One of the most recent of these programmes is that issued by the National Association of Head Teachers, which has a membership of nearly 6000. Among outstanding recommendations of the head teachers are the following: The age of exemption from full-time attendance should not be lower than fourteen; the leaving age should be raised to fifteen and then to sixteen, so soon as the necessary arrangements can be made; no class should exceed forty on the roll, and steps should be taken immediately to reduce them to that limit, and there should be a fully qualified teacher, trained and certificated, for each class. The head teachers urge that a committee of competent educationists should decide what subjects form a necessary and basic part of every curriculum, up to, say, twelve years of age, and the amount of time per week which should be devoted to them, and what subjects should be added in later years, attention being directed to the needs of particular localities. They insist, too, that the curriculum of every school should include an amount of practical work sufficient for the needs of the locality, and that a special room for such work should be attached to each school. They ask for a sufficient and suitable supply of secondary schools of varying type and character, and that every child with the requisite ability and inclination should be able to proceed to them. In large elementary schools where children remain beyond the age of fourteen, provision, the programme states, should be made for instruction in drawing, music, science, language, handicraft, and domestic economy. So far as continuation schools are concerned, the head teachers suggest that the employer of any person under eighteen should be required to enable him or her to attend day continuation classes for not less than eight hours a week, for which the employee should be paid the ordinary rate of wages, and that, in addition to this attendance at school, the hours of labour per week should not exceed forty-eight.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, March 29.—Sir J. J. Thomson, president, in the chair.—Sir William **Abney**: The fourth colourless sensation in the spectrum sensation curve when measured in the centre of the retina. At the end of the last century the author carried out a large series of observations on the luminosity of spectra of very low density, but only recently has he had an opportunity of working some of them out. Some time ago he published in the *Phil. Trans.* the three-colour sensations which apparently suffice to account for all the spectrum colours. There was a doubt if in the mixture of the sensations to form these colours some account ought not to be taken of the colour sensation which appears when a coloured ray is diminished in intensity for all colour to be absent and only a colourless residue is left. The author confines himself to the colours received on the centre of the retina, for on the periphery other conditions exist. The paper shows the method of observation which was employed, and, discussing the results, the author comes to the conclusion that the admixture of the colourless sensation with the three-colour sensations is so small as to be inappreciable, and that the sensation curves given in his paper, to which reference has been made, need no correction on this account.—G. W. **Walker**: Magnetic inertia. It is shown that a magnetised body may be expected to possess magnetic inertia just as an electrified body possesses electric inertia. In the case of a sphere of radius a and magnetic moment m the inertia for acceleration parallel to the magnetic axis is $2/5m^2a^{-3}C^{-2}$, and for acceleration perpendicular to the magnetic axis $4/5m^2a^{-3}C^{-2}$. (C is the velocity of radiation.) The order of magnitude of this inertia is considered in an astronomical as well as in an atomic connection.—F. **Tinker**: The selective properties of the copper-ferrocyanide membrane. In the present paper the selective properties of copper-ferrocyanide have been studied by measuring the change in solution concentration which takes place when the dry colloid is immersed in cane-sugar solutions of various strengths. It is found that the sugar solutions become stronger, owing to the fact that the water and not the sugar is taken up selectively by the ferrocyanide. The experimental results lead to the hypothesis that a colloidal hydrate, $Cu_2FeCy_6.3H_2O$, is first formed, and that this colloidal hydrate then takes up still more moisture by adsorption. The amount of adsorbed moisture taken up by the colloid decreases as the strength of the solution increases. It is also shown in the paper that the side of a membrane in contact with pure water has a greater moisture content than the side in contact with sugar solution. This fact supports the hypothesis—first advanced by Graham on experimental grounds—that osmosis across a membrane takes place because pure water induces a greater moisture pressure and concentration inside the membrane than the solution does.—C. M. **Williams**: X-ray analysis of the crystal-structure of rutile and cassiterite.—Dr. J. G. **Leathem**: Discontinuous fluid motion. The subject of the paper is the flow, with free stream-lines, of infinitely extended fluid past a finite obstacle with a sharp prow and curved sides. The methods of Levi-Civita, Cisotti, Villat, and Levy are compared with the writer's own method, and translated into formulations by curve-factors.

