

Harvard Observatory is carried on in co-operation with other institutions. Prof. Pickering has also assisted largely in the organisation of amateur astronomers in America, especially for the observation of variable stars, in which thirty observers are now associated. For this work the observatory has furnished suitable charts, and determinations of the magnitudes of nearly 5000 reference stars.

Harvard Circulars Nos. 203 and 204 have also been received. The first includes particulars of asteroids which will attain magnitude 10, or brighter, during 1918, and the second contains a valuable summary of the observed magnitudes of Nova Persei No. 2 from 1902 to the end of last year, together with a list of comparison stars suitable for future determinations.

THE CANADIAN "OBSERVER'S HANDBOOK."—A useful service to its members is rendered by the Royal Astronomical Society of Canada in the annual publication of "The Observer's Handbook." It includes a collection of astronomical data, referring especially to the sun, moon, and planets, arranged very conveniently in the form of a calendar. There is also a special list of occultations, calculated for Ottawa. Tables which vary but little from year to year have been omitted from the present issue.

EPIHEMERIDES OF ALGOL VARIABLES.—In the *Journal des Observateurs*, vol. ii., No. 4, M. Luizet has given a valuable series of tables, from which observers can readily prepare a list of the dates of occurrence during the present year of minima of 123 variables of the Algol type. The epoch of the first minimum occurring in each month is given in the first table, and the length of period, and multiples thereof, in the second. The variables are designated by the notation of André, as well as by that of Argelander.

### THE TRAINING OF THE FRENCH ENGINEER.

IN the *Bulletin de la Société d'Encouragement pour l'Industrie Nationale* for September-October last appears a valuable report of the proceedings of the Society of Civil Engineers of France concerning the training of engineers of the first rank, alike for the special services of the State and for leading positions in industry. Not only is the specialised training required considered in the article, but also the previous preparatory education. The matter arose on the presentation of an important communication from M. Léon Guillet, a member of the society, which was considered at a special session of the society held on November 3, 1916, at which the Minister of Commerce and Industry presided. The communication embraced a comparative study of the subject of technical training as it is pursued in France and abroad, a thoughtful criticism of the existing means and methods of such instruction and the preparation required for it, and an expression of personal views as to the lines upon which in future both preparatory and technical studies should proceed. A special commission was appointed, which sat during five sessions, extending to the end of April, 1917, and took important evidence from professional and other persons engaged in engineering.

An official invitation was received by the society in January, 1917, from the Minister of Commerce and Industry, to formulate proposals for the essential modifications required, in its opinion, to be introduced to ensure the more efficient education and training of professional engineers. These proposals take the form of recommendations relative to reforms in the aims and methods of secondary education, as a preparation for higher

technical schools, in which it is suggested that the classical studies should be lessened, the teaching of modern languages encouraged, and courses in manual exercises introduced. It is also suggested that the plan of instruction should be arranged so as to meet the needs on one hand of those proceeding to higher normal schools, and on the other of those entering the technical high schools.

Great importance is attached to the necessity for the fullest opportunity of laboratory practice in the technical high schools, and for the encouragement not only of a spirit of individual research and inquiry in the students, but also of a more intimate relation between them and the teaching body with less merely *ex cathedra* teaching. It is laid down as essential that the directing and teaching *personnel* of the engineering schools shall be recruited from persons actively associated with industrial conditions, and that the students themselves shall have had the opportunity of work in the factories and of travel-study in the workshops of France and in foreign countries. The vital importance of the economic aspect of industry is insisted upon, and with the view of increasing French influence abroad, every encouragement should be given to foreigners to follow in whole or in part the instruction in the technical high schools, and, finally, it is recommended that so far as possible the native pupils shall be admitted without fee, and assisted, where necessary, by loans without interest. It is suggested that regular military training shall be maintained in these schools, that the time spent in them shall count as two years in the Service, and that the one year of effective service shall consist of six months with the colours and six months in the service of the State or in industries susceptible of contributing to the national defence, or in camp instruction for officers.

Proposals are made for further specialised and advanced instruction of a post-graduate character, and after the manner of the newly founded High School of Electricity, it is suggested that institutions dealing respectively with machinery and iron and steel construction, metallurgy, chemistry, textiles, public works and railways, and naval construction should be established, and short technical courses of a very advanced character dealing with the most recent progress in technical science offered to professional engineers engaged in works. The proposals are further elaborated in a long communication from the vice-president of the society to the Minister of Commerce and Industry which is well worthy of the attention of the engineering profession in this country.

### NEMATODE PESTS.

PROF. WARRINGTON YORKE and Dr. B. Blacklock (in *Annals of Trop. Med. and Parasitology*, vol. xi., No. 2, 1917) have recorded a series of interesting observations on the periodicity of the larvæ of the nematode worm, *Filaria bancrofti* (*nocturna*), in an Australian who contracted the infection in Queensland. It is well known that during the night the larvæ of this species are concentrated in the cutaneous vessels, while during the day they are present there in small numbers only. The authors estimated the number of larvæ in the cutaneous blood every two hours for a period of twenty-four hours on December 21-22, 1916, and again on January 5-6, 1917. The maximum concentration observed was at midnight, when there were 12,850 larvæ per cubic centimetre. Although the number of larvæ fell to a low level during the daytime they were never absent, the minimum number noted being 50 per c.c. of cutaneous blood. A discussion of the ob-

servations has led the authors to the conclusion that the nocturnal periodicity of the larvæ is primarily dependent upon periodic variations in the arterial supply of larvæ to the cutaneous vessels. The periods of sleep and activity of the patient were reversed, and there resulted a gradual change in regard to the period of the cutaneous immigration of the larvæ. After four days the maximum concentration of the larvæ in the cutaneous vessels had been changed from midnight to 6 a.m., and after eleven days to midday. Graphs showing the number of larvæ per c.c. of blood passed in the urine reveal the existence of a regular periodicity corresponding with that of the larvæ in the cutaneous blood, with the difference that the time of maximum concentration of larvæ in the renal and vesical vessels was several hours later. Messrs. Malins Smith and Matthews give, in the same number of the *Annals*, further records of the occurrence of intestinal protozoa in non-dysenteric cases. Their results show that among the 200 returned soldiers examined in Liverpool *Entamoeba histolytica* was present in twelve of the 158 cases, with no previous history of dysentery.

