

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

THE Great Hall of the Northern Polytechnic Institute is being opened to-day (Thursday) by the Lord Mayor.

THE Rev. Dr. Thorburn, formerly Science Master in the Royal Grammar School, Sheffield, has been appointed Head Master of the Grammar School, Odiham, Hants.

THE sum of 2000*l.* has been offered to the Smith College for the erection of a building for the scientific laboratories, on condition that the sum of 1800*l.* is subscribed by the alumnae.

DR. KARL TOLDT, Professor of Anatomy in the Medical Faculty of Vienna, has been elected Rector of the University for the Academic year 1897-98.

MR. C. A. MORTON and Dr. J. Swain have been appointed joint Professors of Surgery in the Faculty of Medicine of University College, Bristol.

A DONATION of 2500*l.* has been promised by Mr. A. F. Calvert to the funds of the proposed North-Western Polytechnic (St. Pancras and Hampstead).

ACTING on the recommendation of the Faculty of Physicians and Surgeons, Columbia University, the chair of Chemistry and Medical Jurisprudence (at present vacant) has been changed to that of Physiological Chemistry.

THE tenth session of the Marine Biological Laboratory, Wood's Holl, Mass., began on July 6, and is to last for six weeks. It is being conducted by Dr. B. M. Davis, of the University of Chicago, and two courses are offered, (1) on Elementary Botany, and (2) on the Morphology of the Algae.

THE late Mr. J. S. Taylor, of Edderton, near Ross, left 4000*l.* in trust to found bursaries or scholarships to be known as the "John Taylor bursaries," to be competed for by natives of Thurso desiring to complete their education at Edinburgh University. He also bequeathed 1000*l.* to the Tain Academy, Ross-shire.

Science states that an anonymous donor has presented to the library of Columbia University 387 books, valued at about 1200*l.* They include a number of valuable works in natural history, such as Audubon's "Quadrupeds," Sepp's "Nederland'sche Insekten," Gould's "Humming-Birds," and Levaillant's "Oiseaux d'Afrique."

UNDER the will of Mrs. Gee, widow of the late Mr. Robert Gee, lecturer on the diseases of children in the medical school associated with University College, Liverpool, that college receives over 7000*l.* for the purpose of advancing the medical department, and promoting study and research in medical science. It has been decided by the medical faculty to institute a Robert Gee fellowship in anatomy of the value of 100*l.* for one year, and four entrance scholarships of 25*l.* each for one year.

THE following appointments are announced:—Dr. Thomas S. Fiske, of Columbia College, has been made a full Professor of Mathematics; Dr. Wm. Slocum, at present President of Colorado College, has been elected President of Oberlin College; Dr. G. Boccardi has been appointed Associate Professor of Microscopical Anatomy at the University of Naples; Dr. J. Szadowski, Associate Professor of Geology at the University of Klausenberg; and Dr. J. J. Zumstein to be Professor of Anatomy at the University of Marburg.

A MEETING of the subscribers to the Hall Memorial Fund, which was started a few months ago to commemorate the jubilee of science teaching at the City of London School, was held at the school on Monday last. It was announced that the amount subscribed (including 100 guineas from the Corporation) was about 354*l.*, and it was resolved that 350*l.* should be devoted to founding a scholarship to promote the study of chemistry and physics in memory of the late Mr. T. Hall, science master at the school, 1847-1870. The scholarship is to be awarded every fifth year, and to be tenable for two years.

SCIENTIFIC SERIALS.

American Journal of Mathematics, vol. xix. 3.—Development of the A-process in quaternions, with a geometrical application, by Dr. J. B. Shaw, gives several interesting results.—On the analytic theory of circular functions, by A. S.

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Chessin. The writer points out that the similarity between simply and doubly periodic functions ceases to exist when the behaviour of the function at infinity comes to be investigated. He refers to M. Méray's "Leçons nouvelles sur l'Analyse infinitésimale et ses applications Géométriques," wherein is given a classification of simply periodic functions into *polarised* and *non-polarised* functions. He then states that the character and rôle of the *polar values* of a circular function have not been clearly set forth, and that the object of his paper (pp. 216-258) is to supply the deficiency.—Sur un problème concernant deux Courbes Gauches, by Prof G. Kœnigs. The problem, of which a *direct* solution is given, is "une Courbe C étant donnée, en trouver une autre C, qui lui corresponde point par point de sorte que le plan osculateur à chaque courbe aille passer par le point qui correspond sur l'autre au point de contact."—The object of a second paper, by Dr. Shaw, entitled "The Linear Vector Operator of Quaternions," is the development of the linear vector operator, entirely from a quaternion point of view, which amounts, the author writes, to an extension or development of notions; reference is made to a paper by Dr. H. Taber in vol. xii. of the journal.—On certain applications of the theory of probability to physical phenomena, by Dr. G. H. Bryan. This is a subject to which much has been contributed in our columns. Dr. Bryan arrives at the conclusion that even the theory of probability does not furnish us with a *conclusive* proof of the Boltzmann-Maxwell law. That the law in question represents accurately the state of the molecules in a perfect gas, and approximately their state in an ordinary gas, cannot be doubted; but directly we attempt to generalise the law by applying it to assemblages of densely crowded molecules, we are confronted with the necessity of making some assumption or other, and the above treatment (*i.e.* employed in Dr. Bryan's note) shows that even probability considerations do not afford a sure way out of the difficulty.

