

Observations, made in June 1834, at the Coast-Guard Stations in Great Britain and Ireland". Through representations made by Whewell, orders had been given for simultaneous observations of the tides at all the stations of the Preventive Service on the coasts of England, Scotland and Ireland from June 7 until June 22, 1834. The observations were sent to the Admiralty, and a part of them had been reduced. From them Whewell had been able to deduce many important inferences. He found that the tides in question were not affected by any general irregularity having its origin in distant sources, but only by such causes as were merely local, and that therefore the tides admitted of exact determination with the aid of local meteorological corrections. The curves expressing the tides of high-water presented a very satisfactory agreement with theory. A diurnal difference in the height of the tides, he said, manifests itself with remarkable constancy along a large portion of the coast under consideration. The tide hour appeared to vary rapidly in rounding the main promontories on the coast, and very slowly in passing along the shores of the intervening bays, so that the co-tidal lines are brought close together in the former cases, and in the latter run along nearly parallel to the shore; circumstances which would account for comparative differences of level and of corresponding velocities in the tide stream.

#### Theories of Electricity

Prof. William Ritchie (1790-1837), after being a schoolmaster in Scotland, went to Paris, where he studied under Thenard, Gay Lussac and Biot. In 1829 he became professor of natural philosophy at the Royal Institution, and three years later was given a similar post in the University of London. On April 3, 1835, he gave a lecture at the Royal Institution on the "Comparison of the two Theories of Electricity". The first of these theories, he explained, supposed that electrical phenomena depended upon the existence of a fluid universally diffused through matter and space, the particles of which repel each other inversely as the square of the distances. If we abstract a portion of this fluid from a body, the latter becomes negatively electric; while if we add a portion, we produce the phenomena exhibited by positive electricity. Another theory considered electricity to be a compound substance, consisting of two elements, positive and negative electricity. None of the phenomena is observed until this fluid is decomposed, and then a portion of it goes to the attracted body. Perhaps, said Prof. Ritchie, the fluid may be the ether to which the phenomena of light seem attributable.

#### The Dublin and Kingstown Railway

"The following is a statement," said the *Mechanics' Magazine* on April 4, 1835, "of the number of passengers, of different classes, conveyed along this railway during the first quarter of a year since it was opened, namely, from the 17th December 1834 to the 17th March 1835:

1st Class fare, 1s. each	10,008
2nd ditto 8d. each	72,148
3rd ditto 6d. each	94,961

Total number of passengers 177,117

The whole of this immense number of passengers has been carried without the slightest accident of any sort. The receipts during the same period have amounted to £5,283 16s. 8d."

## Societies and Academies

### LONDON

Royal Society, March 21. D. R. HARTREE and W. HARTREE: Self-consistent field, with exchange, for beryllium. Fock's equations for the self-consistent field of an atom, including exchange effects, have been completely solved numerically for the normal state of neutral Be. In connexion with the numerical calculations of energy values, a new check, depending on the direct calculation of the difference of energy values calculated using the solution of Fock's equations and using any other wave functions, is developed and applied. The inclusion of the exchange terms has a small but appreciable effect on the (1s) wave function, which becomes more like that for the Be<sup>++</sup> ion, and a considerable effect on the (2s) wave function, which contracts, and also becomes smaller near the origin compared to its maximum value. These changes are qualitatively of a kind to bring calculated values of certain atomic properties into better accord with experiment. H. R. HULME, J. McDougall, R. A. BUCKINGHAM and R. H. FOWLER: The photo-electric absorption of X-rays in heavy elements. A method is developed for finding the photo-electric absorption coefficient for the K-shell,  $\sigma_K$ . The calculations are rigorous and are not subject to the restriction  $Z \ll 137$ , where  $Z$  is the atomic number. Theoretically it is possible to apply the method for all values of  $h\nu$ , the energy of the quantum absorbed, but, as a considerable amount of numerical work is necessary, it is not practical for large values of  $h\nu/mc^2$ . Values of  $\sigma_K$  are given for  $h\nu/mc^2 = 0.693$  and 2.21 for elements with atomic numbers 26, 50 and 84. The values obtained do not differ much from those given by Hall, using a method which is discussed. His expression has therefore been used for  $\sigma_K$  in the region  $h\nu > 5mc^2$  and graphs have been constructed giving the photoelectric absorption *per atom* for various elements in the range  $h\nu > 0.7mc^2$  or  $3.4 \times 10^5$  e.v. The values obtained for lead are in excellent agreement with the experimental results as given by L. H. Gray's empirical formula.

