

# DESCRIPTION OF LAST-INSTAR LARVAE OF 31 SPECIES OF TAIWAN SPILOMELINI (LEPIDOPTERA: PYRALIDAE: PYRAUSTINAE)

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**ABSTRACT**—The last-instar larvae of 31 species of Spilomelini are described and illustrated in this work. Diagnostic characters are provided, as well as a key included for Taiwan species.

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**KEY WORDS:** Pyralidae, Pyraustinae, Spilomelini, Larvae, Host plant, Parasite.

## INTRODUCTION

The Pyralidae is a large family containing 16 subfamilies. Pyraustinae is the largest among the subfamilies. The subfamily includes two tribes, i.e., the Pyraustini and the Spilomelini. The Spilomelini is currently represented by 217 species included in 87 genera in Taiwan (Yamanaka & Yoshiyasu, 1992).

The feeding habits of the larvae are diverse, the larvae of Spilomelini are leaf-webbers, leaf-tiers, leaf-folders, leaf-rollers, or stem-borers of many native and cultivated plants, particularly monocotyledons.

Fully-grown Spilomelini larvae are small to medium sized, 10 to 35 mm in length. Many species are more or less uniform in color (shades of green, yellow, brown, white, etc.). Whereas others are spotted due to conspicuous pimented pinacula the base of most primary setae. Last-instar larvae of Spilomelini always possess the following characteristics, i.e., 2 lateral (L1, L2) setae on prothorax (T1), 1 subventral (SV1) seta on mesothorax (T2) and metathorax (T3), lateral setae (L1, L2) adjacent on abdominal segments 1(A1) to 8(A8), 1 lateral seta(L1) on segment 9(A9), and ventral setae(V1-V1) farther apart on segment 10(A10) than 9(A9) (Allyson, 1984).

No comprehensive work on the larvae of this tribe has been performed for Taiwan; isolated

descriptions of only a few species exist in previous literature and are given in the text under the species descriptions. In this work, the last-instar larvae of 31 species of Spilomelini are described and illustrated. The small number of species treat the lack of reared material associated with known adult moths in Taiwan larval collections. The present work, however incomplete, should be regarded as prelude to further study.

## MATERIALS AND METHODS

All insects included in the study were collected as adults or larvae from host plants. Field observations of feeding damage were made at the same time and photographs were taken in the field or upon returning to the laboratory. A small sample of larvae for various stage was placed in hot water and later transferred to 75% of ETOH. The remaining larvae were reared to obtain the latter stage of larvae, pupae and adults for descriptions. The adults were collected alive by using Fluorescence light or Black light. Females were put in the transparent vial for oviposition. After hatching, larvae were transferred to the transparent box and are reared with host plants.

Once pupation was initiated by a few individuals in a sample of larvae being reared, last stage larvae and pupae were then fixed in KAAD, and transferred to 75% ETOH. The remaining larvae

were left to pupate and transferred to transparent containers which allowed the emerging adults to be easily observed. Most adults were killed and spread after emergence.

In this work, descriptions are based on last-instar larvae. The terminology follows as used by Allyson (1981). Color descriptions of the larvae are based primarily in freshly fixed and preserved specimens. Measurements are taken of preserved specimens.

The length of the larval body (TL) is from the distal margin of the labrum to the anal prolegs. Widths of the larval head capsule (HW), larval body (1st abdominal segment) (BW) are at the widest points. The sequence of genera and species is that adopted in the Check List of Lepidoptera of Taiwan by Heppner & Inoue (1992).

## RESULTS

### I. Key to Species of Larval Spilomelini

1. SV group bisetose on A1.....2  
SV group trisetose on A1.....25
2. SD1 pinaculum reduced on A2 and A7...3  
SD1 pinaculum not reduced on A2 and A7.....10
3. D1-D2 and SD2-SD1 pinacula touching on T2 and T3.....4  
D1-D2 and SD2-SD1 pinacula not touching on T2 and T3.....5
4. D1 pinacula pigmented on dorsum of A1 to A8.....*Glyphodes actorionalis* Walker  
D1 pinaculum not pigmented on dorsum of A1 to A8...*Sisyrophora pfeifferae* Lederer
5. L1 pinaculum enclosing spiracle on T1.....  
.....*Cnaphalocrocis medinalis* (Guenée)  
L1 pinaculum not enclosing spiracle on T1.....6
6. Head with posterior angle of frons two-thirds of distance to occipital foramen.....  
.....*Botyodes caldusalis* (Walker)  
Head with posterior angle of frons half of distance to occipital foramen.....7
7. D1-D2 and SD2-SD1 pinacula pigmented on T2 and T3.....8  
D1-D2 and SD2-SD1 pinacula not pigmented on T2 and T3.....9
8. Thoracic shield lightly pigmented.....  
.....*Aripara cribrata* (Fabricius)  
Thoracic shield heavily pigmented.....
- .....*Pleuroptya punctimarginalis* (Hampson)
9. Pinacula conspicuous with marginal shades .....*Haritalodes derogatus* (Fabricius)  
Pinacula not conspicuous without marginal shades.....*Pleuroptya ruralis* (Scopoli)
10. D2-D2 and SD2-SD1 pinacula touching on T2 and T3.....*Nevrina procopia* (Stoll)  
D2-D3 and SD2-SD1 pinacula not touching on T2 and T3.....11
11. L1 pinaculum enclosing spiracle on T1.....  
.....*Omphisa anastomosalis* (Guenée)  
L1 pinaculum not enclosing spiracle on T1.....12
12. D1 pinacula fused on dorsum of A1 to A8.....13  
D1 pinacula not fused on dorsum of A1 to A8.....14
13. Head with posterior angle of frons two-thirds of distance to occipital foramen.....  
.....*Marasmia suspicalis* (Walker)  
Head with posterior angle of frons less than half of distance to occipital foramen.....  
.....*Marasmia limbalis* Wileman
14. D1 seta dorsal to D2 on T2 and T3.....15  
D1 seta posterodorsal to D2 on T2 and T3.....18
15. SD2 seta dorsal to SD1 on T2 and T3...16  
SD2 seta posterodorsal to SD1 on T2 and T3.....17
16. D1-D2 pinaculum on T2 and T3 pigmented .....  
.....*Glyphodes stolalis* Guenée  
D1-D2 pinaculum on T2 and T3 not pigmented.....*Maruca vitrata* (Fabricius)
17. D1 pinacula on A9 pigmented.....  
.....*Parotis athysanota* (Hampson)  
D1 pinacula on A9 not pigmented.....  
.....*Glyphodes itysalis* Walker
18. Prothoracic shield completely pigmented....  
.....*Syllepte taiwanalis* Shibuya  
Prothoracic shield not completely pigmented.....19
19. Prothoracic shield with conspicuous pigmented marginal shade.....20  
Prothoracic shield without conspicuous pigmented marginal shade.....21
20. Pinaculum heavily pigmented and conspicuous.....*Botyodes principalis* Leech  
Pinaculum lightly pigmented and not conspicuous....*Botyodes diniasalis* (Walker)
21. With pair of dark spots on prothoracic shield.....22

