

Early Science at the Royal Society.

February 10, 1663. Mr. Hooke being called in, and desired to suggest some experiments that might be acceptable and useful to the public, suggested, that the experiment of land-carriage, and of a speedy conveying of intelligence, might be considered of.

1669. Three dwarf oaks, with cups or acorns in them (received from Mr. Winthrop, of Connecticut), whereof two were given to Mr. Charles Howard, and one to Mr. Evelyn to plant them here.

1685. Sir Robert Gordon said he had seen the rooth part of a grain weighed.

February 11, 1662. To recommend to Dr. Wren from the Society the continuance of the observations of the eclipses of Jupiter's satellites. The eclipse of the moon of Feb. 12th was directed to be observed by as many as had conveniency.

1674. Dr. Croune read a discourse how flying is performed by birds. Some said, that it would be of real use to contrive something for flying, if it were but to raise a man so high, as to fly over a wall, and the besiegers of a town to carry and bring back intelligence.

February 12, 1661. Dr. Wren proposed black-lead as a better means than oil for preserving the pivots of the wheels of watches or clocks from grating or wearing out.

1672. Being Ash-wednesday, the Society did not meet.

1673. The Society inspected the dog upon whom the experiment had been made with Mr. Lister's styptic water, and found the dog very well and the wound in a manner quite healed up.

1679. Mr. Houghton presented several prints of the line of the Norfolk family, as also the copper plate itself; and a pane of glass on which the picture of the first duke of Norfolk was drawn.

February 13, 1660. The Danish Ambassador visited the Society, being introduced by Mr. Evelyn.

1667. The experiments appointed for the next meeting were:—The wind-gathering vessel.—The cutting out the tympanum of a dog's ear.—Shining wood and fish.—Weighing mineral bodies.

1678. The Society again entered upon a debate concerning the causes and reason of the motion of the mercury in the barometer.

1683. Mr. Paget gave in a paper of the force of heat upon magnetical bodies.

February 14, 1666. Dr. Croune's chariot was produced, and generally approved of by the members; only some fence was proposed to be made for the coachman against the kicking of the horses.

1677. Mentioned, a letter from Mr. Halley from Saint Helena as to his observation of the last visible conjunction of the Sun and Mercury.

February 15, 1664. Mr. Pepys was unanimously elected and admitted. It was ordered that a body be procured at the next sessions and that Dr. Charlton endeavour to get a meeting of some physicians of the society, in order to consider of experiments and inquiries.

1676. Mr. Oldenburg produced the sequel of Mr. Leewenhoeck's letter concerning the great plenty of very little animals observed in rain, well, sea, and snow-water.

1681. Sir Christopher Wren in the chair. Mr. Flamstead having cavilled against the method shewn by Mr. Hooke of describing a parabola, the Society desired it again. Upon which the president declared it was true and certain.

February 16, 1670. Mr. Hooke produced a model of a little box to be thrust into the body of a tree, bored, to find out the ascent and descent of the sap.

Societies and Academies.

LONDON.

