also sets of botanical serials. Among the latter we notice Curtis's *Botanical Magazine* from 1787 to 1906; Edwards's *Botanical Register*, a complete set; Maund's "Botanic Garden," large-paper edition; the Transactions of the Linnean Society of London, complete to 1916; the *Orchid Album*; the *Orchid Review*; the *Phytologist*, by Luxford, Newman, and Irvine, all published. Messrs. Wheldon also have for disposal a large-paper copy of Loddige's "Botanical Cabinet," complete in 20 vols.

OUR ASTRONOMICAL COLUMN.

PERIODIC COMETS.—Wolf's comet was detected by Prof. Barnard at Yerkes Observatory on July 12, three days later than M. Jonckheere's first observation. M. Kamensky's predicted date of perihelion, 1918 December 13·3899, appears to be too early by 0·0531d., which is not a large error, and the ephemeris given in NATURE for July 11 will suffice for finding the comet.

Borrelly's periodic comet will pass perihelion a month earlier than Wolf's, and the conditions will be favourable for observation. Mr. L. v. Tolnay gives the following ephemeris in *Ast. Nach.*, No. 4948; it is for Greenwich midnight:—

		R.A. h. m. s.	S. Decl. ° ′	Log r	Log Δ
July	29	3 19 0	17 1	0·2653	0·2107
Aug.	2	3 28 5	16 41	0·2591	0·1972
	6	3 37 10	16 21	0·2529	0·1835
	10	3 46 15	16 1	0·2467	0·1696
	14	3 55 18	15 41	0·2405	0·1554
	18	4 4 19	15 20	0·2343	0·1411
	22	4 13 17	14 59	0·2282	0·1265
	26	4 22 12	14 37	0·2222	0·1116
	30	4 31 4	14 13	0·2162	0·0964

The perihelion passage is about November 16·65, log a=0·5598, e=0·0153, log q=0·1450.

THE PERIOD OF SIRIUS.—The companion to Sirius has lately been more easily observable than during the previous forty years, and has completed rather more than a revolution since its discovery in 1862. Mr. R. Jonckheere has obtained measures with the 28-in. refractor at Greenwich in the course of the last four winters, and has taken the opportunity of making a revised estimate of the period (Monthly Notices, R.A.S., vol. lxxviii., p. 480). The mean result is 50·02 years, which is 1·78 years shorter than that given by Burnham. The shortest period ever given was that of 48·84 years, arrived at by Zwiers, and the longest that of 58·47 years given by Gore. Mr. Jonckheere recalls that nearly eleven years before the visual discovery Peters made an investigation of the orbit from transit observations, and although the maximum displacement was only 0·152s., he obtained the closely accurate period of 50·01 years. Adopting the parallax 0·38″ and a semi-major axis of 7·5″, the corrected mass of the system is 3·07 times the mass of the sun.

TWO SPECTROSCOPIC BINARIES OF LONG PERIOD.—The spectroscopic binary 32 θ_2 Cygni has been under observation at the Dominion Observatory, Ottawa, by Mr. J. B. Cannon since 1914, and a preliminary orbit has now been determined (*Astrophys. Journ.*, vol. xlvii., p. 193). The period of this star is more than three years, and the eccentricity of the orbit 0·182, but there are irregularities which suggest the presence of a third body The velocity-curve may be explained by considering the system as consisting of a luminous star revolving about another body in a circular orbit in 390 days, and the pair revolving in an elliptic orbit about a third body in 1170 days. The star is of spectral type G5 and magnitude 5·15.

A spectroscopic binary of still longer period has been under investigation at the Cape Observatory by Dr. J. Lunt since 1903. The star in question is α Phœnicis, and the period has been found to be 10·62 years, or 3880 days. The eccentricity of the orbit is 0·32, and the system is receding with a velocity of 75·76 km. As regards length of period, the star is second only to Polaris, which has a period of 11·9 years. The star is of magnitude 2·44 and of type K.

