

twigs. He speaks of taking a similar louse upon *Lamium* and *Stachys* and makes the suggestion that it may be identical with *M. ribis*, but thinks not, as his attempts to transfer early summer—"Vorsommer"—forms to the *Lamium* did not succeed.

We have repeatedly transferred the migrants from the *Ribes* to *Stachys* and *Leonurus* and the fall migrants from these plants to the currant and had them take well, so feel safe in announcing these two genera, at least, as summer hosts of *Myzus ribis* Linn.

For structural details of this species, see Figure 17.

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CHAIRMAN A. W. MORRILL: The next paper, by Professor Illingworth, will be read by the secretary.

### A TROUBLESOME HOUSEHOLD PEST (*ATTAGENUS* *PLEBIUS SHARP*) OF HAWAII

By DR. J. F. ILLINGWORTH, *Professor of Entomology, College of Hawaii, Honolulu*

This insect has habits somewhat closely related to the well-known black carpet beetle (*Attagenus piceus* Ol.) of the United States. My first experience with this pest was upon opening up two trunks, which had been stored for about a year. After arrival in Hawaii we had packed away all of our winter clothing, which was superfluous in a tropical climate, but which we thought might be useful if we ever again visited colder regions. It was certainly a most distressing sight that met our gaze, when the trunks were opened—everything of animal origin was ruined. Our new woolen undersuits were completely riddled; fur, hair and feathers were a mass of fragments; and, worst of all, our heavy, outer clothing was shot full of holes.

I soon discovered that the beetles had not confined their attention to the trunks, for several other objects in the same storeroom were injured. A saddle, padded with sheep-skin, was badly eaten; and even the felt paper, which lined one of my small grips, was almost completely gnawed away. We soon began to find the beetles on the windows in the rest of the house, and occasionally noticed a beginning of their work in the closets. Fortunately, however, they do not give any trouble to clothing or other objects which are used frequently.

During subsequent investigations, I have found that this beetle is often destructive to dried fish in the Honolulu markets, though the principal injury to this product is by the larger dermestid, commonly known in the United States, as the leather beetle (*Dermestes vulpinus* Fab.). Dealers in brushes in Hawaii have also come to know this

pest, for it is frequently closely associated with the buffalo carpet beetle (*Anthrenus scrophulariae* Linn.) in the destruction of their finest goods. I, also, discovered an interesting relation of these insects to the nesting of the English sparrows. Where these birds are in the habit of nesting on banks or in buildings the beetles are attracted to the masses of feathers and other animal matter used in the nest construction.

#### DISTRIBUTION AND HISTORY

Apparently these beetles have not been found outside the Hawaiian Islands, though they are pretty well distributed within the group. We have a number of records of specimens taken on Maui and Hawaii, and they are certainly abundant on Oahu,—probably a little investigation will disclose them on all the islands, for they are an insect easily transferred in shipping.

The earliest record that we have been able to locate is the description of this beetle by Sharp<sup>1</sup> in which he gives the note "Found in Houses in Honolulu." We are surprised, after observing the depredations of this pest, that more references to it can not be located.

#### LIFE-HISTORY

A study of the life-history was comparatively easy, since the several stages advanced so rapidly under our tropical conditions. In one instance the whole life cycle required only 150 days. It is interesting to compare this record with that of the closely related *Attagenus piceus* of the United States, which Chittenden found took two years for its development from egg to beetle.

Newly-emerged beetles were confined in a glass dish and supplied with some of the woolen cloth, which had been injured by the larvæ. A number of dead roaches and flies were also placed in the dish to insure sufficient food. After twelve days, mating was observed, but it was thirty-six days before the first eggs and newly hatched larvæ were discovered.

EGG.—The creamy-white of the eggs made it difficult to discover them on the cloth which was the same color, but after they were once observed it was rather easy to locate them with a lens. It was found that newly-laid eggs required an incubation period of about three days. In form the eggs are broadly oval; being about 1 mm. wide by 2 mm. long; the shape varying considerably, since they are rather soft.

LARVA.—The newly hatched larvæ are noticeably large, compared with the eggs from which they emerge: see Figure 18, 1 and 2, which are drawn to the same scale.

<sup>1</sup> Trans. Royal Dublin Soc., vol. III, ser. II, 1885, p. 147.

