of the college to give an equal sum, conditionally upon the college being incorporated in the University of London, and concurs in the resolution of the council to enter into negotiation with the University with a view to the incorporation." He said the idea of incorporation was not a new one, because when the statutory commissioners were sitting for the purpose of framing the statutes for the reconstitution of the University of London, the council represented to them the intention of the founders and benefactors of University College would only be carried out by incorporation. The commissioners, however, felt that the terms of the Act did not make it possible for them to give effect to the proposal. The council had not abandoned the policy, and since the beginning of the present year events had taken place that brought it within the range of speedy realisation. With regard to the appeal for funds, it was quite obvious that if the work which was being carried out was to be continued, the funds would need a much larger increase. Lord Monkswell, who seconded the resolution, hoped there would be many rich men who would follow the example of their anonymous benefactor. He trusted that the negotiations which they were having with the University of London would be successful, and said that no conciliatory efforts on their part would be wanting. The resolution was adopted.

THE address delivered before the Association of Technical Institutions on January 31, by the president, Lord Avebury, is published in the official report of the proceedings of the meeting. The address was, in a large part, a plea for more liberal recognition of science and modern languages in the time-tables of our schools, supported by the opinions of commissions and other competent authorities. Classics has at present too large a portion of the available time, and science is only tolerated. "An education which excludes science is a one-sided education, and the most learned classical scholar, if he knows nothing of science, is but a half-educated person after all." But the question is not so much one of culture as of equipment for national progress. When, as Lord Avebury remarks, we find commission after commission (composed of men selected for their wisdom and experience), after careful and patient inquiry, one after the other, and with remarkable unanimity, pointing to the neglect of science and of modern languages in our educational system as a grave evil, it must surely be worth while to inquire whether these warnings have been taken to heart, or the recommendations have been carried into effect. Lord Avebury gives instances, most of which are known to readers of NATURE, of industrial progress in Germany due to technical training. "It is evident then," he concludes, "that the technical instruction of Germany has been a very remunerative investment; in the first instance, no doubt, a great national advantage, but a boon also to the world as a whole. These figures bring home to us clearly the importance of the subject. It is obvious how keen competition is going to be. If we are to hold our own, we must supplement the rule of thumb in our workshops—very important in itself—by the rule of brain. Emerson once said that this country 'is prosperous because steam is half an Englishman.' We all hope that Britannia may long rule the waves, but it is most important that she should rule the steam engine and the dynamo as well."

SCIENTIFIC SERIAL.

American Journal of Mathematics, vol. xxiv. No. 1, January. —Cyclic subgroups of the simple ternary linear fractional group in a Galois field, by L. E. Dickson. This paper is an addition to the author's previous one in vol. xxii. pp. 231-252. It gives proofs of results therein stated and adds some new theorems allied to them. The question discussed concerns the substitutions

$$x^1 = \alpha^r \mathrm{x}, \; y^1 = \alpha^s y, \; z^1 = \alpha^{-r-s} z,$$

where α is a primitive root of the Galois field of order p^n. Two cases arise according to the value of the greatest common divisor d of 3 and $p^n - 1$.—Curves of triple curvature, by J. G. Hardy. The object of the paper is to add to the results which have been obtained concerning curves L of triple curvature. Equations of motion for systems in a four-dimensional space have been deduced and used to introduce the notion of an instantaneous plane of rotation. The derivation is not new, but it is retained for the sake of clearness. By constructing the principal tetrahedroid at a point of a curve of triple curvature and studying its motion by means of the kinematical equations obtained, geometrical