### DUBLIN

Royal Irish Academy, February 25. R. Ó CINNEIDE: Some 2.4-derivatives of thiophene. 2-Thiophene-carboxylic acid condenses with *N*-methylolamides to form derivatives of the general formula 2.4.HOOC.C<sub>4</sub>H<sub>2</sub>S.CH<sub>2</sub>NHCOR. These derivatives, on acid hydrolysis, give the amino-acid 2.4.HOOC.C<sub>4</sub>H<sub>2</sub>S.CH<sub>2</sub>NH<sub>2</sub>, which can readily be oxidised to the known acid 2.4.C<sub>4</sub>H<sub>2</sub>S.(COOH)<sub>2</sub>. The hydroxy-acid 2.4.HOOC.C<sub>4</sub>H<sub>2</sub>S.CH<sub>2</sub>OH can also be obtained from the above amino-acid.

### PARIS

Academy of Sciences, February 11 (*C.R.*, 200, 501-596). A. GOSSET: The partial longitudinal resection of the inferior vena cava in the course of the ablation of a right pararenal tumour. Description of a rare operation. HENRI LAGATU and LOUIS MAUME: Leaf diagnosis of tobacco. The comparative influence of the scoria of dephosphoration, of superphosphate and of the basic phosphate on the PNK equilibrium. EDOUARD CHATON and Mlle. BERTHE BIECHELER: *Amæbophrya* and *Hyalosaccus*: their evolutive cycle.

The new order of the Cœlomastigina in the Flagellates. CHARLES POISSON was elected *Correspondant* for the Section of Botany, in succession to the late William Morris Davis. E. J. GUMBEL: The  $m$ th extreme values and the logarithm of the number of observations. OCTAV ONICESCU and G. MIHOC: Chains of statistic variables. DIMITRI PEREPELKINE: The conformal transformation and the intrinsic normal Riemannian curvature of a  $V_m$  in  $V_n$ . SERGE ROSSINSKI: The deformation of a rectilinear congruence with conservation of the principal ruled surfaces. MAURICE JANET: Two theorems on the relations between linear differential expressions. ANDRÉ WEIL: Topological demonstration of a fundamental theorem of Cartan. GEORGES VALIRON: Systems of integral functions. ARMAND RAUCH: The trend of integral algebroids in the paths of infinite determination. HENRI PONCIN: The stable hydrodynamical configurations which admit of surfaces of discontinuity for densities. DANIEL BELORIZKY: A remarkable change in the radial velocity of the new star in Hercules. The results of spectrographic measurements show that the radial velocity of this new star increased 230 km./sec. in ten days. MLLE. M. A. BAUDOT: Generalisation of the equation of continuity and of the theorem of Liouville for a space of wave functions. PAUL RENAUD: A generalisation of Curie's principle of symmetry. JEAN CAYREL: Comparative energetics of a two-current system and a system of equivalent layers. WILLEM UYTERHOEVEN and CORNELIS VERBURG: The superficial effect [skin effect] in the positive column of a sodium-neon discharge. RENÉ PLANIOL: An arrangement for the production of ions in a high vacuum. G. JOURAVSKY, P. CHARCZENKO and G. CHOUBERT: The residual induced magnetism of the eruptive rocks. The residual magnetism of igneous rocks is largely due to magnetite. After mechanical treatment by which the greater part of the magnetite is removed, the residual magnetism of the non-attracted portion is higher than would correspond to the proportion of magnetite remaining. ALBERT MICHEL-LÉVY and HENRI MURAOUR: A light source of exceptional intensity and of very short duration. By the explosion of a small quantity (0.4 c.c.) of a liquid explosive in an atmosphere of argon, a flash of light of very high intensity is obtained which lasts less than five millionths of a second. The spectrum extends into the ultra-violet and promises to have useful applications. FRED VLÈS: A spectral property of electrolytes in solution. NÉDA MARINESCO and MARIO REGGIANI: The impression of photographic plates by ultra-sounds. The action of ultra-sounds on a bromide plate free from any latent image results in the formation of a fine system of stationary waves. MLLE. SUZANNE VEIL: Gelatine submitted to the action of an electric field. Study of the properties of gelatine after submitting to an electric field. There is a diminution in the electrical conductivity, and the anode region is positive with respect to the cathode region. MLLE. CÉCILE STORA: The unsaturated character of colouring matters and the photo-voltaic phenomenon. P. CARRÉ: The relative mobilities of the normal primary alkyl radicals from  $C_1$  to  $C_{16}$  in their chlorosulphites. The temperature of decomposition of the chlorosulphite in the presence of pyridine is taken as the measure of the mobility. The mobilities vary in the same direction from  $C_1$  to  $C_7$ : from  $C_8$  to  $C_{15}$  they become lower than those of  $C_7$ , presenting odd-even alternation. PIERRE TRUNEL: The permanent electric