The larvæ were supplied with the same kind of food as noted above for the adults. They showed a great fondness for dried insects, but in no case were they observed to eat their own cast skins, even when no other food was supplied them. Pupæ, however, were sometimes eaten if left in the same dish with the larvæ.

As is common with all Dermestids, there is great variation in the larval period. While the majority run through rather close together, there are always a few, which for some unaccountable reason, are exceedingly slow, even when all observable conditions are the same. Typical development may be stated as follows: First instar, 10 to 12 days; second instar, 16 to 18 days; third instar, 14 to 16 days; fourth instar, 15 to 35 days; fifth instar, 12 to 15 days; sixth instar, 17 to 25 days; seventh instar, 33 to 46 days. It is interesting to compare with this a specimen, almost full grown when taken from the trunk a year ago. It has hardly increased in size, though abundantly supplied with food; and has molted five times, at the following intervals; 47-37-74-68-87 days. Another individual, after feeding for two years upon dried insects, and molting fifteen times, showed no growth.

**PUPA.**—Pupation takes place wherever the larvæ are feeding,—the last larvæ skin being shed. The pupal stage lasts from 12 to 14 days.

**ADULT.**—The beetles, apparently feed upon the same substances as the larvæ, for our specimens reproduced abundantly and lived for a period of 40 to 52 days. As is characteristic of Dermestids, they are able to live, generation after generation, without a sign of moisture, upon absolutely dry food material, and apparently do well even when sealed up away from the air.

#### TECHNICAL DESCRIPTION

**THE LARVA.**—No description of this stage has been published. Figure 3 shows the general appearance of a full-grown larva. The ground color is very dark brown, and the vestiture slightly lighter. The dorsal surface is covered with short, appressed hairs, and very sparsely interspersed with coarser erect hair arranged in a transverse row along the caudal border of each segment. The lateral tufts of the thorax are slightly denser than on abdomen, where the few hairs are somewhat longer; the caudal segment terminates in a pencil of long, delicate hairs of somewhat lighter shade. Compact, suberect hairs of head, and the legs rufus. The ventral surface is whitish, the abdominal region covered with blackish, appressed hairs, denser on the terminal segments. Length of full grown larvæ about 10 mm.

**THE PUPA.**—No description has been given of this stage either, though the pupa, which is creamy white, and covered with a fulvous pubescens, resembles rather closely that of *Attagenus piceus*. The same peculiar openings are located along the medium dorsal region of the abdomen. (See Figure 18, 3 and 4.) Each of these openings is bordered by two chitinous plates, the cephalic one bearing minute teeth. The function of these openings is hard to determine, though it has been observed that the margins will quickly close upon and grip any object inserted into them. Pupa somewhat longer than adult, measuring 6 mm.

