Notes on the Larval Hosts and Habits of Some North American Eriocraniidae and Acanthopteroctetidae

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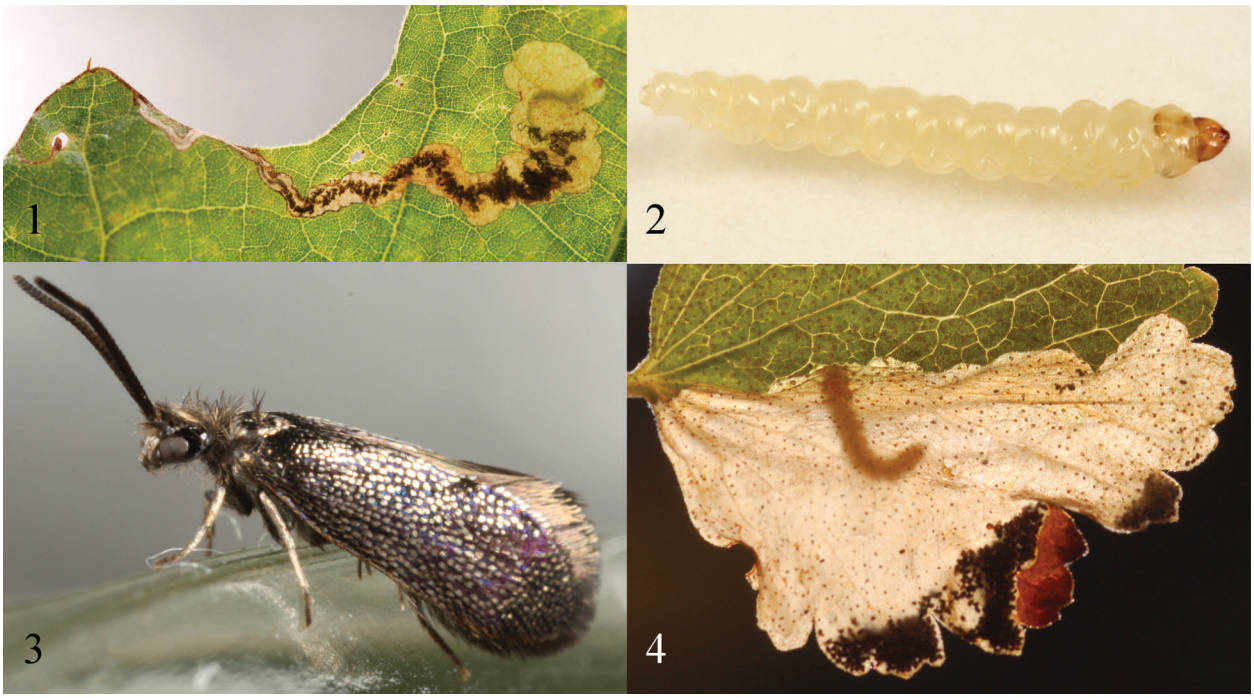
NOTES ON THE LARVAL HOSTS AND HABITS OF SOME NORTH AMERICAN ERIOCRANIIDAE AND ACANTHOPTEROCTETIDAE

Additional key words: leafmining, *Acanthopteroctetes*, *Eriocraniella*, *Quercus*, *Ribes*

Eriocraniidae and Acanthopteroctetidae are two small families of leaf-mining moths, each assigned to its own superfamily. Eriocraniidae is a Holarctic family with 25 species, of which 13 occur in North America (Heppner 2008). As far as is known, all of the world's species have larval hosts in Fagales, with the exception of the western Nearctic *Eriocrania semipurpurella pacifica* Davis, which feeds on *Holodiscus discolor* (Pursh) Maxim. (Rosaceae) (Davis 1978, Wagner 1985, Ellis 2015). There are 10 known species of Acanthopteroctetidae, with five in the western USA (one of them undescribed), two in South Africa (one undescribed), and one each in Crimea, the Tien Shan region, and Peru (the last two undescribed) (Davis 1978, 1984, Kristensen et al. 2014). *Acanthopteroctetes unifascia* Davis feeds on *Ceanothus* L. (Rhamnaceae) (Davis & Frack 1987, Robinson et al. 2002), and the hosts of the others are unknown.

Five species of Eriocraniidae are known from North America east of the Great Plains. *Dyseriocrania griseocapitella* (Walsingham) is widespread, mining leaves of both *Castanea* Mill. and *Quercus* L. (Fagaceae). *Eriocrania semipurpurella semipurpurella* (Stephens) occurs from eastern Canada to southern New York; it is known from several species of *Betula* L. (Betulaceae) in the Palaearctic, but has not been reported from any Nearctic birches. *Eriocraniella mediabulla* Davis feeds on oaks in the Gulf Coast states. *Eriocrania breviapex* Davis and *Eriocraniella platyptera* Davis were each described from a few specimens caught in Ithaca, New York (Davis 1978, Davis & Faeth 1986).