MESSRS. W. AND G. S. WEST's paper on Welwitsch's African Freshwater Algae is still occupying the pages of the *Journal of Botany*, with the description of a large number of new and interesting forms. In the numbers for June and July descriptions are given of the following new genera: *Athroocystis*, belonging to the Palmellaceae; *Camptothrix*, the type of a new order, *Camptotricheae*, of Cyanophyceae; *Polychlamydatum*, near to *Schizothrix*.—Mr. E. G. Baker describes and figures the variety *ceratophyllon* of *Plantago coronopus*, new to Britain.—Mr. Arthur Lister has some notes on rare species of Mycetozoa, in which several new species are described.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, June 17.—"On the Distribution of Frequency (Variation and Correlation) of the Barometric Height at diverse Stations." By Prof. Karl Pearson, F.R.S., University College, London, and Miss Alice Lee, B.Sc., Bedford College.

This paper is especially intended as an *illustration of method*. The authors believe that hitherto no exact theory of variation or of correlation has been applied to meteorological observations, and they have endeavoured to indicate that fruitful results may be obtained from such a theory when applied to one branch at least of meteorology, namely, barometric frequency.

Their first object was to determine the nature of the barometric frequency distribution. By means of tables and plates it is shown that it can be described with a very high degree of accuracy by the use of a generalised frequency curve of the type—

$$y = y_0 \left(1 + \frac{x}{a} \right) p e^{-\gamma x},$$

a type which has been fully discussed in a previous memoir on skew variation.

A standard frequency curve for the British Isles having been selected, it is shown that the frequency distribution varies continuously from this type as we pass from station to station, and appears to be fairly uniform along lines which are termed generalised isobars.

The authors' next object was to discover what constants of the barometric frequency suffice to describe it with the least probable error. A somewhat elaborate investigation was accordingly made into the probable errors of the constants, and four *physical* quantities, the mean, the variation (or standard

deviation), the skewness, and the modal frequency were found to be the constants, which described a local barometric frequency with the smallest probable errors.

They have next discussed the chief physical features of a barometric frequency distribution.

(a) The modal height and the modal frequency are found to possess certain advantages over the mean height and the mean frequency. Various methods are considered for approximately determining the position of the mode.

(b) The variability of the barometric height and the skewness of the distribution are discussed at some length.

(c) A test of the accuracy of the observations for the twenty coast stations is made by attempting an interpolation of the frequency constants of London and Cambridge between those of Southampton, Hillington, and St. Leonards.

In the second part of the memoir the subject of correlation is dealt with. It is shown that within the limits of the British Isles there is a very high degree of correlation (as high as 0.9824 between Babbacombe and Churchstoke), and only sinking to 0.7572 if we take practically the utmost reach of the British Isles. It is pointed out that the gradual change of correlation with direction and distance, combined with change owing to the interval of time between observations, enables the meteorologist to find systems of stations with almost every variety of correlation coefficient.

The probable height and probable deviation from that height at any given station, based on a knowledge of the heights, contemporaneous or not, at one, two, three, or more other stations, are considered. It is indicated that with proper arrangement of times and distribution of stations it must be possible to make the probable deviation zero or nearly zero, and hence to predict with very great accuracy the height at one station from a knowledge of heights at other selected stations. The suggestion is made that this principle might very possibly be applied to closely predict future barometric heights at a given station from antedated observations at other selected stations.

Various theorems are deduced from the general principles of correlation: thus, it is shown that—

(a) There is a balance height for every pair of stations, such that when the barometer stands above this height at one station it will usually stand below it at the other, and *vice versa*.

(b) That for a very considerable number of triplets of stations which are positively correlated together, so that a high barometer at one means usually a high barometer at a second, it can still be predicted that if the barometer be steady at one, a rise or fall at the second denotes a fall or rise respectively at the third member of the triplet.

The writers hope that their paper may draw attention to the importance of rendering the large amount of barometric observations now made, available for the easy calculation of the variation and correlation coefficients. They consider that if a chain of stations round a large continental area could have their correlation for a series of intervals of time worked out, much might be done in the way of very close prediction of barometric changes.