Zoological Society, April 3.—Prof. E. W. MacBride, vice-president, in the chair.—R. H. **Burne**: Notes on some of the viscera of an okapi (*Okapia johnstoni*, Lankester). The author described the anatomy of the soft parts of various portions of this animal.

Royal Meteorological Society, April 18.—Major H. G. Lyons, president, in the chair.—E. G. **Bilham**: The diurnal variation of atmospheric pressure at Benson, Oxon., during 1915. By means of hourly measurements of traces from the Dines float barograph at Benson Observatory, the mean diurnal inequalities for each calendar month of 1915, and for the year, have been obtained and submitted to Fourier analysis. With the exception of the amplitude of the 24-hourly oscillation, the mean results for the year are in good agreement with the normal values for Kew and Oxford. A discussion of the probable errors to which the results are liable leads to the conclusion that the first order term is the most susceptible to casual error due to non-periodic changes of pressure. It is, moreover, well known that this term is largely dependent on local meteorological and geographical conditions, so that considerable fluctuations are to be expected. Comparing the Benson results for individual months with the normal values for Kew, it is found that relatively high values of the diurnal range are associated with high values of the amplitude of the 24-hourly oscillation. The second and third order amplitudes show similar seasonal variations at the two stations.—Lieut. C. D. **Stewart**: Atmospheric electrical phenomena during rain. A preliminary investigation has been made into the values of the potential gradient occurring during rain. It is found that maximum values occur in summer and minimum values in winter. The maximum fine-weather values occur in winter. The form of the diurnal variation of rain potential gradient is still uncertain, although

it appears to have only one oscillation in twenty-four hours, as compared with the double oscillation in fine weather. In most cases rain depresses the potential gradient. Mean depressions have been compared with their corresponding mean hourly rainfalls. The depression was found to be a function of the rate of fall of rain. At Kew the potential gradient is measured directly in volts per metre by taking the potential in volts at the height of a metre. This method gives the time value as obtained from the surface density only where the electrical charge in the air is negligible. This is the case in fine weather, but probably not during rain. The possible errors have been calculated for different potential gradients; in the case of very fine rain the error may be some hundreds of volts per metre.

PARIS.

Academy of Sciences, April 2.—M. d'Arsonval in the chair.—G. **Bigourdan**: The position and co-ordinates of the observatory of the Montmartre gate.—Ch. **Lallemand**: Time on board ship. It is pointed out that with the method at present in use for fixing true time at sea, it is possible that two vessels, coming from opposite directions, and noting at the moment of their meeting the time of the same phenomenon, may differ in their record by as much as 100 minutes, and it is impossible to deduce the true time. It is proposed by the Bureau des Longitudes that as soon as circumstances permit the true time shall be substituted, the time of the universal system of hour-zones, already in use on land in most civilised countries. From March 25 this plan has been adopted in the French Navy and on mobilised vessels.—M. Emile Picard was elected permanent secretary for the mathematical sciences in the place of the late G. Darboux.—J. **Renaud**: The influence of the Hermelles on the *régime* of the bay of Mont Saint Michel. An adverse criticism of the views recently published by MM. Galaine and Houlbert relating to the formation of the Hermelles reefs.—L. **Tribondeau** and J. **Dubreuil**: New microscopic stains derived from methylene-blue. Detailed descriptions are given for the preparation of methylene-violet and methylene-azure from methylene-blue. The preparation of three staining fluids from these colouring matters is also given.—Ph. **Glangeaud**: The peat bogs, the lakes, and the ancient glacial lakes of the Mont Doré volcanic massif.

WASHINGTON, D.C.

