Griffith Taylor has, however, given some account of the initial experiments (Bulletin No. 13, Commonwealth Bureau of Meteorology). He points out that Melbourne is not suited for these experiments, since the prevailing northerly winds cause a large proportion of the balloons to be carried out to sea and lost, while those carried by the easterly upper-air movement to the Victorian mountains are seldom recovered. No conclusive results can be deduced from the meagre data at present available, but after the war experiments are to be conducted under more favourable conditions at the meteorological observatory at Mount Stromlo, in Federal territory.

DR. W. VAN BEMMELEN has published in English a very interesting account of the "Results of Registering Balloon Ascents at Batavia" (*Batavia Javasche Bockhandel en Drukkerij*, 1916). Batavia lies a few degrees south of the equator, and these observations are valuable on account of the obvious care that has been taken to ensure accuracy and also on account of the equatorial situation. The ascents were 103 in all, spread over the six years 1910–15, and sixty-six available records were obtained. Dr. van Bemmelen gives tables showing the temperature and humidity, and also discusses the annual and daily variations. The most striking result is the low temperature that is found at great heights in these equatorial regions. Eighteen ascents reached the stratosphere, the mean height of which is shown as just under 17 km. At sea-level the mean temperature is 26° C., the freezing point is reached at 4·7 km., at 10 km. the temperature is −34° C., compared with −51° C. in England, but at 17 km. over Batavia the low value of −84° C. is found, against −54° C. over England. On one occasion a temperature of −90·2° C. (183° A. or −130° F.) was reached at 16·7 km. If any doubt remained about the existence of these low temperatures over the equator it has been removed by the publication of these results. The value given at 17 km., viz. −84° C., is based on twenty observations, and the standard deviation is small, so that there is no room for serious error in this value.

THE Journal of the Society of Siberian Engineers (Tomsk, January, 1916) devotes an article, illustrated by climatological charts, to the possibility of extending and developing the beet-sugar industry in Siberia. The desirability of establishing this industry in Siberia was pointed out by the Russian Government thirty years ago, and substantial fiscal relief was offered to pioneers, with the result that the first factory was set up in 1889 in the Minusinsk district of the Government of Yenisei. The seat of the beet-sugar industry, the western provinces of Russia, being now in enemy occupation, there is among the refugees from those regions a large amount of highly skilled labour available for employment elsewhere. The present moment is therefore opportune for directing attention to the subject and taking practical steps to foster a growing industry the development of which is of the greatest importance for the future of Siberia.

MESSRS. B. ARTIS and H. L. Maxwell have estimated the amounts of barium present in the leaves of certain tobaccos and trees, and publish the results in the *Chemical News* for August 11. The barium seems to be present in the ash of the leaf, partly as sulphate and partly in a form soluble in hydrochloric acid. The tobaccos examined were grown in Cuba, Pennsylvania, Connecticut, Sumatra, Wisconsin, and Mexico. The amount of barium (calculated as sulphate) found varied from 0·0132 per cent. to 0·0980 per cent. in the leaf, the lowest amount being found in the tobacco from Mexico and the highest in that from Pennsylvania. The stems invariably contained a larger amount. In the leaves of the trees examined the amount of barium sulphate found varied from 0·0071 per cent. (Sumac) to 0·0941 per cent. (wild grape) in immature leaves. In the mature leaves the amount is generally greater than in the immature where comparison is possible.

ACCORDING to a note by Mr. A. W. Knapp in the *Chemical News* for August 18, the pink colour frequently noticed by analysts to develop on the surface of margarine fat which has been exposed in the laboratory is not due to bacterial growth or to the action of light or oxygen. It is caused by the action of the vapour of mineral acids on a dye (probably dimethylamidoazobenzene) frequently present in margarine. A method of detecting the dye is described.