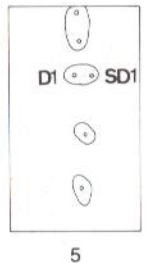
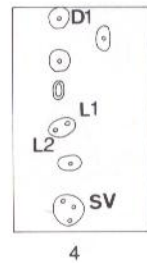
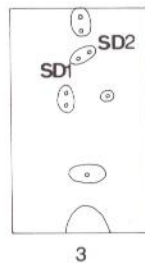
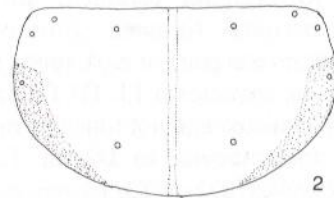
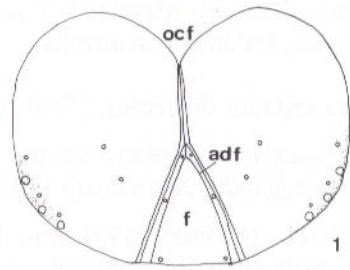
- Without pair of dark spots on prothoracic shield.....24
- 22. Four pairs of dark spots on prothoracic shield .....*Glyphodes pyloalis* Walker
- One pair of dark spots on prothoracic shield .....23
- 23. D1-D2 pinacula pigmented on T2 and T3...  
*Glyphodes duplicalis* Inoue, Munroe & Mutuura
- D1-D2 pinacula not pigmented on T2 and T3 .....*Omiodes similis* (Moore)
- 24. Prothoracic shield heavily pigmented except for middorsum.....  
.....*Glyphodes bivitalis* Guenée
- Prothoracic shield lightly pigmented.....  
.....*Pleuroptya balteata* (Fabricius)
- 25. SD1 pinaculum reduced on A2 and A7..26  
SD1 pinaculum not reduced on A2 and A7 .....27
- 26. D1-D2 and SD2-SD1 pinacula touching on T2.....*Herpetogramma rude* (Warren)
- D1-D2 and SD2-SD1 pinacula not touching on T2.....*Cirrhochrista brizoalis* Walker
- 27. D1-D2 and SD2-SD1 pinacula touching on T2.....28  
D1-D2 and SD2-SD1 pinacula not touching on T2.....30
- 28. L pinaculum enclosing spiracle on T1.....  
.....*Herpetogramma basale* (Walker)
- L pinaculum not enclosing spiracle on T1 .....29
- 29. Pinacula heavily pigmented.....  
.....*Herpetogramma licarsisale* (Walker)
- Pinacula lightly pigmented.....  
.....*Herpetogramma okamotoi* Yamanaka
- 30. Prothoracic shield heavily pigmented.....  
.....*Herpetogramma luctuosale* (Guenée)
- Prothoracic shield lightly pigmented.....  
.....*Omiodes tristrialis* (Bremer)

**1. *Cirrhochrista brizoalis* (Walker, 1859) (Figs.1-5)**

*Materials examined.* Kaohsing: Shanpin, 11-15 November, 1992, *Ficus wightiana*, 3 specimens (NMNS-LCN:116); Kaohsing:Shanpin, 11-15 November, 1992, rearing, *Ficus wightiana*, 10 specimens (NMNS-LCN:129).

*Description.* TL:11-12mm; HW:1.5mm; BW:2.2mm.

Head with posterior angle of frons half of distance to occipital foramen; adfrontals not reaching occipital foramen. Prothoracic shield brown with black marginal shades as illustrated. L



FIGURES 1-5

*Cirrhochrista brizoalis* (Walker, 1859)  
1, head. 2, prothoracic shield. 3, mesothorax (T2). 4, abdominal segment 1 (A1). 5, abdominal segment 9 (A9).

f: frons. adf: adfrontals. ocf: occipital foramen.

pinaculum not enclosing spiracle on T1. D1-D2 and SD2-SD1 pinacula not touching on T2 and T3. D1 seta dorsal to D2 on T2 and T3. SD2 seta posterodorsal to SD1 on T2. SD2 seta dorsal to SD1 on T3. L1 seta dorsal to L2 on T2 and T3. D1 pinacula not fused on dorsum of A1 to A8. L1 seta posterodorsal to L2 on A1 to A8. SV group trisetose on A1. SD1 pinaculum reduced on A2 and A7. SD1 seta directly posterior to D1 on A9. Crochets triordinal.

*Hosts:* *Ficus wightiana*, *Ficus cumingii* (Moraceae).

*Comments.* Fig borer.

*Distribution:* Taiwan; Mainland China; Korea; Japan; India; Indonesia; Australia.

**2. *Aripana cribrata* (Fabricius, 1794) (Figs.6-10)**

*Materials examined.* Nantou: Chusan, 20 Oct., 1993. *Vitex negundo*, 2 specimens (NMNS-CN:7).

*Description.* TL: 16-17mm; HW:1.1mm; BW:1.6mm.

Head with posterior angle of frons half of distance to occipital foramen; adfrontals not reaching occipital foramen. Prothoracic shield brown with several pairs of dark spots. L pinaculum not enclosing spiracle on T1. D1-D2 and SD2-SD1 pinacula pigmented and not touching on T2 and T3. D1 seta posterodorsal to D2 on T2. SD2 seta posterodorsal to SD1 on T3. L1 seta directly dorsal

to L2 on T2 and T3. D1 pinacula not fused on dorsum of A1 to A8. L1 seta posterodorsal to L2 on A1 to A8. SV group bisetose on A1. SD1 pinaculum reduced and pigmented on A2 and A7. SD1 seta posteroventral to D1 on A9. Crochets triordinal. Pinacula conspicuous.

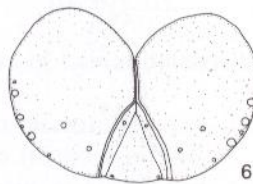
*Hosts:* *Vitex negundo* (Verbenaceae), *Ocimum basilicum* (Labiatae).

*Comments.* The larva is a solitary leaf-roller.

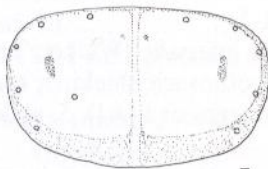
*Distribution:* Taiwan; Mainland China; Japan.

**3. *Cnaphalocrocis medinalis* (Guenée, 1854) (Figs. 11-15)**

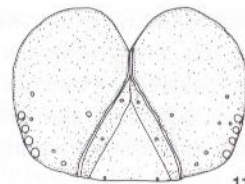
*Materials examined.* 20 Jan., 1991, Taichung,



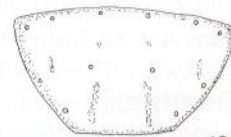
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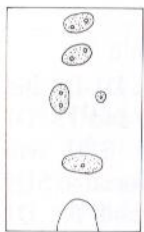
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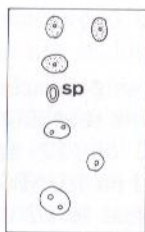
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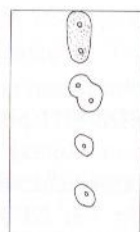
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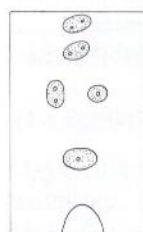
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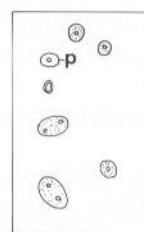
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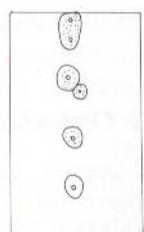
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14



15

**FIGURES 6-10**

*Aripana cribrata* (Fabricius, 1794)

6, head. 7, prothoracic shield. 8, mesothorax (T2). 9, abdominal segment 1 (A1). 10, abdominal segment 9 (A9).

sp: spiracle.

**FIGURES 11-15**

*Cnaphalocrocis medinalis* (Guenée, 1854)

11, head. 12, prothoracic shield. 13, mesothorax (T2). 14, abdominal segment 1 (A1). 15, abdominal segment 9 (A9).

p: pinaculum.

*Oryza sativa*, 3 specimens (NMNS-LCN:195).

*Description.* TL:15-16mm; HW:1.2mm; BW:1.8mm.

