If I may venture to forecast the manner in which these statements may receive from independent sources that verification which any statement requires before it can be accepted as a correct representation of fact, I should say that as regards § I. no contradiction will arise unless the first case tested should happen to be that of a person with the heart occupying an unusually median position, when the favourable and unfavourable cases, though still distinguishable, may be less so than if the heart occupied its usual oblique position pointing to the left. In any case, however, the variation will be found more marked with a favourable than an unfavourable combination. As regards § II., the statements made can be verified as soon as tested upon a recently killed cat or upon a properly educated dog. The verification of § III. only requires that a suitable case should be discovered. As regards the character of the variation, it is probable that its diphasic character may be overlooked at the first glance, but (in a favourable case) this character will soon be apparent. As regards direction, that of the second phase will be determined without much difficulty, but that of the first will be found very difficult to seize. I was not able to make up my mind about it until I had obtained successful photographs of the movements on a quick-travelling sensitive plate.

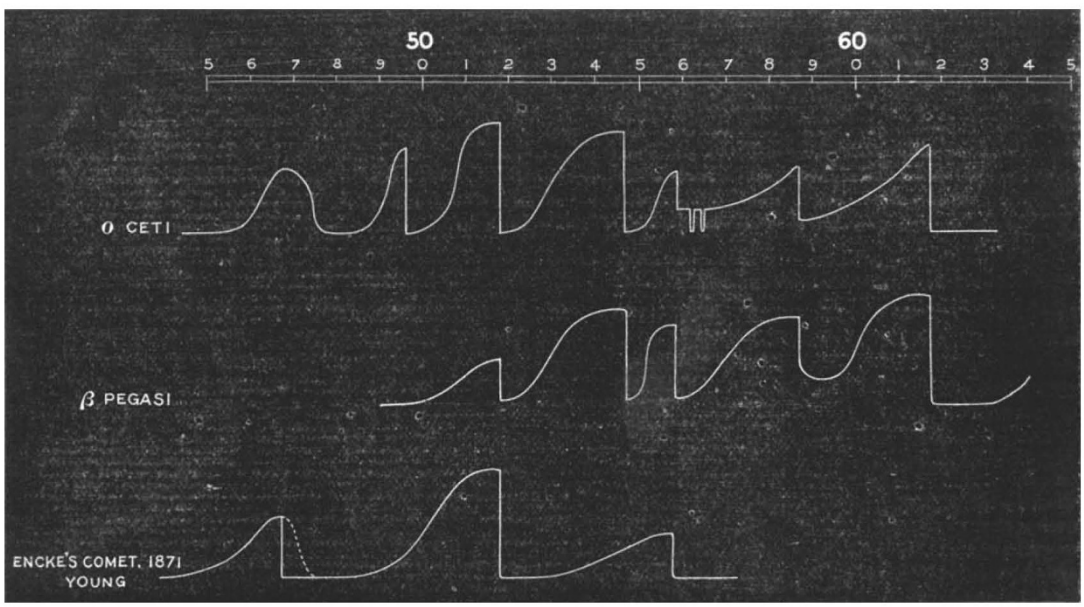
AUGUSTUS D. WALLER.

THE MAXIMUM OF MIRA CETI.

I AM anxious to call the attention of observers to the present spectrum of Mira, which arrived at its maximum brilliancy on the 15th inst. I pointed out recently (NATURE, May 24, p. 79) that stars of the group to which Mira belongs are sparse meteorite-swarms like comets, and that, when variable, the variability is produced by collisions between two swarms, the centres of which are nearest together (periastron passage) at maximum.

Broadly speaking, then, we may regard variables of this class as incipient double stars, or condensing swarms with double nuclei, the invisibility of the companion being due to its nearness to the primary, or to its faintness. It is obvious that variability will occur mostly in the swarms having a mean condensation, for the reason that at first the meteorites are too far apart for many collisions to occur, and that, finally, the outliers of the major swarm are drawn within the orbit of the smaller revolving one, so that it passes clear.

The present maximum of Mira tests my hypothesis, and its brightness is such that a small telescope and a Maclean's spectroscopic eye-piece are all that are necessary to see in how striking a manner the test is borne. The two brightest bands now visible are at λ 517 and λ 546, precisely where these are seen in the brightest comets. The former is the brightest carbon fluting seen in the spectrum of the Bunsen flame, or spirit-lamp,



and the other, at 546, is the citron carbon fluting beginning at 564, but modified by the masking effects of the manganese absorption fluting at 558, and also that of lead at 546.

The blackness of the spaces between the bright flutings shows that there can be very little continuous spectrum from the meteorites, and therefore that the absorption is that of the light of the carbon flutings.

The mean spectrum of Mira is that of a star like β Pegasi, which I have shown to consist of bright carbon flutings, and dark flutings of magnesium, manganese, iron, lead, and barium. In β Pegasi, as in Mira under mean conditions, the carbon is somewhat faint, but in α Herculis it is very bright. The general effect of the conditions of maximum of Mira therefore seems to be that of changing its spectrum from one like that of β Pegasi to one like that of α Herculis.

I observed that the principal carbon fluting at λ 517 was somewhat brighter on the 14th than on the 17th inst. In variable stars of this class the proof is now complete that the increase of luminosity is accompanied by cometary conditions, and that it is due to the increased radiation of carbon.

In the accompanying figure the spectrum of Mira is compared with that of β Pegasi and Encke's comet. In some comets the carbon fluting is cut off at 546, exactly as it is in Mira. The observations of Mira were made by myself at Westgate, those of β Pegasi by Mr. Fowler at the Astronomical Laboratory at South Kensington.

J. NORMAN LOCKYER.