

accordance with the Kutta-Joukowski aerofoil theory. Preliminary experiments have been made on the removal of the boundary layer from the upper surface of an aerofoil by suction from points well forward in the section; it has been found that the maximum lift is considerably increased thereby.

Similar results could no doubt be obtained by the emission of air under pressure; but it will be appreciated that this is in reality the principle of the Handley Page slot, which, moreover, has the advantage of being independent of any pumping plant.

News and Views.

THE Council of the Physical Society has awarded the Duddell medal for 1927 to Dr. F. E. Smith, Director of Scientific Research at the Admiralty. This medal is given annually for work in connexion with the development of scientific instruments or of materials used in their manufacture. Dr. Smith's work at the National Physical Laboratory on the development of electrical standards is too well known to require emphasis. He was trained at the Royal College of Science, 1895-1900, under the late Sir Arthur Rücker, entering the National Physical Laboratory in 1900. There he formed one of the band of pioneers who, under Sir Richard Glazebrook, did so much to raise the scientific work of the Institution to its present high level. His earliest work was concerned with modifications of the Wheatstone and Kelvin bridges for precise measurements of resistance, and the development of bridges for accurate platinum resistance thermometry. A classical piece of work followed on the current balance, by means of which it was found possible to evaluate a current of the nominal value of 1 ampere to within 1 part in 50,000. In the course of this work he developed the silver voltameter which bears his name and is generally accepted as the most trustworthy form of voltameter, in that there is no envelope between the anode and cathode. The successful development of the modern mercury-in-glass resistance standards is largely due to Dr. Smith's work. His specification for the Weston normal cadmium cell is the one generally followed. It is now no uncommon experience for a batch of twenty standard cells to be made commercially in which the E.M.F. given by the cells agrees to 1 part in 10,000. Dr. Smith was also responsible for the design of the Lorenz apparatus (the Viriamu Jones Memorial) installed at the National Physical Laboratory. He has also developed various magnetometers for the measurement of the magnetic intensity of the earth's field; one of his instruments now forms the standard for the measurement of the horizontal intensity at the Magnetic Observatory at Abinger. In 1920, Dr. Smith left the National Physical Laboratory to take up his present post at the Admiralty. He was president of the Physical Society for 1923-24. As one of the honorary secretaries of the British Association, his organising ability is being devoted in a striking manner to the advancement of science.

MR. ROBERT MOND has been appointed a member of the research council of Imperial Chemical Industries, Ltd. to which reference was made in our issue of Dec. 10, p. 850. Mr. Mond has carried out notable research in pure and applied chemistry and has given

particular attention to electrolytic problems. He was associated with his father, Dr. Ludwig Mond, in researches on the metallic carbonyls and the action of nitric oxide upon them. In other directions Mr. Mond has also contributed in a substantial way to scientific progress by his original work and personal influence, and he is as highly esteemed for his Egyptological explorations and studies as he is for his contributions to physical and chemical science. He is honorary secretary of the Davy-Faraday Laboratory of the Royal Institution and honorary treasurer of the Faraday Society; and many other societies and scientific organisations are indebted to him for generous support and encouragement.

It has long been known that the difference between good and poor pastures is not dependent alone upon the energy value of the herbage or the proximate food constituents, carbohydrate, protein and fat. The consequent investigations of mineral deficiencies, notably at the Rowett Research Institute, have already proved to be a well-directed inquiry. The discussions at the recent Imperial Agricultural Research Conference have made it abundantly clear that malnutrition consequent upon mineral deficiencies in pastures is widespread through the Empire. From South Africa one hears that 'styfsiekte' in cattle arises on certain veld soils, the vegetation of which contains less than the optimum requirements of phosphorus. The ruminant stock of the North Island of New Zealand have for some time been troubled with 'bush sickness,' a condition of anæmia and general emaciation which has now been shown by Aston to be correlated with iron deficiency. In the Bihar district of India low milk yield is consequential upon a low phosphorus content of soil and crops. The high mortality among sheep in the Falkland Islands has been found by Godden to be collateral with low lime and phosphorus percentages in the pastures. Similar evidence of malnutrition among Australian sheep is forthcoming. The pastoral industry of Australia contributes about 25 per cent. of the national income, a fact which makes the immediate investigation of mineral deficiency diseases imperative. These deficiency diseases are becoming more evident with the increasing population of the colonies, and the subdivision of the larger holdings. Stock migrated from one area to another in earlier days and so unconsciously secured adequate mineral supplies. The continuous maintenance of stock on the same area has now given rise to this new problem in nutrition, which is to receive full and immediate investigation largely through the co-operative efforts of the Empire Marketing Board, the

Australian Council for Scientific and Industrial Research, the University of Adelaide, and the Rowett Research Institute.