Head with posterior angle of frons three-quarters of distance to occipital foramen; adfrontals not reaching occipital foramen. Prothoracic shield brown with fuscous marginal shade and with several pairs of dark spot. L pinaculum enclosing spiracle on T1. D1-D2 and SD2-SD1 pinacula brown with black marginal shade, and not touching on T2 and T3. D1 seta posterodorsal to D2 on T2 and T3. SD2 seta posterodorsal SD1 on T2 and T3. L1 directly dorsal to L2 on T2 and T3. D1 pinacula not fused on dorsum of A1 to A8. L1 seta posterodorsal to L2 on A1 to A8. SV group bisetose on A1. SD1 pinaculum not reduced on A2 and A7. SD1 seta posteroventral to D1 on A9. Crochets triordinal. Pinacula conspicuous.

*Host:* *Oryza sativa* (Gramineae).

*Comments.* Larva is a solitary leaf-roller.

*Distribution:* Taiwan; Mainland China; Japan; Philippines; Thailand; Indonesia; Sri Lanka; Australia; Africa.

#### 4. *Marasmia limbalis* Wileman, 1911 (Figs.16-20)

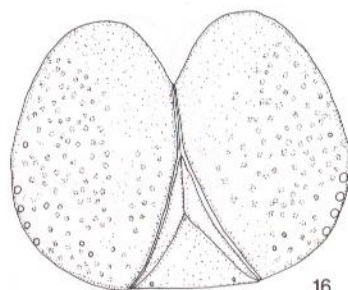
*Materials examined.* Nantou:Nansanche, 26 Oct., 1990. *Setaria palmifolia* (Keen) Stapf., 10 specimens (NMNS-LCN:162). Nantou:Wushe, 26 Sept., 1991 *Setaria palmifolia* (Keen) Stapf., 5 specimens (MNNS-LCN:172).

*Description.* TL:17-18mm; HW:1.8mm; BW:2.1mm.

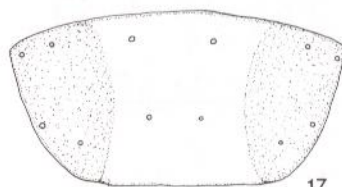
Head with posterior angle of frons less than half of distance to occipital foramen; adfrontals not reaching occipital foramen. Prothoracic shield with two large, marginal dark spots as illustrated. L pinaculum not enclosing spiracle on T1. D1-D2 and SD2-SD1 pinacula not touching on T2 and T3, deeply pigmented on T2 and with marginal shades on T3. D1 seta posterodorsal to D2 on T2 and T3. SD2 seta posterodorsal to SD1. L1 seta directly dorsal to L2 on T2 and T3. D1 pinacula fused on dorsum of A1 to A8. L1 seta posterodorsal to L2 on A1 to A8. SV group bisetose on A1. SD1 pinaculum not reduced on A2 and A7. SD1 seta posteroventral to D1 on A9. Crochets triordinal.

*Host:* *Setaria palmifolia* (Keen) Stapf., (Gramineae).

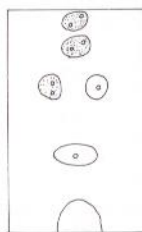
*Comments.* The larva is solitary leaf-roller.



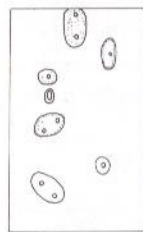
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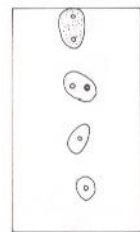
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19



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#### FIGURES 16-20

*Marasmia limbalis* Wileman, 1911

16, head. 17, prothoracic shield. 18, mesothorax (T2). 19, abdominal segment 1 (A1). 20, abdominal segment 9 (A9).

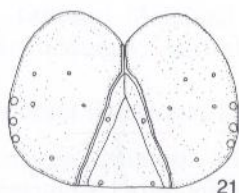
*Distribution:* Taiwan; Mainland China; Cambodia; Thailand; Indonesia; Sri Lanka; Australia; Africa.

#### 5. *Marasmia suspicalis* (Walker, 1859) (Figs.21-25)

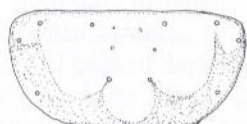
*Materials examined.* Nantou:Wushe, 13-16 August, 1990, *Oplismenus compositus* (L.) Beauri, 10 specimens (NMNS-LCN:173). 18 August, 1990, Nantou:Wushe, *Oplismenus compositus* (L.) Beauri, 2 specimens (NMNS-LCN:183); 19 Sept., 1991, Nantou:Wushe, *Oplismenus compositus* (L.) Beauri. (NMNS-LCN:153).

*Description.* TL:18-19mm; HW:1.1mm; BW:1.4mm.

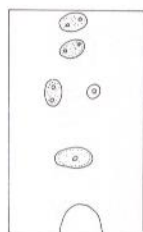
Head with posterior angle of frons two-thirds of distance to occipital foramen; adfrontals not



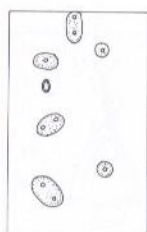
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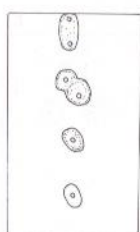
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## FIGURES 21-25

*Marasmia suspicalis* (Walker, 1859)

21, head. 22, prothoracic shield. 23, mesothorax (T2). 24, abdominal segment 1 (A1). 25, abdominal segment 9 (A9).

reaching occipital foramen. Prothoracic shield brown with posterolateral fuscous shade. L-pinaculum not enclosing spiracle on T1. D1-D2 and SD2-SD1 pinacula not touching on T2 and T3. D1 seta posterodorsal to D2 on T2 and T3. SD2 seta posterodorsal to SD1 on T2 and T3. L1 seta directly dorsal L2 on T2 and T3. D1 pinacula fused on dorsum of A1 to A8 as illustrated. L1 seta posterodorsal to L2 on A1 to A8. SV group bisetose on A1. SD1 pinaculum not reduced on A2 and A7. SD1 seta postero-ventral to D1 on A9. Crochets triordinal.

Hosts: *Oplismenus compositus* (L.) Beauri (Gramineae).

Comments. Larva is a solitary leaf-folder.

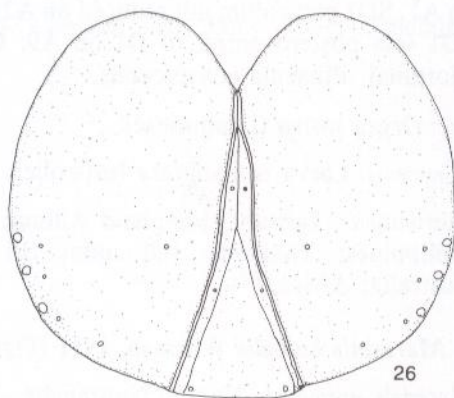
Distribution: Taiwan; Mainland China; Japan; Philippines.

6. *Nevrina procopia* (Stoll, 1781) (Figs.26-30)

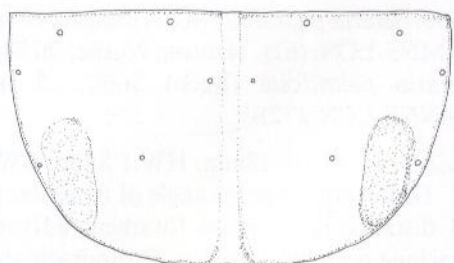
Materials examined. Nantou: Tsu-Diea-Pu-Bum 3 Nov., 1992, *Turpinia formosana*, 2 specimens (NMNS-LCN:231); Kaohsiung:Shanpin, 23 Nov., 1993, *Turpinia formosana*, 3 specimens (NMNS-LCN:23).

Description. TL:18-19mm; HW:2.3mm; BW:2.7mm.

