

THE *Chemical Age* announces that the trustees of the Ferguson Bequest Fund have unanimously approved the appointment of Mr. Henry Hyman to be the first Ferguson fellow for research in applied chemistry. The fellowship is of the annual value of 200*l.* for two years, and the research may be carried out at Glasgow University, the Royal Technical College, or elsewhere, as the fellowship committee may direct.

THE proprietors of the *Practical Engineer*, by arrangement with the International Correspondence Schools, are offering a scholarship in mechanical engineering of the value of 30*l.* The scholarship, which is open to subscribers to that periodical of all ages and both sexes, will be awarded to the candidate submitting the best essay on "Why I would Choose an Engineering Career To-day." Full particulars may be obtained from the *Practical Engineer* offices, 8 Breems Buildings, Chancery Lane, E.C.4.

THE British Federation of University Women is giving practical expression to its belief in international ideals by the offer of a travelling fellowship, value 300*l.*, which is open to members of all national federations of university women forming branches of the International Federation. The fellowship will be tenable for the academic year 1922-23, the main condition being that research or post-graduate study shall be undertaken in some country other than that in which the fellow has received her previous education or habitually resides. Full particulars can be obtained from the Secretary, British Federation of University Women, 73 Avenue Chambers, Vernon Place, W.C.1.

Calendar of Scientific Pioneers.

December 29, 1731. Brook Taylor died.—Educated at Cambridge and a man of means, Taylor was devoted to the arts and sciences, served as secretary to the Royal Society, and in 1715 published his "Methodus Incrementorum Directa et Inversa," a treatise dealing with the calculus of finite differences and containing the important theorem which bears his name.

December 30, 1644. Johann Baptista van Helmont died.—A student of medicine at Louvain, van Helmont settled on his estate near Brussels. Though imbued with the superstitions of his day, he was a careful experimenter, and is remembered for his early researches on various gaseous substances.

December 30, 1691. Robert Boyle died.—The son of an Irish earl, Boyle devoted his life to the advancement of science and the spread of religion. He made numerous additions to physics and chemistry, and his name is perpetuated by the well-known Boyle's law, discovered by him in 1662 and independently by Mariotte about 1676.

December 31, 1719. John Flamsteed died.—The first of a long line of distinguished Astronomers-Royal, Flamsteed began his observations at Greenwich on October 29, 1676, the erection of the observatory being directly due to the need for improving the means of finding the longitude at sea. Flamsteed investigated the fundamental points of astronomy and formed a catalogue of 2935 stars, but his "Historia Cœlestis" was not published in its complete form until 1725.

December 31, 1868. James David Forbes died.—For twenty-seven years professor of natural philosophy at Edinburgh, Forbes was best known for his researches on heat and on glaciers. Like Brewster, he was one of the founders of the British Association.

E. C. S.

Societies and Academies.

LONDON.

Geological Society, December 7.—Mr. R. D. Oldham, president, in the chair.—S. S. **Buckman**: Jurassic chronology: II., Preliminary studies. Certain Jurassic strata near Eype's Mouth (Dorset): the junction-bed of Watton Cliff and associated rocks. A detailed section is recorded of a white lithographic bed in Watton Cliff which shows faunal inversion. The dating of this bed is discussed, and a theory of stratal repetition and coalescence is discussed. Its main date is taken to be Yeovilian, *Hammatoceras hemera*. The white lithographic bed of Burton Bradstock is cited as evidence of stratal repetition, and a theory as to its deposition and partial destruction is put forward. Both beds are cited as evidence of Alpenkalk conditions prevailing in western Europe at two well-separated Jurassic dates, both of them earlier than the times of Alpenkalk deposits in central and eastern Europe. A new species of rhychnellid from a deposit at Thorncombe Beacon is described.—J. **Stansfield**: Banded precipitates of vivianite in a Saskatchewan fireclay. The pale grey Tertiary fireclay worked for firebricks contains bluish-black patches, the central portions of which are deeply coloured and usually surrounded by a uniformly stained area or by several concentric stained layers of varying tint. The colour is due to an amorphous variety of vivianite, formed presumably by precipitation brought about by iron-solutions reacting on solutions of phosphates of organic origin, such solutions being brought together by diffusion through the colloidal clay. The spacing of the vivianite-bands is irregular, and appears to follow no known law.

