

of facts and ideas which are contained in this chapter, and we shall content ourselves with selecting two of the Commission's conclusions.

The first is in connexion with the influence of female education on rural development. Very few boys attending the primary schools in British India stay long enough to attain permanent literacy. In 1921-22 the proportion of boys attending primary schools was 32.2 per cent of the population, and that of girls 7.6 per cent. On the other hand, the percentages of literacy at 20 years and above were 18.13 and 1.9 respectively: it is evident that girls especially do not stay long at school. It is argued that if a mother is literate, a very strong influence will be brought to bear on keeping her children at school until literacy is assured. The Commission, for the purpose of testing this idea, suggest that "a definite effort should be made to impart literacy to a certain number of young mothers" and the results be carefully recorded.

The second is concerned with the kind of education to be given to older boys in rural India. Two existing types of such education, for boys from fourteen to seventeen years of age, are described and contrasted. In the first the school is voca-

tional, being in fact an agricultural college and farm in miniature, with the important proviso that if the whole four-year course is gone through, all charges will be met by the school; in the second, agriculture is a voluntary subject in a vernacular middle school. The first type, started in 1910 in Bombay, has slowly extended, but it has not been taken up to any extent elsewhere: there are six schools of this type at present. The second type was started in the Punjab in 1923: there were 66 in 1926-27, and it was hoped that there would be 121 in 1927-28. In the United Provinces 20 such schools exist, where, however, agriculture is compulsory. Farms of three acres are intended, but all are not as yet provided with these. The Commission is strongly in favour of this latter class, financially and otherwise. It does not consider that the heavy cost of free vocational schools is justifiable, and there appears to be no general call from the people for them.

The remaining chapters deal with rural industries and labour, horticulture and plantations, and agricultural statistics. There are a number of graphs interspersed and a short series of appendices.

### News and Views.

ETHYL petrol—the only motor spirit on the market which contains any lead compound—is, after all, adjudged to be not so deleterious when used under proper safeguards as has been feared in some well-informed quarters. The Departmental Committee which was charged with the examination of the question has issued a unanimous interim report in which it states that, having considered the experimental work which has been done in America, and the evidence which it has itself taken, and having discussed the matter with high officials of the United States Public Health Service, it has reached the conclusion that the findings of the United States Government Committee were justified, and that further experience has supported its conclusion that there are no reasons for prohibiting the use of ethyl petrol. The British Committee does not minimise the risks of using either ethyl or ordinary petrol when ordinary safeguards, such as proper ventilation in garages, are lacking, but it believes that provided ethyl petrol is used solely as a motor fuel, and not for such purposes as cooking or cleaning, its use does not involve a special risk. The dangers attending the manufacture of lead tetraethyl for incorporation into the 'ethyl fluid,' and even the operation of mixing the fluid with petrol, are, of course, in another category. The former operation is not carried out in Great Britain, but in the United States of America it proceeds under proper regulations; the latter stage in the preparation is carried out in Great Britain at nine stations, where the precautions suggested by the United States Committee are observed in all respects, and the arrangements are such that the health of the workers is fully safeguarded.

SCIENTIFIC men who were aware of the peculiarly toxic nature of the material to be employed in the manufacture of ethyl fluid, and of the cumulative effect of the poisonous action of lead compounds in general, and who therefore entertained anxiety concerning the ultimate effect not only on users of the spirit but also on any who might be compelled to breathe an atmosphere polluted with exhaust gases, would have been lacking in an adequate sense of public duty if they had not given expression to their doubts. So far as the evidence is available at present, these fears are not necessarily without foundation, but at least they appear to be concerned with a risk sufficiently circumscribed to fall within that margin of common hazard which modern man has to accept with the other blessings of his civilisation. It remains to be seen whether with the passage of time no such evidence will present itself; in the United States, however, ethyl petrol was in use for some three years before it was introduced commercially into Great Britain, so that the lack of evidence from America in that respect is to be regarded as indicating the improbability of any serious deferred injury. The Committee considers that it would be impossible, and in fact superfluous, to embark on an extensive examination of human subjects in Great Britain, although it proposes to undertake certain confirmatory investigations, and possibly to elucidate some points which have not yet been examined.