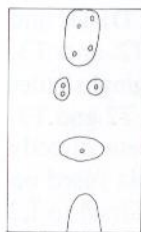
Head with posterior angle of frons half of



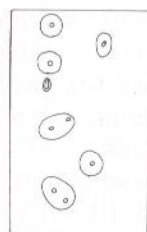
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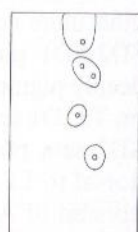
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28



29



30

## FIGURES 26-30

*Nevrina procopia* (Stoll, 1781)

26 head. 27, prothoracic shield. 28, mesothorax (T2). 29, abdominal segment 1 (A1). 30, abdominal segment 9 (A9).

distance to occipital foramen; adfrontals not reaching occipital foramen. Prothoracic shield with marginal pigmented spot. L pinaculum not enclosing spiracle on T1. D1-D2 and SD2-SD1 pinacula touching on T2 and T3. D1 seta posterodorsal to D2 on T2 and T3. SD2 seta posterodorsal to SD1. L1 seta dorsal to L2 on T2 and T3. D1 pinacula not fused on dorsum of A1 to A8. L1 seta posterodorsal to L2 on A1 to A8. SV group bisetose on A1. SD1 pinaculum reduced on A2 and A7. SD1 seta posteroventral to D1 on A9. Crochets triordinal.

*Host: Turpinia formosana* (Staphyleaceae).

*Comments.* Larva is a solitary leaf-folder, folding parts of the leaf and fixing by silk threads.

*Distribution:* Taiwan; Mainland China.

**7. *Omiodes tristrialis* (Bremer, 1864) (Figs.31-35)**

*Materials examined.* Taitung:Konfu, 8 Nov., 1990; *Paederia scandens* (Lour.) Merr.; 1 specimens (NMNS-LCN:161).

*Description.* Head with posterior angle of frons two-thirds of distance to occipital foramen; adfrontals not reaching occipital foramen. L pinaculum not enclosing spiracle on T1. D1-D2 and SD2-SD1 pinacula not touching on T2 and T3. D1 seta posterodorsal to D2 on T2 and T3. SD2 seta posterodorsal to SD1 on T2 and T3. L1 seta dorsal to L2 on T2 and T3. D1 pinacula not fused on dorsum on A1 to A8. L1 seta posterodorsal to L2 on A1 to A8. SV group trisetose on A1. SD1 pinaculum not reduced on A2 and A7. SD1 seta posteroventral to D1 on A9. Crochets triordinal.

*Host: Paederia scandens* (Lour.) Merr., (Rubiaceae).

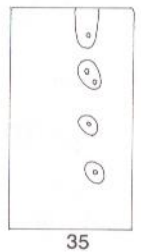
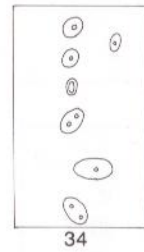
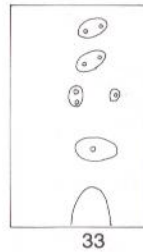
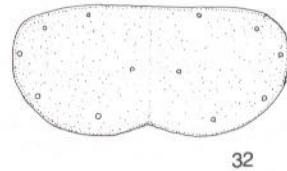
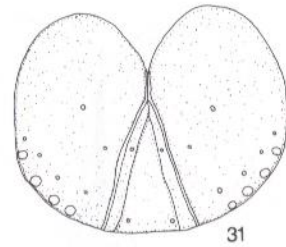
*Parasitoids: Apanteles* sp.

*Comments.* Larva is a leaf-folder, folding on half of the leaf and fixing by silken thread, feeding make the leaf cleared.

*Distribution:* Taiwan; Mainland China; Korea; Japan; Cambodia; Indonesia; India.

**8. *Omiodes similis* (Moore, 1888) (Figs.36-40)**

*Materials examined.* Nantou:Meifeng; 16 May, 1990 (NMNS-LCN:163), 6 specimens; 20 May, 1991; 2 specimens; 24 May, 1993; 4 specimens; *Setaria palmifolia*.



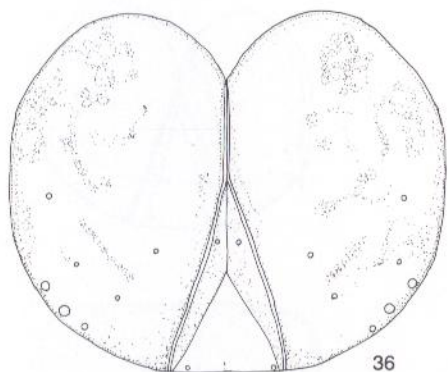
FIGURES 31-35

*Omiodes tristrialis* (Bremer, 1864)

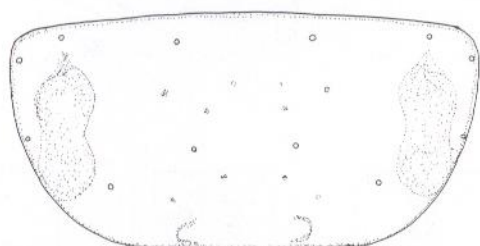
31, head. 32, prothoracic shield. 33, mesothorax (T2). 34, abdominal segment 1 (A1). 35, abdominal segment 9 (A9).

*Description.* TL:31-32mm; HW:2.3mm; BW:3.2mm.

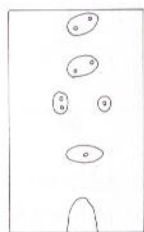
Head brown with dark network pattern, posterior angle of frons less than half of distance to occipital foramen; adfrontals not reaching occipital foramen. Prothoracic shield with marginal pigmented spot. L pinaculum not enclosing spiracle on T1. D1-D2 and SD2-SD1 pinacula not touching on T2 and T3. D1 seta posterodorsal to D2 on T2 and T3. SD2 seta posterodorsal to SD1 on T2 and T3. L1 seta dorsal to L2 on T2 and T3. D1 pinacula not fused on dorsum of A1 to A8. L1 seta posterodorsal to L2 on A1 to A8. SV group bisetose on A1. SD1 pinaculum not reduced on A2 and A7. SD1 seta posteroventral to D1 on A9. Crochets triordinal.



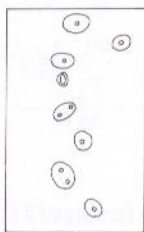
36



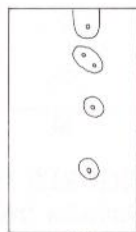
37



38



39

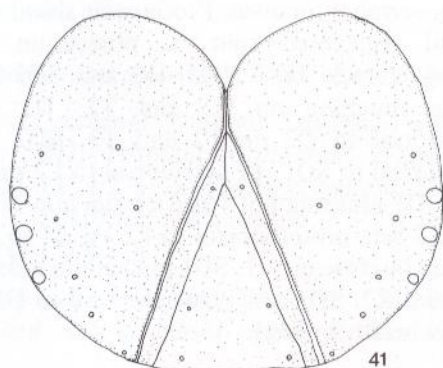


40

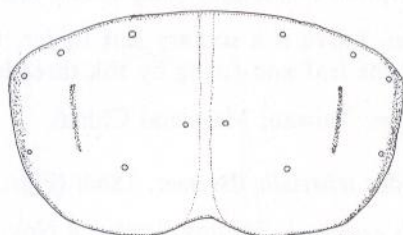
## FIGURES 36-40

*Omiodes similis* (Moore, 1888)

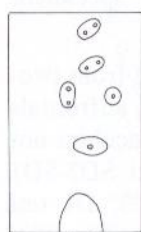
36, head. 37, prothoracic shield. 38, mesothorax (T2). 39, abdominal segment 1 (A1). 40, abdominal segment 9 (A9).



