

in working hours without loss of wages, there had been keenness and improved efficiency among the staff. Mr. Pease pointed out that the problem was of national importance, and that while there might be immediate loss to the employers there would be ultimate gain not only for the employers and the employees, but for the nation at large. He suggested that no employment was beneficial that did not allow reasonable time off for continued education, and charged the business community with the responsibility of a national duty to effect some improvement, which he was sure the London County Council would facilitate.

THE annual report of President Butler on the work of Columbia University, New York, for the year ending June 30, 1913, has now been published. We find that during the year the sum of 123,600*l.* was given to the University to establish permanent funds or to add to existing resources; 67,500*l.* to purchase land or to erect and equip buildings, and 93,300*l.* to be expended for specific purposes, making a total of 284,400*l.*; and yet President Butler says "it is still necessary to repeat words that were used eleven years ago: 'Columbia University as now organised and equipped, may be likened to a giant in bonds. Strength, power, zeal for service, are all at hand, but the bonds of insufficient funds hold them in on every side.'" The unparalleled growth and expansion of the University have far more than kept pace with the new resources that have been provided. The enrolment of students as compared with that for the year 1911-12 shows an increase of 1016, the net total of regular students in every subject reaching 9379. If to the regular students be added those receiving extension teaching and those studying in evening technical classes, the grand total receiving instruction is 13,120. The teaching staff in 1913 numbered 847, as compared with 781 in 1912. President Butler, commenting on these very large numbers, says:—We should deplore growth in numbers unless it were accompanied by a steady increase in the quality of the students. The fact that a rigid examination is insisted upon for admission . . . and that all credentials offered by those who seek advanced standing or who wish to enter the graduate and professional schools are subjected to the closest scrutiny, and the further fact that no student is allowed to shirk his work and to remain long upon the rolls of the University, are an indication of the spirit with which the several faculties, administrative boards, and administrative officers view their responsibilities."

## SOCIETIES AND ACADEMIES.

LONDON.

**Geological Society**, December 17, 1913.—Dr. Aubrey Strahan, F.R.S., president, in the chair.—C. Dawson and Dr. A. Smith Woodward, with an appendix by Prof. G. Elliot Smith: Supplementary note on the discovery of a Palæolithic human skull and mandible at Piltown (Sussex). The gravel at Piltown (Sussex) below the surface-soil is divided into three distinct beds. The first, or uppermost, contains sub-angular flints and "eoliths," and one palæolith was discovered there *in situ*. The second is a very dark bed, composed of ironstone and subangular flints. All the fossils so far found in the pit have been discovered in, or traced to, this bed, with the exception of the remains of deer. A cast of a Chalk fossil, *Echinocorys vulgaris*, from the zone of *Micraster cor-testudinarium*, occurred as a pebble. The third bed was recognised only in 1913, and consists of reconstructed material from the underlying Wealden rock (Hastings

Series). It is only about 8 in. thick, and contains very big flints (8 to 15 in. long) which have been little rolled, and are not striated. They are saturated with iron, and have undergone considerable chemical change. They differ very markedly in appearance from the smaller flints in the upper strata. No implements, "eoliths," or fossil bones have been met with in this bed. The floor of the gravel, where the remains of Eoanthropus were discovered, has been carefully exposed, and many irregularities and depressions have been found to exist. In some of these depressions small patches of the dark overlying bed remained, and new specimens were discovered. The method adopted in excavation is described. The finds made in 1913 are few but important, and include the nasal bones, and a canine tooth of Eoanthropus discovered by Father P. Teilhard de Chardin; also a fragment of a molar of Stegodon and another of Rhinoceros; an incisor and broken ramus of Beaver (*Castor fiber*); a worked flint from the dark bed; and a Palæolithic implement from the débris in the pit. It will be noted that the remains are those of a land fauna only. The further occurrence of bedded flint-bearing gravels in the vicinity of the pit is noted. The authors' former conclusions, as to the Pliocene forms having been derived, are maintained. A further study of the cranium of Eoanthropus shows that the occipital and right parietal bones need slight readjustment in the reconstruction, but the result does not alter essentially any of the conclusions already published. The nasal bones, now described, are typically human, but relatively small and broad, resembling those of some of the existing Melanesian and African races.—In a note appended to the paper Prof. Elliot Smith points out that the presence of the anterior extremity of the sagittal suture, which hitherto had escaped attention, had enabled him to identify a ridge upon the cranial aspect of the frontal bone as the metopic crest, and thus to determine beyond all question the true median plane. It is 21 mm. from the point of the large fragment (in the frontal region). The backward prolongation of the frontal median crest cuts the parietal fragment precisely along the line determined by Dr. Smith Woodward on other grounds.