EXCEPTION has been taken to the suggestion made at the close of our leading article on "The Museums of the British Isles" (July 14), that the first step in the improvement of the provincial museums should be made by funds independent of the public and the

rates. Mr. J. Reeves writes: 'Does the writer seriously suggest that the supply and maintenance of these institutions should be dependent upon private benevolence, and, as a corollary, that existing museums should not receive further aid from public funds, whether taxes or rates? It is not probable that such a view will be accepted by educationists or by many others.' It certainly was not our idea to suggest that public funds presently available for museums should be withdrawn. On the contrary, more money is urgently required. Where is it to come from? In a democratic country public funds are made available only on the insistent demand of the public or its representatives, and the lack of interest of both are painfully evident in the provincial museums which are crumbling to dust, and in the pitiful sums spent upon the majority of local museums, as Sir Henry Miers's tables show. There is little help to be looked for from this quarter.

On the other hand, some of the best of the American museums depend upon private benevolence or support, and so also do the most flourishing of the zoological gardens in Great Britain. If our museums could be made as attractive as these, there can be little doubt that the interest of the public and of municipal and county authorities would be aroused, and a new demand would be created for the further development of the educational and recreational facilities of museums, at the public expense. The practical difficulty lies in the first step of this process of up-grading the poorer museums. It demands curators with knowledge and outlook, and, in addition to the salaries of such skilled and rare men, money for upkeep and development. In the present financial condition of the country it would be difficult to induce the Government to give the necessary help to provincial museums; many local authorities have shown how limited is their ability or willingness. What remains but private benevolence? We had in mind not so much the desultory help of the private individual, for unfortunately the wealthy men of Britain have not rallied to the support of museums in the way that the wealthy American has, but rather we envisaged the assistance that might be forthcoming from such a benevolent body as the Carnegie United Kingdom Trust, if it felt assured that its preliminary aid would lead to the permanent and progressive improvement of the provincial museum.

THE director of the Royal Botanic Gardens, Kew, has arranged for Mr. J. Hutchinson, assistant at the Herbarium, Royal Botanic Gardens, and formerly assistant for Tropical Africa, to carry out a botanical tour in South Africa in concurrence with the botanical authorities in the Union of South Africa. Mr. Hutchinson left Kew on July 27, and is sailing to Cape Town by the S.S. *Saxon*. Shortly after his arrival at Cape Town he will proceed to Namaqualand with Mr. Pillans, who has kindly invited him to join him on a collecting expedition in that region. Later he intends to make a tour through the Central Coast Region and pay visits to the Knysna forests, Transkei, East Griqualand, and Natal, and the regions which are especially rich in succulents. In the Transvaal and

Swaziland Mr. Hutchinson will be assisted as to his tour by Dr. Pole Evans, and he also hopes to visit British Bechuanaland and the Fauresmith Botanical Reserve. The Karroo Flora will be studied, and the autumn Flora of Table Mountain, before he leaves for home in April. Mr. Hutchinson will be visiting the various botanical institutions and gardens in the Union during his stay in South Africa.

THIS tour, which should result in the introduction of many new and interesting plants and valuable specimens for the Herbarium, has been rendered possible through the grant of the Empire Marketing Board to Kew. The portion of the grant assigned for 'Collectors' has enabled Kew to revert to the old practice which was of so much value in the days of Sir Joseph Banks and Sir William Hooker, of sending botanical collectors to study and bring home to the Royal Botanic Gardens plants of economic or botanical interest. The recent mission of Mr. Howes, assistant in the Museums, to Siam, Malay, and Burma in quest of bananas likely to be immune to Panama disease, which was carried out under this grant, has yielded valuable results.

THE Gas Referees have recently extended the use of continuously recording calorimeters for official testings of the gas supplied in Great Britain, and one or more of such instruments has been or is about to be prescribed by them for every gas undertaking which sells more than 2000 million cubic feet of gas per annum. There are already eleven recording calorimeters in use for official testings, and very shortly the number prescribed will be increased to thirty, of which thirteen will be on the gas supplied by Metropolitan and suburban gas companies, and one each at Birmingham, Bournemouth, Brighton, Bristol, Coventry, Croydon, Edinburgh, Glasgow, Leeds, Leicester, Liverpool, Manchester, Newcastle-upon-Tyne, Nottingham, Portsmouth, Sheffield, and Stoke-on-Trent. Three types of continuously recording calorimeter have been approved by the Gas Referees for use in official testings, namely, the 'Boys,' made by Messrs. John J. Griffin and Sons, Ltd.; the 'Fair-weather,' made by Scientific and Projections, Ltd., and the 'Thomas,' made by the Cambridge Instrument Company, Ltd. The instrument provided is, in every case, subjected to preliminary trials by the referees before it is certified for use by the officially appointed gas examiner.