interpretations of the six rotations and also a set of formulæ corresponding to the Serret-Frenet formulæ for curves of double curvature have been arrived at. These formulæ have been applied to the study of curves L and, in particular, of the osculating hypersphere and the locus of its centres. Many of the results were contained in a paper read before the mathematical seminary of the Johns Hopkins University in 1898, and so were antecedent to the articles by Prof. Lovett and Mr. Hatzidakis in vol. xxii. The subject may be studied in Brunel, *Math. Ann.* xix. p. 48; Pirondini, *Giom. di Mat.* xxviii. p. 237; and Piccioli, *Giom. di Mat.* xxxvi. p. 273.—Primary prime functions in several variables, and a generalisation of an important theorem of Dedekind, by H. Hancock. Reference is made to Kronecker, "Grundzüge," &c., § 4, p. 11; Runge, *Crelle*, Bd. xcix. p. 89; Mandl, *Crelle*, cxiii. p. 252; Meyer, *Math. Ann.* Bd. xxx. p. 30, and to other memoirs.—On certain properties of the plane cubic curve in relation to the circular points at infinity, by R. A. Roberts. In this second part, which is on certain plane cubic curves and their angles of intersection, with some account of conics cutting orthogonally, the author investigates some methods of generating certain plane cubic curves in such a way that their angles of intersection assume a simple form.—Estimate of Peirce's linear associative algebra, by H. E. Hawkes. In the fourth volume of the *Journal* there appeared a memoir by Peirce in which he attempted to classify and enumerate hyper-complex number-systems. This does not seem to have received on the Continent the credit it deserves. In order that it should receive due recognition, Mr. Hawkes claims that three questions must be discussed, viz., what problem did Peirce attack, and to what extent did he solve it? what relation does this problem bear to that treated by Study and Scheffers? and to what extent do Peirce's methods assist in the solution of that problem? In the present article, Mr. Hawkes discusses the first two questions, and discusses the last in the *Transactions* of the American Mathematical Society, vol. iii. A historical review accompanies the article. It may be remembered that Mr. Spottiswoode drew attention to Peirce's work in his presidential address before the London Mathematical Society (vol. iv. p. 152); see also Cayley, "Collected Works," xi. p. 465; xii. p. 465.—Dr. G. A. Miller furnishes a short note on groups defined by the orders of two generators and the order of their product.—A fine portrait of Prof. Benjamin Peirce is given with the number.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, December 12, 1901.—"The Effective Temperature of the Sun." By W. E. Wilson, D.Sc., F.R.S.

In a memoir by the author and Mr. P. L. Gray, entitled "Experimental Investigations on the Effective Temperature of the Sun," published in the *Phil. Trans.* Roy. Soc. A. vol. clxxxv. (1894), the method described was as follows:—A beam of sunlight reflected from a Stoney single-mirror heliostat was directed into one aperture of a Boys' differential radiomicrometer. The other aperture received the radiation from a small circular area of a strip of platinum raised to any desired temperature by an electric current, this temperature being measured by the linear expansion of the platinum as in Joly's meldometer. Knowing then the ratio of angular diameter of radiating area of platinum to that of sun, the temperature of the platinum strip, the emissivity of bright platinum, and the amount of the sun's radiation lost by absorption in the earth's atmosphere and by reflection from the heliostat mirror, it is possible in any assumption of a law connecting radiation with temperature to determine the effective solar temperature. The mean of a series of very accordant observations gave 6200° C. (absolute).

To protect the incandescent strip from draughts of air it was covered with a water-jacket of gilded brass. Possibly some of the radiation from distant parts of the strip may have been reflected between the polished walls and the strip itself and, ultimately escaping through the circular aperture fronting the radio-micrometer, reached it and so vitiated the result. Smoking the interior of the water-jacket sensibly reduced the amount of radiation and so proved this surmise correct.

It is also possible that changes in the surface condition of the platinum may effect its emissivity, which in the original memoir was taken at 0·35 that of lamp-black (Rosetti's estimate), so that it is a distinct advantage to abolish the platinum strip as a source of radiation and to substitute a uniformly heated enclosure which would radiate as an absolutely black body.

In 1895 Mr. Lanchester pointed out to the author that such an enclosure would be a theoretically perfect radiator; while Lummer, Paschen and others using radiation from such a source have confirmed in a remarkable manner Stefan's law of radiation, viz. $R = aT^4$.

The radiator employed was a porcelain[1] tube 2 feet long and 1 inch internal diameter fitted into a Fletcher gas-tube furnace. A plug of asbestos was inserted in the tube about 10 inches from the end remote from the radio-micrometer, and resting against this plug was the end of a Callendar platinum resistance thermometer. In front of the open end of the tube was a rectangular aperture 5 mm. wide in a large brass water-screen; a slide closing this aperture was moved by a micrometer screw reading to 0·01 mm. This aperture was 66·3 mm. from the surface of the thermocouple (Fig. 1).

