out the best men; but in the circumstances of the present time it seems impossible to find a substitute.

A REUTER message from Brisbane states that the ceremony of the dedication of Government House buildings as the home of Queensland University was performed on December 10 by Sir W. MacGregor, the Governor of Queensland. Sir W. MacGregor read a message from the King congratulating the people of Queensland and expressing the hope that the enterprise and loyalty which have marked the first fifty years of the existence of Queensland may be an abiding heritage, and that the prosperity of the State will be multiplied abundantly in years to come. The Governor said that he was gratified at participating in a gathering of such importance, establishing as it did the corner-stone of a system of State education. In no other country can the pursuits of professional and economic life be followed to greater advantage than in Queensland, which has an extraordinary multiplicity of resources. The university course includes arts, without unduly encroaching upon more modern developments of direct utility. The plan of the University is an elastic one, and capable of unlimited expansion. Sir W. MacGregor assented, on behalf of the King, to the University Bill, and unveiled a tablet dedicating the building. The gift was accepted on behalf of the people by Mr. Bell, the Speaker of the Legislative Assembly. Speeches were also delivered by Profs. David, of Sydney, and Stirling, of Adelaide Universities. Mr. Kidston announced that 50,000*l.* has been set aside for initial expenditure and 10,000*l.* annually for working expenses, and there will be sixty foundation scholarships.

A RECENT report to the Middlesex Education Committee by its secretary and inspector of schools provides particulars concerning an experiment in operation in Strassburg on employment bureaux for children of school-leaving age. In Strassburg the education authorities work in conjunction with the labour bureaux and the employers. A card is handed to the child on leaving school, which, when filled up, contains all particulars necessary for intending employers. This information is supplied by the parents, the headmaster, and the medical officer. It is obvious that little can be done without the cooperation of employers of labour. Most Strassburg employers now prefer to engage a boy through the bureau, as they are able at a glance to obtain a fair estimate of his capabilities from trustworthy sources, and are in this way safeguarded from employing one who may be unequal to the work required. When a boy is engaged the date is noted, and a record of his career as an employee is kept by the bureau, and this is of great benefit to future employers. The success of this scheme has justified the experiment. Every year a large percentage of children of both sexes find suitable employment in this way. Parents, employers, teachers, and apprentices all speak highly of the scheme. The bureau does not confine its attention to children only, but deals with adults, and is part of a widely spread system, with branches in many parts of Germany as well as in other European countries, and has enabled the authorities to find employment for a large percentage of applicants. The bureau being in direct telephonic communication with every other centre, an applicant is found work in the shortest possible time. With a complete record of a man's career there is little risk of imposture, and no hesitation is made in advancing the railway fare to his work in other towns when necessary.

THE prizes and certificates at the Northampton Polytechnic Institute were distributed on December 10 by Sir John Wolfe-Barry, K.C.B., who in the course of his address spoke of technical education as scientific instruction in the useful arts. It was not, he remarked, until about 1870 that we began to realise that all was not well with the trade of England and with English methods. At that period primary education was at a very low ebb, and scientific education was in the possession of very few. Technical education for the masses was unknown, and was scarcely desired. The late Prince Consort played a prominent part in rousing the country to the necessity of altering its methods and fostering technical education. In 1877 the City and Guilds of London Institute led the way in a systematic manner in developing the new movement. Since they put their hands to the plough they have spent 800,000*l.* of their own property, and are still spending at the rate of from 23,000*l.* to 25,000*l.* a year in developing the movement which they set on foot more than thirty years ago, which has materialised into the Central Technical College at South Kensington, the Finsbury Technical Institute, and their art school at Kennington. Turning to the work of the Northampton Polytechnic Institute, Sir John Wolfe-Barry gave the history of its development from its initiation some fifteen years ago. After referring to the assistance given by the City Parochial Foundation, the Skinners' Company, and the Saddlers' Company, he emphasised the debt which it owes to the London County Council. Dealing specially with the subject of technical optics, he expressed the hope that the much delayed development would be proceeded with before another year had passed, for such development would deal with an important branch of a scientific trade, and a trade in which we ought more than to hold our own with foreign competitors. Returning to the general subject of technical education, he indicated its limitations, and showed how one of its chief objects is to enlarge the army of scientific workers, and thus to enlarge the area from which the leaders and generals of industrial life are to be drawn, tending thus to substitute intelligent methods for the rule of thumb and to make man less and less an animated machine. Technical instruction, he concluded, must follow the abstract sciences, and not attempt to limit them. In the course of the evening the head of the mechanical engineering department, Mr. C. E. Larard, gave a lecture on the twisting of materials to destruction. He directed attention to a remarkable testing machine which has been installed in his department, and embodied in his lecture the results of his researches on the behaviour of various qualities of steel when twisted to destruction. By means of this machine specimens of steel up to 3½ inches in diameter can readily be twisted to destruction.