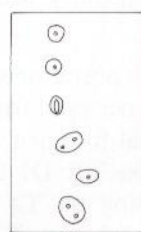
41



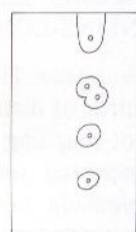
42



43



44



45

## FIGURES 41-45

*Botyodes caldusalis* (Walker, 1958)

41, head. 42, prothoracic shield. 43, mesothorax (T2). 44, abdominal segment 1 (A1). 45, abdominal segment 9 (A9).

Hosts: *Setaria palmifolia*, *Micanthus floridulus* (Gramineae).

Parasitoids: *Glyptapantales* sp.

Comments. Larva is a solitary leaf-folder, folding both side of leaf along mid-rib and fixing by silken threads and becoming tube-shaped.

Distribution: Taiwan; Mainland China; Japan.

**9. *Botyodes caldusalis* (Walker, 1959) (Figs.41-45)**

Materials examined. Nantou:Wushe, 13-16 August,

1990; *Maesa tenera*, 5 specimens (NMNS-LCN: 249).

Description. TL:23-24mm; HW:6.3mm; BW:3.2mm.

Head with posterior angle of frons two-thirds of distance to occipital foramen; adfrontals not reaching occipital foramen. Prothoracic shield with pigmented marginal shades and with pair of dark spots. L pinaculum not enclosing spiracle on T1. D1-D2 and SD2-SD1 pinacula not touching on T2 and T3. D1 seta posterodorsal to D2 on T2 and T3. SD2-SD1 pinacula pigmented. SD2 seta

posterodorsal to SD1 on T2 and T3. L1 directly dorsal to L2 on T2 and T3. D1 pinacula not fused on dorsum of A1 to A8. L1 seta posterodorsal to L2 on A1 to A8. SV group bisetose on A1. SD1 pinaculum reduced on A2 and A7. SD1 seta posteroventral to D1 on A9. Crochets triordinal.

*Host: Maesa tenera* (Myrsinaceae).

*Comments.* Larva is a leaf-folder, folding and webbing the leaves together by silken threads.

*Distribution:* Taiwan; India; Java; Singapore; Japan.

**10. *Botyodes principalis* Leech, 1889** (Figs. 46-50)

*Materials examined.* Nantou:Wushe, 17-18 Oct., 1990, *Salix babylonica* L. (NMNS-LCN:240). Nantou: Meifeng, 18 June, 1991; *Populus alba* L.; 2 specimens; (NMNS-LCN:250). Nantou:Meifeng, 26 August, 1991; *Populus alba* L. 10 specimens (NMNS-LCN:230).

*Description.* TL32-33mm; HW:2.6mm; BW:3.7mm.

Head black except middorsal brown, with posterior angle of frons two-thirds of distance to occipital foramen; adfrontals not reaching occipital foramen. Prothoracic shield with marginal heavily pigmented. L pinaculum not enclosing spiracle on T1. D1-D2 and SD2-SD1 pinacula pigmented and not touching on T2 and T3. D1 seta posterodorsal to D2 on T2 and T3. SD2 seta posterodorsal to SD1 on T2 and T3. L1 seta dorsal to L2 on T2 and T3. D1 pinacula pigmented and not fused on dorsum of A1 to A8. L1 seta posterodorsal to L2 on A1 to A8. SV group bisetose on A1. SD1 pinaculum not reduced on A2 and A7. SD1 seta posteroventral to D1 on A9. Crochets triordinal.

*Hosts: Salix babylonica* L.; *Populus alba* L. (Salicaceae).

*Comments.* Larva is a leaf-webber, webbing the leaves together by silken threads.

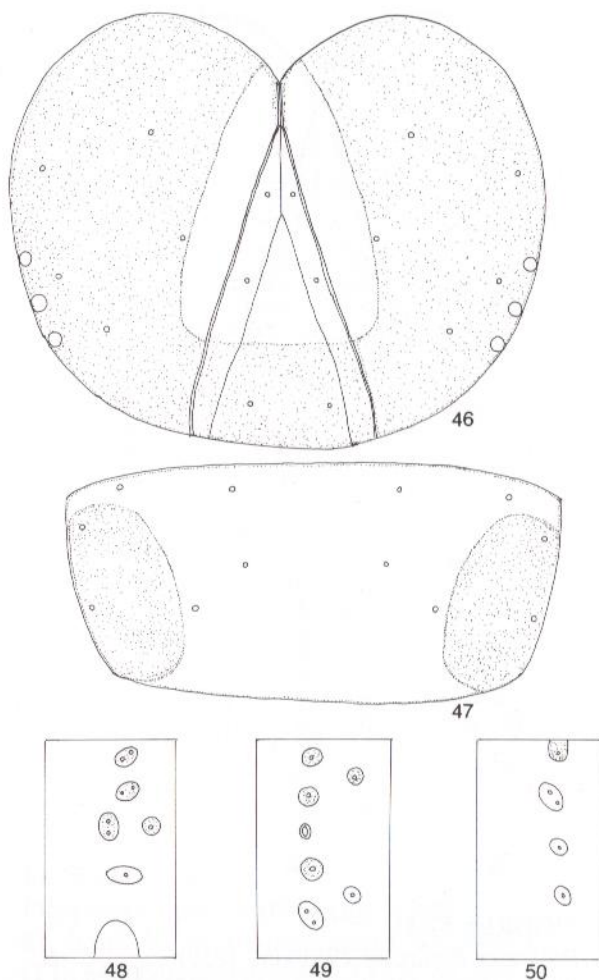
*Distribution:* Taiwan; Mainland China; Korea; Japan; India.

**11. *Botyodes diniasalis* (Walker, 1859)** (Figs.51-55)

*Materials examined.* Hualian: Tienchi, 7 Nov., 1990; *Salix warburgii* O. Seem, 2 larvae (NMNS-LCN:223).

*Description.* TL:20-21mm; HW:2.2mm; BW:3.5mm.

Head pale brown with pigmented marginal

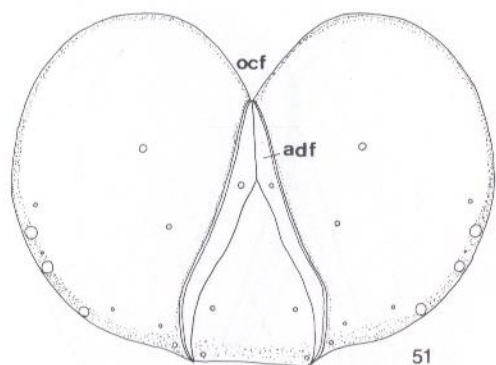


FIGURES 46-50

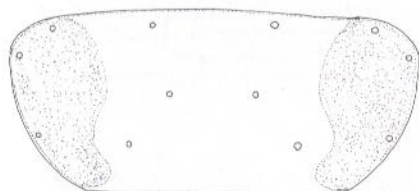
*Botyodes principalis* Leech, 1889

46, head. 47, prothoracic shield. 48, mesothorax (T2). 49, abdominal segment 1 (A1). 50, abdominal segment 9 (A9).

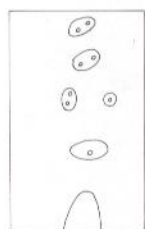
shades, with posterior angle of frons two-thirds of distance to occipital foramen; adfrontals reaching to occipital foramen. Thoracic shield with pigmented marginal spot as illustrated. L pinaculum not enclosing spiracle on T1. D1-D2 and SD2-SD1 pinacula not touching on T2 and T3. D1 seta posterodorsal to D2 on T2 and T3. SD2 seta posterodorsal to SD1 on T2 and T3. L1 seta dorsal to L2 on T2 and T3. D1 pinacula not fused on dorsum of A1 to A8. L1 seta posterodorsal to L2 on A1 to A8. SV group bisetose on A1. SD1



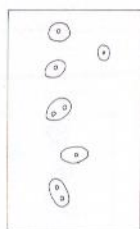
51



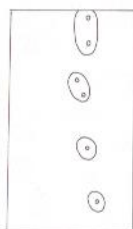
52



53



54



55

## FIGURES 51-55

*Botyodes diniasalis* (Walker, 1859)

51, head. 52, prothoracic shield. 53, mesothorax (T2). 54, abdominal segment 1 (A1). 55, abdominal segment 9 (A9).

adf: adfrontals. ocf: occipital foramen.

pinaculum not reduced on A2 and A7. SD1 seta posteroventral to D1 on A9. Crochets triordinal.