It is reported that a further transference of between 1000 and 1100 bison has been made by the Canadian Department of the Interior, from Wainwright National Park, Alberta, to Wood Buffalo Park, near Fort Smith, in the North-west Territories. The animals were segregated in corrals during the winter, and, as in former years, were moved partly by rail in specially equipped cars, and by river in scows. The number of bison transferred from Wainwright to Wood Buffalo Park since the movements were inaugurated in 1925, now exceeds 6600. When these transferees commenced, a protest was made in NATURE against the deliberate commingling of the 'plains' and the 'wood' bison, two distinct racial forms, the latter of

which, the only truly wild bison now surviving, ran the risk of being swamped in the crossing that seemed probable. While it is stated that "wardens report that the buffalo placed in the park since the first movement in 1925 are making satisfactory progress," no reference is made to the effect of the presence of an overwhelming number of a strange race upon the characters and survival of the sole existing herd of wood buffalo—a matter of much greater significance. Private advices received from Canada in the earlier days of the transferences suggested that the imported bison had migrated to parts away from the "wood buffalo" herds, but whether a natural segregation has continued we have no recent information.

IN the United States attempts to make scientific knowledge common household stock become more and more pressing, but whether they accomplish their aim is a different matter. The popular anti-fundamentalist journal *Evolution* has already been referred to in our columns; it is a serious endeavour to inform public opinion as to modern views of life, and at the same time to laugh out of court the absurdities of the 'funnymentals.' Science Service of Washington, D.C., issues weekly radio summaries of new things in science, as well as daily jottings "from Nature's notebook." The latter are short accounts of well-known plants and animals, but it is doubtful whether the non-naturalist public will be willing to absorb such descriptions at the rate of one a day. The weekly radio summary of July 5 consisted of almost four foolscap pages describing "babies that walk like bears," a so-called behaviour atavism, the interpretation of which scarcely seems to have reached a degree of scientific security sufficient to warrant public broadcasting. A highly problematical, but very interesting, speculation is contained in a recent communication from Science Service, under the caption, "The Dinosaurs died of Rickets; Dust from Prehistoric Volcanoes shut off Ultra-Violet Rays from the Sun, and the Big Lizards were wiped out by a Baby Disease." The Smithsonian Institution, to the excellent publicity work of which we have often referred, also has a "Scientific News Service." Here one would expect to find a high standard of attainment, and while on the whole the information is sound and freshly expressed, there occur occasional blemishes, such as "According to a Smithsonian palæontologist, three great groups of backboneed animals have attained flight—birds, mammals, and reptiles." This is self-advertisement outraging modesty.

ON July 7 a large gathering of chemists from many countries met in Darmstadt at the invitation of the three Societies, the Deutsche Chemische Gesellschaft, the Verein Deutscher Chemiker, and the Deutsche Bunsen-Gesellschaft, to be present at the formal dedication of the national memorial to Liebig and Wöhler at the birthplace of the former. According to the *Chemiker-Zeitung*, the ancient house in which Liebig was born in 1803 had become so dilapidated in 1920 that it had to be demolished, but by the generosity of chemists and the chemical industry in Germany a replica of the original building

has been made. The guests were greeted by Prof. Berl in the Otto-Berndt hall of the Technische Hochschule. Prof. J. F. Thorpe presented an address from the Chemical Society of London, and representatives from France, Denmark, Holland, Japan, Sweden, Switzerland, Spain, and Austria were also present. Prof. Haber delivered an oration, in which he eulogised Liebig's character and dwelt upon the influence of his great personality, his wide culture, his peculiar fitness for the tasks which he undertook, his experimental skill, his imaginative vision, and his masterly command of the German language. This was followed by an appreciation by Prof. Wohl of Danzig, of Liebig's great colleague Wöhler, whose work may be said to have paved the way for the development of modern biochemistry. M. Gabriel Bertrand, of the Pasteur Institute in Paris, also addressed the delegates, who journeyed to Giessen on the following day to visit the Liebig museum there.

