

## Descriptions of three species larvae of genus *Diaphania* (Lepidoptera, Pyralidae, Pyraustinae) from China

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**Abstract:** The last-instar larval external morphologies of *Diaphania pyloalis* (Walker), *Diaphania indica* (Saunders) and *Diaphania perspectalis* (Walker) are described and illustrated. All specimens examined are deposited in the larva Collection of Department of Plant Protection, Zhejiang University, China. [En, 3 fig. 6 fig.]

**Key words:** entomology; larval description; *Diaphania*; Pyralidae; Lepidoptera; China

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## 中国绢野螟属 3 种幼虫记述(鳞翅目螟蛾科野螟亚科)

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**摘要:** 详细记述了中国绢野螟属 *Diaphania* 桑绢野螟 *D. pyloalis* (Walker), 瓜绢野螟 *D. indica* (Saunders) 和黄杨绢野螟 *D. perspectalis* (Walker) 幼虫的形态特征, 并提供了形态特征图。所有标本均保存在浙江大学植物保护系幼虫标本室。图 3 参 6

**关键词:** 昆虫学; 幼虫形态; 绢野螟属; 螟蛾科; 鳞翅目; 中国

Genus *Diaphania*, belongs to Pyraustinae, has a great deal of species, destroys plants badly and is distributed widely. Generally, the larvae in *Diaphania* curl up the leaves of crops and trees, and are buried alive among leaves. Harmed by the larvae, the leaves become yellow and curled, or only veins and leafstalks are left. Issiki (1969)<sup>[1]</sup> briefly described color pattern and chaetotaxy of *Diaphania perspectalis* (Walker) and others pyralid larvae. Neunzig (1987)<sup>[2]</sup> published the larval morphology of *Diaphania hyalinata* (L.), *Diaphania nitidalis* (Stoll) and 13 other species of Pyraustinae. This paper provides detailed descriptions and illustrations of larvae of *Diaphania pyloalis* (Walker), *Diaphania indica* (Saunders) and *Diaphania perspectalis* (Walker).

### 1 Materials and Methods

The collected larvae were reared to last-instar for morphological examination. About 1/3 of the last-instar larvae were preserved in 70% alcohol, and the left were reared with host plant to obtain associated adults.

The morphological features of the body of mature larvae in alcohol were examined. They were macerated

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in  $100\text{ g} \cdot \text{kg}^{-1}$  KOH for several minutes and dissected under stereoscopic microscope ( $40\times$ ).

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 ( $100\times$  or  $150\times$ ).

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>, and Grimes and Neunzig (1986a, b)<sup>[5,6]</sup>.

## 2 Description

### 2.1 *Diaphania pyloalis* (Walker) (Figure 1)

Body usually yellow; head and thoracic shield yellowish brown; anal shield yellow; thoracic legs yellow, claws pale brown; dorsal pinacula large and blackish brown; spiracles yellow with brown peritremes.

**Head:** The adfrontal suture not reaching epicranial notch, the distance from vertical triangle to apex of adfrontal sutures about one of three the distance from apex of adfrontal sutures to apex of frontal sutures, the frons extends two-third of the distance to the vertical triangle. A1, A2 and A3 forming an obtuse angle at A2.

**Mouthparts:** Labrum emargination about two-ninths deep, forming an obtuse angle; M2 laterodorsal to M1; L1 and L2 closely approximate, L1 directly lateral to L2. Epipharynx with small spines. Mandible with five apical teeth on cutting edge. Labium having membranous postmentum, with two conspicuous setae; mentum sclerotized; prementum with median spinneret distally and labial palpi laterally; spinneret rounded apically, about 6 times as long as median breadth, and longer than tip of seta on apical segment of labial palpi. Maxillae: cardo mostly membranous, with hook-like sclerites basally; stipes with two setae; palpifer sclerotized and with one seta; palpus: basal segment with a maxillary lobe and one seta, on the lobe with two sensilla styloconica, three sensilla trichodea, three sensilla basiconica and one puncture; median segment subequal to apical segment and with one puncture; apical segment with eight small sensilla basiconica distally.