“On the Theory of the Magneto-Optic Phenomena of Iron, Nickel, and Cobalt.” By J. G. Leatham, Fellow of St. John’s College, Cambridge. Communicated by Sir Robert S. Ball, F.R.S.

In this paper the fundamental equations of a particular type of magneto-optic theory are taken in a general form on the lines of Mr. Larmor’s recent papers on electro-dynamics, and developed so as to obtain the solutions of the problems of magnetic reflection and of transmission through films. The formulæ so obtained are compared with the available experimental results.

The notation differs slightly from that of Maxwell: c denotes the velocity of radiation, and (f'', g'', h'') corresponds to Maxwell’s total electric displacement; this has components (f, g, h) and (f', g', h') , of which the former is the displacement involved in the ether strain, and the latter that involved in the polarisation of the matter. It being assumed that for light oscillations the magnetic permeability is unity, the fundamental equations of the theory are as follows: (i.) The circuital relations $dc/dy - db/dz = 4\pi u$ and $dR/dy - dQ/dz = -da/dt$. (ii.) The equations of the current $u = \sigma P + g_3 Q - g_2 R + df''/dt$, where the vector (g_1, g_2, g_3) represents the Hall effect. (iii.) The displacement relations, and the elastic relations between electromotive force and polarisation, viz. $f'' = f + f'$, $f = P/4\pi c^2$, and $f' = (K - 1)/4\pi c^2 \cdot P + b_3 dQ/dt - b_2 dR/dt$, the vector

(b_1, b_2, b_3) representing, in transparent matter, the whole magneto-optic effect.

The vector $\{(b_1 d^2/dt^2 + g_1), (b_2 d^2/dt^2 + g_2), (b_3 d^2/dt^2 + g_3)\}$ is assumed equal to $C_0 e^{ix} (\alpha_0, \beta_0, \gamma_0)$, where $(\alpha_0, \beta_0, \gamma_0)$ is the intensity of magnetisation; and $C_0 e^{ix}$ is the single magneto-optic constant of the theory.

The principal experiments made use of are those of Drs. Sissingh and Zeeman on magnetic reflection, their observations being measurements of the phase m and amplitude μ of the “magneto-optic component” of the reflected light for various angles of incidence.

The following table will serve to indicate what sort of agreement is found to exist between the theory and the experiments.

Equatorial Reflection from Iron.

Angle of incidence.	Observed value of m .	Calculated value of m .
86° 0'	... 209 26	... 272 35 - x
82 30	... 204 22	... 265 19 - x
76 30	... 194 49	... 256 31 - x
71 25	... 190 3	... 251 13 - x
61 30	... 181 49	... 244 18 - x
51 22	... 179 0	... 239 48 - x
36 10	... 174 9	... 235 27 - x

If the value of x is about 62°, the agreement shown is remarkably good. Experiments on polar reflection from iron point to almost exactly the same value for x .

If we suppose the value of C_0 to be given by

$$-C_0 = 7.283 \times 10^{-11},$$

the ratios of the calculated to the observed values of μ for the above angles of incidence are found to be respectively 1.13, 0.96, 0.99, 0.97, 1.01, 1.03, and 0.97; so that in the case of the amplitudes also there is good agreement.

The theory gives a satisfactory account of a phenomenon which has only recently been discovered, namely, an effect of the component of magnetisation perpendicular to the plane of incidence. Good agreement is also found to exist in the case of the experiments on transmission through films.

It is to be noticed that, as b_1, b_2, b_3 are necessarily real, the imaginary part of $C_0 e^{ix}$ must be entirely accounted for by the Hall effect. Hence the present theory involves the supposition that the Hall effect is very much greater for rapidly alternating currents than for steady ones.

“On the Change of Absorption produced by Fluorescence.”

By J. Burke, M.A. (Dub.).

A careful series of experiments which have led to the result that certain fluorescent substances—notably uranium glass—absorb the rays which they give out whilst fluorescing differently, according as they are in a state of fluorescence or not; so that if a body, A, of some fluorescent substance, such as uranium glass, be transmitting light from a similar body, B, which is fluorescing the amount of light transmitted by A from B, is quite different, according as A is fluorescing or not.

If α and β are the coefficients of transmission in the two cases for uranium glass 1 cm. thickness, the mean values obtained by eye observation are $\alpha = 0.47$; $\beta = 0.79$.

The ratio $\frac{\beta}{1+\alpha}$ was also independently determined, the mean value of which = 0.507. The values of α and β determined photographically were

$$\alpha < 0.48 \quad \beta > 0.75$$

$$> 0.43 \quad < 0.89$$

In the determinations of α and β , a null method has been employed, by which any appreciable want of uniformity in the illumination could be detected.

