

value as to warrant publication. In more than a hundred centres in the surrounding counties affiliated continuation classes in science and technology were conducted by education authorities: nearly all evening students entering the college, except those from a considerable distance, present qualifications gained in such affiliated classes. The school of pharmacy is now thoroughly established, and several students are preparing for the B.Sc. degree in pharmacy of the University of Glasgow.

RECENT developments in the Swedish national school system are described in an article by Prof. Hänniger of the Landskrona Training College in the November number of *School Life*—an official journal of the United States Bureau of Education. In 1919 the Government prescribed for use in the folk-schools a new instruction plan, the outstanding feature of which is "home and community study," involving lessons based on direct observation of the environment of home and school and linking the observed facts with geography, nature-study, history, drawing, and sloyd. About the same time were established two-year continuation schools with a total of 360 hours of instruction, directed in the main on practical lines, and including citizenship and the mother-tongue, and either a craft or natural history, sloyd, and horticulture. These schools are to be obligatory after 1924. Apprentice schools with two-year curricula, for which the continuation schools serve as a preparation, may be made compulsory at the option of the local community. In the apprentice schools the instruction comprises 6 to 12 hours per week during 8 or 9 months of the year. Beyond it is an optional crafts school with a one-year course. In a report just issued by a Grand School Commission proposals are made for substituting for the existing dual system (folk-school and *vealskola*) a common foundation school to be attended by children of all classes for six years, leading to a middle school with a four-year course, to be followed by a three-year "gymnasium."

HIGHWAY Engineering and Highway Transport Education problems were discussed at a conference held at Washington on October 26-28, under the auspices of the United States Highway Education Board. Between 1910 and 1922 the number of motor vehicles increased 2000 per cent. (to ten and a half millions), while the increase in funds for road building was only 400 per cent. Neither highway construction nor highway transport education have kept pace with the stupendous increase in automobile traffic. The trend in the colleges at present is towards a system whereby certain fundamental courses covering about 5 semester hours in highway engineering are required of all civil engineering students, while an equal amount of optional supplementary highway instruction in the subject is offered for intending specialists.

It is announced in the *British Medical Journal* that the University of Paris has received two gifts of 100,000 francs each from Madame Edouard Nathan. The first of these is to be applied to the improvement of the scientific laboratories of the University, and to the promotion of research work. The second is to be set apart for the purpose of making loans to impecunious students of the University to enable them to continue their studies.

THE *Chemiker Zeitung* of October 28 reports that Prof. Pfeiffer, of the Technische Hochschule, Karlsruhe, has been appointed Director of the "Josefine und Eduard von Portheim-Stiftung für Wissenschaft und Kunst" in Heidelberg, and will direct the Chemical Research Institute of this Fund.

Societies and Academies.

LONDON.

Physical Society, December 8.—Dr. Alexander Russell, in the chair.—G. Shearer: The relation between molecular and crystal symmetry as shown by X-ray crystal analysis. By X-ray analysis the number of molecules associated with the unit cell is determined. The symmetry number for each of the 32 crystal classes is shown to mean the minimum number of asymmetric molecules necessary in the unit cell to satisfy the symmetry conditions. The symmetry number is the actual number of molecules in the cell when the molecule is asymmetric; if the molecule possesses symmetry, this symmetry appears also in the crystal, and the number of molecules in the unit cell is obtained by dividing the symmetry number of the crystal by the symmetry number of the molecule.—E. A. Owen and G. D. Preston: Modification of the powder method of determining the structure of metal crystals. Plates of aluminium, iron, copper, lead, and magnesium have been examined by means of the Bragg X-ray spectrometer, employing radiation direct from a molybdenum anti-cathode. The maxima in the spectra are sufficiently intense to measure with accuracy, and the crystalline structure of the materials examined are readily determined.—A. B. Wood: The cathode ray oscillograph. The instrument is of the low-voltage type, in which a hot cathode is employed as a source of the electron current. This low-voltage type of oscillograph is much more sensitive than the high-voltage cold-cathode type of M. Dufour. There are various methods of focussing the cathode-ray stream, and it has been proposed to have an external (*i.e.* outside the vacuum) photographic film. Ordinary gelatin-coated roll films or plates are unsuitable, owing to the marked absorption of the cathode-rays by the gelatin. The best results have been obtained with Schumann plates containing calcium tungstate. This material phosphoresces with a light rich in ultra-violet, and consequently the secondary luminous effect on the Schumann plate is very great. Mechanical, electrostatic, and electromagnetic methods are described for generating a time-axis on the records.—R. Webb: A low-voltage cathode ray oscillograph. The instrument is designed to work at 300 volts. The cathode consists of a hot platinum filament coated with certain oxides, and formed into a circle coaxial with the path of the rays. It is protected from bombardment by positive rays, which would disintegrate it, by a screen in which is cut a circular hole slightly less in diameter than the filament. It has a life of about 200 hours. The anode is a platinum tube through which the rays pass. The deflecting fields are electrostatic, and are provided by two pairs of plates at right angles. The bulb is in the form of a conical flask, the cathode being at the narrow end so that the rays impinge on the flat bottom, which is coated inside with fluorescent matter. The luminous trace of the rays can be seen from outside through the bottom of the flask.

