tention is to decentralise the administration of school grants by the Education Department, and to throw upon those bodies the duty of administering the Parliamentary grant. Should the Bill become law, the general inspection of schools will be undertaken by the county authority, and the Committee of Council—the central government—will only have inspectors who will visit the schools from time to time in order to see that the county education authority is properly fulfilling its duties, and that the education is up to the proper standard. It is proposed to hand over to this committee the powers of the county council under the Technical Instruction Act, 1889. The money received under the Local Taxation Act, 1890, will be specially applicable to secondary education, and will be administered by the education authority, and may be accumulated. It is hoped that the Bill will create a system under which all those parts of a county in which there are public schools will be connected with and under the authority of the county education authority, and will be maintained out of the general county rate. As regards secondary education, the new authority will be able to aid schools out of the money at its disposal and to establish them; and with the assent of the Education Department it may take a transfer from the School Boards of their higher grade schools. The Bill contains numerous proposals which will revolutionise the system of elementary education in this country, and greatly change the positions of Board Schools and voluntary schools.

## SCIENTIFIC SERIALS.

*Symons's Monthly Meteorological Magazine*, March.—Extreme heat in Australia in January 1896. Mr. Russell, Government Astronomer of New South Wales, writes: "We are having a very hot summer. . . . Those who hold that icebergs cool the weather will have a nut to crack with the icebergs on one hand, and these excessive heats on the other." On January 13 the temperature in the shade at Sydney rose to 108°·5. This is the greatest heat recorded there since 1859; the highest previously registered there was 106°·9 in January 1863. A temperature of 108° was also registered in Melbourne, but this temperature had been exceeded on three occasions: in January 1862, the shade temperature reached 111°·1; in 1876, 110°·7, and in the summer of 1882, 110°·5. In some inland parts of Victoria, even higher temperatures were recorded.—Severe frost in North America. Unprecedently severe weather has been experienced over the Eastern States of America, and in Newfoundland. On February 17 the thermometer registered 39° of frost at New York, a lower reading than has been recorded so late in the year since observations were begun. In the interior of the State of New York a record of 49° below zero was obtained. In Newfoundland the winter is said to be more severe than has been known for forty years. Snow was lying on the ground to a depth of fifteen feet at St. John's. At Fortune Bay the entire failure of the herring fishery has brought the people to the verge of starvation.

*Wiedemann's Annalen der Physik und Chemie*, No. 3.—Influence of light upon the form of discharge of an influence machine, by J. Elster and E. Geitel. The brushes and sparks from a Holtz machine passing between a kathode plate of amalgamated zinc and an anode sphere of any metal, are replaced by a glow discharge when the kathode is illuminated with short-wave light. A smaller quantity of electricity passes by this glow discharge than by the brushes and sparks in the dark.—Change of resistance due to electric radiation, by E. Aschkinass. Gratings made of strips of tinfoil have their series-resistance lowered by electric rays. The original resistance is restored by shock or heating. It is most likely that the strips are bridged by free metallic particles, but certain experiments tend to show that the process is molecular rather than purely mechanical.—Interference of electric waves, by Viktor von Lang. This was shown by an apparatus constructed on the plan of that used by Quincke for sound waves. The electric waves enter a tube which divides into two branches, and then recombines. The length of the branches can be adjusted. After recombination the waves impinge upon a Lodge "coherer" which indicates interference by changes of resistance. Well-defined maxima and minima were obtained, and the apparatus was used for obtaining the velocity of the waves in paraffin and in sulphur. The electrical index of refraction was thus found to be 1·648 for paraffin, and 2·333 for sulphur. These values are higher than those hitherto obtained.—Fluorescence of sodium and potassium vapour, by E. Wiedemann and G. C. Schmidt. The vapours of these metals show bright fluorescence when illuminated with bright sunlight. Sodium vapour shows a continuous band in the red, a fluted band in the green, and the bright sodium line in the yellow. Potassium vapour shows an intense red band. These vapours also show electro-luminescence. These results are of importance to astrophysics. The vapours in the solar atmosphere probably owe part of their luminosity to fluorescence, and this kind of radiation would not obey Kirchhoff's law.

