

Morphological Observation on the Two Species of Hadeninae Larvae in Korea(Lepidoptera: Noctuidae)

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2종의 한국산 줄무늬밤나방아과 幼蟲에 대한 形態的 觀察

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ABSTRACT

The last-instar larval external morphologies of *Orthosia carnipennis* (Butler) and *Pseudaletia separata* (Walker) of Hadeninae (Noctuidae) were observed.

key words: larval Morphology, Hadeninae, Noctuidae, Lepidoptera, Korea

요 약

줄무늬밤나방아과의 한일무늬밤나방(*Orthosia carnipennis*)과 멸강나방(*Pseudaletia separata*)
老熟幼蟲의 形態的 특징을 觀察하였다.

INTRODUCTION

The family Noctuidae is large and widely distributed in Korea nearly 1,000 species have been described from adult specimens, but larvae are known for only a few species. The Noctuidae larvae is mostly important pests of agriculture and forestry. Many of the documented larvae are so poorly understood that redescriptions, more host plant data, and direct, field behavioral observations are needed.

The last-instar larva of *Pseudaletia*

separata (Haw.) was diagnosed by Crumb (1956). The color pattern and majority chaetotaxy of *Orthosia carnipennis* have been only briefly described by Issiki (1965). Abbreviated description of late stage larvae have been given for *Orthosia hibisci* (Guenée), *Pseudaletia unipuncta* (Haworth) and others 12 species of Hadeninae by Godfrey (1987). We here provide detailed descriptions and illustrations of the larvae of *Orthosia carnipennis* (Butler) and *Pseudaletia separata* (Walker).

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MATERIALS AND METHODS

The morphological features of the body of matures larvae in alcohol were examined.

Then, they were macerated in 10% KOH for several minutes and dissected under stereoscopic microscope (40×). The head capsule with attached mouthparts was first removed from the body by a cut made with a fine forceps around the edges of the occipital foramen. The maxillae and labium as a unit were removed from the head capsule. The head was sketched under this condition from dorsal and ventral sides. Then the mandibles with attached tendons were removed from the head capsule. Mouthparts and skins were mounted on microscopic slides for detailed

examinations (100× or 150×).

The nomenclature of larvae setae and puncture follows Hinton (1946), and the terminology of labrum, maxillary lobe, and palpi follows Heinrich (1916), Grimes and Neunzig (1986a,b).

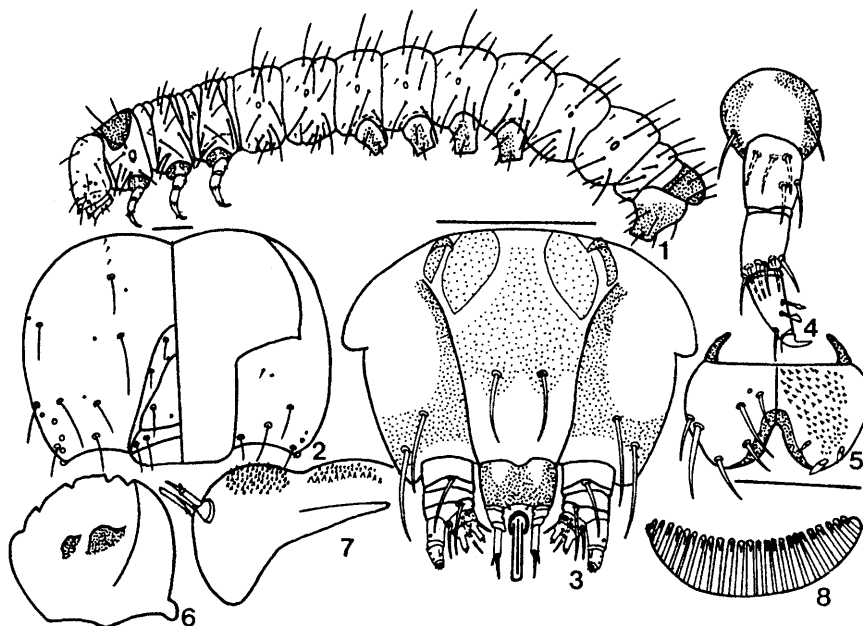
DESCRIPTION OF LARVAE

Genus Orthosia Ochsenheimer, 1816

Orthosia carnipennis (Butler) (Figs. 1~8)

한일무늬밤나방 (Figs. 1~8)

Body stout and blackish gray, with small and black freckles on each segment, and with two large black spots in the subdorsal line and superaspicricle line view, mid-dorsal line, lateral line, spiracle line, subspiracle lines distinctly



Figs. 1-8. *Orthosia carnipennis* (Butler)

1. larva; 2. head(dorsal and ventral view); 3. maxillae and labium;
4. thoracic leg; 5. labrum and epipharynx; 6. mandible(ventral view); 7. hypopharynx; 8. crochets of A3-6. scales : 0.5mm

grayish white, ventral gray; head reddish brown with small rugose; thoracic shield and anal shield black; thoracic legs reddish brown; prolegs and anal legs light brown with black marking in lateral view; spiracles light brown with black peritremes.

