

societies and publications. The list contains nearly one hundred papers as the record of activity during the College year 1900-1901, and it is a better testimony to the work carried on than many successes at examinations. A similar statement of investigations made in the laboratories of the Royal College of Science and the Solar Physics Observatory during the session 1899-1900 will be found in the recently-published report of the Board of Education, vol. iii.

### SCIENTIFIC SERIAL.

*American Journal of Science*, November.—On the effect of temperature and moisture on the emanation of phosphorus, and on a distinction in the behaviour of nuclei and of ions, by C. Barus.—On the determination of the heat of dissociation and combustion of acetylene, ethylene and methane, by W. G. Mixer. Acetylene was exploded alone and with oxygen and the amount of heat evolved measured. If acetylene is exploded without oxygen in presence of a small quantity of ethylene, the latter is completely decomposed, and in this way the heat of dissociation can be more accurately determined than by the usual combustion method.—The geological relations and the age of the St. Joseph and Potosi limestones of St. Francois County, Missouri, by F. S. Nason.—Note on the Cambrian fossils of the Francois County, Missouri, by C. E. Beecher. From the fossils found an extensive area and thickness of sedimentary rocks are definitely placed in the Cambrian. Palæontological evidence as to the nature of these rocks had hitherto been largely wanting.—Discovery of Eurypterid remains in the Cambrian of Missouri, by C. E. Beecher. Description and drawing of *Strabops Thacheri*.—The determination of persulphates, by C. A. Peters and S. E. Moody. An experimental examination of the methods proposed by Mondolpo, Namias, Le Blanc and Eckhardt, Grutzner and the author. The process of Le Blanc and Eckhardt, the oxidation of ammonio-ferrous sulphate in sulphuric acid solution, is recommended as being simple, rapid and convenient.—Studies of Eocene mammalia in the Marsh collection, Peabody Museum, by J. L. Wortman. A continuation of previous papers on the same subject.—The Carboniferous and Permian age of the red beds of Eastern Oklahoma from stratigraphic evidence, by G. I. Adam.

### SOCIETIES AND ACADEMIES.

#### LONDON.

**Physical Society**, November 22.—Prof. S. P. Thompson, president, in the chair.—Prof. W. Cassie read a paper on multiple transmission fixed arm spectroscopes. The simplest form of spectroscope shown consisted of two half prisms silvered on the back, between which a beam of light goes backwards and forwards with a slight upward inclination. The result in dispersing and resolving power is equivalent to direct transmission through a long train of prisms. The collimator and observing telescope are fixed and adjustment is made by a double tangent screw which moves both the prisms. Two other types constructed on a similar principle were described, of which one had one prism and two speculum mirrors, and the other had two refracting prisms and a reflecting right-angled prism. The adjustments of these instruments are simple and their power great. By a small movement of an adjusting screw the observer can produce great changes of dispersion by passing from one to another of the series of spectra which are produced. The author in reply to questions said that with an ordinary Bunsen burner sodium flame a series of about five spectra is easily observed with dispersion equivalent to direct transmission through ten full-sized prisms. The loss of light at the reflections limits the number of transmissions that can be used; but he believed that no other spectroscope with only two prisms would give dispersing power and resolving power in any way approaching the instrument described.—Prof. W. Cassie then read a paper on the measurement of Young's modulus. The apparatus described consisted of a horizontal needle (a bar of large moment of inertia) supported by a bifilar suspension made of the wire of which the stretch modulus is to be measured. The periods of the pitching, rolling and bifilar oscillations of this system are observed, and an expression for the stretch modulus is obtained which involves no measurements except the