Dr. N. A. Cobb, of the United States Department of Agriculture, has published (in *Nematology*, vol. iii., pp. 431-86) an account of the nematode genus *Mononchus*. The genus is of world-wide distribution, and some of the species are cosmopolitan. *Mononchs* are regularly present in arable land of a sandy or loamy nature, and sometimes occur in great numbers; the author estimates that there were at least thirty millions per acre in the top six inches of a field of maize in New Jersey. Most mononchs are carnivorous; they have been found to feed on protozoa, on rotifers, and on other nematodes. One cosmopolitan species was found by the author in Florida feeding on the larvæ of *Heterodera radicolica*, a serious root-pest, and it is suggested that further investigations may reveal the possibility of utilising mononchs to reduce the enormous losses in crops due to plant-infesting nematodes. A description of the characters and anatomy of the genus is given, and it is stated that the females of many, probably of most, species are really hermaphrodite, the gonad producing also spermatozoa, which are so minute that they have apparently hitherto escaped notice. Males, if found at all, are nearly always rare, and of most of the species males are not known. A key is provided to the subgenera and to the fifty-seven species—including twenty-eight described as new in this memoir—and the text has seventy-five excellent figures.

#### RAINFALL DISTRIBUTION OVER FRANCE.<sup>1</sup>

THIS is the first portion of a contemplated large investigation into the rainfall distribution over France, and deals with the régime over the North-West Provinces. Other memoirs will contain a discussion of the data for the south-west, north-east, and south-east of the country for the fifty years 1851-1900. In the work under notice, which is an extract from the memoirs of the French Central Meteorological Office, full particulars are given of the data used in compiling the maps of average rainfall based on a fifty years' normal, by a comparison of short-period data with standard stations, affording records for the complete series. In some cases the standard stations seem to be at a considerable distance from the short-period record to be corrected to the fifty years' normal.

The variability of rainfall based on records for sixteen stations in France and adjacent countries during the

<sup>1</sup> "Etudes sur le Climat de la France. Régime des Pluies. Première Partie. Considérations générales: Région du nord-ouest." Par M. Alfred Angot. Pp. 128+13 plates.

second half of last century is discussed, from which it is shown that the departures of individual years from the normal are in accordance with the theory of probabilities. A list of the stations arranged in river basins is given by departments, along with the altitude and the period of observation. Monthly isohyets are drawn at intervals of 10 mm. up to 100 mm., but at 120 mm. and 150 mm. thereafter, while on the annual maps the intervals extend to 100 mm. A summary of the leading features governing the rainfall distribution is given for each month and for the year.

In almost all the regions considered October is the wettest month, the rainfall exceeding 100 mm. in the country of Caux, the department of the Manche, the western part of Brittany, and the heights of Gâtine, the maximum being 151 mm. at Saussemesnil; while the driest areas in this month are the middle valley of the Seine, the basin of the Eure, and on the Beauce, where the rainfall is between 50 mm. and 60 mm., but not under the former value. The driest month is February, not only as regards the actual quantity, but also taking into consideration the shortness of the month.

For the whole year the driest regions are the basins of the Seine, the Loire, and the Oise, where the precipitation varies between 500 mm. and 600 mm. The stations where more than one metre of rain falls are extremely few, and are mostly located in mountainous areas, the maximum being 1181 mm. in the Monts d'Arrée. No detailed description appears of the methods of mapping the material utilised. Rivers are shown, but towns, railways, and departments are not indicated, nor are the orographical features shown. The maps clearly indicate the very patchy distribution of rainfall, and have evidently been drawn with much care. The originals were on a scale of 1:1,500,000, or twenty-two miles to an inch, and then reduced for publication on a scale of thirty-nine miles to an inch.

#### MINERAL PRODUCTION OF PERU AND THE PHILIPPINE ISLANDS.

THE official report upon the mineral production of the Philippine Islands for the year 1915 has recently been issued by the Division of Mines, Bureau of Science, of the Government of the Philippine Islands. The importance of the gold production far outweighs that of any other mineral; its value is returned as 2,633,523 pesos, say about 274,000l., being an increase of 12.1 per cent. above that of 1914. The gold bullion, of course, also carries a certain amount of silver, which is valued separately. The only other metallic product is iron, of which ninety-six tons appear to have been produced, this being only about one-half of the production of the previous year. This iron is all produced in small native furnaces, and is worked up into ploughshares or similar articles; the main reason in the falling off is the competition of inferior articles, made from scrap-iron. There is no production of native coal, none having been worked since 1912. The other minerals, of which returns are included, are salt, sand and gravel, clay products, stone, lime, and mineral waters. The total value of all these is estimated at rather less than the value of the gold output.

The mineral statistics of Peru for the year 1915 show a considerable increase in most of the products according to the report (No. 83) recently published in Lima. The total value is given as 5,930,000l., being an increase of 42 per cent. above that of 1914. This increase is due in part to the important rise in the value of mineral products, but it must be noted that this rise did not extend to the value of silver, and as