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 $+4^{\circ} 27.4'$ (1916-0), and the annual proper motion, in a northerly direction, amounts to about 10". The star follows B.D. $+4^{\circ} 3560$ 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 authori-

ties 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. Afdeling 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.)

tance, no reason is apparent why these hills should not presently share in the movement of the material which lies upon their flanks. The apprehension is all the more natural because great chunks of the massive rock have broken from the parent masses adjacent to the sliding ground. When, however, we examine the materials closely we find a great difference in character between the central, and highest, part of these hills and the lower slopes which slide. The committee reports that the hills consist of intrusive bodies of basalt or of masses of hard Obispo tuff, and that, so far as the exposures show, they do not rest upon the soft beds, but extend far down below Canal bottom. The committee is therefore of opinion that although rock may break off from them, they will not collapse.

In this connection it is important to note the observation in the report that there has been no upheaval of the Canal bottom between Gold Hill on the east, and Contractor's Hill, nearly opposite to it, on the west, side of the Canal, which is the deepest part of the cut. This shows that the hills are not pressing on the bottom.

Thus the findings of the committee, and the evidence in their report, favour the opinion that the establishment of a permanent waterway free from interruption is only a question of time; of time to be reckoned, not in months, indeed, on one hand, but certainly not in centuries on the other. It thinks that "some sliding ground will continue to enter the Canal for several years to come," and it recommends that certain steps be taken to lessen its amount. These recommendations have to do with the control of the rain-water, which in this region of great precipitation adds so much to the weight of porous, stratified rocks, and so greatly diminishes their cohesion. The committee proposes, therefore, that the growth of vegetation should be promoted, that cracks should be filled up as soon as formed, that surface and tile drainage should be undertaken in threatened areas, and that drains should be established on the moving ground of the three great slides. VAUGHAN CORNISH.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

It is announced in the issue of *Science* for August 18 that Lafayette College is the residuary legatee of the late Mr. A. N. Seip, of Washington, D.C. It is said that the college will ultimately receive not less than 50,000*l.*

The Elgar Scholarship of the Institution of Naval Architects, of the annual value of 100*l.*, and, subject to certain regulations, tenable for three years, has been awarded to Mr. R. J. Shepherd, of his Majesty's Dockyard, Devonport.

It is stated in a recent issue of *Science* that the vocational-educational Bill, providing for Federal co-operation with the various States in promoting agricultural and industrial education in the United States, makes an annual appropriation beginning at 100,000*l.* and increasing each year by 50,000*l.* until 600,000*l.* is reached, to be apportioned to the States in proportion to their rural population.

THE calendar for 1916-17 of the Edinburgh and East of Scotland College of Agriculture is now available. The college was founded to provide for agricultural education and research in the central and south-eastern counties of Scotland. It receives annual grants from the Government through the Board of Agriculture for Scotland. Its classes are arranged in conjunction with the science faculty of Edinburgh University, and the courses for the diploma of the college and the B.Sc. degree of the University are

concurrent. The calendar contains full details of the courses of instruction available in the departments of agriculture, horticulture, and forestry. The aim of the college is to supply such training in agriculture and the sciences underlying it as is nowadays indispensable to all who intend to gain their living from the land as owners, or tenants, or agents. Copies of the calendar may be obtained from the secretary of the college, 13 George Square, Edinburgh.

A CONFERENCE representative of the Classical, English, Geographical, Historical, and Modern Language Associations has drawn up the following resolutions, which have received the approval of the councils of the five associations named:—That in the opinion of the conference: (1) It is essential that any reorganisation of our educational system should make adequate provision for both humanistic and scientific studies. (2) Premature specialisation on any one particular group of studies, whether humanistic or scientific, to the exclusion of all others, is a serious danger, not only to education generally, but to the studies concerned. (3) Humanistic education implies the adequate study of language and literature, geography and history, which in each case should, at the appropriate stages of education, go beyond the pupils' own language and country. (4) The representatives of humanistic studies would welcome from the representatives of the mathematical and natural sciences a statement with regard to those studies similar to that contained in (3). (5) In all reform of education it must never be forgotten that the first object is the training of human beings in mind and character, as citizens of a free country, and that any technical preparation of boys and girls for a particular profession, occupation, or work must be consistent with this principle. (6) Subject to the above principles the associations concerned would welcome a comprehensive revision of national education from the point of view of present needs. It is stated that "the resolutions are published in the hope that in any coming reconstructions of our educational system this attempt to restate the 'humanistic' position will mitigate the dangers incident to a violent breach of tradition and an excessive reaction against the past predominance of certain types of study. But it will be obvious that they are drawn up in no spirit of hostility or indifference to either scientific or technical studies, and their framers are anxious to co-operate in securing for these, as well as for the studies with which they are themselves more particularly interested, their due place in a national system of education." Co-operation and suggestions are invited; any communication may be addressed to the chairman of the Conference of the Five Associations, Prof. T. F. Tout, Oak Drive, Fallowfield, Manchester.

SOCIETIES AND ACADEMIES.

PARIS.

Academy of Sciences, August 21.—M. Paul Appell in the chair.—A. Lacroix: Some volcanic rocks of the French possessions in the Indian Ocean and the Pacific.—Paul Appell: The developments of the square root of a polynomial in continued fractions.—W. H. Young: The convergence of Fourier's series.—M. Petrovitch: Theorem of the mean relating to the integrals of an important partial differential equation.—G. Giraud: Quadratic forms and hyperabelian functions.—A. Liljeström: A geometrical theorem useful for the study of the direct inversion of Abelian integrals.—R. Garnier: A new method for resolving Riemann's problem.—R. Birkeland: Developments of the movement of a fluid parallel to a fixed plane.—V. Kostitzin: The periodicity of the solar activity and the influence