

mathematical works. Mr. Dixon was Senior Wrangler in 1886, and is Professor of Mathematics at Galway.

A lectureship in Hausa is about to be founded, in virtue of a benefaction by the Hausa Association. The language ranks with Arabic and Suaheli as one of the most important West African tongues used within the British sphere of influence.

The General Board propose that a Professorship of Mental Philosophy and Logic, with a stipend of £700 a year, should be forthwith established. Prof. Sidgwick has generously offered to accept a diminished stipend of £500 a year for the next six years in order that funds may be available for this purpose.

The Tyson Medal for Astronomy has been awarded to Mr. E. T. Whitaker, of Trinity.

Mr. W. Mather has received the thanks of the University for a valuable gift to the Engineering Laboratory of an experimental steam-engine and dynamo.

A Latin letter of congratulation to Lord Kelvin on the jubilee of his Professorship at Glasgow was approved at the Congregation on June 11, and was ordered to be sealed with the Common Seal of the University and presented to him by the University delegates to Glasgow.

The Syndicate on Women's degrees was appointed without opposition, and have already held their first meeting. Their report will not be issued until next Term.

THE following appointments have been made in the Northern Polytechnic Institute, Holloway:—Mr. Hubert A. Garratt, Senior Lecturer in Engineering, University College, Bristol, to be Head of the Engineering Department; Mr. V. A. Mundella, Assistant Lecturer in Physics and Electrical Engineering, Durham College of Science, Newcastle, to be Head of the Physics and Electrical Engineering Department; Dr. Thomas Ewan, Assistant Lecturer in Chemistry, the Yorkshire College, Leeds, to be Chief Assistant in the Chemical Department. Other recent appointments are:—Dr. G. Frege to be Professor of Mathematics at Jena; Dr. Lickfett to be Director of the Hygienic-bacteriological Institute at Danzig; Dr. Scholl to be Extraordinary Professor of Chemistry in the Technical High School at Karlsruhe. Mr. E. A. Gardner, formerly Director of the British School at Athens, to be Yates Professor of Archaeology in University College, London; Dr. Paul Eisler to be Extraordinary Professor of Anatomy at Halle; Dr. L. Joubin to be Professor of Zoology, and Dr. H. Prous to be Extraordinary Professor in Lille University; Dr. Theobald Smith to be Professor of Comparative Pathology in Harvard University.

THE Technical Instruction Committee of the North Riding County Council some time ago substituted a system of individual instruction in cheese and butter making at the farm-house of any farmer who desired it, for the more commonly adopted travelling dairy school. In addition to this method of instruction they have agreed to a scheme whereby a permanent dairy school will be opened at Helmsley in the course of the present month. The school is being built by the Earl of Feversham, and is to be placed at the Committee's disposal, who are making themselves responsible for the proper fittings and apparatus. It is confidently anticipated that the school, which will be styled the "Ryedale Dairy School," will be much used and greatly appreciated.

On Thursday evening last it was resolved by 332 votes to 83, that boroughs of not less than 20,000 population should form separate educational authorities. This will mean, as the Vice-President of the Council pointed out in his speech on this amendment, that in addition to the 128 authorities which there would have been as the Bill originally stood, we are to have 241 more authorities added, that is, provided the amendment passes the House of Lords. Further, since there is no doubt populous urban districts will claim to be treated like municipal boroughs, and it seems only reasonable to suppose that such will be granted similar powers, forty-nine more authorities will be brought in, making a total of 418 separate centres for the Education Department to deal with. In some cases the result will be extraordinary; for example, in Lancashire there will be some forty-two different educational authorities. The extent to which the work of the County Councils would suffer should this concession of the Government become law, can only be appreciated by those who know the spirit in which small local authorities approach any matters pertaining to secondary education.

SOCIETIES AND ACADEMIES.

LONDON.

