and do not readily separate. Copulation takes place soon after emergence (Fig. 2), lasts for 1-2 hours, and is not repeated.

Fig. 2

The moths feed at all hours of the active period on sugar solution, fruit or on the secretion of the nectaries at the base of the cotton bolls. Oviposition, which usually commences on the third day after copulation, likewise takes place at any time of the night.

F. A. SQUIRE.

Imperial College of Tropical Agriculture,
St. Augustine, Trinidad, B.W.I.

¹ Wilcocks, F. C., "The Insect and Related Pests of Egypt Injurious to the Cotton Plant", Ministry of Agriculture, Egypt (1916).

² Busck, "The Pink Bollworm (*Pectinophora gossypiella*)", *J. Agric. Res.*, 9, No. 10 (1917).

³ Ballou, H. A., "Cotton and the Pink Bollworm in Egypt", *West Indian Bull.*, 17 No. 4.

A Double Refraction Effect in Certain Fatty Materials

THE projection refractometer is particularly suitable for the examination of some doubly refracting materials, the properties of which do not appear to be widely known.

Certain fatty materials the refractive indexes of which are known have, in fact, two refractive indexes. On the ordinary refractometer in which the light is transmitted through the material to be tested, the border line of total reflection due to the higher index is not usually seen, since there is much greater contrast at the border line due to the lower index. The space between the two border lines is plane polarized, the vibrations taking place in a direction parallel to the border lines. Thus, these materials appear to behave as though they were doubly refracting.

It has been known for some years that soap gives these two border lines under certain conditions. Recently some other materials were investigated, and it was found that

vaseline, lanoline, rubber lubricant, ordinary yellow soap, and the pure green soft soap, all give the two border lines referred to. On the other hand, various thick lubricants give only one border line.

It was found that vaseline, lanoline and the rubber lubricant, if melted and dripped on to the refractometer prism, give only one border line, that due to the lower index; but if the material is then smeared while it is still upon the prism, thus removing any possibility of micro-crystals being orientated in a particular direction, the second border line appears, and in the case of lanoline treated in this way, there is a trace of a third border line. In the case of moistened yellow soap, the difference in refractive index is about 50 per cent greater than the difference between the ordinary and extraordinary rays of quartz.

The projection refractometer has a single horizontal prism surface upon which material is placed. Light from an internal source is totally reflected at the interface of the prism and the material being tested. None of the materials mentioned above gives a sufficiently sharp border line to allow of readings closer than the third decimal place.

L. BELLINGHAM.

71 Hornsey Rise,
London, N.19.

Collision of Two Oil Drops and the Stability of a Non-spherical Oil Drop

It has been found that the oil drops used in our investigation on the determination of the electronic charge show large variations in the time of descent, t_g , and ascent, t_f-g , with time, and consequently the greatest common divisor v_1 . This is true of all oils experimented with, such as Apiezon A and B, Nye's super-fine clock oil and others, except our newly prepared animal oil (which shows little or no change). Nevertheless, it makes necessary the careful study of the time variations of these three quantities. The results may be stated as follows:

There are four distinct classes of drops.

(1) 50 per cent of the total number are spherical drops which behave normally.

(2) With a few drops, collision of two unequal spheres forms a pear shape drop, showing very large

Fig. 1.