Royal Society, February 7.—G. Udny Yule: A mathematical theory of evolution based on the conclusions of Dr. F. C. Willis, F.R.S. The fundamental assumptions are that: (1) Within any species, in any interval of time, an "accident" may happen that brings about "specific mutation," *i.e.* the throwing of a new form, regarded as a new species within the same genus; (2) within any genus, in any interval of time, an "accident" may happen that brings about "generic mutation," *i.e.* the throwing of a new form so different from the parent that it will be placed in a new genus. Both chances are taken as invariable within the group considered and constant for all time. Sections I.-III. of the paper lead up to the expression for frequency-distribution of size of genus at any given time. In Section IV. the expression is tested on data for four cases, and gives very good agreement with facts, but there are serious difficulties of interpretation. In Section V., frequency-distributions of age for genera of a given size are determined. Approximately for large genera after infinite time, the mean age varies as the logarithm of the number of species, but the dispersion is considerable. When time is limited, primordial and derived genera form distinct groups. Finally in Section VI. an attempt is made to estimate the doubling period for species in flowering plants, which is placed at probably some two or three million years, the present rate of production of specific mutations probably lying between 1 in 15 and 1 in 30 years, among all flowering plants on the whole surface of the globe.—L. B. Winter and W. Smith: Studies on carbohydrate metabolism. I. Variations in the nature of the blood sugar. Marked differences exist between the blood sugar of normal persons and those suffering from diabetes mellitus. The sugar was extracted from considerable quantities of blood and a comparison made between the observed optical rotation (P) and that calculated from the reducing power of the carbohydrate, on the basis that glucose is the only reducing substance present (C). In diabetic cases, P is usually greater than C, and is increased by mild hydrolysis with weak hydrochloric acid, whereas C is unaltered. This may be evidence for the existence of complex sugars in diabetic blood. Similar substances are present in the blood of rabbits after injection of either adrenaline or thyroid alone. Injection of thyroid and adrenaline together usually causes an increase in the total blood sugar, but no change from the normal; P is low and complex sugars are absent. After injection of insulin into rabbits the blood sugar is dextro-rotary, but has no copper reducing power. Insulin convulsions in rabbits are relieved by adrenaline alone or by a mixture of thyroid and adrenaline.—J. W. Pickering and J. A. Hewitt: The action of "peptone" and of nucleic acids on the coagulability of the blood. Intravascular injection of Witte's "peptone" into tortoises deprived of hepatic activity inhibits coagulation of blood subsequently shed. Addition of moderate concentrations of "peptone" to blood of the tortoise *in vitro* causes prolonged inhibition of clotting, provided the blood has not been in contact with damaged tissues. As regards rats, partly pigmented animals are more resistant to the anticoagulant action of peptone and to its toxic effect on the heart than are animals with completely pigmented fur. Albino rats are still more resistant. The rapid intravascular injection or addition *in vitro* of thymus or yeast nucleic acids inhibits coagula-

tion of blood shed from cats and rats which have been deprived of hepatic activity. Serial intravascular injections of thymus nucleic acid into cats or rats deprived of hepatic activity produce hypercoagulability followed by tolerance, culminating in immunity to the anticoagulant action of nucleic acid. Immunisation can be produced with material free from protein. Anticoagulant action of thymus nucleic acid is exhibited during the presence and absence of platelets. It is suggested that nucleic acid inhibits clotting by union with plasma components, forming a more stable complex than that existent in normal circulating blood.—E. C. Grey: The latent fermenting powers of bacteria. Pts. I., II., and III. There cannot be a host of essentially different anzymes. The mechanism by which succinic acid is split into two parts cannot differ fundamentally from the mechanism by which glucose is split into two parts to form lactic acid, or three parts to form acetic acid, or into two parts to form a mixture of succinic acid and acetic acid or alcohol. It is not conceivable that the addition of formates can change one enzyme into another, as the lactic-acid-forming enzyme into an acetic-acid-forming enzyme, unless both have a common basis.

Aristotelian Society, January 21.—Prof. T. Percy Nunn, president, in the chair.—H. Wildon Carr: Human intercourse by means of speech. All the biological theories of the evolution of man infer that speech must in its origin have been an invention. The usual inference is that a new race of Hominidæ, at an early period of its emergence by evolution, discovered that natural cries could be adapted and modified and moulded into an instrument of discourse. In like manner all philosophies of language treat words as the conventional use of a material means of conveying meanings from mind to mind. Against these theories the view put forward is: that invention is the distinctive mark of intellect, and that therefore it characterises the development of speech, but it does not account for its origin; that further, it is the artificiality of the higher forms of speech which hides from us both the nature of speech itself and its origin. The origin of speech is in the nature of human mentality. Reason in its human form could not exist without speech. The concept of reason implies discourse, for reason is an activity directed from within outwards. Speech is expression. Self-expression is already speech though the individual mind have no audience but itself. It is this self-expression which becomes communicable, not on the analogy of physical objects passing from hand to hand, but on the analogy of a sympathetic emotion which, in passing from individual to individual, never ceases to be self-expression in the individuals who experience and communicate it.