Physical Society, June 12.—Captain Abney, F.R.S., President, in the chair.—Mr. Campbell read a paper on the measurement of very large and of very small alternating currents. The author advocates the use of air-coil transformers for measuring voltages and currents which are either above or below the range of the instruments available. If an attempt is made to measure the current in the primary of an air-coil transformer by observing the voltage on an open circuit secondary, it is found that the readings depend on the frequency. In order to overcome this difficulty the author uses a closed secondary with a very high inductance. In this case the primary current is proportional to the secondary current, which latter may be measured by an ammeter. The author has also investigated the case of transformers with iron cores, and of which the inductance of the secondary is large. In the case of a ring transformer with a closed magnetic circuit, if the load on the secondary consisted solely of a Kelvin 100-ampere balance of very low resistance, the ratio between the primary and secondary currents is practically constant. With an open magnetic circuit transformer, however, this is not found to be so, as the ratio between the primary and secondary current varies considerably with the frequency. Mr. Blakesley said that the author's arrangement could only be used for measuring the *current* in the primary. He (Mr. Blakesley) had shown how to measure alternating currents by means of dynamometers, and without the necessity for any special apparatus. Mr. Griffiths exhibited and described his improved form of resistance box. This resistance box has many novel features: (1) It permits of all the coils being compared with one another, without the use of standard coils, and with great ease and rapidity. Hence it is sufficient at any time to compare any one of the coils with a standard to obtain the correction to be applied to all the coils. (2) The bridge wire can be calibrated by means of the box itself. (3) The temperature of the coils can be accurately determined, since they consist of bare platinum-silver wire wound on mica and immersed in an oil bath, which bath is kept stirred. (4) The resistance of the leads from the box to the object being tested is eliminated, as well as any error due to a change in this resistance with temperature. (5) The coils are arranged according to a binary scale, and the author claims that it is possible to measure resistances up to 105 ohms, to within 0.000001 ohm. (6) All the coils, after being adjusted, have been heated to redness and allowed to cool slowly, so that all strain has been removed from the wire. (7) By having a separate pair of blocks for each plug, it is impossible for the insertion of one plug to affect the fit of a neighbouring plug. The plugs themselves are so made that no part of the plug is wider than the top of the hole, and so it is impossible to wear a "shoulder" on the plug. Prof. A. Gray said that Mr. Griffiths had discovered and remedied all the weak points of the ordinary form of bridge. Lord Kelvin had ordered the paraffin to be melted off the coils of one of his resistance boxes, and it was found that the resistance of the coils altered considerably, owing, no doubt, to the strain to which the wire had been subjected, when imbedded in the solid paraffin. Lord Kelvin had made coils without paraffin, and was specially in favour of the use of the binary scale. Prof. S. P. Thompson said he considered the binary scale the weak point of the author's arrangement, since it did not permit of ratios other than 1 to 1 being employed. Mr. Campbell asked what current could safely be passed through the coils. The author in his reply said that he believed it to be a great mistake to employ any ratio for the arms other than 1 to 1.—Prof. S. P. Thompson read a communication on Röntgen rays. The author, after describing the various forms of tubes he had made with a view of discovering the best form for the production of Röntgen rays, gave an account of the experiments he had made to try and obtain some indication of polarisation. In this connection a large number of crystals have been tested, but the experiments have all given negative results. The author exhibited an electroscope with aluminium leaves and enclosed in a wire-gauze screen, to protect it from the influence of outside electric changes, by means of which he was able to show the discharge of a positively or negatively electrified body by means of the X-rays. A method of obtaining dust figures by the discharge of an electrified body by the X-rays

was shown, and some of the results which have been obtained were exhibited. All attempts to obtain true reflection have failed, although it appears as if most bodies, including air, are capable of giving diffuse reflection.—Dr. Shettle, who was announced to give a paper on Röntgen rays, explained that he had just discovered that the effects he had intended to describe were due to red light which had penetrated his dark room.—Prof. du Bois said that Galitzine had found that Röntgen rays were polarised by tourmaline, a special form of developer being employed. The behaviour of tourmaline to light waves presents some curious features, for if the wave-length is increased a point is at length reached where the ordinary and extraordinary rays are equally absorbed. For greater wave-lengths the ordinary conditions are reversed. If the Röntgen rays are not homogeneous, the contradictory results obtained by different observers might be due to the fact that they were working with rays which were differently absorbed by tourmaline.—Mr. Swinton said he had tried the effect of heating the kathode, and had obtained results which were similar to those obtained by the author. Mr. Swinton further said that he had found that the blue luminescence sometimes observed depended on the size of the kathode. With tubes in which the kathode was almost a complete hemisphere it was impossible to eliminate this blue luminescence.—Mr. Appleyard suggested the performance of the experiments under the surface of a dielectric.—Prof. Gray said he had obtained some indication of regular reflection, but nothing definite. The author in his reply said that it had been found that if the Röntgen rays are reflected from a surface of sodium in vacuo the amount reflected is a minimum for normal incidence, and increases at oblique incidence. Comparing this behaviour with that of ultra-violet light, it supports the idea that the Röntgen rays consist of transverse vibrations. The Society then adjourned till June 26.