To make an observation, the tube was heated to as high a temperature as the furnace was capable of, and the radiation from the interior of the tube passing into the aperture (B) of the radio-micrometer was adjusted by the micrometer screw until a balance was obtained with the radiation of the sun through the aperture (A).

After a series of observations had been made, the arrangement was altered so that the radiation from the tube should enter aperture (A) and from the sun aperture (B) of the radio-micrometer, and in this position a second series of observations was taken. The geometric mean of the results of the two groups gives the effective temperature of the sun.

The mean of the observations thus made gave 5773° C. (absolute) as the sun's effective temperature.

In calculating this result, Rosetti's coefficient of atmospheric absorption, viz. 0·29, has been used. Taking Langley's value, viz. 0·41, the result will be 6085° C. (absolute).

It is interesting to allow for the effect of absorption in the sun's atmosphere. Assuming the results of Wilson and Rambaut's experiments (*Proceedings* Royal Irish Academy, 1892, vol. ii. No. 2), the value 6863° C. (absolute) is deduced as the effective temperature of the sun's photosphere.

Physical Society, February 28.— Prof. S. P. Thompson, president, in the chair.—A paper on focal lines and anchor-ring wave-fronts was read by Prof. J. D. Everett. When a small cone of rays is obliquely incident on a spherical reflecting or refracting surface, the rays after reflection or refraction no longer compose a true cone. Instead of meeting in a point they form a narrow neck, and this neck is flattened in two places called the *two focal points*, the planes of flattening being at right angles to each other. Optical writers give the name *focal lines* to the sections of the pencil made at the focal points by planes perpendicular to the axis of the pencil; but it would be more appropriate to give the name to the sections which most nearly resemble lines, whatever angle they make with the axis of the pencil. Attention is drawn in the present paper to the case in which the wave-front in one of its positions is a tore (or anchor-ring). Even when dealing with wide-angled pencils there are then two well-defined focal lines, the primary focal line being what may be called the circular axis of the tore, and the secondary a portion of the line about which the generating circle turns to form the anchor-ring. Toric wave-fronts can be produced by reflection from a mirror made by allowing an ellipse or portion of an ellipse to revolve completely round

an ordinate erected at one focus, and employing it to reflect rays diverging from a small source at the other focus. The primary line is always real; the secondary is real or virtual according to the position of the area of incidence of the pencil.—A paper entitled "Contributions to the Theory of the Resolving Power of Objectives" was read by Prof. Everett. The practical limit to the resolving power of objectives depends upon the blurring due to diffraction. Observations on double stars for the purpose of investigating the separating power of telescopes have been made by Dawes, who arrived at the conclusion that the angular distance between the two components, when they are nearly equal in magnitude and are just separated, is given by the formula, 4·56 seconds
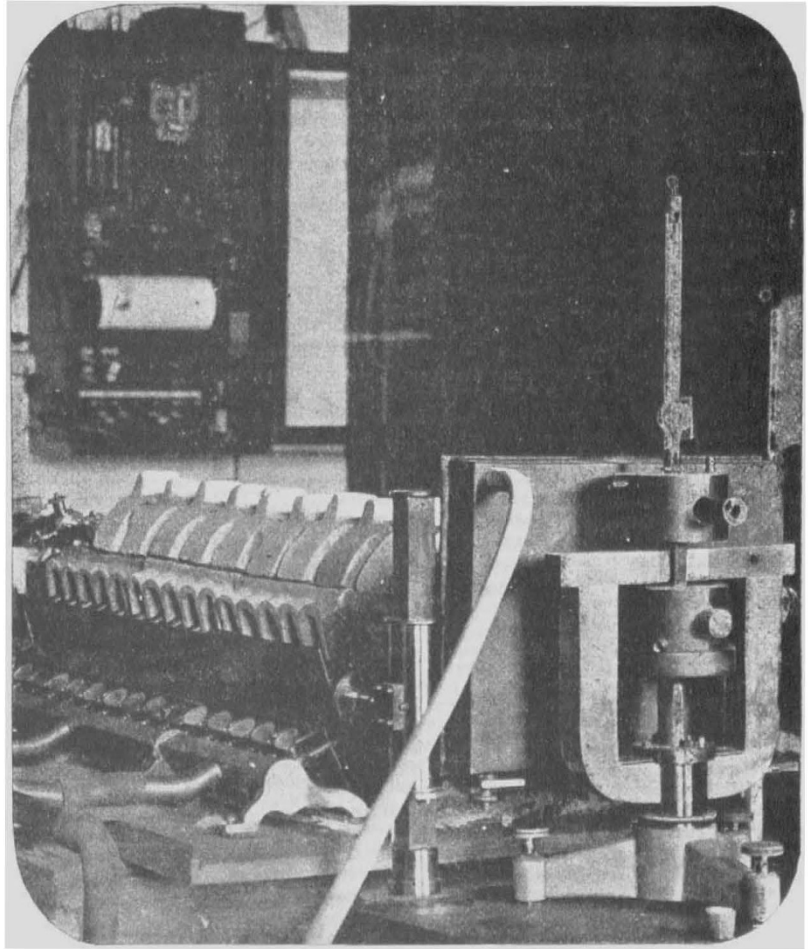