Optical Society, December 8.—Mr. R. S. Whipple, president, in the chair.—L. C. **Martin**: The physical meaning of spherical aberration. Experimental determination of the intensity of light near the focus of a lens system shows that the "spurious disc" appearance persisted at the best visual focus, even with large amounts of aberration. Increasing the aberrations draws light from the central concentration and scatters it in the surrounding field; from measurements of the loss the necessity of restricting the phase residuals to within $\lambda/6$ is inferred. Spherical aberration produces marked asymmetry on each side of the focus.—F. L. **Hopwood**: An auto-stroboscope and an incandescent colour top. The production of a variety of stationary dark images, due to the eclipse of an incandescent wire by an adjacent cold wire or opaque object when both are revolving about a common axis, was described. The phenomena might be practically applied to the study of the behaviour of a rotating body by converting it into an auto-stroboscope.—J. W. **Gifford**: Achromatic one-radius doublet eyepieces. Eyepieces both of the Huygenian and the Ramsden types have been constructed from pairs of one-radius achromatic doublets with external plane surfaces to the flint lenses. They compare well with the German orthoscopes in definition, while the cost of production, since the same radius serves for each doublet, or in the case of the Ramsden throughout, is sensibly less. Such eyepieces are adapted either for the telescope or the microscope. By their use a more perfect achromatism is obtained, and also in both of them a flat field, very extensive in one case, likely to be useful in such operations as counting blood corpuscles, etc.

Association of Economic Biologists, December 9.—Sir David Prain, president, in the chair.—J. H. **Priestley**: The resistance of the normal and injured plant-surface to the entry of pathogenic organisms. When the protective surface of the flowering plant is injured the

first visible indication of healing is the deposit of fatty substances from the evaporating "sap" at the cut surface and their later transformation into a resistant substance of the nature of "suberin" or "cutin." The nature and origin of the protective layer in the exodermis of the root and the general distribution of the endodermis and its frequent transition through different structural stages are briefly described. Primary and secondary stages have different powers of resistance to the entry of pathogenic organisms; the importance of these considerations in relation to mycorrhiza was indicated. After the cortical tissues of the root are isolated from the vascular strand by a secondary endodermis with suberin lamellæ plus casparian strip, fungi found penetrating cortical tissues only may be regarded as saprophytic rather than parasitic. In the stem the first line of protection against pathogenic organisms lies in the cuticle. Underground and submerged stems usually possess a well-developed endodermis. In some plants a functional endodermis, normally absent, can be developed by etiolation, and its occurrence has a profound influence on the structure of the plant. After a wounded parenchymatous surface has been blocked by the rapidly forming deposit of suberin the tissues beneath usually give rise to an active phellogen producing cork. The general principles underlying cork formation and the occurrence of cork in normal stems and roots are briefly reviewed. In many cases the occurrence of deep-seated layers of cork could be associated with their formation beneath functional endodermal cylinders.

Faraday Society, December 13.—Prof. A. W. Porter, president, in the chair.—A. O. Rankine: The structure of some gaseous molecules of which hydrogen is a constituent. Data relating to the viscosity of gases the molecules of which contain one or more hydrogen atoms provide means of obtaining some knowledge of the dimensions of the molecules. An examination of certain hydrogen compounds containing different numbers of hydrogen atoms leads to novel views of the arrangement of the atoms. The behaviour of the molecules in molecular collision is considered and tables are given of the "mean collision areas." Assuming that the atoms towards the end of each period of the periodic table are equal in size, it is probable that as the number of hydrogen atoms in the molecule increases their nuclei become more remote from the nucleus of the central atom. The retreat of the hydrogen nuclei is due to their mutual repulsion, and the effect eventually leads to the failure to form such molecules as BH_5 and AlH_5 . A comparison is made of the relative dimensions of CH_4 and Kr , which prove to be of the same size to a degree within that of experimental errors. The identity of correspondence between CH_4 and NH_3 , as compared with that between Kr and Rb , and the equality of domains occupied in corresponding crystals by NH_3 and Rb respectively are indicated. Estimates of molecular dimensions from viscosity measurements agree with these results.

