CORRESPONDENCE.

To the Editors of 'The Observatory'.

Reduction of Lunar Occultations.

GENTLEMEN,—

The following is an extract from a letter recently received from Dr. Dirk Brouwer of Yale University Observatory :—

"A preliminary discussion of disappearances has yielded the following values for the correction to the Moon's mean longitude :—

	ΔL.	p.e.
1938·5	+1″·88	±0″·03
1939·5	+1″·34	±0″·06
1940·5	+0″·92	±0″·15

In view of the continuing diminution of this correction, I am recommending that, beginning with Lunation 223 (New Moon of 1940 December 28), *no correction* be applied to the observed time in the reduction of occultations."

Will all those who reduce occultations please note that the present correction of +1″·5 to the Moon's mean longitude, which has been in operation since the beginning of the first lunation in 1939 (New Moon of 1938 December 21), should not be used after 1940 December 28.

I am, Gentlemen,

Yours faithfully,

D. H. SADLER.

1940 December 16.

NOTES.

BOMBS ON GREENWICH OBSERVATORY.—A few words may now be vouchsafed to our many astronomical friends at home and abroad who are anxious for the safety of the Royal Observatory. Owing to the indiscriminate nature of the German bombing of London, it soon became apparent from the high density of bombs falling in the neighbourhood that it must be only a matter of time before one or more of the Observatory buildings was damaged. Up to the time of writing, direct hits with high explosive bombs (fortunately not of high calibre) have occurred on two occasions. Although windows, roofs, dome coverings

and fences have been badly affected, the amount of structural damage is not serious. The historic Octagon Room of 1675 has, so far, escaped ruin, although the great north window (as well as all the other windows) has been shattered by blast. A direct hit on the lodge gates demolished brickwork and damaged the public time dial, which with its 24-hour designation has been a source of interest, often of perplexity, to a couple of generations of sight-seers, who have made the pilgrimage to set their watches right by Greenwich Time. On the second occasion, a large number of bombs fell in and around the Observatory grounds. There was a direct hit on one end of the Altazimuth Building which was housing a reversible transit instrument. The instrument was thrown off its pier, but although badly damaged is not unrepairable; the object glass was unbroken and the impersonal wire micrometer remained intact, together with the spider threads! Near the Altazimuth Building still stands a Stevenson screen, complete with its thermometers, although two bombs fell one on either side of it a few feet away. One of the attics of the Main Building stopped a glancing hit on its sloping roof. About 8 tons of masonry were hurled down, but the structure stood firmly. A large measuring micrometer was thrown on its side to the concrete floor, but examination shows no apparent damage to the machine.

Fortunately, when the numerous bombs were falling over the Observatory, the small staff on night watch had taken cover, otherwise casualties must almost certainly have occurred, for the deep holing and cutting of brickwork, doors and stack pipes bear witness to the multitudinous flying fragments from the exploding bombs. The buildings and grounds have now been tidied and temporary repairs made. The familiar appearance of Greenwich Observatory (almost a tiny city of domes) still greets the visitor to Greenwich Park.

One new feature remains until further repairs are completed; from the inside of the largest dome an excellent illusion is created in daylight of the quiet night sky with many first magnitude stars above the horizon.

One of the small party (Mountain, the deputy foreman of the Observatory) who nightly watch over the safety of the Royal Observatory, has received the Medal of the British Empire for his work, under bomb and anti-

aircraft fire, in making a temporary stopping to a serious gas leak in a bomb crater at the entrance to the Observatory.

MAGNETIC STORMS AND SOLAR ACTIVITY DURING 1940.—Although there was a definite decline in solar activity during 1940 as compared with the preceding years, 1937–1939, of very high activity, there was no scarcity of sunspots. The magnetic activity for 1940 declined proportionately less than the sunspots, the decrease being chiefly noticeable in the fewer "great" storms. With respect to sunspots, the provisional sunspot number for 1940, based on Greenwich data alone, was 66 as compared with the published Zurich values for the years 1936–39 of 80, 114, 110, and 89. Some 24 groups of spots during 1940 reached or exceeded an area of 500 millionths of the Sun's hemisphere; of these, 4 groups $\geqslant 1000$ units in area.

During 1940, there were 20 magnetic storms recorded at the Greenwich magnetic station at Abinger. Four of the storms were "great" storms in which the ranges in $D \geqslant 1°$ or those in H or $V \geqslant 300\,\gamma$. The storms are tabulated below with their respective ranges in declination, horizontal force and vertical force kindly supplied by Mr. Witchell. A typical "sudden commencement" is denoted by *sc*; an abrupt commencement (other than a *sc*) by the letter *a*. The last column shows whether a sunspot $\geqslant 500$ units in area was within 4·0 days of central meridian passage at the time of the origin of the storm.