From 9 to 12 June 2013, I collected eriocraniid leaf mines (Fig. 1) from scrub oak (*Quercus ilicifolia* Wangenh.) at several locations on Nantucket Island, Massachusetts. Mines of eriocraniids are easily recognized by the stringy frass, and there are few other oak leafminers active in spring. The only other leafminers observed on scrub oak at this time (both of which I successfully reared) were *Japanagromyza*



FIGS. 1–3. *Eriocraniella platyptera*. **1**) Larva mining a *Quercus ilicifolia* leaf; **2**) Mature larva; **3**) Reared adult
FIG 4. *Acanthopteroctetes* larva mining a *Ribes* leaf.

viridula (Coquillett) (Diptera, Agromyzidae), which produces frass in irregular lumps and streaks, and *Neurobathra strigifinitella* (Clemens) (Gracillariidae), which mines primarily in the midrib and produces frass in tiny, compact pellets.

The eriocraniid larvae (Fig. 2) began exiting their mines on 11 June. I transferred them to small jars containing a moistened 1:1 mixture of sand and peat, into which they burrowed. Empty leaves were pressed and stored for later study. Between 23 and 30 June, six hymenopteran parasitoids emerged from the eriocraniid mines. C. Hansson determined that they consisted of at least two different species of *Pnigalio* Schrank (Eulophidae), neither of which fit into the existing key to this genus (Yoshimoto 1983). They are deposited in the Museum of Zoology, Lund, Sweden. The jars of soil were stored in a refrigerator at 1–3° C from 6 November to 25 February 2014. Two adult moths (Fig. 3) emerged on 27 and 29 March. I sent one specimen to J.-F. Landry, who identified it as *Eriocraniella platyptera* and deposited it in the Canadian National Collection of Insects, Ottawa, Ontario.

I examined ten complete (not parasitized) *Eriocraniella platyptera* mines, which were always solitary. In each case, the egg was inserted 1–3 mm from the leaf edge (1.5 mm on average), and its location was marked by a small hole in the leaf. The hole ranged from 0.3–4 mm long (average 1.3 mm) and 0.2–1 mm wide (average 0.7 mm). Half of the eggs were in the basal fifth of the leaf, eight were in the basal two-fifths, and all were in the basal three-fifths. The mine was initially linear and always proceeded parallel to or away from the leaf edge (toward the leaf base in all but one instance) for 1–3 mm before curving until it reached the edge. It then followed the leaf margin apically for 15–25 mm (average 20 mm) before beginning to expand into an elongate blotch. Frass was deposited in a broken central line in the linear portion, becoming squiggly and forming a dense, broadening central mass in the blotch. The blotch continued to follow the leaf margin and ultimately occupied 1–2 cm^2 (average 1.5 cm^2). Blotches measured 20–32 mm long (25 mm average), and the total span of the mine was 24–49 mm (average 39 mm). The larva exited through a ragged hole or slit in the lower epidermis at the edge of the blotch. D. L. Wagner (pers. com.) reports that these mines are common in sandy areas of Connecticut, and that he has reared *Eriocraniella* adults from scarlet oak (*Quercus coccinea* Münchh.) there.

The general form of the mine is consistent with that of all other known *Eriocraniella* mines (Davis 1978). However, mines of the other eastern species, *E. mediabulla*, differ from those of *E. platyptera* in that oviposition is usually in the apical half of the leaf and does not cause a hole to form in the leaf (Davis & Faeth 1986). Davis and Faeth (1986) contrasted the mine of *E. mediabulla* with that of *Dyseriocrania griseocapitella*, which they said, in addition to causing a hole to form, "commences near the lower third of the leaf and continues along the leaf edge as a serpentine mine to the distal half." This description suggests a mine identical to that of *E. platyptera*, but is at odds with all other descriptions I have found for the mine of *D. griseocapitella*. Davis (1978) stated that the eggs of *D. griseocapitella* are usually deposited "over the outer half of the leaf" and that the early linear portion of the mine is usually obliterated by the blotch.

T. Harrison provided me with a photograph of 23 *Dyseriocrania griseocapitella* mines on leaves of *Quercus* cf. *velutina* Lam. Although the resolution is insufficient to determine the oviposition sites in all cases, most do appear to have been initiated at or beyond the middle of the leaf. However, one of the mines is confined entirely to the basal half, and 13 others have substantial portions extending into the basal half, if not originating there. Just two mines have what appears to be an oviposition scar outside the blotch. In both cases this is well within 1 cm of the blotch. Since the photograph included a ruler for scale, I was able to measure the area covered by the mines, and these ranged from 2.5–6.25 cm^2 (average 4.3 cm^2). Based on these observations, distinguishing among mines of the three eastern oak-feeding eriocraniids should be straightforward.