The source of illumination was almost invariably the spark discharge of a Leyden jar between cadmium electrodes, being one of the richest sources of the fluorescence exciting rays, and the photometer one specially constructed for the purpose.

The phenomenon has been exhibited directly by obtaining two photographs side by side upon the one plate: one the effect of the fluorescence due to two layers of the fluorescent substance; the other the result of superposing the effects due to the fluorescent light from a single layer according as it came directly or through a non-fluorescing layer of equal thickness. The exposures being equal in each of the three cases, the superposed photographic effect was greater than the other one,

notwithstanding the fact that the result of superposing two nearly equal effects due to light of the same intensity—or nearly so—had been found not to be equal to, but less than that due to light of double the intensity acting for half the time. If the resultant effect were equal to the sum of the separate ones, the effect caused by the change of absorption would have been still more marked.

The effect can also be shown by the photometer, for if $\alpha = \beta$, taking the maximum value of $\alpha = 0.48$, the ratio $\frac{\alpha}{1+\alpha} = 0.32$, and instead of obtaining equality when the photometer is adjusted for this value the difference is most marked.

“On the Relative Behaviour of the H and K lines of the Spectrum of Calcium.” By William Huggins, D.C.L., LL.D., F.R.S., and Mrs. Huggins.

The problem before us was to find out by experiments in the laboratory, under what conditions the lines of calcium other than the lines H and K, and in particular the strong blue line at 4226.9, were so greatly enfeebled relatively to H and K, that they became quite insignificant, or even disappeared altogether from the spectrum, leaving the very simple spectrum of the two lines H and K, or nearly so.

It was suggested to us by the known rarer state of the gases in the regions above the photosphere, as well as by my long experience with the behaviour of calcium in comparison spectra, that the modifications of the calcium spectrum which we were seeking, would be likely to show themselves under conditions of greatly reduced density of the calcium vapour.

For obvious reasons we elected to use throughout the experiments a spark of very small intensity.

Our expectations were completely confirmed. Under the conditions (a) of greatest density of the calcium vapour, when metallic calcium was employed, the blue line was as strong and possessed the same diffuse character as H and K.

As the density of calcium was reduced, the lines were not found to be equally enfeebled, but, on the contrary, the blue line and the greater number of the lines were increasingly reduced in intensity relatively to H and K, until at last with the twice washed electrodes (d) the spectrum was simplified to the condition usually existing in the prominences, in which H and K only are present.

A more precise statement of the changes of relative intensity as they are presented in the photographs on the plates are given in the paper.

The only condition which was varied during this set of experiments was the amount or density of the calcium vapour. The changes of relative intensity, and the modifications of the calcium spectrum produced thereby, correspond closely to the behaviour of calcium at different levels near the sun's limb, and in the atmospheres of stars of different orders. There can remain little doubt that the true interpretation of the changes in appearance of the calcium lines in the celestial bodies is to be found in the different states of density of the celestial gases from which the lines are emitted or by which they are absorbed.

In the modifications of the calcium spectrum arising from variations in the relative intensities of the lines which have been discussed in this paper, and which correspond to those observed in the celestial bodies, there does not appear to us any reason for assuming, much less any direct evidence in favour of, a true dissociation of calcium, that is, of its resolution into chemically different kinds of matter.

A letter from Prof. Liveing is added, which contains an account of early experiments on the spectrum of calcium which support, by a different method of working, the conclusions of our paper; and seem to show the possible occurrence of the line H without K. In our experiments both H and K were always present, K being stronger than H, as is the case in the photographs of the prominences by Hale, and by Deslandres.

“Stress and other Effects produced in Resin and in a Viscid Compound of Resin and Oil by Electrification.” By J. W. Swan, F.R.S.

In this paper are described the stress and other effects produced by non-luminous electrical discharges on a viscid mixture of resin and oil. Wires from the discharging terminals of an induction coil or Wimshurst machine were led, one above and the other below a glass dish containing the resin mixture. The terminal above the resin surface was usually a point, ball, or disc, and the one below was a disc, forming a support for the

dish of resin. The discharging arms of the coil were used as a spark gap. The spark, 25 to 50 mm. long, always passed at the spark gap, the terminals above the resin being so adjusted that the resistance to discharge was slightly greater there than at the spark gap. When the upper terminal is a ball, and connected to the + electrode, then on a spark passing at the spark gap there is produced on the surface of the viscous mixture a star-shaped figure, formed of deeply-furrowed, closely-clustered, outward-branching rays, extending from a circular frill near the centre to the margin of the dish. The figure gradually dies down, and when the surface is smooth it may be produced again and again.