weight of the needle and the periods of oscillations. The necessary adjustments, and the means of eliminating residual errors of adjustment, were described for two forms of the apparatus. One form also affords a simple means of statical measurement by hanging a small weight on the needle at measured distances from the centre, calculating the difference of tension produced in the wires, and observing with a mirror and scale the consequent dip of the needle.—A paper entitled "Notes on Gas-Thermometry, Part ii," by Dr. P. Chappuis, was read by Dr. Harker. Messrs. Holborn and Day have published recently in a research on the air thermometer the results of a new determination of the expansion of Berlin porcelain between 0° and 1000°. The author has already drawn attention in a former note to the fact that part of the divergence found between the results of Callendar and Griffiths and of Harker and himself for the boiling-point of sulphur may be attributed to the uncertainty in the values assumed for the expansion of porcelain. In the present paper the author examines the way in which their results would be modified by the introduction of the dilatation deduced from the experiments of Messrs. Holborn and Day. It follows from the introduction of the new values that the boiling-point of sulphur deduced from experiments with a porcelain reservoir thermometer would be lowered from 445°·2 to 444°·7, a number very close to that obtained by Callendar and Griffiths. In a second part of the paper Dr. Chappuis has recalculated the divergences between the uncorrected nitrogen scale and the theoretical scale, and finds that the difference between these values and those given previously is too small to be of any practical importance. Prof. H. L. Callendar said that he was highly gratified to see that the application of the correction for the expansion of the bulb of Dr. Chappuis' gas-thermometer, deduced from Holborn and Day's results, gave a value, 444°·7, for the boiling-point of sulphur in such close agreement with the value 444°·5 deduced by Mr. Griffiths and himself in 1890. The agreement was really much closer than appeared at first sight, because the remaining difference of two-tenths of a degree in the results was almost exactly accounted for by the scale difference of the constant pressure and constant volume thermometers according to the theory of Joule and Thomson. It was also interesting to remark that the corrected result found by Dr. Chappuis was in very close agreement with that deduced from their own observations by Messrs. Holborn and Day. Dr. Chappuis had not referred in the present note to the work of Bedford on the expansion of Bayeux porcelain, which he had criticised in a previous paper. A comparison of results would show that Bedford's results agreed very fairly, allowing for the difference of material, with Holborn and Day's from 200° to 600° C.; and that both differed from those of Dr. Chappuis between 0° and 80°, when extrapolated, in a precisely similar manner. It was quite possible, as he (Prof. Callendar) had previously suggested, that the expansion of porcelain between 0° and 100° was anomalous. It appeared certain that some anomaly in the expansion at 800° was indicated both in the experiments of Bedford and also in those of Holborn and Day. It was also clear that Dr. Chappuis' results for Bayeux porcelain when extrapolated would agree with Bedford's at a temperature a little above 100° C., or very nearly at the same point at which his results for Berlin porcelain agreed with those of Holborn and Day.

**Mathematical Society**, November 14.—Dr. Hobson, F.R.S., president, in the chair.—After the ballot had been taken the president announced that the gentlemen whose names were published in NATURE (October 17) were duly elected for the current session. Dr. J. Larmor, F.R.S., propounded a query regarding the recent behaviour of Nova Persei which gave rise to remarks by the president, Dr. Glaisher, F.R.S., and Messrs. Hargreaves, Hough and Lieut.-Colonel Cunningham, R.E.—Prof. Love, F.R.S., communicated two papers by Mr. J. H. Michell, (1) on the inversion of plane stress, and (2) on the theory of Hele-Shaw's experiments on fluid motion, dwelling specially on the latter paper, which also evoked some discussion.—Mr. E. T. Whittaker read a paper on the solution of dynamical problems in terms of trigonometrical series. The president spoke at some length upon the subject and other members joined in a discussion.—The following papers were communicated by the reading of their titles:—Linear groups in an infinite field, Dr. L. E. Dickson; note on the algebraic properties of Pfaffians, Mr. J. Brill; on Burmann's theorem, Prof. A. C. Dixon; the Puiseux diagram and differential equations, Mr. R. W. H. T.

Hudson; determination of all the groups of order 168; Dr. G. A. Miller; an outline of a theory of divergent integrals, Mr. G. H. Hardy; limits of logical statements, Mr. H. MacColl; addition theorems for hyperelliptic integrals, Mr. A. L. Dixon; on the representation of a group of finite order as a permutation group, and on the composition of permutation groups, Prof. W. Burnside, F.R.S.; note on Clebsch's transformation of the equations of hydrodynamics, Mr. T. Stuart, and linear null systems of binary forms, Mr. J. H. Grace.