Of the above storms, Nos. 4, 6, 7 and 12 fall into the category of "great storms". No. 10 was not included as a great storm, because the range in H in excess of $300\,\gamma$ (the lower limit for a great storm) was apparently due to the diurnal inequality. Some details of the combined solar, magnetic and radio phenomena during the very disturbed magnetic period 1940 March 23 to April 3 is given in *The Observatory*, **63**, 129, 1940.

There was a notable succession of 6 large groups of sunspots (maximum area, 500–1200 units) in August and another of 5 groups in June. There appears, however, to have been a general absence of bright chromospheric eruptions of great intensity in association with these groups, and a corresponding infrequency of ionospheric

irruptions (producing fade-outs on short-wave, long-distance wireless communication) may be noted. The magnetic activity during the same period was not above the general average for the year.

Comparative data for the year 1939 are given in *The Observatory*, **63**, 53, 1940. H. W. N.

Magnetic Storms, 1940.

No.	Date.	Begins U.T.	Ranges. D.	H.	V.	Sunspots ⩾ 500 units C.M.P.
		h.		γ	γ	
1	Jan. 3–4	14·6 *sc*	43′	140	160	Jan. 5·5
2	Jan. 18	14	45′	210	165	....
3	Mar. 23–24	6·3 *a*	32′	170	100	Mar. 26·3
4	Mar. 24–25	13·8 *a*	2°·1	900	1050	Mar. 26·3
5	Mar. 25–26	20·0 *a*	40′	250	220	Mar. 26·3
6	Mar. 29–31	16·0 *sc*	70′	649	550	Mar. 26·3
7	Mar. 31–Apr. 1	9·7 *sc*	55′	620	245	....
8	Apr. 2–3	19·0 *a*	43′	260	190	....
9	Apr. 25–26	2·1 *sc*	54′	220	185	....
10	May 23–25	17·9 *sc*	30′	350	120	....
11	June 14–15	8·0	26′	190	75	June 12·8
12	June 25–26	2·9 *sc*	52′	470	250	June 25·3 *
13.....	July 13–14	8	24′	180	110	July 16·3
14	Aug. 3	14½	20′	180	90	Aug. 3·9
15	Aug. 9–10	8	23′	175	80	Aug. 12·6 †
16	Sept. 26–27	17·0 *sc*	50′	230	140	....
17	Oct. 6–9	21	40′	180	170	....
18	Nov. 12–13	8	33′	135	95	....
19	Nov. 25–26	8	39′	160	90	....
20	Dec. 20–24	21	33′	170	100	....

Solar Notes.—The last solar notes were given in 63, 290, 1940, and brought the record to the middle of October. Since then there has been no spectacular group of sunspots, though one growing rapidly to a brief maximum area of 500 millionths of the Sun's hemisphere crossed the Sun's central meridian on Nov. 16·5. During the cloudy winter months in this country, it is not possible to keep a close track on solar activity, but it is inferred that great chromospheric activity was generally absent from 1940 Oct.–1941 Jan. 1 inclusive. During this interval, only three ionospheric irruptions (radio fade-outs associated with bright chromospheric eruptions) have been reported to Greenwich. These occurred on Oct. 7, Nov. 15 and Jan. 24 respectively. On the other

* The larger of two groups > 500 units is tabulated.
† The largest of three groups is tabulated.

hand, small or moderate-sized groups of sunspots have not been infrequent, especially during December, when no fewer than twelve groups were recorded on Dec. 10–12.

COMET FRIEND-REESE.—Harvard Card 560 announces that Mr. Clarence L. Friend, Escondido, California, discovered a comet on Jan. 17. It was discovered independently by Mr. E. J. Reese, Uniontown, Pennsylvania, and was described as diffuse with a nucleus, tail less than 1° in length and magnitude 10. Messrs K. Guthe and R. M. Thomas, of the Harvard Observatory, have determined positions of the comet from a prediscovery image on a Harvard plate taken with the FA camera (Cambridge, 1·5 inch aperture), and from a plate taken with the I camera (Cambridge, 8-inches aperture). The first was on Jan. 0·9908 and the other on Jan. 29·00698, and from these and observation on Jan. 19 they have computed the following orbit :—

T	1941 Jan. 20·633 U.T.	
ω	132° 35′·9	1941·0
Ω	329 2 ·9	1941·0
i	26 36 ·5	1941·0
q	0·94285	

COMET ENCKE.—Harvard Card 561 announces that Van Biesbroeck, Yerkes Observatory, reports the discovery of this comet on 1941 Jan. 19·033. It is described as diffuse with a nucleus, the magnitude being 17. In *The Handbook of the British Astronomical Association*, 1941, the late Dr. A. C. D. Crommelin gave the elements and an ephemeris and the comet is very close to the predicted position.

