

BIOLOGY AND IMMATURE STAGES OF
POLIA LATEX (GUENÉE) (NOCTUIDAE)

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ABSTRACT. *Polia latex* was studied from 1984-86 at Cooper's Rock State Forest in northern West Virginia as well as under laboratory conditions. Adult flight period was from 24 May to 29 August and larvae were collected from 21 June to 2 October. Thirteen host plants and 14 species of parasites were recorded for *P. latex* larvae. The egg and seven larval instars are described. Larval duration averaged 45.3 days at 24°C.

Additional key words: hardwood defoliator, West Virginia, parasites, Hadeninae.

Polia latex (Guenée) is a common hadenine (Noctuidae, Hadeninae), the adults of which are well known and easily recognized. The adults fly from May to August with melanics being common (Covell 1984). The immature stages are less well known.

Larvae are found from early June to mid-August with a peak in early August (Prentice 1962). Brief descriptions of larvae were given by Crumb (1956) and Godfrey (1972). Godfrey figured the head, hypopharyngeal complex, and mandible and illustrated habitus of the mature larva.

According to Crumb (1956), the distribution of *P. latex* is restricted to the northeast United States and adjoining Canada. Smith (1893) recorded it from the northern, eastern, and middle states.

During 1984-86 *P. latex* was studied at Cooper's Rock State Forest in northern West Virginia, just west of the leading edge of the infestation of the gypsy moth, *Lymantria dispar* (L.) (Lymantriidae). The objective of the study was to obtain baseline data for native lepidopterous defoliators and their parasites before the build-up of gypsy moth to enable evaluation of changes in native defoliator populations later as the gypsy moth population increases. During this study, *Polia latex* was one of the more abundant defoliators, but was producing no significant defoliation. Since little information is available on the biology of *P. latex*, we recorded duration of larval development, host plants, and parasites of this species. Voucher specimens are in the West Virginia University Arthropod Collection.

MATERIALS AND METHODS

The West Virginia University Forest at Cooper's Rock State Forest is located in Preston and Monongalia counties about 32 km east of Morgantown, West Virginia. The area consists of 50- to 60-year-old even-aged mixed mesophytic forest and has a mean elevation of 561 m (Carvell 1983). The most abundant tree species in the study area are red maple (*Acer rubrum* L., Aceraceae), white and red oak (*Quercus alba* L., *Q. rubra* L., Fagaceae), black cherry (*Prunus serotina* Ehrh., Rosaceae) and black birch (*Betula lenta* L., Betulaceae).

The flight period of *Polia latex* was determined by blacklight trapping throughout the 1984 and 1985 seasons. A single gravid *P. latex* female was live-trapped at a blacklight trap and caged with foliage of maple, cherry, birch and oak on which to oviposit; the adult was provided with water and black cherry blossoms as a nectar source.

Larvae were reared in 150 × 25 ml plastic petri dishes. Fresh red maple foliage was placed in clean petri dishes every other day. Larvae were observed daily, and at each instar some larvae were killed in KAAD and preserved in 80% ethanol for head measurements. Pupation was in a layer of moist vermiculite 5 cm deep in quart canning jars. All rearing was conducted at 24°C and 12L:12D photoperiod.

Larval descriptions were based on laboratory reared specimens only. The terminology used is that of Godfrey (1972). Eggs and larval head capsule measurements were made with an ocular micrometer.

Field sampling of *P. latex* larvae was conducted in 1984 and 1985 by pruning foliage samples once each week during the growing season. Foliage sampled was primarily *Acer rubrum*, *A. saccharum* Marsh., *A. saccharinum* L. and *A. nigrum* Michx. f., *Prunus serotina*, *Betula lenta*, *Quercus alba*, *Q. rubra*, *Q. prinus* L. and *Q. velutina* Lam. Some additional host trees were observed during field sampling. During 1986, larvae were sampled by burlap banding black cherry, black birch, red maple, and mixed oaks (45 trees total). All field collected larvae were reared in the laboratory on the appropriate host plants to isolate parasites.