Royal Meteorological Society, December 20.—Dr. C. Chree, president, in the chair.—C. J. P. Cave and R. A. Watson Watt: The study of radiotelegraphic atmospherics in relation to meteorology. Results obtained in 1915, at the Meteorological Office Radio Station, Aldershot. Radiotelegraphic direction finding on atmospherics was introduced as a means of locating thunderstorms, and successful observations were made, with the co-operation of the Admiralty coast stations, on storms as near as five miles to an observing station, and on other storms 1000 miles distant. The first thunderstorm thus located, and

confirmed by subsequent meteorological reports, occurred in the south of Ireland on July 24, 1916, at a distance of 280 miles from the most distant station participating in its detection. A storm was traced across the Bay of Biscay and Southern France, a thunderstorm at Venice was located by two stations a thousand miles away, and a storm five miles from Aldershot was followed by the direction finder there, the bearings given being in complete agreement with the bearing of the audible thunder and the visible storm.—C. J. P. Cave: Winter thunderstorms in the British Islands. During the first three months of the years 1916, 1917, 1918, and 1920, the number of storms occurring in the winter months was very remarkable, there having been storms somewhere in the region on more than 40 per cent. of the days. Some of the storms were very widespread. They seem to have been connected with the occurrence of masses of air at widely different temperatures in close proximity. Thunderstorms are caused, it is suggested, (1) by the heating of the lower layers of the atmosphere, (2) by the cooling of the upper layers, (3) by a warm current of air rising over a cold one, (4) by cold air undercutting warm air.—D. E. Row: Forecasting sky-types. The type of pressure distribution as shown by a map or suggested by the "Further outlook" of the Meteorological Office, and the part of it which is likely to affect the locality concerned, is used, and local indications are considered. For example: Cirrus types followed by cumulus forms are to be expected during the passages of depressions, or even where overlapping occurs between an anticyclone and a depression. Indefinite areas of low or medium pressure often give very composite skies, thus yielding striking cloudscapes in which a large variety of cloud types is featured simultaneously.

DUBLIN.

Royal Irish Academy, December 11.—Prof. Sydney Young, president, in the chair.—J. J. Nolan: Ionic mobilities in air and hydrogen. The composite nature of ordinary ionisation in air is demonstrated by a third method. The ionisation in hydrogen is examined by the Rutherford-Franck method. The results obtained are similar to those already found for air and are, in general, confirmatory of the work of Haines. The ionisation is more complex than Haines's work would indicate, and a high degree of purity or drying is not necessary to bring out this feature. Criticisms by Blackwood are considered.

PARIS.

Academy of Sciences, December 11.—M. Émile Bertin in the chair.—Pierre Termier: The structure of the eastern Alps: relations of the Dinarides and the Alps.—A. Rateau: Pressures and specific gravities of air in a normal atmosphere.—M. H. Vincent was elected a member of the section of medicine and surgery in the place of the late M. A. Laveran.—Gaston Julia: Rational substitutions with two variables.—Maurice Lecat: The development of determinants as a function of determinants with axial empty spaces.—Lucien Mouren: New nomograms with aligned points applicable, in particular, to problems of navigation and their mechanical realisation.—M. Amoroso Costa: Concerning a note of M. Borel.—Mlle. O. Jasse: The Comas Sola planet of November 26, 1922: its identity with (629) Bernardina.—J. Guillaume: Observations of the sun, made at the Lyons Observatory during the second quarter of 1922. Observations were possible on 80 days in this quarter; the results are summarised in three tables showing the number of spots, their distribution in latitude, and the distribution