At the thirty-second winter general meeting of the Institution of Water Engineers, held in the rooms of the Geological Society on Dec. 9, the following resolution was proposed by Capt. W. N. McClean, seconded by Mr. S. R. Raffety, and unanimously agreed: "That there is urgent need of an organisation which will ensure a continuous record of the flow and storage of surface and underground water, and this Meeting desires the Council of the Institution to consider and report in what directions such investigation might be profitably developed." It is satisfactory to learn that water engineers are themselves dissatisfied with the present position in regard to the records of the flow and storage of surface and underground water. The subject is one of national importance; and for the adequate and equitable utilisation and development of the available water supplies, it is essential that statistical information should be generally available in regard to the distribution and amount of the supplies.

THE proposal in the Electricity Bill (1926) that all the electricity supply companies in Britain should supply alternating current energy at a standard frequency of 50 was the proposal which was most criticised. It was pointed out that in order to standardise the frequency it would be necessary to change over some of the largest supply systems in the country. The National Electricity Board, instructed by the Electricity Commissioners, is now supervising this change. The Electricity Department of the Glasgow Corporation is one of the first to change over. Glasgow, which generates at a frequency of 25 cycles per second, is included in the area covered by the central Scotland scheme. The problem presented by the change over was quickly solved by instructing the English Electric Company to build for the Dalmarnock Power Station a 50 cycle turbo-generator set which has an output of 25,000 kilowatts. This unit takes the place of one of the existing 25 cycle machines. All the other units in the station will gradually either be converted or replaced. Active steps are thus being taken to secure for Great Britain the great boon of an electric supply of standard frequency.

In connexion with the Associated Edison Illuminating Companies' Convention at Colorado Springs, a spectacular method of illumination was shown. The sunken garden of the Broadmoor Hotel was flooded with invisible ultra-violet rays from quartz tube mercury vapour lamps fitted with powerful reflectors. The light was filtered through special lenses made of Corning glass which obstructs all the visible light. It also prevents the band of short wave energy deleterious to the eyesight from passing through. As silvered glass reflectors absorb ultra-violet rays it was found necessary to make the reflectors of polished aluminium. The flowers, shrubbery, and evergreens were sprayed with chemicals which fluoresced under the ultra-violet rays. The chemicals used were zinc sulphide, eosin and

rhodamine. Each individual leaf, twig, or flower glowed in various colours. The water in the fountain in the centre of the garden was also treated with fluorescent chemicals so that it became brilliantly luminous when the rays fell on it.

LEPLAY HOUSE, 65 Belgrave Road, London, S.W.1, deserves wide publicity. Founded in 1920 on sociological principles laid down by Frédéric Le Play, principles that have been interpreted and enlarged by Patrick Geddes in studies associated with the Outlook Tower at Edinburgh, the House has worked steadily toward the better understanding of the complexity of city and regional life. Its work may well be styled the sociology of locality, the study of intricate and multifarious parts and functions as members one of another. From the beginning the main purpose has been to promote and assist discussion, study, and research in the field of sociology, and to apply the results to practical civic developments. This has been done by surveys undertaken through its own members or by voluntary and public organisations acting under its inspiration and advice. No one doubts to-day the wisdom of such surveys. The days of haphazard growth are past. Some scheme or plan of future development based on accurate knowledge of conditions is essential if a better future is to grow harmoniously out of an indifferent present. Local surveys cannot, however, be isolated from each other. Distance is the function, not of space, but time, and new means of transport, of thought no less than goods, are changing rapidly the geographic values of places. Regional surveys need themselves to be surveyed from a national viewpoint. This in practical politics means a central bureau capable and willing to advise and to co-ordinate. Leplay House fulfils these conditions, and the appeal by the Committee for Civic and Regional Institutes made on its behalf for personal and financial support should meet with ready response.