If the terminal above the resin surface be made — instead of +, then on a spark passing at the spark gap, a figure characteristic of the — discharge is produced. This figure is much smaller and weaker than the + one; most frequently it consists of a circular band or ring, more or less indented in outline, enclosing leaf-like rays which tend towards the centre. These are relatively broader and less branching than the + rays, and are in relief, while the + rays are below the plane of the surface. When the electrification is strong, the ring enclosing the rays stands up as a frill in considerable relief. These figures closely resemble the dust figures obtained by Lichtenberg and Armstrong.¹

The character of the figures depend on

- (1) Whether the terminal over the electric is + or —.
- (2) The form and size of the + and — terminals.
- (3) The distance of the upper terminal from the surface of the dielectric.
- (4) The character of the spark at the spark gap.
- (5) The density of the atmosphere.

Permanent figures may be obtained by substituting ordinary hard resin for the viscous mixture. The figures are then developed by warming and rendering the surface sufficiently plastic to allow of movement. The persistence and fixity of the stresses produced by a discharge on resin is remarkable, figures have been developed two months after the discharge with very slight diminution of effect.

The density of the atmosphere exercises a great effect on the figures obtained. As the density diminishes, the figures become more diffuse and less marked in character, and at an air pressure of 85 mm. a + figure becomes faintly marked by bands without the characteristic rays.

Geological Society, June 23.—Dr. Henry Hicks, F.R.S., President, in the chair.—Notes on a collection of rocks and fossils from Franz Josef Land, made by the Jackson-Harmsworth Expedition during 1894-96, by E. T. Newton, F.R.S., and J. J. H. Teall, F.R.S. A large collection of rocks and fossils, obtained by the members of the Jackson-Harmsworth Expedition, chiefly from the neighbourhood of Cape Flora, on the south-west of Northbrook Island, but also from more distant localities visited during boat- and sledge-journeys, have been sent to the Director-General of the Geological Survey, and examined by the authors. After a summary of what was previously known of the geology of Franz Josef Land, an account of the new specimens was given. The rocks are for the most part basalts, and are described in detail; they are usually formed of labradorite, augite, and interstitial matter which is sometimes represented by palagonite containing a large percentage of iron-oxide. This palagonite is regarded as the hydrated representative of the residual magma left after the separation of labradorite and augite; and the conclusion is reached that in this case progressive crystallisation has resulted in the concentration of iron-oxide in the mother liquor. Most of the fossils have been collected around Cape Flora. The presence of *Ammonites macrocephalus*, *A. modiolaris*, and *Belemnites Panderi* indicate the presence of rocks of Lower Oxfordian or Callovian age; while, apparently above these, a plant-bed was met with in which the genus *Ginkgo* is conspicuous, and this is believed to be of Upper Jurassic age. The oldest fossiliferous bed yet found occurs about twenty miles to the west of Cape Flora, and also contains plant-remains, which, it is thought, may be Lower Jurassic and possibly of the age of the Great Oolite. These plant-beds and numerous indications of layers of lignite seem to show that these Jurassic strata are to a great extent of estuarine or fresh-water origin. The general structure of the country appears to be typified by what occurs at Cape Flora, where cliffs of sedimentary strata some 600 feet high (for the most part hidden

¹ “Electric Movements in Air and Water, with Theoretical Inferences.” By Lord Armstrong, C.B., F.R.S. (London: Smith, Elder, and Co., 1897.)

by talus) are overlain by 500 feet of basalt. At some other localities, however, the basalt is found at the sea-level. It is pointed out that the islands, which make up the archipelago of Franz Josef Land, are fragments of a formerly extensive region of plateau-basalts, similar to that of which the Færøe and the Western Isles of Scotland must have formed a part.—Deposits of the Bajocian age in the North Cotteswolds. I. The Cleve Hill Plateau, by S. S. Buckman.—Pleistocene plants from Casewick, Shacklewell, and Grays, by Clement Reid.—An explanation of the Claxheugh Section (Co. Durham), by D. Woolacott.

PARIS.

