

HEILIPUS SQUAMOSUS Lec, A NEW ENEMY OF THE AVOCADO

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This insect problem was recognized about 1 year ago. In October of 1947 a boring insect was discovered in a young avocado planting of the Sunland Groves where it was injuring and even killing the trees. Between 8 and 10 percent of the trees were counted as losses in a block of 512 trees. Larvae were sent to the Division of Insect Identification, U.S. Bureau of Entomology and Plant Quarantine, which Dr. W. H. Anderson tentatively identified as *Heilipus squamosus* Lec. Examinations of trees in other plantings showed that the insect was commonly present in southern Florida. Larvae in stumps of infested trees were reared to adult emergence. These adults were submitted to Mr. L. L. Buchanan of the Division of Insect Identification who confirmed Dr. Anderson's previous tentative determination made from the larvae.

The insect must have been present, infesting avocado trees in south Florida for several years. Dr. George D. Ruehle reports that such an insect was found some 8 to 10 years ago in trees at the Subtropical Experiment Station. A photographic slide in Station files made about 1939 identified by the title, "Boring grub on avocado trunk," illustrates signs recognized as those of *Heilipus squamosus* Lec. Knives were used to cut out and destroy the larvae in the infested trees at that time. Grove owners and caretakers now report having seen the same or a similar insect in avocados for several years. It cannot be said with certainty whether the present infestations may be an annual occurrence, or an unusually high one attributable in part to trees that had been weakened or injured by wind or high water.

Heilipus squamosus Lec. is a beetle, a member of the snout weevil, Curculionidae family. Some of these weevils are serious pests on other crop plants. Three examples are the cotton boll weevil *Anthonomus granáís* (Boh.), white-fringed beetle, *Pantomorus leucoloma* (Boh.), and plum curculio, *Conotrachelus nenuphar* (Herbst.). Close relatives of *H. squamosus*, however are recognized as insects attacking the avocado in other areas. Four of these recognized in Central America are *H. pittieri* (Barber), *H. trifasciatus* F., *H. lauri* (Boh.), and *C. Perseae* (Barber). Responsibility for preventing entry of these insects into the United States is invested in our quarantine officials. None of the four avocado pests listed above, nor of *H. squamosus* is listed in a Catalogue of Cuban Insects, by Bruner, et al (1945). No records are known of either of these avopado insects having been taken in the West Indies Islands.

Heilipus squamosus has been taken, according to Dr. W. H. Anderson, (correspondence) on cotton, sassafras, and Satsuma orange. It has also been taken on pine, according to Blatchley and Leng (1916). It has been taken in Florida, Georgia, and Tennessee in the United States, also in French Guiana, according to Blatchley and Leng (1916). The evidence indicates, therefore, that it is a native insect. Although the

insect has been taken from plants other than the avocado, and it must have other host plants, the biology of the species remains practically unknown.

In view of the present problem a need for a common name for the species has arisen. It is a bark weevil and might be termed the "avocado bark weevil." Since it is the habit of the beetle larvae to burrow in the bark at the base of the trees the species might be termed the "avocado collar weevil," or "avocado collar borer." The term "avocado crown borer" has also been suggested since the larvae burrow at the juncture of root and stem parts of the plant. The damage caused by the insect, however, is through girdling of the trees. It seems, therefore, that from the economic viewpoint the term "avocado tree girdler" is an appropriate term. It is the term here in proposed as a temporary one until further knowledge indicates the need of a more appropriate one, or until common usage confirms it as a satisfactory term.

The *Heilipus squamosus* (Lec.) adult is characterized by its black color, very irregular white areas and spots on its wing covers, and oblong shape. It is about one-half an inch long. Its beak is slightly longer than its thorax. (Fig. 1).

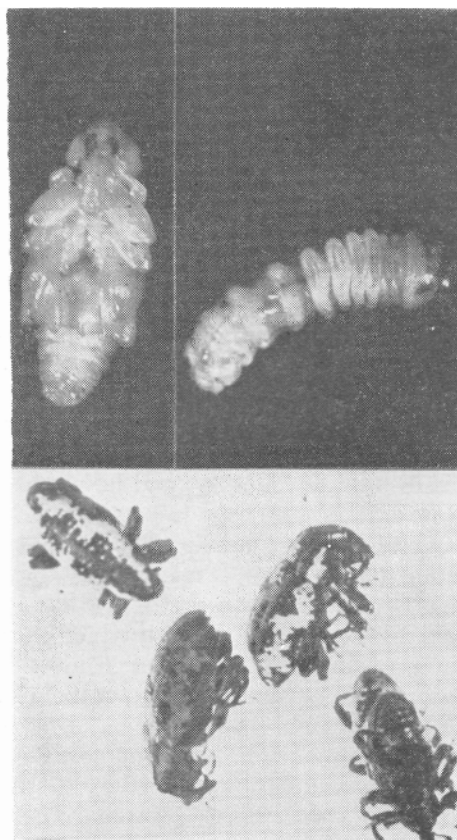


Fig. 1. *Heilipus squamosus* larva, pupa, and adults. Magnifications—Pupa 3x, larva 3x, adults nearly 3x.