of the faculae in latitude.—L. Décombe: The direct calculation of the secular perihelic displacement of the planets on the hypothesis that the gravitation is of electrical origin. Application to the planet Mercury.—F. Michaud: The rigidity of jelly. The influence of a dissolved crystalloid. An application of a method described in an earlier note, capable of measuring a modulus of rigidity one-hundredth of that measured by Schwedoff. The effects of adding acids, bases, mineral salts, and organic substances have been studied.—A. Dauvillier and Louis de Broglie: Remarks on the work of M. E. Hjalmar concerning the M series of the elements. The measurements recently published by Hjalmar confirm the theory of the structure of the Röntgen spectra of the elements developed by the authors.—G. Durante: An apparatus for microphotography. Simplicity, transportability, and low cost are the advantages claimed for the apparatus described.—Georges Déjardin: The ionisation of mercury vapour in the presence of argon. The phenomena described in detail can be best explained by assuming that for electrons traversing an atmosphere of argon there exists a first critical velocity corresponding to about 11.3 volts, and that the resonance radiation emitted by the gas under these conditions ionises the vapour of mercury. This ionisation is not accompanied by any notable modification of the mercury spectrum.—G. Denigès: The rapid estimation of magnesium in a single drop of sea-water. The method is based on Schlagdenhaufen's reaction, the colour produced by the interaction of magnesium salts and potassium hypiodite.—L. J. Simon and A. J. A. Guillaumin: Methylisopyromucic acid and a method of diagnosis of the acids of the sugar group. The dehydration of the lactone of rhamnonic acid gave methylisopyromucic acid, a description of which is given.—Marcel Delépine: The dipyrindine iridium tetrachlorides. Configurations of the iridio-dipyrindino-tetrachlorides.—M. Picon: The action of sod-ammonium on aniline and its homologues. Sod-ammonium (in liquid ammonia) and aniline react slowly at the ordinary temperature giving hydrogen, sodium amide, and the aniline derivative $C_6H_5.NHNa$. The last named reacts violently with ethyl bromide, giving ethylaniline. Other aryl amines behave similarly.—E. E. Blaise: Syntheses by means of mixed organozinc derivatives: propylglyoxal.—Léon Moret: The existence of the upper Cretaceous (facies "Red layers") in the Autochtone in the neighbourhood of Thônes (Haute-Savoie).—F. Roman and J. Royo Gomez: The existence of Lutecian mammals in the Douro basin (Spain).—V. Van Straelen: The decapod crustaceans of the Portland beds of Cerin-Marchampt.—Henri Coupin: The origin of the siliceous carapace of diatoms.—A. de Puymaly: The adaptation to aerial life of *Zygnema peliosporum*.—E. Chauvin: The toxicity of *Volvaria gloiocephala*. This fungus, commonly considered as poisonous, when gathered near Algiers was shown by A. Gautier to be edible without inconvenience. The author has gathered the same fungus in France (Fontainebleau) and eaten it without ill-effects.—V. Vincent: The measurement of the acidity of soils by alkaline liquids.—L. Fage and R. Legendre: Fishing with a submerged source of light as a means of studying the coast fauna.—Mme. Z. Gruzewska and M. Fauré-Frémiet: The maximum quantities of reserve glycogen in the livers of dogs of different ages.—L. Garrelon, D. Santenoise, and R. Thuillant: The parallelism between the sensibility to the oculo-cardiac reflex and the sensibility to toxic actions.—Mlle. France Gueylard and M. Marcel Duval: The comparative toxicity of various acids for fishes (*Gasterosteus aculeatus*). The hydrogen ion concentration is not the sole cause of the rapid death

of the fishes in acidified solutions: the nature of the acid has also an important influence.—Aug. Michel: Caudal regeneration in *Polygordius neapolitanus*.—H. Barthélémy: The maturation *in vitro* and the activation by puncture of the ova of *Rana fusca* at the moment of discharge from the frog.—M. Charcot: Preliminary report on the voyages of the *Pourquoi-Pas?* in 1922.—A. Desgrez and H. Bierry: A mode of action of Vichy waters.

WASHINGTON.