**Institution of Mining and Metallurgy**, December 18.—Mr. Bedford McNeill, president, in the chair.—C. O. Bannister and G. Patchin: Cupellation experiments: a simple method for the detection of the platinum metals in cupellation beads. Following up previous investigations, the authors presented in this paper, and by means of a series of fine lantern slides, illustrations of the method they submit for the detection of platinum and its kindred metals in cupellation beads composed of gold and/or silver. The method consists in transferring the beads, after cooling, and without any squeezing, hammering, or brushing, direct from the cupel on to a plasticine mount attached to a microscopic slide, and examining it with a low-power objective, with vertical illumination preferably. This method possesses the marked advantage that no preparation of the bead by polishing, etching, &c., is necessary before examination, the only precaution advisable being the prevention of undue spitting. The results of the authors' investigations and experiments with gold and silver beads containing varying quantities of platinum, iridium, rhodium, ruthenium, and palladium were to show that, by a simple microscopic examination it is possible to detect platinum in cupellation beads when present below 1.6 per cent.; that is to say, when present below the amount necessary to cause crystallisation visible to the naked eye; the presence of iridium in small quantities may be detected in silver beads; that rhodium and ruthenium

may also be detected by visual examination; that palladium, whilst producing a structure similar to that caused by the presence of platinum, yields evidence of its presence by the coloration of the parting acid. No specific indications were obtained of the presence of osmium, but the presence of osmiridium was shown to give results closely approximating to those obtained from the presence of iridium alone.—G. Maitland Edwards: Notes on mines of the Ottoman Empire. In this paper the author gives a brief review of the mineral resources of Asia Minor, dealing respectively with coal, iron, chrome and emery, lead, zinc, silver, nickel, gold, mercury, borax, magnesia, phosphates, guano, salt, petroleum, and other deposits. He also furnishes a brief review of the laws governing mining enterprise in the empire, and of the economic and transportation facilities.

**Linnean Society**, December 18.—Prof. E. B. Poulton, F.R.S., president, in the chair.—J. Parkin: The evolution of the inflorescence. The author stated that the evolution of all types of inflorescences is to be traced from the solitary terminal flower; and he indicated the order of development.—C. E. Salmon: *Hypericum desetangsii*, Lamotte, in Britain. In 1893 the late Mr. T. Hilton, of Brighton, collected what he considered to be *H. dubium*, Leers, in the vicinity of Lewes. Some years after, the specimen came into the author's hands and was seen not to be the usual plant so named. Various causes prevented him from visiting the locality at the proper season until the present year, when good examples were examined on the spot and afterwards more minutely at home. It appears that the Lewes plant must be placed under the species published by Lamotte (in Bull. Soc. Bot. Fr., vol. xxi., p. 121) in 1874, as *H. desetangsii*, and further elaborated, in the same journal, by Bonnet in 1878. It may be roughly distinguished from *H. perforatum*—of which it has the golden yellow flowers—by its four-angled stem; from *H. tetrapterum* by the colour and size of its flowers, and from *H. quadrangulum* (*H. dubium*) by its dotted leaves and narrower sepals. These are main distinctions; finer ones exist.

