As Mr. Synge says, the angles of reflection and incidence as measured by an observer moving with the mirror must be equal. When the motion of the mirror relative to the earth is in its own plane, the effect of the FitzGerald contraction is the same on each angle, since it affects all distances parallel to the motion in the same ratio, while leaving those perpendicular to the motion unaltered. Thus the angles will appear equal to an observer fixed with regard to the earth. They would also appear equal if the motion was normal to the plane of the mirror, but not if it were in any other direction than these two. Even in the last case, however, the difference would depend, not on the motion of the earth, but on the motion of the mirror relative to the earth.

Again, it is true that the apparent distance between two stars must vary during the year on account of the variations in the direction of the earth's motion relative to the stars; if all larger disturbances were eliminated this could be detected, but observation of it could only determine the variations in the velocity of the earth relative to the stars, not its motion in æther or "space." The same applies to the immersion in water of the Michelson and Morley apparatus; none of these methods could tell us anything we do not already know more accurately by other means.

HAROLD JEFFREYS.

Conical Refraction in Biaxial Crystals.

AN arrangement for demonstrating conical refraction usually found in laboratories is a piece of aragonite crystal mounted inside a little tube which has one end covered with a metal foil pierced by a number of pin-holes, and an eye-lens in a focussing mount at the other end. When the tube is directed against a luminous object and the eye-lens focussed on the pin-holes through the crystal suitably oriented they are seen as luminous rings of light. Writers on physical optics who describe this experiment refer to it as illustrating *internal* conical refraction—that is, as due to the fact that the Fresnel wave-surface has a tangent-plane which touches it along a circle. I wish to point out that this is really an error. A little consideration will show that as the eye-lens is focussed on the pin-holes, which may be as small as we please, we are concerned here with the waves *diverging* from them in all directions within the crystal, and the observed effect is due to the fact that the two sheets of the wave-front intersect at a conical point. In other words, the experiment really illustrates *external* conical refraction. This is confirmed by the fact that an extended source of light may be used without interfering with the success of the experiment.

A remarkable effect is observed if, with the tube pointed towards an open window, the eye-piece is steadily drawn back from the crystal. It will be noticed that a well-defined image of each pin-hole may be traced behind the crystal for a distance of several centimetres. The formation of this continuous image by a crystalline plate with parallel faces cannot be explained on geometrical principles, and is of great interest. The effect appears to be due to the dimpled form of the wave-front within the crystal, and is being further investigated by Mr. V. S. Tamma and myself.

C. V. RAMAN.

22 Oxford Road, Putney, S.W.15, August 4.

Coiling of Underground Shoots of Convolvulus arvensis.

THE shoots ascending from the rootstock of *Convolvulus arvensis*, before they reach the surface of the ground, are frequently found to be coiled. The coils vary in diameter from one to two inches or more, and lie closely adpressed upon one another. A considerable length of shoot, in some cases three or four feet, is thus compressed into a small space. No object has been found enclosed by the coils which would serve as a stimulus; the soil contains very few stones to obstruct the straight upward growth of the shoots. In a few cases a similar coiling has been observed in the ascending shoots of *Carduus arvensis*. One of the "popular" names of *Convolvulus arvensis* is "Devil's Corkscrew." These white corkscrew coils of the shoots underground seem more likely to be the origin of the name than the less noticeable above-ground coiling portion.

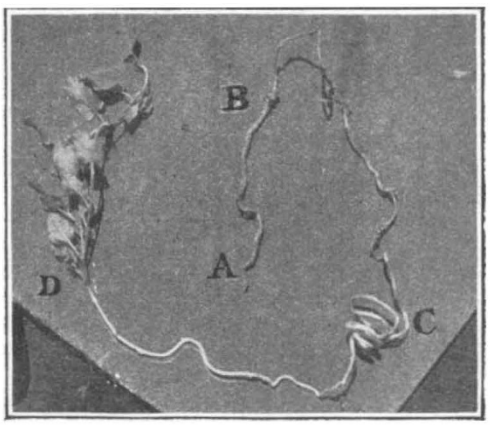

FIG. 1.—Devil's Corkscrew (*Convolvulus arvensis*).

In the accompanying illustration (Fig. 1) A–B is the rootstock; the ascending shoot, originating at B, is coiled at C, and terminates in the leafy above-ground portion at D. (The coils were slightly pulled out before taking the photograph.)

J. E. H. BLAKE.

Bees and Scarlet-Runner Beans.

I SHOULD like to add to the remarks on bee visitors to the flower of the scarlet-runner bean contained in my letter in NATURE of July 28, p. 684, the following further observations. Some ten days from the time of making the original notes a complete change was found in the insect visitors to the flowers and in their behaviour towards them. Instead of the smaller black and black with grey humble-bees busy over the blooms in what I termed the legitimate way, there were numbers of a larger, yellow-banded species of humble-bee that had bitten every newly developed bloom and were searching the nectaries through the perforations made in the base of the flower. They all unhesitatingly scrambled to the underneath part of the blooms, which in every instance had been bitten before the observation was made. Many honey-bees were following in their wake, busily draining the exposed nectaries of every particle of the sweet liquid that had been left or had newly formed.

The results of the two ways of visiting the flowers are very marked and distinguishable. The earlier flowers and lowest on the racemes that were first visited without injury are replaced with a good show of pods, while the later bitten blooms drop off very quickly, with only barren pedicels remaining.

The season being so unusually forward gave opportunity to the earlier insect workers, which made some return to the plant for its sweet gifts, while the later humble-bees are mere depredators that only rob and injure the plant.

HARFORD J. LOWE.

The Museum, Torquay, August 3.