OUR ASTRONOMICAL COLUMN.

OBSERVATIONS OF COMETS 1911*c*, 1911*e*, 1911*f*, AND 1911*g*.—In No. 4544 of the *Astronomische Nachrichten* Dr. Bemporad discusses at length the photometric observations of Brooks's comet (1911*c*), made at the Catania Observatory during the period August 14 to November 28, 1911. The greatest apparent brightness was recorded on October 23, when the comet was about as bright as a 3·5 magnitude star. On a chart accompanying the paper he plots the curves $i=k/r^2\Delta^2$ and $i=k/r^4\Delta^2$ with the curve of observed magnitudes, and this shows that the comet became brighter even than the value given by the latter formula. A fourth curve, on which the intensities reduced to $\Delta=1$ are shown, indicates that the rise of intensity near perihelion was very steep, the magnitude rising from 9·5 on October 12 to 4·8 at perihelion.

As an abstract from *Hemel en Dampkring* (October, 1911), Prof. Nijland sends us an account of the Utrecht observations of comets 1911*c*, 1911*f*, and 1911*g*. A drawing of Beljawsky's comet (1911*g*), made on October 1, 1911, shows the head quite near to ι Leonis, with the tail extending nearly to η Leonis, while an enlarged drawing of the head shows two dense streamers flowing as a parabolic envelope from the head.

The Algiers observations, made by MM. Rambaud and Villatte, of Borrelly's comet (1911*e*) are reported in No. 4544 of the *Astronomische Nachrichten*. On October 27, 1911, the comet was observed as a round nebulosity 45″ in diameter, with a brilliant nucleus of magnitude 10·5.

A BRILLIANT METEOR.—A meteor of extraordinary brilliancy was observed at South Kensington by Mr. W. Moss at 5h. 10m. on December 22, 1911. Starting from a point near ϵ Persei, the object moved very quickly, passing above Mars and Saturn to a point $\alpha=35°$, $\delta=+12°$. The latter part of the path was distinctly wavy, and the meteor was at least as bright as Mars, and left a slight trail.

NICKEL-ON-GLASS REFLECTORS.—As is well known to anyone who has done any photographic work in the ultra-violet, silver reflects scarcely any light in the neighbourhood of λ 3160, therefore, for this special region, a silver-on-glass mirror is practically useless as a reflector. To overcome this difficulty, primarily in his experiments on the ultra-violet photography of the moon, Prof. R. W. Wood carried out some trials, during his last summer vacation, in which he endeavoured to replace the silver film on a figured glass disc by some other metal capable of reflecting light throughout the whole range of the spectrum; the production of large mirrors of speculum is too difficult for ordinary work.

Consulting Rubens's tables, he found that nickel was probably the most suitable metal, and after numerous experiments he succeeded in depositing, electrolytically, a film of nickel on a previously silvered, figured disc. The method of doing this and the results obtained are described in an interesting paper which Prof. Wood publishes in No. 5, vol. xxxiv., of *The Astrophysical Journal*. To illustrate the various reflecting powers of glass, silver, nickel, and speculum, he photographed, through a quartz lens, a mirror partly covered by Ag, partly by Ni, and partly left bare, alongside a piece of polished speculum. With blue and violet rays passing through the lens the order (increasing) of reflecting power was glass, Ni, Ag, speculum, but when the quartz lens was heavily coated with silver, thus allowing only the ultra-violet rays to pass through it, the silver was found to reflect as little as the bare glass, and came out nearly black, while the nickel surface was almost as bright as the speculum surface on the resulting photograph. Incidentally, Prof. Wood points out that such ultra-violet photography as that which he has applied to the moon may prove exceedingly useful in other branches of science. For example, some white substances come out quite black (*e.g.* zinc oxide), and white flowers show very different reflecting powers; common phlox comes out quite black, while white geraniums are much lighter.

ALMANACS FOR 1912.—From the Observatory of Madrid we have received a copy of the official *Anuario* (525 pages) for 1912, which, in addition to the usual astronomical and meteorological tables, contains special articles dealing with the observations of comets, the solar eclipse of April 17, the spectroheliograph of the Madrid Observatory, and the solar and meteorological observations made in 1910. From the discussion of the various data, the writer of the article on the April eclipse suggests that possibly a totality of three or four seconds will occur in Spain and Portugal, and mentions three favourable stations, viz. Cacabelos, Barco de Valdeorras, and Verin.

The *Annuaire Astronomique* for 1912, published by M. Flammarion, is of the usual form, and, being published later than usual (December, 1911), contains in the annual *revue* of astronomy some very interesting notes and comments on recent solar, planetary, and cometary observations.