Academy of Sciences, July 5.—M. A. Chatin in the chair.—The elections of M. Hatt, as Member of the Section of Geography and Navigation, and of M. de Lapparent, in the Section of Mineralogy, were confirmed by the President of the Republic.—Distribution of the velocities of gradually varied flow in tubes of large section, and the equation of the motion to a higher degree of approximation, by M. J. Boussinesq.—On the explosion of a manometer in a projection apparatus, by M. de Lacaze-Duthiers. The manometer in question had been used without accident on many previous occasions, and no explanation can be offered to account for its bursting, which was attended with serious injury to the lantern manipulator. The question was referred to a committee for investigation.—M. Virchow was elected a Foreign Associate of the Academy in the place of the late M. Tchebichef.—On the establishment of a general formula of interpolation for functions of any number of variables, by M. Dupont.—On the algebraic surfaces which admit of a skew cubic as an asymptotic line, by M. Ch. Bioche.—On the partial polarisation of luminous radiations under the influence of the magnetic field, by MM. N. Egoroff and N. Georgiewsky. The experiments show that the luminous intensity of a Bunsen burner always increases under the influence of a magnetic field. By the aid of a Wollaston prism it was found that a magnetic field partially polarises each of the rays of the sodium spectrum in two perpendicular planes.... The fine lines of the metalloids, obtained by M. de Gramont's method, remain unchanged in the magnetic field.—The magnetic deviation of the kathode and X-rays, by M. G. de Metz. In a previous paper certain effects were attributed to the kathode rays, which M. Poincaré suggested might really be due to X-rays, the latter being possibly produced by the reflection of the kathode rays at a platinum surface. Preliminary experiments upon the behaviour of the reflected kathode rays towards a magnet tended to show that X rays were not produced under these conditions, but further researches seem to indicate that the two classes of rays cannot be distinguished by their behaviour towards a magnet.—On the actino-electric effects of the Röntgen rays, by M. S. Puggenheimer. If two similar electrodes are plunged into a liquid and exposed to the Röntgen rays, a current is set up in the wire joining the plates, the intensity and direction of which depends upon the intensity of the radiation.—On a thermal ammeter containing mercury, by M. Charles Camichel. The bulk of a mercury thermometer is placed concentrically in a glass tube containing mercury; the current is passed through the latter for a definite time, and the rise of temperature read. It is shown that for a constant current the rise of temperature is constant, moderate variations of the air temperature being without effect upon the readings.—New mercury pump without taps or mobile joints, by M. H. Henriot. The pump figured appears to be practically identical with the original form of the Töppler pump, except that the side tube for admitting air without bumping to the vacuous vessel is omitted.—Action of tellurium chloride and fluoride upon the corresponding hydracids, by M. K. Metzner. The compounds $\text{TeCl}_4 \cdot \text{HCl} \cdot 5\text{H}_2\text{O}$, $2\text{TeF}_4 \cdot 3\text{TeO}_2 \cdot 6\text{H}_2\text{O}$, and $\text{TeF}_4 \cdot \text{TeO}_2 \cdot 2\text{H}_2\text{O}$ were prepared and analysed.—Reduction of molybdic acid by hydrogen, by M. M. Guichard. Below 470°C . the reduction of MoO_3 to MoO_2 is continuous, no intermediate oxide being formed.—On the manganimolybdates, by M. E. Péchar. The potassium, sodium, and ammonium salts of a new complex acid containing manganese and molybdenum are described.—On veratrylenediamine, by M. Ch. Moureu. The new amine condenses with phenanthraquinone, acetic acid, and benzaldehyde.—On paraxylylacetic acid, by M. Guerbet.—Action of tannin and of gallic acid upon quinoline bases, by M. Oechsner de Coninck.—On a new carbohydrate, caroubinol, by M. Jean Effront. The new carbohydrate, which possesses the general formula of the celluloses ($\text{C}_6\text{H}_{10}\text{O}_5$) is extracted from the grains

of *Ceratonia siliqua*.—On fermentation in media consisting of solid particles, by M. Th. Schloësing, jun.—The potato, by MM. H. Coudon and L. Bussard.—Researches relating to the homology of the shoulder-bone in Batrachians and Saurians, by M. A. Perrin.—On the morphological signification of the hinge teeth in Lamellibranchs, by M. Félix Bernard.—The regeneration of the micronucleus in some ciliated Infusoria, by M. Félix Le Dantec.—Evolution of the parasite found in the coelom of the house-cricket, by M. L. Cuénot. This parasite belongs to the genus *Diplocystis* (Kunstler). Two new species are described, named *D. minor* and *D. major*.—On the morphology of the compound larva of a Synascidian (*Diplosomoides Lacazei*, Giard), by M. Maurice Caullery.—On the hypodermal nuclei of the Anguillulidæ, by M. Joannes Chatin.—The true cause of the disease of the potato known as *Frisolée*, by M. E. Roze.—On a layer of syenite in the ground mass of Mount Genève, by M. W. Kilian.—Remarks by M. Michel Lévy on the preceding paper.—Experiments made with an aeroplane moved by steam, by MM. V. Tatin and Charles Richet.—On certain disturbances of the sea-level observed in the bay of Brusca, by M. Barthe de Sandfort.—Account of an apparatus for measuring the speed of boats or of sea-currents, by M. Merlateau.

NEW SOUTH WALES.