PREVIOUS to the founding of the *Zeitschrift für Kristallographie und Mineralogie* in 1877 by Prof. P. von Groth, whose recent death at the age of eighty-five years we regret to announce, crystallographic papers in Germany had been published mainly in the *Annalen der Physik und Chemie* (Poggendorff), and mineralogical papers in the *Neues Jahrbuch für Mineralogie, Geologie, etc.* The want of a journal devoted to crystallography was then beginning to be felt, but in order to gain a circulation it was at first necessary to add also mineralogy. When, in 1921, the editorship was taken over by Prof. P. Niggli, crystallography had made such rapid advances, due to the new X-ray methods of investigation, that a journal devoted to it entirely could be self-supporting, and the title was accordingly changed to *Zeitschrift für Kristallographie*, as originally planned by Groth. In the current issue—the first part of vol. 66—Prof. Groth gives an interesting historical review and recounts the support he received from workers in many countries during his forty-four years of editorship.

As further marking the jubilee of the *Zeitschrift für Kristallographie*, some other changes are now intro-

duced with the view of making the journal still more international in character. On the wrapper the names of eighteen well-known workers (in twelve countries) are given as associate editors, the representatives in England being Sir William Bragg, Prof. W. L. Bragg, and Sir Henry Miers. Of the fourteen papers contained in this issue, nine deal with the structure of crystals as determined by X-ray methods, and two of these are printed in English. There are also two separately-paged appendices giving connected reviews, rather than a disjointed series of abstracts, of special branches of the subject. Although the *Zeitschrift* is printed and published in Germany, the editor in chief, Prof. Niggli, is Swiss, and an inspiring teacher in Zürich. Such international co-operation in science is a healthy sign and promises well for the future. As further evidence of international goodwill in mineralogy, mention may here be made that, at the annual meeting of the German Mineralogical Society in Breslau last September, Sir Henry Miers and Dr. L. J. Spencer were elected honorary members, and that at the last meeting of the Mineralogical Society of America, Dr. Spencer was elected an honorary life fellow.

EXCAVATIONS at Ur were closed down prematurely last year on account of lack of funds at a moment when exceptionally important finds of jewels and other antiquities gave every promise that the expedition was on the eve of discoveries of the greatest interest. This promise has been amply fulfilled by the opening of the current season. Excavations resumed at the same point have already brought to light a royal tomb of two chambers built of large unhewn blocks of limestone, with walls three feet thick. This is in itself remarkable in an area in which this material was entirely absent, and was, therefore, extremely costly. The tomb had unfortunately been rifled, and the royal chamber produced little; but the outer chamber, in which the king's attendants had been buried, contained one body which had not been disturbed. With this were personal ornaments of gold and silver. A number of copper vessels had been crushed by the roof, but a silver vessel with fluted sides was recovered. Notwithstanding the disappointment of finding the tomb rifled, the discovery is of importance for the light it throws on royal burials in early Mesopotamia. An adjacent grave, however, in which the coffin was intact, has provided a rich treasure. Mr. C. L. Woolley, who describes the find in the *Times* of Dec. 16, considers that it must have been the grave of a member of the royal family, though not of a king. The name Mes-kalam-dug is inscribed on each of the gold vessels taken from the coffin. A great variety of articles in silver, copper, and gold—personal ornaments, axe-heads, lance-points, saws, chisels, etc., as well as gold and silver vessels, was found. One of the most remarkable objects was a gold peruke which completely covered the head of the skeleton from the forehead to the nape of the neck. It is interesting to note that four lances with gold-mounted shafts had been placed, one at each corner of the grave.