**Geological Society, November 6.**—Mr. J. J. H. Teall, V.P.R.S., president, in the chair.—Note on a submerged and glaciated rock-valley recently exposed to view in Caermarthen-shire, by Mr. Thomas Codrington. This valley was brought to light in building a bridge across the River Towy at Dryslwyn, nine miles above Caermarthen, to which the tide now flows. At the bridge the valley is narrowed to about half a mile. Near the water-edge the rock sloped down gradually to 23 feet below summer water-level, and was glaciated in large furrows a foot or more across, and striated blocks of grit rested upon it. About 60 feet farther out into the river rock was not met with till depths of from 34 to 42 feet below summer level were reached, and the rock-surface was found to be sloping towards the south at an angle of from  $28^\circ$  to  $18^\circ$  with a vertical line; it was followed down to between 45 and 56 feet below summer water-level. Scratched stones were again met with in the clay near the rock. The glaciated surface on the northern bank is only 25 feet above sea-level; and the rock-surface is sloping down at a precipitous angle at 8 feet below sea-level at a distance of eighteen miles from the mouth of the river.—On the Clarke collection of fossil plants from New South Wales, by Mr. Edward Alexander Newell Arber. This collection, numbering nearly 2600 specimens of all kinds, including some 80 fossil plant-remains, was presented to the Woodwardian Museum, Cambridge, in November 1844. Among other points discussed is the age of the beds. Such evidence as the few plants in the Clarke collection afford supports Feistmantel's conclusion that the Wianamatta beds are of Triassic age. *Thinnfeldia odontopteroides* occurs in Rhætic beds in South America, and the identification of Rattee's *Salisburya palmata* with the American *Baiera multifida*, and a comparison with the Rhætic *Baiera Steinmanni* of Chile, is a new point in favour of this conclusion. The plants also support Feistmantel's opinion that the New-castle beds are equivalent to the Permian of Europe. The exact origin and age of the Arowa beds must for the present remain doubtful. In the discussion that followed Dr. Blanford expressed his satisfaction at hearing a paper read before the Geological Society in which the Palæozoic age of the Australian Coal-Measures was fully accepted on palæontological evidence. For many years the question had been debated between McCoy, backed by all the European palæontologists, Schimper among others, who declared that the New-castle beds of Australia were Jurassic, on the one side; and on the other, by the geologists of New South Wales, among whom none did more valuable work in proving the Palæozoic age of the Coal-Measures than the Rev. W. B. Clarke, the collector of the specimens described by the author.—On an altered siliceous sinter from Builth (Brecknockshire), by Mr. Frank Rutley.

**Zoological Society, November 19.**—Mr. William Bateson, F.R.S., vice-president, in the chair.—Prof. E. Ray Lankester, F.R.S., read a memoir on the new African mammal, *Okapia johnstoni*. After an account of the history of the discovery of this remarkable animal by Sir Harry Johnston, Prof. Lankester gave a description of its skull and skin, based upon the specimens forwarded to the British Museum by the discoverer, and compared its structure with that of the giraffe and the extinct member of the same family, *Helladotherium*. The nearest living ally of the okapi was undoubtedly the giraffe.—Mr. Oldfield Thomas read a paper on the five-horned giraffe obtained by Sir Harry Johnston near Mount Elgon. It was shown that, although the horns were unusually developed, the animal could not be specifically separated from the ordinary North-African giraffe, *Giraffa camelopardalis*. This latter was believed to grade uniformly in the development of the horns and other characters into the South-African form, which would therefore be only a subspecies, *G. c. capensis*. On the other hand, de Winton's *G. c. reticulata* (from Somaliland) seemed to be sharply separated, and therefore to be worthy of recognition as a distinct species, *G. reticulata*. With regard to the accessory

horns, it was shown that they, or rudiments of them, existed in all male giraffes, even in the southern subspecies. Mr. Thomas believed that these rudimentary horns corresponded, not only to the somewhat similar projections found in *Samotherium* and the okapi, but also to the large posterior horns of *Bramotherium*, and perhaps of *Sivotherium*. If this were the case, it seemed probable that they were the degenerate rudiments of horns which had been large and functional in the giraffe's ancestors.—Mr. J. Graham Kerr read some notes on the genito-urinary system in the male *Lepidosiren* and *Protopterus*, in which he gave an illustrated account of the more important anatomical features of the organs. Mr. Kerr dwelt particularly on the presence in both *Lepidosiren* and *Protopterus* of very definite remains of a testicular network, and pointed out that the presence in all three Dipnoi of the connection between the testis and the kidney gave greatly increased probability to the view that this connection is a very ancient and primitive feature of gnathostomatous vertebrates. Mr. Kerr also pointed out that the conditions in the Dipnoi shed considerable light upon the relations of testis and testis-duct in the *Crossopterygians* and the *Teleosts*.—A communication was read from Mr. Alfred E. Pease, M.P., containing some field-notes on the antelopes obtained during his expedition to Somaliland and Southern Abyssinia in 1900-1901.