Society of Glass Technology, December 14.—Dr. Morris W. Travers, president, in the chair.—I. Masson, N. F. Gilbert, and H. Buckley: A suggested method of investigating the viscosity of glass. Applying a modified form of Stokes's law to ocular measurement of the rate of fall of a metal sphere in a viscous fluid gives results in fair agreement with the X-ray measurement where the shadow of the sphere was projected on to a photographic plate. For molten glass alundum crucibles had been found satisfactory, with platinum or large nickel balls.—V. Stott: Note on pipettes. Pipettes should be adjusted for a par-

ticular delivery time, and they are unsatisfactory if the delivery time is too short or too long. A definite period should be allowed for drainage when graduating, testing, and using pipettes.—F. Twyman: The annealing of glassware and annealing without pyrometers. A piece of the glass to be annealed is introduced into the furnace among the articles to be annealed. It is elastically strained by a definite amount, sufficient stress being brought to bear to deform it. Periodically the stress is removed. As the temperature of the furnace is raised a time will come when the test-piece will not recover entirely, and from a record of the time during which the piece has been kept strained at a particular temperature and the extent to which it recovers its original position it would be possible to calculate the time of relaxation at the temperature. For practical purposes if it springs back on release by one-half its originally strained amount it has been half-annealed, and so on; this time is independent of whether the Lehr has been kept at a constant temperature during the annealing or not. If the test-piece deliberately strained is annealed, then the other objects which have passed through the same temperature and were originally strained by want of annealing will become annealed simultaneously to the same degree.

Linnean Society, December 15.—Dr. A. Smith Woodward, president, in the chair.—F. A. Potts: The work of the Carnegie Institution in the marine biology of Samoa. The Island of Tutuila, its wooded cliffs, coral-reefs, and the fish fauna, were described, with illustrations taken under water.—G. C. Bourne: The Raninidæ, a study in carcinology. The Raninidæ, a family of the Decapoda Reptantia, have arisen independently from Astacuran ancestors. Although the endophragmal skeleton of the Raninidæ exhibits certain cancrioid characters, it is much more nearly related to the macruran than to the bachyuran type. The "epistome" is the antennary sternum, and the mandibular sternum enters into the composition of the preoral ventral plate. It is proposed to place the Raninidæ in a separate tribe, *Gymnopleura*, defined as follows:—Anterior thoracic sterna broad, posterior sterna narrow and keel-like; posterior thoracic epimera largely exposed by reduction of the branchiostegite; female openings on coxæ; last pair of pereopods dorsal in position, normal or reduced in size. Sternal canal present; thoracic nerve ganglion-chain elongate; antennary sternum triangular, spout-shaped; branchia 8 on each side. The respiratory mechanisms of the Raninidæ were described. The antennary flagella are usually short, but there are special arrangements for maintaining a respiratory current of water when the animals are covered with sand or mud, for they are burrowers; *Notosceles* shows adaptations to a swimming habit.

DUBLIN.

Royal Dublin Society, December 20.—Mr. G. Fletcher in the chair.—H. H. Dixon and N. G. Ball: Photosynthesis and the electronic theory, ii. Experiments were described showing that the sensitisation of photographic films to red light by chlorophyll and by a commercial sensitiser is effective at the temperature of liquid air. It has been previously shown that chlorophyll does not emit electrons when exposed to visible light in sufficient number to account for photosynthesis; hence the present experiments indicate that the effect of light is to cause a displacement of electrons within the chlorophyll molecule, thus rendering part of the molecule reactive. A new scheme of photosynthesis is suggested.—P. A. Murphy: The bionomics of the conidia of *Phytophthora infestans*.