STONYHURST COLLEGE OBSERVATORY.—The annual report of this observatory for 1917 includes a valuable record of the state of the sun's surface on 210 days of observation. In units of one five-thousandth of the visible surface the mean disc-area of the spots was 12·1, which is about three times greater than that of the previous year, and twice as great as at the previous maximum. The increased activity commenced early in February and reached its greatest intensity in August, the greatest area on any one day being 50 units on August 11. The February and August groups were of exceptional size, and second to none that have appeared during the last thirty-eight years. As regards the ranges of magnetic declination and horizontal force, the year was relatively quiet and out of accord with the solar activity. A comparison of the Stonyhurst drawings with spectroheliograms taken at the Yerkes Observatory has shown an almost perfect agreement between the faculæ and the calcium flocculi, but no similarity with the hydrogen flocculi. The report also includes particulars of meteorological and magnetical observations.

THE FUTURE OF THE ELECTRICAL TRADES.

THE Departmental Committee appointed by the Board of Trade to consider the position of the electrical trades after the war, with special reference to international competition, has now issued a Report (Cd. 9072, price 2*d*.). Like other similar Committees, this urges that "remedial and unifying legislation governing the supply and distribution of electrical energy should be introduced forthwith." A historical *résumé* of electrical enterprise in this country is given, and it is pointed out that, like the automobile industry, it has been hampered all through by the lack of a scientific outlook on the part of the officials of our Government Departments. Acting according to their lights, they encouraged competing companies using different types of plant and different systems to set up in the same area, the reason given being that the healthy competition would cheapen the supply to the consumer. The mischievous effect of this policy is well illustrated by the circular issued by the Board of Trade in 1916 calling on the supply companies to link up with one another in the national interests so as to reduce the consumption of coal and economise labour. That is, after making it practically impossible for the companies to link up, the Board calls on them to do so.

Looking to the future, the Committee points out that as the supply of electrical energy is a "key industry," it is imperative that questions concerning it should be prevented from becoming party questions. They should be considered solely on their merits from the point of view of national requirements. We quite agree, but we are afraid that this is a counsel of perfection. Few questions are of greater urgency than that of standardising some system for electrifying

all our railways. The power stations need to be placed in the best positions for civil and military needs, and all main and local lines should be properly co-ordinated. At present our railways are being electrified in a piecemeal and desultory way. A comparison is made between manufacturing conditions in this country and in Germany. The conclusions, with some of which we do not agree, are altogether in favour of the German methods. The Committee was impressed by the fact that the balance-sheets of the Allgemeine Elektricitäts Gesellschaft showed a cash balance of more than six million pounds in 1915. Another flourishing firm, the Siemens-Schückert Co., has stated that its large cash balance will shortly be depleted by the manufacture of "peace products" for stock for disposal at the end of the war.

At least, up to the present time, German manufacturing firms have had little to pay in the way of extra taxation or excess profits duty, and so English firms are naturally getting anxious. The Committee recommends that the import of enemy goods should be prohibited for three years after the conclusion of peace. Other recommendations are the imposition of import duties (in other words, Protection), combination between manufacturers, the provision of extended banking facilities, and, most important of all, the promotion of a better understanding between employers and employed and the provision of better housing and working conditions. A supplementary report is promised which will deal, *inter alia*, with education, research, the decimal system, and the consular service. As Sir Charles Parsons and Sir John Snell are on the Committee, their educational proposals will be looked forward to with keen interest.

ITALIAN METEOROLOGY.[1]

A NUMBER of interesting papers dealing with various aspects of meteorology in Italy, including results from a new station in the colony of Gebel Bengasi, have recently been issued by Prof. Eredia, director of the service. The first (1) contains the results of observations made at Nalut during the two years ending May, 1915. The co-ordinates of the station are lat. 31° 53′ N., long. 8° 45′ E., and the height 600 m. The mean temperature is 65·7° F.; that of the warmest month, July, 84·6°, and of January, the coldest month, 44·4°, showing the large variation of more than 40°. The mean daily maxima vary from 98° in July to 52·5° in January. The corresponding mean minima are 70·6° and 36°, so that the amplitude in the day values is 10° in excess of the night values. The mean daily range is 21·5°, and the absolute extremes of temperature are 111° and 23°. Compared with Tripoli, on the coast, the mean temperature is 1·6° lower. In summer (May to August) Nalut is 5° warmer than Tripoli, in winter 10° colder, the extreme differences being +6° in June and −11° in January. The annual rainfall is 194 mm. (7·63 in.), which almost all falls between December and April. The average number of days with rain in the year is nineteen. The rain falls in heavy showers of short duration, which, as a rule, do not exceed thirty minutes. Only on three occasions did the duration of a shower exceed five hours, although one rainstorm lasted two days. The heaviest fall was 1½ in. in two and a half hours, on April 4, 1915. December, 1914, was the wettest month, with 5·16 in., falling on four days during an aggregate of twelve hours, although in the same month of the previous year only 0·03 in. fell. There are 237 cloudless and 36 overcast days annually. The predominant wind is N. at all seasons, accounting for about half of all the observed winds, while winds from the E. and S.E. rarely occur.