SOCIETIES AND ACADEMIES.

LONDON.

Geological Society, December 1.—Prof. W. J. Sollas, F.R.S., president, in the chair.—W. G. **Fearnsides**: The Tremadoc slates and associated rocks of south-east Carnarvonshire. Results obtained in making a detailed map of the country about Portmadoc, Tremadoc, and Criccieth in Carnarvonshire, and a description of the stratigraphy of the Cambrian and Ordovician rocks there exposed. The sedimentary series are described in the order of their formation. The succession is tabulated. The folding, cleavage, faulting, and jointing of the rocks are described, and an attempt is made to show some relationship between the stress-phenomena which have produced these structures. The great fault through Penmorfa is interpreted as a thrust-plane hading gently to the north-east. It is supposed to form the lowest sole of the group of thrust-planes which follow the southern margin of the Snowdonian mountain-tract. The well-known pisolitic iron ore of Tremadoc is shown to follow the line of this fault. Direct evidence of overthrusting has been got from a study of the graptolite-bearing Llandeilo rocks of Tyddyndicwm, which have been exposed in two artificial trenches dug for the purpose, and the distribution of the andesitic volcanic series in lines of detached lenticles among the Grey Slates is described as evidence of a similar re-duplication of the newer rock-series of the north-eastern district on a more extended scale. It is noted that the dolerites are (1) unaffected by cleavage and faulting, and (2) have metamorphosed rocks which were already cleaved, cut, and re-duplicated by the thrust-faulting at the time of their intrusion. The Glacial and post-Glacial accumulations are also described in outline.—E. S. **Cobbold**: Some small trilobites from the Cambrian rocks of Comley (Shropshire). Most of the trilobites were obtained during the progress of the excavations referred to in the report of the Geological Excavations Committee of the British Association, read at the Dublin meeting, 1908. The specimens were derived from the Olenellus Limestone of Comley, and from the Grey Limestones which intervene between that horizon and