National Academy of Sciences (Proc. Vol. 8, No. 11, November 1922).—J. A. Marshall: Bactericidal properties of the products of radium emanation. Old radium emanation tubes which have undergone disintegration in respect of γ -ray content are crushed under Ringer's solution in a sterile mortar. The radioactive solution obtained is conveyed immediately to the infected areas by sterile dressings; in the case of abscesses at the roots of teeth, it is injected through the pulp canal. This treatment gives better results than other antiseptic agents.—H. S. Washington: The jades of Middle America. The jades investigated are from a sacred natural well in the ancient Maya city of Chichen Itza, in northern Yucatan. The dominant colours are grey and green. They are jadeite jades of American origin, and differ from Asiatic jadeite in the large amount of diopside in the pyroxene they contain and the presence of much albite. Analyses are given.—Carl Barus: On a comparison of the relative sensitiveness of telephones. An interferometer U-gauge is connected by a quill tube to the telephone mouthpiece and a relation is obtained between the fringe movements and the constants of the instrument.—Carl Barus: The equilibrium positions of the vacuum gravitation needle in 1921 and 1922. From the curves given, the variations of the position of equilibrium in the lapse of time are of a different order in 1922 from their approximate constancy, in the given scale, in 1921. This may be due to the difference in the vacua obtained. All observations have a period of 24 hours, indicating solar radiation as the origin of the variations.—W. W. Coblentz: Further measurements of stellar temperatures and planetary radiation. (See NATURE, December 30, p. 886.) H. A. Lorentz: Proof of a theorem due to Heaviside. The theorem in question is: "The whole work done by impressed forces suddenly started exceeds the amount representing the waste by Joule-heating at the final rate (when there is any), supposed to start at once, by twice the excess of the electric over the magnetic energy of the steady field set up."—A. J. Lotka: The stability of the normal age distribution. There is an age distribution which, in certain circumstances, perpetuates itself when once set up in a population. An analytical method is used to show that this distribution is stable and that a population spontaneously reverts to it if the age distribution be displaced.

Official Publications Received.

Journal of the Indian Institute of Science. Vol. 5, Part 4: Induction Motors used as Synchronous Machines. By S. V. Ganapati and R. G. Parikh. Pp. 37-46+9 plates. 1.8 rupees. Vol. 5, Part 5: The Relation between the Iodine Values and Refractive Indices of some hardened Vegetable Oils. By J. J. Sudborough, H. E. Watson, and D. Y. Athawale. Part 1. Pp. 47-69+3 plates. 1.8 rupees. (Madras: Indian Institute of Science.)

Imperial Department of Agriculture for the West Indies. Report on the Agricultural Department, Dominica, 1921-22. Pp. iv+32. (Barbados.) Gd.

The British Mycological Society. Transactions. Vol. 8, Parts 1 and 2, December. Pp. 111. (London: Cambridge University Press.) 15s. net.

Leeds University. Eighteenth Report, 1921-22. Pp. 190. (Leeds.) Ministère de l'Instruction publique et des Beaux-Arts. Enquêtes et documents relatif à l'enseignement supérieur. 117: Rapports sur les observatoires astronomiques de Province. Année 1921. Pp. 127. (Paris: Imprimerie Nationale.)

Diary of Societies.

SATURDAY, JANUARY 6.

ASSOCIATION OF WOMEN SCIENCE TEACHERS (at University College) at 2.30.—Dr. Dorothy Wrinch: Relativity.
ROYAL INSTITUTION OF GREAT BRITAIN, at 3.—Prof. H. H. Turner: Six Steps up the Ladder to the Stars (5). Two Great Streams of Stars (Juvenile Lectures).
GILBERT WHITE FELLOWSHIP (at 6 Queen Square, W.C.1), at 3.—G. J. B. Fox: A Visit to Pompeii.

MONDAY, JANUARY 8.

INSTITUTION OF ELECTRICAL ENGINEERS (Informal Meeting), at 7.—E. W. Moss, and others: Discussion on the Protection of Inventions by Letters Patent.
ARISTOTELIAN SOCIETY (at University of London Club, 21 Gower Street), at 8.—Rev. Leslie J. Walker: A New Theory of Matter.
SURVEYORS' INSTITUTION, at 8.—F. W. Hunt: Zoning in the Control of Large Cities.

TUESDAY, JANUARY 9.

