A PSEUDOSCORPION ON MOTHS

by ASHER E. TREAT

The collector who uses his hand lens or entomological microscope before spreading and boxing his specimens may encounter many an interesting and unexpected biological association. The example reported here shows that even insects collected years previously may yield surprises.

Because of their smallness and their retiring habits, the tiny arachnids of the order Pseudoscorpionida are seldom seen, though common and widely distributed. More than 1,000 species are known, the largest only about 8 millimeters long, and most very much smaller. All are predatory, feeding on mites and other small arthropods under stones, in mosses and leaf litter, in bark or rotting wood, or in heaps of organic debris. One species is found in old books and in clothes closets, where it preys upon psocids. Another lives on the salt beaches of the Mediterranean Sea. Several inhabit caves. The name pseudoscorpion reflects the resemblance of the body and appendages to those of true scorpions. The abdomen, like that of true scorpions, is clearly segmented, but it is not narrow or elongated in the posterior portion, and does not bear a sting.

Several species of pseudoscorpion are commonly found on the bodies of other animals, most often on Diptera, Coleoptera, and Hymenoptera, but occasionally on insects of other orders, and even on birds and small mammals. The association exemplifies phoresy or phagophily rather than parasitism. The arachnid does not attack or injure its bearer, but appears to be benefitted solely by being transported (phoresy) or, in some instances, by preying upon mites which are sharing the same "vehicle." The latter behavior is referred to as phagophily (BEIER, 1948). Though male pseudoscorpions are occasionally found in such situations, VAUCHON (1947, 1949) conjectures that it is the females which are most often phoretic. These, he believes, after the curious process of injecting their nutritive body fluids into their larval offspring, are in urgent need of food, and are ready to attach themselves to any animal that presents itself.

Records of pseudoscorpions on moths are exceedingly rare. BEIER (1930) refers to 4 adults of *Atemnus piger* (Simon, 1878) taken in October, 1929, from moths attracted to light at Guelt-es-Stel, south central Algeria. These were the first of this species collected since the original description. In 1932 BEIER described a new species, *ugandanus,* of the African genus *Stenowithius* from a male and 8 females found on an arctiid moth, *Spilosoma rattrayi* Hampson, taken in Kampala, Uganda, on 2 February 1930. BERLAND (1932), without giving details or references, credits one J. DE JOANNIS with the observation of a pseudoscorpion transported by a microlepidopteran.

A search for mites on pinned Lepidoptera in the collection of The American Museum of Natural History has brought to light two more instances of the association of pseudoscorpions with moths. One moth was a female *Acronycta g. grisea* Walker. The specimen bears three printed labels: an incorrect sex determination, "♂," a locality reading "Me." (Maine), and a third reading "Collection J. B. Smith." The second moth was a female *Acronycta ovata* Grote, labelled merely "Collection J. B. Smith." It does not seem possible to obtain precise locality data on either of these insects, and their collection dates can be fixed only as within the period of SMITH'S professional activity, roughly between 1880 and 1910. FORBES (1954) states that *A. grisea* flies in June and July, and gives its range as "from Hamilton Sound, Labrador, and northern localities in Ontario to Alberta . . . and south to central Maine and mountains of New Hampshire and New York." *A. ovata* is said to fly from May to July, ranging from "Massachusetts to Tennessee, Minnesota, Colorado and Texas," with "runty" specimens appearing from Manitoba and Nova Scotia.

On each of these moths a single male pseudoscorpion was found. In each instance the anterior parts of the arachnid were deeply buried among (but apparently not attached to) the scales covering the antero-ventral surface of the cervical and prothoracic regions. The only part of the arachnid that was visible in its undisturbed position on the moth was the abdomen. This was much flattened dorso-ventrally, presumably by dessication. The pincers were open, and extended forward so that a tip of each lay close to the base of the labial palpus on the corresponding side. The venter of the pseudoscorpion was in contact with the ventral side of the moth. No mites, psocids, dermestids, or other animals were found on these insects.

The pseudoscorpions were sent to Dr. C. CLAYTON HOFF of the University of New Mexico, who has tentatively identified them as an undescribed species of the genus *Apocheiridium* J. C. Chamberlin, 1924, a group not previously recorded from eastern United States.

Since the history of the host specimens is poorly known, the possibility must be considered that the arachnids became associated with them in the cabinet rather than in the field. Mites and psocids are found occasionally as scavengers in insect collections. It is conceivable that the pseudoscorpions might have boarded the pinned specimens in search of such prey, and were killed by fumigation or desiccation. No living mites or psocids have been seen in the collection of The American Museum of Natural History, but evidence of their former presence in tributary collections is often noted. However, the lack of such evidence in these specimens, together with the identical positions of the two arachnids on the insects, suggests true phoresy rather than predation upon scavengers.

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THE STATUS OF *KALMIA* AS A HOST PLANT OF *INCISALIA AUGUSTINUS* (LYCÆNIDÆ)

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A discussion of this topic formed part of the substance of a paper by the present author (1953) which appeared recently in this journal. At that time it was pointed out that the inclusion of *Kalmia* in the host plant list of *Incisalia augustinus* Westwood appeared to be based upon papers by JOHN H. COOK, and the pertinent work of that author was summarized. To recapitulate briefly the evidence of COOK on this point, he had made the following observations: (1) the butterfly had been seen to oviposit on *Kalmia* (presumably in the laboratory); however, (2) larvæ were never discovered on this plant in nature; (3) it was impossible to rear the insect on *Kalmia* in the laboratory (larvæ which had been feeding normally on *Vaccinium* refused to eat *Kalmia*); and (4) the green larvæ would be quite conspicuous (and therefore liable to attack by predators) while feeding on the rosy *Kalmia* flowers, the most likely site of attack. On the other hand, COOK had no difficulty in demonstrating that *Vaccinium* spp. were authentic host plants of this butterfly according to the criteria mentioned in points 1, 2, and 3 above.