Variable Star T Cassiopeiæ.

FROM long-continued observations of the above star, irregularities in the ascending light curve may be expected about October or November next. I shall be happy to supply a diagram of the field to any one interested in the question.

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Rousdon Observatory, Lyme, September 5.

THE OPPOSITION OF MARS.

THE *Times* of Saturday contains a most important telegram, giving the results of Prof. Pickering's observations in Peru during the present opposition of Mars, which is one of the most favourable which has occurred during the last half of the present century. The work done at Arequipa in one respect contradicts, and in others goes far beyond, the results recently announced from the Lick Observatory. There can be no doubt that a considerable advance has been made by this year's results; many prior observations which have been considered doubtful have been confirmed, and an additional interest lent to the observation of the planet.

The time, therefore, seems opportune for considering several questions connected with Mars, and it will be convenient to begin with the conditions of this year's observations, especially since the least astronomical among us has certainly noted with surprise the bright red star which now nightly rises low down in the south-east. Nor will he or she be less inclined to regard it when it is recognized as the planet about which during the last month so much has been written of human rather than of astronomical interest. If everything that one sees in print be true, the inhabitants of Mars are signalling to us, and it only remains for us to choose our manner of reply. Of course from signals the imagination of the ready writer has passed at once to words, and having got so far, each planet is about to become acquainted with the history and present conditionings of the other by means of a language understanded of our neighbours as well as ourselves.

But first as to the cause of its excessive brilliancy during the last month or so, for this doubtless has had something to do with the present general interest taken in the planet. Mars was as bright in 1877, but on that occasion nothing like the present amount of interest was taken in its movements and possible structure. For this there are two obvious causes—one the increasing interest taken by people in science generally; the other, popular glosses on several recent discoveries made regarding Mars itself.

The popular idea that the changes which have been recently observed on the planet are changes due to the work of its inhabitants—an idea based upon a mistranslation of a word—has, of course, generated the other one—namely, that vast operations have been undertaken for signalling purposes; and from this idea the step to Mr. Galton's or Mr. Haweis's method of signalling back is a small one. Small though it be, however, the public interest has thereby been greatly enhanced.

One of the most serious suggestions in modern times regarding signalling to bodies outside the earth we owe to a German astronomer, who some while ago enriched the world with the idea that the inhabitants of the Moon might possibly be communicated with by establishing on the vast plains of Siberia geometrical figures, such as circles, &c., built up of fire-signals, to which signal, if seen, the Lunarians would reply by reproducing them.

Then the popular mind was content to bridge the chasm of 240,000 miles which separates us from the moon. But *now* Mars is the objective—Mars, which at its nearest approach is 35,000,000 of miles removed!

But Mars when in opposition may be very much further away than that; so far, indeed, that it is then observed to be 1-5th of its maximum brightness, and naturally with very reduced angular diameter. The two preceding oppositions at which its brightness has been at all comparable to its present one, took place in 1860 and 1877, so that we find the most favourable oppositions about sixteen years apart. The reason of this will easily be gathered from Fig. 1, which shows with sufficient accuracy the very elliptic orbit of Mars in relation to that of the earth. The lines joining the two orbits are those connecting the two planets during some oppositions from 1830 onwards to 1871. The outer planet, Mars, is represented nearly at the *perihelion* part of its orbit, that is the point at which it is nearest the sun (and therefore the earth, if we treat the earth's orbit as a circle), and the reason that the 1830 and 1862 observing conditions were so much better than those of 1869 and 1871 is at once clear. The opposition of 1877 and the present are not shown on the diagram, but they occurred at a time when Mars was not far from its perihelion.

The diagram also allows us to see that at the perihelion point of Mars' orbit the planet is very nearly at the

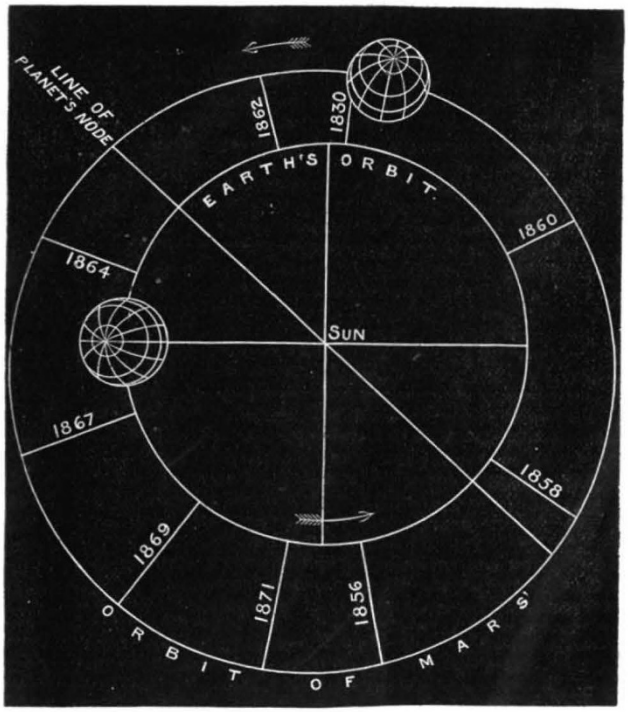

FIG. 1.—The orbits of the Earth and Mars.

time of the southern solstice, the N. pole being inclined away from the sun. Also that this must occur about four months before the southern solstice of the earth, the direction of the axis of which is also shown.

So that at an opposition which occurs in August, as the present one does, we observe what happens in the summer solstice of the northern, and winter solstice of the southern, hemisphere of the planet. In fact, generally we have:—

Time of opposition.	N. hemisphere.	S. hemisphere.
August	Winter	Summer
November ...	Spring	Autumn
February	Summer	Winter
May	Autumn	Spring

The perihelion point of a planet's orbit is astronomically expressed by its heliocentric longitude, and the apparent size of its disc (on which its apparent