IN the United States the new Weights and Measures Bill (H.R. 7208), commonly known as the Tilson Bill, furnished a leading topic for discussion at the twenty-first National Conference on Weights and Measures, which was held at the Bureau of Standards, Washington, during the fourth week of May. This Bill, which aims at establishing a certain degree of Federal control over weighing and measuring appliances, was criticised by delegates representing the American Institute of Weights and Measures on the ground that it constitutes an insidious attempt to drive in the 'pro-metric' wedge, the thin end of which was inserted by the issue of the Mendenhall Order in 1893. The critics of the Bill regard that Order, promulgated by Prof. Mendenhall when Superintendent of Weights and Measures, as *ultra vires* because, having none but departmental authority, and notwithstanding a provision of the constitution which vests solely in Congress the power "to fix the Standard of Weights and Measures," it declared the fundamental standards of the country to be the metre and the kilogram, in place of the yard and the pound respectively, and defined the latter units in terms of the former. They also appear to look upon the Bureau, in spite of its present director's disclaimer, as having pro-metric sympathies and aims, and they therefore wish for the Bill to be amended in such a way as to circumscribe strictly the powers of the Bureau as well as to restore the pre-eminence of the yard and pound as fundamental national standards and to preserve their absolute identity with those of the British Empire. The amounts by which the ratio of the yard to the metre is found to vary on successive comparisons are, from a practical viewpoint, infinitesimal, but the mere fact that the metric *units* are administratively defined as fundamental is feared to furnish a dangerously specious argument for the extended use of the metric *system*, and ultimately for its legislative enforcement.

THE expedition sent by the New York Zoological Society to the Galapagos Islands in the spring of the year has returned safely with its mission fulfilled. Its object, under the leadership of Dr. C. H. Townsend, was to save alive a remnant of the giant tortoises of



the islands, and preliminary reports published in the *New York Times* and *Science* show how desirable that action had become. In the days of Dampier (1864) the tortoises were innumerable; in later times seventy-nine new Bedford whalers carried off 13,000 tortoises, an invaluable article of food. Now the tortoises are extinct on all but two or three of the islands in the group, and Dr. Townsend confirms the reports of recent visitors that the giant tortoise cannot long survive even there, since all the eggs and young are destroyed by wild dogs, pigs, cats, and rats. Once common throughout the islands, the tortoises are now confined to mountainous regions difficult of access to man. The only hope of keeping the stock alive was to establish it in conditions where its safety and continuance could be assured so far as human devices go. Accordingly, the expedition captured 180 live tortoises and, having transported all in safety, it has placed breeding colonies of 15 to 30 individuals at half-a-dozen stations in tropical and sub-tropical Central and North America, in the belief that at some, if not at all of the stations, breeding and successful rearing of young will take place. Since all the captured specimens have been numbered and weighed, the experiment should yield information as to rate of growth and age. A dozen skeletons of the long-extinct tortoise of Charles Island were also obtained by the expedition.

AFTER the conferring of degrees in medicine in the University of Edinburgh on July 18, Prof. W. Wright Smith addressed the graduates on the subject of the place which the physician has held in the world and the position he is likely to occupy in the future. The physician's is no longer merely the healing art; trend of medicine is to the prophylactic. Reference was made to the opinions of doctors held by various writers, medical and lay, and among the latter, Robert Louis Stevenson. Prof. Smith said, though it was possibly not on record that Stevenson ever meditated becoming a doctor, he had it on the authority of his predecessor, the late Sir Isaac Bayley Balfour, that Stevenson began attendance on the class of zoology then held in the summer term. In the practical class the men worked in pairs, and Stevenson and Balfour worked together, and the crayfish was their first venture. The work was divided on the principle that Balfour did the dissection while Stevenson read the details from the text-book. But on the morning of the third day, under their attentions and those of the summer sun, the crayfish lodged a strong protest. With a vivid comment thereon Stevenson departed, and did not again appear in the precincts of the Zoology Department.

DR. FARNELL'S recent lecture to the British Academy on "Hedonism and Art" (London: Oxford University Press, 1s. net) deserves some notice by men of science, because, although he does not specifically mention it, the question at issue touches both science and art. As we know, they are closely connected activities of the mind, and in the case of art it has frequently been claimed that the giving of pleasure is its primary object. It is this contention that Dr. Farnell disputes and disposes of. In place of

the "flowery tracks of pleasure" he would substitute "sublimity, high-souledness, nobility in sentiment and thought." The conscious reaction to a work of art "in the susceptible hearer or spectator" is certainly not to be called pleasure, but rather "uplift, awe, admiration, consciousness of the higher value of a nobler world than that of our normal self, a world from which the true hedonist is excluded." He illustrates this to good effect from many great works of art, especially from the poets, and his conclusion seems to be sound. For a full discussion, however, much more than a pamphlet of 19 pages is needed, and any such discussion should include the companion sphere of science in which similar, though not precisely identical, considerations would be found to hold good. In each sphere the true goal and the higher sense of achievement is reached just in so far as the work of science or of art enlarges and elevates the spiritual world in which we live. This merging and elevation of the individual in a greater sphere is the true explanation of both, the difference being, as Francis Bacon once put it, that in science, man grows by taking Nature into himself—in art he projects or adds himself to Nature. But Dr. Farnell's lecture deserves a careful reading and contains nothing contradictory to the wider view in which science and art may be seen as complementary and connected aspects of spiritual growth.