Geological Society, May 27.—Dr. Henry Hicks, F.R.S., President, in the chair.—The President announced that a portrait in oils of the late Prof. Huxley had been presented to the Society by Sir John Evans, K.C.B., F.R.S.—On the Pliocene deposits of Holland, and their relation to the English and Belgian crags, with a suggestion for the establishment of a new zone “Amsteliën,” and some remarks on the geographical conditions of the Pliocene epoch in Northern Europe, by F. W. Harmer. The author drew attention to some papers by Dr. J. Loricé, of Utrecht, describing the strata met with in some deep borings in Holland, which showed that the Newer Pliocene is in that country nearly 500 feet thick, and that it had been depressed more than 1000 feet below its original position. He inquired whether this subsidence could be connected with the elevation of the Older Pliocene in Belgium and Kent, and how far these earth-movements could be traced in East Anglia and influenced the deposition of the English crag. He gave particulars of the alterations in level which have taken place during and since the Crag period in England and on the continent, showing that the two movements of upheaval and subsidence have much in common, and especially that they regularly increase in degree to the north and south respectively.—The *Lingula*-flags and igneous rocks of the neighbourhood of Dolgelly, by Philip Lake and S. H. Reynolds.—The Kildare inlier, by S. H. Reynolds and C. I. Gardiner. The area described in this paper is occupied by four prominent hills composed of lower palæozoic rocks rising as an inlier from beneath carboniferous beds. The authors gave the following succession of rocks in descending order. (6) Green and grey micaceous grits and shales of Dunmurry. (5) Red and black shales. Gap: no exposure seen. (4) Limestones of the chair of Kildare. (3) Contemporaneous igneous rocks. (2) Fossiliferous ash of Grange Hill House. (1) Green gritty shales (unfossiliferous).

CAMBRIDGE.

Philosophical Society, May 25.—(a) On the spectroscopy used in connection with the 25-inch refractor; (b) on a suggestion for a form of spectroheliograph, by Mr. H. F. Newall. On the period of the earth's free Eulerian precession, by Mr. J. Larmor. The following general proposition is easily established; it has been suggested by the recent memoirs of Prof. Newcomb and Mr. Hough. Consider any solid body, for example the earth, in rotation about its axis of greatest moment of inertia: when the body is not absolutely rigid, the period of the small free precessional motions of the axis of rotation will depend in part on its elastic yielding to the centrifugal force; but in all such cases, whether the body is homogeneous or not, whether the elasticity is perfect or imperfect, this precessional

motion will be the same as that of a body absolutely rigid, with its materials distributed in the configuration which the actual body would assume, on the supposition that it remains perfectly elastic, were it relieved of the centrifugal force of rotation. Taking the case of the earth, in which the equatorial moments of inertia are all equal to A , while the axial one is C , the ordinary forced Eulerian precessions give the value of $(C - A)/C$; while knowledge of the variation of terrestrial gravity gives $C - A$; so that C and A are separately known. The period of the free Eulerian precession gives $(C' - A')/A'$, where C' and A' are the moments of inertia which the earth would have were the strain corresponding to centrifugal force removed. In so far then as this free period can be reliably disentangled from the actual observations of changes of latitude, which are also affected by unknown irregular variations due to meteorological causes, and so more or less of an annual character, we derive from it a knowledge of $C' - A'$; thereby obtaining an additional datum for discussions relating to the constitution of the earth's interior. This is on the supposition that the earth is wholly solid. The influence of the surface waters can, however, be estimated by the same principle, as they are in the main deep enough to make an equilibrium theory applicable. It appears that, if the actual earth were absolutely rigid, and wholly covered by an ocean, the mobility of this ocean would lengthen the period of free precession by about 14 per cent. But this superior limit is reduced both by the limited extent of the ocean and by the yielding of the solid earth; so that, on an outside estimate, not more than 6 or 8 of the actual 40 per cent. of lengthening of the period can be due to mobility of the surface waters. On this equilibrium theory, an amplitude of a third of a second of arc in the Eulerian precession would produce a tidal component, of the same period, whose amplitude would in middle latitudes be about half an inch; which is just the kind of result that has been derived from examination of the tidal observations in Holland and on the east and west coasts of North America. The influence of possible fluidity of a portion of the interior has been fully developed by Mr. Hough, the results agreeing with indications virtually given by Lord Kelvin so long ago as 1876, and published in the British Association Report for that year. The conclusion drawn by Mr. Hough from the Chandler period, that, for the small stresses involved, the interior of the earth is in the main perfectly elastic and about as rigid as steel, is in accord with the recent observations by seismologists of what is probably the time of propagation of earthquake disturbances from Japan to Europe in a direct line across the earth's interior.—Note on a point in theoretical dynamics, by Sir Robert Ball. Let α be a screw about which a free rigid body is made to twist in consequence of an impulsive wrench administered on some other screw η . Except in the case where α and η are reciprocal it will always be possible (in many different ways) to design and place a rigid body so that two arbitrarily chosen screws α and η will possess the required relation. Let now β and ζ be two other screws (not reciprocal); we may consider the question as to whether a rigid body can be designed and placed so that α shall be the instantaneous screw corresponding to η as an impulsive screw, while β bears the same relation to ζ . It is easy to see that it will not generally be possible for $\alpha, \beta, \eta, \zeta$ to stand in the required relations; they must in some way be restricted. It is the object of the author's note to show that the restrictions are two in number, and to set down what they are.