#### MANCHESTER.

**Literary and Philosophical Society**, December 2.—Prof. F. E. Weiss, vice-president, in the chair.—Prof. E. Rutherford: The structure of the atom. The author two years ago described a new type of atom—the "nucleus" atom—supposed to consist of a central nucleus, probably charged positively, of very minute dimensions, in which practically all the mass of the atom was concentrated. This was surrounded by a distribution of negative electrons sufficient to make the atom electrically neutral. This type was devised to explain the fact that the swift  $\alpha$  particles in traversing matter are occasionally deflected through more than a right angle as the result of a single encounter with another atom. It was deduced that the number of electrons and consequently the charge on the nucleus was numerically equal to about half the atomic weight. Experiments since carried out by Geiger and Marsden have shown that the large angle scattering of  $\alpha$  particles is in very close agreement with this assumption of the atom's constitution, and they showed, in particular, that the variation of the number of  $\alpha$  particles scattered through different angles by different elements agreed closely with the theory over a range in number of nearly one million times. The deflection of the  $\alpha$  particle is due to its passage close to the intense field of the nucleus. In his experiments with hydrogen, Mr. Marsden has found definite evidence that some of the hydrogen atoms actually acquire such a great velocity by their encounters with  $\alpha$  particles that they

are able to travel through hydrogen at least three times the distance of the  $\alpha$  particle itself through the same gas. On the nucleus theory it is supposed that the hydrogen atom contains one positive charge and the helium two. The author discussed the dimensions of the bodies in question, and the probable distance apart of the nuclei at the moment of repulsion. It was pointed out that the chemical and physical properties of the atom are ultimately determined by the charge on the nucleus, which should consequently be a more fundamental constant than the atomic weight. The latter will depend on the inner structure of the nucleus, and may not be proportional to the charge on the nucleus.

December 16.—Mr. F. Nicholson, president, in the chair.—R. L. Taylor: The action of bleaching agents on various natural colouring matters. In estimating the bleaching power of the ordinary bleaching agents the kind of colouring matter has to be taken into consideration. Colouring matters such as indigo and turkey-red are quickly and completely bleached by chlorine or hypochlorous acid. In ordinary unbleached linen, cotton, and jute, there appear to be two quite different kinds of colouring matter, one rapidly bleached by chlorine and hypochlorous acid, while the other is quite unaffected by these bleaching agents, but is bleached by a solution of a hypochlorite containing little, if any, free alkali. A considerable amount of the colouring matter in linen and jute is not affected by chlorine or hypochlorous acid, but in cotton the proportion unbleached by these agents is very small indeed. However, cotton is not completely bleached by either bleaching agent even after prolonged exposure to one of them.

#### PARIS.

**Academy of Sciences**, December 29, 1913.—M. P. Appell in the chair.—Paul Sabatier and M. Murat: Contributions to the study of benzhydrol: the preparation of symmetrical tetraphenylethane. The reaction between benzaldehyde and phenylmagnesium bromide gives a very poor yield of benzhydrol, under 3 per cent., diphenylmethane and symmetrical tetraphenylmethane being produced by secondary reactions. The interaction of hydrogen and tetraphenylmethane in presence of reduced nickel at 230° C. gives diphenylmethane and dicyclohexylmethane.—M. de Grossouvre was elected a correspondent for the section of mineralogy in the place of M. Depéret, elected non-resident member.—Ernest Esclangon: Observations of the Delavan comet made with the large equatorial of the Bordeaux Observatory. Data given for December 22 and 23.—F. Ollive: The solar system.—Luc Picart: The calculation of a circular orbit with the aid of a single photographic observation.—A. Demoulin: The resolution of a problem of the integral calculus.—Léon Lichtenstein: Integration of the equation  $\Delta_s u = ke^u$  on a closed surface.—Georges Giraud: A group of birational transformations.—Alfred Rosenblatt: The invariants of algebraical varieties in three dimensions.—Jules Drach: The integrals common to several problems of mechanics.—A. Cotton, H. Mouton, and P. Drapier: The influence of the size of the particles on the electro-optical and magneto-optical properties of a mixed liquid. The conclusions arrived at theoretically by Pockels are shown to be confirmed by experiment.—Jean Pougnet, Emile Segol, and Joseph Segol: The variation of the electromotive force of a Weston cell under the influence of ultraviolet light. Light of short wave-length causes a progressive lowering of the E.M.F. of a Weston cell. Removed from the radiation, the cell slowly returns to its original E.M.F. The change observed was 0.007 volt.—A. Recoura: Chromium fluosilicate and