moments of some alkyl chlorosulphites. From measurements of the electric moments of alkyl chlorosulphites it is concluded that the structure remains the same for any value of  $R$  up to normal hexyl. MICHEL LESBRE: The action of the alkyl iodides on the alkaline plumbites. Sodium plumbite reacts with methyl or ethyl iodide giving sodium iodide and a plumbonic acid,  $RPbO.OH$ . ANTOINE WILLEMART: Contribution to the study of the preparation of coloured hydrocarbons of the rubene type. PAN TCHENG KAO: A phenomenon shown in polarised light by quartz in vibration. NY TSI-ZE and TSIEN LING-CHAO: The oscillations of a hollow quartz cylinder. A hollow quartz cylinder can vibrate in four different ways. In certain cases, the piezoelectric quartz plate can be advantageously replaced by a hollow cylinder. LOUIS ROYER: The orientation of lead chloride and bromide by muscovite mica. MLLE. YVONNE BOISSE DE BLACK: New data on the constitution of the Puy Violent, an autonomous volcano of Cantal. G. DUBAR and D. LE MAITRE: The presence of Solenopores and Spongiomorphides in the Moroccan Lias. JEAN LEGRAND: The utilisation of observations of the mean sea-level in the investigation of climatic cycles. PIERRE GAVAUDAN, MME. NOÉLIE GAVAUDAN and MARCEL PELLETIER: The evolution and significance of the nucleolar apparatus in the somatic karyokinesis of some Angiosperms. RAOUL COMBES: The biochemical study of the flower. The mineral nutrition of the corolla. The comparative study of the corolla and leaf shows that the former is less mineralised than the leaf. MARC SIMONET: The experimental synthesis of *Iris intermediares*. JOSEPH MEIERHANS: The pneumatic canal and the swim-bladder of the Physostome fishes. MME. JULIE KOSTITZINE: The female reproductive system of *Purpura lapillus*. LUCIEN PLANTÉFOL and GEORGES CHAMPETIER: The action of heavy water (deutrohydrogen oxide) on reviviscent animals. ARMAND DEHORNE: Cytological observations on a new species of Haplosporidium, parasite of the coelom of *Nereis diversicolor*. GASTON RAMON and EDOUARD LEMÉTAYER: The immunising action of the tetanic toxin, mixed with lanoline, on the experimental animal. The toxin of tetanus mixed with lanoline and olive oil, after injection into the rabbit in quantities representing ten times the toxic dose, gave none of the symptoms of tetanus. The rabbit was immunised against tetanus. CONSTANTIN LEVADITI, RENÉ MARTIN, ANTOINE BONNEFOI and MLLE. RACHEL SCHOEN: The etiology of mumps.

