

technology, and for greater facilities for students desiring to pursue courses of work in applied science; but there are likely to be differences of opinion as to the wisdom of inaugurating a separate university devoted only to study and research in pure and applied science. At Manchester, Glasgow, Edinburgh, Sheffield, Bristol, and other places the colleges of technology have in recent years become technical faculties of the universities of their respective areas; and it would seem that similar co-ordination might be possible in a reconstituted University of London with the Imperial College and other London colleges which provide special facilities in applied science, forming a faculty of technology. Also, it may be doubted whether the associateness of the Royal School of Mines—a constituent college of the Imperial College—could be given a higher value than it has at present by being merged in a mining degree of the proposed new university. No doubt these matters have been considered by the promoters of the movement, and will be carefully weighed by the governors of the Imperial College before taking the steps suggested.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, January 23.—Sir J. J. Thomson, president, in the chair.—Admiral Sir Henry Jackson and Prof. G. B. Bryan: Experiments demonstrating an electrical effect in vibrating metals. Experiments are described which demonstrate the electrical effect produced by vibration in wires and other metallic bodies, and a method of detecting and recording them by means of searching coils connected to delicate recording apparatus. The diminution of the effect when the surface of a steel wire is rusted is dealt with, in continuation of a paper by one of the authors on the subject of vibrating wires. The inductive effect of a vibrating wire on a neighbouring circuit is mentioned; and this led up to the fact that all metallic bodies experimented with, whatever their shape or material, generate eddy currents, which can be detected in them by using suitable searching coils. That this effect is primarily due to the vibrating conductor cutting the lines of the earth's magnetic field is proved by the experiments, but that there seems to be a residual effect, not at present fully accounted for, which is greater than can be attributed to experimental errors. Details of the tests are described. These have been carried out with wire bridges, tubes, utensils of various forms and materials, and also with Chladni plates.—Prof. T. H. Havelock: Wave resistance: some cases of three-dimensional fluid motion. It is shown how to calculate the wave resistance when the surface pressure is two-dimensional and the wave-pattern like that of ship-waves. Certain cases are examined in detail, and the method can be extended to more complex systems. Interpreting some of the results in terms of the related problem of a submerged body, expressions are obtained for the wave resistance of a prolate spheroid and of other bodies.—W. S. Abell: Chances of loss of merchant ships. This communication discusses the effect of damage to vessels in respect of chances of loss of bulkheads and the consequent chances of loss of vessels. If the extent of damage be fairly constant, as in torpedo explosions, it would appear that there is an inferior limit to the spacing of bulkheads. Further, as the carriage of cargo is impeded by subdivision, there is an economic reason for calculating the number of bulkheads sufficient for reasonable safety. Such calculation involves the discussion of chances of loss of one or more bulkheads, and of the relation of size of vessel to bulkhead spacing. Assuming that water-

tightness is destroyed within radius R from centre of damage, it is shown that where (1) bulkhead spacing $= 2R + a$, the "odds on" for loss of one bulkhead are $2R/a$; (2) spacing $= 2R - a$, "odds on" for loss of two bulkheads are $a/(2R - 2a)$; and (3) spacing $= R - a$, "odds on" for loss of three bulkheads are $2a/(R - 3a)$. These results are applied to the case of ordinary cargo-carrying vessels of fixed type, but of varying lengths, with $R = 20$ ft. representing longitudinal extent of torpedo damage. Diagrams accompanying indicate that (1) for a given standard of subdivision, decrease of size of large vessels only slightly increases chances of loss; (2) for small vessels, risk of loss is relatively high, and it is doubtful whether any subdivision whatever is effective for vessels below 320-ft. length; (3) safety increases markedly with length of vessel; and (4) intermediate bulkheads are more useful in larger vessels, but may also, in certain cases, increase risk of loss. By suitable assumptions the method may be used to discuss subdivision of passenger vessels exposed to ordinary marine risks.—Prof. W. M. Hicks: A critical study of spectral series. Part v.: The spectra of the monatomic gases. This part deals with the series relationships in the second or blue spectra of the rare gases. Not only are the S, D, and F series allotted, but the discussion serves to amplify and sustain the laws developed in preceding parts, and illustrates their value for the purpose of the analysis of spectra in general. Amongst new methods may be mentioned the use of the links, discovered in part iv. of these communications, for the purpose of dealing with lines expected from formulæ or other considerations which lie outside the observed region. Thus, in the case of a wave-number n of a line in the ultra-violet $n - e$, or $n - u$, or *vice versa* if in the ultra-red $n + e$, $n + u$, where e , u are definite and calculable quantities, may be wave-numbers in the observed region and correspond with lines actually seen. In this way it is possible to obtain evidence of the existence and wave-length of lines belonging to the spectrum, although not actually measured. Of importance also in the general theory of spectra is the discovery of summation series. Thus in the case of the ordinary well-known series the wave-numbers are represented as the difference of two quantities $A - \phi(m)$, where m is the order in the series. It is shown that in the case of the F series at least there are, in addition to these difference frequencies, also a corresponding series of summation frequencies given by $n = A + \phi(m)$. For S, D series, such series if existing, would occur far down in the ultra-violet.