Fig. 1.—Differential radio-micrometer with tube furnace.

divided by the diameter of the objective in inches. Foucault also investigated the matter experimentally, and in 1830 Airy calculated the brightness at various points of the spot and rings which constitute the image of a point source formed by an objective. If the extreme difference of optical path for disturbances coming from different points of a concave wave-front to a point at lateral distance b from the geometric focus is made equal to the wave-length of light, a value for b is obtained which represents with fair accuracy the limit of separation as determined by experiment. The formula agrees with that of Dawes if $\lambda = \cdot 56$ micron., whereas the wave-length of the brightest ray is usually taken as ·55 micron. In the case of microscopes the author has supposed that the formula for the minimum distance b still holds good, and combining this equation with the sine condition applicable to optical systems giving sharp flat images, he has deduced the expression which has been extensively used

[1] In later experiments an iron tube was substituted.

for the distance between lines or points which can be barely separated. Microscopic test objects are not self-luminous, like double stars, but are viewed by transmitted light. If no condensing arrangement is employed, the pencil of light sent by a point of the object to the objective consists, in effect, of rays from different sources. The result of this is that the image of the point is larger and more blurred. The cure for this evil is furnished by employing a condenser of high quality, to throw upon the part of the object under examination a very sharp image of the source of illumination. Each point of the object thus gets its light from its own special point of the source ; the object, therefore, acts as if it were self-luminous, and the power of the instrument is increased. The benefit derived from sharp focussing on the object explains the advantage of using an achromatic condenser and not, as formerly recommended by Abbe, one which is not achromatic. Another advantage of sharp focussing by the condenser is that there can be no interference of the light from different parts of the object. The author then gives an explanation of the advantage of oblique illumination, and arrives at the view of microscopists that the obliquity of illumination should be rather less than the obliquity of the extreme rays of the incident pencil. The paper concludes with Hockin's proof of the sine condition.—A paper on the absorption, dispersion and surface colour of selenium, by Prof. R. W. Wood, was read by the secretary. The dispersion of selenium has been investigated by means of prisms made in the same manner as the cyanine prisms already described by the author. The substance is much more transparent than cyanine, and prism angles of four or five degrees can be employed. Determinations were made with three selected prisms down to wave-length 61 ; below this the interferometer method was employed. Uniform films of selenium were obtained on plates of plane parallel glass by means of a flat selenium kathode in a high vacuum, and the displacements of the interference fringes by the introduction of the films were measured for lights of different known wave-lengths. Wedge-shaped films were then employed, which allowed the displacement for any wave-length to be measured for the maximum thickness capable of transmitting the light. An advantage of the wedge-shaped films is that the fringes are curved and the displaced fringe can be easily identified with the undisplaced. The refractive indices obtained in the red by prisms were used as a basis for the calculation of the indices in the rest of the spectrum from the interferometer measurements. Determinations were made in this way down to wave-length 40, beyond which it was impossible to go owing to the powerful absorption. A curve has been plotted showing the relation between refractive index and wave-length. It has a maximum at wave-length 50 ·00005 cm.), where the refractive index is 3·13. An examination of the light transmitted by a thin film showed that there was no return of transparency in the ultra-violet at least down to wave-length 28. Photometric measurements were made of the transmitted light, both visible and ultra-violet, and a curve has been drawn with wave-lengths as abscissæ and extinction coefficients as ordinates. It is proved that the extinction coefficient increases continuously with decrease in wave-length as far as wave-length 22, where the coefficient has as high a value as in the case of metals. The author concludes that the absorption is due, not to a single band, but to a series of overlapping bands. The object of this work was to determine whether there was a return to partial transparency in the ultra-violet region. This question appears to be answered in the negative, although a possible turning-point in the curve might be masked by the reflection coefficient of selenium. The high value of the extinction coefficient in the ultra-violet led the author to look for traces of selective reflection in this region. The light of an arc lamp was reflected successively from six surfaces of selenium, and the image of the crater after the sixth reflection, although faint, was without colour or excess of ultra-violet light. If the data obtained in the paper for refractive index and extinction are used in the formula for reflection from an absorbing medium, a result is arrived at which indicates that the reflection increases rapidly with decreasing wave-length. As multiple reflections from selenium surfaces give no trace of colour, errors must exist in either the refraction or the extinction curve. The author suggests that in the case of films of thickness less than the wave-length of light, the displacement of the interference fringes does not give a measure of the refractive index.—The chairman exhibited some tellurium mirrors made in the same way as the selenium ones used by Prof. Wood.

