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## The Observation of Transient Lunar Phenomena

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## The observation of transient lunar phenomena

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[Plate 1]

There has been a great deal of recent discussion about t.l.p. or transient lunar phenomena. My only qualification for discussing them is that I have been watching for them over a period of almost forty years, and have recorded several, but it was only in recent years that they have been accepted as real. They take various forms. Some are merely local obscurations, hiding surface detail which is normally visible; others are obviously coloured, generally red. The classic observation was made by Kozyrev in 1958, who recorded a red t.l.p. in the crater Alphonsus and obtained confirmatory spectrograms (Kozyrev 1959: see also Cattermole & Moore 1967). His interpretations have been disputed, but there can be little doubt that an event of some sort took place. Among other professional records there are observations of t.l.p. in the Aristarchus area by Greenacre and his colleagues at the Lowell Observatory (Greenacre 1965). Going back much further, no less a person than Barnard recorded a distinct t.l.p. in the crater Thales, which he described as being filled with pale luminous haze although adjacent areas were sharp and distinct (Barnard 1892).

I have reviewed the problem elsewhere (Moore 1967; Moore 1971*a*) and so in this paper I propose to deal with a few specific problems. First, the reality of t.l.p. is not now seriously in doubt. Their origin is beyond my present scope – the theory of gaseous emission has been strongly supported, notably by McCall (1965), but the whole matter remains open.

It is inevitable that amateur observers should play a major rôle in the detection of t.l.p., simply because they are used to studying the physical features of the Moon and have the time and the equipment to do so. It is significant that reports from professional and from experienced amateur observers are in close agreement so far as descriptions are concerned. The trouble is that not all reports come from observers who are capable of distinguishing a true t.l.p. from a spurious effect, and this makes analysis difficult.

A catalogue of all t.l.p. reported up to mid-1968 was prepared by Middlehurst, Burley, Welther & Moore (1968) and I have produced an extension to mid-1971 (Moore 1971*b*); a further extension to the present time is now being prepared. Over 700 reports were included in the first two catalogues. The distribution of event-prone areas is not random, as a chart shows; in this map, areas where red t.l.p. have been reliably seen are starred, while areas of colourless t.l.p. have been indicated by black circles. T.l.p. tend to occur near the boundaries of the regular maria, as has been found by Middlehurst & Moore (1967) and near areas rich in rills, such as the floors of Gassendi and Alphonsus. Much the most event-prone region is that of Aristarchus, which accounts for about half the reports. It also seems that red t.l.p. are concentrated in the western hemisphere, while colourless events are more common in the eastern. T.l.p. in highlands are relatively rare, but this apparent paucity may be due in part, at least, to observational selection.

It is by no means easy to decide upon the reality, or otherwise, of a lunar event; there are many factors to be taken into account, as I have described in detail elsewhere (Cattermole & Moore 1967*b*). There are regions which look blurred during periods of every lunation – Schickard is one – and only the really practised observer can reach a reliable decision. Effects in the Earth's atmosphere, and in the equipment used, are naturally all-important. Colour is very often seen on the Moon, particularly down the terminator, which is obviously not lunar in origin. A system of rotating filters has been developed by British observers, mainly those of the Lunar Section of the British Astronomical Association; the construction has been described by Sartory (1974). It involves quick visual alternation between red and blue filters, and the use of the persistence of vision. The device may seem simple, but has proved to be very sensitive – though it is, of course, useful only for red events. It is commonly called a Moon-blink. However, if an effect is seen in any particular area, it is essential to carry out a thorough check to ensure that other regions are not behaving in the same way. If they are, then the cause is obviously non-lunar.

In setting out guide-lines for the observation of t.l.p. it is fair to say that there is no substitute for experience, which can be gained only by years of work at the eye-end of a telescope. Direct photography of a t.l.p. has yet to be achieved; however, the British Astronomical Association has a project in which cooperating observatories will be alerted as soon as a major event is seen, so that attempts may be made to obtain a spectrogram. Some t.l.p. last for an appreciable period – as with the Gassendi event of 30 April 1966 (Moore 1967*c*).