Linnean Society, May 26.—Prof. J. T. Wilson, President, in the chair.—Notes on the *Formicidæ* of Mackay, Queensland, by Gilbert Turner. Nearly one hundred and forty species have been collected, and with the kindly afforded help of Prof. Aug. Forel, of Zürich, identified, except in a few cases still under consideration. A general account of their habits and distribution was given.—Descriptions of two new species of *Cypræa* from West Australia, by Agnes Kenyon.—Notes from the Botanic Gardens, No. i., by J. H. Maiden and E. Bêche. (a) Notes on rare Port Jackson plants, viz. *Siebera Stephensonii*, Benth., at Botany Bay and La Perouse; *Helichrysum adnatum*, Benth., at Oatley and Hurstville; *Acacia Baueri*, Benth., at the Centennial Park, and an almost glabrous form of *Eriachne obtusa*, R. Br., near Rose Bay. The authors also presented a note on the rare *Dodonæa filifolia*, Hook., showing that the doubt cast by Bentham in the "Flora Australiensis" on the correctness of the Sydney locality is now removed. (b) Plants new for New South Wales. These are *Acacia alpina*, F. v. M., from near Kiandra; *Pterigeron dentatifolius*, F. v. M., from Olive Downs, Grey Range; *Geodorum pictum*, Lindl., from Byron Bay.—Descriptions of three new Australian plants, by J. H. Maiden and E. Bêche. (1) *Dodonæa Camfieldi*, a remarkable species belonging to Bentham's section "Cyclopteræ," but not closely allied to any described form. The leaves have broad sessile bases which appear to be unique in the genus, and the leaves have large groups of resin-secreting glands which give them a dotted appearance. (2) *Helipterum microglossum* (Syn. *H. corymbiflorum*, var. *microglossum*), differing in some important particulars from its so-called variety, between which there appear to be no intermediate forms. (3) *Leucopogon Fletcheri*, a species allied to *L. juniperinus*, from which it is chiefly distinguished by the pendulous flowers, the proportionately longer corolla lobes, and the exserted style.—Descriptions of two new Acacias from New South Wales, by R. T. Baker. Of the two species described, one is allied to *A. elongata*, Sieb., and the narrow-leaved variety of *A. subporosa*, F. v. M.; the other to *A. penninervis*, Sieb., and *A. retinoides*, Schl. Both are from the Rylestone District, the second of them, however, extending also to Cobar and Tocumwal.—On a larval Teleost from New South Wales, by J. Douglas Ogilby. The form described is conjectured to be the larva of one of the ophisuroid eels. Reference was made to Grassi's important researches on the Mediterranean Leptocephali or Glass-Eels; and to the insuperable difficulty which, in the absence of any biological station, effectually precludes the possibility of carrying out similar investigations on Australian forms.

AMSTERDAM.

Royal Academy of Sciences, April 21.—Prof. van der Waals presented, on behalf of Prof. Kamerlingh Onnes, two papers by Mr. E. van Everdingen, jun. (a) On the increase of the resistance of bismuth in connection with the dissymmetry of Hall's effect. Experiments with small bismuth bars cut, in different directions, out of the same piece of bismuth, show that the ratio of the amounts of resistance in those directions is modified in the magnetic field. This modification appears to

suffice to account for the sign and amount of the dissymmetry of Hall's effect. (*b*) On the relation between crystal direction and resistance, increase of magnetic resistance and Hall's effect. Hall's coefficient is not the same for a number of small plates, cut, in different directions, out of the same bismuth crystal. (The ratio of the maximum to the minimum value was once found to be nearly 8.) The amount of the increases of magnetic resistance in the plane \perp magnetisation is determined by the same angle. (The ratio of maximum to minimum sometimes amounts to more than 2.)

