

## NOTES ON A MISTLETOE ANT.

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While collecting in Miller Canyon, in the Huachuca Mts., Arizona, during November, 1910, my attention was attracted by the very large and beautiful masses of mistletoe (*Phoradendron flavescens* var. *villosum*) growing on the live oaks (*Quercus emoryi*) which in that locality abound at altitudes of 5,000–6,000 feet. I noticed that many of the masses of mistletoe had wilted more or less and had turned yellow. On closer examination I found that their stems at the base, and in many cases for several inches from their point of attachment to the oak branches, had been hollowed out by a beetle larva and that the cavities thus formed were regularly tenanted by colonies of a small black ant (*Cremastogaster arizonensis* Wheeler). The worker of this ant was first described from Tucson, Arizona,<sup>1</sup> where I found it to be not uncommon on the trunks of cotton-woods and mesquites in the valley of the Santa Cruz River. In the Huachucas it was not only living in the hollow stems of every yellow mistletoe which I examined—and I broke open dozens of them from many different oaks—but the walls of the cavity were invariably covered with reddish Coccids, which the ants were busily attending. These Coccids, which Prof. T. D. A. Cockerell has kindly identified for me as *Pseudococcus phoradendri* sp. nov., are in all probability one of the causes of the wilting and dying of the mistletoe.

On consulting the literature I find that a very keen observer, Mr.

<sup>1</sup>“The Ants of Texas, New Mexico and Arizona,” Part I, Bull. Amer. Mus. Nat. Hist., XXIV, 1908, p. 482.

E. A. Schwarz, has anticipated some of the preceding observations in a short paper published several years ago.<sup>1</sup> Speaking of the mistletoe on the trees of Bear Canyon, near Ft. Lowell, at the foot of the Santa Catalina Mts., Arizona, he says: "The majority of the more accessible mistletoe bushes proved to be more or less infested by *Lecanium phoradendri* and, in many instances, plants had been killed by the prevalence of the scale. A search for Coccinellid enemies produced, after considerable exertion, only a few specimens of *Cephaloscymnus occidentalis* Horn. Occasionally mistletoe branches, either not or but feebly infested with scales, were observed to be dead or wilting and it was found were hollowed out for a distance greatly varying in length, according to the thickness of the twig. The author of these galleries proved to be a Curculionid larva of the genus *Otidocephalus*, the particular species being still undescribed. The beetle makes its exit through a round hole at the side of the twig, and the deserted gallery is then usually occupied by a colony of ants, *Cremastogaster* sp., which attend to and protect the *Lecanium* scales.

"The infested twig is not killed at once by the boring of the *Otidocephalus* larva, but remains green for one season or longer, but at any rate long enough to allow colonies of a Scolytid beetle, to undergo one or two generations in the terminal portion of the twig. This Scolytid, one of the smallest of our fauna, is also undescribed, and belongs, as far as I can make out at present, in the neighborhood of *Stephanoderus*. It is an 'inside borer,' but no regularity whatever can be observed in the tiny galleries, nor could one find any trace of 'ambrosia.' The colonies are extremely populous, a single one containing between seventy and a hundred specimens, but the males appear to be just as rare as in *Xyleborus*."

Schwarz also mentions a Bostrychid larva (*Amphicerus* sp.) which bores in the mistletoe stems and a Lycænid larva (*Thecla halesus*) which feeds on the leaves.

There can be little doubt that similar phenomena were observed both by Schwarz in the Santa Catalina Mts. and by myself in the Huachuca, and that the *Cremastogaster* and beetle are specifically identical in the two localities. The scale *Lecanium phoradendri*, however, lives on the outer surface of the mistletoe and was not seen

<sup>1</sup>"On the Insect Fauna of the Mistletoe," Proc. Ent. Soc. Wash., Vol. IV, 1901, pp. 392-394.

by me, whereas the scale I observed, *Pseudococcus phoradendri*, lives hidden away in the hollow bases of the stems.