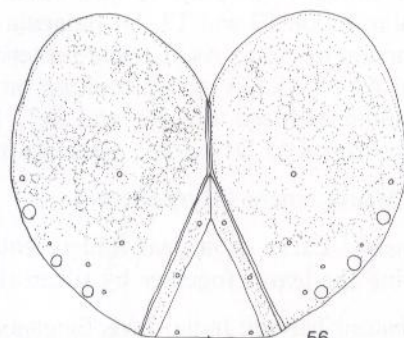
Host: *Salix warburgii* O. Seem (Salicaceae).

Comments. The larva is a leaf-webber, webbing the leaves together by silken threads.

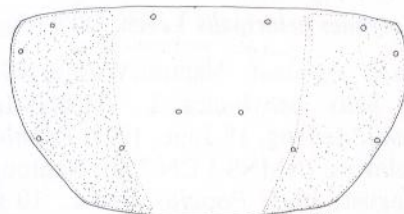
Distribution: Taiwan; Mainland China; Korea; Japan; Cambodia; India.

12. *Pleuroptya ruralis* (Scopoli, 1763) (Figs.56-60)

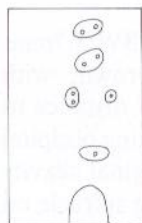
Material examined. Nantou:Wushe, 26 Sept., 1991, *Boehmeria nivea*, 2 specimens (NMNS-LCN:174);



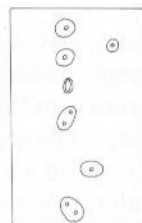
56



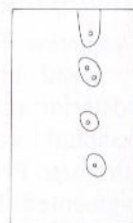
57



58



59



60

## FIGURES 56-60

*Pleuroptya ruralis* (Scopoli, 1763)

56, head. 57, prothoracic shield. 58, mesothorax (T2). 59, abdominal segment 1 (A1). 60, abdominal segment 9 (A9).

Nantou:Wushe, 13-16 August, 1990, *Boehmeria frutescens* Thunb. 4 specimens; *Villebrunea pedunculata*, 4 specimens; Nantou: Wushe, 29 August, 1990, *B. formosana*, 2 specimens.

Description. TL:18-19mm; HW:2.1mm; BW:3.1mm.

Head with dark pattern, with posterior angle of frons half of distance to occipital foramen; adfrontals not reaching occipital foramen. L pinaculum not enclosing spiracle on T1. D1-D2 and SD2-SD1 pinacula not touching on T2 and T3. D1 seta posterodorsal to D2 on T2 and T3. SD2 seta posterodorsal to SD1 on T2 and T3. L1 seta dorsal

to L2 on T2 and T3. D1 pinacula not fused on dorsum of A1 to A8. L1 seta posterodorsal to L2 on A1 to A8. SV group bisetose on A1. SD1 pinaculum reduced on A2 and A7. SD1 seta posteroventral to D1 on A9. Crochets triordinal.

*Hosts:* *Boehmeria formosana*, *B. frutescens*, *B. nivea*, *Villebrunea pedunculata* (Urticaceae).

*Parasitoids:* *Apanteles* sp.; *Paroplitis* sp.; *Inchneumonidae*.

*Comments.* The larva is a leaf-roller, rolling the leaf tube-shaped.

*Distribution:* Taiwan; Mainland China; Japan.

### 13. *Pleuroptya balteata* (Fabricius, 1798) (Figs.61-65)

*Materials examined.* Nantou:Nansanchi, 18 Oct., 1990, *Rhus semialata* Murr. var. *roxburghiana* DC, 2 specimens (NMNS-LCN:246).

*Description.* TL:19-20mm; HW:1.8mm; BW:8.8mm.

Head with posterior angle of frons half of distance to occipital foramen; adfrontals not reaching occipital foramen. Prothoracic shield brown except mid-dorsum. L pinaculum not enclosing spiracle on T1. D1-D2 and SD2-SD1 pinacula not touching on T2 and T3. D1 seta posterodorsal to D2 on T2 and T3. SD2 posterodorsal to SD1 on T2 and T3. L1 seta dorsal to L2 on T2 and T3. D1 pinacula not fused on dorsum of A1 to A8. L1 seta postero-dorsal to L2 on A1 to A8. SV group bisetose on A1. SD1 pinaculum not reduced on A2 and A7. SD1 seta posteroventral to D1 on A9. Crochets triordinal.

*Hosts:* *Rhus semialata* Murr. var. *roxburghiana* DC., (Anacardiaceae).

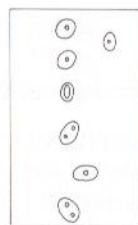
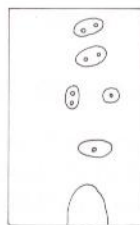
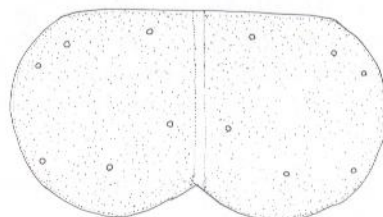
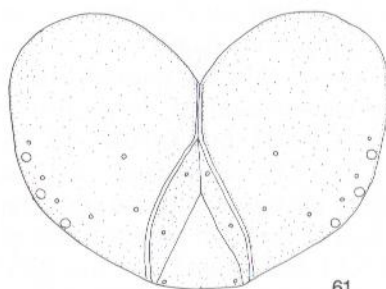
*Parasitoids:* *Apanteles balteatae* (Braconidae) (Wang, 1980).

*Comments.* Larva is a solitary leaf-folder, folding and webbing the leaves together by silken threads.

*Distribution:* Taiwan; Mainland China; Japan; Korea; Sri Lanca.

### 14. *Pleuroptya punctimarginalis* (Hampson, 1896) (Figs.66-70)

*Materials examined.* Nantou:Wushe, 13 Sep., 1990; *Pueraria lobata* (Willd.) Ohwi, 4 specimens (NMNS-



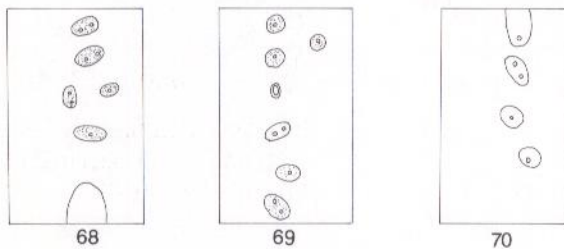
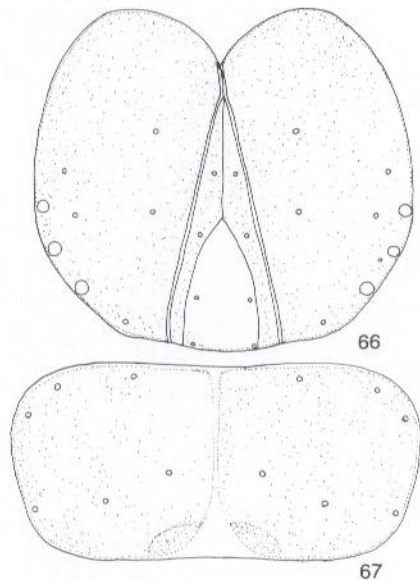
FIGURES 61-65

*Pleuroptya balteata* (Fabricius, 1798)

61, head. 62, prothoracic shield. 63, mesothorax (T2). 64, abdominal segment 1 (A1). 65, abdominal segment 9 (A9).

