

they should therefore be present, but the amounts passed into the milk may be greater than can be absorbed in the food, leading to a depletion of the animal's own stores. This appears to occur especially in the case of the calcium of the milk. During liberal milk production on winter foodstuffs there may be a definite loss of calcium from the body; on fresh foodstuffs this loss is less or may be absent (E. B. Forbes, Washington Government Printing Office, 1924). This effect is quite probably to be related to different amounts of vitamin A present in the dry and fresh green foodstuffs, but it seems to be clear that the cow should be encouraged to store as much calcium as possible in her body during her dry periods by the giving of calcium, for example, in the form of bone

meal, in addition to an adequate supply of fresh green foodstuffs. It is possible also that the addition of sodium phosphate to a dried ration may increase the milk yield after parturition, suggesting that this food may be deficient not only in calcium but also in phosphorus, or that the availability of these elements present in the food is impaired by a deficiency in the fat-soluble vitamin A.

The general result of all these investigations is that a dairy cow should be fed on an abundance of fresh green food, containing a supply of protein, etc., which is sufficient to maintain both the quantity of the milk produced at a high level as well as its protein, mineral and vitamin content. If this be done, the supply of energy will certainly be adequate also.

Current Topics and Events.

SCIENTIFIC aspects of national life were honoured by the attention and interest given to them on two occasions last week by the King and Queen. On the afternoon of Wednesday, July 22, their Majesties visited the Royal Society and examined with much interest many of the exhibits arranged for the annual conversazione of the Society held on the evening of the same day. They were also present at a lantern lecture by Mr. F. E. Smith, Director of Research at the Admiralty, upon the subject of navigational devices. On Thursday, July 23, the King and Queen visited the Royal Observatory, Greenwich, in connexion with the celebration of the 250th anniversary of the foundation of the Observatory. They were received in the Octagon Room by Sir Frank Dyson and conducted round the Observatory. A number of members of the Board of Visitors and delegates from abroad of the International Astronomical Union had the honour of being presented to their Majesties.

A SLIGHT anticipation of dates was made in the celebration of the 250th anniversary of the Royal Observatory, Greenwich, on July 23, in view of the presence in England of the large body of foreign astronomers who had come for the meeting of the International Astronomical Union at Cambridge. Actually the foundation stone of the Observatory was not laid until August 10, 1675, and Flamsteed did not come into residence until July 1676. However, an exact adherence to dates is seldom possible in these commemorations, and the circumstances amply justified the anticipation. The celebration was honoured by the presence of the King and Queen, this being the second visit of a British sovereign to the Observatory since its foundation; the previous one was by George III. Although Charles II. showed so much interest in its foundation, there is no record extant of his having actually visited it. Their Majesties were conducted round the principal domes by the Astronomer-Royal, and later expressed the interest and pleasure that they had derived from the visit. It may be well to remind younger readers that our "Sailor King" has been through the complete course of a naval officer, and commanded a destroyer, so that he has a full knowledge of nautical astronomy. The prime object of the foundation of the Observatory

was to aid navigation; this end has been kept in view up to the present, as we see in the rating of chronometers, the dropping of time-balls at Greenwich, Deal and elsewhere, and the continued observation of the positions and motions of sun, moon and fundamental stars. The evolution of the chronometer could be traced by the visitors, since the three earliest timepieces of Harrison were exhibited. Two of them have lately been restored, and were actually going, so that they could be compared with a large number of modern chronometers.