No. 3034, VOL. 120]

IN Germany, high pressure voltages exceeding 100 kilovolts have been used for the transmission of electric power over long distances for nearly twenty years. The cities of Berlin, Magdeburg, Leipzig, and Dresden are provided with electrical energy by means of an extensive 100 kilovolt network, which is supplied by the super-power stations situated in the lignite districts in Central Germany. Overhead lines also transmit at this pressure power obtained from waterfalls throughout the States of Baden and Württemberg. Dr. Cohn, in the October number of *AEG Progress*, published by the Allgemeine Elektrizitäts-Gesellschaft of Berlin, describes and gives a map of the super tension networks erected and projected in Germany. The development of these networks, although retarded, was not interrupted by the War, and has been taking place very rapidly ever since. It is stated that if we have to consider economy, electric power can only be transmitted about 130 miles at 100 kilovolts. To transmit power economically from southern to central Germany, a distance of about 360 miles, would require a pressure of at least 220 kilovolts. Lattice girder poles are exclusively used for high pressure transmission in Germany. For 220 kilovolt lines the distance between the poles varies from 300 to 400 metres, but when the lines have to cross rivers and valleys much greater lengths of span are used. The Water Power Conference at Basel in 1926 recommended the linking up of the power systems in various countries, as this is to their mutual advantage. In the near future important developments in this direction are expected.

IN 1924, Finland invited representatives of the States bordering on the Baltic Sea to a conference from which resulted the setting up of a Baltic Geodetic Commission to deal with geodetic matters in which co-operation between these States is of importance. The second conference was held in Stockholm in 1926, the countries which took part being Germany, Finland, Sweden, Denmark, Danzig, Esthonia, Lettland, Lithuania, and Poland. The annual contributions of member-States are 500 dollars for the first three and 250 for the remainder. The conferences are held annually, and the report of the 1926 meeting has just been issued. The matters dealt with included re-measurement of the base lines in the various countries by the same observers with the same instruments; the measurement of triangles overlapping two States by observers of each State, independently of each other; the longitude differences between the standard stations in the various States; and measurements of gravity. The Commission considered the enlargement of its scope to include magnetic surveying over the Baltic Sea and adjoining lands, but a decision on the matter was postponed until the 1927 conference.

AN illustrated article by E. H. Wilcox contained in the *Scientific American* for December describes how in the United States large areas are protected from lightning strokes by a ring of high steel towers, the tops of which are connected by wires. The wires are provided with numerous steel points, which dissipate the ground charge induced by a lightning cloud. By continual point discharges the potential gradient

between the cloud and the ground is kept below the value necessary for the occurrence of a lightning flash; the principle of the method is thus opposite to that of the ordinary lightning conductor, which is designed to offer an easy and safe path to the lightning discharge. The wires carrying the discharging points are all well grounded and connected electrically with the reservoir or other object which is to be protected. The method has been applied to great open reservoirs of petrol in California, where temporary over-production has necessitated this method of storage.

PROF. HENRY J. SPOONER has an article in the *Society of Industrial Engineers Bulletin* (vol. 9, No. 9), on the progress of the movement for the reduction of noise. He discusses noise in the home, in the streets, rubber roadways, noise in the work-place, and the cost in human wastage and in depreciation of property. He complains that research bodies have so far done nothing or next to nothing with regard to the problem. With much of what the writer says everyone will be in agreement. The reduction of noise would be of very great value to the community, and there is little doubt that the noise made by some machines could and ought to be diminished. The scientific study, though, of the effects of noise on individuals, whether that noise be in the form of street noises or of particular noise from machines, is not easy. Efforts are being made now by the Industrial Fatigue Research Board to collect data with regard to the effect of noise-making machines in clerical work. So far there has been no evidence of more sick leave or of a higher labour turn-over in departments using noise-making machines than in other departments. The individual reactions to the noise are complicated. One question that arises is how Prof. Spooner has arrived at his calculation of £50,000,000 economic loss through the effects of noise. There are so many variables in calculating the effects of any economic factor that one would like to know whether the figure belongs to the domain of scientific fact or popular fiction.

APPARENTLY there are only a few more parts of that monumental work, "A Critical Revision of the Genus *Eucalyptus*," by J. H. Maiden, yet to be published, the parts having already been issued, so that students of the Australian flora are awaiting the completion of the book, and particularly the key to the species, with eager anticipation. The almost inevitable postponement of publication of the key until the whole work is finished, is one of the chief defects of a monograph of this type in which publication is continued over a period of years, the first part of the present work having been issued in 1903. The difficulties arising from this are enhanced by the fact that no comprehensive scheme of classification of the genus has appeared in Mr. Maiden's "Revision." No doubt this will be remedied in the last parts, but certainly the usefulness of the book up to the present has been greatly impaired by these omissions, unavoidable though they may be. It has been announced that the manuscript for the last parts was completed by Mr. Maiden before his death, so that these may be expected to round off the whole work. In addition