Head. Ocelli I~IV placed in a semi-circle. The distance from epicranial notch to apex of ecdysial lines greater than the distance from apex of ecdysial lines to apex of frontal sutures; the front extends about half of the distance to epicranial notch. A1, A2 and A3 forming a right angle at A2.

Mouthparts. Labrum emargination two-fifth deep, forming a U-shape; M2 lateroventral to M1; L1 and L2 closely approximate, L1 slightly laterodorsal to L2. Epipharynx with small spines. Mandible with six apical teeth on cutting edge, the first and second teeth somewhat sharpe, others apical blunt; inner surface with two internal teeth. Labium having membranous postmentum with two conspicuous setae, a dark pigmentation around them; mentum sclerotized and dark brown; prementum with median spinneret distally and labial palpi laterally; the spinneret moderately long, apical rounded, about 5 times as long as median breadth and almost equal to tip of seta on apical segment of labial palpi. Maxillae: Cardo mostly membranous, with hook-like sclerites basally; stipes mostly membranous, with large black sclerites and two setae; palpifer sclerotized, with one seta. Palpus: basal segment with one seta and a maxillary lobe, on the lobe with three sensilla trichodea, two sensilla styloconica, and one sensilla basiconica

and one puncture; median segment slightly longer than apical segment and with one puncture; apical segment with eight sensilla basiconica distally. Distal region of hypopharynx with scattered spines, and proximolateral region with spines and with twelve flat acute triangular projections row.

Thorax. T1: XD1 and XD2 positioned near anterior margin and D1 and D2 close to posterior margin of shield, D1 slightly closer to XD1 than to D2, SD1 and SD2 are very close together and not on the shield, SD1 usually thinner than SD2; L2 usually thinner than L1; SV1 and SV2 present above leg. T2 and T3: D1, D2 and SD2 insertions approximate a straight line; SD1 usually hair like, situated below from SD2; L1, L2 and L3 present; SV group unisetose. Thoracic leg: coxa with seven setae; femur with two setae; tibia with six setae and one puncture; tarsus with four setae (thick, lanceolate, spatulate, narrow in shape).

Abdomen: On A1-8, D1 distinctly anterodorsal to D2; secondary seta MD1 present; SD1 dorsal to spiracle, SD2 very small and anterodorsal to spiracle; L1 directly caudad of spiracle in A1, slightly or distinctly posteroventral to spiracle in A2-8; L2 straight below spiracle; L3 posteroventral to L2 in A1-6 and A8, straight below from L2 in A7. On A9, D1 equidistant from D2 and SD1, L group unisetose. Anal shield rounded posteriorly; anal legs with nine setae and one puncture. SV group on abdominal segments 1, 2, 7, 8 and 9 usually 2: 3: 1: 1: 1. Prolegs on A3-6 and A10, A5 and A6 prolegs subequal, may decrease in size cephalad, the crochets uniordinal,

arranged in homoideous mesoserries. All spiracles oval, those on T1 and A8 of about the same size, two times as long as others spiracles.

Larva length: 40 mm; Head width: 4.8 mm.

Materials examined: Mature larvae collected from leaves of *Quercus aliena* Bl. at the Experiment Forest of Kangwon National University, Chunchon City, Kangwon Do, 11. IV. 1997.

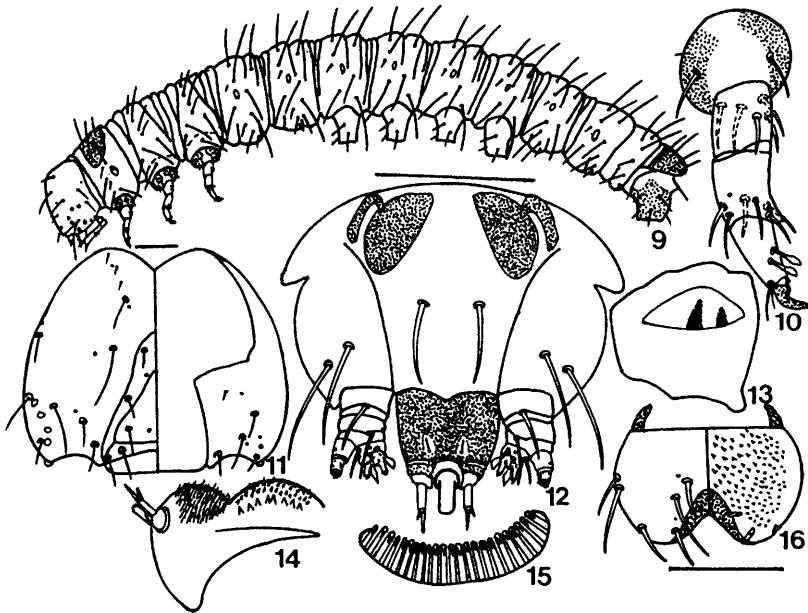
This species may be characterized by the dark pigmentation around two postmentum setae of labium, spinneret apical rounded and almost equal to tip of seta on apical segment of labial palpi; mandible with six apical teeth, inner surface with two internal teeth; thoracic legs with spatulate and lanceolate ventral

setae near claw; proximolateral region of hypopharynx with spines and bearing twelve flat acute triangular projections row.

