WITH what thoroughness the more recently established of the provincial universities are performing their new duties is well brought out by an examination of their calendars for the session 1910–11, which is now commencing. The calendar of the University of Leeds, for instance, runs to some six hundred pages, and gives particulars of courses of work for undergraduates wishing to take degrees in arts, science, technology, and medicine, and for other students desirous of studying for special purposes in the laboratories of the University. In the case of the University of Bristol, in addition to the necessary regulations for degrees, diplomas, and certificates, particulars are given of the university work done in associated institutions, of courses to meet particular local needs, and so on. Reference to courses of a special character brings to the mind again the work of the London polytechnics. The prospectus of the Borough Polytechnic Institute for the coming session shows that, in addition to the numerous trade classes held in previous years, special lectures and practice have been arranged in waistcoat-making and trade millinery for women, classes in masonry and lectures on the chemistry and manufacture of food-stuffs, and the analysis of laundry trade materials. At the City of London College the needs of commercial men especially are provided for, and the new syllabus is very strong in classes intended for young men engaged in offices and warehouses. The prospectus of the Belfast Technical Institute shows that, while specialising to some degree in classes intended to train men employed in textile and engineering industries, the authorities have in no way forgotten the needs of other workers. It would be difficult to find an industry in the city in which any considerable number of men and women are engaged that has not been considered in drawing up the scheme of work of the institute.

SOCIETIES AND ACADEMIES.

GLASGOW.

Institute of Metals, September 21.—Donald **Ewen** and Prof. T. **Turner**: The shrinkage of antimony-lead alloys and of the aluminium-zinc alloys during and after solidification. From the investigation of the shrinkage of the brasses it has been suggested that, for an alloy of given composition, a direct proportion exists between the amount of expansion on solidification and the distance of the solidus from the liquidus at this composition on the equilibrium diagram. The results of shrinkage tests on two further series of alloys are included in this paper; they show that the above theory is incapable of general application, and appear to indicate that it obtains only in the case of alloys containing solid solutions.—F. **Johnson**: The effect of silver, bismuth, and aluminium on the mechanical properties of "tough-pitch" copper containing arsenic. Contrary to the general belief, it was found that bismuth *increased* the tensile strength, as did silver also. It was found that silver had little effect upon the toughness of the arsenical copper, which, again by virtue of the presence of arsenic, was tougher than electrolytic copper made under similar conditions. The effect of silver on the hot-working properties was found to be negligible up to 0·3 per cent.; that of bismuth noticeable above 0·02, and serious above 0·05 per cent.; whilst that of aluminium was ruinous at 0·3 per cent. In view of the possibility of modern commercial copper containing other impurities which could modify the limiting proportion allowable of the above-mentioned impurities, it is difficult to fix a limit beyond which they should not occur. It may, however, be safely said that silver occurs in such traces that its presence may be ignored. Its influence will be beneficial rather than harmful. Bismuth should, preferably, be entirely absent, and may be expected to cause trouble in any process of mechanical treatment at a red-heat, if present above 0·01 per cent. As regards the presence of this impurity in the finished material, however, little concern may be felt, as the amount which will render arsenical copper unfit for working hot, will have no serious effects on the mechanical properties of the finished material in the cold.—A. D. **Ross**: Magnetic alloys formed from non-magnetic materials. The paper deals with investigations carried out chiefly on ternary alloys consisting of copper, manganese, and one of the elements aluminium, tin, bismuth, and antimony. All the groups show fair magnetic quality, but the most interesting are the ternary alloys containing respectively aluminium and tin. Some of the former are, under small magnetising forces, much more magnetic than cobalt, and have little coercive force. The tin alloys are less permeable, but exhibit greater hysteresis. Most of the alloys have their magnetic quality improved if they are annealed for a short time at a moderate temperature, 150°–200° C. Prolonged annealing has invariably an adverse effect, the hysteresis loss increasing rapidly with time. The behaviour of the alloys on cooling to the temperature of liquid air is peculiar and characteristic. For low and moderate fields the process results in general in a decided increase in susceptibility, whereas almost all other magnetic materials are rendered less susceptible.