THE Littlehampton Nature and Archæology Circle is a thriving local society of 56 members, which has completed its fourth year of existence, and the reports for 1926 and 1927 that we have received show that much important work has been done. Exploration of the low cliff of brick-earth at Kingston has shown, by an examination of the non-marine mollusca by A. S. Kennard, that the lowest bed is a late pleistocene deposit, and it apparently deserves further exploration. An interesting piece of exploration has been done in Arundel Park, at Nanny's Croft, where a Roman road appears to have led down to the River Arun from settlements on the Downs, which thus were linked up with the trade passing up and down the river. The road terminates in a causeway below the river bank. Evidence of iron-melting was found, and some pounds of slag obtained. About 600 feet of trenching was carried out, and many fragments of Roman pottery, tiles, bricks, and four coins of Constantine I., Valentinian I., etc., were found, the date of the occupation of the site being thus approximately the fourth and fifth centuries. The remains of bones found also indicate, according to Sir Arthur Keith, Roman age. There were no Saxon or Norman remains. The report also contains bird-notes, from which we note a sight of a peregrine falcon on the Arun, a supplementary list of local flowers, and a short description of the Old Manor-House at Rustington, the frontispiece to the volume being an illustration of the timber-work of the formerly concealed west front.

THE greater part of the inaugural address on "The Impact of Science upon an old Civilisation," given by Prof. F. Soddy at University College, Aberystwyth, in October last, has recently been

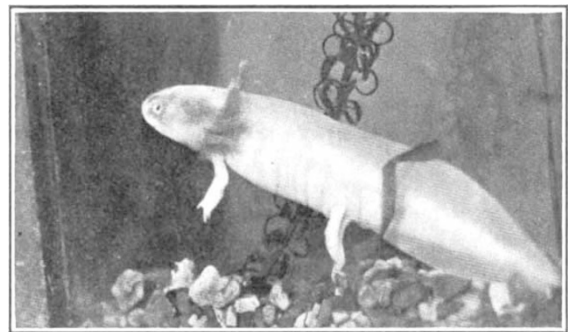
published by Messrs. Hendersons, 66 Charing Cross Road, London, as a pamphlet (price 6d.). The pamphlet epitomises Prof. Soddy's views on the monetary system of the civilised world which he dealt with exhaustively in a recent volume. In his opinion, that system was attuned to the principle of scarcity upon which he alleges our civilisation is still based, in spite of the fact that the impact of science upon productive processes has made possible the easy satisfaction of the necessities and essentials of a healthy and abundant existence for a far greater population than the world supports to-day. The fact that 'sufficiency' has not been realised he attributes to the persistence of an antiquated non-scientific orthodoxy in the spheres of economics and finance. "Our [present] civilisation demands and, through its financial system, issues an edict," he says, "that there shall be no production unless there is a willing and solvent debtor to owe for the product."

SOCIETY, Prof. Soddy states, befogged by the reiteration of the static beliefs of those steeped in the classical tradition, is still apparently unaware of the cause of present discontents, although made uncomfortable by its symptoms, or that it is drifting rapidly towards the abyss. It fails to realise that the proper function of a monetary system is to facilitate and expedite the interchange of goods and services and not the enrichment of private usurers. Nevertheless, there is a quickened interest in the matters dealt with in Prof. Soddy's pamphlet. There are even rumours of the possibility of a Royal Commission on Finance. If there were more scientific workers like him, prepared to approach the problems facing society in the same spirit as they approach their specialised studies, the civilised world might possibly be stirred from its complacent indifference to the urgent need for a critical investigation of the present system.

