THE LARVA OF *LOXAGROTIS KYUNE* (BARNES) (NOCTUIDAE)

GEORGE L. GODFREY
Illinois Natural History Survey and Illinois Agricultural Experiment Station, Urbana, Illinois 61801

Loxagrotis kyune (Barnes) was described on the basis of a single female collected in the Huachuca Mountains, Arizona (Barnes, 1904). Barnes originally placed *kyune* in the genus *Hadena.* Except for changes in generic reassignments of the species, no additional published information is available. The following notes constitute the first information about the larval instars of *kyune.*

Dr. John G. Franclemont captured a female moth of *kyune* on the night of 12 July 1967, at Onion Saddle, 7600 feet, Chiricahua Mountains, Cochise County, Arizona. Eggs obtained from the specimen the same night hatched on 19 July. The larvae subsequently passed through five instars before burrowing into the peat moss and sand filled rearing boxes during prepupal activity.

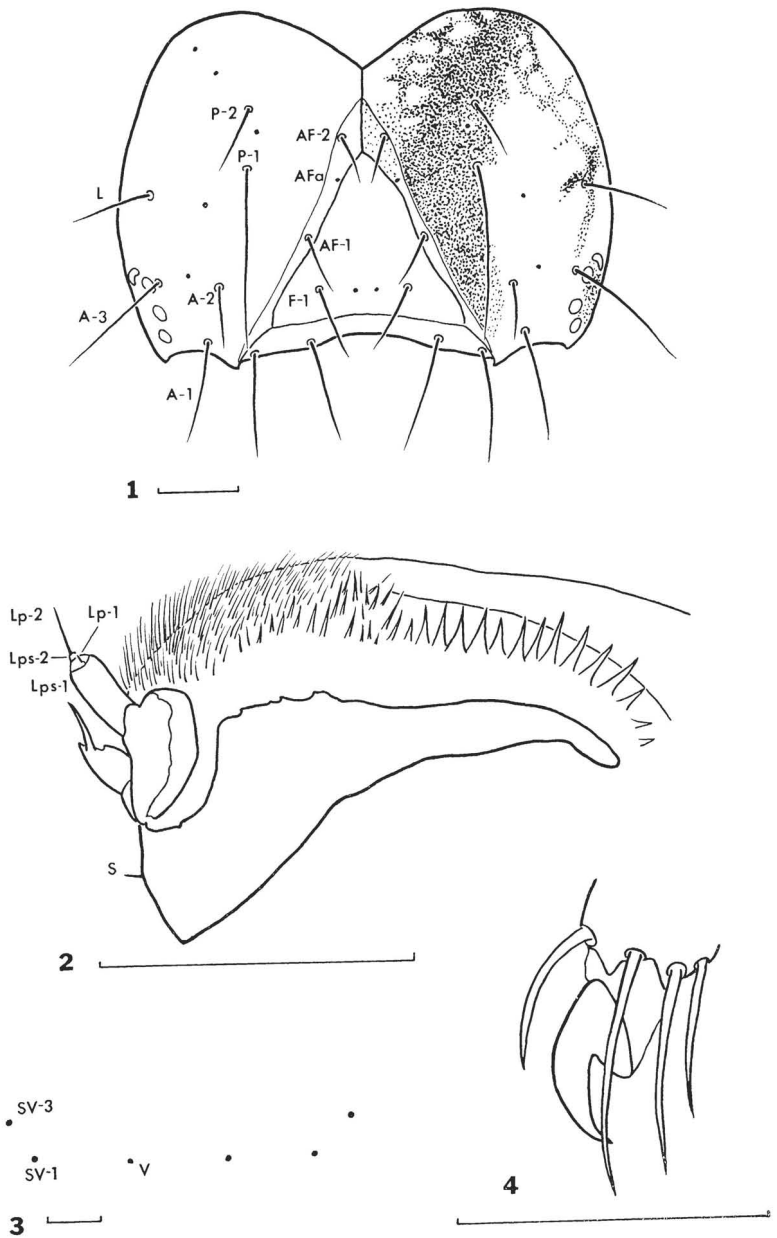
The natural host is unknown. Newly hatched larvae were confined with cuttings of commercial lettuce (*Lactuca* sp.), *Astragalus* sp., *Rubus* sp., *Quercus* spp., *Brickellia* sp., *Viguiera multiflora* (Nutt.) Blake, and *Pseudotsuga douglasi* Carr. (Douglas fir). Except for the last plant, all cuttings showed some feeding signs by the first instars. The greatest feeding was on *Viguiera multiflora.* The second instars fed only on *V. multiflora,* and I eventually discontinued offering the other plants.

The illustrations that accompany the following description of the last larval instar were drawn to scale by a grid system. All scale lines represent 0.5 mm. The terminology and abbreviations follow those adopted earlier (Godfrey, 1972).

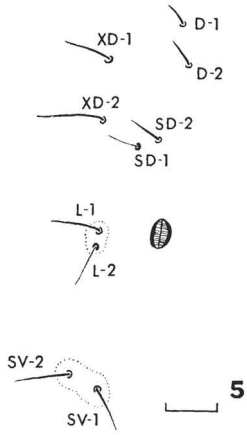
General. Head 3.0–3.2 mm wide. Total length 38–43 mm. Abdominal prolegs present on third through sixth segments. Head and body smooth. Dorsal abdominal setae simple; setal insertions minute. Dorsal setae on seventh and eighth abdominal segments 0.75–0.88 times height of seventh abdominal spiracle.

