The following Communications were read :—

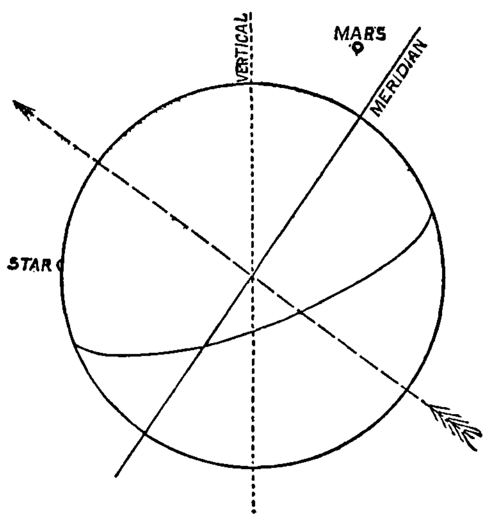
1. On the Occultation of the Star 103 Tauri. (B. A. C. 1572.) By Edward Sang.

An occultation of a star, though not appealing to ordinary observation with the same force, is intrinsically an event as striking as an eclipse of the sun. It establishes the fact of the moon's proximity. Were it not that the moon's brightness overpowers the light of the small stars, occultations would be commonplace phenomena. As things are, we can watch, with the eye unaided, the eclipses of the planets and larger stars, not down, perhaps, to below the third magnitude; and the rarity of such conspicuous objects makes the occultations correspondingly rare.

By help of a telescope of two or three feet in focal length, we are able to examine stars even so small as of the sixth magnitude, and thus greatly to increase the number of observations, so much so that as many as 150 occultations may be visible from one place in the course of the year.

The particular case to which I would draw attention is thus one of many : it derives its interest from the proximity of the planet Mars, whose occultations will have been carefully observed from many places.

The three objects—the moon, Mars, and the star—were all within the field of the telescope; their relative positions at the instant of the star's disappearance being as shown in the accompanying figure. The observation was made with a telescope having an aperture of 1·9 in., a focal length of 23·5 in., and a magnifying power of 26. The moon's dark edge was distinctly visible, the atmospheric tremor was slight, so that, notwithstanding



the moon's proximity to the horizon, the disappearance was watched under very favourable circumstances. The time was noted by an excellent chronometer, which was compared, twelve hours thereafter, with the mean time clock of the Royal Observatory, and again rated after nine days. The comparison of the time may be held as true to within a quarter of a second. The observation may be recorded thus:—

North Latitude, . . .	55° 55′ 42″
West Longitude, . . .	0h. 12m. 42s.

Greenwich mean solar time of disappearance—

1880, March, 17d. 12h. 23m. 55·8s.,

as by the mean time clock of the Royal Observatory of Edinburgh.

In order to compare this with the predicted motions, the moon's right ascension and declination were interpolated strictly from the hourly table in the "Nautical Almanac," and the star's place was taken from the "Elements of Occultations," while the parallax was computed on the supposition that the earth's equatorial is to the polar axis as 300 to 299. In this way the expected time was computed to be 17d. 12h. 23m. 46·3s., or 9·5s. earlier than the observed time.

There is no astronomical phenomenon more definite as to time than the occultation of a star, nor any perhaps more easily observed when the disappearance is against the dark edge of the moon. Provided that the telescope be sufficiently powerful to show the star, it is of little or no moment whether the definition be good, or even whether the instrument have been well adjusted to focus. In all cases the disappearance is instantaneous.

But, although the observation be thus satisfactory, there are various difficulties in the way of the calculations. In the first place, there is the error to which our lunar tables are liable; these tables, all founded on previous observation, are brought forward by an estimate of the laws and rate of change, and thus are unavoidably subject to a gradually increasing uncertainty. Wonderfully exact as these tables are, it would always be necessary, before drawing any exceedingly minute conclusion, to study the tabular error as obtainable from nearly contemporaneous observations on the moon. Next we have the possible error in the tabulated place of the star; an error, in the case of small stars, which is not to be despised. The number of such stars is great, the number of observers small.

Next in order comes the size and shape of the earth. A relatively small difference in our position on the earth's surface makes a notable difference on the apparent position of the moon, and, in consequence, on the time of the occultation ; even the height of the observer above the level of the sea has its influence. This may be well studied in the present instance; viewed from our latitude, the moon was seen to pass a little to the south of the planet Mars, whereas in the southern counties of England an occultation was seen. The oblateness of the earth has also to be taken into account. In the present instance calculations made as if the earth were spherical, would give the disappearance some eighteen seconds earlier than the above. Hence observations made on these phenomena from places in different latitudes afford a means for determining the earth's oblateness.

But, lastly, these observations are all deranged by the extreme jaggedness of the moon's edge. This jaggedness is well seen during an eclipse of the sun; it is also conspicuous against the disc of a planet. I recollect of witnessing an occultation of Saturn, some half a century ago, during which the corner of a lunar mountain was projected against the planet in such a way as to cut out a sector of about one-third of the surface. Irregularities of such magnitude cause serious variations in the times of disappearance and reappearance; and, for the purpose of estimating their possible extent, it might be useful to make concerted observations at places a few miles apart, so that the appulse may happen, here on the top of a lunar mountain, there in the hollow.

2. On Currents produced by Friction between Conducting Substances, and on a new form of Telephone Receiver. By James Blyth, M.A.

In former papers laid before this Society, I showed that when any two metals are rubbed against each other, a current of electricity is produced; and that this current agrees in direction with the thermo-electric current for the same two metals, and is greater, approximately at least, in proportion as the metals rubbed are far