**Thorax:** T1: D1 closer to D2 than to XD1; XD2, SD1 and SD2 forming an obtuse angle at SD1; L group bisetose; SV1 and SV2 present above leg. T2 and T3: D1 and D2, SD2 and SD1 on the same pinaculum, respectively; 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 – A8, D1 anterodorsal to D2; SD1 dorsal to spiracle; L1 and L2 adjacent and ventral to spiracle, L3 lateroventral to L1 – L2. On A9, D2 pinaculum separate from dorsum; SD1 posteroventral to D1; L1 group unisetose. Anal shield rounded posterior; anal legs with nine setae and one puncture. SV group on abdominal segments 1, 2, 7, 8 and 9 usually 2:3:2:1:1. The crochets of A3 – A6 triordinal mesopenellipse. All spiracles oval, those on T1 and A8 of about the same size, larger than the others.

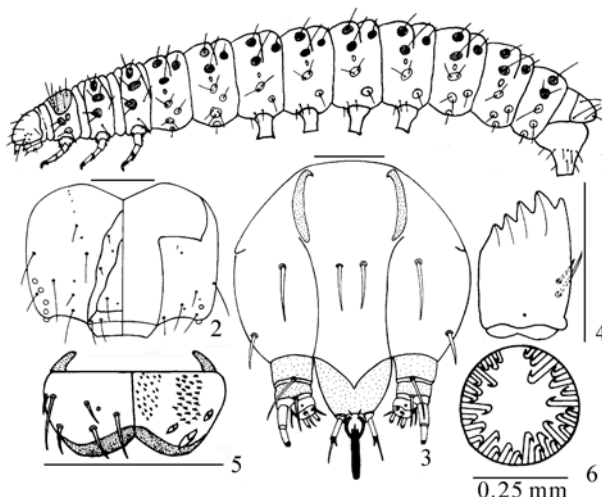


Figure 1 *Diaphania pyloalis* (Walker)

1. larva; 2. head (dorsal and ventral view); 3. maxillae and labium;  
4. mandible (ventral view); 5. labrum and epipharynx; 6. crochets of  
A3 – A6 scales; 0.5 mm

**Larva length:** 18 – 24 mm; **Head width:** 1.4 – 1.8 mm.

**Materials examined:** Mature larvae collected from leaves of *Morus alba* in Hangzhou City, Zhejiang Province, 1985-09-15.

**Number of larvae examined:** 5.

This species is characterized by the labrum emargination forming an obtuse angle, seta L1 and L2 closely approximate, L1 directly lateral to L2; mandible with five apical teeth, inner surface without internal tooth; SV group of abdominal segments 1, 2, 7, 8, and 9 usually 2:3:2:1:1.

## 2.2 *Diaphania indica* (Saunders) (Figure 2)

Body usually pale yellow; head light brown; thoracic shield and anal shield yellow; thoracic legs yellow, claws brown; pinacula indistinct; spiracles yellow with brown peritremes.

**Head:** The adfrontal suture not reaching epicranial notch, the distance from vertical triangle to apex of adfrontal sutures slightly shorter than the distance from apex of adfrontal sutures to apex of frontal sutures, the frons extends three-fourths of the distance to the vertical triangle. A1, A2 and A3 forming an obtuse angle at A2.

**Mouthparts:** Labrum emargination two-sevenths deep, forming a normal arc; M2 laterodorsal to M1; L1 and L2 closely approximate, L1 slightly lateroventral to L2. Epipharynx with small spines. Mandible with six apical teeth on cutting edge, the first tooth small and rounded apically. Labium having membranous postmentum with two conspicuous setae; mentum sclerotized; prementum with the median spinneret distally and the labial palpi laterally; the spinneret apical rounded, about 10 times as long as median breadth, and longer than tip of seta on apical segment of labial palpi. Maxillae: cardo mostly membranous, with hook-like sclerites basally; stipes with two setae. Palpus: basal segment with a maxillary lobe and one seta, on the lobe with three sensilla trichodea, two sensilla styloconica, and two sensilla basiconica and one puncture; median segment subequal to apical segment and with one puncture; apical segment with eight small sensilla basiconica distally.