Genus *Pseudaletia* Franclemont, 1951
***Pseudaletia separata* (Walker) (Figs. 9~16)**

벌장나방 (Figs. 9~16)

Body brownish with varying degrees of blackish mottling and white freckles; mid-dorsal, subdorsal and superaspicricle line thin and white; lateral area divided into dark brown dorsal stripe and violet gray ventral stripe; head yellowish brown with dark brown coronal stripes and brown reticulations; thoracic shield and anal shield dark brown; thoracic legs



Figs. 9-16. *Pseudaletia separata* (Walker)
 9. larva; 10. thoracic leg; 11. head(dorsal and ventral view);
 12. maxillae and labium; 13. mandible(ventral view); 14.
 hypopharynx; 15. crochest of A3-6; 16. labrum and epipharynx.
 scales : 0.5mm

light brown; spiracles dark brown with black peritremes.

Head. Ocelli I~IV always semi-circle. The distance from epicranial notch to apex of ecdysial lines greater than the distance from apex of ecdysial lines to apex frontal sutures; the front extends about half of the distance to epicranial notch. A1, A2 and A3 forming an obtuse angle at A2.

Mouthparts. Labrum emargination one-fourth deep, forming almost right angle; M2 lateroventral to M1; L1 and L2 closely approximate, L1 slightly laterodorsal to L2. Epipharynx with small spines. Mandible with rather weak distal teeth on cutting edge; inner surface with large internal plate-like ridge. Labium having membranous postmentum with two conspicuous setae; mentum sclerotized and dark brown; prementum with median spinneret distally and labial palpi laterally; distal lip of the spinneret entire, tube-shaped, about 2 times as long as median breadth and shorter than tip of seta on apical segment of labial palpi. Maxillae: Cardo mostly membranous with hook-like sclerites basally; stipes mostly membranous, with two setae; palpifer sclerotized, with one seta. Palpus: basal segment with one seta and a maxillary lobe, on the lobe with three sensilla trichodea (spatulate, lanceolate, bristlelike in shape), two sensilla styloconica, and three sensilla basiconica; median segment subequal to apical segment and with one puncture; apical segment with eight sensilla basiconica distally. Distal region of hypopharynx with thin spines forming dense brush and separated from proximal

region, medial transverse cleft deep, proximolateral region with eight flat acute triangular projections row.

Thorax. T1: XD1 and XD2 positioned near anterior margin and D1 and D2 close to posterior margin of shield; D1 closer to D2 than to XD1; SD1 and SD2 are very close together and not on the shield, SD1 usually thinner than SD2; L2 usually thinner than L1; SV1 and SV2 present above leg. T2 and T3: D1, D2 and SD2 insertions approximate a straight line, SD1 usually hair like, situated below from SD2; L1, L2 and L3 present; SV group unisetose. Thoracic leg: coxa with seven setae; femur with two setae; tibia with six setae and one puncture; tarsus with four setae (thick, lanceolate, spatulate, narrow in shape).

Abdomen. On A1-8, D1 distinctly anterodorsal to D2, SD1 dorsal to spiracle in A1 and A8, anterodorsal to spiracle in A2-7; SD2 anterodorsal to spiracle; L1 directly caudad of spiracle in A1 and A8, slightly posteroventral to spiracle in A2-7; L2 anteroventral to spiracle in A1-6 and A8, straight below from spiracle in A7; L3 posteroventral to L2 in A1-6 and A8, straight below from L1 in A7. On A9, D1 equidistant from D2 and SD1; L group unisetose. Anal shield rounded posteriorly, anal legs with nine setae and one puncture. SV group on abdominal segments 1, 2, 7, 8 and 9 usually 2: 3: 1: 1: 1. Prolegs on A3-6 and A10, A3-6 prolegs subequal, the crochets uniordinal, arranged in homoideous mesoserries. All spiracles oval, those on T1 and A8 of about the same size, and larger than others.

Larva length: 35 mm; Head width: 3.2mm.

Materials examined: Mature larvae collected from leaves of *Zoysia japonica* Steud at the Forest Research Institute Kangwon Province, Chunchon City, Kangwon Do, 11. VI. 1997 (25. V. 1998).

This species may be separable from relatives by the distal lip of the spinneret entire, tube-shape, and shorter than tip of seta on apical segment on labial palpi; maxillary lobe with spatulate and lanceolate sensilla trichodea; distal region of hypopharynx with thin spines forming dense brush and separated from proximal region, medial transverse cleft is deep, proximolateral region with eight flat acute triangular projections row; thoracic legs with spatulate and lanceolate ventral setae.

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