**Mineralogical Society, November 12.**—Dr. Hugo Müller, F.R.S., president, in the chair.—Mr. R. H. Solly, in continuation of his investigations on minerals from the Binnenthal, described *baumhauerite*, a new sulph-arsenite of lead,  $4\text{PbS} \cdot 3\text{As}_2\text{S}_3$ , which crystallises in the oblique system ( $\beta = 82^\circ 42' \frac{1}{2}$ ); the crystallographic examination of good recently-acquired crystals of *dufrenoyite* led him to refer this mineral also to the oblique system with  $\beta = 90^\circ 33' \frac{1}{2}$ ; twin crystals of *hyalophane* from the Legenbach Binnenthal were also described.—Dr. H. Warth contributed a note on the occurrence of gibbsite in the Palni Hills in southern India.—Prof. H. A. Miers gave an account of a visit to the Klondike which he had made last August at the invitation of the Canadian Minister of the Interior. He described the various methods of mining which are in operation this year, and showed a number of photographs illustrating the great changes which have taken place in the mining camp. An account was given of the various conditions under which the gold occurs.

#### EDINBURGH.

**Royal Society, November 4.**—The Hon. Lord M'Laren in the chair.—The chairman read an opening statement describing the work done during the preceding session and enumerating the losses the Society had sustained, with special reference to the great loss occasioned by the death of Prof. Tait, who had for many years acted as general secretary.—A paper on variable stars of the Algol type was communicated by Dr. A. W. Roberts. It dealt with the star C.P.D.  $41^\circ 45' 11$ , whose period of variation of brightness is 1 day 20 hours 30 minutes. The light curve has one well-marked minimum lasting 4 hours 30 minutes, with a diminution 0.85 from the normal brightness, which is steady for the remainder of the period with the exception of a short drop of 0.1 dividing it into two symmetrical parts. These variations of brightness are due to the two stars which form the double system eclipsing one another wholly or partially as viewed by an observer on the earth. From them Dr. Roberts deduces the following elements for the double-star system:—Diameter of each (probably the same), 0.325, the distance between them being unity; inclination of orbit,  $6^\circ 43'$ ; ratio of the brightnesses of the two components, 6:1; and mean density 0.44 of the sun's density, or about two-thirds that of water. The theoretical light curve calculated from these data agreed exactly with the observed light curve.—Prof. MacGregor read a note on the relation of the density of electrolytes to ionisation, chiefly with reference to certain discrepancies which appeared when the densities were measured and calculated to six significant figures.—Prof. Chrystal communicated a paper, by Mr. J. N. Miller, on an instrument for the mechanical trisection of an angle. A rod OAB is rotatable about the fixed point O, and a second rod PAX pivots on A, and PA is made equal to OA. From M, the middle point of AB, a perpendicular is constructed of convenient length. If O is placed at the vertex of the angle to be trisected, the trisection is accomplished by adjusting the instrument until the point P lies on one side of the angle and the other side of the angle passes through the intersection of AX with the perpendicular to the middle point of AB. The curve

on which the properties of the instrument depend is a unicursal curve of the sixth degree, and Prof. Chrystal showed how, by making a templet in the form of part of the curve, the trisection of a given angle could be easily effected with the use of a pair of compasses.

CAMBRIDGE.

**Philosophical Society, November 11.**—Mr. W. Bateson, vice-president, in the chair.—The unit of classification in systematic biology, by Mr. H. M. Bernard. The writer described the difficulties he had experienced in grouping the stony corals into generic groups, and maintained that the time had come when for such unstable groups a new technique was urgently required. The present unit of classification, the only one we had at our disposal, was the species. Hence if these are not discoverable the work is brought to a standstill. His work with the stony corals had suggested to him a geographical method of designating the varying forms as the units for work. These forms he proposed to arrange in geographical lines. Upon the chart of each genus thus obtained he proposed to arrange the different structural variations exhibited within the genus, and hoped to find in this way a powerful and searching instrument for morphological study by means of which in time a natural classification may be built up.—An exhibition of fishes and amphibians to illustrate new methods of mounting specimens for museums, by Mr. J. S. Budgett.—Notes on the development of Sagitta, by Mr. L. Doncaster. The paper confirmed O. Hertwig's account of the development in most points, but showed that Bütschli's account of the formation of the head-cœlum was correct. Sections were described showing the temporary obliteration of the cœlum and the origin of the muscles. The genital cells were described, and the origin of the posterior septum between them during larval life. The development of the genital ducts was discussed, and this, together with the mode of origin of the transverse septa and absence of nephridia, led to the rejection of the view that the Chætognatha are connected with Annelids.