I turn finally to the reliability of reports. The catalogues listed above have included all reports of events which we did not regard as definitely non-lunar, but there is no doubt that many of them – perhaps the majority – are unintentionally spurious. Other published catalogues seem to contain entries contributed by observers with inadequate equipment or clearly inadequate experience. The difficulty is in weeding them out. I attempted a 'weighting' system in my second catalogue (Moore 1971*b*) but this too is open to challenge, because my weighting is essentially personal in judgement and there is no check. The fact that many reports are non-lunar is easily shown. Taking the years from 1866 to the present time, we find that up to about 1958 there were only a few reports per year – sometimes none at all; but there were 99 in 1969, when Apollo 11 landed on the Moon and observations were being attempted (and reported) by many novice observers. A graph shows these peaks very well, but is not reproduced here because it is so obviously valueless! The greater the number of inexperienced observers sending in reports, the greater will be the number of alleged t.l.p.

This makes analysis difficult. It may well be that the ratio of genuine to spurious reports was more satisfactory before 1958 (the date of Kozyrev's observation) than it is now; but no doubt many genuine t.l.p. were missed. And if debatable cases are included in statistical analyses, the essential points of distribution and frequency will be masked, as is very apt to happen if only the recent (post-1958) reports are included. In the chart given here, I have included only t.l.p. which seem to be reasonably well authenticated – that is to say, seen either by more than one observer, or else by an observer of unquestioned skill and equipment – but here too the personal views of the analyst may have an unfortunate effect. I would therefore be wary of reading too much into the distribution laws which have so often been described. The correlation with mare boundaries and with rill areas seems definite, but that is as far as I would personally be prepared to go.

The same difficulties apply to the frequency of t.l.p. Attempts to link them with solar activity