to much valuable information of the usual type found in monographs, there is a great deal of subsidiary matter (e.g. classification of barks, timbers, fossil records, enemies, ecological notes), often illustrated by copious figures. The economic aspect of the genus has been dealt with fully, while numerous references to other work on the timber, oils, gums, etc., are included. However, unless some arrangements have been made for the issue of special sets bound up differently from the normal, it seems that the morphological and additional information will remain scattered here and there throughout the latter parts of the book. Criticisms in detail are best left until the work is complete: it may be pointed out, however, that the late Mr. Maiden collected an enormous amount of information together, and even as it stands the book is invaluable to anyone working on the flora of Australia.

A SECOND International Conference on Bituminous Coal will be held at the Carnegie Institute of Technology in Pittsburgh, Pennsylvania, U.S.A., during the week commencing on Nov. 19, 1928. The first conference was held at the Carnegie Institute in November 1926, and was devoted to discussions of the better utilisation of bituminous coal. It was attended by 1700 persons, including delegates from thirteen different countries. No definite programme for the second conference has been made, but it is expected that the latest developments in obtaining substitutes for petrol from coal, power from coal, low and high temperature distillation processes, smokeless fuel, gasification of coal, utilisation of coal tar products, coal as a source for fertiliser, and coal in relation to the production of fixed nitrogen, will be discussed.

THE *British Journal of Actinotherapy* for October (vol. 2, No. 1) contains an article by Prof. Birch-Hirschfeld of Königsberg, on the value of ultra-violet rays in ophthalmology, particularly in the treatment of ulcers of the cornea and conjunctiva. This journal, which is devoted to the medical and scientific aspects of ultra-violet rays, is now published at 17 Featherstone Buildings, W.C.1.

THE Ministry of Health has issued new Regulations (Statutory Rules and Orders, 1927, No. 1004), to date from Jan. 1, 1928, revoking the Public Health (Pneumonia, Malaria, Dysentery, etc.) Regulations, 1919. Trench fever drops out, as it is apparently now an extinct disease. Although malaria remains notifiable, the new Regulations exempt from notification a case of malaria in which the disease has been induced in an institution for therapeutic purposes (e.g. the treatment of general paralysis). But such a case, if liable to relapses, must be notified at least four days before discharge to the medical officer of health of the district in which the patient proposes to reside.

THE exhibition by Mr. Burchell and Mr. J. Reid Moir at the rooms of the Society of Antiquaries of finds of archaeological interest from Sligo has led two correspondents to express their views in letters to the Editor. Mr. Henry Dowey, of the Geological

Survey and Museum, Jermyn Street, London, S.W.1, states that he has seen the specimens and documentary evidence, and is of opinion that "certain features shown on the 'implements' could be formed only by human agency . . . a parallel as regards their form and technique can be found among the Levallois implements discovered at Northfleet, Kent." Mr. R. Vernon Favell, Penberth, St. Buryan, Cornwall, states that he was greatly impressed by the exhibit, and that "the implements and cores are undoubtedly of human workmanship in the Mousterian manner."

Mr. W. E. MILLER, writing from Avenue Rambert, Clarus, Switzerland, describes observations on four occasions recently of a third rainbow bow inside the primary bow and asks for an explanation of the phenomenon. The rainbow appears to have been a supernumerary (German, *sekundäre*) bow. The optics of these bows is described in the third volume of the "Dictionary of Applied Physics," page 525; in Dr. Humphreys' "Physics of the Air," page 463; and in Pernter and Exner's "Meteorological Optics," 2nd edition, page 531 onwards. On page 594, Pernter and Exner give some notes as to the deductions about the size of the raindrops which can be drawn from the observation of these supernumerary rainbows. It may be of interest to recall that in NATURE of Nov. 9, 1911, there is an account of an observation by Mr. E. Newbery of a number of brilliant rainbows. At

one time six rainbows were simultaneously visible, of which four seem to have been supernumerary bows. The colours of supernumerary bows appear usually to be green and violet, but that is not invariably the case. One of the supernumerary bows observed by Mr. Newbery was nearly white.