The "Companion to the Observatory" is too well known to need any description here, and should, of course, be in the observatory of every British astronomer. This year's issue resembles that of other years, and may be obtained from Messrs. Taylor and Francis at the price of 1*s.* 6*d.*

THE PALISA-WOLF STAR CHARTS.—The fifth series of the star charts prepared by Drs. Palisa and Wolf is now ready, and until April 1 a set may be obtained for 30 marks; after that date the price will be 40 marks.

WEATHER IN 1911.

FROM a meteorological point of view, the year which has just closed was of considerable interest. The feature which stands out beyond all others is the abnormal summer, during which both the temperature and sunshine have established a record, whilst the rainfall was also exceptional. After the heat and brilliancy of the summer, the exceptionally heavy rains of the late autumn and early winter are probably of next importance, although in many parts of England rain was sorely needed.

Taking the country as a whole, the mean temperature for the year was everywhere in excess of the average, and in England, where the excess was greatest, the difference amounted to fully 2°. The rainfall was deficient over the entire kingdom, except in the south-east of England and the Channel Islands, the deficiency in the English Midlands, where the summer drought was keenly felt, amounting to 4·20 inches, the aggregate rainfall being only 84 per cent. of the average. The duration of bright sunshine was everywhere largely in excess of the average, the excess amounting to 336 hours in the south-east of England, and the duration was 121 per cent. of the normal.

The Greenwich observations, which may fairly be taken to represent England, show that the mean temperature for the year was 52°, which is 2° above the average. The warmest month was August, with the mean temperature 69°, which is 6° above the average, and was the warmest August since 1841. The temperature was in excess of the average every day throughout the month, and on August 9 the sheltered thermometer registered 100°, which is the highest reading as yet recorded in any part of the British Isles. The mean temperature in July was 68°, which is 4·5° above the average, and there have only been two Julys warmer in the last seventy years. The first twelve days of September were also the warmest on record. The mean temperature was in excess of the average in every month, with the exception of January and April. The thermometer was continuously above the average for sixty days from July 11 to September 13, and there were in all 224 warm days during the year. The lowest temperature was 22°, in February, and frost occurred on thirty-three days. Two of the coldest days on record for April occurred on April 5 and 6, and on May 22 the radiation temperature fell to 25°.

The aggregate rainfall for the year was 23·67 inches, which is 0·46 inch less than the average. The rainfall was above the normal in six months and below in six months. The wettest month was December, with 3·99 inches, which is 2·16 inches more than the average, and in both October and November the rainfall exceeded 3 inches. The total for the three closing months of the year was 10·71 inches, which is 45 per cent. of the fall for the year. The driest month was July, when the total measurement was 0·26 inch, and rain only fell on three days during the month. The aggregate summer rainfall, for June, July, and

August, was 3·72 inches, which has only been smaller in three previous summers since 1841. There were during the summer two periods of absolute drought—twenty-three days from July 1 to 23, and seventeen days from August 2 to 18. Rain fell on 156 days during the year; December had twenty-three wet days and November twenty.

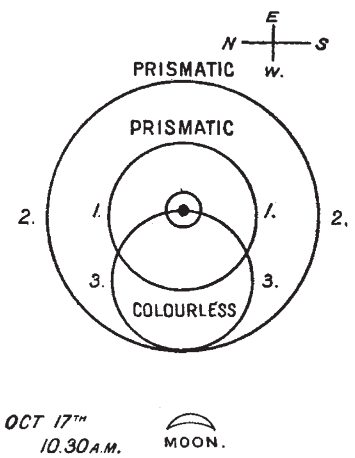
In the Ebbw Vale Sir Alexander Binnie measured 29·23 inches of rain from October 18 to December 31, and during the whole of this period there were only nine days without rain.

The duration of bright sunshine at Greenwich was 1780 hours, which is 425 hours in excess of the average of the past thirty years, and is the brightest year on record since 1881; the next brightest year was 1906, with 1735 hours. July had 335 hours' sunshine, which is the sunniest month since the establishment of sunshine records in 1881. The duration of sunshine was in excess of the average in each month, with the exception of January and March.

CHARLES HARDING.

OBSERVATION OF SOLAR HALOS IN AFRICA.

AN optical phenomenon is reported by a correspondent from Elobey Island, lat. 1° N., long. 9° 30′ E., in the Gulf of Guinea. On October 11, 1911, between 1 and 2 p.m., he observed "a large light, of different colours as the rainbow, encircling the sun, and at times only visible on the east side and sometimes only on the west of the sun, and at 2 p.m., our time, disappeared altogether." During this time the sky was covered with swiftly passing small clouds, and shortly after the disappearance of the phenomenon heavy rains began to fall. Without information as to the angular diameter of the ring or the order of the colours it is not possible to say with certainty whether it was a halo or a corona, but its appearance with low clouds makes it probable that the phenomenon was a corona. The corona sometimes appears round the sun when it shines through thin cloud or mist. It is coloured, red being outermost, and several successive sets of coloured rings are usually formed. They are due to the diffraction which the light undergoes in passing among drops of which the cloud is composed. The radius of the first ring of the corona varies from 1° to 3°, according to the size of the drops, and radii of the others are successive multiples of that of the first. As the drops of water in the mist or cloud become larger the rings grow smaller. Their diminution consequently implies approaching rain.