September 22.—G. D. **Bengough** and O. F. **Hudson**: The heat-treatment of brass: Experiments on 70:30 alloy. The authors have studied the general effect of heat-treatment on the mechanical properties of 70:30 brass, and have paid special attention to the question of burning. Bars and wires made by different manufacturers were used in order to ascertain to what extent variations in character of the alloy and size of section influenced the results. The mechanical tests of the bars and wires after they had been annealed for half an hour show, in agreement with the results of previous workers, that the best annealing temperature is between 600° and 700° C. For this time of annealing a temperature within a few degrees of the melting point does not seriously injure 70:30 brass which is free from tin and lead, but, if maintained for a sufficiently long time, a temperature nearly 100° C. lower will burn the brass.—Dr. C. H. **Desch**: Some common defects occurring in alloys. After references to the defective state of our knowledge of the "diseases" of non-ferrous metals and alloys, as compared with that possessed by manufacturers and users of iron and steel, the importance of the equilibrium diagram as a guide in undertaking investigations of this kind is emphasised, and some of its limitations are mentioned. Some of the principal defects observed in non-ferrous alloys are then briefly reviewed, as a basis for discussion.—H. S. **Primrose**: Metallography as an aid to the brass founder. The results of a systematic investigation of the gun-metal castings in a large engineering foundry are discussed in the light of microscopical examination, in addition to the ordinary tensile testing. The reason why metallography is steadily superseding the old methods of judging by fracture is shown by comparison of photomicrographs of the internal structure. The crystalline formation being profoundly influenced by the rate of cooling as well as by the initial casting temperature, the microstructure of test bars, variously cooled and cast at different points, is contrasted to indicate how the best physical tests are got from a perfect interlocking structure. The different causes of blow-holes are described, and their detection by the microscope discussed with reference to micrographs of the various types. How these defects can be obviated or subsequently eliminated is illustrated by examples taken from actual cases.

PARIS.

Academy of Sciences, September 19.—M. Armand Gautier in the chair.—E. **Bertin**: The arrest of steamships either by reversing the engine or by allowing to slow down by friction of the water. With reciprocating engines reversal causes a rapid slowing down, but with steam turbines the reversing effect is much less. Formulæ are worked out for the reduction in velocity both with and without reversed turbines.—M. **Pougnet**: The action of the ultra-violet rays upon plants containing coumarin, and some plants the smell of which is due to the hydrolysis of glucosides. The ultra-violet rays produce the smell rapidly in coumarin plants, and also in plants the odour of which arises from the products of hydrolysis of a glucoside. The action is caused by the cells being killed by the ultra-violet light.—J. **Athanasin**: The functional mechanism of striated and non-striated muscular fibres.—J. **Deprat** and H. **Mansuy**: General stratigraphical results of the geological expedition to Yun-nan.—Ernest **van den**

Broeck and E. A. **Martel**: The conditions of effective filtration of the underground waters in certain chalk formations. In Belgium the crinoidal chalk at the base of the Carboniferous of the Dinant geological basin furnish filtered potable waters in a remarkably constant manner.

NEW SOUTH WALES.

Linnean Society, July 27.—Mr. C. Hedley, president, in the chair.—G. I. **Playfair**: Polymorphism and life-history in the Desmidiaceæ. A number of new forms described.—L. A. **Cotton**: The ore-deposits of Borah Creek, New England, N.S.W. The Borah Creek Mine is situated in the New England district of New South Wales, within two miles of the Gwydir River. The ores contained in the mine are arsenopyrite, zinc blende, chalcopyrite, stannite, and galena. They are very uniformly distributed through the mine, both along the lode and in depth. The order of deposition of the minerals, which form symmetrical zones in the fissure, is arsenopyrite, pyrite, zinc blende, chalcopyrite, stannite, galena, and finally quartz. Comparison with other occurrences indicates the probability of a genetic relationship between the silver-lead deposits and the tin deposits. It is suggested that the Borah Creek deposits have been formed later than the tin deposits by deposition from highly aqueous and siliceous magmatic extractions containing relatively large amounts of metallic sulphides.—T. G. **Sloane**: Revisional notes on Carabidæ (Coleoptera), part iii. The tribes Oodini, Chlæniini, and Sphodrini, as represented in Australia, are reviewed, and the Australian genera of these tribes, as well as the species of every genus found in Australia, are tabulated. Synonymy is dealt with, and six species are described as new (Chlænius, 1 sp.; Anatrichis, 1 sp.; Coptocarpus, 2 spp.; Platynus, 12 spp.). Certain characters not hitherto deemed of importance in classification are discussed.