Eggs are deposited in the edge of the bark usually at ground level. White, slightly

yellowish footless grubs or larvae hatch from the eggs. The larvae are small, about one-fourteenth of an inch long at hatching time. As they feed and develop they grow to one-half or five-eighths of an inch in length. Nearly mature larvae are most active in extending their burrows and in pushing grass from the trees. Infestations appear to be most abundant at this time because they are more easily observable.

There seems to be about one generation per year, as Dietz and Barber (1920) reported for *Heilipus perseae* Barber. Many adults have been observed in April, May, and June although adults and other stages may be found occasionally any month of the year. Observations indicate that the longest part of the life cycle is spent as larvae; the next longest as adults, although the average length of time spent in each stage has not been determined. It is likely that the larval stage is the one most adapted to control measures.

Signs of *Heilipus squamosus* infestations are masses of frass exudations at the base of the trees. Fresh signs are reddish in color, but change and become lighter red to pale brown in color. The masses tend to fall apart and be washed away by rains. These signs are nearly always found at or near the soil level, frequently between cracks in the thick bark. The larvae seem to provide an opening in the bark through which they may push the castings, although most of the frass remains in the burrows, behind the larvae.

Symptoms of *Heilipus squamosus* infestations were observed during the months of February and March. These symptoms were yellowing leaves and premature leaf fall. Often a leader or part of a tree expressed symptoms while other parts did not. Examinations of trees exhibiting these symptoms disclosed that severe injuries or partial girdling had occurred beneath the affected branches. The expression of symptoms by trees this time may be accounted for by (1) voracious feeding activities of large nearly mature larvae, and (2) the dry season, and consequent need of moisture by the trees. These symptoms have been observed only in small trees, those of 3 to 6 inches in diameter at 6 inches above the ground. Other factors may induce these or similar symptoms, hence the symptoms are not a positive means of determining borer infestations.

Most signs of infested trees are observed, and nearly all larvae are taken within 6 inches of ground level of small trees. It is only in large 13 to 24 inch tree bases that they have been found up to 2 feet high in the heavy bark of the trunk, especially in the crotches of trees previously top-worked or storm-damaged where irregular, knotted, or burlled conditions existed.

Although the borer infests both young and old trees, the young trees, 1/2 to 4 years old suffer more than the old trees. The older trees seem better able to grow and survive the insect infestations. Younger trees have thinner bark, which is more likely to be completely severed by the feeding larvae. In young trees the larvae usually burrow along the cambium layer and sometimes score deeply into the wood tissues. This, in effect causes partial or complete girdling of the tree, depending on the number of larvae in the tree.

Tree losses vary from grove to grove, as may be expected; losses from zero to 10 percent have been observed. The average loss is probably less than 1 percent. A more detailed study, made in a block of 240 trees almost 2 years old, in a Subtropical Experiment Station experimental planting is an example that may typify general

conditions. One tree was found dead, having been girdled by larvae. Two trees were almost entirely girdled, while another was very severely injured. Almost 9 percent of the trees were found infested with one or more larvae. A total of 40 larvae was removed from 239 trees which averages 0.17 larvae per tree. According to the observations made in these trees, 3 to 6 inches in diameter at 6 inches above soil level, from 5 to 8 larvae per tree may be expected to injure them fatally.

Fruit Injury. Although the adults are usually found on the basal portions of the trees engaged in egg deposition, they were also found feeding on young avocado fruits. Hollowed out excavations about one-sixth to one-half inches in diameter and up to one-tenth inches deep are characteristic of the feeding wounds (Fig. 2). The wounds are more pit-like in early stages of beetle feeding, but enlarge by additional feeding. The pit-like wounds are about one-tenth of an inch deep and one-twentieth inch in diameter. Some fruit-drop was observed of badly injured fruit. Most of the fruit remained on the trees and scar tissue grew over the wounds (Fig. 3). Some wounds appeared at harvest time as superficial scars. Other wounds, or numerous wounds on the fruit cause such disfigurement as to classify the fruits in lower grades or as culls. Of the total fruit produced it is desired to emphasize that only a very small portion is injured by *Heilipus squamosus*. This attention to fruit injuries is for information rather than for economic reasons.