EDINBURGH.

Royal Society, June 1.—Prof. Copeland in the chair.—Prof. Tait read a paper on the linear and vector function. We speak of fluid motion as being “differentially irrotational” when there is a velocity potential, and as “rotational” when there is a vortex. In the first case, the strain involved is pure, *i.e.* there are three rows of particles, at right angles to one another, whose directions are momentarily unchanged. In the second case, one such row of particles alone exists. But there is, when we look at the matter from the point of view of the roots of the strain-cubic, a third case—where there are three rows of particles, not generally at right angles to one another. Prof. Tait showed that such a strain is, in general, the result of the superposition of two successively applied, but different, pure strains. Thus, comparing the non-vortex states of a small element of a fluid at three successive instants, a portion, cubical at the instant A , may be found, such as to be brick-shaped, without change of direction of its edges, at B . Similarly from B to C . But to

compare A with C, we have a definite parallelepiped whose edges remain unchanged in direction.—Mr. R. C. Mossman gave the first part of a communication on the meteorology of Edinburgh, in which he dealt with the mean values of the climatic elements for each day of the year, basing his inquiry on over a million observations. The non-instrumental records extended over 125 years, and the daily sunshine means over 30, the average of the nineteen classes of observation being about 80 years. As regards pressure, the maximum was from April 7 to July 3, and the minimum on November 26. For temperature the maximum was an average of $59^{\circ}3$ on August 8, while January 8 was the coldest, the mean temperature being $36^{\circ}0$. The curve of rainfall showed that the seven days ending April 18 were the wettest days in the year, thus confirming the popular belief in the Lammas floods. Mr. Mossman described in detail the climatic features of each month, and showed how these reacted on each other. An interesting result was the recurrence of similar types of weather at the same time each year.—Mr. Malcolm Laurie read a paper on the nutrition of the embryo in scorpions. The variation in the modes of development in different genera of scorpions is very large. The primitive form seems to be a large egg with much food yolk, and is found in *Euscorpis* and the *Buthide*. This egg develops in the ovarian tube. In other *Juride* the egg is yolkless, though appearing to be a considerable size owing to the surrounding embryonic membranes. In the *Scorpionide* the egg is entirely without yolk, and develops in a diverticulum of the ovarian tube. Various contrivances exist for the better nourishment of the embryo during the later stages of development. Nourishment, secreted by the cells of the diverticulum and by a solid cord of cells (appendix) in which it terminates, is always taken in through the mouth, which is early developed. In addition to this, in *Ischnurus*, the chelicerae grow into long root-like processes which lie among the cells of the appendix, and seem to absorb nourishment from them. In *Hormurus* a similar function is performed by the chela, while in the *Scorpionini* the chelicerae grasp a cord of cells coming from the centre of the appendix, and masticate it. In these last forms there are also present dorso-lateral out-growths of the segments of the body, which appear to act as surfaces for absorbing nourishment directly from the surrounding maternal tissues. This arrangement is carried still further in *Opisthophthalmus*, where there are two long processes, one from the prostomium, and the other from the back of the carapace, which run out among the maternal tissues.

