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# Last-instar larval description of two species of Thyatiridae from Korea (Lepidoptera)

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**Abstract:** The last-instar larval external morphologies of *Thyatira batis* (Linnaeus) and *Kurama mirabilis* (Butler) of Thyatiridae are described and illustrated. All specimens are deposited in the Insect Collection of Department of Forest Resources Protection, Kangwon National University, Korea. [En, 2 fig. 6 ref.]

**Key words:** entomology; larval description; Thyatiridae; Lepidoptera; Korea

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The Thyatiridae includes 15 species in Korea<sup>[1]</sup> and many are agriculture and forestry pests.

The 110 prolegs of Thyatiridae larvae are little, and have two SV setae on T1, T2 and T3. All setae "normal" in position except for L3, which is quite anterior to SV4, and with two extra setae, there are also two extra setae dorsocaudally from the SV setae on T2 and T3; SD1 and SD2 are not included on the T1 shield.

The larva color and only major features of *Thyatira batis*, *Kurama mirabilis* and other species were briefly described by Issiki (1965)<sup>[2]</sup>. This paper provides detailed descriptions and illustrations of the last-instar larvae of *Thyatira batis* (Linnaeus) and *Kurama mirabilis* (Butler).

## 1 Materials and Methods

The morphological features of the body of mature 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)<sup>[3]</sup>, and the terminology of labrum, maxillary lobe, and palpi follows Heinrich (1916)<sup>[4]</sup>, Grimes and Neunzig (1986a, b)<sup>[5,6]</sup>

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## 2 Description

### 2.1 *Thyatira batis* (Linnaeus)

Body usually brown to blackish brown, prothoracic subdorsal area with one tubercle, mesothoracic dorsal area with a pair of small knobs, on the dorsal from second to seventh abdominal segments with somewhat tubers, the spiracle posteroventral of seventh and eighth abdominal segments with one tuber laterally on each side, on the first abdominal segment with distinct small V-shape black patch; head with brown and small granules on dorsal and lateral area; head apex having a pair of knobs with seta P2; thoracic shield indistinct; anal shield brown and anterodorsal margin having a pair of tubers with seta D1; spiracles blackish brown with black peritremes.

Head: wider than long; ocellar area darker pigmented. The adfrontal apex midway between apex of front and vertical triangle; the front extends about half of the distance to vertical triangle.

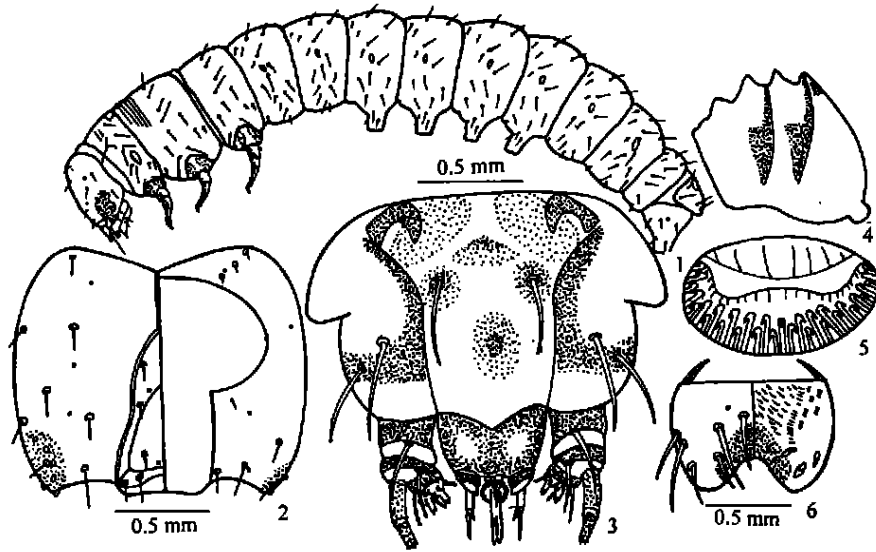


Figure 1 *Thyatira batis* (Linnaeus)

1. larva; 2. head (dorsal and ventral view); 3. maxillae and labium;  
4. mandible (ventral view); 5. crochets of A3-6; 6. labum and epipharynx

Mouthparts: labrum emargination one-third deep, forming a semi-circle; M2 lateroventral to M1; L1 and L2 closely approximate, L1 slightly laterodorsal to L2. Epipharynx with small spines. Mandible with five apical teeth on cutting edge; inner surface with two distinct internal teeth. Labium having membranous postmentum with two conspicuous setae, a dark pigmentation around them; mentum sclerotized and black; prementum with median spinneret distally and labial palpi laterally; spinneret apical bifid, about 4 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 dark sclerite and two setae; palpifer sclerotized with one seta; palpus: basal segment with a maxillary lobe and one seta; on the lobe with two sensilla styloconica, three sensilla trichodea, and three sensilla basiconica; median segment 2 times as long as apical segment and with a puncture; apical segment with eight small sensilla basiconica distally.

