challenged the view taken by astronomers that the moon was dead and that no changes took place on its surface in a paper contributed to the Royal Astronomical Society on "Seasonal Changes occurring in certain Lunar Craters". These he attributed to patches of snow which disappeared gradually and reformed. These changes have not been confirmed, and must be attributed to differences of definition.

Pickering, Percival Lowell and George Forbes all made calculations to discover an extra-Neptunian planet. Pickering used the slight deviations of the orbit of Uranus, Lowell and Forbes the slight deviation of the orbit of Neptune (and in the case of Forbes the existence of a so-called family of Neptunian comets), as data for the existence of this body. The position of the planet was found by both Pickering and Lowell from these wholly insufficient data, and strangely enough a planet was found by Tombaugh at the Lowell Observatory on January 21, 1930. Judging from its brightness, the mass of the planet is too small to exercise any appreciable perturbation on Uranus or Neptune.

Prof. Pickering married Anne Atwood, daughter of Mr. Isaac Butts of Boston. They visited England a number of times and made many friends. Prof. Pickering spoke several times at the Royal Astronomical Society, of which he was elected an associate in 1910. He has also addressed the British Astronomical Association, as he was greatly in sympathy with amateur observers. F. W. D.

WE regret to announce the death of Sir James Crichton-Browne, F.R.S., a pioneer in the treatment of mental disease, which occurred on January 31, aged ninety-seven years.

News and Views

Mr. W. M. H. Greaves

THE King has approved, on the recommendation of the Secretary of State for Scotland, the appointment of Mr. W. M. H. Greaves, chief assistant of the Royal Observatory, Greenwich, to be astronomer royal for Scotland and professor of astronomy in the University of Edinburgh, in succession to Prof. R. A. Sampson, who retired recently. Mr. Greaves entered St. John's College, Cambridge, in 1917. He obtained a first class with distinction in Part II of the Mathematical Tripos and was awarded the Tyson Medal for astronomy. He obtained a Smith's Prize in 1921 for an essay on the movement of asteroids of the Trojan group, was awarded an Isaac Newton Studentship and in 1922 was elected a fellow of his College. Mr. Greaves was appointed chief assistant at the Royal Observatory, Greenwich, in 1924. The most important work undertaken by Mr. Greaves at Greenwich has been the development of methods for the determination of the colour temperatures of stars. The observations are divided into two parts: the determination of the relative gradients of the spectral energy curves and the fixing of the zero point of the temperature scale. The determination of the zero point is a long and intricate investigation, requiring reference to a terrestrial source; it has been undertaken twice with concordant results. The mean colour temperature for stars of spectral type *A*0 was found to be 18,000° K.; this value is appreciably higher than had previously been accepted but has since been confirmed by other investigators. Mr. Greaves has also been in charge of the magnetic work at Greenwich and has made some valuable investigations of the relationships between sunspots and magnetic storms. Mr. Greaves was secretary to Section A (Mathematics and Physical Science) of the British Association from 1924 until 1931, and has been secretary of the Royal Astronomical Society since 1932.

Accident to Dr. W. W. Vaughan

MOST of the members of the British Association delegation to the jubilee meeting of the Indian Science Congress Association have now returned, and one of them has kindly told us the circumstances of Dr. W. W. Vaughan's lamentable accident at Agra. It appears that Dr. Vaughan, with Mrs. Vaughan and other members of the delegation, had gone to the Taj Mahal before moonrise on the night of the party's arrival at Agra. In the darkness, he missed his footing on the upper of two terraces between which there is a fall of several feet, without any parapet. He fell on to the lower terrace, and his leg was broken above the knee. Help was obtained from other members of the delegation, and also, very fortunately, from an Indian friend of one of them, who, as a resident in Agra, knew what to do. But there was a weary wait for the sufferer before an ambulance could be got, during which he retained both consciousness and, by all accounts, the bravest bearing. The Thomason Hospital at Agra received him with every attention. It is now known that the leg, which had not been healing satisfactorily, was amputated on Monday, January 24; a private message on the following Thursday spoke of the patient's condition as "improving", and a press bulletin on January 31 appeared equally favourable.

International Economic Collaboration

THE able report by M. Van Zeeland on his mission of inquiry to various countries, directed to "the possibility of obtaining a general reduction of quotas and of other obstacles to international trade", was published in the press on January 28. His proposals in the main are very much in line with views that have been repeatedly expressed in NATURE, and they should receive serious consideration by all Governments. His immediate object is to bring together

representatives of the principal economic Powers in particular, Great Britain, the United States, France, Germany, and Italy—in the hope that they may succeed in working out an agreed plan of international economic collaboration. That there is ground for this hope is clear from the fact that everywhere he went M. Van Zeeland tells us that he met with a most sympathetic reception. The report he has so carefully prepared should provide an excellent basis for discussion. It is well balanced, stating frankly the difficulties which have to be faced without being too caustically critical of the narrow nationalistic aims recently pursued by nearly all countries.

