FEEDING HABITS OF *HEMILEIUS* NEW SPECIES
(ACARI: CRYPTOSTIGMATA: ORIBATULIDAE)
ON FLORIDA ORCHIDS

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Oribatid mites are often found associated with orchids and seem to be especially numerous in Florida greenhouses where growers are using various kinds of bark for a potting medium. Occasional damage to aerial roots has been observed by commercial growers who often attribute the damage to the oribatid mites. Growers have made requests to the Division of Plant Industry for control measures for these mites.

Concerning the feeding habits of oribatid mites, Woolley (1960) stated:

Essentially, the oribatid mites are herbivorous. They feed on all types of decaying plant material, fungi, algae, and lichens. The food requirements differ for different species and the state of decomposition of the food material consumed also varies.

Woolley’s statement sums up the thoughts of most earlier and present day workers on the food habits of oribatids. Woodring (1963) has summarized the cultured or reared oribatids and listed the food sources. Most of the mites received from orchids for identification and control belonged to the family Oribatulidae. The mites were found on pieces of bark, clustered on dead leaves, on aerial roots, and crawling about singly over the plant. Mites were usually found in largest numbers on dead or dying leaves; secondly, on and under pieces of bark used for potting medium; and, thirdly, on roots covered with green algae.

OBSERVATIONS OF FEEDING HABITS

The mites for the following observations came from Miami and Gainesville. The laboratory cultures died out for some unexplained reason in the late winter of 1963-64, and the last two experiments could not be repeated.

Seven observations were made to determine the feeding habits of *Hemileius* new species.

In the first observation, six adult mites and the tips of an aerial root were placed in each of six test tubes 100 mm long and 10 mm inside diameter. Three test tubes and their mites and aerial roots free of algae were soaked for two minutes in 1:1000 parts of bichloride of mercury and rinsed for five minutes in distilled water. Three test tubes and their mites and aerial roots with algae were not treated with bichloride of mercury. Three test tubes, each with six unsterilized mites and without an aerial root, served as the check. All aerial roots were attached to potted plants, and sterilized cotton was used to plug the mouth of the test tube around the root. Mites for the observations were taken from dead *Cattleya* leaves.

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Fig. 1. A. Two chambers used to confine mites on aerial roots.  
B. Closeup of chamber.
No feeding signs were evident in the first observation. The mites were often trapped against the inside of the test tube due to condensation.

In the second observation, six adults were placed in each of nine test tubes 100 mm long and 10 mm inside diameter. Three test tubes had aerial roots with algae growing on the surface, three test tubes had aerial roots sterilized in the above manner, and the checks had only unsterilized mites. All test tubes had paper towel linings to absorb condensation on the inside of the tube, and sterilized cotton was used to plug the mouth of the test tube around the root. Observations could not be made without removing the roots from the paper lined test tubes. To prevent disturbing the mites, only one observation was made after 28 days.

There were no feeding signs evident on the roots. The mites were found on the roots with algae, on the paper lining, or caught in the cotton plugs.

To overcome the problem of space for root growth in the test tubes and the difficulty in observing mites in paper-lined test tubes, glass tubing 25 mm in diameter was cut into 25 mm lengths. A 9:1 mixture of plaster of paris and charcoal was used to form a bottom 10 mm deep. Holes 3-4 mm in diameter were drilled through the glass tube on opposite sides just above the plaster of paris to accommodate the aerial root (Fig. 1). A thin piece of Saran was used to cover the top, and modeling clay was used to keep the small chamber in place on the aerial root and to fill any excess space around the root to prevent the mites from escaping. Condensation was at a minimum, and mites could be observed without disturbing them in these small chambers.

A third observation was made with 12 mites each in the above chambers with four replications of each of the following three treatments: roots without algae and mites soaked for two minutes in 1:1000 parts of bichloride of mercury, rinsed for five minutes in distilled water and placed in sterilized chambers; unsterilized mites with unsterilized roots covered with algae; unsterilized mites in chambers without roots.