ON the occasion of the annual meeting of the British Medical Association at Cardiff on July 20-28, the Wellcome Historical Medical Museum has published an announcement, accompanied by numerous illustrations, of the "History and Lore of Cymric Medicine," which is to form the next addition to the Research Studies in Medical History issued by the Museum. The forthcoming work claims to be a trustworthy source of information for students, research workers, and all those interested in the evolution of medicine from the most primitive times. The book will contain a full description of ancient medical lore in Wales from the palæolithic period onwards, and will include translations of the celebrated medieval Welsh manuscript known as Meddyon Myddfai. The results of the study of the chronicles of epidemics from the earliest times are to be recorded, as well as the history of healing wells, charms, amulets, and talismans connected with Cymric medical lore. A section is devoted to the Cardiff medical school, with a biographical review of notable Welsh doctors. Members of the medical profession and others possessing books, manuscripts, and other useful information on the subject of the history, folklore, and legends dealt with in this work are requested to communicate at once

with the Conservator of the Wellcome Historical Medical Museum, 54 Wigmore Street, W.1.

THE British Aquarists' Association Exhibition was held at Trinity Hall, Great Portland Street, London, W.C.1, on July 24-28. There were about 600 exhibits, including some very rare specimens, such as white orandas, which are the highest point in the hybridisation of the fancy goldfish, the harlequin-hued shubunkin, and telescopic-eyed veiltail, and grotesque black telescopic-eyed veiltail. There were also specimens of *Copeina Arnoldi*, the male and female of which leap out of the water when spawning, and the eggs are laid on the side of the aquarium about two or three inches above the surface; after completing spawning, the male drives the female away, and splashes the eggs with water with his tail. Another interesting fish was the climbing African perch, which is able to propel itself on land by means of its pectoral fins in search of water in the event of drought. Other exhibits included the angel fish, the aristocrat of all



Photo]

FIG. 1.—Albino axolotl.

[E. C. Le Grice.

aquarium fishes, fine lizards, and Japanese tree frogs, which arrived from Yokohama, via Siberia, by letter post in a tobacco tin, and dwarf chameleons. The 'best fish' in the exhibition was judged to be white oranda, owned by Dr. H. B. Jones; and the 'best reptile,' a pair of axolotls shown by Mr. H. Whitley. A noteworthy feature of the show was the stall by Mr. Amos Perry, Enfield, on which were shown many beautiful *Nymphaeae*, and other rare plants. The pond life exhibits, with their minute aquatic insects and other creatures, also created much interest. One fish, a blue telescopic-eyed veiltail, was sold for £100. The whole arrangement of the show was to demonstrate that fish can be kept in aquaria, and will live there if only reasonable precautions are taken. Mr. A. W. Croser, the Hon. Secretary of the British Aquarists' Association, 12 Winkfield Road, Wood Green, London, N.22, will be glad to give information on home aquaria, etc.

MR. A. PAGE, the chief engineer to the Central Electricity Board, in the course of an interesting paper on the electric transmission of power, read at the recent centenary conference of the Civil Engineers, pointed out that the ideal to be aimed at is to make electricity available without restriction throughout Great Britain. The system chosen, therefore, must

be extremely flexible, so as to make the supply trustworthy and reduce the charges to the consumer. Since the price of the coal used for the boilers varies very little in different localities, there is a wide choice of suitable sites for power stations. As many of these sites have already been developed, the problem resolves itself into selecting the best of them for association with the 'grid.' The voltage and carrying capacity of the grid lines have been fixed at 132 kilovolts and 50,000 kilowatts respectively. It is interesting to know that in New York and Chicago there is now a considerable length of line operating at 132 kilovolts. The conductors are of aluminium, with a steel core, and their size is such that there is little risk of brush discharge taking place even under the most unfavourable weather conditions. After a careful study of the effect of foggy salt-laden atmosphere on high tension insulators, it was decided to use suspending strings containing nine of them in series. Induced voltages in the line due to lightning flashes in the neighbourhood are very unlikely to flash over these strings of insulators. There is, however, no certain way of escaping the consequences of a flash striking the line directly. Methods have been developed for disconnecting faulty lines for repair without interrupting the supply. One point Mr. Page emphasised was that the main function of the grid lines was to act as interconnectors, and not merely for power transmission. Hence they had only to carry a fraction of the energy generated in Great Britain. The percentage energy losses in these mains, therefore, would be practically negligible and would diminish as the load developed.

WE are informed by Imperial Chemical Industries, Ltd., that Dr. E. F. Armstrong, having resigned his position as a director of British Dyestuffs Corporation, Limited, has accepted a retainer as consultant to Imperial Chemical Industries, Ltd.

MR. J. G. PEARCE, director of the British Cast Iron Research Association, has been unanimously awarded by the judges the first prize of 100 guineas for a series of practicable proposals relating to 'Goodwill in Industry.' The competition was organised by the Glasgow and West of Scotland Association of Foremen Engineers and Draughtsmen, and the judges represented the three parties in industry—the employer, the worker, and the technical or administrative officer.