DUBLIN.

Royal Irish Academy, June 8.—Dr. J. Kells Ingram, Vice-President, in the chair.—Mr. Charles J. Joly read a paper on quaternion invariants of linear vector functions and quaternion determinants. This was a supplement to a paper read before the Academy in December 1895, and published in their *Transactions* (vol. xxx. part 18). From given linear vector functions others are derived by repeated multiplication in any order. The Hamiltonian and other quaternion invariants of these new functions are expressed as the quotients of two determinants with vector constituents. Their scalar parts having been considered in the previous paper, their vector parts are now reduced to the results of operation on the spin-vectors of the given functions, and of one function of each of certain cyclical groups of the derived functions. Examples and interpretations are also given of determinants with quaternion constituents in the expansion of which the order of the rows is preserved.—Mr. Henry Dixon read a paper on the osmotic pressures in the cells of leaves. The method adopted for estimating the osmotic pressures existing in the cells of leaves, consisted in enclosing a branch bearing a number of leaves in a strong glass cylinder, capable of resisting high gas pressures (*e.g.* 50-100 atmospheres). The ends of this cylinder consist of stout brass castings, drawn together on the cylinder by means of bolts and nuts. The upper end is furnished with suitable couplings for connection with an air compression pump or an iron bottle containing liquid CO_2 . The lower end is perforated and admits of the branch, to be experimented with, being sealed into it. The cut end of the branch dips into a vessel containing a weighed amount of water, which is placed below the glass cylinder. When the pressure in the cylinder is raised, it is found, that at a certain pressure, the leaves begin to collapse and lose their turgescence, and that water is forced down from them into the vessel beneath. By a series of experiments on each branch, a certain critical pressure

is found which just balances the osmotic pressure of the cells, but which neither causes their collapse nor permits of their drawing up water from below.

PARIS.

Academy of Sciences, June 8.—M. A. Cornu in the chair.—Theory of the flow of water in conduits, by M. J. Boussinesq.—On the effect produced by the ring in iron in dynamo-electric machines. Reply to the note of M. Potier, by M. Marcel-Deprez.—Study of melted vanadium and its carbide, by M. H. Moissan. Vanadium pentoxide, reduced by carbon in the electric furnace, yields an ingot of metal which always contains an appreciable amount of carbon. If the time of heating is as short as possible, a metal containing only 5 per cent. carbon can be obtained; by prolonging the time of heating the percentage of carbon increased to 18.5 per cent., indicating the formation of the carbide VC. The carbide is not attacked by water at the ordinary temperature. Vanadium forms alloys with iron, copper, and aluminium, but not with silver.—On a new method of preparing alloys, by M. H. Moissan. Alloys of refractory metals can be prepared by projecting a mixture of the oxide with powdered aluminium into a bath of liquid aluminium. The heat set free by the oxidation of the aluminium is sufficient to carry on the reaction. Alloys of aluminium with nickel, molybdenum, tungsten, uranium and titanium have been obtained in this way.—On the nature of the chemical processes involved in muscular action, by M. A. Chauveau. Summing up the results of a series of experimental researches on the relation between the energy given out as muscular work and the energy absorbed as food.—On the value as food of bread made from screened flours, by M. A. Girard. Analyses of flours of various qualities, from which the conclusion is drawn that the ideas generally held concerning the inferior nutritive power of fine white bread as compared with brown bread, are fallacious; both kinds of bread containing practically identical amounts of gluten and of phosphates.—On the theory of gases, a letter from M. Boltzmann to M. Bertrand, continuing the discussion concerning the validity of Maxwell's formula for the distribution of the velocities of the molecules at a given instant.—Reply to the preceding by M. Bertrand, by whom Maxwell's theorem is held to be obviously inaccurate.—The influence of the temperature of the freezing mixture upon cryoscopic measurements, by M. F. M. Raoult. Starting from simple considerations an expression is obtained giving a correction for super-cooling in cryoscopic measurements. This formula is identical with that given by MM. Nernst and Abegg, but the practical application of it given by the latter, is open to criticism. A very simple and accurate method is given by M. Raoult, who shows that the temperature of the bath is without practical effect upon the laws previously published. In the few cases where the correction is necessary, it is easily measured and applied.—On differential equations of the first order, by M. P. Painlevé.—On the regulation of motors, by M. L. Lecornu.—Observations on the errors due to variations of temperature in geodesic instruments, by H. F. A. Aimé. A discussion of the effect of temperature upon the size and shape of the air-bubble in levelling instruments.—On the spectra of metalloids in fused salts, by M. A. de Gramont. Measurements of the lines due to sulphur in metallic sulphides.—Contributions to the study of absorption by porous bodies, by M. Lachaud. An experimental study of the amounts of quinine, methyl-violet, salicylic acid, tannin, dextrine, and gelatine remaining in solution after treatment with animal black.—On the estimation of potassium, by M. Charles Fabre. The platinumchloride is reduced in warm aqueous solution by magnesium powder, and the resulting chloride titrated with standard silver solution.—On the heat of vaporisation of formic acid, by Miss D. Marshall. By comparison with benzene as a standard substance, the value for the latent heat of vaporisation of formic acid was found to be 120.4 , a number practically identical with that (120.9) calculated from M. Raoult's formula containing the rate of variation of vapour pressure with temperature, the absolute boiling point, and the molecular lowering of the vapour pressure as the experimental data.—Combinations of antipyrin with oxybenzoic acids and their derivatives, by MM. G. Patein and E. Dufau.—On lighting by acetylene, by M. G. Trouvé. A description of the methods used for the practical preparation of acetylene for lighting purposes from calcium carbide.—On the composition of the red pigment of *Ananita muscaria*, by M. A. B. Griffiths.—On the larval metamorphoses of the *Phoronis sabatieri*, by M. Louis Roule.—Description of a new genus of simple Ascidia, *Gamaster Dakarenis*, by M. A.