THE sudden death on July 26, at the age of sixty-five years, of Mr. W. J. Bryan, orator, politician and Fundamentalist, has come as a shock to all who followed the course of the trial at Dayton, Tennessee, of Mr. J. T. Scopes, who was convicted of breaking the State law against teaching the truth of evolutionary theory. Mr. Bryan conducted the prosecution ably, but during his examination by the defence, he made some remarkable statements as to the precise dating of events in the Biblical record. The Flood was fixed as probably having taken place in 2348 B.C., while the confusion of tongues at the Tower of Babel was assigned to 2230 B.C. Mr. Bryan conceded that the six days of creation must be regarded as periods of time. A further admission that the creation might have continued for millions of years may perhaps open the way to some sort of accommodation with geological evidence; it might even admit of an adjustment with the one hundred and thirty thousand years or so which at least seem to be demanded for man's existence on this earth by the evidence of the stone implements of Lower Palæolithic Age—to say nothing of those of earlier date. In putting to Mr. Bryan the evidence for the existence of civilisation in China before the Bible creation 6000 years ago, counsel was perhaps on somewhat uncertain ground, although the Shu-king begins with a record of the days of Yaou (2355 B.C.) and Shun, who brought to a close the second patriarchal dynasty of China, founded by Foh-hi in the year 2943 B.C. On the other hand, Mr. Bryan's fellow-countryman, Mr. Pumpelly, estimated that the beginnings of the neolithic stratum which he excavated at Anau in Turkestan dated back somewhat before 8000 B.C.

ALTHOUGH archæologists are inclined to regard Mr. Pumpelly's dating at Anau as too early, and display the same hesitation in accepting the very high dating of M. de Morgan for the early civilisation he found at Susa, the results of recent excavations in Mesopotamia are of considerable interest in relation to the question of early datings. The work both at Kish and at Ur and the neighbouring site of Tel el-Obeid in the last two or three years has considerably extended the period of antiquity of which the dating may be considered to have been fixed with a reasonable degree of accuracy. At Kish, for example, an inscription of Lugul-ud, king of Kish prior to 3100 B.C., has been discovered, and below the floor of the building in which it was found lie 15 feet of debris, which on a conservative estimate would place the early occupation so far back as 4500 to 5000 B.C. At Tel el-Obeid a marble socket of a gate has been found which bears the inscription of a king of the first dynasty at Ur. According to Babylonian tradition, this dynasty was the third to rule after the Flood. This discovery vindicates the existence of the dynasty, which had hitherto been regarded as mythical like its two predecessors, and if the dead reckoning estimate of its beginning in 4600 B.C. is too high, 4000 B.C. or 3900 would be a not unreasonable date. In Egypt, as is well known, astronomical data are available, though gaps in the records give some uncertainty to early dates. On the lowest estimate, however, the accession of Menes, the first king of the First Dynasty, is assigned to 3400 B.C., while the calendar was introduced in 4241 B.C.

In a speech delivered at a luncheon of the British Optical Instrument Manufacturers' Association on Thursday, July 23, Mr. F. Twyman, the president, gave an instructive and encouraging review of the present technical condition of the optical instrument industry of Great Britain. It is well known that the industry has suffered enormously during the financial and commercial decline of the past few years. It is not so well known, however, that these years have been for the industry a period of experiment and development, of prolonged and successful effort towards improving its products, inventing and putting new products on the market, and increasing its equipment for producing. The experimental and research work carried out continuously by members of the industry has resulted not only in an increase in the range of products, but also in developments of real scientific importance. From many examples quoted, it would seem probable that most of the research of the world, in certain fields of prime importance in modern physics, is being done with British-made instruments. The growing use of optical instruments for the control of industrial processes, and for maintaining a high and uniform standard of quality in the productions of important industries, has undoubtedly been encouraged by the fact that these industries have been able to obtain from British optical firms suitable instruments, often very complex and designed with great inventive ability to achieve the particular end desired. The technical advances and

achievements in regard to the design and production of optical instruments, enumerated by Mr. Twyman, give evidence that the industry is active in invention and development and in the application of the results of scientific research conducted by it or on its behalf. The result is seen in its ever-improving position in the race for technical supremacy.

A MEETING, called by the Optical Society to consider the desirability of arranging an Optical Convention in 1926, was held at the Royal Society of Arts on Tuesday, July 21. Sir Herbert Jackson presided, and there were present representatives of all branches of the optical and scientific instrument industry, together with representatives of cognate scientific and technical societies, and others interested in the theory and practice of optical science and in the use of optical instruments. The chairman intimated that the object of the proposed Convention was to bring before the notice of the scientific and general public the many and important developments which had taken place in recent years in British optical apparatus and instruments, and to show that the products of the optical glass industry and the optical instrument industry of Great Britain were well able to compete with those of foreign competitors. It was for the manufacturers to decide whether the time was opportune for holding such a convention. Several of those present spoke in favour of the proposal, and it was resolved that a British Optical Convention be held at the Imperial College of Science and Technology, South Kensington, in July 1926, and that a guarantee fund of 2000*l.* be raised, if possible, before October 1, 1925. It was announced that the Council of the Optical Society had already agreed to contribute a sum of 200*l.* towards such a fund. Thereafter, a general committee consisting of those present was formed, and an executive committee nominated, with powers to make the necessary arrangements. Detailed proposals will be published with regard to the scope and scheme of the Convention as soon as the executive committee has considered the various matters involved.