## SOCIETIES AND ACADEMIES.

### LONDON.

**Royal Society**, March 19.—"On the new Gas obtained from Uraninite. (Seventh Note.) Remarks on Messrs. Runge and Paschen's Diffusion Experiment." By J. Norman Lockyer, C.B., F.R.S.

I pointed out in a previous communication (*Roy. Soc. Proc.*, vol. lviii. p. 193) that, from evidence afforded by the behaviour of the lines under different conditions of the spark, the gas obtained from clèveite is in all probability compound.

Some time afterwards (July 11, 1895) Messrs. Runge and Paschen published (*Sitz. der K. Preus. Akad. der Wiss. zu Berlin*, vol. xxxiv., 1895) the same conclusion, and, as a result of a diffusion experiment (NATURE, vol. lii. p. 321) described in their paper, they came to the conclusion that the gas giving the line $D_3$ was heavier than the gas giving the line 5015·7. As they themselves, however, pointed out, the result was not final, because the pressures were not the same. As it is important for stellar classification to settle this matter, I have recently made some experiments in which the pressures remain the same. The experiments are not yet finished, but the first, which was made on January 22, 1896, seems to leave no doubt on one point of the investigation.

An **U**-tube was taken, and at the bend was fixed a plaster of Paris plug about 1·5 cm. thick; in one of the limbs two platinum wires were inserted. The plug was saturated with hydrogen to free it from air; the tube was then plunged into a mercury trough, and fixed upright with the limbs full of mercury. Into the leg (A) with the platinum wires a small quantity of hydrogen was passed, and as soon after as possible another small quantity of a mixture of helium and hydrogen from samarskite was put up the other limb (B) of the **U**-tube.

Immediately after the helium was passed into the limb (B), spectroscopic observations were made of the gas in the limb (A); $D_3$ was already visible, and there was no trace of 5015·7. This result seems to clearly indicate that if a true diffusion of one constituent takes place, the component which gives $D_3$ is lighter than the one which gives the line at wave-length 5015·7.

Athough this result is opposed to the statement made by Runge and Paschen, it is entirely in harmony with the solar and stellar results. In support of this I may instance that of the clèveite lines associated with hydrogen in the chromosphere, and the stars of Group III$_7$, those allied to $D_3$ are much stronger than those belonging to the series of which 5015·7 forms part.

**Physical Society**, March 27.—Prof. Carey Foster, Vice-president, in the chair.—Prof. J. A. Fleming read a paper on the Edison effect. The Edison effect alluded to in the title of the paper is that if a metal plate is placed inside the loop of an incandescent lamp, then a galvanometer of which one terminal is connected to this metal plate, and the other to the positive lead of the lamp, will indicate a current passing from the lead to the plate. If, however, the galvanometer is connected to the plate and the negative lead, no current passes. Prof. Fleming, by connecting the poles of a condenser, firstly to the two leads, secondly to the plate and positive lead, and thirdly to the plate and negative lead, and in each case discharging the condenser through a galvanometer, has shown that after the lapse of a certain time, depending on the position of the plate, if the lamp is working at about four watts per candle, the potential of the plate falls to that of the negative lead. If the plate, instead of being inside the loop of the filament, is outside, then the time taken by the plate to acquire the potential of the negative lead is considerably longer. The space between the plate and the negative lead exhibits a kind of unilateral conductivity, for a battery having a low voltage is able to send a current from the plate to the negative lead, but not in the opposite direction. If instead of using a cold metal plate a second filament, maintained