Thorax: T1 D1 closer to D2 than XD1; SD1 and SD2 anterodorsal to the spiracle, SD1 thinner than SD2; Lgroup bisetose and L2 thinner than L1; the spiracle posteroventral with two subprimary setae; SV group bisetose. T2 and T3; D1, D2 and SD2 lying in a straight vertical line; SD1 anteroventral to SD2 and hair-like; below L group with two subprimary setae; 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 small setae.

Abdomen: on A1-8, D1 distinctly anterodorsal to D2 and slightly shorter than D2; SD1 dorsal to spiracle in A1-2 and A7-8, anterodorsal to spiracle in A3-6, SD1 anterodorsal with two extra setae; SD2 anterodorsal to spiracle in A1-7, anterior to spiracle in A8; spiracle lateral or lateroventral with one extra seta, SV 4 seta laterodorsal

with one extra seta; L3 quite anterior to SV4. On A9, D1 directly anterior to D2; L group bisetose. Anal shield rounded posteriorly, anal leg with nine setae and one puncture. SV group of abdominal segments 1, 2, 7, 8 and 9 usually 3:3:2:2:1. The crochets on A3-6 and A10 biordinal; homoideous mesoseries. All spiracles oval, those on T1 and A8 of about the same size, larger than the others.

Larva length: 35 mm. Head width: 1.6 mm.

Materials examined: mature larvae collected from leaves of *Fragaria ananassa* Duchesne at Experiment Forest of Kangwon National University, Chunchon City, Kangwon Do, 1998-07-22.

This species may be characterized by the thoracic and anal shield having tubercles with setae XD1 and D2 respectively; mandible with five apical teeth and two internal teeth; the dark pigmentation around two postmentum setae of labium; spinneret apically bilobed, parallel sided, and equal to labial palpi; labral emargination forming a semi-circle.

## 2.2 *Kurama mirabilis* (Butler)

On the body, dorsal area and spiracle line yellow, from spiracle line to subdorsal area bluish gray widely, the subdorsal area bearing two circle black spots, those anterior with one black spot, and on the two spots arise setae D1 and D2, the superaspiracle line with three black spots on the thorax, two black spots on the A1-2, one black spot on the other abdominal segment, and arise seta SD1; head brown with dark brown and small granulous; thoracic shield brown; anal shield pale brown; thoracic legs yellowish brown with brown claws; spiracles yellowish brown with brown peritremes.

Head: wider than long; ocellar area black pigmented. The adfrontal sutures midway between vertical triangle and apex of frontal sutures; the front extends about two-fifths of the distance to vertical triangle. A1, A2 and A3 forming an obtuse angle at A2.