THE Department of Zoology of the British Museum (Natural History) has received an important collection of mammals and birds obtained by a Franco-British expedition to French Indo-China under the leadership of M. Jean Delacour, with whom was associated M. Pierre Jabouille. The collection comprises 151 mammals and 1794 birds: of these, three mammals and twelve birds are forms new to science and are therefore of considerable systematic interest.

It is announced in *Science* that Thomas A. Edison, John J. Carty, Michael I. Pupin, Ambrose Swasey, and Elihu Thomson have been elected honorary members of the American Institute of Electrical Engineers.

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This is the first time that any American honorary members have been elected.

THE *Medical Press and Circular* (8 Henrietta Street, London, W.C.2) is now issuing quarterly a "Literary Number," a feature of which is a bibliography of medical books published during the previous three months. The bibliography is comprehensive and is designed to cover the literature of the medical and allied sciences of the whole world. The second literary number was published on July 11.

THE McGraw-Hill Publishing Co., Ltd., has issued a useful list (No. 13) of books on mathematics and physics, the mathematics section including advanced and practical or engineering mathematics. Each title is accompanied by a brief note on the style and scope of the book and a list of the chapter headings, so that it is possible to judge quickly as to the suitability or otherwise of any book for a particular purpose.

THE appearance of a third edition of the illustrated handbook on the house-fly, by Major E. E. Austen (British Museum (Natural History), Economic Series 1A, 1928; 1s.), affords ample testimony to its utility. Although only two years have elapsed since the publication of the last edition, new discoveries of importance have been made, and with these facts in mind its text has been thoroughly revised. We commend this excellent publication to all interested in public health and fly suppression. It is obtainable through booksellers.

THE U.S. Coast and Geodetic Survey has issued, as *Special Publication No. 139* (price 20 cents), a useful booklet of 78 pages entitled "Instructions for Tide Observations," by G. T. Rude. It summarises for field purposes the methods used by the Survey in obtaining tide observations, and in making the reductions of the tide records necessary for the establishment of planes of reference for reducing the soundings of a hydrographic survey. Being intended as a working manual, the methods of computation described are restricted to those required for field use, and no theoretical discussions are included.

THE Ross Institute and Hospital for Tropical Diseases, Putney Heath, S.W.15, has organised an "Anti-Malarial Advisory Committee," with the object of assisting tropical industries in carrying out practical measures to combat the disease. The technical members of the committee are Sir Malcolm Watson, Sir Ronald Ross, Sir William Simpson, and Sir Aldo Castellani, and the lay members include representatives of a number of rubber, cotton, gold, and other mining companies and associations. The anti-malaria staff at the Institute will be at the disposal of these companies for advice, and it is intended that Sir Malcolm Watson himself shall visit some part of the tropics every year for a short period.

APPLICATIONS are invited for the following appointments, on or before the dates mentioned:—A part-time evening lecturer and instructor for carpentry



and joinery at the Acton Technical Institute—The Principal, Chiswick Polytechnic, Bath Road, Bedford Park, W.4 (Aug. 8). An assistant master to teach mechanical engineering subjects to junior technical pupils and evening adult students at the Redhill Junior Technical School—The Clerk to the Governors, Education Office, Municipal Buildings, Reigate (Aug. 8). A junior technical officer in an Admiralty Experimental Establishment the work of which consists mainly of design in connexion with acoustical and electrical apparatus—The Secretary of the Admiralty (C.E. Branch), Whitehall, S.W.1 (Aug. 11). A wood workshop instructor for the Junior Technical School of the Coventry Municipal Technical College—The Director of Education, Council House, Coventry (Aug. 15). A research chemist under the Safety in Mines Research Board, for the study of ionisation during gaseous explosions—The Under Secretary for Mines, Establishment Branch, Mines Department, Dean Stanley Street, S.W.1 (Aug. 18). A woman demonstrator and assistant lecturer in the department of chemistry of the Royal Holloway College—The Principal, Royal Holloway College, Englefield Green, Surrey (Aug. 30). A physics graduate at the Northampton Polytechnic Institute, partly for teaching and partly for research in ophthalmic optics—The Principal, Northampton Polytechnic