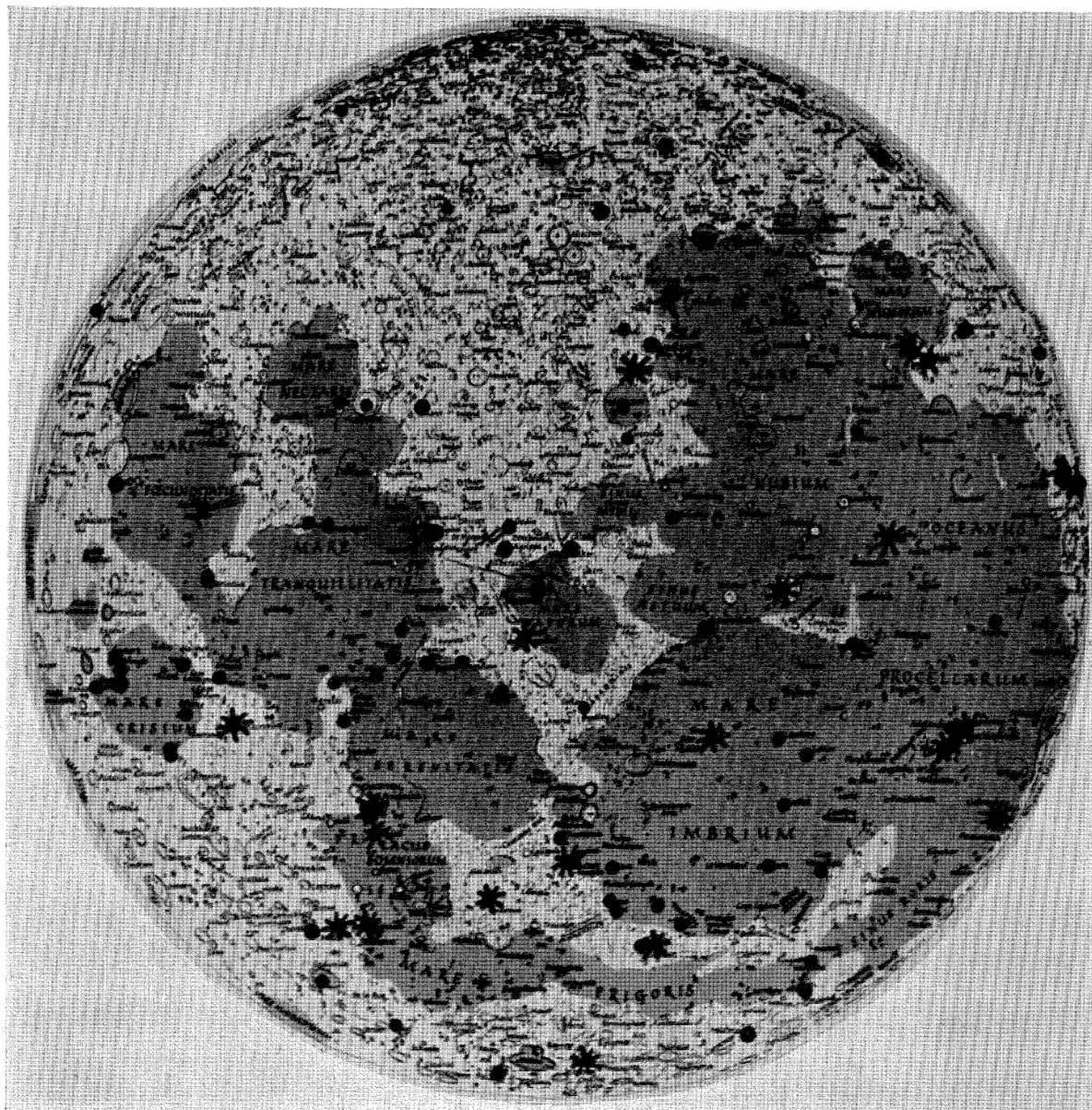


FIGURE 1

(Facing p. 482)

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have been unsuccessful (Flamm & Lingenfelter 1965; Middlehurst 1966). There have been more promising results in linking t.l.p. with lunar perigee and apogee (Green 1963; Middlehurst & Moore 1967) but the latest results are not wholly confirmatory, and more data are needed.

Certainly the visual observer can be of the utmost value, provided that he is discriminating and experienced; it is a mistake to concentrate exclusively upon known t.l.p. sites such as Aristarchus, and surveys of other regions should also be made under all conditions of solar illumination. Our knowledge of these strange, elusive glows and obscurations is still far from satisfactory.

## REFERENCES (Moore)

- Barnard, E. E. 1892 *Astr. Nach.* **130**, 7–10.  
 Cattermole, P. J. & Moore, P. 1967 *The craters of the Moon*, (a) p. 82, (b) pp. 75–87. London: Lutterworth Press.  
 Flamm, E. J. & Lingenfelter, R. E. 1965 *Nature, Lond.* **205**, 1301.  
 Green, J. 1963 In *Proc. Lun. Plan. Explor. Colloq.*, North American Space Science Division.  
 Greenacre, J. C. 1965 *Ann. N.Y. Acad. Sci.* **123**, 812.  
 Kozyrev, N. 1959 *Priroda* **3**, 84.  
 McCall, G. J. H. 1965 *Ann. N.Y. Acad. Sci.* **123**, 816.  
 Middlehurst, B. 1966 *Nature, Lond.* **209**, 602.  
 Middlehurst, B. & Moore, P. 1967 *Science, N.Y.* **155**, 449–450.  
 Middlehurst, B., Burley, J. M., Moore, P. & Welther, B. L. 1968 *Chronological catalog of reported lunar phenomena*.  
 NASA *Tech. Rep.* TR R – 277.  
 Moore, P. 1967 *J. Br. Astron. Ass.* **78**, 138.  
 Moore, P. 1971 *a* *Q. J. R. Astr. Soc.* **12**, 45–47.  
 Moore, P. 1971 *b* *J. Br. Astron. Ass.* **81**, 365–390.  
 Moore, P. 1971 *c* *Sky & Tel.* **33**, 27.  
 Sartory, P. K. 1974 In *Guide for observers of the Moon*. London: B.A.A. 26–28.