Chemical Society, February 19.—Prof. Emerson Reynolds, V.P.R.S., president, in the chair.—The union of hydrogen and oxygen, by Mr. H. B. Baker. The author has devoted, during the last few years, much attention to the inhibition of chemical action produced by thoroughly drying substances, but until quite recently had not succeeded in so completely desiccating a mixture of oxygen and hydrogen as to prevent the explosion of such a mixture when electric sparks were passed through it. He has now found that by electrolysing a solution of barium hydroxide it is possible to obtain a mixture of these gases which, when dried over phosphorus pentoxide, is no longer exploded by electric sparks or by the application of intense heat, the highly explosive character of the mixture, however, being regained by the introduction of a mere trace of moisture.—Enzyme action, by Prof. A. J. Brown. Some years ago the author showed that the fermentation of saccharine solutions by yeast does not proceed according to the ordinary mass law which governs chemical reactions. On the other hand, O'Sullivan and Tompson found that the inversion of cane sugar by the enzyme invertase follows this law. Since both of these reactions, in the light of Buchner's researches on zymase, are produced by enzymes, there appeared to be a remarkable difference in the operation of the latter. The inversion of sucrose by invertase has, therefore, been reinvestigated by the author, who finds that this reaction does not progress according to the mass law, but in precisely the same way as the fermentation of sugars by yeast. The explanation of this feature of enzyme action is, the author thinks, the formation of an intermediate unstable compound between the enzyme and the substance it is decomposing, thus introducing a time factor which obscures the mass influence.— On the velocity of hydrolysis of starch by diastase, with some remarks on enzyme action, by Mr. H. T. Brown, F.R.S., and Mr. T. A. Glendinning. The authors confirm the results obtained by Prof. Adrian Brown with regard to the progression of hydrolytic reactions caused by enzymes, but they explain the peculiarity exhibited in a different manner, an attempt being made to connect enzyme hydrolysis with acid hydrolysis, the unstable combination of starch or sugar with the enzyme being regarded as the hydrolyte and the active dissociated water molecules present as the hydrolysts.—Polymerisation products from diazoacetic ester, by Dr. O. Silberrad. Three series of polymerides are obtainable from diazoacetic ester, and the present paper gives an account of the results of experiments on the so-called "pseudo-diazoacetamide," whereby the author has been able to assign a constitution to this substance.—Condensation of phenols with esters of unsaturated acids, by Dr. S. Ruhemann. The author describes the products obtained by the action of ethyl chlorofumarate on guaiacol and α-naphthol, whereby a benzopyrone and a naphtharone are respectively formed.—The chemical change produced by the immersion of lead in distilled water, by Dr. F. Clowes. Distilled water, recently boiled, exerts very little action upon metallic lead immersed in it, but unboiled distilled water converts the metal into hydroxide of lead, which remains in solution, and into a hydrated carbonate, which is precipitated. The principal agent in effecting this change appears to be the oxygen dissolved in the water.—The bases contained in Scottish shale oil, part i., by Messrs. F. C. Garrett and J. A. Smythe. The fraction of Broxburn shale oil boiling below 164° contains pyridine and several of its homologues.—Note on liquid nitrogen peroxide as a solvent, by Prof. P. F. Frankland, F.R.S., and Dr. R. C. Farmer. The authors note that in their recent paper on this subject they inadvertently omitted any reference to the previous work by Bruni and Berti, who investigated the cryoscopy of nitrogen peroxide solutions of various substances and pointed out the associating power of this solvent.