National Academy of Sciences (Proceedings, No. 2, vol. iii., February).—C. **Schuchert**: Atlantis and the permanency of the North Atlantic Ocean bottom. The Azores are volcanic islands and not the remnants of a continental mass. The tachylites dredged up from north of the Azores were probably formed where they now are. No known geologic data prove the existence of Plato's Atlantis in historic times.—G. H. **Parker**: The responses of hydroids to gravity. The geotropic response in Corymorpha is the result of activity of the neuromuscular sheath and not of the core cells.—E. P. **Allis**, jun.: The lips and the nasal apertures in the Gnathostome fishes, and their homologues in the higher vertebrates.—J. **Lipka**: Natural and isogonal families of curves on a surface.—G. H. **Hardy** and J. E. **Littlewood**: Some problems of Diophantine approximation: the series $e(\lambda_n)$ and the distribution of the points $(\lambda_n\alpha)$.—H. S. **Uhler**: Moseley's law for X-ray spectra. The law that the square root of the frequency of the lines is a linear function of the atomic numbers of the radiating elements is found to depart from the observed facts far more than the experimental errors, and an additional term is suggested which yields a formula agreeing with the facts. The order of magnitude of the high-frequency radiations of elements of small atomic number the spectra of which have not yet been obtained is discussed.—J. R. **Miner**: A note on the fitting of parabolas. Pearson's formula for fitting parabolas by the method of moments assumes the origin at the mid-point of the range. Similar formulæ are developed by the author when the origin is assumed one unit below the first ordinate, as in least squares.—F. G. **Pease** and H. **Shapley**: Axes of symmetry in globular clusters. The axis of symmetry of Messier 13 appears to be independent of magnitude, length of exposure, and distance from the centre. An elliptic distribution of stars is not confined to the Hercules cluster.—E. G. **Conklin**: The share of egg and sperm in heredity. The author discusses assumed equivalence of inheritance of both persons, egg differentiations which persist in embryo and adult, Mendelianism of inheritance through the egg cytoplasm.—J. P. **Iddings** and E. W. **Morley**: A contribution to the petrography of the island of Bawéan, Netherlands Indies. Six detailed analyses are given.—W. M. **Wheeler**: The phylogenetic development of subapterous and apterous castes in the Formicidæ. An array of facts bearing on the question of continuous variation *versus* mutation, with the conclusion in favour of the former.—C. **Barus**: Refractivity determined, irrespective of form, by displacement interferometry.—J. P. **Baumberger**: The food of *Drosophila melanogaster*, Meigen. The food of the larvæ is yeast; the insect depends upon these cells for its proteins. Adult flies do not need proteins, but survive much longer on sugar agar than upon yeast agar.—E. **Huntington**: Temperature optima for human energy. The optimum temperature appears to be very nearly 63° F., and largely independent of race or locality.—A. van **Maanen**: The parallax of the planetary nebula N.G.C. 7662. The value 0·023″ is obtained, placing the nebula at a distance of 140 light-years with a linear diameter of nineteen times that of Neptune's orbit (see NATURE, April 19, p. 153).—C. T. **Brues**: Adult hymenopterous parasites attached to the body of their host.

VICTORIA.

Royal Society, December 14, 1916.—Mr. J. A. Shephard in the chair.—F. **Chapman**: New or little-known Victorian fossils in the National Museum, part xx. Some Tertiary fish-teeth. The occurrence of the genus Carcharoides (*C. totuserratus*, Amegh., and *C. tenuidens*, Chapm.) affords an additional link in the evidence for the contemporaneity of the South American (Patagonian) and the Victorian (Janjukian) series. *Odontaspis elegans*, Ag. sp., *Myliobatis moorabbinensis*, Ch. and Pr., and *Sargus laticonus*, Davis, are now recorded from undoubted Janjukian (Miocene) beds, the latter being hitherto known only from the Oamaru beds of New Zealand. Rostral teeth of Pristis allied to the Mediterranean species, *P. antiquorum*, occur for the first time in the southern hemisphere, in the basal Kalimnan at Beaumaris. Pristiophorus (the side-gilled shark of Hobson's Bay), hitherto known only from the molasse of Würtemberg and the Upper Cretaceous of Mount Lebanon, is represented by a rostral tooth from the same beds, and the author shows Davis's *Lamna lanceolata* from the Oamaru series of New Zealand to belong to that genus, and conspecific with the Victorian form.—A. J. **Ewart**: Contributions to the flora of Australia, No. 25. The author notes the sudden appearance of aliens belonging to the genera Brachypodium and Orthocarpus. Other plants recorded as being established in Victoria are Ceratogyne, *Digitalis purpurea*, *Erica arborea*, and two species of plantain.—Elinor **Archer**: A disease or malformation of lucerne. The proliferation discovered in this plant was investigated