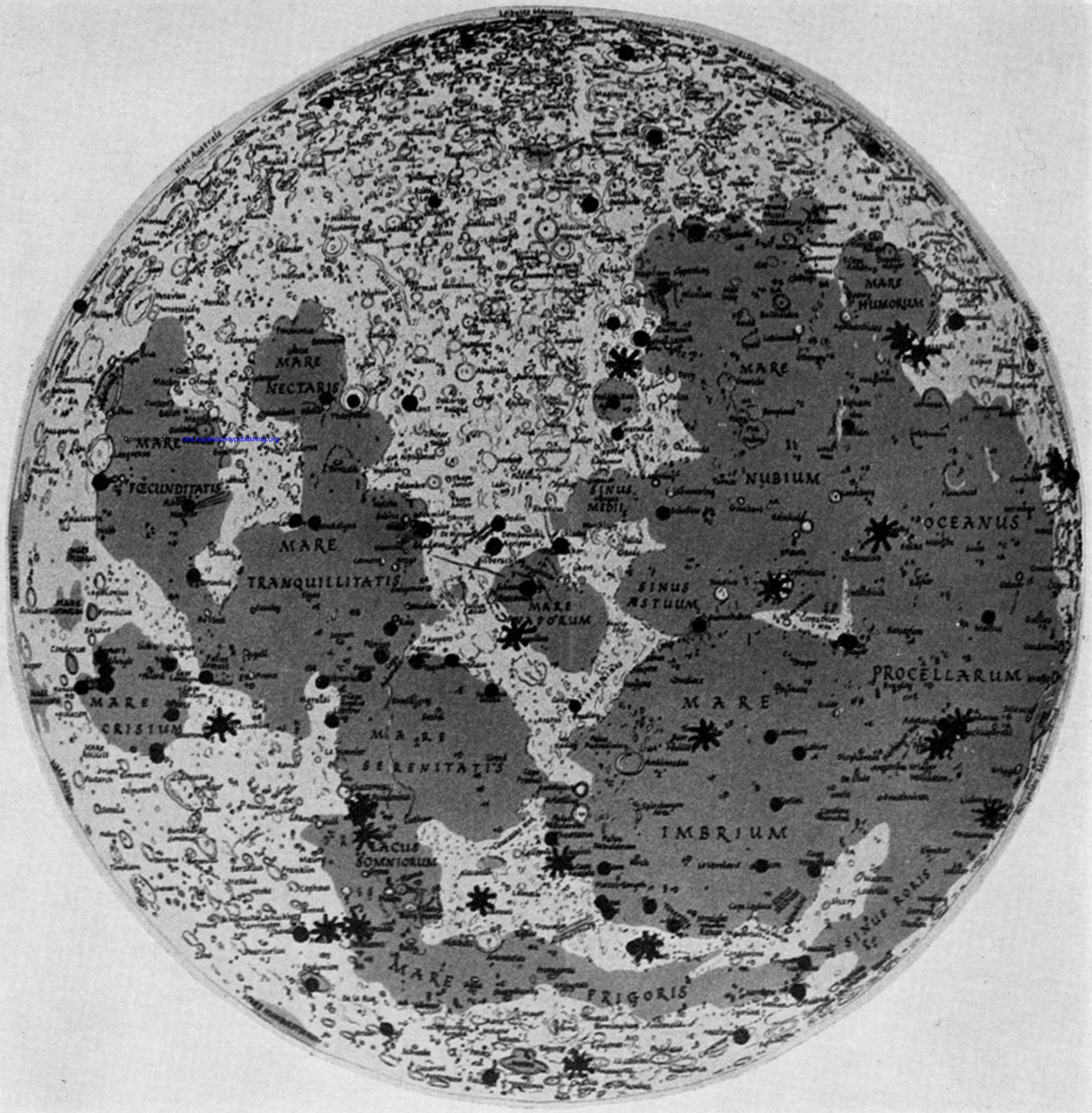


FIGURE 1