Linnean Society, February 6.—Prof. S. H. Vines, F.R.S., president, in the chair.—Prof. Reynolds Green, F.R.S., exhibited some primroses which showed the rare phenomenon of sepalody. The corolla was green and the limbs of the petals were rugose and of a texture almost comparable with that of the foliage-leaves. He also showed another specimen in which the calyx as well as the corolla was petaloid. Both specimens were received from a garden in the north of England.—Messrs. H. and J. Groves exhibited a series of British hybrid batrachian Ranunculi, together with specimens of their supposed parents. They pointed out that the hybrids were usually characterised by (1) being intermediate in appearance between the two parents, having some of the distinctive characters of each, but with a

more vigorous vegetative growth, and (2) by the fruit being mostly abortive and the peduncles not becoming recurved.—Mr. Francis Darwin, F.R.S., read a paper on a method of investigating the gravitational sensitiveness of the root-tip, showing the apparatus used and lantern-slides of seedlings under experiment. Confining himself to the modern development of the question, the author remarked that the observations of Czapek and of Pfeffer having been contradicted by Wachtel, it had become desirable to confirm these observations by employing a different method. The apparatus used consisted of a counterbalanced lever 53 cm. long, able to turn in any direction by being mounted on knife-edges. Seedlings of the bean and the pea were employed, and glass tubes, straws and dandelion scape were in turn used to contain the root-tip, and, by the aid of certain mechanical appliances, to prevent the root slipping out of the tube. The tip being fixed, the remaining part of the root and the hypocotyl became curved in varying degrees, due to the continued stimulation of the root-tip. The result has been confirmation of the observations made both by Czapek and by Pfeffer.—Dr. D. H. Scott, F.R.S., gave an account (illustrated by lantern-slides) of an extinct family of ferns—the Botryopterideæ, our knowledge of which is primarily due to the researches of M. Renault.

