

Societies and Academies.

LONDON.

Royal Society, November 22.—F. Simeon: The carbon arc spectrum in the extreme ultra-violet—II. The spectrum of the carbon arc in vacuum extends as far in the extreme ultra-violet as that of the spark, with the exception of a very faint line at 360.5 Å, and about 25 lines have been added to the arc spectrum as already recorded. The L series of carbon can be excited by a potential of between 30 and 40 volts. A number of lines in the carbon spectrum are probably true "arc" lines. Providing the grating will give radiation in the short-wave region, the same technique suffices to photograph the spectrum from 1850 Å to 370 Å.—H. J. Gough and D. Hanson: The behaviour of metals subjected to repeated stresses. The effect of static and alternating stresses on the micro-structure of metals was examined, the main object of the research being to determine whether the crystalline structure of a metal can be affected when subjected to ranges of stress less than the limiting range of stress (fatigue range). With "Armco" iron, mild steel, and copper, crystalline "slip" occurs at ranges of stress considerably less than the fatigue range. It is suggested that metals can be "strain-hardened" under the action of alternating stresses, as well as under static stresses; fracture occurs, in a metal subjected to alternating stresses, when a certain limiting strain for the material is exceeded.—W. Sucksmith and L. F. Bates: On a null method of measuring the gyro-magnetic ratio. A new method is described of determining the gyro-magnetic ratio; as in the ordinary resonance method, the specimen, suspended vertically by a fine wire along the axis of a helix, is magnetised by an alternating current of the same frequency as the natural frequency of the system; but the resulting resonance amplitude is reduced to zero by a series of impulses timed to oppose those due to gyro-magnetic effect. As no measurement of magnetic moment, frequency, or damping is involved, a considerable gain in precision is obtained. The method is independent of time-lag in magnetisation, and so can be applied to Heusler alloys. The following mean values of the ratio obtained for iron, nickel and Heusler alloys were obtained: Iron 0.503; nickel 0.501; Heusler alloys 0.501.—J. H. Shaxby: Studies in Brownian movement.—II. The determination of Avogadro's number from observations on bacteria (cocci). A determination of Avogadro's number by measuring the displacements, due to their Brownian movements, of small spheres suspended in water was carried out with cocci. Their surfaces may be supposed to be "wetted" so that there is no slip between the water immediately adjacent and the spheres themselves, and the resistance which might arise from electrical sources depending on slip is avoided. The value of N thus found, from the large number of observations made on *Staphylococcus albus*, is 6.08×10^{23} .—H. Hartridge and F. J. W. Roughton: The kinetics of Haemoglobin.—II.—A. F. A. Young: The thermionic and photo-electric properties of the electro-positive metals.—O. F. T. Roberts: The theoretical scattering of smoke in a turbulent atmosphere.

Zoological Society, November 6.—Sir S. F. Harmer, vice-president, in the chair.—A. Loveridge: (1) East African birds (chiefly nesting-habits and endoparasites), collected 1920–1923. (2) East African snakes, collected 1918–1923. (3) East African tortoises, collected 1921–1923, with description of a new species of soft land-tortoise. (4) East African

lizards, collected 1920–1923, with descriptions of two new races of *Agama lionotus* Blgr. (5) East African insects, collected 1915–1922.—I. G. S. Montagu: On some mammals from Jugo-Slavia.—I. G. S. Montagu and Miss Grace Pickford: The Guernsey Crocidura.—G. H. Goldfinch: Notes on the African crested rat (*Lophiomys imhausi*).—H. G. Jackson: A revision of the isopod genus *Ligidium* Brandt (Crustacea).—S. S. Flower: On additions to the snake fauna of Egypt.—S. Hirst: On some new or little-known species of Acari.—C. F. Sonntag: On the pelvic muscles and generative organs of the male chimpanzee.