A fourth observation was made using the same procedure as in the third observation, except the number of mites was increased to 25 in each chamber.

In the third and fourth observations, mites were found clustered on roots covered with algae. These gregarious mites were feeding on algae, but in neither observation did the mites remove enough algae in their feeding to be evident. Mites under sterilized conditions wandered aimlessly or clustered beneath the roots. There was no reproduction in any of the first four observations.

A fifth observation was made using as the food source fir bark pieces from ¼ to ½ inch in diameter, placed in plastic containers 3½ inches in diameter and 2 inches deep. The bottoms of the containers were covered with ¼ inch of 9:1 mixture of plaster of paris and charcoal. Transparent plastic (Saran) with pin-point openings was used to cover the tops. Twenty-five adult mites, bark, and chamber were sterilized in the above manner; 25 adult mites, bark, and chamber were unsterilized; and 25 unsterilized mites were placed in an unsterilized chamber as the check. Each treatment was replicated four times, and the chambers were placed in a desiccator charged with ZnSO₄ to maintain a humidity of 82 per cent.

The adult mites in the fifth observation clustered and fed on the underside of the bark. Larvae and nymphs were produced, but the life cycle
was not completed. The colonies in both sterilized and unsterilized chambers died.

A sixth observation was made with 25 adult mites and 6 one-inch squares of dead Cattleya leaves in plastic containers. Saran with pin-point openings was used to cover the top of the plastic containers 3/4 inches in diameter and 2 inches deep with 1/2 inch of 9:1 mixture of plaster of paris and charcoal in the bottom. Twenty-five mites, dead leaf squares, and chambers were sterilized in the above manner; 25 mites, leaf squares with Actinomyces sp. growing on the surface, and chambers were unsterilized; and the check contained only unsterilized mites. Each treatment was replicated four times, and the chambers were placed in a desiccator charged with ZnSO$_4$ to maintain the humidity at 82 per cent.

Mites completed a life cycle (egg to adult) in 31 to 33 days in the sixth observation. The mites fed on dead plant tissue and Actinomyces sp. The immature mites fed more on Actinomyces sp., and the adults fed more on dead plant tissue. Mite colonies did not do as well on the sterilized plant tissue, but some reproduction occurred even though no life cycles were completed.

A seventh observation was made on pure cultures of Actinomyces sp. grown on agar slants in test tubes. All mites were sterilized for two minutes in 1:1000 parts of bichloride of mercury and rinsed for five minutes in distilled water before they were introduced into the test tubes. Four replications were made of each of these treatments: one adult to each test tube, five adults to each test tube, one protonymph to each test tube, and five protonymphs to each test tube. The checks were five adults on agar and five protonymphs on agar.

The mites feeding on pure cultures of Actinomyces sp. did not reproduce in the seventh observation. The protonymphs completed their life cycles but did not lay eggs.

Conclusions and discussion: Hemileius new species is found on orchids in the Miami and Gainesville areas. These two widely separated collections and the numerous complaints of mites from orchid growers indicate a wide distribution of this mite in the state. The above observations did not prove this mite to be a pest of orchids, but it did further substantiate that oribatid feed on decaying plant material, algae, and Actinomyces sp.

The damage reported to the aerial roots of orchids is probably caused by Collemboila or some other chewing insect. Growers can easily control oribatids with almost any acaricide that is safe to use on orchids. A second application may be necessary as a clean up spray in about 30 days since the life cycle of Hemileius new species is approximately a month. This mite is described below.