PARIS.

Academy of Sciences, January 20.—M. Léon Guignard in the chair.—H. Deslandres: The reform of the calendar. A discussion of a recent proposal of M. Bigourdan, with a summary of previous proposals with the same object. A sketch of an alternative calendar is given.—J. Andrade: The minimum number of associated spirals.—R. Garnier: The irregular singularities of linear differential equations.—M. Riquier: The analytical prolongation of the integrals of certain systems of linear partial differential equations.—G. Julia: Some problems relating to the iteration of rational fractions.—P. Lévy: Functions of implicit lines.—A. Guldberg: The errors of situation of a point.—M. Mesnager: A case of simplification of the formulæ of M. Boussinesq.—E. Belot: A hypothesis bringing into agreement the vortex cosmogony and the explanation of the peculiarities of novæ and the sun.—G. Déjardin: Calculation of the ratio of the principal specific heats of benzene and of cyclohexane by the cyclic method of M. Leduc.—E. Esclangon: A new determination of the velocity of sound in the open

air. The determination of positions by sound requires a knowledge of the velocity of sound in free air with a very high precision. The numerous experimental difficulties are summarised, and particulars given of determinations made during 1917 and 1918, under varying weather conditions, and at temperatures between 0° and 20° C. The mean value found was 339.9 metres per second in dry air at 15° C.—**M. Horsch**: A method of rapid reduction of potassium chloroplatinate. The salt is dissolved in boiling water, some alcohol added, and evaporated in a platinum crucible on the water-bath. The platinum is deposited as a coherent film on the crucible. Test analyses are given.—**Ph. Dautzenberg** and **G. Dollfus**: A raised beach in the neighbourhood of Saint Malo.—**A. Guéhard**: The cooling of the planetary globes.—**P. Bertrand**: The flora of the coal basin of Lyons.—**L. Joleaud**: Relations between the migrations of the genus *Hipparion* and the continental connections of Europe, of Africa, and of America during the Upper Miocene period. The author gives evidence which, taken together with the data collected by American geologists, leads to the probable conclusion that during the Upper Miocene period there was land connection between the Old and New World, by means of which *Hipparion* and other species of mammals could pass from America into Europe and Africa.—**C. E. Brazier**: The influence of the velocity of the wind on the vertical distribution and the variations of the meteorological elements in the lower layers of the atmosphere. The barometric pressure at the ground-level, calculated from observations made on the Eiffel Tower, is lower than the observed pressure. The difference between the observed and calculated pressures increases with the average velocity of the wind.—**P. Guérin**: The development of the anther and pollen of the Labiates.—**L. Moreau**: The architecture of the calcaneum in stereoradiography.—**H. Vincent** and **G. Stodel**: Results of the treatment of gas gangrene by multivalent serum. The serum was obtained from the horse after increasing injections of sixteen races of micro-organisms. Sixty-nine cures out of eighty-one cases were obtained, and of the deaths only eight were the result of gas gangrene.

BOOKS RECEIVED.

The Australian Army Medical Corps in Egypt: An Illustrated and Detailed Account of the Early Organisation and Work of the Australian Medical Units in Egypt in 1914-15. By Lt.-Col. J. W. Barrett and Lieut. P. E. Deane. Pp. xiv+259. (London: H. K. Lewis and Co., Ltd., 1918.) 12s. 6d. net.