Geological Society, November 7.—Prof. A. C. Seward, president, in the chair.—R. W. Hooley: On the skeleton of *Iguanodon atherfieldensis* sp. nov., from the Wealden shales of Atherfield (Isle of Wight). The nearly complete specimen was obtained in 1914. There is an essential similarity as regards the relationship of the bones of the skull to the American predentate dinosaurs. Grooves on the premaxillæ prove that the tip of the snout was sheathed in horn. The quadrate bone articulated freely with the squamosal, and there was a fore-and-aft action of the mandible. The tongue must have been extremely narrow, with a broad tip, and prehensile. The neck was habitually flexed, the point of greatest arching being at the ninth cervical. All the pre-sacral vertebræ carry ribs. The sacrum comprises six fused vertebræ. The ossified elements of the left carpus were preserved. The integument was very thin and covered with small tubercles, interspersed with groups of large polygonal plates, as in *Trachodon*. The estimated length of the skeleton is 6.3 m. (about 21.6 feet). *I. atherfieldensis* is distinct from any known species, and the skull and bones are intermediate in form between that of *I. mantelli* and *I. bernissartensis*.—S. H. Reynolds: The igneous rocks of the Tortworth inlier. The igneous rocks occur in two bands, the upper of which is associated with calcareous tuffs containing Silurian fossils and is doubtless lava. The lower band appears to be intrusive. The rocks of the two bands have several features in common. The rocks of the lower band are characterised by the presence of pseudomorphs after olivine, and may be grouped as olivine-enstatite-basalts. Those of the upper band are devoid of olivine, and consist of pyroxene-andesite. They are characterised by the presence of highly corroded xenocrysts of quartz and feldspar, and by the occurrence of variolitic and glassy patches in the ground-mass.

Linnean Society, November 15.—Dr. A. B. Rendle, president, in the chair.—E. J. Salisbury: The relation of earthworms to soil reaction. Natural undisturbed soils usually show a definite gradient with respect to organic material and acidity, both of which tend to attain a maximum at the surface. Analyses of worm casts show that these have a high organic content indicating their origin from the superficial and most acid layers. Comparison of the hydrogen ion concentration of worm casts and surface soil shows that acid soils tend to be rendered much less acid by passage through the worm. Markedly alkaline soils may similarly be rendered less alkaline. The former action may be attributed to the calciferous glands. The greatest frequency of worms is met with in soils with approximately neutral reaction.—Miss E. M. Blackwell: The flora of Solomon's Pools. Solomon's Pools lie about six miles south of Jerusalem, 2616 feet above sea level, in a valley, Wady Artâs, which runs east and west between low hills of red-brown ferruginous earth through which limestone bosses project. The pools, three in number, are obviously artificial. The middle and lowest pools have been

cleaned and partly repaired, and pumping plants erected. In July 1923 the uppermost pool had already dried up. The clear water of the pools supported a luxuriant growth of *Chara connivens* in the lowest and *C. contraria* and *C. fragilis* in the middle pool, forming almost a pure society. In the middle pool there was in addition an aquatic grass and a new filamentous alga, desmids and diatoms. In the lowest, *Potamogeton flabellatus* var. *scoparius* was flowering and fruiting, almost rivalling the *Chara* for dominance. At the deeper end of the lower pool were tufts of *Riella helicophylla*, their spirally coiled thalli floating out into the water in loose rosettes at a considerable depth. Where the floor of the west side of the lowest pool was exposed on account of the slope, the drying mud was covered with bleached plants of *Chara*, and growing up through it *Typha latifolia*, *Scirpus maritimus*, *Heliocharis palustris*, and *Euphorbia aleppica*. The flora is similar to that of the "slacks" in the Lancashire sand-dunes. The waters in both cases have a high percentage of dissolved solids, especially chlorides and carbonates.—R. E. Chapman: The carbohydrate enzymes of certain Monocotyledons. The material used was the green foliage leaves of the snowdrop, the onion, and the leek, with a starch-forming plant, a common dock, for purposes of comparison. The leaves were air-dried, powdered, and added to dilute solutions of starch, dextrine, maltose, cane sugar, and amygdalin, using qualitative tests and changes in the rotation of polarised light for the detection of hydrolysis. Toluol was used as antiseptic and the solutions incubated at 39° C. The results indicated that of the five carbohydrate enzymes—amylase, dextrinase, maltase, invertase, and emulsin—maltase and emulsin were absent from the snowdrop, dextrinase from the onion, amylase from the leek, but all five were present in the dock. The formation of starch in the parenchyma cells of the three Monocotyledons is thus prevented, because the necessary set of enzymes is incomplete. In certain cases (e.g. *Galanthus* and *Narcissus*) starch is always present in the guard cells, and prolonged starvation in darkness does not cause the disappearance of this starch. In the snowdrop the adult leaf has starch in the guard cells together probably with diastase but not maltase, so that hydrolysis can proceed only to maltose, and the system, starch $\xrightarrow{\text{diastase}}$ maltose catalysed by diastase, may be part of the mechanism controlling the opening or closing of the stomata.