**Thorax:** T1: D1 closer to D2 than to XD1; XD2, SD1 and SD2 forming an acute angle at SD1; L group and SV group bisetose. T2 and T3: D1 and D2, SD2 and SD1 on the same pinaculum, respectively; L1, L2 and L3 present; SV group unisetose. Thoracic leg: coxa with seven setae; femur with two setae; tibia with six setae; tarsus with four small setae.

**Abdomen:** On A1 – A8, D1 anterodorsal to D2; SD1 dorsal to spiracle; L3 posteroventral to L1 – L2 pinaculum. On A9, D2 pinaculum fused from dorsum; SD1 and D1 on the same pinaculum; L group unisetose. Anal shield rounded posteriorly, anal legs with nine setae and one puncture. SV group of abdominal segments 1, 2, 7, 8, and 9 usually 2:3:2:1:1. Crochets of A3 – A6 triordinal mesopenellipse. All spiracles oval, those on T1 and A8 of about the same size, larger than the others.

**Larva length:** 24 – 26 mm; **Head width:** 1.7 – 2.1 mm.

**Materials examined:** Mature larvae collected from leaves of *Citrullus lanatus* at Hangzhou City, Zhejiang Province, 1985-10-15.

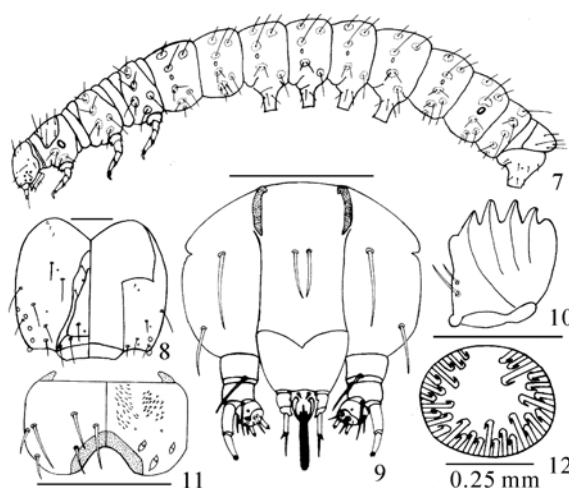


Figure 2 *Diaphania indica* (Saunders)

7. larva; 8. head (dorsal and ventral view); 9. maxillae and labium; 10. mandible (ventral view); 11. labrum and epipharynx; 12. crochets of A3 – A6 scales; 0.5 mm

### Number of larvae examined: 5.

This species is characterized by the labrum emargination forming a normal arc, seta L1 and L2 closely approximate, L1 slightly lateroventral to L2; Mandible with six apical teeth on cutting edge, the first tooth small and rounded apically; SV group of abdominal segments 1, 2, 7, 8, and 9 usually 2:3:2:1:1.

### 2.3 *Diaphania perspectalis* (Walker) (Figure 3)

Body usually green with black stripes; head blackish brown; thoracic shield darker brown; thoracic legs brown; anal shield yellowish brown; pinacula brownish black; spiracles pale brown with dark brown peritremes.

**Head:** The adfrontal suture not reaching epicranial notch, the distance from vertical triangle to apex of adfrontal sutures about half the distance from apex of adfrontal sutures to apex of frontal sutures, the frons extends five-eighths of the distance to the vertical triangle. A1, A2 and A3 forming an obtuse angle at A2.