February 4.—Viscount Haldane in the chair.—K. J. Spalding: The presuppositions of philosophy. Philosophy involves two cognate presuppositions. First, that thought is a nature incapable of satisfaction in a world which it does no more than recognise and incomprehendingly accept, that is, in a world conceived as independent of thought's own nature; second, that thought has or may acquire the power of satisfying itself in a world adjusted and accommodated to itself. These presuppositions imply an essential relation between thought and being, a congruence between them which thought cannot think away nor being contradict. Thought cannot think nothing. This was pointed out by Plato when he named the faculty related to non-existence, ignorance (*ἀγνοια*). Equally it is not in the nature of being to exist independently of thought. This proposition seems less self-evident

than the other, but it was forcibly presented by Berkeley, and a great part of the historical arguments of modern philosophy insist on the fundamental importance of its recognition.

Geological Society, January 23.—Prof. A. C. Seward, president, in the chair.—A. Smith Woodward: On a Hybodont shark (*Tristychius*) from the Calciferous Sandstone Series of Eskdale (Dumfriesshire). The portions of Carboniferous elasmobranchs hitherto studied seem to represent groups which are very different from those of the Mesozoic and Kainozoic eras. A specimen of *Tristychius* in the Royal Scottish Museum, from the Calciferous Sandstone of Eskdale, more nearly conforms to the Mesozoic Hybodont type. It shows the head, abdominal region pectoral fin, and dorsal fins. The cartilages are only superficially calcified in small tesserae. The teeth, of the form commonly named *Lophodus* (Romanowsky), are arranged as in *Hybodus*, but in slightly more numerous transverse series. The notochord must have been persistent, and the short slender ribs are as in *Hybodus*. In the pectoral fin there are two basal cartilages, as in *Cestracion* and some other recent sharks; but there seems to be no extension of the fin-membrane beyond the radial cartilages. The specimen is unique, but apparently suffices to show that elasmobranchs of nearly the modern type were beginning to arise in the Carboniferous Period.—W. S. Boulton: On a recently discovered breccia-bed underlying Nechells (Birmingham), and its relations to the Red Rocks of the district. A recent boring for water at Nechells Gasworks (Birmingham) has revealed an unexpected succession of rocks. The Keuper Sandstone (272 feet thick) rests unconformably upon a coarse breccia (Nechells Breccia) 350 feet thick, which in turn rests unconformably on Hamstead Beds. The breccia consists of angular fragments and lumps derived for the greater part from Cambrian quartzite and sandy limestone with some decomposed volcanic rocks; and in the lower portion, the fragments are calcareous sandstone of the type of the underlying Hamstead Beds. Fossils, belonging to the horizon just below the Olenellus Limestone at Comley (Shropshire) and to the horizon of the *Hyalolithus* Beds at the top of the Hartshill Quartzite of Nuneaton, have been collected from lumps of the sandy limestone in the breccia. The Nechells Breccia was probably derived from an old land-surface very near Birmingham, probably on the south-east. Breccias seem to occur at intervals in a belt 40 miles long from north-east to south-west, all, so far as known, unconformable to the beds below them, and to the Trias above. Generally speaking, the material was derived from rocks which increase in age from north to south. The following grouping of the pre-Triassic Red Rocks of the Midlands is suggested: (3) Clent beds (Breccias), (2) Corley beds (the Calcareous Conglomerate group), (1) Keele beds. The age of the Corley Beds, which follow conformably upon the Keele, is still uncertain, and may eventually prove to be Permian. The Clent beds, in which the Nechells Breccia is included, are Permian.

Royal Microscopical Society (Industrial Applications Section), January 23.—Sir Robert A. Hadfield in the chair.—J. W. Bamfylde: Some failures in steel as revealed by the microscope and recorded by photography. Three cases of failure in railway material are described, in which the causes were investigated by macroscopical and microscopical methods. A new form of metallurgical objective is discussed, in which oblique light from all sides is employed. It can be used even with high-power objectives such as the 2 mm. oil immersion.—H. B.

Milner: The use of the microscope in the petroleum industry. Sub-surface correlation of the rocks in oil-bearing territory, as indicative of structure, has come to be more and more dependent on the precise methods of micropalæontology and micropetrology, especially the latter. Similarly, the microscopical investigation of impregnated (bitumenised) rocks is of great practical importance. The microscope is being employed on the refining side in a number of specialised operations including those concerned with decolorisation of oil, the use of certain filters such as fullers' earth, "floridin," charcoal, and bauxite, and in the study of oil-films and oil-blending. The microscope is also of service in dealing with greases, lubricants, "loaded" greases, and other impregnated textile materials used for roofing, insulation, and sheathing purposes, and for asphaltic rubber and asphaltic cement.