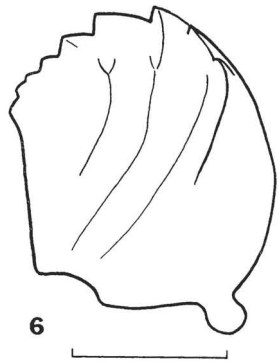
Head (Fig. 1). Epicranial suture 0.51 times height of frons. Distance from frontal seta (F-1) to frontoclypeal suture 0.33 times distance between F-1's. Anterior setae (A 1–3) forming slightly less than 90° angle. Adfrontal puncture (AFa) anterior and second adfrontal seta (AF-2) posterior to apex of frons. First posterior setae (P-1's) slightly anterior to apex of frons. Lateral setae (L's) transversely anterior to AFa's. Ocellar interspaces between Oc-1–Oc-2 0.50 times that of Oc-2–Oc-3; Oc-2–Oc-3 4.0 times that of Oc-3–Oc-4.

Mouthparts. Oral surface of labrum unspined. Hypopharyngeal complex (Fig. 2): spinneret with distal lip bearing long fringes, short, not surpassing first segment of labial palpus (Lps-1); stipular seta (S) about 0.25 length of Lps-1, twice length of seta (Lp-1) borne by Lps-1 and second segment of labial palpus (Lps-2), about 0.33 length of seta (Lp-2) borne by Lps-2; Lp-1 positioned laterad of Lps-2; distal



Figs. 1–4. *Loxagrotis kyune*, Chiricahua Mts., Arizona: **1**. frontal aspect of head capsule; **2**. left aspect of hypopharyngeal complex; **3**. ventral setal arrangement of first abdominal segment; **4**. posterior aspect of tarsal claw.





Figs. 5–6. *Loxagrotis kyune*, Chiricahua Mts., Arizona: **5**. left dorsolateral setal arrangement of prothorax; **6**. oral aspect of left mandible.

region of hypopharynx densely covered with fine spines becoming stouter proximad; proximomedial region without spines; proximolateral region bearing single row of about 15 distinct spines. Mandible (Fig. 6): inner ridges distinct; no inner tooth; outer teeth 1–5 forming distinct angles; sixth outer tooth low, divided into smaller subteeth.

Thoracic segments. Segment T-1: seta D-2 posterior of line formed by D-1 and XD-2 (Fig. 5); major axis of prothoracic spiracle passing through base of D-2 and distinctly posterior of subventral setae (SV 1–2); SD-1 transversely anterior of D-1 and D-2. Lateral setae (L 1–2) and SV 1–2 enclosed by pinacula. Segments T 2–3: seta L-1 located above and slightly posterior of L-2. Tarsal claw (Fig. 4) with reduced basal angle; tarsal setae simple, tapering distad.

Abdominal segments. Ab-1 (Fig. 3): only two subventral setae (SV-1, SV-3) present; SV-1 laterad of line formed by setae V and SV-3. Ab-2–6: three subventral setae present. Ab-8: only one seta in each subventral group. Ab-9: seta SD-1 much finer than setae D 1–2. Anal and subanal setae subequal to lateral setae on anal proleg. Crochets: uniordinal, 18–22 per third abdominal proleg, 22–26 per fourth, 24–28 per fifth, 25–32 per sixth.

Coloration. Head pale brown with darker brown freckles. General body color brownish green. Middorsal and subdorsal lines, thin, whitish. Subdorsal area dark olive green with thin white line passing length of body. Lateral area diffusley white with indistinct brown center stripe, passing to tip of anal proleg. Spiracles black.

Material examined. 10 specimens, Onion Saddle, 7600 ft., Chiricahua Mountains, Cochise County, Arizona, July–August 1967, from ova of female collected and determined by J. G. Franclemont, reared by G. L. Godfrey. Hypopharyngeal complex on slide G-0203.

ACKNOWLEDGMENTS

This research was supported by USDA AGR RMA Grant No. 12-14-100-8031 (33) awarded to Dr. John G. Franclemont of Cornell University. I thank Dr. Franclemont for his assistance. Additional funds and facilities

were supplied by the Illinois Natural History Survey, the Illinois Agricultural Experiment Station, and the Office of International Agriculture, College of Agriculture, University of Illinois, Urbana.

LITERATURE CITED

BARNES, W. 1904. New species of North American Lepidoptera. Can. Entomol. 36: 165–173.

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 p.

METHODS FOR EXTERNALLY SEXING MATURE LARVAE AND PUPAE OF *LIMENITIS* (NYMPHALIDAE)

PHILIP J. KEAN AND AUSTIN P. PLATT

Department of Biological Sciences, University of Maryland Baltimore County, Catonsville, Maryland 21228

Little published information exists regarding accurate methods for sexing the larvae and pupae of butterflies. It is well-known, however, that larger larvae and pupae within a brood generally develop into females, whereas, the smaller ones usually turn out to be males. In addition, the majority of males often will eclose at the beginning of a brood, whereas, the latter portion of the brood will consist almost exclusively of females. Nevertheless, numerous exceptions occur, and such methods cannot be considered to be very accurate.

Among the larger moths (Saturnidae and Sphingidae), morphological differences such as the relative breadth of the pupal antennae and subtle differences in the ventral genital plates of pupae have been used for predicting the sex of the imago (Villiard, 1969), and methods for sexing mature larvae of the tobacco hornworm (*Manduca sexta* Johanssen) are known (W. Bowers, personal communication). Recently, other methods have been reported for sexing both the larvae and pupae of the codling moth, *Laspeyresia pomonella* L. (MacLellan, 1972).

During laboratory hybridization studies on the Nearctic *Limenitis*, which were initiated in 1966 and are still in progress (Platt, 1969; Platt, Frearson & Graves, 1970; Platt & Greenfield, 1971), it became apparent that in inter-specific hybrid crosses, either excessive or complete heterogametic (female) inviability often occurs (Haldane, 1922; Remington,