Royal Meteorological Society, November 21.—Dr. C. Chree, president, in the chair.—L. F. Richardson: Attempts to measure air temperature by shooting spheres upward. Whilst making observations of the upper wind by shooting polished steel spheres upwards in a direction slightly inclined from the vertical so that the wind caused the returning sphere to fall quite close to the gun, the time of absence of the sphere can afford a measure of a mean temperature of the air through which it has passed. The upper air temperature was measured from the mean of six shots with a standard error of 1° C. at sunrise in calms or light winds. On such occasions, there is often a layer of cold stagnant air near the ground, so that the temperature in the Stevenson screen is a poor guide to the temperature at 70 metres. Here the projectile may be useful.—S. N. Sen: On the distribution of air density over the globe. Thirteen charts of "isopycnics" or lines of equal air density are drawn depicting the density distribution at the various levels. The air density at the 8 km. level all over the globe is illustrated by the chart for that level. The air density is controlled by temperature up to a height of about 8 km. and by pressure above

that level. The name "thermosphere" is proposed to denote the atmospheric shell in which temperature is the controlling factor, and "barosphere" that in which pressure is the controlling factor. On the average, when the temperature is rising in one hemisphere there is a diminution of air density in the thermosphere and an increase in the barosphere, and the effect of diminishing temperature in the other hemisphere is the reverse. These opposite thermometric tendencies create a mechanism for the automatic breaking down of the stratification of the free atmosphere. This mechanism, or the "convective cycle" which is postulated to be established between the North and South poles, also affords a means for the interchange of air between the two hemispheres.

PARIS.

