University. After considerable discussion, resolutions were passed approving of the admission of certain educational institutions having one, or more than one, faculty of University rank as constituent Colleges of the University, of the establishment of a Council of Education, and of certain changes in the constitution of the Senate.

SCIENTIFIC SERIALS

THE most important paper in the *Journal of Botany* for April is the commencement of a Synopsis of the Rhizocarpeæ, by Mr. J. G. Baker, another of the series of this writer's exhaustive monographs of the families of Vascular Cryptogams outside the Ferns. The present instalment includes the genus Salvinia, in which three new species are described, and a portion of Azolla. In the May number we find a continuation of Mr. W. B. Grove's paper on new and noteworthy fungi, in which several new species are described, and one new genus of Sphæroideæ, Collonema. Mr. W. H. Beeby gives further particulars respecting the distribution of his newly discovered *Sparganium neglectum*, and Mr. Arthur Bennett an account of the distribution in Britain of the various species of Potamogeton, in addition to those contained in the second edition of "Topographical Botany."

SOCIETIES AND ACADEMIES

LONDON

Royal Society, May 20.—"Relation of 'Transfer-Resistance' to the Molecular Weight and Chemical Composition of Electrolytes." By G. Gore, LL.D., F.R.S.

In the full paper the author first describes the method he employed for measuring the "resistance," and then gives the numerical results of the measurements in the form of a series of tables.

He took a number of groups of chemically related acids and salts of considerable degrees of purity, all of them in the proportions of their chemical equivalent weights, and dissolved in equal and sufficient quantities of distilled water to form quite dilute solutions. The number of solutions was about seventy, and included those of hydriodic, hydrobromic, hydrochloric, hydrofluoric, nitric, and sulphuric acids; the iodides, bromides, chlorides, fluorides, hydrates, carbonates, nitrates, and sulphates, of ammonium, cæsium, rubidium, potassium, sodium, and lithium; the chlorides, hydrates, and nitrates, of barium, strontium, and calcium; and a series of stronger solutions, of equivalent strength to each other, of the chlorides of hydrogen, ammonium, rubidium, potassium, sodium, lithium, barium, strontium, and calcium. A series of similar liquids to those of one of the groups of acids, of equal (not of equivalent) strength to each other, was also included.

As electrodes, he employed pairs of plates of zinc, cadmium, lead, tin, iron, nickel, copper, silver, gold, palladium, and platinum; and separate ones formed of small bars of iridium.

He took each group of solutions, and measured in each liquid separately, at atmospheric temperature, the "total resistance" at the two electrodes, and the separate "resistances" at the anode and cathode respectively with each other, and thus obtained about seventy different tables, each containing about thirty-six measurements, including the amounts of "total," "anode," and "cathode" resistance of each metal, and the "averages" of these for all the metals.

By comparing the numbers thus obtained, and by general logical analysis of the whole of the results, he has arrived at various conclusions, of which the following are the most important:—The phenomenon of "transfer-resistance" appears to be *a new physical relation of the atomic weights*, attended by inseparable electrolytic and other concomitants (one of which is liberation of heat, *Phil. Mag.*, 1886, vol. xxi. p. 130). In the chemical groups of substances examined *it varied inversely as the atomic weights of the constituents, both electro-positive and electro-negative, of the electrolyte, independently of all other circumstances;* and in consequence of being largely diminished by corrosion of the electrodes, it appeared to be intimately related to "surface-tension." He suggests that corrosion may be a consequence, and not the cause of small "transfer-resistance." The strongest evidence of the existence of the above general law was obtained with liquids and electrodes with which there was the least corrosion and the least formation of films; those liquids were dilute alkali-chlorides, with electrodes of platinum.

This research is an extension of a former one on "Transfer-Resistance in Electrolytic and Voltaic Cells," communicated to the Royal Society, March 2, 1885. Further evidence on the same subject has been published by the author in the *Philosophical Magazine*, 1886, vol. xxi. pp. 130, 145, 249.

"A Study of the Thermal Properties of Ethyl Oxide." By William Ramsay, Ph.D., and Sydney Young, D.Sc.

A year ago a paper was communicated to the Society on the behaviour of ethyl alcohol when heated. A similar study of the properties of ether has been made, in which numerical values have been obtained exhibiting the expansion of the liquid, the pressure of the vapour, and the compressibility of the substance in the gaseous and liquid conditions; and from these results, the densities of the saturated vapour and the heats of vaporisation have been deduced. The temperature range of these observations is from − 18° to 223° C.