in a state of incandescence by an insulated battery, is used, then a current can be obtained between this filament and both the positive and negative leads. If the voltage on the lamp is raised considerably above that required to give one candle-power for four watts, then a current can be passed from the plate to the negative lead, while a galvanometer connected to the positive lead and the plate will indicate the passage of a current from the positive lead to the plate. When the lamp is in this condition, the space between the plate and the negative lead is very sensitive to the effects of a transverse magnetic field, such a magnetic field causing a large increase in the resistance. The curve showing the connection between the current passing from the positive lead to the plate and the volts between the terminals of the lamp is found to be discontinuous. As the volts are raised the current suddenly increases about ten-fold, and it is while the lamp is in the condition corresponding to this upper portion of the curve that it is sensitive to the influence of the transverse magnetic field. By using a movable plate it has been found that the minimum current is obtained when the plate is nearer the positive than the negative lead. When an alternating current is used to supply the lamp, a continuous current can be obtained passing from the plate to either of the leads. If a small platinum cylinder is placed surrounding each of the leads, then a current can be obtained between each of the cylinders and the positive lead, but no current between the two cylinders. The largest effect occurs when a cylinder near the end of the negative lead is connected to the positive lead. The author considers that his experiments show that the resistance of a vacuum tube to the passage of a discharge would be greatly reduced if the kathode were made incandescent. Prof. S. P. Thompson said he would like to have some information as to the state of exhaustion of the lamps; whether this was such as is found in ordinary commercial lamps, or whether it more nearly approached that used by Crookes. A great change in the conductivity, &c., took place at an exhaustion slightly greater than that ordinarily found in incandescent lamps. It would be of interest to vary the size of the kathode and to investigate whether the magnitude of the effects observed depended on the fall of potential per unit length along the filament. Another point was whether the position of the plate, for which the effect was a minimum, was the same for all lamps, or whether it changed with the volts and the length of the filament employed. Again, did the minimum occur at a certain fraction of the distance between the positive and negative leads, or, as was the case in some of the phenomena observed by Crookes, at a definite distance from either of the leads. These points might be investigated by means of a lamp with a straight filament where the fall of potential per unit length along the filament might be the same as with the loop-shaped filament, but the fall of potential per unit length in the vacuum would be different. The author's proposed experiment of heating the kathode by concentrating on it the rays of a lamp, did not seem to him (Prof. Thompson) to differ materially from Crookes' experiment in which an incandescent wire, heated by a current, was used as the kathode. Mr. Skinner said that the heating of the kathode by means of a "burning-glass" could easily be carried out. Mr. Blakesley pointed out that it would be quite possible to produce an increase of the current by means of a magnet. Mr. Serle said that Prof. J. J. Thomson had shown that a magnet affected the conductivity of a gas. Prof. Fleming, in his reply, said that no doubt the effects were largely dependent on the vacuum in the lamps. The lamps employed were exhausted to the ordinary commercial vacuum. Since it was found that the "treating" was more worn off the negative leg of the filament, and that a screen placed between the legs of the filament was more blackened on the side turned towards the negative leg, it would appear that the particles of carbon were shot off from the negative leg, and hence perhaps the charge was carried by these carbon molecules.—A paper of a purely mathematical character, entitled "Notes on the electro-magnetic effect of moving charges," by Mr. W. E. Morton, was read by Mr. Serle, who also made some remarks on his own investigations dealing with this subject. The Society then adjourned till April 24.