COMET PARASKEVOPOULOS (1941 *c*).—This comet was discovered by Dr. John S. Paraskevopoulos, of the Boyden Station, Bloemfontein, on Jan. 23, and also by Dr. R. Grandon and others. Its magnitude was stated to be 3·5 and its tail was 5° in length. An orbit computed by Wood and Jackson, and cabled by Dr. John Jackson, Cape of Good Hope, is given below and also an ephemeris:—

Elements.

T	1941 Jan. 27·779 U.T.	
ω	268° 26′	1941·0
Ω	41 50	1941·0
i	168 08	1941·0
q	0·7894	

1941.	Ephemeris. R.A. h m	Dec. °	ρ.	r.
March 23.....	2 07	+10·8		
27.....	2 08	11·3	2·124	1·327
31.....	2 10	11·8		
April 4.....	2 11	12·3	2·323	1·435
8.....	2 13	12·7		
12.....	2 14	13·1	2·497	1·544

A GRAZING OCCULTATION.—A remarkable occultation of the star B.D. +0° 19 (H.D. 940) was observed with the Huggins refractor at the Solar Physics Observatory, Cambridge, on November 10. The *Nautical Almanac* predicted an occultation at Edinburgh but none at Greenwich, and it was therefore doubtful whether or not one would occur at Cambridge. At about $23^h\ 07^m$, when the star appeared rather close to the Moon's terminator, there was a suggestion of flickering in the star's light. About two minutes later this became quite pronounced, and it was evident that the star was passing behind lunar mountains and valleys. There was considerable range in the duration of each flicker—most lasted only a fraction of a second while one deep minimum lasted about two seconds, and it was thought for a moment that the final occultation had occurred. A stop-watch was started at $23^h\ 10^m\ 48^s$, the time when it was estimated that the star had been finally occulted. Owing to the peculiar nature of the observation this time may have been as much as 0·5 sec. late. No parallax is available for the star, but type and proper motion mark it as a distant Ko giant ($m = 6{\cdot}3$), and presumably the real angular diameter was lost in the diffraction pattern at the Moon's limb. ——— A. D. T.

INTERNATIONAL ASTRONOMICAL UNION.—Because of difficulties in administration and especially in communication among the nations belonging to the International Astronomical Union, the position of Secretary has been taken over temporarily by Dr. Walter S. Adams, American Vice-President of the Union. Action to this effect has been approved by a majority of the members of the Executive Committee at the request of Sir Arthur Eddington, President of the Union, and Dr. J. H. Oort, Secretary. Communications relating to the activities of the Union should now be addressed to Dr. Adams at the Mount Wilson Observatory, Pasadena, California, U.S.A.

PERSONAL.—Dr. Dirk Brouwer has been appointed Director of the Yale University Observatory in succession to Dr. Frank Schlesinger, who is due to retire next June.

OBITUARY.—We regret to record the death at the age of 55 of Sir Shah Muhammad Sulaiman, who combined with a distinguished judicial career a love of mathematics and astronomy. He was one of the three original members of the Federal Court of India, and was also president of the National Academy of Sciences, India. In astronomical circles his name is associated with an interesting new theory of light which had an important bearing on the interpretation of the gravitational red shift of spectrum lines.

IF an excuse be needed for recording the experience described below in these pages, it may be pointed out that hydrodynamical principles are being applied to many modern astrophysical problems, so that some day we may find an analogous phenomenon in the external universe.

A passing shower had left some raindrops on the window of a train travelling southwards. A passenger looking out of the window on the western side noticed a peculiar eddy-motion of dust-specks in the drops; perhaps because it was war-time there was more grime than usual on the window-pane, and each drop had a fair ration of dust-specks suspended in it. *All the specks were rotating anticlockwise.* Other windows were examined on the same side of the train; whenever motion could be observed (which was not always), the rotation was in the same sense. On examining the eastern windows, the only rotations that could be observed were *clockwise.* Judging by the smoke of the train the west side was more sheltered from wind than the east. It seems probable that the direction of rotation is determined by the asymmetrical shape of the drops produced by gravity, and that the undercutting action of the wind tends to initiate motion in the bulge of each drop. A further phenomenon was noticed when the train began moving after a stop. Although the motion of the train was quite smooth the rotation in the drops began in pronounced jerks as though checked by viscosity.