It is the authors' intention to consider in full the relations of the properties of alcohol and ether; in the meantime it may be stated that the saturated vapour of ether, like that of alcohol, possesses an abnormal density, increasing with rise of temperature and corresponding rise of pressure; that at 0° the vapour-density is still abnormal, but appears to be approaching a normal state; and that the apparent critical temperature of ether is 194° C.; the critical pressure very nearly 27,060 mm. = 35·61 atmospheres; and the volume of 1 gramme of the substance at 184° between 3·60 and 4 c.c.

Mathematical Society, May 13.—J. W. L. Glaisher, F.R.S., President, in the chair.—Mr. F. W. Watkin was admitted into the Society.—The following communications were made:—On Cremonian congruences contained in linear complexes, by Dr. Hirst, F.R.S.—Solution of the cubic and biquadratic equation by means of Weierstrass's elliptic functions, by Prof. Greenhill.—On the complex of lines which meet a unicursal quartic curve, by Prof. Cayley, F.R.S.—On Airy's solution of the equations of equilibrium of an isotropic elastic solid under conservative forces, by W. J. Ibbetson.—Conic note, by H. M. Taylor.—On the converse of stereographic projection and on contangential and coaxal spherical circles, by H. M. Jeffery, F.R.S.

Zoological Society, May 18.—Prof. W. H. Flower, F.R.S., President, in the chair.—Mr. C. W. Rosset exhibited a series of photographs taken during his recent visit to the Maldive Islands, and made some remarks on the zoological collections obtained during his expedition.—Mr. Philip Crowley, F.Z.S., exhibited some pupæ of nocturnal Lepidoptera which had been sent to him from Natal; and read some notes from his correspondent, which proved that they were subterranean.—Mr. Joseph Whitaker, F.Z.S., exhibited a specimen of Wilson's Phalarope, said to have been obtained at Sutton Ambian, near Market Bosworth, in Leicestershire.—A communication was read from Dr. A. B. Meyer, C.M.Z.S., containing an account of the known specimens of King William the Third's Bird of Paradise (*Rhipidornis guglielmi-tertii*), and remarking on a fourth specimen which had been recently obtained by the Dresden Museum.—Mr. Frank E. Beddard read a paper on some new or little-known Earthworms, together with an account of the variations in structure exhibited by *Perionyx excavatus*.—Mr. Sclater read a paper on the species of Wild Goats and their distribution. Mr. Sclater recognised ten species of the genus Capra, distributed over an area extending from Spain to Southern India, and from Central Siberia to Abyssinia.

Royal Meteorological Society, May 19.—Mr. W. Ellis, F.R.A.S., President, in the chair.—Mr. L. T. Cave and Rev. C. Malden, M.A., were elected Fellows of the Society.—The following papers were read:—The severe weather of the past winter, 1885-86, by Mr. C. Harding, F.R.Met.Soc. The author showed that the whole winter was one of exceptional cold, not so much on account of any extremely low temperatures experienced, but more from the long period of frost and the persistency with which low temperature continued. In the South-West of England there was not a single week from the commencement of October to March 21 in which the temperature did not fall to the freezing-point. In many parts of the British Islands frost occurred in the shade on upwards of 60 nights between the beginning of January and the middle of March, and during the long frost which commenced in the middle of February and continued until March 17 the temperature fell below the freezing-point in many places on more than 30 consecutive nights. At Great Berkhamsted, in Hertfordshire, frost

occurred on the grass on 73 consecutive nights from January 5 to March 18. The winter of 1885–86 was the only one in which there was skating on the water of the London Skating Club, in Regent's Park, in each of the four months December to March, since the formation of the Club in 1830, and there are but four records of skating in March during the 56 years, and none so long as in the present year. With regard to the temperature of the water of the Thames at Deptford, it was shown that the total range from January 8 to March 20 was only 6°, whilst from March 1 to 19 the highest temperature was 36°·5, and the lowest 35°. The temperature of the soil at the depth of 1 foot was generally only about 2° in excess of the air over the whole of England, and from March 1 to 17 the earth was colder than usual by amounts varying from 6°·3 at Lowestoft to 8°·5 at Norwood. The facts brought together showed that the recent winter was one of the longest experienced for many years, and that in numerous ways it may be characterised as "most severe."—Description of an altazimuth anemometer for recording the vertical angle as well as the horizontal direction and force of the wind, by Mr. L. M. Casella. The author describes an anemometer he has made which records continuously on one sheet the pressure, direction, and inclination of the wind.—Earth temperatures, 1881–85, by Mr. W. Marriott, F.R.Met.Soc. This is a discussion of the observations of the temperature of the soil at various depths below the surface, which have been regularly made at 9 a.m. at several of the stations of the Royal Meteorological Society during the past five years. The results show that the temperature of the soil at 1 foot at nearly all the stations in the winter months is almost the same as that of the air, while in the other months of the year the temperature of the soil is higher than that of the air at all except that of the London stations.—Note on the after-glows of 1883–84, by Mr. A. W. Clayden, M.A., F.R.Met.Soc. The author suggests that the after-glows were the result of the water-vapour erupted from Krakatâo, and that the dust and other ejecta played but a secondary part in the production of the phenomena.