Pre-History in Essex, as Recorded in the Journal of the Essex Field Club. By S. H. Warren. (Essex Field Club Special Memoirs, vol. v.) Pp. 44. (Stratford, Essex: The Essex Field Club; London: Simpkin, Marshall, and Co., Ltd., 1918.) 2s. 6d. net.

Traité Clinique de Neurologie de Guerre. Par Paul Sollier, Chartier, and Félix Rose, Villandre. Pp. viii+830. (Paris: Félix Alcan, 1918.) 32 francs.

DIARY OF SOCIETIES.

THURSDAY, FEBRUARY 6.

ROYAL INSTITUTION, at 3.—Dr. W. Wilson: The Movements of the Sun, Earth, and Moon.

ROYAL SOCIETY, at 4.30.—A. Mallock: The Elasticity of Metals as Affected by Temperature.—W. L. Cowley and H. Levy: Vibration and Strength of Struts and Continuous Beams under End Thrusts.—A. Dey: A New Method for the Absolute Determination of Frequency (with a prefatory note by C. V. Raman).

LINNEAN SOCIETY, at 5.—N. E. Brown: (1) Old and New Species of Mesembryanthemum, with Critical Remarks. (2) A New Species of Lobostemon in the Linnean Herbarium.—Dr. J. R. Lecson: Exhibition of Mycetozoa from Epping Forest.

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CHEMICAL SOCIETY, at 8.—G. N. White: A Note on the Action of Chloroform on certain Aryl Mercaptans in Presence of Caustic Soda.—J. T. Hewitt and W. J. Jones: (1) The Estimation of the Methoxyl Group. (2) The Estimation of Methyl Alcohol in Wood Distillates and their Concentrates.—P. F. Frankland, F. Challenger, and N. A. Nicholls: The Preparation of Monomethylamine from Chloropiricin.—W. C. McC. Lewis: Studies in Catalysis, Part x. Preliminary Note upon the Applicability of the Radiation Hypothesis to Heterogeneous Reactions.

FRIDAY, FEBRUARY 7.

ROYAL INSTITUTION, at 5.30.—Prof. J. G. Adami: Medical Research in its Relationship to the War.

MONDAY, FEBRUARY 10.

ROYAL SOCIETY OF ARTS, at 4.30.—Prof. J. A. Fleming: Scientific Problems of Electric Wave Telegraphy.

ROYAL GEOGRAPHICAL SOCIETY, at 8.—Commander Roncagli, Italian Navy: The Adriatic.

TUESDAY, FEBRUARY 11.

ROYAL INSTITUTION, at 3.—Prof. J. T. MacGregor-Morris: Study of Electric Arcs and their Applications.

INSTITUTION OF CIVIL ENGINEERS, at 5.30.—Further Discussion: Hon. R. C. Parsons: Centrifugal Pumps for Dealing with Liquids containing Solid, Fibrous, and Erosive Matters.—Probable Papers: F. J. Mallett: The Flow of Water in Pipes and Pressure Tunnels.—A. A. Barnes: Discharge of Large Cast-Iron Pipe-Lines in Relation to their Age.

WEDNESDAY, FEBRUARY 12.

ROYAL SOCIETY OF ARTS, at 4.30.—Sir Frank Heath: The Government and the Organisation of Scientific Research.

THURSDAY, FEBRUARY 13.

ROYAL INSTITUTION, at 3.—Dr. W. Wilson: The Movements of the Sun, Earth, and Moon.

INSTITUTION OF ELECTRICAL ENGINEERS, at 6.—Br.-Lt.-Col. W. A. J. O'Meara: The Functions of the Engineer: his Education and Training. CHILD-STUDY SOCIETY, at 6.—Dr. C. W. Kimmins: The Significance of Children's Dreams.

OPTICAL SOCIETY, at 7.—Annual General Meeting.—At 7.30.—Lord Rayleigh: A Possible Disturbance of a Range-finder by Atmospheric Refraction due to the Motion of the Ship which carries it.—L. C. Martin and Mrs. Griffiths: Deposit on Glass Surfaces in Instruments.

FRIDAY, FEBRUARY 14.

ROYAL ASTRONOMICAL SOCIETY, at 5.—Anniversary Meeting. ROYAL INSTITUTION, at 5.30.—Prof. C. G. Knott: Earthquake Waves and the Interior of the Earth.

MALACOLOGICAL SOCIETY, at 7.—Annual General Meeting.

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