period. Mr. Jeffreys will surely admit that a periodic disturbance of this kind, acting parallel to the minor axis of the orbit, would certainly affect the longitude of perihelion, without affecting the eccentricity; though whether the amount of resistance to be expected, say from matter in the Zodiacal light, is sufficient to make the effect appreciable may well be doubted. Moreover, I had not thought of the resisting medium as revolving in a planetary manner. I am inclined to attribute much more importance to my other suggestion based on the electrical theory of matter (*Phil. Mag.* for August, 1917). Nevertheless, a periodic resistance hypothesis is peculiarly applicable to Mercury, (*a*) because of its nearness, (*b*) because of the eccentricity of its orbit. OLIVER LODGE.

Relativity and Gravitation.

A MATHEMATICAL friend with whom I have been discussing Prof. Eddington's paper on "Relativity and Gravitation," recently published in NATURE, has made what appears to me to be an interesting suggestion. Prof. Eddington states that if a current of æther were moving vertically (say) with a velocity of 161,000 m./sec., a rod 8 ft. long, when placed transversely to the stream (*i.e.* horizontally), would, when turned vertically, be only 4 ft. He also says that this contraction would be unobservable because the retina of the eye would have similarly contracted in a vertical direction. Suppose, however, that the rod in its two positions were observed, not directly, but by means of a mirror inclined at an angle of 45°, by a spectator lying on his back on the floor of the room? His retina, being horizontal, would, *ex hypothesi*, have undergone no contraction at all. Both images of the rod, in its horizontal and vertical positions, would fall on this horizontal retina. If the experiment could be performed the contraction of the rod ought to be evident, and afford direct proof of the Lorentz-Fitzgerald hypothesis. Is there any flaw in this reasoning?

H. H. O'FARRELL.

IT is interesting to examine Mr. O'Farrell's plan for defeating the conspiracy to conceal the change of length of the rod; but the resourcefulness of the conspirators is equal to the occasion. A compensation will take place in connection with the reflection of the light from the moving mirror. Light rebounds from a fixed mirror as though it were a billiard ball rebounding from a perfectly elastic cushion. If the cushion were moving with a great velocity the angle of rebound would naturally be modified. That is only an analogy, but it will perhaps show that we cannot apply the rules of elementary optics to the formation of images by a mirror moving through the æther. A mathematical discussion, on the basis of Huygens's principle, shows that a change of size of the image will be introduced which compensates for the change of size of the rod. It may be remarked that in order to deflect the ray from the horizontal to the vertical direction the mirror, although apparently inclined at 45° to the horizontal, would actually (in terms of the "real" space) be inclined at 26·6° ($\tan^{-1}\frac{1}{2}$); this illustrates how the laws of reflection become modified in the conditions postulated.

A. S. EDDINGTON.

Elliptical Haloes.

THE accepted explanation of the haloes of 22° radius which are seen surrounding the sun and moon implies that they are exactly circular in form. About two years ago, however, I noticed a halo which appeared to be elliptical with the major axis vertical. I was unfortunately unable to take any measurements on that occasion, but on March 18 last a lunar halo, which was visible for a considerable time during the evening, also appeared to possess a decided, though slight, ellipticity. That this deviation from the circular form was not an illusion I was enabled to verify by noting the positions of Capella and γ Geminorum relative to the ring.

At 7.30 p.m. Capella appeared to be exactly upon the inner edge of the halo, while γ Geminorum was within the ring at a distance from it, which, as nearly as I could judge, was a quarter of the moon's diameter. From these data I find that the radii of the halo measured from the centroid of the illuminated disc of the moon through these two stars were 22·8° and 21·4° respectively. Assuming that the halo was elliptical with the major axis vertical, I deduce values of 23·3° and 21·4° for the semi-major and semi-minor axes. I am aware that a more or less complete halo the major axis of which is horizontal is occasionally seen surrounding the 22° halo, but records of haloes elongated vertically are rare. In 1908 Prof. Schlesinger noticed one the axes of which were about 7° and 4°.

Sir Napier Shaw informs me that very little is done in this country on the shapes of haloes, so that this letter may serve to direct attention to the desirability of obtaining accurate measurements. J. B. DALE.

Craigness, New Malden, Surrey, April 10.

Abnormal Catkin of Hazel.

IN February last one of my students, Miss M. Benson, brought me a flowering branch of the hazel (*Corylus Avellana*) in which one of the male catkins had a group of female flowers at the base. The other catkins were entirely male, but this one had eight female flowers, all of which appeared to be normal in structure; they were arranged like the male flowers on the same axis, but the bracts had the pointed shape of those of the ordinary female flower, and no other peculiarity was perceived. It would seem that this is the adoption of the arrangement which is the normal one in Castanea, but such cases appear to have been rarely observed in this species of Corylus, although known to occur in *C. tubulosa*. The bush was one growing on the bleak heathy moorland of Sutton Coldfield. W. B. GROVE.

Birmingham.

VOLCANIC STUDIES.[1]

THE death of Tempest Anderson in 1913, when returning from a voyage to the volcanoes of the East, removed a very familiar figure from scientific circles. For years he had made a special study of recent volcanoes, and as he was a very highly appreciated lecturer and delighted to expound his subject to popular audiences, there were very few who take an interest in geology and geography who had not had the pleasure of listening to him. He was a skilful and enthusiastic photographer, and his lectures were illustrated with beautiful lantern slides; hence it is probably correct to say that no one did more to inform the public on the subject of volcanoes during the twenty years before his death. At the Royal Geographical Society, the Geological Society, the British Association, and many local societies he was always sure of a warm welcome; and his

[1] "Volcanic Studies in Many Lands." Being Reproductions of Photographs taken by the Author. By Dr. Tempest Anderson. The Text by Prof. T. G. Bonney. Second Series. Pp. xv+88. (London: John Murray, 1917.) Price 15s. net.