A NEW system of signalling which dispenses with semaphores has been in use on a section of the Pennsylvania Railroad for nearly eighteen months, and is described in the *Engineer* for September 1. Daylight lamp signals having a range of visibility of about 2500 ft. in broad daylight had been obtained, using a lamp of not less than 20 watts and a lens 8 in. to 10 in. diameter. In 1914 Dr. Churchill, of the Corning Glass Company, discovered the possibility of securing very long range from a small lamp arranged in the exact focal centre of a small wide-angle lens. Each light unit consists of a box painted dull black on the inside, and containing a 12-volt 6-watt lamp with tungsten horizontal helical filament. The lamp is placed in the focus of a lens 5·5 in. diameter, having a focal length of 2·25 in. In front of the lens is a convex glass cover of the same diameter, and is so constructed as to avoid the difficulty of sun glare, which was at first experienced when a flatter cover-glass was used. A 4-in. spherical mirror is placed over the lamp, and is so arranged as to give the signal indication at extremely close range. A hood 11 in. long is placed over the cover-glass in order to concentrate the lamp rays and to exclude the sun's rays. The article contains clear illustrations of the arrangement.

WE are informed that Messrs. Macmillan and Co., Ltd., have become the sole agents for the sale at home and abroad of the publications of Messrs. W. and A. K. Johnston, Ltd., of Edinburgh.

OUR ASTRONOMICAL COLUMN.

MAXIMA OF MIRA CETI, 1915.—From observations made between November 21, 1914, and March 8, 1916, Mr. Felix de Roy has concluded that the dates of maxima of Mira Ceti were January 25, 1915 (mag. 3·8), and December 20, 1915 (mag. 3·0), while the intervening minimum (mag. 8·7) occurred on August 22 (*Mem. della Soc. degli Spett. Ital.*, vol. v., series 2, July). The first maximum of 1915 was the feeblest observed since 1896, and its abnormal character has already been discussed by A. Bemporad (NATURE, vol. xcv., p. 405). The brightness at the minimum was also exceptional, having been equalled or exceeded only at six of the forty-three minima which have been sufficiently recorded. The second maximum of 1915 showed a normal amplitude of variation, and a normal interval from minimum to maximum, and a return of the star to normal conditions is suggested. A general discussion of the "perturbations" indicates the probability that the diminution and re-establishment of the brightness at maximum, of the amplitude, and of the interval from maximum to minimum, are progressive, and pass through a minimum when the maximum is abnormal. The disturbances usually extend through

three or four periods, but the three elements are not always simultaneously affected, and no periodicity for the abnormal maxima can yet be established.

A FAINT STAR WITH LARGE PROPER MOTION.—The greatest proper motion yet known for any star has been discovered by Prof. Barnard from a comparison of photographs taken with the 10-in. Bruce telescope, with the aid of the Zeiss blink-microscope. The star in question is one of the 11th magnitude, situated in R.A. 17h. 53m. 44s., declination +4° 27·4′ (1916·0), and the annual proper motion, in a northerly direction, amounts to about 10″. The star follows B.D. +4° 3560 by 9·5s., and is 0·4′ north. The motion is confirmed by numerous plates taken at Harvard, dating from 1888 (Harvard Bulletin, 613). The greatest proper motion previously known was that of Cordoba zones, 5h. 243, magnitude 8·3, R.A. 5h. 8m., declination −45°, amounting to 8·7″ per annum. The well-known star, 1830 Groombridge, of magnitude 6·5, comes next with a proper motion of 7″ per annum.

THE VAN VLECK OBSERVATORY.—The Van Vleck Observatory of Wesleyan University at Middletown, Connecticut, was dedicated on June 16. The observatory is the gift of the late Joseph Van Vleck, in commemoration of the services rendered to the University by his late brother, John Monroe Van Vleck, who had been professor of mathematics and astronomy for many years. The chief instrument is an equatorial refracting telescope of 18½-in. aperture and 26 ft. focal length, but the completion of the objective has been delayed by the war, and a 12-in. lens is temporarily in use. The observatory is designed for purposes of instruction and research, and, in addition to the large telescope, is provided with two small transits and numerous portable instruments. The director is Prof. F. Slocum, who is well known for his successful work at the Yerkes Observatory. It is intended to apply the large telescope chiefly to the photographic determination of stellar parallaxes (*Popular Astronomy*, vol. xxiv., No. 7).