**Geological Society,** March 11.—Dr. Henry Hicks, F.R.S., President, in the chair.—On an Alpine nickel-bearing serpentine with fulgurites, by Miss E. Aston, with petrographical notes by Prof. T. G. Bonney., F.R.S. The specimens described were collected on the summit of the Riffelhorn (near Zermatt) by Prof. W. Ramsay, F.R.S., and Mr. J. Eccles, and they showed some very well-marked "lightning-tubes." The rock was a serpentine, somewhat schistose from pressure, which had been formed by the alteration of a rock chiefly composed of olivine and augite. One of the analyses gave 4·92 per cent. of nickel oxide and hardly any lime. Prof. Bonney detected some awaruite under the microscope, but not nearly enough to account for the analysis. Reasons were given to show that the nickel oxide probably replaced lime in the pyroxenic constituent of the rock. The tubes, about $\frac{1}{10}$ inch in diameter, were round in section, cleanly drilled, and lined with a very thin film of dark brown or black glass.—The Pliocene glaciation, pre-glacial valleys, and lake-basins of subalpine Switzerland: with a note on the microscopic structure of Tavayanaz diabasic tufa, by Dr. C. S. Du Riche Preller. The main object of this paper, which was the sequel to one read last session, was to solve the problem whether the Pliocene glacio-fluviatile conglomerates of the Swiss lowlands were deposited on a plateau or in already existing valleys. For the purpose of this inquiry, the author examined last summer a large additional number of glacial high- and low-level deposits throughout the Zürich Valley over an area more than 40 miles in length; and his investigations further led him to important conclusions with respect to the combination of causes which determined the formation of the lake-basins lying in the same zone at the foot of the Alps. He showed that the Lake of Zürich owes its origin, in the first instance, to a zonal subsidence (probably between the first and second glaciation) of about 1000 feet, as evidenced by the reversed dip of the disturbed molasse-strata between the lakes of Zürich and Zug. During the second and third Ice-periods, the original lake-basin was gradually filled with glacial and fluviatile deposits at both ends, and was finally restricted to its present dimensions by a post-glacial bar deposited at its lower end by a tributary river. In the author's view, the other subalpine lakes, extending from the Lake of Constance to Lac Bourget in Savoy, owe their origin and present limits, in the main, to the operation of similar causes. With regard to the main question, he averred that the Lower and Middle Pliocene period was, in Switzerland, entirely one of erosion and denudation on a prodigious scale. Irrespective of the evidence he had adduced, he was therefore driven to the conclusion that at the advent of the first Ice-period in Upper Pliocene times the principal subalpine valleys must have been already excavated approximately to their present depth, and that ever since then the action of the great Alpine and subalpine rivers had been, as it is still in our own day, mainly directed to regaining the old valley-floors by removing those enormous accumulations of glacial and glacio-fluviatile material, which are respectively the direct and indirect products of three successive and general glaciations.—Notes concerning certain linear marks in a sedimentary rock, by Prof. J. E. Talmage. The marks described in the paper occur in a fine-grained argillaceous sandstone referred by the U.S. Geological Survey to the Triassic or Jura-Trias period, which is found on a low tableland within two miles of the bluffs overlooking Glen Canyon. The marks commonly appear as straight lines intersecting at right angles, but some have a pinnate distribution, suggesting engravings of frost-flowers. A description of the markings was given, and various experiments made in the laboratory to illustrate the effects of formation of crystals formed over sediment were described.

## PARIS.

**Academy of Sciences,** March 23.—M. A. Cornu in the chair.—On the invisible radiations emitted by the salts of uranium, by M. H. Becquerel. A confirmation and extension of previous experiments upon potassium uranyl sulphate. Uranium salts appear to be unique in the length of time during which they give off photographically active rays in the dark. On comparing the rate of discharge of a gold leaf electroscope by the radiations from a crystal of potassium-uranyl sulphate and a Crookes' tube respectively, the effect of the tube was found to be over one hundred times greater than that of the crystal.—Observations on the preceding communication, by M. L. Troost.—Observations relating to a note of M. C. Henry, entitled "On the principle of an accumulator of light," by M. H. Becquerel. An account of some earlier work on the same subject overlooked by M. Henry.—Application of the X-rays to the diagnosis of surgical diseases, by M. Lannelongue. A description of the results obtained in two cases, in the second of which a supposed exostosis was shown not to exist, the pain and muscular atrophy being due to hysteria.—Researches on the earths contained in the monazite sands, by MM. P. Schützenberger and O. Boudouard.—On the quantities of nitric acid contained

