has in view the advancement of the educational interests of Orkney and Shetland, of either of which the intending bursars must be natives.

SOCIETIES AND ACADEMIES

LONDON

Royal Society, April 12.—"On the Constant Vibration of Minute Bubbles." By Walter Noel Hartley, F.R.S.E., King's College, London.

Those who have given great attention to the study of fluid cavities in minerals, have occasionally met with vibrating particles which are apparently bubbles.

Mr. Hartley became acquainted with these at the close of last year, 1875, when Mr. P. J. Butler showed him a ruby containing a cavity partially filled with liquid carbonic acid, the bubble in which, when of small size, was in constant motion.

He also refers to a felstone containing portions of quartz with many cavities. The majority of these were water cavities, but others appeared to be empty; and in one of them Mr. Young had noticed a moving particle, supposed to be a bubble, which made its appearance only in a cold atmosphere. By dropping a little ether on the object, the evaporation cooled it sufficiently to condense a liquid in the cavity, and the moving particle was easily seen with a magnifying power of 400 diameters. By immersion in iced water, the temperature of which was 3°·5 C., the cavity had the appearance of being two-thirds filled with a liquid, the gas-bubole of course occupying the remaining space, and having a sort of trembling motion. The bubble decreased in size, and the motion became more and more rapid as the size became smaller, until it rushed up and down and across the space in which it was confined. The thought immediately occurred that this was not a gas-bubble, but a liquid in the spheroidal condition,—in all probability carbon dioxide in a perfectly dry condition, and perhaps mixed with some incondensable gas, so that its critical point was lowered.

He concludes:—I have proved that gas-bubbles in water as well as in carbonic acid, may be attracted by a source of heat giving an extremely slight rise of temperature. It is impossible to imagine a body which is not gaining or losing, or at the same time both gaining and losing heat; it is therefore impossible to imagine it entirely throughout at a uniform temperature. It is evident then that an easily movable particle which can be set in motion by exceedingly slight rises of temperature will make the transference of heat from one point to another plainly visible; I have shown that the minute bubbles in fluid-cavities are such particles; and I believe that the vibratory motions which I have described afford an ocular demonstration of the continual passage of heat through solid substances. These phenomena really make the molecular vibrations of matter plainly visible.

April 12.—"On Attraction and Repulsion of Bubbles by Heat," by Walter Noel Hartley, F.R.S.E., F.C.S., King's College, London.

The paper deals with the bubbles in fluid-cavities of crystals, and their behaviour when a source of heat is brought near them.

With regard to the attraction of bubbles by heat, the author has noticed this take place in some water-cavities when the bubbles were free to move, and no carbonic acid was present.

With regard to this second point, the repulsion of bubbles by heat, water being the only liquid. It occurs quite as frequently, if, indeed, not more so, in the specimens which the author has examined, than attraction; and it is seen to occur in cavities containing water and liquid carbonic acid.

In a paper which the author lately communicated to the Chemical Society, he has given details of experiments on certain bubbles in water-cavities, which prove that by rise of temperature the bubbles become denser than the water and sink.

Bubbles attracted by heat and those which are repelled have generally been found in separate and entirely different specimens, and it would appear most improbable that they should exist in the same piece of stone side by side.

My work, the author said, was discontinued for a long period of two months, but on being able to look over my specimens once more, I verified all my former observations, and became surprised by the following discovery:—A bubble which was repelled by a gentle heat was attracted after it had been heated more strongly, and then on cooling it was again repelled. It appeared to contain some liquid carbonic acid floating on water with the gas.

It may be considered an argument against the motions being due to any pyro-electric conditions of the minerals, that they have been noticed in crystals of fluor-spar, and that no matter in which direction sections of rock-crystal are cut, the movements are all equally well obtained.

Regarding the repulsion of gas-bubbles, two facts are striking, namely, the very slight rise of temperature (less than ¼° C.) on one side of the bubble capable of causing the movement, and the great tension existing within the bubble. The gaseous contents prevent attraction by resisting the repulsion of the liquid from the wall of the cavity. Warmth at one side of the bubble results in increased tension of the gas. This being partial, causes such internal molecular disturbance before it becomes uniformly distributed, that the bubble is rolled away from the source of heat. The bubble then takes up that position consistent with the least internal pressure. In this case it is the same bubble which moves from end to end of the cavity. When repulsion is followed on rise of temperature by attraction, the *modus operandi* is the following:—Repulsion due to the circumstances above mentioned occurs until such a temperature has been reached that, in spite of the presence of gas within the bubbles, the increased vapour-tension of water becomes a motive power by reason of evaporation and condensation, the motion of course being in the reverse direction.

April 19.—"On some Figures exhibiting the Motion of Vibrating Bodies, and on a New Method for Determining the Speed of Machines," by Herbert M'Leod, F.C.S., Professor of Experimental Science, and George Sydenham Clarke, Lieut. R.E., Instructor in Geometrical Drawing in the Royal Indian Engineering College, Cooper's Hill. [See Physical Society.]

Chemical Society, May 3.—Dr. Gladstone in the chair.—The treasurer announced that 1,000*l.* had been placed to the credit of the Society by the son of the late fellow, Mr. Lambert.—The following papers were read:—On some points in gas analysis, by J. W. Thomas. The author finds that nitric oxide is absorbed by caustic potash and pyrogallic acid, and recommends that a known volume of pure oxygen should be introduced after the absorption of carbonic acid and any decrease of volume noted as nitric oxide. He states that an excess of caustic potash should always be present in the alkaline pyrogallate, but that too much of the latter should not be used.—On the decomposition of nitric oxide by pyrogallate of potash, by Dr. Russell and W. Lapraik. The authors state the probable action of the above reagent is to convert nitric oxide into half its volume of nitrous oxide, but simultaneously another more obscure reaction takes place, so that 58 to 76 per cent. of the gas is absorbed instead of 50 per cent.—Contributions to the history of the naphthalene series. No. 1. Nitroso-β-naphthol, by Dr. Stenhouse and Mr. Groves. Nitroso-β-naphthol was obtained by the action of nitrosyl sulphate on β-naphthol and purified by conversion into a barium compound, &c.; it crystallises in brilliant hydrated yellow needles or anhydrous orange brown plates or prisms. It melts at 109°·5 C. By treatment with dilute nitric acid mononitro-β-naphthol is obtained. By acting on the barium compound of nitroso-β-naphthol with hydrogen sulphide a precipitate is formed which, by the action of potassium dichromate, is converted into β-naphthaquinone melting at 96° C.; this substance is interesting as being the first instance of two isomeric quinones derived from the same hydrocarbon.—On asbestos cardboard and its uses in the laboratory, by W. N. Hartley. This substance resembles thick greyish cardboard and is formed principally of asbestos fibres; it can be cut or moulded (by moistening with water) into any shape, and is extremely useful for crucible supports, muffles, &c.

Zoological Society, May 1.—Prof. Newton, F.R.S., vice-president in the chair.—Mr. Howard Saunders exhibited and made remarks on some nests and eggs of the Orphean Warbler (*Sylvia orpheus*) from the vicinity of Malaga, Spain. Amongst the eggs in each nest were one or two of larger size, supposed to