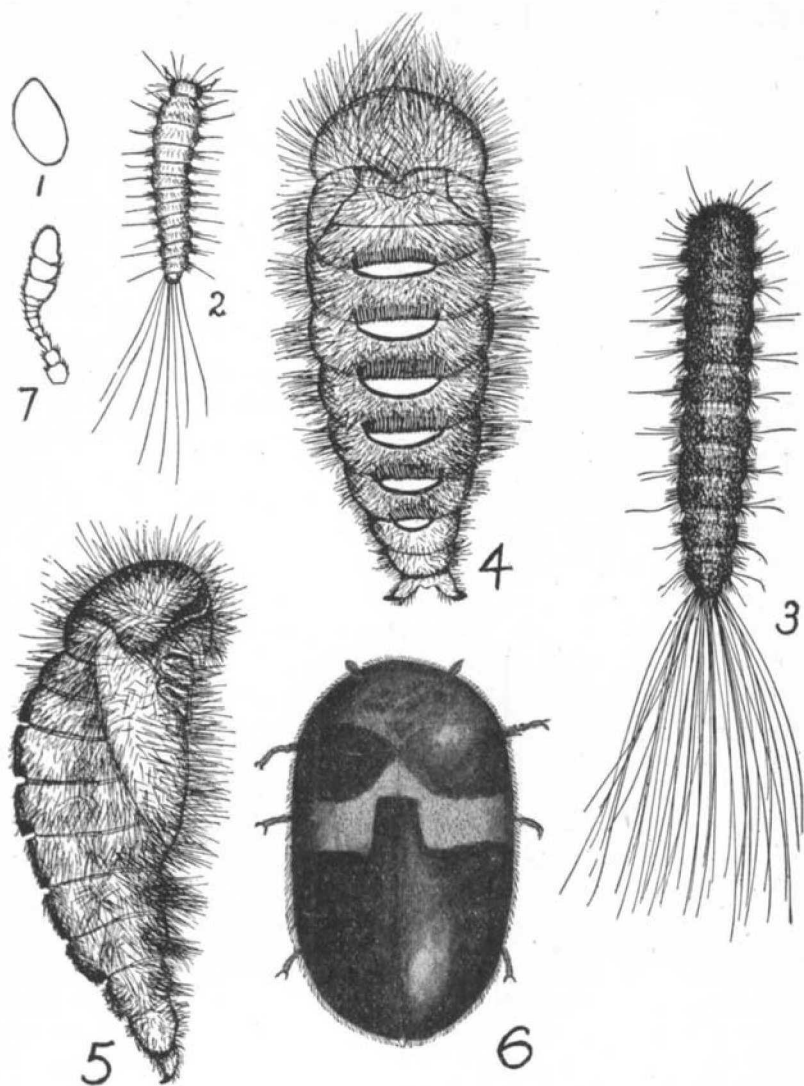


Fig. 18. *Attagenus plebius*. 1. Egg, x14. 2. Newly hatched larva x14. 3. Full grown larva, x10. 4. Dorsal view of the Pupa, x10. 5. Lateral view of Pupa, x10. 6. Dorsal view of beetle, x10. 7. Antenna.

THE BEETLE.—It may be well to quote here from the original description since that publication is not easily accessible.

"Sat elongatus, opacus, dense pubescens, niger, antennis pedibusque rufis, capite, thorace, elytrorumque fascia angusta, angulata, subbasali pubescentiæ pallidæ. Long. 4-4½ mm. ♀ ♀"

"Similar in size, form and appearance to the European *A. verbasci*, but with only one pale band on the elytra. The specimens described are probably of the female sex, and have the antennæ short, the club three-jointed, and in length equal to the

five or six preceding joints together; the apical joint but little longer than the tenth; thorax densely pubescent, so that its punctation is concealed; the pubescence pale, but in certain light, appearing dark on middle parts, owing apparently to an admixture of spots or patches of black pubescence; elytra not quite so densely pubescent as the thorax; the pubescence black, but there is a conspicuous band of cinereous pubescence near the base which at the suture is strongly angulated in front, so as to approach rather near to the scutellum; legs entirely red."

#### RELATION TO LIGHT

Both the larvæ and the mating beetles show a decided negative relation to light. The latter, however, fly to the windows after ovipositing. The beetles may be collected in this way but it is of little avail, since the eggs have already been deposited in closets or trunks, etc.

#### CONTROL MEASURES

Carbon bisulphide was found to be effective for the destruction of both beetles and larvæ in the trunks, but apparently the eggs were not killed by it, for young larvæ were discovered on some of the contents two weeks later. After a second treatment with the carbon bisulphide we found no further signs of the insects. To insure the contents against further attack they were given a liberal supply of flake naphthaline, scattered between the various garments. This treatment lasts for a year or more if the trunks are not opened, and no beetles will enter while the naphthaline is present.

Treatment of clothing in closets of open houses, such as we have in the tropics, is a more difficult matter. Fumigation is often out of the question, and if moth-balls are used they require frequent renewal. Fortunately, however, the clothing which is used frequently is not subject to injury. Very satisfactory moth-proof bags are on the market, and these come in such sizes that entire garments may be suspended in them.

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This paper was discussed by A. W. Morrill, R. W. Doane, E. O. Essig and others.

CHAIRMAN A. W. MORRILL: The next paper by Mr. G. F. Mozenette will be read by the secretary.

### THE CYCLAMEN MITE, *TARSONEMUS PALLIDUS* BANKS, AND METHODS FOR ITS CONTROL

By G. F. MOZENETTE, *Corvallis, Oregon*

(Paper withdrawn for publication elsewhere)

CHAIRMAN A. W. MORRILL: The next paper, by Prof. A. L. Lovett, will be read by the secretary.