Linnean Society, January 24.—Dr. A. B. Rendle, president, in the chair.—F. Howarth: The sexuality of *Ustilago*. The sporidia of the smuts of barley and oats, *Ustilago Hordei* and *U. Avenæ*, can be divided into two groups. Those of one group will not conjugate amongst themselves but will readily do so with those of the other group. The strains appear to be identical morphologically but different physiologically. Conjugation will take place on a gelatine or agar gel medium with 1 per cent. malt extract, but not in the absence of oxygen nor in an atmosphere of carbon-dioxide, nitrogen, or hydrogen. Conjugation occurs best on a neutral or slightly alkaline medium; beyond a small range on the acid or alkaline side conjugation is inhibited.—J. R. Norman: The Greenland halibut (*Reinhardtius hippoglossoides*). This fish is apparently new to the British fauna. A specimen was caught off the south coast of Ireland, latitude 52° 30' N., at 170 fathoms. Normally it is an arctic and sub-arctic species. From its nearest relative, the common halibut, it differs especially in the plumper body, larger mouth and stronger teeth, in the left eye being on the upper surface of the head and the dorsal fin commencing behind it, and in being coloured on both sides. In the young, however, the blind side is colourless. It appears to be discarding the habits characteristic of the order, and has regained to a certain extent its original symmetry.—J. Ramsbottom: The fungus flora of British woodlands. Apart from the part played by microfungi which pass at least a portion of their life-history in the soil and are concerned in soil fertility, there have to be considered the perennating mycelia of the larger fungi and the relation of these to the mycorrhiza of trees. Moreover, since fungi are either saprophytes or parasites, each association of the higher plants has its characteristic fungus constituents.

Physical Society, January 25.—Dr. Alexander Russell in the chair.—E. A. Milne: Recent work in stellar physics. A review of the relation of stellar spectra to modern spectral theory, with reference to giant and dwarf stars and to recent additions to our knowledge of stellar temperatures. Methods of deducing certain atomic quantities from astrophysical evidence were suggested.

DUBLIN.

Royal Irish Academy, January 28.—Prof. Sydney Young, president, in the chair.—G. P. Farran: Seventh report on the fishes of the Irish Atlantic Slope. Eleven species of Macrurid fishes (*Coryphænoideidæ*) were taken in the course of fishery investigations on the west coast of Ireland down to

800 fathoms. Tabulation of vertical distribution shows that three species do not extend locally beyond a depth of 750 fathoms. The range of the remainder reaches to greater depths than were explored. One northern species, *Trachyrhynchus Murrayi*, is recorded from off the Irish coast for the first time. Another species, formerly identified as *Macrurus Mediterraneus*, is referred to *Coryphænoides Murrayi*.

Royal Dublin Society, January 29.—Prof. E. A. Werner in the chair.—W. R. G. Atkins and Marie V. Lebour: The habitats of *Limnæa truncatula* and *L. peverer* in relation to hydrogen ion concentration. The habitats of *L. peverer* and *L. truncatula* appear to differ in the fact that whereas the former is truly a water-snail, and can endure even somewhat stagnant water, the latter is amphibious, and can live either in shallow, well-aerated water or on moist land, or even on cliffs in a region of high humidity. The observed ranges for the two species are almost identical as regards acidity and salt content, those for *L. peverer* being P_H 6.6 to 7.7 and $C = 72.227 \times 10^{-6}$ at 0° C., and for *L. truncatula*, P_H 6.4-7.8 and $C = 59.294 \times 10^{-6}$. The records do not include upland waters of very low salt content, with conductivity 20.30×10^{-6} , nor regions of high acidity, more acid than P_H 6.4 for water or P_H 5.8 for land records.—H. H. Poole: A telephone method of photo-electric photometry for use at sea. The current driven by a high-tension battery through a Kunz photo-electric cell, exposed to the light to be measured, is passed through a resistance of about 50,000 ohms. The potential difference between the ends of the latter is balanced against a potentiometer. In place of a galvanometer, the balanced circuit includes the primary of a two-valve low-frequency amplifier (the output circuit of which is connected to a pair of telephones), and also a special form of interrupter, which breaks the circuit several hundred times per second, and causes a sound in the telephones whenever the system is unbalanced. A condenser of capacity about 0.5 microfarad is placed in parallel with the amplifier and the interrupter. This alternately charges and discharges, and adds greatly to the sensitiveness of the arrangement, which works well with illuminations between 10 and 10,000 metre candles. It is hoped to employ this method in conjunction with Dr. Atkins of the Marine Biological Laboratory, Plymouth, for measurements of the penetration of light into sea-water.