its transformations.—F. Bourion and A. Sénéchal: The estimation of chromium by oxidation in alkaline solution. The results are exact with chromium alone or in presence of iron. The determinations are inexact in presence of nickel, cobalt, and manganese.—Paul Gaubert: The modifications of form of crystals of some substances artificially coloured during their growth.—G. Friedel: The crystalline symmetries shown by the diffraction of the Röntgen rays.—L. Blaringhem: The hereditary transmission of rust in the hollyhock.—M. Sauvageau: Fucus of the Straits of Gibraltar.—J. Vallot and Raoul Bayeux: Experiments made at Mont Blanc, in 1913, on spontaneous muscular activity at very high altitudes. The daily work done by a squirrel at the summit of Mont Blanc was reduced to one-seventh of the daily work done at Chamonix.—M. Piettre and A. Vila: The study of the plasmas after sugar dialysis.—Louis Roule: The influence exerted by the reproductive function on the migrations of salmon in spring and summer. There is a definite relation between the ascent of rivers by salmon and the condition of their reproductive organs.—A. Trillat: The influence of surface tension of liquids on the removal of micro-organisms by an air current. If air is bubbled through a liquid containing micro-organisms in suspension, the latter may be carried on with the air current if the droplets of liquid produced are sufficiently small, and the size of the drops is governed by the surface tension of the liquid.—L. Mengaud: The lower Aptian marl of the province of Santander.—G. J. Painvin: New contribution to the geology of the region of high plateaux situated to the north and north-west of Bou-Denib.—René Fourtau: The echinitic fauna of the raised shores of the Red Sea.—G. Valsan: Remarks on the terraces of the eastern Roumanian plain.

## NEW SOUTH WALES.

Linnean Society, November 26, 1913.—Mr. W. S. Dun, president, in the chair.—W. N. Benson: The geology and petrology of the Great Serpentine Belt of New South Wales. Part iii., Petrology. A detailed account of the rocks collected over the whole area described in parts i.-ii. The material is classified under (A) igneous rocks, twelve divisions; and (B) sedimentary rocks: (a) clastic rocks of the Eastern Series, the Tamworth Series, cherts and breccias; (b) the limestone; (c) Baldwin Agglomerates; (d) Barraba, Burindi, and Rocky Creek Series; (e) Permo-Carboniferous sandstone.—F. H. Taylor: A revision of the Culicidæ in the Macleay Museum.—Dr. R. Greig-Smith: Contributions to our knowledge of soil fertility. Nos. vii.-xi. (vii.) When soils are heated or treated with volatile disinfectants, the bacterial development depends upon the amount of fatty matter present. Field soils show little difference, while a garden soil produced about ten times more bacteria, when treated with chloroform, than when heated at 65°. (viii.) The demonstration of toxins in soils depends upon obtaining a soil in which the toxins preponderate over the nutrients, and in using an appropriate dilution in making the extracts. Equal parts of soil and water generally yield the most toxic extract. (ix.) Rain removes toxin from soil, but the toxicity returns with dry weather. Similarly, a soil originally toxic, becomes non-toxic when extracted with water, and the toxicity reappears upon incubation in the moist condition. (x.) When nitrogenous, organic matter is saturated with wax or vaseline, and subsequently treated with chloroform, it does not decay any quicker on account of the treatment. (xi.) Naphthalene induces an increase in the number of bacteria in soils.—Dr. J. M. Petrie: Note on the occurrence of strychnine. The native strychnine-tree, *Strychnos psilosperma*, contains the