Zoological Society, February 18.—Prof. G. B. Howes, F.R.S., vice-president, in the chair.—Mr. W. B. Tegetmeier exhibited and made remarks upon the skull of a supposed hybrid between the sheep and the pig, named "cuino" by the inhabitants of Mexico, where it is stated to be extensively reared as an agricultural animal. The skull was clearly that of a pig.—Dr. C. I. Forsyth Major exhibited and made remarks upon some remains of voles from the Upper Val d'Arno (Italy) and from the Norwich Crag, representing *Microtus pliocaenicus* (Maj.) and *Microtus intermedius* (Newt.). Dr. Forsyth Major considered that they belonged to a distinct genus, which he proposed to name Mimomys.—Mr. R. Lydekker exhibited, on behalf of Mr. Rowland Ward, two pairs of antlers and a skull of an elk from Siberia (beyond the Altai). Mr. Lydekker pointed out that, although belonging to adult animals (as the dentition of the skull indicated), the antlers had practically no palmation—a characteristic which induced him to propose the specific name *Alces bedfordiae* for the Siberian elk.—Dr. C. I. Forsyth Major gave a description of *Mustela palaeattica*, Weith., from the Upper Miocene of Pikermi and Samos, based chiefly on an almost perfect skull from Pikermi in the Turin Museum.—Mr. Oldfield Thomas, F.R.S., read a description of two new rodents discovered by Mr. P. O. Simons near Potosi, Bolivia. The one proposed to be called *Neoctodon simonsi* was allied to Octodon, but had simpler teeth, without enamel infoldings, and a bushy tail, the size and external appearance being much those of *Neotoma cinerea*. The second, called *Andinomys edax*, was allied to Phyllotis, but had much larger, more complicated and highly hypsodont teeth; in general appearance it was like a large Phyllotis, such as *Ph. darwini*. Its head and body measured 160 mm. and its tail 145 mm.—Mr. Oldfield Thomas also read a paper on some new mammals from northern Nyasaland, which had been contributed to the National Museum by Commissioner Alfred Sharpe, C.B., and Colonel Manning.—Mr. Boulenger, F.R.S., made remarks on the characters of the very young form of Polypterus, connecting the early stage recently discovered by Mr. Budgett with the more advanced stages described by Dr. Steindachner and himself. Characters were pointed out by which the young of *Polypteri lapradii, congicus, endlicheri, weeksii, senegalus* and *palmas* could be distinguished. Special attention was drawn to young specimens of *P. lapradii* from Nigeria, in which the external gills measured up to one-third of the total length.—Mr. Boulenger also drew attention to a new snake of the genus Psammophis, from Cape Colony, of which a specimen had been presented to the British Museum by Dr. G. Leighton. The name *P. leightoni* was proposed for this new species.—Mr. F. E. Beddard, F.R.S., read a paper dealing with the tuft of vibrissæ commonly met with upon the wrist of mammals belonging to the orders Lemuroidea, Carnivora, Rodentia and Marsupialia. It was pointed out that this structure was found in both sexes and in a large proportion of the genera and species belonging to the mammalian groups mentioned. As to other orders of mammals, the only ungulate in which they had been discovered was stated to be Hyrax; of edentates, the armadillos alone possessed these vibrissæ upon the wrist.

CAMBRIDGE.

Philosophical Society, February 17.—Prof. Macalister, president, in the chair.—The histology of the endosperm during germination in *Tamus communis* and *Galium tricorne*, by Mr. Walter Gardiner, F.R.S., and Mr. Arthur W. Hill. After briefly describing the stages in the germination of *Tamus communis*, the authors gave an account of the histology of the endosperm and of the changes which accompany the dissolution of the cell walls.—Demonstration on the dimorphism of the Foraminifera, by Mr. J. J. Lister.—On the differentiation and integration of divergent series, by Mr. G. H. Hardy. The paper contains some discussion of the general principles in accordance with which we may attribute conventional values to analytical expressions which do not represent any determinate quantity when interpreted in the ordinary way. In particular it is shown how they lead to Borel's definition of the sum of a divergent series. It also contains investigations as to the possibility of applying the ordinary operations of the calculus to divergent series whose sums are defined as by Borel. A series of general theorems is proved, and applications are made to the reevaluation of definite integrals and the theory of trigonometrical series.

PARIS.