THE second of the annual conversaciones of the Royal Society was held in the Society's rooms on July 22. The majority of the exhibits arranged for the occasion were also shown at the first conversazione (NATURE, May 23, p. 819). Among the fresh exhibits were six models of early locomotive engines, pieces of apparatus used by Sir William and Sir John Herschel and a replica of an early Egyptian astronomical instrument. This instrument, the "Merkhet" of the Egyptians, and the "ἀρολόγιον" of the Greeks, was used to lay out a meridian line and to note the meridian passage of stars for determining the time in connexion with temple ceremonies. The original in Berlin dates from about 700 B.C., but the instrument was in use very much earlier. These exhibits were shown by the Science Museum. Mr. W. Bateson and Mr. R. J. Chittenden (John Innes Horticultural Institution) showed examples of root-cuttings and plant-chimæras in *Pelargonium*. Plants raised from buds formed on roots may differ from those

raised from shoots, demonstrating the existence of an inner component. The plant may be (1) male only, (2) female only, (3) sterile, whereas the inner component is in each a normal hermaphrodite. The distinction is probably in epidermis alone. Zonal Pelargoniums raised by cross-fertilisation between green and albino tissues show the artificial formation of chimæras. Rothamsted Experimental Station had an exhibit illustrating the inoculation of lucerne with nitrogen-fixing bacteria (Mr. H. G. Thornton and Prof. N. Gangulee). A motile stage has been discovered in the life-cycle of *Bacillus radicicola*, the organism forming nodules on the roots of leguminous plants within which nitrogen is collected and utilised by the plant. This stage is connected with the spread of the bacteria through soil. The results have been applied, with some success, to the practical problem of inoculating the lucerne crop. The National Physical Laboratory showed a Guild colorimeter for fundamental investigations in colour vision (Mr. T. Smith). Light from a single source, after passing through gelatine filters of three selected colours arranged symmetrically about the circumference of a circle, is brought to a common axis by a rotating prism. The mixture thus obtained is presented side by side with the colour to be measured by means of a photometric cube.

At the Conference of Women in Science, Industry and Commerce, held at the British Empire Exhibition on July 15-18, Miss C. U. Kerr read a paper on the effect of welfare work upon health and efficiency. Miss Kerr outlined the history of the welfare movement and pointed out that the earliest experiments in welfare work were initiated in engineering factories. The chief branches of welfare were considered and a special plea put forward for the adequate provision of food for the workers. Many firms are still without canteens, and those which do have them often fail to see that the food is interesting and appetising. The proper selection of workers was discussed and an interesting suggestion made that many operations could be well performed by people not of robust physique, provided that the conditions were good. The advantage to a delicate person who finds his job and knows he can do it well cannot be calculated only by his efficiency at work; the mental effect is probably the cause of the improvement related by the writer in connexion with a tobacco factory. One would like to see the engineering metaphor disappear from these discussions. The writer of this paper quotes the phrase "Human Engineering" as an apt description of welfare work and calls "food for the producers," "fuel for the human machines." These phrases stand for a mechanical interpretation of life which has been, and still is, the cause of no little trouble in the industrial world. A machine is a means to an end: Can that be true of a human being?