Hemileius nicki, new species

(Figs. 2-4)

Diagnosis: H. nicki may be distinguished from H. initialis (Berlese 1908) by smaller sizes and much longer interlamellar setae; from H. tropicus (Balogh 1958, 1960) by the almost round hysterosoma (H. tropicus is elongate) and the lance-like pseudostigmatic organ; and from H. oblongus (Ewing 1909, Woolley 1961) by shorter adanal setae, lack of downward bending pteromorphs, and the arched dorsal sejugal suture.
Fig. 2. Adult *Hemileius nicki* n. sp.; ventral and dorsal views.
ADULT: No sexual dimorphism, average 660 μ long and 460 μ wide, rather globular hysterosoma, and colored yellow to orange. Lamellae lie close to edge of prosoma, tectopedia 1 not protruding laterally when viewed from above, and rostrum more pointed than rounded. Lamellae short, half the length of prosoma, and posterior lateral edge of lamellae sharply elbowed. Rostral setae as long or longer than lamellar setae and usually with two curves. Interlamellar setae slightly longer than prosoma, exostigmal setae minute, and all dorsal prosomal setae lightly pectinate. Pseudostigma partially covered by hysterosoma, oval in shape, and with rounded

Figs. 3-4. *Hemileius nicki* n. sp.; 3. Tritonymph; 4. Larva.
lateral ectrusion. Pseudostigmatic organ with evenly oval, clavate head and lightly pectinate on all surfaces. Notogaster with 10 small setae, 5 sacculi, and 2 slits as in Fig. 2. True area porosae lacking. Notogaster extends slightly over the venter throughout, but more so in shoulder region. A true pteromorph formed by the fusion of 2 surfaces lacking. Anal setae 2, adanal 3, and ventral podosomal arrangement 3-2-2-3. Ventral podosomal apodemes complete and continuous in midline. Tectopedia 2 small and evenly rounded as in Fig. 2. Anal plate 3 times area of genital plate, and almost twice the distance of length of genital plate from genital plates. Four pair small genital setae arranged as in Fig. 2. All legs tridactylus, with median claw twice thickness of lateral claws.

**Triptonymph** (Fig. 3): Prosoma averages 150 μ long and 106 μ wide at posterior margin. Rostral setae placed closer to midline than lateral edges when viewed from above, and slightly more than ½ length of lamellar setae. Lamellar setae almost as long as prosoma. Interlamellar setae longer than prosoma, and arising very close to pseudostigma. Exostigmatic setae almost as long as pseudostigmatic organ. All prosomal setae distinctly pectinate. Pseudostigma small, far removed from dorsal-sejugal suture and almost round in shape. Pseudostigmatic organ a smaller copy of adult's. A fine lamella runs from the pseudostigma anteriormedially through the interlamella setal socket, then discontinuously through lamellar setal socket. The 15 notogastral setae all dark, stout, blunt-tipped, and distinctly pectinate. Anterior setae progressively larger than posterior setae, so that most anterior are twice length of posterior most. Setae c₂, la, lp, h₃, and h₂ with small lightly sclerotized plates surrounding sockets. Genital setae 3, ad genital 1, anal 2, adanal 3, and ventral podosomal arrangement 3-1-2-2. Ventral podosomal setae twice length of genital, ad genital, and anal; and adanal twice length of ventral podosomal setae. All legs monodactylus.

**Larva** (Fig. 4): Prosomal shield averages 40 μ long and 40 μ wide at widest point. The 3 prosomal setae in a row, exostigmatic setae minute, and pseudostigma and organ a smaller copy of the tritonymph's. Of 10 notogastral setae only c₂ and la have associated minute, sclerotized plates. Hysterosomal gland opening ventral-lateral. No anal setae, adanal 1 as long as notogastral setae, and 2 minute adanal setae. Ventral podosomal arrangement 2-1-2. Claparedé's organ simple.

**Holotype:** Homestead, Florida, 22 February 1962 (J. H. Knowles), on Cattleya sp.; type no. 3106 in the U. S. National Museum.

**Paratypes:** One adult on same slide as holotype; 1 adult (slide mount), Gainesville, Florida, 11 February 1963 (H. A. Denmark), on Cattleya sp. in the U. S. National Museum; 2 adults (alcohol specimens), Gainesville, Florida, 23 September 1963 (H. A. Denmark), on Cattleya sp. in the Florida State Collection of Arthropods, Gainesville; 2 slides of immatures, 3 slides of adults, and 6 adults in alcohol in junior author's collection.

**Literature Cited**


The Florida Entomologist 48(1) 1965