Six days after the observation at Elobey Island, on October 17, the combination of halos shown in the diagram was observed by Mr. J. G. Orchardson at Kericho, in British East Africa. The halos 1 and 2 are probably the two of most common occurrence, with radii of about 22° and 46° respectively. The altitude of the sun at the time of the occurrence was presumably about 65°–70°, and for this altitude the horizontal circle through the sun, on which mock suns are usually found, would just touch the larger halo and appear to have its centre on the smaller halo. This ring would be produced by reflection at the vertical faces of ice crystals in the higher atmosphere. It seems most likely that this is the origin of ring No. 3. If, however, the circle had been parallel with the horizon, it is probable that the fact would have been mentioned by the observer. The other possibility is that the circle was a secondary halo formed about a mock sun in the same way as the 22° halo is formed about the sun itself. Such secondary haloes are very rare. The position of the mock sun which could produce one in the present case would be at the point where the vertical through the sun met the halo of 22° either at the zenith or half way between the horizon and the zenith. In the former case the secondary halo and the mock sun ring would coincide.

PRIZES PROPOSED BY THE PARIS ACADEMY OF SCIENCES FOR 1913.

GEOMETRY.—The Francœur prize (1000 francs), for discoveries or works useful to the progress of pure or applied mathematics; the Bordin prize (3000 francs), for improving in some important point the arithmetical theory of non-quadratic forms.

Mechanics.—A Montyon prize (700 francs), for inventing or improving instruments useful in agriculture or the mechanical arts or sciences; the Poncelet prize (2000 francs), for a work on applied mathematics.

Navigation.—The extraordinary prize of 6000 francs, for a work increasing the efficiency of the French Navy; the Plumey prize (4000 francs), for improvements in steam engines or any other invention contributing to the progress of steam navigation.

Astronomy.—The Pierre Guzman prize (100,000 francs), for the discovery of a means of communicating with a star other than the planet Mars; the Lalande prize (540 francs), for the most interesting observation, memoir, or work contributing to the progress of astronomy; the Valz prize (460 francs), for the most interesting astronomical observation made during the year; the G. de Pontécoulant prize (700 francs).

Geography.—The Tchihatchef prize (3000 francs), for the encouragement of explorers of the lesser known parts of Asia; the Gay prize (1500 francs), for a study of the reptiles of warm countries, especially the reptiles of Mexico.

Physics.—The Hébert prize (1000 francs), for the best treatise or most useful discovery for the practical application of electricity; the Hughes prize (2500 francs), for discoveries or works contributing to the progress of physics; the Gaston Planté prize (3000 francs), for an important discovery or invention in the field of electricity; the Kastner-Boursault prize (2000 francs), to the author of the best work on the various applications of electricity in the arts, industry, and commerce.

Chemistry.—The Jecker prize (10,000 francs), for works contributing to the progress of organic chemistry; the Cahours prize (3000 francs), for interesting researches in chemistry; a Montyon prize (unhealthy trades; a prize of 2500 francs and a mention of 1500 francs), for the discovery of a means of ameliorating an unhealthy trade or occupation; the Vaillant prize (4000 francs), for the discovery of a photographic layer without visible grain and as sensitive as the gelatino-bromide now used.

Mineralogy and Geology.—The Victor Raulin prize (1500 francs), for assisting the publication of works relating to geology and palæontology; the Delesse prize (1400 francs), to the author, French or foreign, of a work on geological or mineralogical science; the Joseph Labbé prize (1000 francs), for geological works or researches putting in evidence the mineral riches of France, its colonies or protectorates.

Botany.—The Desmazières prize (1600 francs), for the best work published during the year on Cryptogams; the Montagne prize (1500 francs), for works on the anatomy, physiology, development, and description of the lower Cryptogams; the de Coincy prize (900 francs), for a work on Phanerogams; the grand prize of the physical sciences (3000 francs), for the geographical study of the flora of French western Africa; the Thore prize (200 francs), for the best work on the cellular Cryptogams of Europe; the de la Fons-Mélicocq prize (900 francs), for the best work on the botany of the north of France.

Rural Economy.—The Bigot de Morogues prize (1700 francs), for a work contributing to the progress of agriculture in France.

Anatomy and Zoology.—The Savigny prize (1500 francs), for the assistance of young travelling naturalists, not receiving Government assistance, who specially work on the invertebrates of Egypt and Syria; the Cuvier prize