MR. GOYDER, of Mill Hill School, has maintained two-way radio communication with the leader of the MacMillan Expedition in the Arctic. When communication was first established on July 18,

the *Bowdoin*, with Captain MacMillan on board, was at Hopedale, Labrador, but on July 24 she was crossing the Arctic Circle. The two ships, the *Peary* and the *Bowdoin*, are proceeding to their base at Etah in Greenland, and it is hoped to make an aeroplane base at Cape Thomas Hubbard in Axel Heiberg Land. Mr. Goyder works with a 250-watt Mullard valve on a wave-length of 40 metres. He only uses a single wire Hertz aerial, but he receives on a special circuit devised by Mr. Reinartz, who operates the radio apparatus on the *Bowdoin*. The messages are received best between midnight and six o'clock in the morning. Mr. Goyder has himself transmitted to America several messages from the explorers to their friends. It will be remembered that he was the first to maintain two-way communication between Great Britain and New Zealand. Mr. Goyder is to be congratulated on his success, which will raise the status of British amateur radio-telegraphy.

At the annual general meeting of the Marconi International Marine Communication Co., Ltd., held on July 24, Senator Marconi gave an interesting sketch of the lines on which radio signalling is developing on board ship. During the past two years, numerous experiments have been made to find out how far radio telephony is desirable and practicable in the mercantile marine. Trials were made in trawlers as well as in liners, both between ships and between ships and shore. The results obtained prove that there is no technical difficulty in the way of accomplishing a satisfactory service of duplex radio telephony between ship and ship when they are on the high seas and away from the areas of congested radio-telegraphic traffic. In one instance a range of nearly 400 miles was covered. If a demand arises by ship's commanders and passengers, it can easily be met. There is, however, no likelihood at present of radio telegraphy at sea being superseded by radio telephony. When financial matters are less stringent, it is probable that shipowners with the collaboration of the Post Office will give facilities for conversation between passengers and shore stations. The Board of Trade has recently made a regulation under which the use of a radio automatic calling device is made compulsory for all ocean-going vessels the crews of which number less than 50. Shipowners, however, are appealing against this regulation as they consider that the present time is inopportune for increasing their financial burdens. Senator Marconi said that there has been a rapid increase in the demand for his company's direction finder, which has proved of great value to navigation, especially in foggy and rainy weather. A ship fitted with this device is able to assist other ships in its neighbourhood by sending them their positions.

SINCE the War, France has paid particular attention to securing its economic independence of other nations. Great attention has therefore been paid to developing "la houille blanche," or water power, so called to distinguish it from "la houille noire," or

coal, from which thermal power is developed. As the total possible power output of the mountain torrents of the Pyrenees and the Alps and of the Rhone, the Garonne, and the Rhine is several times greater than the power equivalent of the present French output of coal, there is plenty of scope for industrial development. In connexion with the present exhibition of "La Houille Blanche" at Grenoble (May–November) the *Revue Scientifique* has published an excellent historical and industrial account of the state of the art of hydro-electrics. It is interesting to remember that Fourneyron in 1837 installed at Saint-Blasien in the Black Forest small water turbines 31 cm. in diameter, producing 60 horse power, the fall being 114 metres. The efficiency of the machines was no less than 80 per cent., which is quite comparable with that of the best modern machines. In the historical survey an account is given of the work in hydrodynamics done by Pascal, D'Alembert, Lagrange, Laplace, Poisson, Cauchy, and others down to Poncelet and Girard. Interesting portraits are given of the French scientific workers. In the technological section illustrations are given of the chief steam- and water-power stations in France, and methods are indicated for accelerating the development of industry by distributing electric power over wide areas. H. Parodi, the engineer to the Compagnie d'Orléans, contributes a thoughtful paper on the different policies adopted by the various countries of the world with regard to railways operated by electric traction, and more particularly those which utilise water power through the medium of electricity. The curves he gives indicate clearly when electric traction becomes a commercial proposition.

THE River Pollution Committee of the Ministry of Agriculture and Fisheries, having learned that the impression prevails in many quarters that the Committee is antagonistic to the use of tar in the preparation of road surfaces, is anxious to correct this impression. The Committee is concerned solely with the question of river pollution from the point of view of the fishery interest. The constituents of tar, if they find access to a river, are most injurious to fish and their food, and the Committee earnestly advocates the avoidance of the use on any road, the washings from which are likely to find their way directly into a stream, of any road dressing containing tar or tar products. Washings from bituminous surfaces are, however, innocuous to fish and their food, and the Committee has advocated the use on roads in proximity to streams of bituminous dressings. Obviously, the roads with which the Committee is concerned constitute only a small fraction of the total roads of the country. The Committee's policy has been solely to urge upon all road authorities that care should be taken to avoid the use of tar at what are the danger points from the point of view of pollution. The Committee has examined a number of preparations for road-surfacing, and is prepared, if consulted by road authorities or other persons concerned, to advise them as to the suitability for use in proximity to streams of such preparations as they have examined.