Pizon. This genus resembles generally the *Eugyra*, from which however it is clearly differentiated by the structure and position of the genital organs.—On the existence and development of the eggs of the sardine in the waters of Concarneau, by MM. Fabre-Domergue and Biérix.—The latent life of grain, by M. V. Jodin.—Remarks on the preceding communication, by M. Armand Gautier.—Analysis of one of the meteoric stones that fell at Madrid, February 10, 1896, by M. S. B. Mirat. The meteorite consisted practically of the silicate of magnesium and iron, containing also estimable quantities of aluminium, nickel, and calcium.—Artificial reproduction of malachite by a new method, by M. A. de Schulten.—On the liassic domes of the Zaghouan and of Bou-Kourmin, by MM. E. Ficheur and E. Hang.—The part played by the hind limbs in the motion of the horse, by M. Le Hello.—On a relation between muscular energy and sensibility, and on the laws of variation of this energy with respect to time, by M. C. Henry.—Photographs by the X-rays of a bullet in the brain, by MM. E. Brissaud and Londe.

NEW SOUTH WALES.

Linnean Society, April 29.—Mr. Henry Deane, President, in the chair.—Theoretical explanations of the distribution of southern faunas, by Captain F. W. Hutton, F.R.S. After reviewing the various theories which have been offered to explain the difficult and intricate problem of the distribution of southern faunas, the author pointed out that the supposition that the ancestors of certain groups migrated from the northern into the southern hemisphere by the present continents, and have since then become extinct in the north, explained a good deal, but failed to give a full and satisfactory explanation of the whole of the facts. Moreover the members of the fauna unaccounted for are old forms, and consequently the means of communication which served them must long ago have been destroyed. To the author a fatal objection to the theory of migration by way of an Antarctic continent is offered by the following consideration. Aplacental mammals—both Multituberculata and Polyprotodontia—existed in Europe and North America in the Triassic and Jurassic periods, and these Polyprotodontia were, no doubt, the ancestors of the living Polyprotodontia of Australia. In the Eocene strata of Patagonia remains of a large number of Polyprotodontia have been found which are far more closely related to the Polyprotodontia of Australia than to the Mesozoic forms of Europe and North America; consequently a direct land communication must have existed between these two southern countries. Now there is strong geological and palaeontological evidence that no land ridge existed between North and South America during the Mesozoic and early Cainozoic eras; consequently it must be assumed that the southern forms migrated through the Malay Archipelago; and, if they went to Patagonia by means of an Antarctic continent, they must have passed through Australia. But mingled with the Eocene marsupials of Patagonia there are a number of Eutheria of typically South American character without any northern forms of *Artiodactyla*, *Carnivora*, or *Insectivora*; and it is hardly possible that these should have passed through Australia without leaving any record behind. The theory of the former existence of a South Pacific Mesozoic continent, first suggested by Huxley, seemed to be the only theory left. It not only explains the origin of the Australian and South American marsupials, but also the almost simultaneous appearance of different Eutherian mammals in North and South America. It must be supposed that this continent threw off first New Zealand, then Australia, then Chili, and finally disappeared under the waves. At a later date, New Zealand must have formed part of a large island joined to New Caledonia, but not to Australia. The objections to this theory are geological rather than biological, involving the doctrine of the persistence of continental and oceanic areas upon which geologists are not agreed; and such objections are equally applicable to the theory of an Antarctic continent.