## SYDNEY

Royal Society of New South Wales, December 5\*. G. HARKER: Note on the determination of traces of prussic acid in tissues. Chelle's method involves the distillation of the prussic acid and its subsequent concentration in a small volume of potash solution, by removing it from the distillate with a current of air. Owing to destruction of nearly half the prussic acid in the preliminary distillation process—a destruction which takes place also in the absence of tissue—the results were distinctly low. The percentage loss, however, is fairly constant and an allowance can be made for it, leaving but a small margin of error. The direct removal of the prussic acid from the tissue by a current of air gives higher yields except when less than 0.01 mgm. prussic acid

\* Continued from p. 484.

is present. ADOLPH BOLLIGER: The volumetric microdetermination of picrolonic acid in organic picrolonates with methylene blue. Picrolonic acid forms with methylene blue a compound which is sparingly soluble in water (less than 0.001 per cent), but fairly soluble in chloroform (0.16 per cent). Thus picrolonic acid is so far the most soluble *o*-nitrohydroxyl compound for titration with methylene blue. The technique of the titration is the same as that described for picric acid or other *o*-nitrophenols. The end point is very sharp. Varying amounts of 0.01N picrolonic acid could be recovered with an error not exceeding 0.2 per cent. Further, the picrolonates of  $\alpha$ -naphthylamin, piperidin and *p*-toluidin were examined for their picrolonic acid content by the method described. P. M. GAME: Geology of the Cudgegong district. This paper describes a belt of country, 12-15 miles wide, extending south-eastwards from Mudgee for about 35 miles. Upper Silurian and Middle and Upper Devonian strata are represented. All three series are fossiliferous. A great strike fault, following the Cudgegong valley, separates the Upper Silurian and Upper Devonian systems here, but elsewhere the three series are conformable with each other. They have been intruded by acid igneous types of the Kanimbla epoch, and are overlain unconformably by horizontal Kamilaroi and Triassic strata. Remnants of thick Tertiary sills and flows cap the highest hills, such as Mount Bocoble (sill), and Cumbermelon Mountain (flow). S. C. BAKER: Testing a Lummer-Gehrcke interferometer; its use in a search for abnormality in the relative abundance of the isotopes of a special sample of mercury. A cadmium-amalgam lamp of new design is described. The relative intensities and half-value widths of the interference fringes of the cadmium red line were measured and compared with the theoretical values calculated from data of the apparatus. Discrepancies are attributed to the experimental limitations. The relative intensities of the hyperfine components of the green line emitted by two samples of mercury—one Australian, the other foreign—when excited by the high-frequency discharge differ by less than 2 per cent, which is within the limits of experimental error, so that there is no evidence of difference in the relative abundance of the isotopes of the two samples. F. A. COOMBS, W. MCGLYNN and M. B. WELCH: The tannin content of a variety of *Acacia mollissima*, Willd. (4). A description is given of a variety of *Acacia mollissima*, black wattle, which occurs over a wide area of New South Wales. Whilst the maximum tannin content found in seventeen analyses was found to be 51.5 per cent, the lowest was only 22.9 per cent. It is evident that under favourable conditions this variety may yield a tan bark of high quality. M. B. WELCH: The longitudinal variation of timber during seasoning (2). An examination was made of the longitudinal variation of some three hundred samples of a large number of different woods, in relationship to their densities. While 66 per cent of the total samples swelled or remained stationary during drying from a green condition to the fibre saturation point, only 33 per cent behaved similarly from the fibre saturation point to an air-dry condition. In general, woods of low density showed the greatest tendency to swell and heavy woods were more prone to remain stationary, during the initial drying period. Below the fibre saturation point, light timbers showed the greatest liability to shrinkage and heavy woods were inclined to remain stationary or to swell.

## Forthcoming Events

[Meetings marked with an asterisk are open to the public.]

### Monday, April 1

- BRITISH MUSEUM (NATURAL HISTORY), at 11.30.—J. Ramsbottom: "Symbiosis in Plants".\*  
ROYAL GEOGRAPHICAL SOCIETY, at 8.30.—Capt. Gabel-Jørgensen: "Dr. Knud Rasmussen's Contribution to the Exploration of the S.E. Coast of Greenland".