Conidia in soil may retain their vitality under natural conditions for more than three weeks, and under artificial conditions for at least six weeks. Some of the more important factors governing this process, e.g. nature of soil, humidity, and temperature, were determined. The longer life of the conidia in soil as contrasted with air is attributed to the greater proportion of carbon dioxide and lack of oxygen in the former. Conidia and their products on germination were observed for periods of from two to five weeks under conditions tallying with those occurring in the soil; during these periods many remained alive and capable of infecting potatoes. The life of the fungus in water and soil is much extended when germ-tubes are formed; the same end is attained when zoospores result, for these can give rise directly to diminutive conidia.

SYDNEY.

Linnean Society of New South Wales, October 26.—Mr. G. A. Waterhouse, president, in the chair.—Vera Irwin-Smith: Studies in life-histories of Australian Diptera Brachycera. Pt. 1: Stratiomyiidae. No. 3: The structure of the mouth-parts and pharynx of the larval *Metoponia rubriceps*. Morphological studies of the mouth-parts and pharynx of larval *M. rubriceps*, which lives on the juices in the roots of grasses, are described.—R. J. Tillyard: A new genus and species of May-fly (order Plecoptera) from Tasmania, belonging to the family Siphuridae. The new genus is closely allied to the genus *Oniscigaster* found in New Zealand, from which it differs in its smaller size, in the complete absence of the appendix dorsalis in both sexes, and in the larval habit of living in still water.—G. F. Hill: New and rare Australian termites, with notes on their biology. Ten species are described, five of them being new. The number of described species of Australian termites is now approximately 115.—R. J. Tillyard: Two fossil insect wings in the collection of Mr. John Mitchell, from the Upper Permian of Newcastle, N.S.W., belonging to the order Hemiptera. The impressions are in association with *Glossopteris* fronds. The smaller belongs to a new family, genus and species of the division Sternorrhyncha of the sub-order Homoptera. The larger is a hindwing of a new genus and species allied to *Probole* from the Upper Permian of Russia, and belonging to the sub-order Palæohemiptera, now extinct. Evidently in Upper Permian times the sub-order Homoptera was already divided into its two main divisions, whereas the Heteroptera proper had not yet appeared, being represented only by the Palæohemiptera.—T. Steel: Chemical notes: Botanical. Analyses are recorded of some Australian fruits and of Fijian wild sugar-cane and the roots of the dragon-tree. Notes on the deposit of calcium carbonate in timber of *Geissois Benhami*, F. v. M., and the percentage of nitrogen in Australian fungi are also given.

Royal Society of New South Wales, November 2.—Mr. E. C. Andrews, president, in the chair.—A. R. Penfold and M. B. Welch: Two pinnate-leaf *Boronias* and their essential oils, with description of a new species. *Boronia pinnata*, common on the sandstone ridges north and south of Sydney, and *B. thujona*, with thin velvety leaves, found only in dense undergrowth in moist situations, were described. The principal constituent of the essential oil of *B. pinnata* is an unidentified terpene, resembling limonene, whilst the oil of *B. thujona* consists essentially of α - and β -thujone.—F. R. Morrison: The occurrence of rutin in the leaves of the *Boronia* (N. O. Rutaceæ). The yellow dye material was obtained from the leaves of the native rose, *B. serrulata*, and from *B. pinnata*

and *B. thujona*. The yield of crude rutin varied from 0.7 to 1.6 per cent. The colours produced on mordanted cloth were similar to those produced by rutin from other sources. This dye was first isolated from *Ruta graveolens*, which belongs to the same natural order as the *Boronias*.—T. H. Harrison: Note on the occurrence in New South Wales, Australia, of the perfect stage of a *Sclerotinia* causing brown rot of fruits. Review of climatical conditions leading to production of apothecia. Apothecia arose from mummified apricots in an orchard at Pennant Hills, near Sydney, N.S.W. Inoculations of loquat with cultures from an apothecium produced typical brown-rot lesions. The organism is probably *Sclerotinia fructigena*.