RESULTS

Phenology, Host Plants, and Parasites

Seasonal flight period of *P. latex* during 1984 was from 25 May–29 August; 128 specimens were trapped. In 1985, 79 specimens were collected between 24 May–13 August. Peak trap numbers were on 6 July 1984 and 12 June 1985. Despite the long adult flight period, field collections of larvae indicate that *P. latex* is univoltine.

In 1984, 91 larvae were collected on foliage in the field between 21

June and 13 September; in 1985, 52 larvae were collected between 3 July and 12 September. In 1986, 255 *P. latex* larvae were taken between 11 July and 2 October from burlap bands placed on 45 trees. Thirty-nine percent of the larvae were on birch (7 trees), 24% on black cherry (12 trees), 19% on red maple (13 trees), and 18% on mixed oaks (13 trees). *Polia latex* made up 86% of all lepidopterous larvae found under burlap bands during that time period.

The larvae of *P. latex* are general feeders on deciduous broad-leaved trees; the 13 host species found during this study were: *Acer nigrum*, *A. rubrum*, *A. saccharinum*, *A. saccharum* (Aceraceae); *Betula lenta* (Betulaceae); *Nyssa sylvatica* Marsh. (Nyssaceae); *Magnolia acuminata* L. (Magnoliaceae); *Prunus serotina* (Rosaceae); *Quercus alba*, *Q. prinus*, *Q. rubra*, *Q. velutina* (Fagaceae); and *Sassafras albidum* Nees (Lauraceae). Additional host plants given by other authors include: *Betula nigra* L. (Crumb 1956), *B. lutea* Michx. f. and *B. papyrifera* Marsh. (Betulaceae) (Prentice 1962); *Fagus grandifolia* Ehrh. (Fagaceae) (Covell 1984); and *Ulmus americana* L. (Ulmaceae) (Covell 1984).

Larval instar durations as determined from laboratory rearing are summarized in Table 1; the larval period averaged 45.3 days at 24°C.

Parasites reared from field-collected *P. latex* larvae were: *Hyphantraphaga virilis* (Aldrich & Webber) and *Lespesia stonei* Sabrosky (Diptera: Tachinidae); *Alloplasta suberba* (Provancher), *Eutanyacra improvisa* (Cresson), *Hyposoter fugitivus* (Say), and *Mesochorus pictilis* Holmgren (hyperparasite) (Hymenoptera: Ichneumonidae); *Perilampus* sp. (hyperparasite) (Hymenoptera: Perilampidae); *Eulophus nebulosus* (Provancher), *Euplectrus* sp. and *Enplectrus maculiventris* (Westwood) (Hymenoptera: Eulophidae); *Diolcogaster facetosa* (Weed), *Microplitis hyphantriae* (Ashmead), *Microplitis* sp. and *Meteorus bakeri* C. & D. (Hymenoptera: Braconidae).