alkaloid strychnine, which was discovered, in 1902, in the leaves of the Nux-vomica. Its properties differ from those of strychnine or brucine.—R. J. Tillyard: A study of the Odonata of Tasmania, in relation to the Bassian Isthmus. Though the dragonflies of Tasmania are fairly well known, the number of species is small, particularly on rivers; still waters support a more abundant fauna. A comparison made with the dragonfly fauna of southern Victoria gives the following results. Of the forms that breed exclusively in running water, about 22 per cent. of the Victorian fauna are found to have reached Tasmania. Of the forms that breed in still water about 80 per cent. have reached Tasmania. The 20 per cent. that failed to do so, all belong to the most recent genera, which have come into Australia from the north. The reason suggested for the discrepancy is that, throughout a long period, the connection between the island and S. Victoria was of such a nature that few permanently running water-courses were formed.

## BOOKS RECEIVED.

Lowson's Text-Book of Botany. Indian edition. Adapted by M. Willis, with a preface by Dr. J. C. Willis. Pp. xii+602. (London: W. B. Clive.) 6s. 6d.

Annuaire Astronomique et Météorologique pour 1914. By C. Flammarion. Pp. 427. (Paris: E. Flammarion.) 1.50 francs.

Conseil Permanent International pour l'Exploration de la Mer. Rapports et Procès-Verbaux des Réunions. Vol. xix. Procès-Verbaux. Juillet 1912-Juillet 1913. Pp. vii+142. (Copenhague: A. F. Host et Fils.)

La Face de la Terre (Das Antlitz der Erde). By Prof. E. Suess. Translated by E. de Margerie. Tome iii. (3<sup>e</sup> Partie.) Pp. x+957-1360. (Paris: A. Colin.) 12 francs.

Canada. Department of Mines. Mines Branch. The Production of Copper, Gold, Lead, Nickel, Silver, Zinc, and other Metals in Canada during the Calendar Year 1912. By C. T. Cartwright. Pp. 86. (Ottawa: Government Printing Bureau.)

Summary Report of the Mines Branch of the Department of Mines for the Calendar Year Ending December 31, 1912. Pp. ix+174+xvi plates. (Ottawa.) 15 cents.

Records of the Survey of India. Vol. iii., 1911-12. Prepared under the direction of Col. S. G. Burrard. Pp. ii+176+12 maps. (Calcutta: Superintendent, Government Printing, India.) 6s.

Smithsonian Institution: Bureau of American Ethnology. Bulletin 83. Chippewa Music, ii. By F. Densmore. Pp. xxi+341+45 plates. (Washington: Government Printing Office.)

Traité Raisonné de la Pisciculture et des Pêches. By Prof. L. Roule. Pp. viii+734. (Paris: J. B. Baillière et Fils.)

The A.B.C. Guide to Astronomy. By Mrs. H. P. Hawkins. Third edition. Pp. 124. (London: Simpkin and Co., Ltd.; Bedford: Beds. Times Publishing Co., Ltd.) 1s. 6d. net.

The Revolving Star Map with Movable Declination Scale. By Mrs. H. P. Hawkins. (London: Simpkin and Co., Ltd.; Bedford: Beds. Times Publishing Co., Ltd.) 1s. net.

The Star Almanac for 1914. By Mrs. H. P. Hawkins. (London: Simpkin and Co., Ltd.; Bedford: Beds. Times Publishing Co., Ltd.) 6d. net.

Experience Teaches. By I. Trinda. Pp. xiv+194. (London: Simpkin and Co., Ltd.) Limp leather, 4s. net; cloth, 2s. 6d. net.