Academy of Sciences, November 5.—M. Albin Haller in the chair.—The president announced the death of M. Arnaud de Gramont, member of the section of free Academicians.—G. Ferrie, R. Jouaust, and R. Mesny: The amplification of the current from photo-electric cells and its applications. The currents produced by photo-electric cells are very small, of the order of 10⁻¹⁰ amperes. These can be magnified by the use of a three-electrode lamp as a relay without inertia. A magnification of 1000 has been obtained with a lamp of the dimensions of an ordinary receiving lamp; with an emission lamp of 50 watts working under 1000 volts, an amplification of 10,000 was obtained. A more complicated method, based on the conversion of the photo-electric current into an alternating current and transforming up, is described: this permits of amplifications up to the order of 10⁶.—J. Costantin: The Pleurotus of the blue thistle of the Vanoise.—L. Maquenne: The theory of chlorophyll synthesis. A discussion of the Boussingault-Bayer theory of chlorophyll synthesis of the carbohydrates. An alternative hypothesis is put forward in which quadrivalent magnesium is assumed. Carbonic acid is assumed to be taken up by direct addition to the :N-Mg-N: groups; the assumption of the intermediate formation of formaldehyde is unnecessary.—Andre Bloch: Paratactic congruences and Dupin's cyclid.—M. Angelesco: The generating functions of Hermite polynomials.—Emile Borel: Remarks on the preceding communication.—J. Wolff: Non-measurable ensembles.—N. Gunther: A problem of hydrodynamics.—A. Foch: The dynamic similarity of an aspiration tube and its model. A discussion of the application of aspiration tubes to turbines, with especial consideration to the formulæ governing the relations between models and the full-size turbine.—Louis Breguet: The calculation of the weight of combustible consumed by an aeroplane during ascent. The formulæ for the effective range of an aeroplane have been worked out on the assumption of horizontal flight. Modifications are introduced into the Rateau equation showing the variations in petrol consumption during ascent and descent.—C. Chéneveau and J. Callame: A micropalmer. A description, with diagram, of an instrument designed for measuring the thickness of thin sheets or plates of rubber or other plastic material, with an accuracy of 0.001 mm.—E. Brylinski. Michelson's experiment.—Mlle. Berthe Perrette: An arrangement of the electric arc in a vacuum allowing the spectra of metals to be obtained with very small quantities of material. The cathode is formed of tungsten (or tungsten-thorium) wire, and the anode of a tungsten plate in which a small cavity is drilled to hold the material. The cathode is raised to a high temperature by a current of 4 to 5 amperes from accumulators.

The voltage between anode and cathode is 110 volts, the whole working in a vacuum of about 0.002 mm. of mercury. The lines of the spectrum given by this apparatus are very fine and give high orders of interference, and less than 0.05 gm. of material can be taken.—N. Perrokis: Study on the stability, in the presence of water, of a certain number of binary mixtures. Two groups of pairs of miscible liquids were studied: ethyl alcohol with phenyl ether, benzene, *o*-cresol, phenol; benzene, with various alcohols. The figure determined was the quantity of water necessary to produce two layers when added to 100 gm. of the binary mixture. Some results are given in a diagram.—N. D. Zelinsky: The polymerisation of acetylene by contact.—B. Darder Pericás: The tectonic of the neighbourhood of Sineu and of Ping de Sant Onafre (Island of Majorca).—Jules Wolff: The conditions favourable or prejudicial to the germination of the seeds of orchids and to the development of the seedlings. The seeds of the orchid can be germinated aseptically in a rich medium, and in the absence of fungi. The seedling can then be planted out on mycelium, and symbiosis is established normally. The presence of the fungus at the commencement of the germination is not only unnecessary, but may prove injurious to the seedlings.—J. Dauvergne and Mlle. Weil: The culture of plants in a sterile liquid medium. A development of Mazé method, the seeds being supported on perforated aluminium plates.—C. Fromageot: Assimilation in the green cells and the structure of the protoplasm.—Lucien Daniel and Jean Ripert: Researches on the variations of chemical action in grafted plants.—A. Maige: The metabolism of the sugars in the cell and amylogenesis. It results from the experiments described that even in cells where amylogenesis requires only a very low concentration in sugar, the essential phenomena of cellular metabolism which assure the continuity of life and growth of the living material may be effected at still lower concentrations.—Chavastelon and J. Luquet: Contribution to the study of the edaphic conditions of the pastoral associations in the massif of Mont-Dore.—Emile F. Terroine, R. Bonnet, and P. H. Joëssel: The composition of seeds and yield of energy in germination.—Mme. L. Randoïn and H. Simonnet: The influence of the nature and quantity of the glucides present in a ration deprived of factor B on the precocity of appearance of the accidents of polyneuritis in birds. In constructing an artificial diet for experiments on diet deficiency, it is very important to take into account the digestive utilisation of each of the food materials composing the diet. The experiments give some support to the idea that the magnitude of the factor B requirement is not absolute but is relative and in direct relation with the degree of utilisation of one or several elements of a ration, and, in particular, with the quantity of sugars assimilated.—Paul Voukassovitch: The biology of two parasitic Hymenoptera of *Pyralis* of the vine.—Marc Bridel and Jean Charpentier: The biochemical characterisation of galactose in a mixture containing galactose and arabinose. Galactose can be detected in the presence of arabinose, by the action of emulsin in 70 per cent. alcoholic solution. The β -ethylgalactoside can be obtained in the crystalline state, suitable for identification.—André Lwoff: A new free ciliated Infusorian, *Stephanopogon Mesnili*. Its taxonomic importance.—Mlle. M. Gauthier: The development of the egg and embryo of *Cyathocephalus*, a parasite of the trout.—Henri Stassano: The double rôle of the heating plates in apparatus for the sterilisation of liquids in continuous circulation.