Academy of Sciences, February 24.—M. Bouquet de la Grye in the chair.—On transcendental meromorphs defined by differential equations of the second order, by M. Paul Painlevé.—On the origin of stolonian formations, by M. Edmond Perrier.—On the impossibility of certain permanent states in viscous liquids, by M. P. Duhem.—M. Baillaud was elected a correspondant for the section of astronomy in the place of the late M. Souillart.—On some transformations of Bäckland, by M. E. Goursat.—The application of Duddell's singing arc to the measurement of small coefficients of self-induction, by M. Paul Janet. It is known from the experiments of Duddell that there is a simple relation between the period of the note given out by a singing arc, the capacity and the self-induction of the circuit. By measuring the intensity of the current with a thermal ammeter, the difference of potential with a thermal voltmeter, and working with condenser of known capacity, it is shown that coefficients of self-induction smaller than 0·003 Henry can be measured.—On a capillary electrometer, by M. Pierre Boley. The Lippmann capillary electrometer will not work with saturated liquid amalgams which are not sufficiently mobile in the narrow tubes. It has therefore been modified to meet this special case. Its sensibility was found to be of the order of ·00003 volt.—On some properties of azobenzene and hydrazobenzene, by MM. P. Freundler and L. Béranger. The Friedel and Crafts reaction cannot be utilised for the preparation of ketones from azo-bodies.—On the constitution of dibutylic and diœnanthylic alcohols, by M. Marcel Guerbet. By a careful study of the oxidation products of these two alcohols, it was found that they are represented by the formulæ $CH_3.CH(C_4H_9).CH_2.CH_2OH$ and $CH_3.CH_2.CH_2.CH(C_7H_{15}).CH_2.CH_2.OH$.—On the polymerised state of ordinary indigo and the isomeric transformation of indigotin into indirubin, by M. L. Maillard.—On some reactions obtained with the aid of magnesium amalgam, by M. L. Meunier. Magnesium amalgam attacks ethyl alcohol even in the cold, magnesium ethylate being formed. The alkyl iodides are more readily attacked by this reagent than by the copper-zinc couple, the saturated hydrocarbon being formed. Ordinary aldehyde reacts violently with magnesium amalgam, the symmetrical dioxybutane, $CH_3.CHOH.CHOH.CH_3$, being produced.—On the constitution of tariric acid, by M. Arnaud.—A new method for characterising the pseudo-acids, and on its application to the oximidocyanacetic esters, by M. P. Th. Muller. Measurements are made of the molecular refraction and molecular dispersion.—On some derivatives of methyl-nonyl-ketone, by M. H. Carette. By the addition of hydrocyanic acid to this ketone and the subsequent hydrolysis of the nitrile produced, the corresponding amide and acid were obtained, the properties of which are described.—On an important source of error in the examination of diastases, by MM. Emm. Pozzi-Escot. The colour reaction with tincture of guaiacum, which has been relied upon in many researches, is now found to fail in certain cases. From this it follows that a certain number of published works on the diastases and their localisation in particular cells are of no value.—On the analysis of ceramic products, by M. V. de Luynes.

For the analysis of objects in relief on porcelain of a different composition, advantage is taken of the action of a layer of drying glycerine in removing the surface of porcelain or glass.—Search for fatty acids in contaminated waters, by M. H. Causse. The amounts of fatty acids present in a water are regarded by the author as measuring the contamination, and methods are given for separating and estimating the quantities of such acids present. —The resistance of the red globules of the blood determined by its electrical conductivity, by MM. Calugareanu and Victor Henri. In the determination of the resistance of the red globules of the blood, it is necessary to determine both the hæmoglobin and the salts. This determination can be made with great precision by measuring the electric conductivity of the solutions. The application of this method has shown that the red globules may lose a part of their salts without any corresponding change in their colouring-matter.—On the simultaneous production of indoxyl and urea in the organism, by M. Julius Gnezda.—On asphyxia by the gases of drains, by M. Hanriot. Accidental cases of asphyxia in drains are usually attributed in the text-books to the presence of sulphuretted hydrogen. Analyses of the air in ventilated drains showed that this gas was either absent or present in such small proportion as to have no appreciable effect. In unventilated drains the amounts were larger, ·03 to ·05 per cent., but still too small to exert a poisonous action. The air in the unventilated drains was irrespirable on account of the large amount of carbonic acid present and the deficiency in oxygen, and hence no disinfectant that might be proposed would meet the case. The only practicable means of rendering the air of a drain inoffensive is energetic ventilation at the time the workmen are descending.— On the germination of Onguekoa and Strombosia, by M. Edouard Heckel.—On the tectonic of the neighbourhood of Biarritz, Bidart and Villefranque, by M. Leon Bertrand.—On the existence of phenomena of overlapping in the subbetic zone, by M. René Nicklès.—A geological map of Bambouk, in the French Soudan, on the scale of 1/250,000, by M. Alex. J. Bourdariat.— On the constitution of the suboceanic soil, by M. J. Thoulet.

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CONTENTS.