CAPE TOWN.

Royal Society of South Africa, August 17.—Mr. S. S. Hough, F.R.S., president, in the chair.—H. **Bohle**: The influence of uniformity and contrast on the amount of light required. The author dealt first with the adaptability of the human eye to various daylight illuminations, and gave a new definition of glare. When the eye looks at an illuminant of great intrinsic brilliancy in front of a dark background it tries to do two things at once: to open wide for the dark background and to close up for the intrinsic brilliancy. The author then considered the physiological effects of radiation, explained overheating of the eyes due to excess light absorption, and considered the effects of the ultra-violet rays of modern illuminants and of solar radiation. In addition he treated the effects of light radiation on germs of disease, the destructive action of rays when applied excessively, and finally dealt with the effect which uniformity and the avoidance of contrast in artificial lighting have on the amount of light required. He came to the conclusion that in a room with black walls an illumination of 35 to 40 candle-metres is required, whereas in a place with white ceilings and light walls the amount of light can be reduced to 30 candle-metres. For perfect uniformity in such places, as obtained with inverted lamps, 20 candle-metres give, in the opinion of the author, complete satisfaction. The effects of various lamp-shades on the uniformity of illumination were also shown.

CALCUTTA.

Asiatic Society of Bengal, September 7.—T. H. D. **La Touche**: The Lonar Lake.—B. L. **Chaudhuri**: *Triacanthus weberi*, sp. nov. It is one of the new fishes found widely distributed in the Bay of Bengal by the trawling operation of the *Golden Crown*. In the collection of the Indian Museum there are five species of this interesting genus besides this new one.—J. Coggin **Brown**: A description of a Lisu Jew's harp. The paper describes a Jew's harp which is the favourite musical instrument of the Lisu's, a tribe living in western China. It differs from those described from Assam, and approximates to those found in the Malay Peninsula. It consists of three delicate harps cut out of bamboo, and held upright between the thumb and first finger or between the first and second fingers of the left hand, while the tongues are made to vibrate with the right hand. The mouth acts as the sounding-board. The instrument is used by the young men in their serenades, and forms a part of the orchestra at all their festivals.

GÖTTINGEN.

Royal Society of Sciences.—The *Nachrichten* (physico-mathematical section), parts ii. and iii. for 1910, contain the following memoirs communicated to the society:—

May 28.—R. **Courant**: The establishment of the Dirichlet-principle.—M. **Born**: Kinematics of a rigid body in relation to the principle of relativity.—P. **Koebe**: The uniformisation of algebraic curves by means of automorphous functions with imaginary substitution-groups (concluded).—R. **Gans**: The electron-theory of ferromagnetism.—J. K. **Whittemore**: Convex curves.—H. **Bohr** and E. **Landau**: The behaviour of the functions $\zeta(s)$ and $\zeta(\lambda)(s)$ in the neighbourhood of the straight line $\sigma = 1$.

June 11.—F. **Riesz**: Quadratic forms with an infinite number of variables.

The *Business Communications* of the society, part i. for 1910, contains reports on the Samoa Observatory (1909–10), on the progress of the complete edition of Gauss's works, and on subjects for prize dissertations. The obituary notices of F. Kohlrausch, by **Riecke**, and of T. W. Engelmann, by **Verworn**, are included.

CONTENTS.