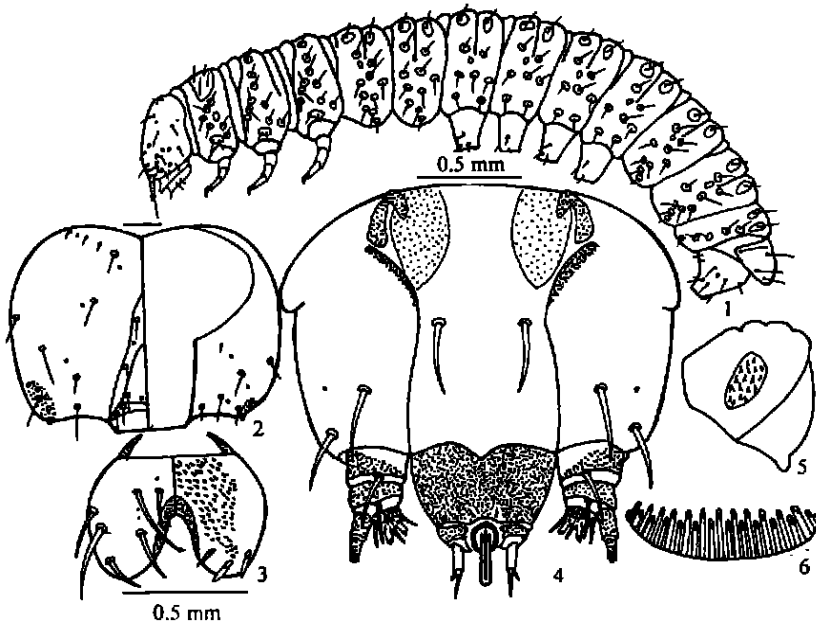


Figure 2 *Kurama mirabilis* (Butler)

1. larva; 2. head (dorsal and ventral view); 3. labrum and epipharynx;
4. maxillae and labium; 5. mandible (ventral view); 6. crochets of A3-6

Mouthparts: labrum emargination about half deep, forming a U-shape; M2 directly lateral to M1; L1 laterodorsal to L2. Epipharynx with small spines. Mandible with four apical teeth on cutting edge, each tooth apically somewhat rounded; inner surface with a large internal tooth, on distal surface with flat acute projections. Labium having membranous postmentum with two conspicuous setae; mentum sclerotized and black; prementum with spinneret distally and labial palpi laterally; spinneret apically rounded, about 3~4 times as long as median breadth and shorter than tip of setae on apical segment on labial palpi. Maxillae: cardo having membranous with hook-like

sclerites basally; stipes mostly membranous and with two setae; palpifer sclerotized and with one seta. Palpus: basal segment with a lobe and one setae, on the lobe with two sensilla styloconica, three sensilla trichodea, and three sensilla basiconica and one puncture; median segment longer than apical segment and with one puncture; apical segment with eight small sensilla basiconica distally.

Thorax: T1·D1 equidistant from D2 and XD1; SD1 and SD2 close approximate, anterodorsal to spiracle; L group bisetose; the spiracle below with two subprimary setae; SV group bisetose. T2 and T3·D1, D2 and SD2 lying in a straight vertical line; SD1 anteroventral to SD2 and hair like; three L group posteroventral area with two subprimary setae; SV group bisetose. Thoracic leg: coxa with seven setae; femur with two setae; tibia with six setae; tarsus with four setae (one narrow, others thick).

Abdomen: on A1-8, D1 slightly dorsal to D2; SD1 dorsal to spiracle in A1 and A-8, anterodorsal to spiracle in A2-6; spiracle posterolateral or posterior with one subprimary seta; L1, L2 and L3 present; L3 quite anterior to SV4; SV4 laterodorsal with one extra seta. On A9, D1 anterior to D2; L group bisetose; between L and SV with one extra seta. Anal shield rounded posteriorly, anal legs with nine setae and one puncture. SV group on abdominal segments 1, 2, 7, 8 and 9 usually 3:3:2:2:1. The crochets of A3-6 and A10 biordinal, homoideous mesoseries, anal prolegs smaller than other prolegs. All spiracles elongate oval, those on T1 and A8 about the same size, larger than the others.

Larva length: 35 mm. Head width: 3.7 mm.

Materials examined: mature larvae collected from leaves of *Quercus aliena* at Experiment Forest of Kangwon National University, Chunchon City, Kangwon Do, 1997-05-31.

This species is characterized by SD1 and SD2 pinacula separate and not on T1 shield; spinneret apical rounded and shorter than labial palpi; labral emargination about half deep, forming a U-shape; mandible with four apical teeth, each tooth apically rounded, and having a large internal tooth with flat acute projections on the distal surface.

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## 韩国 2 种波纹蛾科幼虫形态记述 (鳞翅目)

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**摘要:** 波纹蛾科是一个较小的科, 隶属于鳞翅目。在韩国已记述的波纹蛾科成虫有 15 种, 大多数是农林害虫。幼虫刚毛微小, 长在小乳突上; 头甚宽; 腹足退化; 小至中型; 折叶或卷叶成巢。记述了韩国波纹蛾科重要害虫 *Thyatira batis* (Linnaeus) 和 *Kurama mirabilis* (Butler) 老熟幼虫的形态特征, 并提供了形态特征图。所有标本均保存在韩国江原大学森林资源保护学科昆虫标本室。图 2 参 6

**关键词:** 昆虫学; 幼虫形态; 波纹蛾科; 鳞翅目; 韩国