Control. In the one year this insect has been recognized experiments have been initiated to develop control measures. Spraying the infestable parts of trees with one or more of the newer insecticides might be expected to give control. Although they are being tested none is now recommended. Manual removal of the larvae is the current recommendation. This necessitates examinations of the trees for signs of infestation and of cutting out the larvae.

There are some enemies of the *Heilipus squamosus*. Birds, apparently of the woodpecker group, eliminate a few larvae. They seem to feed on larvae only in trees which have no weeds or other debris about the tree bases. The birds, furthermore, feed on the larger more mature larvae, hence most of the tree injury has been sustained by the time the birds begin feeding. Although parasitic and predatory insects and other enemies may prey on them only ground beetle larvae have, up to the present, been observed feeding on the larvae in their burrows.

Summary. Beetle larvae of the snout weevil family, *Heilipus squamosus* Lee. species were recently recognized injuring and killing avocado trees. This is the principal type of damage of the species, although they were also found feeding on young fruit. Young trees about 2 years old appear more seriously injured than older more mature trees. These larvae burrow in the inner bark, feed, and push out frass as a sign of infestation. One generation per year appears to constitute a life cycle. Examination of each tree and the removal of the larvae by digging them out of the trunk is the recommended control at present. Other control methods are being investigated, which may prove more practical.

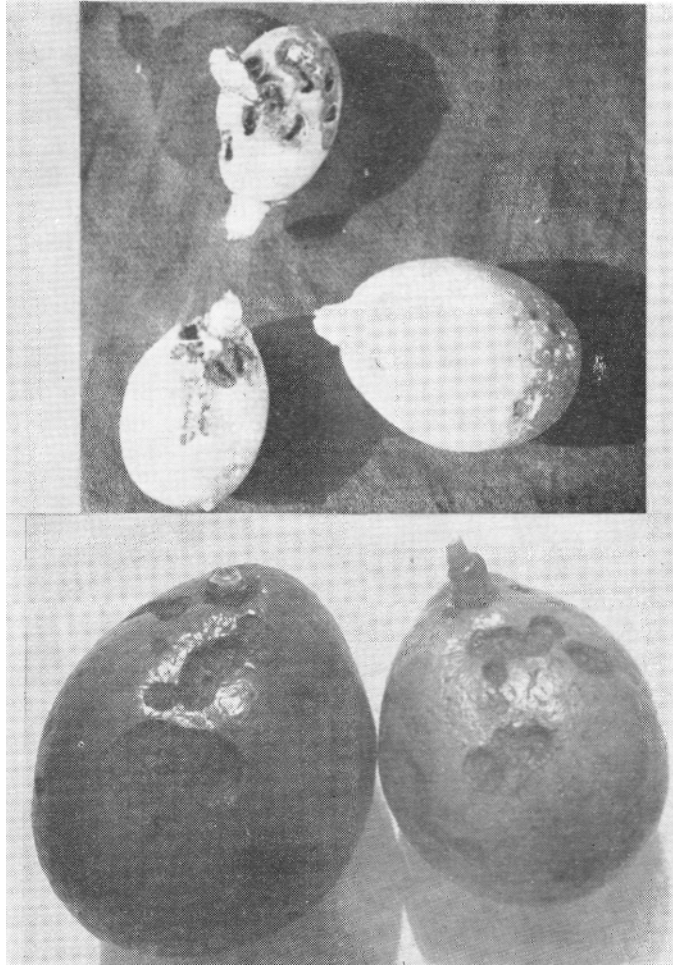


Fig. 2. Avocado fruits injured by *Heilipus squamosus*. Top is young fruit at time of injury (beetle in upper right). Near natural size. Bottom is healed-over scars at picking time. About three-fourths natural size.

LITERATURE CITED

- BLATCHLEY, W. S. and C. W. LENG 1916, *Rhynchophora or weevils of North Eastern America*. 682 pp. The Nature Publishing Co., Indianapolis.
- BRUNER, S. C., L. C. SCARAMUZZA and A. R. OTERO. 1945. *Catalogo de los insectos que atacan a las plantas económicas de Cuba*, 246 pp, Ministerio de Agricultura, Havana.
- DIETZ, H. F. and H. S. BARBER. 1920. A new avocado weevil from the Canal Zone, *Jour. Agr. Res.* 20 (2): 111-115, illus.