LAHORE.

Philosophical Society, June 15.—Dr. B. Sahni, president, in the chair.—S. K. Pandé: Some observations on a rust on *Euphorbia tibetica*. The diseased plants were collected in Ladakh (Kashmir). In its structure and its effects on the host the fungus resembles some species of *Uromyces*. The fungus causes marked changes in the habit of the host; the growth becomes stunted, the leaves become broader, and the production of flowers is retarded.—B. Sahni: Preliminary account of a petrified palm-stem (*Palmoxylon* sp.) from the Tertiary rocks of Jammu. The transverse section shows numerous scattered fibro-vascular bundles in a loose parenchyma. There are no fibrous bundles between the vascular strands.

June 20.—Dr. B. Sahni, president, in the chair.—G. Matthai: General account of a marine biological excursion to Karachi during December, 1920, and January, 1921. The different groups of animals in the collection were described as follows:—I. M. Puri: The Nemertean. —H. Singh: The birds.—A. Kumar: The sponges, polyzoa, and ascidians.—G. R. Kohly: The brachyura and anomura.—A. Chand: The polychaetes and gephyreans.—G. Matthai and M. L. Bhatia: The nudibranch mollusca.—I. Ali: The fishes.—G. Sondhi: The lamellibranch mollusca.—D. Ram: The chaetognatha.—G. Matthai: The hydrozoa and anthozoa.—S. Singh: The entomostraca.

Diary of Societies.

THURSDAY, DECEMBER 29.

ROYAL INSTITUTION, at 3.—Prof. J. A. Fleming: Electric Waves and Wireless Telephony: Surface Waves on Liquids.
HEALTH, MATERNITY, AND CHILD WELFARE LEAGUE (at University College), at 5.—Prof. Winifred Cullis: The Significance and Problem of Growth.
ROYAL DRAWING SOCIETY (at University College), at 5.30.—Miss D. M. Wilkins: The Affinity of Science with Art.
HEALTH, MATERNITY, AND CHILD WELFARE LEAGUE (at University College), at 6.—The Growth of the Mind.
INSTITUTION OF AUTOMOBILE ENGINEERS (at 28 Victoria Street), at 7.30.—Adjourned Discussion on Paper by H. F. L. Orcutt: Motor-car Gear-boxes.

FRIDAY, DECEMBER 30.

HEALTH, MATERNITY, AND CHILD WELFARE LEAGUE (at University College), at 5.—The Physiology of Adolescence and its Physical Requirements; at 6.—The Psychology and Mental Management of the Adolescent.
INSTITUTION OF PRODUCTION ENGINEERS (at Institution of Mechanical Engineers), at 7.30.—G. H. Hales: The Costing System and its Relation to Production.
JUNIOR INSTITUTION OF ENGINEERS, at 8.

SATURDAY, DECEMBER 31.

CONFERENCE OF EDUCATIONAL ASSOCIATIONS (Joint Conference) (at University College), at 10.30 a.m.—Dr. J. C. Maxwell Garnett and Prof. J. Strong: Education as a Science.
ROYAL INSTITUTION, at 3.—Prof. J. A. Fleming: Electric Waves and Wireless Telephony: Waves in Air.

MONDAY, JANUARY 2.

BRITISH PSYCHOLOGICAL SOCIETY (Education Section) (at University College), at 2.30.—Prof. T. H. Pear: Mental Tests and Mentality.
ROYAL GEOGRAPHICAL SOCIETY (Christmas Lectures to Young People) (at Eolian Hall), at 3.30.—Miss Ella Sykes: A Ride on the Roof of the World.
CENTRAL ASSOCIATION FOR THE CARE OF THE MENTALLY DEFECTIVE (at