ROYAL INSTITUTION OF GREAT BRITAIN, at 3.—Prof. H. H. Turner: Six Steps up the Ladder to the Stars (6). The Size of a Star. (Juvenile Lectures).
SOCIETY FOR THE STUDY OF INEBRIETY (at Medical Society of London), at 4.—Dr. H. Campbell and others: Discussion on The Pathology and Treatment of Morphia Addiction.
INSTITUTION OF PETROLEUM TECHNOLOGISTS (at Royal Society of Arts), at 5.30.—Dr. W. R. Ormandy and E. C. Craven: Further Investigations into the Physico-Chemical Significance of Flash-Point Temperatures.
MINERALOGICAL SOCIETY (at Geological Society), at 5.30.—A. Brammall and H. F. Harwood: Dartmoor Granite: (a) Rutile, Brookite, and Anatase: Genesis. (b) Varieties of Zircon: their significance.—Dr. A. Hutchinson: A Graphical Method of Correcting Specific Gravity Determinations.—Dr. L. J. Spencer, with microscopical determinations by W. Campbell Smith, and chemical analyses by E. D. Mountain: A Davyne-like Mineral and its Pseudomorphs from St. John's Island, Egypt.
INSTITUTION OF CIVIL ENGINEERS, at 6.—H. W. H. Richards: Twelve Years' Operation of Electric Traction on the London, Brighton, and South Coast Railway.
INSTITUTE OF MARINE ENGINEERS, INC., at 6.30.—H. Campbell: Gas Engines, and Gas Producer Plants.
ROYAL PHOTOGRAPHIC SOCIETY OF GREAT BRITAIN (Scientific and Technical Group), at 7.—H. W. Greenwood: The Manufacture of Paper for Photographic Purposes. Historical—Hand-made Paper—Machine-made Paper—Raw Materials—Preparation—Beating—Sizing—Making—Finishing and Baryta Coating. Faults of Manufacture and their Effect on Emulsions—Testing for Faults, Impurities, etc.
QUEKETT MICROSCOPICAL CLUB, at 7.30.—Various Members: Notes on Mounting.
CIRCLE OF SCIENTIFIC, TECHNICAL, AND TRADE JOURNALISTS (at Institute of Journalists), at 8.15.—Sir Richard Gregory and others: Discussion on Reviews and Reviewers.

WEDNESDAY, JANUARY 10.

ROYAL SOCIETY OF ARTS, at 3.—C. R. Darling: The Spectrum, its Colours, Lines, and Invisible Parts, and some of its Industrial Applications (Dr. Mann Juvenile Lectures) at 5.30.
GEOLOGICAL SOCIETY OF LONDON, at 5.30.
INSTITUTION OF ELECTRICAL ENGINEERS (Wireless Section), at 6.—C. F. Elwell: Design of Radio Towers and Masts: Wind Pressure Assumptions.
INSTITUTION OF AUTOMOBILE ENGINEERS, at 7.30.—Col. P. H. Johnson: Improvements in Efficiency of Roadless Vehicles.

THURSDAY, JANUARY 11.

ROYAL AERONAUTICAL SOCIETY (at Royal Society of Arts), at 3.—R. A. Frazer: Testing Model Seaplanes (Juvenile Lecture).
OPTICAL SOCIETY (at Imperial College of Science and Technology), at 7.30.—C. Davidson: The Amount of Displacement in Gelatine Films shown by Precise Measurements of Stellar Photographs.—J. E. Barnard: The Use of Ultra-violet Light in Microscopy.—F. W. Preston: Pitch.—T. Y. Baker: A Prismatic Astrolabe.
INSTITUTE OF METALS (London Section), (at Institute of Engineers, Inc.), at 8.—W. E. Hughes: Some Aspects of Electro-deposition.
CAMERA CLUB, at 8.15.—J. S. Wells: Criticism of Members' Prints.

FRIDAY, JANUARY 12.

ROYAL ASTRONOMICAL SOCIETY, at 5.—Prof. A. S. Eddington and A. V. Douglas: The Progression of Stellar Velocity with Absolute Magnitude.—J. Evershed: Note on the Corona of 1908.
MALACOLOGICAL SOCIETY (at Linnean Society), at 6.
INSTITUTION OF HEATING AND VENTILATING ENGINEERS, INC. (at Engineers' Club, Coventry Street), at 7.—Dr. B. R. Wingfield: Automatic Temperature Control.
JUNIOR INSTITUTION OF ENGINEERS, at 7.30.—S. A. Stigant: Transient Phenomena arising in Transformers from Switching Operations.
ROYAL SOCIETY OF MEDICINE (Ophthalmology Section), at 8.30.—H. Butler: Some Unusual Cataract Operations.—C. Killick: The Treatment of Conical Cornea.

SATURDAY, JANUARY 13.

GILBERT WHITE FELLOWSHIP, at 2.15.—Visit to the Geological Museum, Jermyn Street.