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GENERAL NOTE

PENSTEMON DIGITALIS (SCROPHULARIACEAE), A NEW FOOD PLANT RECORD FOR *HAPLOA CONFUSA* (ARCTIIDAE)

Additional key words: alkaloid, boschniakine.

The confused Haploa moth (or Lyman's Haploa, *Haploa confusa* Lyman) is common during July in tallgrass prairie habitats in E-central Illinois. However, little information is available on its larval food plants. *Haploa confusa* is not listed by Tietz (1972, An index to the described life histories, early stages, and hosts of the Macrolepidoptera of the continental United States and Canada, A. C. Allyn, Sarasota, Florida, 536 pp.), and Holland (1968, The moth book, Dover Publications, New York, 479 pp.) makes no mention of food plants. Covell (1984, A field guide to the moths of eastern North America, Houghton Mifflin, Boston, 496 pp.) lists only "hound's-tongue" as a food plant. Several herbaceous plant species are commonly called hound's-tongue, but the name best applies to *Cynoglossum officinale* L. (Boraginaceae), a herbaceous plant of European origin widely naturalized in the United States (Lyons, 1901, Plant names scientific and popular, Nelson, Baker and Co., Detroit, 630 pp.). Other *Haploa* species feed on a variety of plants, including *Eupatorium* (Compositae), *Salix* (Salicaceae), and *Triosteum* (Caprifoliaceae) species (Holland, above).

Foxglove penstemon (*Penstemon digitalis* Nutt., Scrophulariaceae) is a common biennial forb in tallgrass prairie habitats of the Ecological Research Area maintained near Urbana, Illinois, by the University of Illinois. Other dominant plant species in the habitat include big bluestem (*Andropogon gerardii* (Vitm.), Gramineae), Indian grass (*Sorghastrum nutans* (L.), Gramineae), and lespedeza (*Lespedeza cuneata* (Dum.-Cours.) G. Don, Leguminosae) (Lindroth & Batzli, 1984, J. Mamm. 65:600–606). On 1 May 1984, while collecting *P. digitalis* for analysis of alkaloid constituents, I found a second or third stage larva resting on a *P. digitalis* rosette leaf. The leaf was partially eaten and some larval frass adhered to it. The larva was taken into the laboratory and reared through its remaining stadia on leaves of *P. digitalis*. The larva was maintained in a glass Petri dish and fed clumps of rosette leaves until the final stadium, at which time I transferred it to a small Plexiglas cage covering a potted *P. digitalis* plant. The larva exhibited an unusual feeding behavior; it started feeding at the tip of a leaf, then cut a narrow (<1 cm) swath down the center of the leaf, consuming the midrib and a narrow band of tissue on both sides. After pupation, the insect was not visible on the plant or soil surface. Two to three weeks after pupation, a female *H. confusa* emerged.

Use of *P. digitalis* by *H. confusa* is interesting because the plant contains especially high levels of boschniakine (a pyridine monoterpene alkaloid) during the larval feeding period (Lindroth et al., 1986, Biochem. Syst. Ecol. 6:597–602). Alkaloids commonly occur in the food plants of *Haploa* species, including cynoglossophine, heliotrine, lasiocarpine, and platyphilline in *Cynoglossum officinale*, and echinatine and trachelanthamidine in *Eupatorium maculatum* L. (Willaman & Li, 1970, Lloydia 33, Suppl. No. 3A:1–286). In addition to alkaloids, *Penstemon* species commonly contain a variety of iridoid glycosides, such as ajugol and catalpol (Junior, 1983, Planta Medica 47:67–70), although it is not known whether *P. digitalis* contains the compounds. Both alkaloids and iridoid glycosides are deterrent or toxic to many insects (Robinson, 1979, pp. 413–448 *in* Rosenthal & Janzen, Herbivores: Their interaction with secondary plant metabolites, Academic Press, New York, 718 pp.; Bernays & De Luca, 1981, Experientia 37:1289–1290). Thus *H. confusa* larvae probably have physiological or biochemical adaptations that enable them to avoid the effects of these potentially toxic compounds. Alkaloids and iridoid glycosides are sequestered as defensive compounds in other lepidopteran species (Duffey, 1980, Ann. Rev. Entomol. 25:447–477; Bowers, 1980, Evolution 34:586–600). The apparent aposematic coloration of *H. confusa* larvae, black with orange longitudinal stripes, indicates that they may sequester alkaloids or iridoid glycosides from *P. digitalis*.

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