WASHINGTON, D.C.

National Academy of Sciences (Proc., Vol. 9, No. 10, October).—L. B. Loeb: The mobilities of electrons in air. The mobilities of electrons in air at pressures of 41, 51.5, 60, 66.5, and 92 mm. of mercury were measured in an ion chamber. A constant field superposed on the actuating alternating field was used to neutralise the field produced by the accumulation of ions. Plotting mobility constant (mobility reduced to atmospheric pressure) against critical voltage (static voltmeter) minus retarding potential, curves are obtained showing breaks probably due to attachment of electrons to molecules. Expressions are given for the mobility constants for the distance separating the plates in the ion chamber (1.955 cm.).—P. W. Bridgman: The thermal conductivity of liquids. A radial flow apparatus with the liquid between two concentric metal cylinders was used. The inner cylinder was the source of heat, and conductivities were measured at 30° C. and 75° C., and at atmospheric pressure, 6000 kg./cm.² and 12,000 kg./cm.² pressures. Water and fourteen organic liquids were used. Conductivity decreases with rise of temperature, at atmospheric pressure, except for water. At constant temperature, it rises with increasing pressure; at 12,000 kg./cm.², the increase is from 1.5 to 2.7 fold, the more compressible liquids showing the greater increase. The absolute conductivities at 30° C. range from 0.000505 (methyl alcohol) to 0.000265 (ethyl iodide); for water the value given is 0.00144. A formula connecting the conductivity, gas constant, velocity of sound in the liquid, and the mean distance of separation of the centres of the molecules of the liquid, is derived. The high value for water is referred to its low compressibility and the closeness of the centres of its molecules.—E. S. King: (1) Photovisual magnitudes of one hundred bright stars. The Draper 8-inch refractor was used and Cramer Isochromatic Instantaneous plates with a yellow filter. All the plates were taken 1.25 cm. or more outside the focus. Results for A₀ stars agree with the photometric magnitudes. In general, the photovisual colour index is greater than the visual or photometric index. (2) Revised magnitudes and colour indices of the planets (*v. NATURE*, November 24, p. 769).—R. H. Bowen: The origin of secretory granules. Nasonov, working on Salamander glands, showed that early secretory granules are associated with the Golgi apparatus of cells and afterwards have caps or girdles of Golgi material. These results are confirmed. It is suggested that the acrosome of the animal sperm, which arises as a vesicle in close connexion with the Golgi apparatus, and from which the Golgi apparatus is finally separated, is a secretory granule applied to the head of the mature sperm, whence its substance may be released at fertilisation. Referred to other gland cells, the hypothesis suggests that there is direct relation between the Golgi cells and chemical synthesis, and in particular enzyme formation.—R. R. Huëstis: The heredity of microscopic hair characters in *Peromyscus*. Two geographic races (coast- and desert-race) of two species of deer-mouse were used. Each coast-race differed from the corresponding desert-race in much the same way. It is concluded that the differences observed between contrasted races have been evolved in the wild state, and some at least are the effect of environment. The results indicate Mendelian inheritance of multiple factors.—C. G. Abbot: Preliminary note on the variation of the sun's visible features associated with variations of solar radiation (*v. NATURE*, November 17, p. 738).