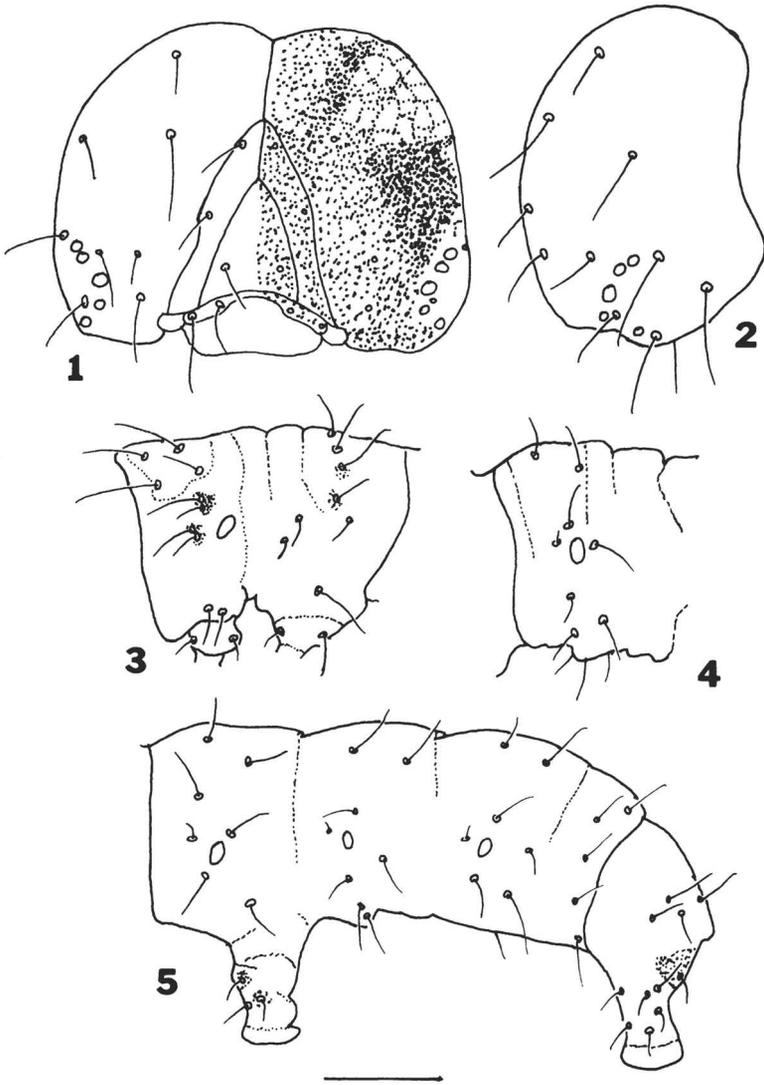
Description of Immature Stages

Eggs: In the laboratory, the caged female oviposited, producing a one-layered egg mass (129 eggs) and a three-layered egg mass (217 eggs). The eggs were spherical in shape, 0.66 mm ($n = 50$) in diameter. One egg observed by scanning electron microscope at 130 \times was sculptured with 37 ridges and paralleled by transverse cross-striae forming hexagons toward the anterior pole and more quadrate shapes toward the posterior; at 650 \times , 16 micropyles were observed at the anterior pole.

Larvae: Instar 1 ($n = 13$): Head capsule 0.36 mm (range 0.33–0.36), light tan. Body ground color transparent to yellowish with gut contents giving a basic green color; pinacula black and prominent. Prolegs on abdominal segments 3 and 4 reduced with the greatest reduction on abdominal segment 3. Prothoracic shield light tan and difficult to distinguish from general body surface; lateral shields of anal prolegs tan and prominent.

Instar 2 ($n = 14$): Head capsule 0.58 mm (range 0.50–0.60), tan. Body ground color yellowish-green. Pinacula prominent.

Instar 3 ($n = 14$): Head capsule 0.97 mm (range 0.90–1.00), tan with black reticulations. Body color variable (olive green, light brown, grey, yellow); dorsal (D), subdorsal (SD),



FIGS. 1-5. *Polia latex*, mature larva: 1, head capsule, frontal view; 2, head capsule, lateral view; 3, prothorax and mesothorax, lateral view; 4, abdominal segment 2, lateral view; 5, abdominal segments 6-10, lateral view. Scale line = 1 mm for Figs. 1-2, 2 mm for Figs. 3-5.

and lateral (L) lines white with the D line being most prominent; the body region between the D and SD lines much darker than the body ground color.

Instar 4 (n = 16): Head capsule 1.49 mm (range 1.29-1.72), tan. A black pinaculum around the D1 seta on each segment; abdominal segments 8 and 9 olive green to black, the white D line ending on the anterior half of the 8th abdominal segment.