DUBLIN.

**Royal Irish Academy, November 11.**—Prof. R. Atkinson, president, in the chair.—Prof. Charles J. Joly read a paper on the interpretation of quaternions as point-symbols. The author explained a convention by means of which a quaternion may be interpreted as the symbol of a weighted point. He assumes an arbitrary origin, and writing

$$q = (1 + OQ)Sq, \quad OQ = Vq/Sq,$$

he interprets the quaternion  $q$  as denoting the point  $Q$  at the extremity of the vector  $Vq/Sq$  drawn from the origin. The weight attributable to this point is  $Sq$ —the scalar part of the quaternion—so that multiplication by a scalar leaves the representative point unchanged and merely alters the weight. He gave some examples of applications to projective geometry, and pointed out that the equations

$$Sq(f + f^1)q = 0, \quad Sq(f - f^1)p = 0$$

represent respectively the equation of the general quadric surface and the equation of the general linear complex,  $f$  being a linear quaternion function and  $f^1$  being its conjugate. The equations of the reciprocals of these loci are simply

$$Sq(f + f^1)^{-1}q = 0, \quad Sq(f - f^1)^{-1}p = 0.$$

The principle of duality presents itself with perfect naturalness, and a quaternion may also be regarded as the symbol of a plane. Thus two objections to the calculus of quaternions have been removed—the want of a point symbol and of a concrete interpretation for a quaternion—and, what is in the author's opinion of much greater importance, the whole field of projective geometry is rendered easily tractable by quaternion methods.—Prof. Joly also read a paper on quaternion arrays. In the previous paper the author employed and extended a most useful but neglected notation of Hamilton's ("Elements," art. 365 [6]) in order to define lines, planes and volumes in terms of two, three and four quaternions or points. In this paper the notation is further extended, and the vanishing of the array with quaternion constituents

$$\left\{ \begin{array}{cccccccc} a_1 & a_2 & a_3 & \dots & a_n \\ b_1 & b_2 & b_3 & \dots & b_n \\ \dots & \dots & \dots & \dots & \dots \\ p_1 & p_2 & p_3 & \dots & p_n \end{array} \right\} \text{ (} n \text{ columns, } m \text{ rows),}$$

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expresses the possibility of determining  $n$  scalars  $t_1, t_2, \dots, t_n$ , so that

$$\sum t_1 a_1 = 0, \quad \sum t_2 b_1 = 0, \quad \dots, \quad \sum t_n p_1 = 0.$$

The laws of expansion and of manipulation of these quaternion arrays are explained, and it is pointed out that the quotient of a two-row and a one-row array

$$\left\{ \begin{array}{cccc} fa, fb, fc, fd \\ a, b, c, d \end{array} \right\} \div \{a, b, c, d\}$$

comprises all the Hamiltonian invariants of the linear quaternion function  $f$ —a result easily extended to the case of any number of functions by increasing the number of rows in the first array. As another example of the use of these arrays, if  $\mu$  is the couple and  $\lambda$  the force of a wrench, the origin being base-point, the invariants of an  $n$ -system of screws are at once deducible from the array,

$$\left\{ \begin{array}{ccccccc} \mu_1 & \mu_2 & \mu_3 & \dots & \mu_n \\ \lambda_1 & \lambda_2 & \lambda_3 & \dots & \lambda_n \end{array} \right\}.$$

—Mr. Frederick Purser read a paper on the application of Bessel's functions in the theory of elasticity. This paper attempts to use Bessel's functions in the discussion of the elastic equilibrium of a right circular cylinder. It is shown that the elastic forces and displacements at any point when no bodily forces act can be expressed as the sum of two series, one of which proceeds by products of exponential functions of  $z$  and ordinary Besselians in  $r$ , the other by products of trigonometrical functions of  $z$  with Besselians in  $r$  of imaginary argument. The method is also applied to certain cases of applied bodily force, and various practical problems are considered both with a view to approximate solution and as illustrating the St. Venant theory of equipollence, on which it is conceived the present method throws some light.

PARIS.