Sydney

Linnean Society of New South Wales, March 31.—Mr. William A. Haswell, M.A., B.Sc., in the chair.—The following papers were read:—On certain Geckos in the Queensland Museum, by Charles W. de Vis, M.A. A new species of the very curious genus *Nephrurus* is described under the specific name of *lævis*, from its smooth lepidosis, as compared with the only other species, *N. asper*. A species of *Diplodactylus* (*D. venicauda*) is also described. Both lizards are from Northern Queensland.—Description of a new aphanipterous insect from New South Wales, by A. Sidney Olliff, F.E.S., Assistant Zoologist, Australian Museum. The remarkable parasite here characterised under the name *Echidnophaga ambulans* was found in large numbers on the head and breast of a porcupine ant-eater (*Echidna hystrix*). It differs from the *Pulex echidnæ* described by Denny from the same host in habit as well as in several important points of structure, and is, therefore, regarded as forming the type of a new genus. Unlike the majority of its allies this species does not appear to possess the power of jumping.—On a microscopic fungus parasitic on the Cucurbitaceæ, by E. Haviland, F.L.S. In this paper the author gives an account of his inquiry as to the origin of a disease which has caused much destruction to melon and pumpkin plants during the last three months, and which he has identified as the micro-fungus *Oidium monilioides*. As a preventative he suggests greater care in cultivation, and quotes various authors proving that old plants will thereby be sufficiently vigorous to resist the attacks of the fungus.—Jottings from the Biological Laboratory of Sydney University, by William A. Haswell, M.A., B.Sc., Lecturer on Zoology and Comparative Anatomy. On the myology of the flying squirrel (*Petaurista taguanoides*). In its muscular anatomy the flying phalanger nearly resembles the vulpine phalanger and the *Cuscus*, with a few special modifications, of which the chief is the presence of a peculiar "long femoro-caudal muscle."—Insects of the Fly River, New Guinea, "Coleoptera," by William Macleay, F.L.S., &c. This is the second paper communicated by Mr. Macleay on the insects collected during the recent expedition organised by the Geographical Society of Australia for the exploration of the interior of British New Guinea. The previous paper dealt with the Coleoptera up to the end of the Heteromera. The present one deals with the families *Curculionidæ*, *Brenthidæ*, *Anthribidæ*, and *Longicornia*, comprising in all 96 species, of which 31 are now described for the first time.—The Mollusca of the Pareora and Oamaru systems of New Zealand, by Capt. F. W. Hutton, Hon. Member Linnean Society, New South Wales. Capt. Hutton's paper is a contribution towards the correlation of the Tertiary rocks of Australia with those of New Zealand, and it enumerates 268 species of Mollusca from the Pareora and Oamaru systems, which are probably of Miocene and Oligocene age, of which 184 species are confined to the Pareora beds, 33 species to the Oamaru, while 51 species, of which a few are doubtful, are common to both.