LCN:198). Nantou:Wushe, 27 Aug., 1991, 2 specimens (NMNS-LCN:176); Nantou:Wushe, 25 April, 1990, 1 specimen (NMNS-LCN:156).

*Description.* Head fuscous, with posterior angle of frons half of distance to occipital foramen; adfrontals not reaching occipital foramen. L pinaculum not enclosing spiracle on T1. D1-D2 and SD2-SD1 pinacula pigmented, and not touching on T2 and T3. D1 seta posterodorsal to D2 on T2 and T3. SD2 seta posterodorsal to SD1 on T2 and T3. L1 seta dorsal to L2 on T2 and T3. D1 pinacula pigmented and not fused on dorsum of A1 to A8. L1 seta posterodorsal to L2 on A1 to A8. SV group bisetose on A1. SD1 pinaculum reduced on A2 and



FIGURES 66-70

*Pleuroptya punctimarginalis* (Hampson, 1896)  
66, head. 67, prothoracic shield. 68, mesothorax (T2). 69, abdominal segment 1 (A1). 70, abdominal segment 9 (A9).

A7. SD1 seta posteroventral to D1 on A9. Crochets triordinal.

Host: *Pueraria lobata* (Willd.) Ohwi (Leguminosae).

Comments. The larva is a solitary leaf-roller.

Distribution: Taiwan; Mainland China; Japan.

**15. *Haritalodes derogatus* (Fabricius, 1775) (Figs. 71-75)**

Materials examined. Nantou:Wanta, 21 July, 1991; *Hibiscus indicus*; 5 specimens (NMNS-LCN:107)

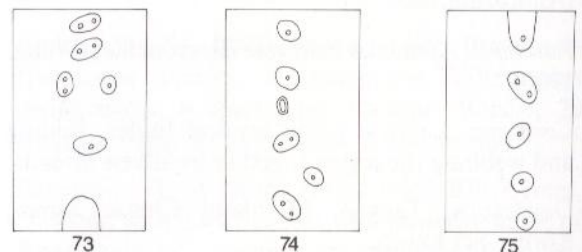
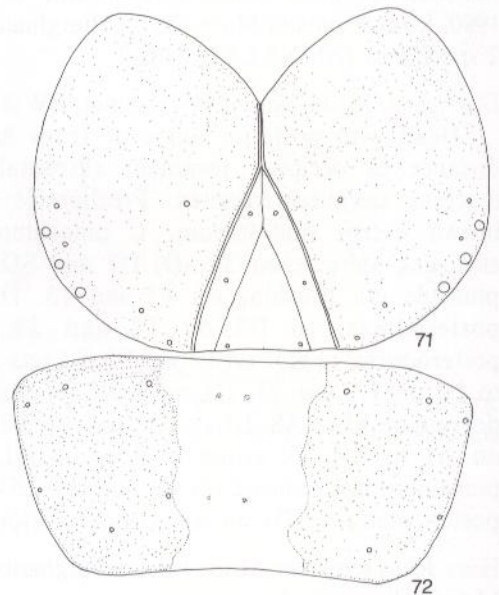
Description. TL:26-27mm; HW:2.4mm; BW:3.2mm.

Head black, with posterior angle of frons half of distance to occipital foramen; adfrontals not

reaching occipital foramen. Prothoracic shield heavily pigmented except along middorsum. L pinaculum not enclosing spiracle on T1. D1-D2 and SD2-SD1 pinacula with pigmented marginal shades, and not touching on T2 and T3. D1 seta posterodorsal to D2 on T2 and T3. L1 seta directly dorsal to L2 on T2 and T3. SD2 seta posterodorsal to SD1 on T2 and T3. D1 pinaculum not fused on dorsum of A1 to A8. L1 seta posterodorsal to L2 on A1 to A8. SV group bisetose on A1. SD1 pinaculum reduced on A2 and A7. SD1 seta posteroventral to D1 on A9. Crochets triordinal.

Hosts: *Hibiscus taiwanensis*, *H. rosa-sinensis*, *Sida rhombifolia*, *H. indicus*, *Urena lobata* (Malvaceae).

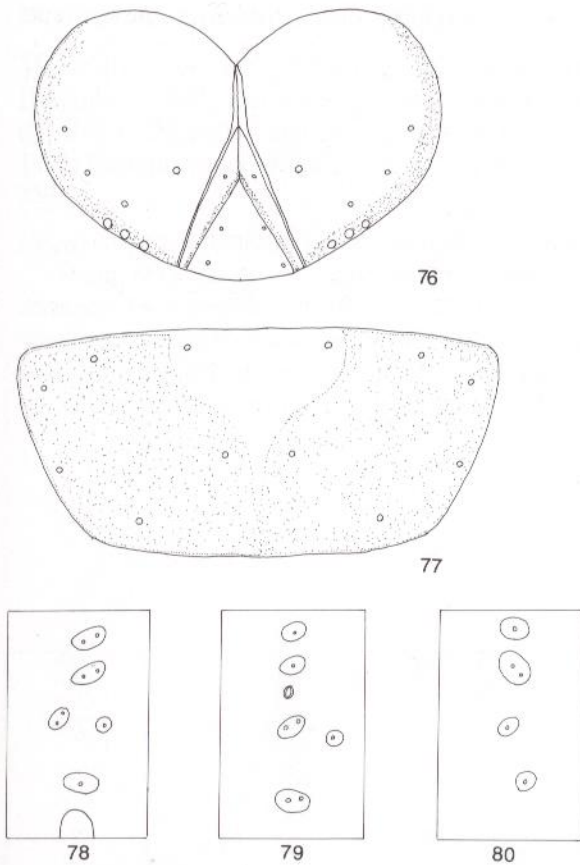
Comments. The larva is a leaf-roller, trenching at one-



FIGURES 71-75

*Haritalodes derogatus* (Fabricius, 1775)

71, head. 72, prothoracic shield. 73, mesothorax (T2). 74, abdominal segment 1 (A1). 75, abdominal segment 9 (A9).



FIGURES 76-80

*Syllepte taiwanalis* Shibuya, 1928

76, head. 77, prothoracic shield. 78, mesothorax (T2). 79, abdominal segment 1 (A1). 80, abdominal segment 9 (A9).

third of the leaf and webbing leaf inward and making a leaf-curling, usually constructing a rudimentary silk tube.

*Distribution:* Taiwan; Mainland China; Japan; India.

#### 16. *Syllepte taiwanalis* Shibuya, 1928 (Figs.76-80)

*Materials examined.* Nantou:Wushe, 28 August, 1991. *Broussonetia papyrifera* L., 1 specimen (NMNS-LCN:158; Nantou:Wushe, 27 September, 1991, *B. papyrifera* L. 5 specimens (NMNS-LCN: 253).

*Description.* TL:27-36mm; HW:2.1mm; AW:3.7mm.

Head brown with fuscous, marginal shades,

with posterior angle of frons half of distance to occipital foramen; adfrontals not reaching occipital foramen. Prothoracic shield brown except middorsum pale brown. L pinaculum not enclosing spiracle on T1. D1-D2 and SD2-SD1 pinacula brown and not touching on T2. D1-D2 and SD2-SD1 pinacula pale brown and not touching on T3. L1 seta posterodorsal to L2 on T2 and T3. D1 seta posterodorsal to D2 on T2 and T3. SD2 seta posterodorsal to SD1 on T2 and T3. D1 pinacula not fused on dorsum of A1 to A8. L1 seta posterodorsal L2 on A1 to A8. SV group bisetose on A1. SD1 pinaculum reduced on A2 and A7. SD1 seta posteroventral to D1 on A9. Crochets triordinal.