Institute, St. John Street, E.C.1 (Aug. 30). An assistant lecturer and demonstrator in the British School of Malting and Brewing and department of the Biochemistry of Fermentation of the University of Birmingham—The Secretary, University, Birmingham (Aug. 31). Two chemists for the Meat Products Research Branch of the N.Z. Department of Scientific and Industrial Research, Wellington—The High Commissioner for New Zealand, 415 Strand, W.C.2 (Sept. 8). A chief assistant entomologist at the Rothamsted Experimental Station—The Secretary, Rothamsted Experimental Station, Harpenden, Herts (Sept. 15). A lecturer in biology at the Portsmouth Municipal College—The Secretary, Municipal College, Portsmouth. A head of the mechanical engineering department of the Darlington Technical College—The Chief Education Officer, Education Office, Darlington. A head of the Junior Technical School of the Borough Polytechnic Institute—The Principal, Borough Polytechnic Institute, Borough Road, S.E.1. A principal of the North-Western Polytechnic (now being erected)—The Clerk to the Governors, North-Western Polytechnic, 3 Temple Gardens, Temple, E.C.4. A laboratory assistant in the Department of Agriculture and Forests, Khartoum—The Controller, Sudan Government, London Office, Wellington House, Buckingham Gate, S.W.1.

### Our Astronomical Column.

**MAGNETIC STORMS AND SUNSPOTS.**—Under the title "Large Magnetic Storms and Large Sunspots," in *Monthly Notices Royal Astron. Soc.*, May 1928, W. M. H. Greaves and H. W. Newton discuss the occurrence of sunspots at the time of magnetic storms for the 54 years 1874–1927. Magnetic disturbances are included for which the range in declination was at least  $1^\circ$ , or that in H.F. or V.F. at least  $300\gamma$ . Sunspots of mean area 500 millionths of the sun's hemisphere or greater are considered significant in a comparison with magnetic storms. The analysis shows that out of 60 magnetic storms, 36 commenced within 4 days of the central meridian passage of a large spot (chance would give about 17 coincidences between spot and storm); 8 other storms commenced within 4 days of the central meridian passage of a region of the sun which had previously been markedly disturbed; in 7 other cases the storm was followed one solar rotation later (about 27 days) by the transit of a large spot which had developed in the interval; the remaining 9 storms occurred when neither spots nor faculae were unusual. When the largest magnetic storms were examined ( $D \geq 1\frac{1}{2}^\circ$  or H.F. or V.F.  $\geq 500\gamma$ ), it was found that 15 out of 17 storms occurred in conjunction with a large spot; the sixteenth storm took place one solar rotation after the central meridian passage of a large spot, while the seventeenth storm preceded by one solar rotation the central meridian passage of another large spot (see NATURE, May 26, p. 842). These figures show that individual storms and individual spots are associated with each other more often than can be ascribed to chance, and that the tendency to association is greater for the largest storms:

Little evidence is found of a tendency for these magnetic storms to recur one solar rotation later. This is not necessarily in contradiction to Maunder,

who found a definite tendency for magnetic disturbances to recur about 27 days later (*Monthly Notices R.A.S.*, pp. 19–22, etc.; 1904). The present authors have collected data for the period 1874–1927 relating to smaller storms (such as were included by Maunder in his analysis), and a discussion of this class of magnetic disturbance may show a more definite recurrence phenomenon.

**SATURN'S SATELLITE HYPERION.**—This satellite has attracted the special attention of dynamical astronomers owing to its large perturbations by Titan, and the fact that the mean motions of the two are nearly commensurable, in the ratio of 4 to 3. The *Annals of Leiden Observatory*, vol. 16, Part 3, contain a new investigation by J. Woltjer, Jun. He gives a revised theory, and a comparison with observations from 1875 to 1922; also tables for computing the motion as perturbed by Titan.

The discussion affords three different determinations of the mass of Titan, from the motions of (1) the argument of libration, (2) the longitude of peri-centre, (3) the node. The values of the reciprocal of the mass, compared with that of Saturn, are 3986, 4080, and 3767 respectively; combining these with values found by Brouwer, Eichelberger, and Samter, he adopts the weighted mean 4033. This makes the mass of Titan 1.9 times that of our moon, but its density is only about half that of the moon.

The comparison with observations brings out the superiority of the method of comparing one satellite with another, rather than with Saturn itself. The latter method was used up to 1887 and gave for the mean error of one observation values that ranged from  $\frac{1}{2}''$  to  $\frac{3}{4}''$ ; the other method was then introduced by Struve at Pulkovo and reduced the mean error of an observation to  $\frac{1}{4}''$ .