for traces of parasitic fungi and malformation caused by insects, but with negative results. The provisional inference is drawn that this malformation was caused more or less directly through malnutrition of the plant, which was growing in droughty country.—E. W. **Skeats**: The age of the alkali rocks of Port Cygnet and the D'Entrecasteaux Channel in the south-east of Tasmania. The previous evidence of the age of the alkali rocks of this district pointed to the Permo-Carboniferous or Trias, since they did not appear to intrude the diabase. Fresh evidence is now recorded which shows, at Kettering, that these rocks cut the diabase, and are therefore referred to a Cainozoic age.—A. D. **Hardy**: Teratological notes on Victorian plants. The author described a number of abnormal occurrences as affecting root, stem, branch, and fruit of indigenous flora, chiefly of the genus Eucalyptus. Fasciation in *Exocarpus gracilis* and spiral torsion in *Casuarina stricta* were noted.

BOOKS RECEIVED.

La Réforme Rationnelle de l'Heure. By E. Désortiaux. Pp. 14. (Paris: Gauthier-Villars.)

Seven Doubts of a Biologist. By S. A. McDowall. Pp. 64. (London: Longmans and Co.) 1*s*. net.

Transactions and Proceedings of the Royal Society of South Australia. Vol. xxxix. Pp. 892+70 plates +50 figures. (Adelaide: The Society.) 21*s*.

British Antarctic Expedition, 1907–9. Reports on the Scientific Investigations. Geology. Vol. ii., Contributions to the Palæontology and Petrology of South Victoria Land. By W. N. Benson and others. Pp. vii+269+38 plates+18 figures; also index to vols. i. and ii. (London: W. Heinemann.) 3 guineas net.

The Causation of Sex in Man. By E. R. Dawson. Second edition. Pp. xiv+226+illustrations. (London: H. K. Lewis and Co., Ltd.) 7*s*. 6*d*. net.

Bacon's New Series of Physical Wall Atlases. British Isles. (London: G. W. Bacon and Co., Ltd.) 26*s*.

DIARY OF SOCIETIES.

THURSDAY, APRIL 26.

ROYAL INSTITUTION, at 3.—Industrial Finance after the War: Prof. H. S. Foxwell.

INSTITUTION OF ELECTRICAL ENGINEERS, at 6.—High-tension Overhead Transmission Lines: G. V. Twiss.

ROYAL GEOGRAPHICAL SOCIETY, at 5.—A New Series of Economic Maps: G. Philip.

FRIDAY, APRIL 27.

ROYAL INSTITUTION, at 5.30.—The Organs of Hearing in relation to the War: Dr. Dundas Grant.

SATURDAY, APRIL 28.

ROYAL INSTITUTION, at 3.—Principles of Aerial Navigation: Prof. G. H. Bryan.

PHYSICAL SOCIETY, at 5.—Note on the General Equation for Wave Motion in an Elastic Medium: Prof. J. A. Fleming.—The Effect of Stretching on the Thermal Conductivity of Wires: A. Johnstone.—Cohesion: Prof. H. Chatley.

MONDAY, APRIL 30.

