

course of meteorology and navigation for students principally concerned with aerodynamics is being given by Sir Napier Shaw, while in the latter half of the session Wing-Comdr. Cave-Brown-Cave will lecture on airships. The full-time course on meteorology and navigation comprises a very detailed study of meteorology with special attention to its bearing on aeronautics. The work is under the control of Sir Napier Shaw, the late director of the Meteorological Office, with the assistance of Squadron-Leader Wimperis as lecturer on navigation. The whole programme for both courses is very well arranged, and as the services of such excellent lecturers have been obtained it is to be hoped that a sufficient number of students will be forthcoming to make the courses a success and to establish firmly this new department of the Imperial College.

Societies and Academies.

LONDON.

Royal Society, November 4.—Sir J. J. Thomson, president, in the chair.—Prof. **H. Lamb**: The vibrations of an elastic plate in contact with water. The chief problem considered is that of determining the gravest frequency of a thin elastic diaphragm filling an aperture in a plane rigid wall which is in contact on one side with an unlimited mass of water. This had an interest in connection with submarine signalling. An exact solution is not attempted, but a sufficient approximation for practical purposes is obtained by Rayleigh's method of an assumed type, which gives good results if the type be suitably chosen.—Prof. **H. M. Macdonald**: The transmission of electric waves around the earth's surface.—Lord **Rayleigh**: A re-examination of the light scattered by gases in respect of polarisation. II.: Experiments on helium and argon. The light scattered by helium and by argon is investigated. It is found in the case of helium that the total light scattered is in accordance with what would be expected from its refractivity. The polarisation in helium, contrary to what was found in 1918, is approximately complete. No intensity was detected in twenty-four hours of exposure in the component vibrating parallel to the exciting beam, and certainly this component was less than 6.5 per cent. of the other. Argon polarises much more completely than any other gas examined (with the possible exception of helium), the weak component being only 0.4 per cent. of the other.—Prof. **C. F. Jenkin**: Dilatation and compressibility of liquid carbonic acid. The paper describes the measurement of the dilatation and compressibility of carbonic acid between temperatures of -37° C. and $+30^{\circ}$ C. and up to pressures of 1400 lb. per square inch. The measurements were made to supply accurate data for determining the starting point for drawing the $\theta\phi$ and $I\phi$ diagrams and to replace the approximate results (known to be inaccurate) given in a former paper (Phil. Trans., A, vol. ccxiii., p. 76).—W. T. **David**: Radiation in explosions of hydrogen and air. This paper contains a record of the results of experiments on the emission of radiation during the explosion and later cooling of mixtures of hydrogen and air contained in a closed vessel. The results of experiments on the transparency of the exploded mixtures are also recorded. Some of the main conclusions arrived at are as follows: (1) The rate of emission is approximately proportional to the fourth power of the absolute mean gas temperature. (2) The maximum rate of emission occurs at the point of maximum temperature. (3) The exploded mixtures are very transparent throughout cooling to radiation of the same kind as

they emit. (4) The intrinsic radiance increases both with the lateral dimensions and with the thickness of the radiating layer of gas. (5) The 2.8μ band of steam ceases to be emitted when the gas temperature has fallen to about 700° C.—Dr. **R. E. Slade** and **G. I. Higson**: Photochemical investigations of the photographic plate. (1) It has been shown that the silver halide grain is the photochemical unit in the photographic plate. (2) A method has been devised whereby the law of photochemical behaviour of these grains can be investigated free from the disturbing effects of development, etc., which occur in the photographic plate itself. (3) From experimental results obtained a formula has been deduced which shows the relation between the behaviour of the silver halide grains, the light intensity to which they have been exposed, and the time of exposure. (4) The results show that it is impossible for the mechanism of the process to be the absorption of light in discrete quanta, and that a given amount of light energy has a greater effect photographically when concentrated into a short range of wave-lengths than when it is distributed over a large range.—Dr. **E. H. Chapman**: The relationship between pressure and temperature at the same level in the free atmosphere. The paper deals with the exceptionally high values contained in the table of coefficients of correlation between changes of pressure and changes of temperature at different levels in the atmosphere included in Geophysical Memoir 13 of the Meteorological Office, by W. H. Dines. The coefficients are computed for observations taken at random, and arranged in four groups for the year of three months each. For the layers between 4 km. and 8 km. these coefficients range from 0.75 to 0.92. It is assumed that if the observations were freed entirely from errors of measurement the coefficients would be still higher. A method is therefore worked out for correction of coefficients of correlation for probable errors of observation in measurement.—Prof. **J. C. McLennan**: Note on vacuum grating spectroscopy.

PARIS.