—Report on a Bone Breccia deposit near the Wombeyan Caves, New South Wales: with descriptions of some new species of marsupials, by Dr. R. Broom. A detailed examination of this deposit from which *Burramys parvus* and *Palaopetaurus elegans* have already been described by the writer, adds considerably to our knowledge of the smaller marsupial fauna of the later Tertiary period. Of existing forms there have been found *Petaurus breviceps*, *Dromicia nana*, *Phascologale flavipes*, *P. penicillata*, and some detached teeth referred to *Thylacinus cynocephalus*. Besides these are found a presumably new species of *Macropus* for which

the name of *M. wombeyensis* is proposed, a new species of *Pseudochirus* (*P. antiquus*), a new species of *Perameles* (*P. wombeyensis*), and an extinct variety of the existing *Potorous tridactylus*. A few bones of a large *Echidna* are referred to *E. oweni*. There are also innumerable remains of bush rats (*Mus* sp.), together with a few bones of small birds and lizards.—The entomology of Australian grass trees (*Xanthorrhoea*), by W. W. Froggatt. The life-histories or habits of a number of insects which either breed in the stems of the grass tree or feed upon its foliage were described.—On the *Galaxias* from Mount Kosciusko, by J. D. Ogilby. After reviewing its history and describing the species (*G. findlayi*, Mcl.) from a fine series, obtained from streams on both watersheds of the Australian Alps, the author gave an account of the curious distribution of this fresh-water family of fishes, with special reference to its Antarctic origin, and concluded with a list of the known forms, holding that far too many species had been made by naturalists who relied too much on contour and coloration, both of which characters are most inconstant.

BOOKS, PAMPHLETS, and SERIALS RECEIVED.

BOOKS.—An Elementary Treatise on the Integral Calculus: Dr. B. Williamson, 7th edition (Longmans).—Im Australischen Busch und an den Küsten des Korallenmeeres: Prof. R. Semon (Leipzig, Engelmann).—A Manual of Mending and Repairing: C. G. Leland (Chatto).—Macmillan's Geography Readers, Book VI. (Macmillan).—Arithmetic for Promotion, Scheme B.: Lock and Macdonald, 4 Parts (Macmillan).

PAMPHLETS.—A New Treatment of the so-called Incubably Deaf People: Dr. J. J. Hovent (Bruxelles, Lebegue).—Representation in Virginia (Baltimore).—St. Paul's School and the Charity Commissioners: Colonel Clement (Bell).

SERIALS.—Science Progress, June (Scientific Press).—Geographical Journal, June (Stanford).—Botanische Jahrbücher, &c., Zweiundzwanzigster Band, 2 Heft (Leipzig, Engelmann).—Proceedings of the American Philosophical Society, December (Philadelphia).—Physical Review, Vol. 3, No. 6 (Macmillan).—Proceedings of the Royal Society of Victoria, Vol. 3, new series (Williams).—American Journal of Science, June (New Haven).—Engineering Magazine, June (Tucker).—Bulletin of the American Mathematical Society, May (New York, Macmillan).—Westminster Review, June (Warne).—Leisure Hour, June (56 Paternoster Row).—Proceedings of the Physical Society of London, Vol. xiv, Part 6 (Taylor).—Rapport Annuel sur l'Etat de l'Observatoire de Paris, 1895: M. F. Tisserand (Paris).—American Naturalist, June (Philadelphia).—Journal of the Franklin Institute, June (Philadelphia).

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