As noted above, *Eriocrania semipurpurella semipurpurella* (Stephens) is known to be a birch miner but there are no North American rearing records. The mines are similar to those of *Dyseriocrania griseocapitella* in having a short initial linear portion that is often obliterated by the blotch (Ellis 2015). I found active *Eriocrania* mines on gray birch (*Betula populifolia* Marshall) in Pelham, Massachusetts on 11 May 2012. In one case, two larvae were feeding in a single mine. The larvae began emerging the following day and burrowed into soil that I offered them, but I failed to rear any. I found a few abandoned *Eriocrania* mines on paper birch (*B. papyrifera* Marshall) in Machiasport, Maine on 16 June 2014. Because the host of *E. breviapex* is unknown, it cannot be said with certainty which species was responsible for these mines, although *E. semipurpurella* is most likely based on known distributions. Apart from *E. semipurpurella pacifica*, all confirmed hosts of *Eriocrania* species are in Betulaceae, with *E. alpinella* Burmann on *Alnus viridis* (Chaix) DC. and all others on *Betula* spp. (Davis 1978, Ellis 2015).

On 16 October 2012, along the Metolius River in Oregon, I collected leaf-mining larvae on *Ribes cereum* Douglas (Grossulariaceae) that I assumed to be sawflies (Tenthredinidae: Fenusini). The mines (Fig. 4) were full-depth blotches with the frass in oval pellets, concentrated along one edge of the mine. The larvae fed venter-upwards and had prominent thoracic legs. They died in the mines and became moldy, but two years later DNA barcoding of one of the dried larvae indicated a 97% match for *Acanthopteroctetes bimaculata* Davis. The match is insufficient to confirm that the larvae belonged to this species, which is known only from northeastern Oregon and the southern Sierra Nevada of east-central California (Davis 1978), but it is closer to this than to any of the three other described Nearctic *Acanthopteroctetes* species. D. L. Wagner (pers. com.) recalls having seen these mines commonly in California, but never collected them because he, too, mistook the larvae for sawflies. On 5 and 7 July 2015, I found occupied *Acanthopteroctetes* mines to be common on *R. cereum* in Chaffee and Fremont Counties, Colorado. There were occasionally two larvae per mine. In rearing vials, some larvae were able to establish new mines in fresh leaves, and I kept some alive until early August, but once again all died without pupating. I report these observations in the hope that someone in the western US will be inspired to search for more larvae and rear them to confirm their identity.

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LITERATURE CITED

DAVIS, D. R. 1978. A Revision of the North American moths of the superfamily Eriocranioidea with the proposal of a new family, Acanthopteroctetidae (Lepidoptera). Smithson. Contr. Zool. Num, 251: 1–131.

———. 1984. A new *Acanthopteroctetes* from the northwestern United States (Acanthopteroctetidae). J. Lepid. Soc. 38: 47–50.

DAVIS, D. R. AND S. H. FAETH. 1986. A new oak-mining eriocraniid moth from southeastern United States. Proc. Entomol. Soc. Wash. 88: 145–153.

D. R. DAVIS AND D.C. FRACK. 1987. Acanthopteroctetidae, pp. 344–347, 14 figs. *In* Stehr, F.W. (ed.), Immature insects, vol. 1. Kendall/Hunt Publishing Company, Dubuque, Iowa.

ELLIS, W. N. 2015. Leafminers and plant galls of Europe. Available from: http://www.bladmineerders.nl (Accessed 24 February 2015)

HEPPNER, J. B. 2008. Sparkling Archaic Sun Moths (Lepidoptera: Eriocraniidae). p. 3477. *In* Capinera, J. L. (ed.), Encyclopedia of Entomology. Springer, Netherlands.

KRISTENSEN, N. P., J. ROTA, AND S. FISCHER. 2014. Notable *plesiomorphies* and notable specializations: head structure of the primitive "tongue moth" *Acanthopteroctetes unifascia* (Lepidoptera: Acanthopteroctetidae). J. Morphol. 275: 153–172.

ROBINSON, G. S., P. R. ACKERY, I. J. KITCHING, G. W. BECCALONI, AND L. M. HERNÁNDEZ. 2002. Hostplants of the Moth and Butterfly Caterpillars of America North of Mexico. Mem. Amer. Entomol. Inst. 69: 1–824.

WAGNER, D. 1985. First California record and confirmation of a rosaceous host for *Eriocrania* (Eriocraniidae). J. Lepid. Soc. 39: 52.

YOSHIMOTO, C. M. 1983. Review of North American *Pnigalio* Schrank (Hymenoptera: Eulophidae). Can. Entomol. 115: 971–1000.

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