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the Conglomeratic Grit, yielding a Paradoxides fauna.—J. B. **Scrivenor**: The rocks of Pulau Ubin and Pulau Nanas (Singapore). Pulau Ubin and Pulau Nanas are islands set in the eastern entrance to the Straits of Johore, and consist of igneous rocks of considerable interest. Pulau Ubin is composed mainly of hornblende-granite, but a pyroxene-bearing microgranite is found also, while the hornblende-granite is cut by rhombic-pyroxene bearing veins and also contains angular masses of rock resembling the veins. Pulau Nanas consists of dacite-tuffs and dacite, which are referred to the Pahang volcanic series, of Carboniferous or Permo-Carboniferous age. The tuffs and lavas have been altered by the adjacent granite of Pulau Ubin, and contain much secondary biotite and hornblende; their most remarkable feature is the presence of fragments of altered granite. The mutual relations of the different rocks are described. The normal granite of Pulau Ubin is hornblende-granite, the age of which is certainly post-Triassic and pre-Eocene, perhaps post-Inferior-Oolite and pre-Cretaceous. Veins of quartz-norite and masses of quartz-biotite-gabbro, and veins and masses of a fine-grained rock which may be described as enstatite-spessartite, are found in the normal granite of Pulau Ubin. A pyroxene-micro-granite and porphyry on Pulau Ubin, and a rock at Changi, having the mineral constitution of an amphibole-vogesite, are described. The dacite-tuffs of Pulau Nanas contain fragments of granite which must be of pre-Carboniferous age, and are referable to the granite of Amboyna. The fragments of granite, and perhaps certain pebbles of schorl-rock, are the only evidence found as yet in the Malay Peninsula of pre-Carboniferous rocks.—J. B. **Scrivenor**: The tourmaline-corundum rocks of Kinta (Federated Malay States). Overlying the limestone on the west side of the Kinta Valley is a thin cap of schists, with which are found certain rocks, the two chief constituents of which are tourmaline and corundum. They are often carbonaceous, and, in the many variations found, white mica, brown mica, pleonaste, rutile, and metallic sulphides occur. The tourmaline-corundum rocks of Kinta consist of varying amounts of tourmaline, corundum, carbon, white mica, spinel, and other minerals. They contain cavities about 6 millimetres in greatest width, generally bordered by a layer of corundum grains, with tourmaline grains on the inside of this border. Sometimes solid bodies similar in size and shape to the cavities occur. Smaller bodies occur, sometimes, but not always, accompanied by the larger cavities and bodies. They consist of tourmaline, of corundum, and of tourmaline and corundum. When both minerals are present the corundum forms a shell to a nucleus of tourmaline. The tourmaline-corundum rocks are associated with other rocks, which lead to the conclusion that the structures described are the result of replacement of the materials of preexisting bodies at the time of extensive granitic intrusions. They also are associated with rocks which point to the original beds having been laid down under conditions similar to those that obtained when the Pahang chert series was deposited. As tourmaline-bearing partings in the limestone at Changkat Pari constitute a case of selective metamorphism, so it is thought that the tourmaline-corundum rocks mark a process of intense metamorphism in beds associated with schists. These beds were probably chert and silicified limestone, both being in many cases carbonaceous. The larger cavities and bodies mentioned are believed to be the result of replacement of oolitic grains. The smaller bodies may be, in part, the result of replacement of the materials forming casts of radiolarian structures.

Mathematical Society, December 9.—Sir W. D. Niven, president, in the chair.—T. H. **Blakesley**: An instrument for the kinematical solution of cubic equations.—A. L. **Dixon**: The eliminant of the equations of four quadric surfaces.

CAMBRIDGE.

Philosophical Society, November 22.—Prof. W. Bateson, F.R.S., president, in the chair.—J. C. F. **Fryer**: Aldabra and neighbouring islands.—Prof. Stanley **Gardiner**: Western Indian Ocean.—D. G. **Lillie**: Notes on the larger Cetacea. It is pointed out that whaling stations have been recently established off the shores of Ireland and Scotland which offer exceptional opportunities for a study of the larger Cetacea. The history of the whaling industry is briefly traced, and a short account given of the modern methods of whaling from notes taken during a visit to the Irish station. The paper also contains a note on the occurrence of hairs in whales. Hairs appear to be absent in Odontocetes. The distribution of hairs in two species of Balænoptera is described, and a reason suggested for the occurrence of hairs in the Mystacoceti.—G. N. **Watson**: The continuations of functions defined by generalised hypergeometric series.—L. **Vegard**: Some general properties of mixed solutions.

MANCHESTER.