**Mouthparts:** Labrum emargination about one-fourths deep, forming an almost right angle; M2 laterodorsal to M1; L1 and L2 closely approximate, L1 laterodorsal to L2. Epipharynx with small spines. Mandible with six apical teeth on cutting edge. Labium having membranous postmentum with two conspicuous setae; mentum sclerotized and dark brown; prementum with median spinneret distally and labial palpi laterally; the spinneret apical rounded, about 6 times as long as median breadth, and longer than tip of seta on apical segment of labial palpus. Maxillae: cardo mostly membranous with hook-like sclerite basally; stipes with dark sclerite and two setae; palpifer sclerotized and one seta; palpus: basal segment with one seta and a lobe, on the lobe with three sensilla trichodea, two sensilla styloconica, and three sensilla basiconica; median segment longer than apical segment and with one puncture; apical segment with eight small sensilla basiconica distally.

**Thorax:** T1: D1 closer to D2 than to XD1; XD2, SD1 and SD2 forming an obtuse angle at SD1; L group bisetose; SV1 and SV2 present above leg. T2 and T3: D1 and D2, SD2 and SD1 each on the same pinaculum; L1, L2 and L3 present; SV group unisetose. Thoracic leg: coxa with seven setae, femur with two setae; tibia with six setae; tarsus with four small setae.

**Abdomen:** On A1 – A8, D1 anterodorsal to D2; SD1 dorsal to spiracle; SD2 anterodorsal to spiracle except for A8 (SD2 anterol to spiracle); L1 and L2 on the same pinaculum and ventral to spiracle, L3 lateroventral to L1 – L2. On A9, D2 pinaculum fused from dorsum; SD1 slightly posteroventral to D1; 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 3:3:2:1:1. The crochets of A3 – A6 triordinal, mesopenellipse. All spiracles oval, on T1 and A8 of about the same size, larger than the others.

**Larva length:** 44 – 46 mm; **Head width:** 2.5 – 2.9 mm.

**Materials examined:** Mature larvae collected from leaves of *Buxus microphylla* var. *sinica* in Hangzhou City, Zhejiang Province, 1991-04.

**Number of larvae examined:** 5.

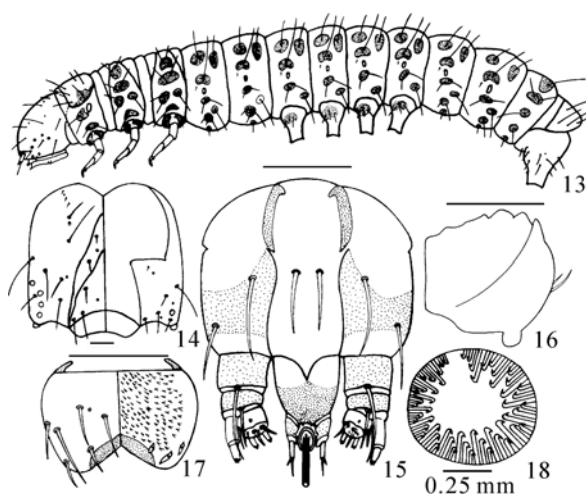


Figure 3 *Diaphania perspectalis* (Walker)

13. larva; 14. head (dorsal and ventral view); 15. maxillae and labium; 16. mandible (ventral view); 17. labrum and epipharynx; 18. crochets of A3 – A6 scales; 0.5 mm

This species is characterized by the labrum emargination forming an almost right angle, L1 and L2 closely approximate, L1 laterodorsal to L2; Mandible with six apical teeth on cutting edge; SV group on abdominal segments 1, 2, 7, 8 and 9 usually 3:3:2:1:1.

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## 方伟教授获“2007 年度浙江省有突出贡献中青年专家”称号

2007 年 11 月 6 日，浙江省人民政府关于表彰 2007 年度浙江省有突出贡献中青年专家的决定下发，浙江林学院方伟教授被浙江省人民政府授予“2007 年度浙江省有突出贡献中青年专家”称号。

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