Paris

Academy of Sciences, May 17.—M. Jurien de la Gravière, President, in the chair.—Presidential allocution on the occasion of the homage offered to M. Chevreul at the meeting of Monday, May 17, when that illustrious member and *doyen* of the Academy completed his hundredth year. In reply, M. Chevreul assured the audience that to be told his long career had been useful to science and his country was the greatest eulogium he had ever ambitioned.—Observations in reference to the quantitative analysis of the ammonia found in the ground: a reply to M. Schlœsing, by MM. Berthelot and André. The authors point out that the note recently published by them in the *Comptes rendus* was not intended to raise any discussion on M. Schlœsing's theories regarding the absorption of atmospheric ammonia by arable lands. Their main object was to explain a special precaution and a common source of error in the quantitative analysis of the ammonia present in the ground. Nor did they wish to deny that the ground receives in a general way a supply of ammonia from the atmosphere, although they did not consider that this fact had been fully demonstrated by M. Schlœsing's experiments.—Reply to M. Taurines's recent observations on the communication of March 23, 1885, regarding marine engines and the experiments made on board the *Primauguet*, by M. A. Ledieu. The author maintains the general correctness of his conclusions, which are unfairly stigmatised by M. Taurines as "theories conceived *a priori* and at times dangerous."—Remarks on the third volume of the Scientific Mission to Cape Horn, presented to the Academy by M. Mascart. This volume contains all the observations regarding terrestrial magnetism, and MM. Müntz and Aubin's analyses of the specimens of atmospheric air collected by Dr. Hyades. The researches on terrestrial magnetism were greatly aided by a continuous registering apparatus, which was set up by MM. Payen and Le Cannellier, and which worked satisfactorily the whole time the Mission remained in Orange Bay. Incidental reference was made to the subsequent death of M. Payen in France, and of M. Martial, commander of the Expedition, in China.—Elements of the orbit of Brooks's comet, No. 1, by M. Lebeuf. These elements, deduced from observations made at Kiel on April 30, and at Paris on May 4 and 8, are as under:—

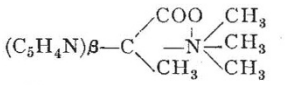
T = 1886 June 7·5158 Paris Mean Time.

$$\left.\begin{aligned} \Omega &= 193^\circ\ 1'\ 29''\cdot5 \\ \varpi &= 33\ 42\ 7\cdot1 \\ i &= 87\ 47\ 34\cdot7 \end{aligned}\right\} \text{Mean Eq. } 1886\cdot0.$$

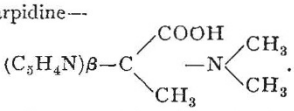
$$\log q = 9\cdot439104$$

—Observations of Brooks's comets made at the Observatory of Algiers with the 0·50 m. telescope, by M. Rambaud.—Measurement of the electric conductivity of the dissolved chloride of potassium, by M. E. Bouty. Between the temperatures of 0° C. and 30° C. the resistance of the solutions of the chloride of potassium is expressed with sufficient accuracy by the binomial formula $r_t = \frac{r_0}{1 + \alpha t}$. A table is given of the absolute values of the specific resistance r_0 and the relative values of the molecular resistance ρ_0, as well as the values of α.—On the atomic volume of oxygen, by M. E. H. Amagat. M. Wroblewski having recently announced that the atomic volume of oxygen was considerably below 16, the author points out that he had arrived at the same conclusion early in 1885. In his communication of March 2 of that year he stated that under a pressure exceeding 4000 atmospheres he had succeeded in obtaining oxygen with a density higher than 1·25 and at a temperature of 17°.—Observations on the deviation from the vertical on the south coast of France, by M. Germain. From four determinations obtained at Nice, Saint-Raphael, Toulon, and Marseilles, the author infers that on this seaboard the continent attracts the vertical, that is to say, repels the astronomic as opposed to the geodetic zenith, and that this attraction

appears to be exercised by a point situated to the north of Nice in the Alps.—On the barometric pressure of May 13, 1886, when at 4 o'clock in the morning the barometer fell to 737·37 mm., the lowest recorded in Paris since the year 1757, by M. E. Renou. This remarkable fall coincides with violent atmospheric disturbances in Madrid and other parts of Spain, in England and the United States. The stormy weather reached Italy and Germany on May 14, when the Jura and Chaux-de-Fonds were covered with snow.—Action of vanadic acid on the ammoniacal salts (continued), by M. A. Ditte. In this paper the author deals with a second group comprising the sulphate, chromate, iodate, borate, acetate, vanadate, perchlorate, carbonate, and hydrochlorate of ammonia.—On several double silicates of alumina, and of potassa or soda, by M. Alex. Gorgeu. The kaolin with which these silicates are obtained is that used at the Sevres works. This composition when dried at a temperature of 120° C. is almost exactly that of the silicate of hydrated alumina, $2SiO_2Al_2O_3,2HO$. Its action is described on the alkaline haloid salts, on the alkaline carbonates, and on the fused caustic alkalies.—On the combinations of the chloride of zinc with water, by M. R. Engel. Besides that discovered by M. Schindler, the author describes three other hydrates of the chloride of zinc, of which two may be obtained in large isolated crystals.—On a combination of phosphuretted hydrogen with the hydrate of chloral, by M. J. de Girard.—On pilocarpine, by MM. E. Hardy and G. Calmels. For this substance the authors have established the formula—