Literary and Philosophical Society, November 30.—Mr. Francis Jones, president, in the chair.—Prof. E. **Rutherford**: The action of the α rays on glass. The author recently reproduced the conditions under which pleochroic halos, such as have been observed in mica, would be formed, by enclosing a large quantity of radium emanation in a fine capillary tube of soda glass. When looked at under the microscope the walls of the tube were seen to be surrounded by a well-defined halo about 0·4 mm. in depth, which was equivalent to the maximum distance of the α particle from the active matter. This result confirms the correctness of the explanation given by Joly of haloes in mica, as being due to small inclusions of radio-active material.—Dr. B. B. **Boltwood** and Prof. **Rutherford**: Production of helium by radium. After mentioning that Rutherford, Geiger, and Royds had shown that the α particle was an atom of helium, and that Rutherford and Geiger had also calculated, by counting the α particles, that 1 gram of radium in equilibrium should produce 158 cubic mm. of helium per year, the authors state that they have recently made a determination of the rate of production of helium by actually measuring the volume produced. They used a barium-radium salt containing about 200 milligrams of radium, loaned to one of them by the Vienna Academy of Sciences. The experiments gave a result corresponding to the production of helium at the rate of 163 cubic mm. per gram of radium per year. Sir James Dewar last year made systematic measurements which indicated that helium was produced at a constant rate equivalent to 135 cubic mm. per gram of radium per year.—Dr. A. N. **Meldrum**: Development of the atomic theory, i., Berthollet's doctrine of variable proportions. The controversy between Berthollet and Proust at the beginning of the nineteenth century as to whether the composition of chemical substances is variable or not has been greatly misunderstood. The histories of chemistry represent Berthollet as a "person who had preposterous notions" about the composition of chemical substances, and was "deservedly annihilated" by Proust. A study of the period shows that Berthollet's teaching, having easily survived the criticisms of Proust, was refuted by Dalton's teaching, and that the doctrine of fixed proportions was only then put on a sound basis.

PARIS.

Academy of Sciences, December 6.—M. Bouchard in the chair.—The number of foreign associates has been increased from eight to twelve.—H. **Poincaré**: Curves traced on algebraic surfaces.—T. **Carpentier**: Remarks on an isothermal barometer invented by the Marquis de Montrichard.—C. **Guichard**: Surfaces such that the tangents to a series of lines of curvature touch a quadric.—D. **Cirera**: The magnetic disturbance of September 25, 1909. Details of observations made at the Observatory of Ebro.—J. Comas **Sola**: *Résumé* of observations of Mars, made at the Fabra Observatory, Barcelona, during the opposition of 1909. These observations were made with the double Mailhat equatorial of 38-cm. aperture, the atmospheric conditions in October being extremely good. The main topographical details of Mars are invariable, but this is not the case with the smaller details. A diagram of a portion of the planet accompanies the paper.—Ch. **Nordmann**: A new approximation in the study of the effective temperatures of the stars. These results are based on the application of Planck's radiation law to the spectrophotometrical measurements described in an earlier paper. The temperatures found range from 2870° for ρ Perseus, 5320° for the sun, to δ Perseus 18,500°, and λ Taurus more than