HEATHFIELD HALL, Watt's residence at Birmingham, where he lived from 1769 until his death, is now in course of being demolished to make way for new buildings which are to be erected on what was once his estate. Fortunately, however, all the machines, tools, benches, etc., from Watt's workshop have been presented by Major Gibson Watt to the Science Museum at South Kensington, where on the ground floor of the new building, not far from three of the engines which were built by the firm of Boulton and Watt between 1777 and 1797, an accurate reproduction of James Watt's workshop has just been completed. The present owners have generously presented the door, windows, flooring, etc., of the old room, so that it has been possible to produce a replica of the old attic, and in it to arrange the contents as they were at the time of Watt's death. The two copying sculpture machines, the lathe, and benches, boxes of tools, tables, etc., take up too much space for the public to circulate in the room, but a large plate glass window in one of the walls allows the workshop and its contents to be seen readily.

THE following officers of the Institution of Electrical Engineers have been elected:—*President*, Mr. R. A. Chattock; *Vice-Presidents*, Lieut.-Col. K. Edgcombe, Prof. W. M. Thornton; *Hon. Treasurer*, Mr. P. D. Tuckett.

At the annual general meeting of the Royal Society of New South Wales, held on May 6, the following officers were elected:—*President*, Prof. R. D. Watt; *Vice-Presidents*, Mr. J. Nangle, Mr. E. C. Andrews, Mr. C. A. Sussmilch, and Dr. C. Anderson; *Hon. Treasurer*, Prof. H. G. Chapman; *Hon. Secretaries*, Mr. R. H. Cambage and Dr. R. Greig-Smith.

SIR ERNEST and LADY RUTHERFORD left Great Britain for Australia and New Zealand on July 25, on the s.s. *Ascanius*, bound for Adelaide. While their main object is to visit their parents and relatives in New Zealand, Sir Ernest has also promised to deliver lectures on aspects of modern physics in some of the chief cities of Australia and New Zealand. They hope to return to England in January 1926.

At the annual meeting of the Museums Association held at Exeter on July 7, the following resolution was passed:—"That the Museums Association desires to place on record its opinion that the present reckless destruction of animal and plant life by collectors and others will, if continued, result in a deplorable loss to posterity." Mr. J. Bailey, late of the Circulating Department of the Victoria and Albert Museum, London, was elected president of the Association for the year 1925–26. The next conference will be held at Bournemouth in July 1926.

PROF. A. A. MICHELSON, professor of physics in the University of Chicago, has been appointed to the first of the distinguished service professorships which have been established in that University. These professorships form part of a development scheme which, we learn from *Science*, has been instituted with the view of raising a new endowment fund of 6,000,000 dollars. Special efforts were made to obtain funds

in sums of 200,000 dollars, the incomes from which would be devoted to professorships such as that now conferred on Prof. Michelson. The present professorship is due to the generosity of Mr. M. A. Ryerson, of Chicago, formerly president of the board of trustees and donor of the Ryerson Physical Laboratory of the University.

THE autumn meeting of the Institute of Metals is to be held at Glasgow on September 1-4, under the presidency of Prof. T. Turner, Feeney professor of metallurgy in the University of Birmingham. The proceedings commence with the fourth autumn lecture, by Sir John Dewrance, who will take as his subject "Education, Research and Standardisation." Sixteen papers on various aspects of the constitution and properties of metals and alloys are to be submitted for discussion at the meeting. The lighter side of the programme announces visits to works and places of interest in the neighbourhood of Glasgow, and special arrangements are being made for the entertainment of the ladies present. Railway vouchers enabling members of the Institute and their friends to purchase return railway tickets to Glasgow at the rate of a single fare and a third can be obtained from the secretary of the Institute of Metals, 36 Victoria Street, London, S.W.1.