### Tuesday, April 2

- LONDON NATURAL HISTORY SOCIETY, at 6.30.—(at the London School of Hygiene and Tropical Medicine, Keppel Street, Gower Street, W.C.1).—Sir F. Gowland Hopkins: "The Naturalist in the Laboratory" (Bacot Memorial Lecture).

### Wednesday, April 3

- SOCIETY OF ENGINEERS, at 6.—(at the Royal Institution, Albemarle Street, W.1).—Sir William Bragg: "The Theoretical Strength of Materials and their Practical Weakness".

### Thursday, April 4

- INSTITUTION OF ELECTRICAL ENGINEERS, at 6.—Prof. E. W. Marchant: "Electricity in the Life of To-day" (Faraday Lecture).

## Official Publications Received

### GREAT BRITAIN AND IRELAND

- Harper Adams Agricultural College, Newport, Shropshire. Soil Survey of North Shropshire. By W. Morley Davies and G. Owen. Pp. 33+2 plates. (Newport: Harper Adams Agricultural College.)  
The Board of Greenkeeping Research. Report for 1934. Pp. 44. (Bingley: St. Ives Research Station.)  
Proceedings of the Royal Society of Edinburgh, Session 1934-1935. Vol. 55, Part 1, No. 1: The Duration of Life in an Albino Rat Population. By Dr. B. P. Wiesner and N. M. Sheard. Pp. 22. 2s. Vol. 55, Part 1, No. 2: Dating of Late-Glacial Clay Varves in Scotland. By Gerard De Geer. Pp. 23-26. 6d. Vol. 55, Part 1, No. 3: The Invariant Theory of the Correlation. By Prof. H. W. Turnbull. Pp. 27-41. 1s. 3d. (Edinburgh: Robert Grant and Son; London: Williams and Norgate, Ltd.)

### OTHER COUNTRIES

- Annual Report of the Indian Central Cotton Committee, Bombay, for the Year ending 31st August 1934. Pp. ii+152. (Bombay: Indian Central Cotton Committee.) 2 rupees.  
Carnegie Museum, Pittsburgh, Pennsylvania. Botany Pamphlet No. 1: Poisonous Plants of Pennsylvania. By Dr. Edward H. Graham. Pp. 16. (Pittsburg, Pa.: Carnegie Museum.) 10 cents.  
I.R.I. Broadcasts in conjunction with International Industrial Relations Institute Conference on Social Economic Planning, November 1934. Pp. iv+40. (New York and The Hague: International Industrial Relations Institute.) 30 cents.  
Lac and the Indian Lac Research Institute. By Dorothy Norris, P. M. Glover and Dr. R. W. Aldis. Pp. iii+53+12 plates. (Nankum: Indian Lac Research Institute.) 2.8 rupees.  
Report of the Aeronautical Research Institute, Tokyo Imperial University. No. 117: On the Motion of High-pressure Powder Gases and Compression Waves in the Neighbourhood of a Muzzle of a Rifle. By Kwan-ichi Terazawa, Mitsuo Tamano and Sin-iti Hattori. Pp. 439-492+9 plates. (Tokyo: Koseikai Publishing Office.) 75 sen.  
U.S. Department of Agriculture. Circular No. 342: The Waterfowl Flyways of North America. By Frederick C. Lincoln. Pp. 12. (Washington, D.C.: Government Printing Office.) 5 cents.  
The Hokkaido Imperial University. Calendar 1934-1935. Pp. iv+240. (Sapporo: Hokkaido Imperial University.)  
Education, India. Education in India, 1932-33. Pp. vii+117. (Delhi: Manager of Publications.) 2.8 rupees; 4s. 6d.  
Kungl. Svenska Vetenskapsakademiens Handlingar. Series 3, Band 14, No. 2: Studies in the Genus *Astelia* Banks et Solander. By C. Skottsberg. Pp. 106+24 plates. (Stockholm: Almqvist and Wiksells Boktryckeri A.-B.) 10.00 kr.  
Astrophysica Norvegica. Vol. 1, No. 3: Measurements of Luminous Night Clouds in Norway 1933 and 1934. By Carl Størmer. Pp. 87-114+17 plates. (Oslo: Jacob Dybwad.)

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