Instar 5 (n = 15): Head capsule 2.24 mm (range 2.00-2.57), with extensive reticulations

TABLE 1. Larval duration of *P. latex* reared on leaves of red maple at 24°C (n = 14).

Instar	Mean time \pm SD (days)
1	5.6 \pm 0.5
2	4.2 \pm 0.6
3	4.5 \pm 1.3
4	5.9 \pm 1.8
5	5.9 \pm 1.5
6	7.0 \pm 3.6
7	10.5 \pm 3.8
Prepupal	3.8 \pm 1.0
Total	47.4 \pm 4.4

and submedial arcs. Body mostly dark green; lateral band creamy yellowish-white and surrounding the lower half of black abdominal spiracles; venter pale green. White D and SD lines still present; area between D and SD lines mottled green and white; area between white SD and L lines dark olive, slightly lighter olive green just below SD line; dorsal dark wedge-shaped markings on abdominal segments and black dorsal bars evident on the 8th abdominal segment.

Instar 6 (n = 14): Head capsule 3.01 mm (range 2.86–3.29); reticulation and submedial arcs similar to those of instar 5. Body dark with D, SD, and L lines mottled white and green; the L line most distinct. Black dorsal bars more evident than in previous instar.

Instar 7 (n = 13): Head capsule 3.65 mm (range 3.29–4.15), dark brown with reticulations covering the entire head. Lateral line consisting of a brown supraspiracular line and a pinkish-peach subspiracular line; prothoracic and abdominal 8 spiracle set completely within supraspiracular line; abdominal spiracles 1–4 and 7 located between the supraspiracular and subspiracular lines and spiracles 5 and 6 completely within subspiracular line.

GENERAL: Body of mature larva 33 mm long and 4 mm wide; prolegs present on abdominal segments 3–6, size increasing caudad; crochets uniordinal, 25–28 per third abdominal proleg, 28 per fourth, 29–31 per fifth, 29–32 per sixth. All setae simple. Chaetotaxy illustrated in Figs. 1–5.

DIAGNOSIS: *Polia latex* larvae may be distinguished from larvae of other *Polia* spp. common in the study area on the basis of color pattern (Crumb 1956, Godfrey 1972). *Polia purpurissata* (Grote) is larger and also differs in being yellow grey or violet grey with obscure markings. The cervical shield, which is shiny brown in *P. purpurissata*, lacks contrast in *P. latex*. *Polia imbrifera* (Guenée) is similar in size but is greyish with distinct black oblique lines from D2 to SD1 on abdominal segments 1–8; these lines are lacking in *P. latex*. *Polia nimbose* (Guenée) also possesses distinct black oblique lines on abdominal segments as well as a prominent segmental series of black, diamond-shaped middorsal spots. *Polia detracta* (Walker) is smaller with head reticulation darker than that of *P. latex*. The body of *P. detracta* is more reddish and has darker cervical and anal plates than *P. latex*.

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LITERATURE CITED

- CARVELL, K. L. 1983. A summary of 1973-1982 weather data from the West Virginia University Forest. WVU Forestry Notes 10:13-16.
- COVELL, C. V. JR. 1984. A field guide to the moths of eastern North America. The Peterson Field Guide Series. Houghton Mifflin, Boston. 496 pp.
- CRUMB, S. E. 1956. The larvae of the Phalaenidae. U.S. Dept. Agr. Tech. Bull. 1135. 356 pp.
- GODFREY, G. L. 1972. A review and reclassification of larvae of the subfamily Hadeninae (Lepidoptera, Noctuidae) of America north of Mexico. U.S. Dept. Agr. Tech. Bull. 1450. 265 pp.
- PRENTICE, R. M. 1962. Forest Lepidoptera of Canada. Vol. 2. Dept. of Forestry Bull. 128. pp. 77-281.
- SMITH, J. B. 1893. Catalogue of Noctuidae. U.S. Natl. Mus. Bull. 44. 424 pp.

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