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40,000°.—M. **Maneng**: Observations of a small planet, probably new. The elements have been determined from photographs taken by M. Boinot on October 19 and 23.—M. **Tilho**: The precision of determinations of longitude on land by the chronometer, according to observations by the Niger-Tchad expedition. A comparison of the results obtained for differences of longitude by the telegraph, direct-length measurement, and the chronometer show that the last-named agrees very satisfactorily with the other methods.—Eugène **Fabry**: The order of a Taylor's series.—M. **Galbrun**: The representation of the solution of an equation of finite differences for large values of the variable.—Arnaud **Denjoy**: Completely discontinuous ensembles.—D. **Pompeiu**: Discontinuous singularities of uniform analytical functions.—J. **Haag**: Families of Lamé composed of helicoids.—René **Garnier**: Surfaces of the fourth order which admit of an infinite discontinuous group of birational transformations.—L. **Remy**: The birational transformations of surfaces of the fourth order with doubly isolated points.—M. **Ravigneaux**: The generalisation of the formula of Willis on epicycloidal trains.—Hector **Pécheux**: The electrical properties of steels. Measurements are given of the resistances at various temperatures and thermoelectromotive forces (against copper) of four steels, ranging in quality from very soft to hard.—André **Léauté**: The mathematical study of the heating of a conductor traversed by a very rapid oscillatory discharge.—C. E. **Guye** and V. **Freedericksz**: The internal friction of solids at low temperatures. Studies of the torsion of wires of silver, aluminium, gold, magnesium, iron, and quartz at temperatures between 100° C. and −196° C.—H. **Baubigny**: The estimation of dithionic acid and the dithionates. Accurate results were obtained only by the dry method, fusion with a mixture of alkaline carbonate and nitrate.—Marcel **Delépine**: The chloroiridates and chloroiridites of silver and thallium.—G. D. **Hinrichs**: The calculation of atomic weights: the solution of the equation of condition.—A. **Colson**: The reduction of sodium sulphate by carbon. A mixture of lampblack and sodium sulphate reacts rapidly at 950° C., 70 per cent. of the sulphate being decomposed in twenty minutes.—J. A. **Muller**: The phase rule. A reply to the criticism of M. Boulouch.—G. **Leser**: The two isomeric hexamethylene β-diketones.—H. **Arsandaux**: Contribution to the study of lateritic formations.—A. **Maige**: The formation of heterotypical chromosomes in *Asphodelus microcarpus*.—G. **Perrin**: Fertilisation in the prothallus of *Pteris tremula*.—J. **Dumont**: The layers surrounding earthy particles. Sand grains separated from soil by simple levigation are generally coated with a colloidal layer, removable by solutions of oxalic acid. The amount of this layer is shown to depend on the size of the particles.—G. **Grandidier**: The description of a new bird, *Monias benschi*, from Madagascar.—Louis **Roule**: Amphibians of the genus Euproctus.—B. **Collin**: Preliminary diagnoses of some new or badly known Acinetæ.—L. **Cayeux**: The secondary quartz of the Silurian oolitic iron minerals of France, and its replacement in the lower layers by iron carbonate.

DIARY OF SOCIETIES.

THURSDAY, DECEMBER 16.

INSTITUTION OF ELECTRICAL ENGINEERS, at 8.—Some Quantitative Measurements in Connection with Radio-telegraphy: Dr. J. A. Fleming, F.R.S.—Efficiency of Short Spark Methods of Generating Electrical Oscillations: Dr. W. H. Eccles and A. J. Makower.

LINNEAN SOCIETY, at 8.—Report on the Crustacea Isopoda and Tanaidacea collected by Mr. C. Crossland in the Sudanese Red Sea: Rev. T. R. R. Stebbing, F.R.S.—Pycnogonida from the Red Sea and Indian Ocean collected by Mr. C. Crossland: Prof. G. H. Carpenter.—On a Collection of Blattidæ preserved in Amber from Prussia: R. Shelford.—Isopoda from the Indian Ocean and British East Africa: Rev. T. R. R. Stebbing, F.R.S.—The Bryozoa from Collections made by Mr. C. Crossland, Part II., Cyclostomata, Ctenostomata, Endoprocta: A. W. Waters.

INSTITUTION OF MINING AND METALLURGY, at 8.

FRIDAY, DECEMBER 17.

INSTITUTION OF MECHANICAL ENGINEERS, at 8.—Mild-steel Tubes in Compression and under Combined Stress: W. Mason.—Compound Stress Experiments: C. A. M. Smith.

INSTITUTION OF CIVIL ENGINEERS, at 8.—The Foundation and Construction of Dock Walls: H. T. Tudsbery.

MONDAY, DECEMBER 20.

ROYAL SOCIETY OF ARTS, at 8.—Aëronautics: C. C. Turner.

INSTITUTE OF ACTUARIES, at 5.—On the Mortality of Female Assured Lives, with Graduated Tables deduced from the British Offices' Experience, 1863–1893: C. W. Kenchington.

TUESDAY, DECEMBER 21.

ROYAL STATISTICAL SOCIETY, at 5.

INSTITUTION OF CIVIL ENGINEERS, at 8.—*Further discussion*: Railway-Signalling in India: C. W. Hodson.—*Probable Paper*: The Design of Rolling Stock for Smooth-rail Working on Heavy Gradients: F. W. Bach.

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