Academy of Sciences, October 18.—M. Henri Deslandres in the chair.—M. **Mesnager**: The applications of the Pitot tube. Remarks on the note in the last issue of the *Comptes rendus* by the late Yves Delage. It is pointed out that the three problems stated by him—transmission to a distance, independence of the experimental indications and of the support, and registration of the velocities—have already been solved, and the first two in a simpler manner. An account is given of the methods hitherto proposed, all of which would be difficult to use at sea.—M. **Hamy**: The photography of stars in full daylight. An account of some experiments carried out at the Observatoire des Bosses (altitude 4350 metres) on Mont Blanc.—H. and F. **Le Chatelier**: The mechanical properties of plastic bodies: the importance of reactivity. From a study of the torsion of glass kept at 550° C. and of steel at 825° C., it is shown that there are three kinds of deformation: an instantaneous elastic strain, which disappears on removal of the stress; a sub-permanent deformation, produced slowly and disappearing equally slowly; and, finally, a viscous deformation, produced with a constant velocity and not vanishing after release from stress.—M. **Le Prieur**: A route corrector: a new method of aerial navigation by estimation.—J. L. **de Olivar**: Correction of the lunar co-ordinates deduced from observations made at Montevideo of the annular eclipse of the sun of December 3, 1918.—E. **Belot**: The law of distribution of masses in the solar system, and the origin of the smaller planets.—A. **Véronnet**: Time and temperature

of formation of a collection of stars in an indefinite homogeneous nebula.—L. and E. Bloch: The spark spectra of some elements in the extreme ultra-violet. Details of the spark spectra of antimony, arsenic, bismuth, and tin between the limits 1850 and 1400 Ångström units.—G. Bruhat: The specific heat of saturated vapours at low temperatures. Reply to some criticisms of M. Ariès.—P. Vaillant: The existence of intermediate states in the phosphorescence of calcium sulphide deduced from its conductivity.—P. Théodoridès: The thermal variation of the coefficient of magnetisation in anhydrous sulphates, and the theory of the magneton. The results of magnetic measurements on the sulphates of manganese, cobalt, and iron at varying temperatures are given. These are in general agreement with the magneton theory.—A. Dauvillier: A new theory of photographic phenomena. In a recent communication the author developed a new theory of the chemical action of cathode, β , X, γ , and ultra-violet rays. The production of photographic images is considered from the same point of view.—L. Dubreuil: Determination of the number of independent constituents of a system of bodies.—R. Fosse: The micro-chemical qualitative analysis of cyanic acid. The method is based on the crystallisation of silver cyanate from hot water. After examining the forms of the crystals, they may be used for several colour reactions.—P. W. Stuart-Menteth: The tectonic of the Pyrenees.—G. F. Dollfus: The geological probabilities of discovering petroleum in France. A summary of the trial borings made in various parts of France for coal, potash, and oil. The outlook is generally unfavourable except in the valley of the Saône.—P. Négris: Considerations on the Glacial period. In an earlier communication the author was led to attribute the invasion by ice and its retreat to epirogenic movements. Further direct evidence of these movements is now given.—A. Lepape: The radio-active analysis of the thermal springs of Bagnères-de-Luchon. Some of the springs are rich in radium emanations, figures of 26.5, 31.6, and 41.5 millimicrocuries of emanation per litre of water being recorded.—H. Ricôme: The orientation of branches of plants in space.—L. Emberger: Cytological studies of the sexual organs of ferns.—M. and Mme. G. Villedieu: The non-toxicity of copper for moulds in general and for mildew in particular. Copper in the form of copper-ammonio-citrate does not interfere with the growth of the spores of *Penicillium* or mildew.—M. Nicolle and E. Césari: The effects and constitution of the antigens.—A. Lumière and J. Chevrotier: A simple and inoffensive method of avoiding anaphylactic shock. Starting with the hypothesis that anaphylactic shock is due to the formation of a solid precipitate in the blood plasma, experiments have been made *in vitro* on mixtures of sera capable of giving flocculent precipitates. Various reagents were added to these tubes with the view of discovering a substance capable of preventing the flocculation. Of the large number of reagents tested very few were found to possess the required property, and of these sodium hyposulphite was the most suitable. Experiments on animals showed that this substance was capable of preventing anaphylactic shock, and it was further proved that sodium hyposulphite did not appear to destroy, or even to attenuate, antitoxic sera.—G. Bertrand and R. Vladesco: The distribution of zinc in the horse. Twenty-three organs of the horse have been examined for zinc, the quantities found varying from 12.2 to 98 milligrams per 100 grams of dried material. Zinc was found in every organ examined, and the proportion varied not only from one organ to another, but also in the same organ or tissue

in different individuals.—A. Němec and V. Kás: The favourable influence of selenium on some moulds arising from the cheese industry.—J. L. Dantan: The development of the Antipathella.—M. Delphy: The reproduction of *Enchytraeoides enchytraeoides* and *Clitellio arenarius*.—V. Galippe: Researches on the presence of living organisms in cretaceous, ferruginous, pyritic, and siliceous fossils.—A. Paillet: Immunity in insects.