THE Council of the Institution of Electrical Engineers, which took an important part in founding the Society of Radiographers in the year 1920, and, under that Society's constitution, has up to now nominated six out of the eighteen members of the Society's Council, has withdrawn its nominees and terminated the Institution's connexion with the Society. This action has been taken because the majority of the Council of the Society of Radiographers has resolved upon certain alterations of the Society's articles, with which the Council of the Institution of Electrical Engineers is in entire disagreement, as in the Council's opinion these alterations will materially lower the professional status of non-medically qualified radiographers.

APPLICATIONS are invited for the following appointments, on or before the dates mentioned: An advisory agricultural economist at the Seale-Hayne Agricultural College, Newton Abbot—The Secretary and Bursar (August 4). A second assistant in botany in the University of Aberdeen—The Secretary (August 19). An assistant lecturer in physics at the University College of Wales, Aberystwyth—The Secretary (August 30). A laboratory assistant for the Veterinary Research Department of the Government of Uganda—The Crown Agents for the Colonies, 4 Millbank, Westminster, S.W.1, quoting M13/800.

Our Astronomical Column.

THE JULIAN DAY.—A matter that excited much interest was settled by the International Astronomical Union, after a long discussion, by a considerable majority. When it was decided that the astronomical day should begin at midnight, instead of noon, a diversity of view was manifested as to whether the Julian day should follow suit, or begin at noon, as heretofore. Speaking broadly, the former view was held in America, the latter in Europe. The matter is of especial importance for variable-star observers, since it has for long been the custom to use the Julian day both for the elements of these and for recording observations.

It was further pointed out that the whole point of the institution of the Julian day system was to have a method of recording time that should be independent of all changes of style or calendar changes, and that once established such a system should not be lightly broken. It was, indeed, admitted that there had been a change of two hours since its institution; its beginning was then noon at Alexandria, afterwards altered to Greenwich noon. However, a change of two hours applied to comparatively rough early observations is of little moment compared with a change of twelve hours in accurate modern observations. Many of the Americans, including Prof. Shapley, admitted the force of these arguments, and supported the retention of the noon beginning, which was afterwards confirmed by the Union as a whole.

An endeavour was also made to agree on a name for the new astronomical day that begins at Greenwich midnight. A very large section expressed disapproval of continuing to use the phrase Greenwich Mean Time for the new system, but no alternative was found that commanded general assent; it was agreed to leave the matter open, as being comparatively unimportant, provided one made clear what time-system one was

using. The title "Universal Time" met with most support, and the Astronomer-Royal said he would endeavour to get this name inserted in the Nautical Almanac as a second title, Greenwich Mean Time continuing to be the first title.

PERTURBATIONS OF MINOR PLANET 944, HIDALGO.—Discovered by Dr. Baade of Bergedorf in 1920, Hidalgo is one of the most interesting of the minor planets, being near the orbit of Mars when in perihelion, and near that of Saturn when in aphelion. Its period, $13\frac{2}{3}$ years, does not differ greatly from that of Jupiter; its orbit is inclined to the ecliptic at the high angle of 43° , the greatest of any minor planet. However, its passage of the descending node takes place not more than half a unit from Jupiter's orbit, and the question of the perturbations by the latter is of interest. Mr. K. Jantzen investigates the secular perturbations by Jupiter in Bulletin of Vilno Observatory, No. 5, using the method given by Hills in vol. 1 of the Amer. Ephem. Papers. The circle of eccentric anomaly was divided into 192 parts, this large number being necessary owing to the near approach to Jupiter's orbit, which occurs when $E = 83^\circ$.

The final values of the secular perturbations of the elements are, $e + 14''\cdot4$, $i - 16''\cdot2$, $\Omega - 26''\cdot5$, $\pi - 65''\cdot3$, $L + 57''\cdot6$. The method of special perturbations would have to be used at the time of a near approach of the two bodies; there was actually a fairly near approach (less than an astronomical unit) in 1922. This was probably the closest in the last century or thereabouts.

Some authorities are inclined to rank this body as a comet rather than a planet. It seems, however, better to limit the term comet to bodies showing nebulosity. Hidalgo always appeared stellar.