AMONG the more fundamental problems for which a solution must be found, two in particular have received a good deal of advertisement, different countries advocating claims and counter-claims in regard to them, namely, those which relate to raw materials and colonies. It is highly important that such problems should be approached, as M. Van Zeeland urges in his report, "in a spirit of complete objectivity". That is a sound principle which every man of science will be ready to endorse. As to colonies, the most promising line of attack seems to be, again quoting the words of the report, "to seek for the means of generalizing the system of the open door which obtains in the Conventional Basin of the Congo, a system the general result of which it is impossible to criticize". So long as colonial Powers are in a position to exercise monopoly rights in the areas they control, dissatisfaction is bound to remain in the minds of those ruling the nations that are shut out, and such dissatisfaction is the potential seed of war.

Niagara Falls Bridge Disaster

THE well-known Niagara Falls View Bridge across the Niagara River, just below the falls, a steel-framed structure in a single span of about 1,200 feet, weighing some 2,600 tons and erected in 1898 at a cost of £60,000, collapsed during the afternoon of January 27, under the pressure exerted by an enormous mass of pack ice which had accumulated at the foot of the Falls. By reason of the intense cold of the preceding weeks, the ice had piled itself in huge blocks as it was swept over the Falls, to a height not much less than the deck level of the bridge, which was 165 feet above the river, and the danger had been clearly recognized for some time previously, so that when, despite the efforts made to save the bridge with heavy timber fenders, the final collapse took place, the sight was witnessed by a crowd estimated at ten thousand. The broken bridge now rests in a tangle of twisted steelwork upon the surface of the ice, which continues to gather and fills the gorge for a distance of two or three miles. There is another bridge for rail and road traffic about a mile and a half downstream, and this will have to be utilized for pedestrians until the fallen bridge is replaced. The drift of ice towards Lake Ontario is causing concern lest damage should be done to the generating station and plant of the Ontario Hydro-electric Commission, which is a short distance below the Falls. As it is, there is serious interference with the supply of electricity due to the fracture of mains.

Decibels and Phons

A CORRESPONDENT has raised the question of the use of the decibel as a unit for expressing sound intensity. Since his difficulties are shared by others, it seemed worth while to place them before an authority on the subject, who has been good enough to deal with them. He points out that it is not always realized that the decibel is a unit for specifying changes in intensity, power, or energy, and not a direct measure of the absolute value of these quantities. Decibels are not additive, since they measure changes on a logarithmic scale; so that it is the ratio of two sound intensities which determines their difference in decibels. Two similar sounds of intensities I and I_0 are said to differ in intensity by n decibels when $n = 10 \log_{10} I/I_0$. Hence a 10-fold increase in the intensity of a sound is a 10 decibel change, a 100-fold increase a 20 decibel change, and a 1000-fold increase a 30 decibel change. A decibel corresponds to an increase of intensity or energy in a ratio of approximately 5/4, two decibels to a ratio of $(5/4)^2$, three to a ratio of $(5/4)^3 = 2$, . . . and so on. Thus doubling the intensity of a sound, as when two similar voices sing the same note, corresponds to a change of 3 decibels. When a sound is said to have an intensity of so many decibels, it is implied that the intensity is being compared with some intensity which has been selected as a zero level. An international conference held in Paris last July adopted an intensity corresponding to an acoustical pressure of 0·0002 dyne per sq. cm. as the reference zero, this being near the threshold of hearing for sounds with frequencies in the neighbourhood of 1000 cycles per second.

IT will be seen that the decibel is a purely physical unit and is independent of the characteristics of the ear, which assesses loudness and not intensity. Moreover, two sounds of the same intensity but of different quality will not necessarily appear to be equally loud. For comparing the loudness of sounds, a scale of phons has been set up, based upon the fact that individuals find it possible to judge whether sounds of differing quality produce a sensation of equal loudness. Any sound or noise is matched under specified conditions against a pure reference tone with a frequency of 1000 cycles per second. If the intensity of the reference tone in decibels above the zero level is n, the reference tone and the sound or noise are said to have an equivalent loudness of n phons. For sounds of medium frequency and moderate loudness, a phon happens to correspond roughly to the smallest difference of loudness which can be detected by alternate listening under ordinary conditions.

Educational Science at Cambridge

THE recommendations of the Special Syndicate at the University of Cambridge on the position of the