in the waters of the Seine and its principal tributaries, by M. Th. Schlœsing. The amount of nitric acid reaches its minimum about August, and its maximum in February. – Study of the stability of ships by the method of small models, by M. J. Leflaive.—A new property of the surface of a wave, by A. Mannheim.—On groups of operations, by M. Levavasseur.—On a means of communicating to the X-rays the property of being deviated by the magnet, by M. A. Lafay. A bundle of rays from a Crookes' tube was allowed to imprint on a sensitive plate the shadow of a platinum wire supported on a very thin sheet of silver. When the whole was placed in a powerful magnetic field (400 C.G.S. units), the reversal of the current produced a sensible deflection of the image, if the needle was strongly electrified by being placed in connection with the negative pole of the induction coil. If the needle was not electrified, no sensible deflection of the image could be produced.—On the mechanical action proceeding from a Crookes' tube, by M. J. R. Rydberg. On repeating the experiments of MM. Gossart and Chevallier, it was found that the actions observed on the radiometer had their origin in the well-known layer of positive electricity with which the external antikathodic surface of the Crookes' tube is covered during the discharge. By covering the radiometer with a metallic gauze screen, it is possible to take Röntgen photographs through it, without any rotation or mechanical effect being observable.—Origin of the Röntgen rays, by M. Jean Perrin. From the experiments described, the conclusion is drawn that the Röntgen rays are developed only at those points where the kathode rays are arrested, and that this is true whatever material may be used for the tube.—Researches concerning the properties of the X-rays, by MM. Prince B. Galitzine and A. de Karnojitzky. By taking photographs with the rays of tourmalines superposed at various angles, results were obtained showing clearly that with crossed plates the photo-chemical action was reduced. From this the authors draw the conclusion that the X-rays correspond to transversal vibrations.—On the reduction of the time of exposure in Röntgen photographs, by M. G. Meslin. A magnet is used to create a magnetic field perpendicular to the kathode rays inside the tube. A good print of the hand was obtained after twenty-five seconds' exposure.—On the same, by M. Basilewski. A sheet of paper coated with a fluorescent substance is placed between the plate and the object. A photograph of the hand was obtained in ten minutes.—On the same, by MM. A. Imbert and H. Bertin-Sans. A magnet is used to deviate the kathode rays within the tube. Good results were obtained for the hand with exposures varying from one to five minutes.—On the X-rays, by M. Piltschikoff.—On the resistance to the passage of the Röntgen rays of some liquid and solid substances, by MM. Bleunard and Labesse. The study of the coefficients of absorption for saline solutions showed that the opacity increases with the atomic weight of both metal and non-metal.—Action of the X-rays on precious stones, by MM. A. Bugueit and A. Gascard.—Three cases of the surgical application of Röntgen photographs, by M. P. Delbet.—The Röntgen rays in the eye, by M. Wuillomenet.—On a new element contained in the rare earths, of samarium, by M. E. Demarçay. The new element is obtained by fractional crystallisation from fuming nitric acid of the portion of the rare earth rich in samarium.—Action of reducing agents upon the nitroso-compounds of ruthenium, by M. L. Brizard.—On the amalgams of molybdenum and some properties of metallic molybdenum, by M. J. Férée. Amalgams with compositions approximating to $MoHg_9$, $MoHg_2$, and $Mo_2Hg_3$ are described. The molybdenum obtained by distilling away the mercury from the amalgams is pyrophoric.—On the products of the distillation of wood, by M. E. Barillot.—On isomerism in the aromatic series, by M. O. de Coninck.—On rhodinol and its transformation into menthone, by MM. Ph. Barbier and L. Bouveault.—On the parasite of black-rot, by M. A. Prunet.—On the mode of formation of helicoidal coproliths, by M. Léon Vaillant.—On the attribution of the genus *Vertebraria*, by M. R. Zeiller.—On vegetation in an atmosphere vitiated by respiration, by M. L. Mangin.—On two new bacteria of the potato, by M. E. Roze.—On the optical isomorphism of the felspars, by M. F. Wallerant.—On the vegetable and mineral débris of the soundings from the *Caudan*, in the Bay of Biscay, by M. Bleicher.—Oceanographical observations made during the voyage of the *Caudan*, in the Bay of Biscay, by M. J. Thoulet.—On photography through opaque bodies, by M. A. Gassend.