Schwarz's observations and my own, which were made independently in different parts of Arizona, thus reveal the existence of a peculiar cœnobiotic association, in which at least five or six different organisms regularly coöperate: a live oak, a mistletoe, a weevil larva, one or two scale insects and an ant. The mistletoe is a parasite on the oak, the weevil and the scales are parasites on the mistletoe and the ant is, in a sense, a parasite on the beetle-larva and the scales, since it owes its dwelling to the former and derives its food-supply from the latter. The Scolytid beetle and the Lycænid caterpillar observed by Schwarz may also belong in this association, since the former perhaps finds the proper conditions for its existence only in mistletoe branches that have been injured by the weevil larva, and the Lycænid caterpillar may court the attentions of the ants. Some resident entomologist in Arizona will probably find that the exhaustive study of the cœnobiotic association here briefly outlined has not only a theoretical but also a practical interest, for the *Cremastogaster* is to be regarded as a useful forest insect, since it cultivates scales that are injurious to a serious plant parasite of the live oaks and other trees.

Each of the *Cremastogaster* nests, which I opened, contained a single queen and in one nest a male specimen was taken. As these phases have not been seen before I subjoin a description of them:

***Cremastogaster arizonensis* Wheeler.**

*Female (deûlated).*—Length 5.5–6 mm.

Head large, rectangular, as long as broad, with straight lateral and posterior margins. Mandibles with 5 subequal teeth. Anterior border of clypeus sinuately excised. Antennial scapes reaching nearly half way between the eyes and the posterior corners of the head. Terminal joint of the two-jointed funicular club scarcely twice as long as the basal joint. Thorax elliptical, flattened dorsally, narrower than the head; posterior border of scutellum overarching the metanotum. Epinotum abrupt, on each side with a small tooth, which is not longer than broad at the base. Petiole and postpetiole similar to those of the worker.

Smooth and shining; mandibles and front of head more opaque; the former, clypeus, front and cheeks longitudinally striated, the mandibles and clypeus also punctate. Remainder of the body with small, scattered, piligerous punctures.

Hairs pale yellow, erect, varying in length, rather sparse, mostly confined

to the dorsal surface of the body. Pubescence long, but very sparse, distinct on the head, gaster and legs.

Rich reddish brown; head and antennæ, especially the scapes, darker; legs paler and more yellowish.

*Male*.—Length 2 mm.

Head subcircular; eyes very large; cheeks very short, posterior margin rounded behind the eyes. Mandibles minute, edentate, pointed. Antennal scape scarcely longer than the globular first funicular joint, which is distinctly broader than the succeeding joints; joints 2-6 as broad as long, remaining joints longer than broad. Thorax as broad as the head, similar to that of the female, but its epinotum is unarmed. Petiole and postpetiole like those of the worker, but their nodes are more rounded.

Sculpture and pilosity as in the female but shorter and less distinct.

Body yellow; upper surface of thorax and gaster brownish; mouthparts and antennæ white; legs pale yellow. Wings whitish hyaline with colorless veins and stigma.

The following is Prof. Cockerell's description of the Coccid that lives in the abandoned *Obidocephalus* burrows:

***Pseudococcus phoradendri* Cockerell, new species.**

"*Female*.—About 2-2½ mm. long, 1½-2 mm. broad, plump, reddish, mealy, strongly segmented. The specimens were collected in alcohol, so the nature of the mealy secretion cannot be precisely described, but it appears to have been scanty. Body with scattered minute round glands and small hairs; bristles of anal ring and the very low caudal lobes short. Legs and antennæ a lively clear yellowish ferruginous. The following measurements of legs and antennæ are in microns ( $\mu$ ).

Middle leg: femur and trochanter, 300  $\mu$  long (width of femur 80); tibia 135; tarsus (excluding claw) 88; tarsal digitules 38, rather stout, with very small knobs; claw digitules moderate; claw short, curved, with no inner tooth.

Labium elongate, two-jointed, 150  $\mu$  broad at base, 338 long.

Antennæ 8-jointed, joints measuring (1) 58-60, (2) 63-68, (3) 55-58, (4) 35, (5) 50-55, (6) 50-53, (7) 50-55, (8) 93-108.

Hab. Miller Canyon, Huachuca Mts., Arizona, 5,500 ft., Nov. 1, 1910 (W. M. Wheeler). Found in hollow stems of *Phoradendron flavescens* var. *villosum* (Nuttall), attended by *Cremastogaster arizonensis* Wheeler.

This little species reminded me strongly of the South American *P. missionum* Ckll., but although that has similar antennæ, its femora are conspicuously stouter. The antennæ also recall those of *P. formicarii* Ehrhorn, but that species is more hairy, and differs in the size and proportions of the legs."