The second paper (2) is a discussion of thunderstorm frequency over the north plains of Italy, with special reference to the barometric pressure at the time of the occurrence. Data from ten observatories are examined for the months April to October for the ten years ending 1916, with the general result that thunderstorms are most frequent with pressure under 755 mm. (29·73 in.), while a secondary maximum occurs between 759 mm. and 762 mm. Only in 5 per cent. of the cases was pressure more than 765 mm. The frequency is also discussed with reference to the relative humidity at the time of the thunderstorm. In summer the air was dry (under 60 per cent.) in one-third of the cases, but in early autumn only one thunderstorm in ten occurs with so dry an atmosphere.

The pressure conditions associated with two floods on the River Uadi, at Derna, on the coast of Bengasi, are discussed in (3), from which it is shown that in the flood of November 30, 1913, there was an anticyclone over Western, and a low-pressure area over Central, Europe. The wind at Derna, and, indeed, throughout Bengasi, changed from S. to N., indicating the passage of a depression to the north. In the flood of April 12, 1916, pressure was low to the north of Scotland and high in Portugal, with a subsidiary area of low pressure over Algeria. Details of some other rains associated with flooding in various parts of Tripoli and Bengasi are also given.

The last paper (4) summarises the work of the Italian Meteorological Office since its initiation in 1879. The geophysical branch dates from 1887, and upper-air research from 1902. In October, 1917, there were 181 stations provided with direct-reading and automatic registers, and other 341 stations observing rainfall, temperature, wind, and cloud. Of extra rainfall stations there were 161. Full particulars are given of the special researches carried out by the various sections.

A new edition of useful tables, such as are available in our own "Computers' Handbook," is given in (5), which include tables for the conversion of millimetres into the new pressure units. R. C. M.

[1] (1) Prof. F. Eredia, "Contributo alla Climatologia del Gebel," *Biblioteca Agraria Coloniale*. (2) Prof. F. Eredia, "La Frequenza dei Temporali in Val Padana," *Rend. della R. Acad. dei Lincei*. (3) Prof. F. Eredia, "Le Piene dell' Uadi di Derna" (Ministero delle Colonie). (4) "L'Officio Centrale Italiano di Meteorologia e Geodinamica," Estratto da *La Scienza per Tutti*, No. 1, 1° Gennaio, 1918. (5) Prof. F. Eredia, "Tavole ad Uso degli Osservatorii Meteorologici Italiani."

GEOLOGY OF THE BARBERTON GOLD-MINING DISTRICT.

THE Geological Survey of the Union of South Africa has issued an important memoir on the geology of the Barberton gold-mining district. This district is made up essentially of the Older Granite and the Swaziland System, probably of pre-Cambrian age, and underlying the Transvaal System, the latter being of importance mainly as determining the great escarpment of the Drakensberg; it may be noted that the latter contains auriferous deposits, both reef and alluvial, that have been worked for some thirty-five years. The tectonics of the Barberton district are very complex, intense folding in various regions, such as the Sheba Hills, having been brought about by the intrusion of the great masses of granite. One of the most interesting features of this report lies in the conclusions reached respecting the genesis of the auriferous deposits of the Barberton district. Apart from the alluvials, auriferous deposits of two types are recognised, namely, pyritic quartz reefs and zones of impregnation. The former occur mainly in the granite of the De Kaap valley, and in some of the older rocks, and in many cases the results obtained from their exploitation have been, upon the whole,