MANCHESTER.

Literary and Philosophical Society, December 18.—Prof. H. B. Dixon, president, in the chair.—A. M. Williams: Surface tension, surface energy, and the surface layer.

January 22.—M. L. Becker: Medieval metallurgy. Prior to the sixteenth century very little of practical value to the metallurgist had been published, although many of the most beautiful examples of art metal work date from that period. Owing to difficulties of transport in the Middle Ages all steps in the industry, from the supply of fuel and the mining, to the founding or forging of the metal, tended to concentrate at one place, namely, the source of the metal. Georgius Agricola, a physician of Saxony, was the first to give a comprehensive technical description of the methods employed by miners and smelters. Agricola's work "De Re Metallica," published in 1556, is of great importance; he deals with locating metallic veins; removing water, ventilating and hauling in mines; ore dressing, crushing and smelting, etc. Although the practices referred to were mostly those of Central Europe, yet there is every reason to believe that

these represented the best and most efficient of the day, except for iron and steel production, which appears to have been more advanced in England.

PARIS.

Academy of Sciences, January 21.—M. Guillaume Bigourdan in the chair.—Henri Lebesgue: The conditions of regularity, conditions of irregularity, conditions of impossibility in the problem of Dirichlet.—André Blondel: The influence of the harmonics of the retardations of phase on the distribution of the cranks in an explosion motor with several cylinders. The influence of elastic connexions and of damping.—W. Kilian: The structure of the subalpine chains of Dauphiny.—Louis Chomard: Discontinuous groups of movements.—Pierre Humbert: A class of polynomials.—Rolf Nevanlinna: Meromorphic functions.—P. J. Myrberg: A theorem on continued fractions.—Michel Collinet: The internal energy of an elastic body.—C. Parvulesco: The constitution of star clusters. The star clusters in Perseus, and any others in which the distribution of the types of spectrum follow the same law, as judged from the photographic appearance, present a stratified structure having the heaviest stars clustered round the centre and the smaller masses removed to the periphery of the cluster. In any group of stars of varying masses, the law of distribution of the stars, as well as that of their velocities, will not remain unchanged unless the cluster is stratified.—L. Bochet: The law of corresponding states of van der Waals. A discussion of the validity of the reduced equation of state of van der Waals.—A. Perot: Experimental verification of the principle of Wladimir Michelson, and of the Doppler-Fizeau principle. Description of construction and use of apparatus, with results quantitatively verifying the principles of W. Michelson and of Doppler-Fizeau.—M. and L. de Broglie: The experimental verification of the projections of electrons, predicted from the diffusion of X-rays, by the considerations of Compton and Debye. The condensation method, although capable of showing that some of the trajectories correspond well to the effects predicted by Compton, is not suitable for quantitative verification. A possible method is outlined.—V. Dolejšek: The identification of the lines of the N series.—G. Athanasiu: The electromotive forces produced by light on metals immersed in solutions of their salts. Electrodes of silver, copper, nickel, cadmium, zinc, undergo changes in solutions of their salts, and the layer thus formed possesses actino-electric properties. The same phenomenon is produced with non-reversible elements.—Pierre Girard: Concerning a note of M. Demoussy entitled "On the displacement of acids by diffusion."—P. Lebeau: The quantity and the nature of the gases disengaged by solid combustibles under the action of heat and a vacuum: coals. Complete analyses are given of the gases evolved at 1000° C. in a vacuum by ten different samples of coal of different origin, and of volatile matter varying from 23 to 39 per cent. Hydrogen and carbon monoxide appear at 400° C. with a maximum at 700° C. Methane also appears at 400° C. and reaches a maximum at 600° C. Ethane, propane, and ethylene are produced at 500° C.—A. Wahl and W. Hansen: The constitution of isatane and isatyde.—Mme. Pauline Ramart: The general preparation of the diphenylalkylacetates of benzyl by means of sodium amide and the alkyl iodides as well as the corresponding acids. Details are given of the method of working, together with accounts of the properties of three acids of the type $(C_6H_5)_2 \cdot CR \cdot CO_2H$.—John Pringle and Pierre Pruvost: Observations on the Portland