**Academy of Sciences, Nov. 18.**—M. Fouqué in the chair.—On the periods of double integrals in the theory of algebraic functions of two variables, by M. Emile Picard.—On a modification in the mode of use of an electrical thermometer, for the determination of subterranean temperatures at the Museum of Natural History, by M. Henri Becquerel. A description of a new method of applying the thermocouple to the determination of temperature at a distance. A d'Arsonval galvanometer, the deviations of which are proportional to the intensities of the currents, is used, and the scale of this galvanometer is calibrated in degrees by direct comparison with the thermocouple and a mercury thermometer. One junction of the thermocouple is then placed in the point the temperature of which is required, and the other in mercury along with a thermometer. Since the deflection of the d'Arsonval is now proportional to the difference of these temperatures, the graduated scale is displaced parallel to itself in such a manner that the zero of the galvanometer coincides with the line indicating the temperature of the junction in the mercury. On closing the circuit the reading on the scale now indicates the temperature of the distant junction.—The study of ammonium amalgam, by M. Henri Moissan (see p. 89).—On the Perseids of 1901, by M. Perrotin. There has been an increase in the number of meteors from the Perseids during the present year. The observations at Nice were somewhat incomplete on account of the weather. On August 10 there was an average of 10 stars per hour, on the 11th, 25 to 30 per hour, on the 12th, 32 were counted during the 40 minutes observations were possible, and only 24 were seen on the two following nights.—Observations of the Perseids made at Athens, by M. D. Eginitis. These stars were seen on the four nights commencing on August 9, and were counted up to the sixth order. About 500 meteors were observed in all, the maximum display being on the 11th, when on the average 31 per hour were seen.—On a manometric differential log, by MM. Emile Raverot and Pierre Belly. The two sides of a manometer are connected to two tubes under the water in the same horizontal plane, one tube opening in the direction of motion of the vessel, the other being at right angles. In the case of the tube in the direction of motion, the pressure depends partly upon the velocity of the vessel and partly upon the variable static pressure due to its depth below the surface of the water. The latter effect is completely compensated by the second tube, and by the introduction of a suitable damping arrangement the readings of the manometer are a function of the speed of the vessel alone. The scale is graduated empirically by runs over a measured distance.—The law of radiation at low temperatures, by M. Compan. A series of experiments were carried out on the rate

of cooling of a blackened ball, the temperatures being measured by means of a thermocouple. The rate of cooling was taken over the ranges 302° to 0° C., 174°·3 to -79°·2 C. and 15° to -182°·5 C., and the experimental values compared with those calculated from the formulæ of Dulong and Petit, Stefan and Weber. The formula of Dulong and Petit was found to apply roughly only between 0° and 200°, that of Stefan covered the whole range from the boiling-point of liquid air to 302°, whilst the formula of Weber does not apply at low temperatures, but for the range 100° to 302° it has the advantage over Stefan's formula.—On the combinations of gold and chlorine, by M. Fernand Meyer. Gold was converted completely into the chloride AuCl<sub>3</sub> by the action of liquid chlorine in a sealed tube at 70° C. The dissociation of this pure chloride into AuCl and Cl<sub>2</sub> was then studied, and also the dissociation of AuCl into chlorine and gold. No indication was obtained of the existence of a chloride of gold intermediate between AuCl<sub>3</sub> and AuCl.—On dioxysopropylhypophosphorous acid, by M. C. Marie. A study of one of the three acids obtained by the action of hypophosphorous acid upon acetone. The acid is monobasic, and from its analysis and the fact that it forms diacetyl and dibenzoyl derivatives it is assumed to have the constitution [(CH<sub>3</sub>)<sub>2</sub>(OH).C<sub>2</sub>H<sub>4</sub>PO(OH)].—The action of some acid chlorides upon the sodium derivatives of methyl and ethyl acetoacetates, by M. Bongert. Details of the compounds obtained by the action of propionyl chloride and butyryl chloride upon ethyl acetoacetate, and of isovaleryl chloride and caproyl chloride upon methyl acetoacetate.—The oxidation of unsaturated alcohols by contact action; the preparation of vanillin, by M. A. Trillar. The vapours of the alcohols mixed with air are submitted to the action of a hot platinum spiral. Allyl alcohol gave 5 per cent. of its weight of acrolein, cinnamic alcohol gave the corresponding aldehyde and isoeugenol gave vanillin. Eugenol gave the same product.—The spermatocyte divisions and chromosome special to the Orthoptera, by M. R. de Sinety.—The blue and green colorations in the skin of the vertebrates, by MM. Camichel and Mandoul. It has been known for some time that the blue coloration of the skin in certain vertebrates is not due to a blue but a black pigment; green skins contain two pigments, black and yellow. A study of these coloured skins with the spectrophotometer shows that there is a complete analogy between these and the phenomena exhibited by turbid media, the curves obtained from skin and from artificial turbid media such as lamp-black and Chinese ink being absolutely similar.—The relation between the liver, skin and hair from the point of view of the pigments and iron, by M. B. Floresco.—The influence of the ingestion of wine on the development of tuberculosis, by M. L. Roos. From experiments made with guinea-pigs the author concludes that there is no reason to suppose that the ingestion of alcohol in the form of wine accelerates the course of tuberculosis.—The formation of pearls and their "diseases," by M. S. Jourdain.—The measurement of the blood pressure in lunatics, by MM. Ed. Toulouse and N. Vaschide. It is shown that there is a distinct connection between the blood pressure and mental troubles; there is also a change in the blood pressure corresponding to different states of the same patient.—A mechanical theory of vision, by M. Antoine Pizon.—An anatomical comparison between grafting, the removal of the heads of buds and annular decortication, by M. L. Daniel.—On chlorophyll assimilation in autumn, by M. Jean Friedel.—On the mica schists, gneiss, amphibolites and green rocks of the schists of the western Alps, by M. Pierre Termier.