THE SYSTEM OF POLARIS.—Spectroscopic observations have revealed the existence of two close companions to Polaris, one having a period of about four days, and the other of about twelve years. From a discussion of all the available data, L. Courvisier, of the Berlin-Babelsberg Observatory, has concluded that the visible 9th magnitude companion to Polaris is also a member of the system, its period of revolution being at least 20,000 years (*Astronomische Nachrichten*, 4854). The mass of Polaris itself is probably not greater than one-fourth that of the sun, and its density not more than 0·003 of the sun's density. The deduced parallax of Polaris is 0·053″. The maximum separation of the companion having a period of twelve years is given as 0·20″, and this may be reached about the beginning of next year.

THE AMSTERDAM COLONIAL INSTITUTE.

FOR some years past a movement has been in progress in Holland having for its object the foundation of a colonial institute in Amsterdam commensurate with Dutch colonial interests, and adequately representative of the important part which Holland has taken in the prosecution of research in tropical agriculture and forestry. There has existed at Haarlem for many years a small, but important, colonial museum, and the promoters of the new institute have fortunately been able to secure the transfer of the economic collections, publications, and staff of the Haarlem museum to the Amsterdam institute. The latter is at present housed in temporary quarters, but the authorities have in hand a capital sum of about 1,600,000 florins, which is apparently all available for the construction of buildings and the installation of the new institute. The latter will apparently be supported mainly by subsidies from the Government, the province of North Holland, and the city of Amsterdam, and by subscriptions from private individuals and firms. In 1914 the ordinary annual expenditure was 91,600 florins, but for 1915 the estimate is 78,000 florins, certain of the subsidies having been cut down owing to war economies.

As at present organised, the institute comprises three sections: *Economic* (which is practically the Haarlem museum transferred to new quarters), *Anthropological*, and *Tropical Hygiene*. It corresponds, therefore, on a small scale to the Imperial Institute of the United Kingdom as regards technical and economic work on colonial products, and to the British Schools of Tropical Medicine as regards tropical hygiene. There is, of course, nothing in this country as yet corresponding to the anthropological section of the Amsterdam institute. A site for the new buildings has been secured on the Oosterbegraafplaats, where a building to house the administrative offices and the economic and anthropological sections will be erected with a front of about 170 yds. on the Maurits Kade and about 75 yds. on Linnaeus Straat. A special building for the section of tropical hygiene will be erected as part of the buildings of the Hygienic Institute of the University of Amsterdam, with which this section will work in close co-operation.

The institute has already issued a number of publications, perhaps the most interesting being a concise history by Dr. Sirks of research in natural science in the Dutch East Indies (Koloniaal Instituut te Amsterdam, Mededeeling, No. vi. Afdeeling Handelsmuseum, No. 2).

LAND-SLIDES ON THE PANAMA CANAL.[1]

A COMMITTEE of the U.S. National Academy of Sciences spent the last fortnight of the year 1915 on the Canal zone studying the great land-slides of the Culebra Cut. These are three in number, and are all comprised within a mile or a little more of the Canal bank. The moving ground consists almost entirely of the stratified rocks known as the Cucuracha or Culebra beds. The East Culebra slide and the Cucuracha slide lie north and south of the core of basalt and hard tuff which forms the high central mass of Gold Hill, the flanks of which are composed of the aforesaid stratified rocks. On the west side of the Canal there are three summits of massive rock, tuff or basalt, viz. Contractor's Hill, nearly opposite to Gold Hill; Zion Hill, north of Contractor's Hill; and Culebra Hill, north of Zion Hill. The third great slide, the only one on the west bank of the Canal, known as the West Culebra slide, lies between Zion and Culebra Hills.

The committee finds that no great extension of the slides in the soft Cucuracha or Culebra beds is probable, because the rock itself is limited in extent, and because the broken ground already extends in many places beyond the crest of the slope.

It also reports upon the important question of the stability of Gold Hill, Contractor's Hill, Zion Hill, and Culebra Hill, which rise considerably above the level of the sliding ground. The confident expectation that these eminences will "slide" makes the average visitor to the Canal works pessimistic of the future of the undertaking. Viewed casually, or from a dis-

[1] Preliminary Report upon the Possibility of Controlling the Land Slides Adjacent to the Panama Canal. By the Committee of the National Academy of Sciences appointed at the request of the President of the United States. (Proc. Nat. Acad. Sci., vol. ii., No. 5, April 15, 1916.)