Books Received.

Proceedings of the Aristotelian Society. New Series. Vol. xx. Containing the Papers read before the Society during the Forty-first Session, 1919-20. Pp. iv+314. (London: Williams and Norgate.) 25s. net.

The Fringe of Immortality. By Mary E. Monteith. Pp. xv+204. (London: J. Murray.) 6s. net.

An Introduction to String Figures. By W. W. Rouse Ball. Pp. 38. (Cambridge: W. Heffer and Sons, Ltd.) 2s.

Où en Est la Météorologie. By Prof. A. Berget. Pp. vi+303. (Paris: Gauthier-Villars et Cie.)

The Volatile Oils. By E. Gildemeister and Fr. Hoffmann. Second edition. Authorised translation by E. Kremers. Vol. ii. Pp. xx+686. (London: Longmans, Green and Co.) 32s. net.

A Course of Modern Analysis. By Prof. E. T. Whittaker and Prof. G. N. Watson. Third edition. Pp. vii+608. (Cambridge: At the University Press.) 40s. net.

Electricity and Magnetism: Theoretical and Practical. By Dr. C. E. Ashford. Third edition. Pp. xii+303. (London: E. Arnold.) 4s. 6d.

A Treatise on Airscrews. By W. E. Park. Pp. xii+308. (London: Chapman and Hall, Ltd.) 21s. net.

First Lessons in Geography. By E. Marsden and T. A. Smith. Pp. 185. (London: Macmillan and Co., Ltd.) 3s. 6d.

Diary of Societies.

THURSDAY, NOVEMBER 11.

ROYAL SOCIETY, at 4.30.—Dr. W. G. Ridewood: The Calcification of the Vertebral Centra in Sharks and Rays.—Dr. A. Compton: Studies in the Mechanism of Enzyme Action. I. Role of the Reaction of the Medium in fixing the Optimum Temperature of a Ferment.—C. H. Kellaway: The Effect of certain Dietary Deficiencies on the Suprarenal Glands.—E. J. Collins: The Genetics of Sex in *Funaria hygrometrica*.

LONDON MATHEMATICAL SOCIETY (at Royal Astronomical Society), at 5 (Annual General Meeting).—J. E. Campbell: Einstein's Theory of Gravitation as an Hypothesis in Differential Geometry (Presidential Address).—H. Bateman: The Conformal Transformations of a Space of Four Dimensions.—F. Bowman: (1) The Differentiation of the Complete Third Elliptic Integral with Respect to the Modulus; (2) Note on the Intersection of a Plane Curve and its Hessian at a Multiple Point.—T. S. Broderick: Dirichlet Multiplication of Infinite Series.—L. E. Dickson: Arithmetic of Quaternions.—P. J. Heawood: The Classification of Rational Approximations.—E. L. Ince: Integral Solutions of Ordinary Linear Differential Equations.—C. Jordan: The Series of Polynomials, every Partial Sum of which approximates n Values according to the Method of Least Squares.—H. J. Priestley: Some Solutions of the Wave Equation.—H. Steinhaus: An Example of a Thoroughly Divergent Orthogonal Development.—N. Wiener: The Group of the Linear Continuum.—G. S. Young: The Partial Derivates of a Function of Many Variables.

ROYAL COLLEGE OF PHYSICIANS OF LONDON, at 5.—Dr. E. G. Browne: Arabian Medicine after Avicenna (FitzPatrick Lecture).

ROYAL COLLEGE OF SURGEONS OF ENGLAND, at 5.—Sir D'Arcy Power: The Education of a Surgeon under Thomas Vicary (Thomas Vicary Lecture).

ROYAL SOCIETY OF MEDICINE, at 6.30.—Sir Almroth Wright: Medical Research, and the conditions that are indispensable to the achievement of new knowledge.

OPTICAL SOCIETY, at 7.30.—Major E. O. Henrieci: The Use of Internal Focussing Telescopes for Stadia Surveying.—Dr. R. J. E. Hanson: Visual Fatigue and Eye Strain in the Use of Telescopes.

ROYAL SOCIETY OF MEDICINE (Neurology Section), at 8.30.—Dr. H. Head, Dr. J. Collier, and Others: Discussion on Aphasia.