DIARY OF SOCIETIES.

THURSDAY, NOVEMBER 28.

ROYAL SOCIETY, at 4.30.—Micro-crystalline Structure of Platinum: T. Andrews, F.R.S.—A Comparative Study of the Spectra, Densities and Melting Points of some Groups of Elements, and of the Relation of Properties to Atomic Mass: H. Ramage.—On the Properties of the Arterial and Venous Walls: Prof. J. A. MacWilliam.—The Development of *Echinus esculentus*: Prof. E. W. MacBride.  
 INSTITUTION OF ELECTRICAL ENGINEERS, at 8.  
 MONDAY, DECEMBER 2.  
 SOCIETY OF ARTS, at 8.—The Chemistry of Confectioners' Materials and Processes: William Jago.  
 IMPERIAL INSTITUTE, at 8.30.—Planters and Planting in Tropical Greater Britain: R. Hedger Wallace.  
 SOCIETY OF CHEMICAL INDUSTRY, at 8.—The Lemon Oil Industry: Herbert E. Burgess and J. F. Child.—The Separation of Materials of Different Specific Gravity: J. W. Hinchley.  
 TUESDAY, DECEMBER 3.  
 ZOOLOGICAL SOCIETY, at 8.30.—On the Myriapoda collected during the "Skeat Expedition" to the Malay Peninsula, 1899-1900: F. G. Sinclair.

On the Crustacea collected during the "Skeat Expedition" to the Malay Peninsula, 1899-1900: W. F. Lanchester.—On the Anatomy and Systematic Position of Rhynchæa: F. E. Beddard, F.R.S.  
 INSTITUTION OF CIVIL ENGINEERS, at 8.—Paper to be further discussed: Train Resistance: J. A. F. Aspinall.  
 AERONAUTICAL SOCIETY, at 8.—Aerial Navigation by the Body heavier than Air: Sir Hiram Maxim.—Atmospheric Currents: William Marriott.—Navigable Balloons, and the Scientific Aspects of M. Santos Dumont's Experiments: Eric Stuart Bruce.  
 WEDNESDAY, DECEMBER 4.  
 SOCIETY OF ARTS, at 8.—The Identification of Wood and its Application to Scientific and Commercial Purposes: Herbert Stone.  
 GEOLOGICAL SOCIETY, at 8.—On a New Genus belonging to the Leperditidae, from the Cambrian Shales of Malvern: Prof. T. T. Groom.—The Sequence of the Cambrian and Associated Beds of the Malvern Hills: Prof. T. T. Groom, with an Appendix by C. A. Matley.  
 ENTOMOLOGICAL SOCIETY, at 8.  
 SOCIETY OF PUBLIC ANALYSTS, at 8.  
 THURSDAY, DECEMBER 5.  
 ROYAL SOCIETY, at 4.30.  
 SOCIETY OF ARTS, at 4.30.—The New Trade Route to Persia by Nushk and Seistan: Edward Penton.  
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