May 29.—Prof. Korteweg, on certain oscillations of higher order and abnormal intensity that can occur in mechanisms of several degrees of freedom. It was shown that, under certain conditions some of the coefficients, and with them, also, the respective oscillations are of abnormal magnitude. The author developed the theory of these abnormal oscillations of higher order. He discussed the part they may perhaps play in the oscillations of a mechanism, in the theory of light, and also in the spectra of gases, if Prof. V. A. Julius's view, that the internal motion of molecules may be conceived as oscillations of moderate intensity about a state of equilibrium, be right.—Mr. Eykman, treating of measures for checking beri-beri, communicated the results of researches made by the Medical Inspector Vorderman, concerning the relation between the nature of the rice-diet and the occurrence of beri-beri in the prisons in Java. From these researches it appears that the disease occurs principally in those prisons where the rice is eaten completely peeled, and, on the contrary, hardly ever in those where the prisoners eat half-peeled rice (*i.e.* rice still covered with the "silvery" pellicle"). This inquiry was suggested by similar results obtained by the author when studying a disease of domestic fowls, resembling beri-beri.—Prof. van der Waals presented, on behalf of Mr. P. Zeeman, further observations by the author concerning the change of spectrum lines by magnetism. Along the lines of force a blue cadmium line was doubled, across the lines of force it was trebled by the action of magnetism, the polarisation of the middle and that of the edges of a broadened line in the latter case being perpendicular to each other. This is in perfect harmony with Lorentz's theory of the effect.—Prof. van der Waals next read a paper by Mr. Zeeman, on a new experiment concerning anomalous wave propagation. Gouy's theory of the subject (*Ann. de Chim. et de Phys.*, vi. 24) was confirmed by means of a combination of a lens and a plate of Iceland spar cut so as to have the optical axis in their planes. Transmitted light was used. The experiment has some advantages over one devised by Joubin for demonstrating Gouy's theory, the principal one being the possibility of having any value for the initial phase difference of the two interfering pencils in the central part of the field.—Prof. van der Waals also presented, on behalf of Prof. Kamerlingh Onnes, (*a*) a paper, by Mr. A. van Eldik, on measurements of the capillary ascent of the liquid phase of a mixture of two substances in equilibrium with the gaseous phase; (*b*) a paper, by Mr. L. H. Siertsema, on the influence of pressure upon the natural rotation of the plane of polarisation in solutions of cane sugar. The measurements mentioned on a previous occasion have been continued with a concentration of 27.84 gr. in 100 cc., and have yielded a variation of 0.270 per cent. for 100 atm. If Tammann's hypothesis concerning the equivalence of internal and external pressure is adopted, these results may be compared with those respecting the variation of the specific rotation capacity by a variation of concentration, or by the addition of an inactive salt. The comparison shows that the phenomenon is probably more complicated than Tammann's hypothesis renders it.—Prof. Lorentz presented, for publication in the *Proceedings*, a paper entitled "On the resistance which a liquid current meets with in a cylindrical tube."—Prof. Bakhuis Roozeboom presented, on behalf of Dr. E. Cohen, a paper on the inversion constant of sugar in an aqueous solution. This constant varies with the concentration of the sugar solution. This difference can be removed if, in calculating the concentration of the inverting acid, the total volume is not used, but if the volume of the sugar in the solution is deducted from it. In this way there arises perfect agreement with the theoretical process of the reaction, as Dr. Cohen demonstrated with experiments made by Ostwald, and observations made by himself, with acids of $\frac{1}{2}$ - $\frac{1}{128}$ norm.—Prof. J. C. Kapteyn contributed a communication on the distribution of stellar velocities, being a sequel to a former paper on the same subject (May 1895). The author shows how the *magnitude* of the proper motions may be made to contribute to the derivation of the law of velocities, as

well as their *direction*. The author further shows that the most serious anomalies which remain in the distribution of the directions of the proper motions, even as computed with the best data available for the precession and the position of the apex, will disappear for by far the greater part, by assuming a constant error, or an error proportional to the cosine of the declination, in Auwer's proper motions in declinations.

BOOKS, PAMPHLET, and SERIALS RECEIVED

BOOKS.—Die Mechanik des Weltalls: Dr. L. Zehnder (Freiburg i. B., Mohr).—Electricity and Magnetism for Beginners: F. W. Sanderson (Macmillan).—Hallucinations and Illusions: E. Parish (Scott).—Wild Flower Lyrics: J. Rigg (A. Gardner).—Electric Smelting and Refining: Dr. W. Borchers, translated, with additions, by W. G. McMillan (Griffin).—Lehrbuch der Erdkunde: Dr. W. Ule, 1 Teil (Leipzig, Freytag).—The Ancient Stone Implements, Weapons and Ornaments of Great Britain: Sir J. Evans, 2nd edition (Longmans).—Reform of Chemical and Physical Calculations: C. J. T. Hanssen (Spon).

PAMPHLET.—On the Synthesis and Molecular Constitution of Dead and Living Proteid: Dr. P. W. Latham (Cambridge, Deighton).

SERIALS.—Traité de Zoologie, Fasc. xi. and xvi. (Paris, Rueff).—Jahrbuch der K. K. Geologischen Reichsanstalt, 1896, 3 u. 4 Hefte, and 1897, 1 Hefte (Wien).—Mind, July (Williams).—American Journal of Science, July (Newhaven).—Journal of Anatomy and Physiology, July (Griffin).—Geological Magazine, July (Dulau).—Lean's Royal Navy List, July (Witherby).—Plantæ Europæ, Tomus ii. fasc. i. (Leipzig, Engelmann).—Brain, Parts 77 and 78 (Macmillan).

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