series of the Boulonnais.—G. Mouret: The supposed pudding-stones of the Dinantian in the department of Creuse, and the schists of Evaux-les-Bains.—Léon Moret: The discovery of Orthophragmines in the "Taveyannaz grit" of the Platé massif (Haute-Savoie) and its consequences.—Ladislas Górczynski: The fraction of the intensity of the solar radiation transmitted, for various wave-lengths, by red Jena glass. The red glass, Jena F. 4512, used by the author in an earlier communication on solar radiation in Siam and Java (*Comptes rendus*, October 22, 1923, p. 754) has been found to transmit 80 per cent. of the total intensity for wave-lengths 0.8μ to 2.5μ . The transmission shows a rapid diminution in the yellow part of the spectrum and becomes opaque for the wave-length 0.54μ .—L. Eblé and J. Itié: Values of the magnetic elements at the station of Val-Joyeux (Seine-et-Oise) on January 1, 1924.—René Souèges: The embryogeny of the Polygonaceæ. The development of the embryo in *Polygonum aviculare*.—Jules Offner and Roger Heim: Pleurotus in the alpine meadows. Commenting on recent communications of M. Costantin, the author points out that this mushroom is widely distributed in Savoy. It has been collected near Saint-Jean-de-Maurienne, in the meadows of Villarembert, on Mont Corbier, the Salève, etc. The suggestion of collection and sale for food has already been realised, and there is a regular market for these fungi at Grenoble during the winter. André Broca: A pupillometer permitting measurements of the pupil (of the eye) in a restricted light.—Jacques Couvreur: The photomotor reflex. The Fick pupillometer, modified by A. Broca (preceding paper), has been used to measure the photomotive reaction of a normal eye adapted to the dark.—Emile Haas: Experiments on the sensation of yellow light obtained by mixture of spectra. It is well known that it is possible to reproduce any colour of the spectrum by mixing two colours, suitably selected, in certain proportions: the experiments described prove, in addition, that the identical appearance between the mixture and the simple colour is maintained, whatever may be their intensity, and whatever the duration of time during which the retina is illuminated. F. Maignon: Researches on the constitution and mode of action of the biological catalysts or diastases. The effects of electrolysis on the diastases of the pancreatic juice and the amylase of germinated barley. After five days' electrolysis, the mineral constituents of the diastase (chlorine, iron, calcium) are removed and the diastatic action is destroyed.—J. Legendre: Variations in the trophism of the Culicidæ.—R. Herpin: The periods of epitoquy of some meridians and their relations with the phases of the moon.—Et. Burnet and Ch. Anderson: The importance of mammitis in goats carrying *M. melitensis*.

Official Publications Received.

- Progress of Education in India, 1917-1922. Eighth Quinquennial Review. Vol. 1. By J. A. Richey. Pp. v+241+xxxv. (Calcutta: Government Printing Office.) 1.6 rupees.
- Bulletin of the National Research Council. Vol. 6, Part 5, No. 36: Catalogue of Published Bibliographies in Geology, 1896-1920. Compiled by Edward B. Mathews. Pp. 228. 2.50 dollars. Vol. 7, Part 1, No. 37: Thermal Process Time for Canned Food. By Charles Olin Bail. Pp. 76. 1.50 dollars. Vol. 7, Part 2, No. 38: Fellowships and Scholarships for Advanced Work in Science and Technology. Compiled by Research Information Service. Pp. 94. 1 dollar. (Washington, D.C.: National Academy of Sciences.)
- Studies from the Plant Physiological Laboratory of Charles University, Prague. Vol. 1. Edited by Prof. Dr. B. Němec. Pp. 119. (Prague.)
- Bulletin of the Terrestrial Electric Observatory of Fernando Sanford, Palo Alto, California. Vol. 1: Summary of Observations for the Period May 1920-August 1923. Pp. 32. (Palo Alto, California.)
- Meddelanden från Statens Skogsforsökanstalt. Häfte 20. Pp. iii+476. (Stockholm.) 9 kr.