and for pilocarpidine—



—Researches on the composition of carotine, its chemical function, and its formula, by M. A. Arnaud. This is a carburet of hydrogen ($C_{26}H_{38}$) identical with the orange-red crystallised substance which the author has extracted from the leaves of various kinds of plants. This colouring-matter exists also in a great many fruits, and especially in the tomato, and may in fact be said to be universally present in the roots, leaves, and fruits of plants. It oxidises in the air even at the ordinary temperature, and especially about 70° C., and in solution this oxidation becomes extremely rapid.—Remarks on the bilobites, by M. Stan. Meunier. The author makes a fresh study of these interesting vestiges, without deciding the question whether they are mere animal footprints, as supposed by M. Nathorst, or real fossil algæ, as maintained by MM. Delgado and De Saporta.—Characteristics of the stem of Poroxylon (fossil gymnosperms of the Carboniferous epoch), by MM. C. Eg. Bertrand and B. Renault.—Account of a meteor recently observed on board the steamer *Algérie* in the Gulf of Smyrna, by M. L. Aubouy.

BERLIN

Physiological Society, April 30.—Dr. Wolffberg spoke on the Young-Helmholtz theory of the colour-sense, which he extended in the direction of assuming the existence of red-sensitive, green- and violet-sensitive ganglia in the central organ of sight-perception in the sphere of vision. These ganglia were connected with the red nerves, the green nerves, and the violet nerves, and by means of such nerves communicated with the retina. Seeing, however, that yellow, blue, and white were likewise psychically simple sensations, Dr. Wolffberg assumed specific ganglia for these as well, which, however, stood in connection with the red, green, and violet ganglia, the yellow ganglia being situated at an equal remove from the red and green, but at a further remove from the violet ganglia. Similar was his conception of the situation and connection of the blue and white ganglia. Regarding the sensation of black, he would speak in an address in the immediate future.—Dr. Uhthoff made further communications respecting the dependence of visual sharpness on the intensity of illumination. After an historical survey of the older experiments to determine the relation of visual sharpness to light intensity, he described the results of his own labours in this field. In the case of white light, he had communicated the relation on a former occasion (NATURE, vol. xxxi. p. 476). In the case of yellow light, the visual sharpness under low intensities increased just as rapidly with increasing intensity of light as in the case of white light. The curve, however, in the former case attained a greater height than it did with white, and then likewise proceeded parallel to the abscissa. With red light, on the other hand, the curve kept below the height reached with white light; it rose slower, moreover, and never became parallel. The curve of visual sharpness for green light lay still deeper than for red, and also rose persistently, though slowly. The curve for blue light lay deepest of all, and very soon became parallel to the abscissa of the light intensity. In the case of a green-blind person, the curves for white, yellow, and red were the same as in the case of the normal eye, as there was likewise a coincidence for blue. The curve for green fell almost coincident with the low curve for blue.

BOOKS AND PAMPHLETS RECEIVED

"Contra-Indications for Visiting the High Altitudes," with a Description of the Environs of Maloja, by Dr. A. T. Wise (Churchill).—"The Pictorial Arts of Japan," part ii., by Wm. Anderson (S. Low).—"Bees and Bee-keeping," part ix., by F. R. Cheshire (U. Gill).—"Fancy Pigeons," 3rd edition, part ix., by J. C. Lyell (U. Gill).—"British Cage Birds," part ix., by R. L. Wallace (U. Gill).—"Bicycles and Tricycles of the Year 1886," by H. H. Griffin (U. Gill).—"Mineralogical Magazine," March.—"Journal of Physiology," April.—"Proceedings of the Physical Society, St. Petersburg," vol. xviii. part 4.—"Bulletin de l'Académie Impériale des Sciences de St. Petersburg," vol. xxxi. No. 1.—"Chemical Atlas," part 1, by C. Peddie (Thin, Edinburgh).—"The Baths, Bathing, and Attractions of Aix-les-Bains," by Dr. W. Wakefield (S. Low).—"Bulletin of the United States Fish-Commission," vol. v., for 1885 (Washington)—"Causeries Scientifiques," by Hy. Vivarez (J. Michelet, Paris).—"Proceedings of the American Philosophical Society," April.—"American *versus* English Methods of Bridge Designing" (Japan Mail).—"Third Report on the Chemical Composition and Physical Properties of American Cereals, Wheat, Oats, Barley, and Rye," by C. Richardson (Washington).—"Memoir of Arnold Guyot, 1807 to 1884," by J. D. Dana.

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