## DIARY OF SOCIETIES.

LONDON.

*THURSDAY*, APRIL 2.

LINNEAN SOCIETY, at 8.—Monograph of the Genus Stemona, Lour: C. H. Wright.—On African Algæ: W. and G. S. West.

GEOLOGISTS' ASSOCIATION (Waterloo Station), at 4.55.—Excursion to Swanage, Corfe Castle, Kimeridge, &c., ending Tuesday, April 7.

CAMERA CLUB, at 8.15.—Cloud Forms and Tropical Weather: Captain Wilson Barker.

*FRIDAY*, APRIL 3.

QUEKETT MICROSCOPICAL CLUB, at 8.

*FRIDAY*, APRIL 10.

ROYAL ASTRONOMICAL SOCIETY, at 8.

GEOLOGISTS' ASSOCIATION, at 8.

MALACOLOGICAL SOCIETY at 8.

## BOOKS, PAMPHLETS, and SERIALS RECEIVED.

BOOKS.—Text-Book of Comparative Anatomy: Dr. A. Lang, translated by H. M. and M. Bernard, Part 2 (Macmillan).—Royal University of Ireland, Calendar for 1896 (Dublin, Thom).—Reduction of Greenwich Meteorological Observations. Part 3. Temperature 1841-1890 (London).—Report of the Commissioner of Education for the Year 1892-93, Vol. 1 (Washington).—Outlines of Logic and Metaphysics: J. E. Erdmann, translated by Dr. B. C. Burt (Sonnenschein).—Méthode et Principes des Sciences Naturelles. Introduction a l'Étude de la Médecine: Th. Funck-Brentano (Paris, Bataille).—The Astronomy of Milton's "Paradise Lost": Dr. T. N. Orchard (Longmans).—The Principles of Sociology: Prof. T. H. Giddings (Macmillan).—Our Country's Butterflies and Moths: W. J. Gordon (Day).—Société d'Encouragement pour l'Industrie Nationale. Annuaire pour l'Année 1896 (Paris).—Le Climat de la Belgique en 1895: A. Lancaster (Bruxelles).—Die Protrophie: A. Minks (Berlin, Friedländer).—Physiological Papers: Prof. H. N. Martin (Baltimore, Johns Hopkins Press).

PAMPHLETS.—Kosto Komparatibo en Chile del Gas i de la Eliktrizidad, &c.: A. E. Salazar i K. Newman (Santiago).—Energetik und Hygiene des Nerven-systems in der Schule: Dr. H. Griesbach (München, Oldenbourg).—Metric System of Weights and Measures: G. T. P. Streeter (Gee).—Philip's Special Map of the Nile Valley, &c. (Philip).—Philip's Special Large Scale War Map of the Soudan (Philip).

SERIALS.—Sunday Magazine, April (Isbister).—Good Words, April (Isbister).—Longman's Magazine, April (Longmans).—Chambers's Journal, (Chambers)—Natural Science, April (Rait).—Bulletin of the American Mathematical Society, March (Macmillan).—Humanitarian, April (Hutchinson).—History of Mankind: F. Ratzel, translated, Part 7 (Macmillan).—Journal of the Royal Horticultural Society, March (Victoria Street).—Proceedings of the American Philosophical Society, July (Philadelphia).—Century Magazine, April (Macmillan).—National Review, April (Arnold).—Mémoires de la Section Caucasienne de la Société Impériale Russe de Géographie, livre xvii. livr$^{n}$ 1.—Ditto, livre xviii.—Jahrbuch der Meteorologischen Beobachtungen der Wetterwarte der Magdeburgischen Zeitung, Band xiii., 1894 (Magdeburg).—Contemporary Review, April (Isbister).

## CONTENTS.