ROYAL SOCIETY OF ARTS, at 4.30.—The National Shortage of Iron Ore Supplies. I.: Available Home Supplies of Iron Ore: Prof. W. G. Fearnsides.

TUESDAY, MAY 1.

ROYAL INSTITUTION, at 3.—Tetanus: Prof. C. S. Sherrington.

FARADAY SOCIETY, at 8.—*Discussion*: Osmotic Pressure: Opener: Prof. A. W. Porter.—Papers: The Colloidal Membrane: Its Properties and its Function in the Osmotic System: Dr. F. Tinker.—Osmotic Pressure in Relation to the Constitution of Water and the Hydrates of the Solute: W. R. Bousfield.

RÖNTGEN SOCIETY, at 8.15.

ZOOLOGICAL SOCIETY, at 5.30.

ROYAL ANTHROPOLOGICAL INSTITUTE, at 5.—Some Human and Animal Bones, Flint Implements, etc., discovered in Two Ancient Occupation-levels in a Small Valley near Ipswich: J. Reid Moir.

WEDNESDAY, MAY 2.

GEOLOGICAL SOCIETY, at 5.30.—Supplementary Notes on Aclisina, De Koninck, and Aclisoides, Donald, with Descriptions of New Species: J. Longstaff.—The Microscopic Material of the Bunter Pebble Beds of Nottinghamshire, and its probable Source of Origin: T. H. Burton.

ROYAL SOCIETY OF ARTS, at 4.30.—Herb-growing in the British Empire: Its Past, Present, and Future: J. C. Shenstone.

ENTOMOLOGICAL SOCIETY, at 8.

INSTITUTION OF CIVIL ENGINEERS, at 5.30.—James Forrest Lecture: The Standardisation of Engineering Materials, and its Influence on the Prosperity of the Country: Sir J. Wolfe Barry, K.C.B.

SOCIETY OF PUBLIC ANALYSTS, at 8.—The Estimation of Phenacetin and Allied Compounds by means of Hypochlorous Acid: A. D. Powell.—A Rapid Method for the Determination of Nickel and Cobalt in Ores and Alloys: Dr W. R. Schoeller and A. R. Powell.—Note on Opium Poisoning Cases: J. Webster.

THURSDAY, MAY 3.

ROYAL SOCIETY, at 4.30.—Croonian Lecture: The Excitation Wave in the Heart: Dr. Thomas Lewis.

ROYAL INSTITUTION, at 3.—Pagan Religion at the Time of Coming of Christianity: Prof. Gilbert Murray.

MATHEMATICAL SOCIETY at 5.30.

IRON AND STEEL INSTITUTE, at 10.30 a.m.—Steel Ingot Defects: J. N. Kilby.—Influence of Surface Tension on the Properties of Metals, especially of Iron and Steel: F. C. Thompson.

INSTITUTE OF METALS, at 8.30.—Seventh May Lecture: Researches made Possible by the Autographic Load-Extension Optical Indicator: Prof. W. E. Dalby.

FRIDAY, MAY 4.

ROYAL INSTITUTION, at 5.30.—Some Guarantees of Liberty: H. Wickham Steed.

IRON AND STEEL INSTITUTE, at 10 a.m.—The Penetration of the Hardening Effect in Chromium and Copper Steels: L. Grenet.—Cementation by Gas under Pressure: F. C. Langenberg.—Origin and Development of the Railway Rail: G. P. Raidabaugh.—Case Hardening of Iron by Boron: N. Tschischewsky.—Determination of the Line S.E. in the Iron-Carbon Diagram by Etching Sections at High Temperatures *in vacuo*: N. Tschischewsky and N. Schulgin.

GEOLOGISTS' ASSOCIATION, at 7.30.—The Correlation of the Ingletonian Slates: J. F. N. Green.—The Landslips of Folkestone Warren and the Thickness of the Lower Chalk and Gault near Dover: C. W. Osman.

SATURDAY, MAY 5.

ROYAL INSTITUTION, at 3.—The Electrical Properties of Gases: Sir J. J. Thomson.

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