MESSRS. Dadau and Co., Ltd., 32 Old Bond Street, W.1, have just circulated Catalogue No. 155 of some 400 new and second-hand books on entomology. It will be sent free upon application.

APPLICATIONS are invited for the following appointments, on or before the dates mentioned:—A demonstrator in physical chemistry in the University of Leeds—The Registrar, The University, Leeds (Jan. 10). A head of the chemistry and industrial chemistry department of the Technical College, Cardiff—The Principal, Technical College, Cardiff (Jan. 21). Lecturers in the Massey Agricultural College, New Zealand, as follow: Inorganic chemistry and soil chemistry, botany and field husbandry, agricultural economics and book-keeping, veterinary science and animal husbandry, agricultural bacteriology, agricultural zoology—The High Commissioner for New Zealand, 415 Strand, W.C.2. A junior assistant chemist under the directorate of explosive research of the Research Department, Woolwich—The Chief Superintendent, Research Department, Woolwich, S.E.18.

Our Astronomical Column.

SKJELLERUP'S COMET.—A new orbit of this comet, differing considerably from that of Mr. H. E. Wood, has been computed by Mr. B. H. Dawson, of La Plata, and distributed by the I.A.U. Bureau, Copenhagen.

T	1927 Dec. 18-200 U.T.	
ω	20° 58'	} 1927-0
Ω	78 43	
i	82 41	
log q	9.5092	

EPHEMERIS FOR 0^h.

	R.A.	Decl.
Dec. 22.	17 ^h 59 ^m 12 ^s	4° 46' S.
26.	18 7 44	0 17 N.
30.	18 14 24	2 34 N.
Jan. 3.	18 20 10	3 31 N.

The new orbit agrees better than Mr. Wood's with a telegram received by the Astronomer Royal from Mr. Chidambharier, assistant at Kodaikanal Observatory, stating that the comet was seen there (evidently in full daylight) about two diameters east of the sun on the morning of Dec. 15. It was then at its nearest to the earth, log Δ being 9.812.

The new orbit makes the comet brighter than the former one did, but much lower down, and better placed for observation before sunrise than after sunset, though it may perhaps be seen in both positions. The comet was observed at Hanover and Hamburg on Friday evening, Dec. 16, and had an appreciable tail.

JUPITER.—Mr. B. M. Peek and the Rev. T. E. R. Phillips discuss (*B.A.A. Jour.* for November) some recent observations of bright spots on Jupiter's north equatorial belt. The chief point of interest is that the rotation period of the spots was intermediate

between the equatorial rate (9^h 50^m) and the temperate rate (9^h 55^m); also the period appeared to increase during the series of observations, thus approximating more closely to the temperate rate. It is very rare to find spots showing these intermediate values. Mr. Phillips suggested that the increasing period might be due to their rising higher in the Jovian atmosphere so that their diurnal circle became larger.

At the meeting of the Royal Astronomical Society on Dec. 9, Prof. Turner exhibited some beautiful photographs of Jupiter taken by Prof. Douglas in light of various wave-lengths. Some of these were arranged to give a stereoscopic effect, by combining exposures a few minutes apart.

THE LIGHT CURVE OF MIRA CETI.—This well-known variable has recently passed through maximum, so it is of interest to note the results of observations in the last few years. There is an article on it in *L'Astronomie* for November, giving the results of three observers, L. Jacchia at Udine, C. Popovici at Galatz, and E. Loreta at Bologna. Minimum, mag. 9.3, was passed on 1924, Sept. 26, and maximum, mag. 3.4, on 1925, Jan. 10, or 106 days later; there was a curious pause on the decline, in February 1925, when it remained for 16 days at mag. 4 (Observer, C. P.). The next maximum occurred on 1925, Dec. 5, according to E. L., but 6 days earlier according to L. J. Both gave the mag. as 3.1. The next was on 1926, Oct. 24, according to E. L., 3 days earlier according to L. J. Both gave the magnitude as 3.1. The light-curves, as drawn, progress quite smoothly except in February 1925. The last two minima could not be observed, as the star was too near the sun. On the other hand, the maxima now occur with the star near opposition, so the conditions for observation are very good.