SHORT COMMUNICATIONS

THE SEXTANID METEOR STREAM*

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The Sextanid meteor shower was first reported by Weiss (1960), who matched theoretical envelopes to the echo range-time plot from a directive radar rate equipment to find the radiant $\alpha = 155 \pm 8°$, $\delta = 0 \pm 10°$. The peak activity persisted from September 29 to October 3, but was noticeable only in 1957. No trace of activity due to this shower could be found in previous surveys.

A radio survey of the orbits of meteors was carried out at Adelaide during 1961. The 27 Mc/s radio equipment has been described by Weiss and Elford (1963). The orbits of 2200 meteors have been computed and the data analysed for showers. Full details of this analysis will be published elsewhere.

The orbit equipment was operated during the period September 21–29, 1961 and nine Sextanid meteors were detected during the period September 24–29. The details of the radiant and orbit are given in Table 1. The errors listed correspond to the 95% confidence limits. Any dependence on the longitude of the Sun $\odot$ listed is significant at the 5% level.

Table 1

THE SEXTANID STREAM

$\odot = 183{\cdot}6°$	$1/a = 0{\cdot}89 \pm 0{\cdot}03 + 0{\cdot}0(\odot - 183{\cdot}6)$ a.u.$^{-1}$
$\alpha = 151{\cdot}7 \pm 0{\cdot}9°$	$e = 0{\cdot}87 \pm 0{\cdot}01$
$\delta = -0{\cdot}1 \pm 1{\cdot}5°$	$i = 21{\cdot}8 \pm 2{\cdot}3°$
$V_o = 33{\cdot}2$ km/s	$\omega = 213{\cdot}2 \pm 2{\cdot}1°$
$V_g = 32{\cdot}2 \pm 0{\cdot}6 - 0{\cdot}5(\odot - 183{\cdot}6)$ km/s	$\Omega = 3{\cdot}6°$

The orbit bears a close resemblance to that of the Geminid stream. Figure 1 shows the Sextanid orbit and the Geminid orbits as determined at Adelaide by 11 meteors in 1960 and 11 meteors in 1961. The mean Geminid orbit determined by Kascheyev, Lebedinets, and Lagoutin (1960) by 298 meteors in 1959 is also shown. The latter was observed from a more favourable site, hence these data should be regarded as the most accurate. The orbits have been projected orthogonally onto the ecliptic plane for presentation. The Kharkov data are compared with the 1961 Adelaide data in Table 2.

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TABLE 2
THE GEMINID STREAM

	Kharkov	Adelaide
$\odot$	260·0°	260·1°
$1/a$	0·76 a.u.$^{-1}$	0·75±0·05 a.u.$^{-1}$
e	0·89	0·89±0·01
i	23·1°	18·5±1·4°
ω	325·9°	324·5±1·3°
Ω	260·0°	260·1°

Apart from the difference in inclination, the agreement is good. Statistically, the difference between the Sextanid and Geminid orbits is not significant, and the former could well represent the day-time return of a branch of the latter stream after perihelion passage, if the stream were wide enough. The distance of closest approach of the Sextanid orbit to the Earth's orbit in December is about 0·34 a.u. The known duration of the Geminid shower is about 7 days, which corresponds to a minimum stream width of 0·11 a.u. This does not indicate the true width, however, and it is possible that the meteoric matter giving rise to the two showers is connected in some manner.

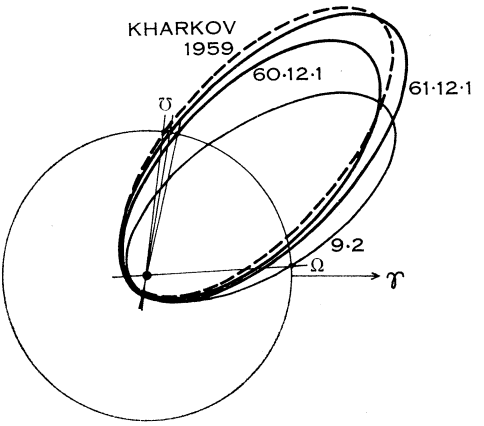

Fig. 1.—The orbits of the September Sextanids, 9·2, and the December Geminids, 60·12·1 and 61·12·1.
——— Adelaide data; – – – Geminids, as observed at Kharkov in 1959 by Kascheyev, Lebedinets, and Lagoutin (1960).

The annual behaviour of the two showers is quite different. The Geminids recur annually with a remarkably consistent echo rate (Weiss 1959), indicating that the meteoric matter is extended uniformly along the orbit. On the other hand, the Sextanids appear to be periodic. This would explain why they have not been detected by previous radio surveys conducted in both hemispheres.

The mean period of the nine Sextanid meteors used in Table 1 is 1·20±0·06 years. A preliminary data search, however, with less stringent limits, selected 11 meteors with a mean period of 1·32 years. Thus, if the meteoric matter were bunched

in the orbit, the shower would occur only every 4 or 5 years. This is consistent with the fact that the only two known observations of the shower are separated by four years (1957 and 1961). The Jodrell Bank surveys in the years 1947–52 should have detected the shower in either 1948 or 1949. The radio echo apparatus using two aerials was listed as operative after September 1949 (Aspinall and Hawkins 1951), but the published data refer mainly to the activity from May to August during the subsequent years. The next appearance of the Sextanids would probably have been in 1953, although in view of the recently determined orbital period, a search should also be made in any 1952 data available. Unfortunately, Weiss (1957) did not record over the necessary few days at the end of September 1953.

Ellyett and Roth (1955) operated a radar equipment throughout 1953, although this too, was shut down for a few days near the end of September.

The theoretical response of the present Adelaide orbit equipment to the Sextanid radiant is only slightly greater than the response to the more northern Geminid radiant. The equipment was not operated for the full duration of the Sextanid shower as it was for the Geminids. The fact that approximately equal numbers of meteors were detected for each shower indicates approximate equality in the activity of the two showers at radio magnitude +6. It would be valuable if a search were made for the Sextanid shower in 1965.

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