*Host:* *Broussonetia papyrifera* L. (Moraceae).

*Comments.* Larva is a solitary leaf-roller.

*Distribution:* Taiwan; Japan.

#### 17. *Sisyrophora pfeifferae* Lederer, 1863 (Figs.81-85)

*Materials examined.* Pingtung: Kentung, 14-17 December, 1992, *Aglaia elliptifolia*, 3 specimens (NMNS-LCN:180); Pingtung:Chu-fu-San, 18 January, 1994, *Aglaia elliptifolia*, 3 specimens (NMNS-LCN:29).

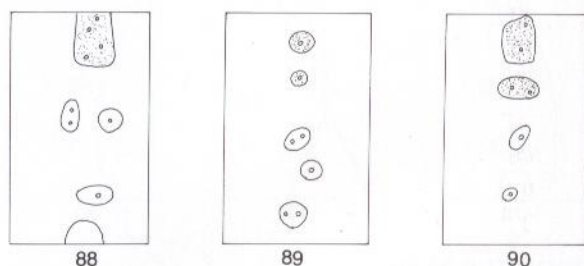
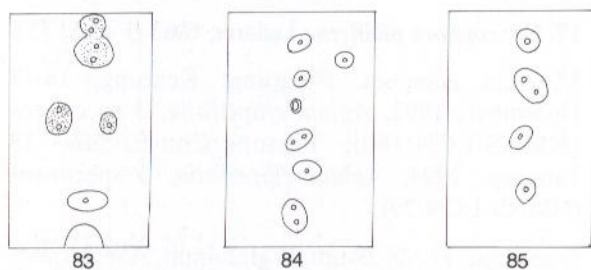
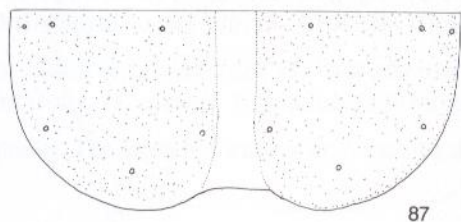
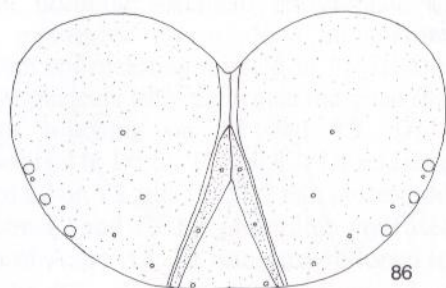
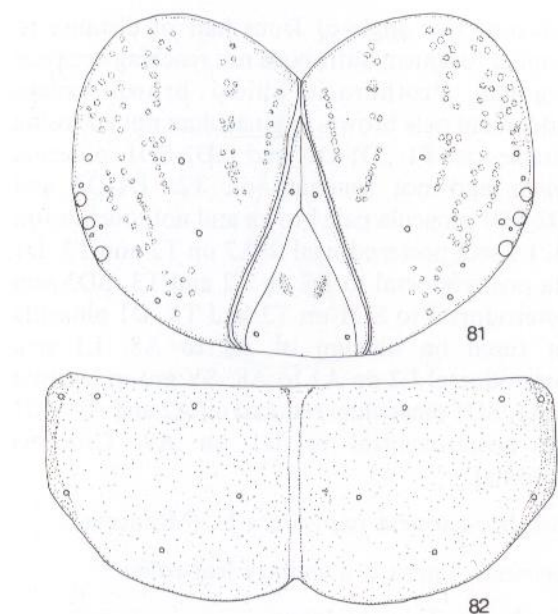
*Description.* TL:28-29mm, WH:2.4mm, AW:3.1mm.

Head pale brown with many tiny, fuscous ring spots and with posterior angle of frons less than half of distance to occipital foramen; adfrontals not reaching occipital foramen. Prothoracic shield with fuscous marginal shades and several pairs of dark spots. L pinaculum not enclosing spiracle on T1. D1-D2 and SD2-SD1 pinacula pigmented and touching on T2 and T3. D1 posterodorsal to D2 on T2 and T3. SD2 seta dorsal to SD1 on T2 and T3. L1 seta dorsal to L2 on T2 and T3. D1 pinacula pigmented and not fused on dorsum of A1 to A8. L1 seta posterodorsal to L2 on A1 to A8. SV group bisetose on A1. SD1 pinaculum reduced on A2 and A7. SD1 seta posteroventral to D1 on A9. Crochets triordinal.

*Host:* *Aglaia elliptifolia* (Meliaceae).

*Comments.* The larva is solitary in a web on the back of a leaf fixing over parts of the other leaf, fed mesophyll and made the leaf whitish.

*Distribution:* Taiwan; Sikkim; Singapore; Sumatra.



#### FIGURES 81-85

*Sisyrophora pfeifferae* Ledrere, 1863

81, head. 82, prothoracic shield. 83, mesothorax (T2). 84, abdominal segment 1 (A1). 85, abdominal segment 9 (A9).

#### FIGURES 86-90

*Glyphodes actorinalis* Walker, 1859

86, head. 87, prothoracic shield. 88, mesothorax (T2). 89, abdominal segment 1 (A1). 90, abdominal segment 9 (A9).

### 18. *Glyphodes actorinalis* Walker, 1859 (Figs. 86-90)

*Materials examined.* Pintung: Kentine, 7-11 January, 1991, *Formosia benthamiana*, 3 specimens (NMNS-LCN:278).

*Description.* TL:19mm; HW:1.7mm; BW:2.3mm.

Head with posterior angle of frons half of distance to occipital foramen; adfrontals not reaching occipital foramen. Prothoracic shield fuscous. L pinaculum not enclosing spiracle on T1. D1-D2 and SD2-SD1 pinacula pigmented and touching on T2 and T3. D1 seta posterodorsal to

D2 on T2 and T3. SD2 seta posterodorsal to SD1 on T2 and T3. L1 seta dorsal to L2 on T2 and T3. D1 pinacula not fused on dorsum of A1 to A8. L1 seta posterodorsal to L2 on A1 to A8. SV group bisetose on A1. SD1 pinaculum pigmented and reduced on A2 and A7. SD1 seta directly posterior to D1 on A9. Crochets triordinal.

*Host:* *Formosia benthamiana* (Apocynaceae).

*Comments.* The larva is a leaf-folder.

*Distribution:* Taiwan; Mainland China; Japan; Korea.

**19. *Glyphodes bivitalis* Guenée, 1854** (Figs. 91-95)

*Materials examined.* Pintung: Kenting, 14 December, 1992, *Ficus microcarpa*, 1 specimens (NMNS-LCN:260); Taichung City, 9 November, 1992, *Ficus microcarpa*. 3 specimens (NMNS-LCN: 259).

*Description.* TL:27-28mm; HW;2.1mm; BW:3.8mm.

Head with posterior angle of frons half of distance to occipital foramen; adfrontals not reaching occipital foramen. Prothoracic shield heavily pigmented except middorsum. L pinaculum not enclosing spiracle on T1. D1-D2 and SD2-SD1

pinacula not touching on T2 and T3. SD2-SD1 pinacula partially pigmented on T2 and T3. D1 seta posterodorsal to D2 on T2 and T3. SD2 seta posterodorsal to SD1 on T2 and T3. L1 seta dorsal to L2 on T2 and T3. D1 pinacula not fused on dorsum of A1 to A8. L1 seta posterodorsal to L2 on A1 to A8. SV group bisetose on A1. SD1 pinaculum not reduced on segments A2 and A7. SD pinacula pigmented. SD1 seta posteroventral to D1 on A9. Crochets triordinal.

*Host:* *Ficus microcarpa* (Moraceae).

*Comments.* The larva is a leaf-folder.

*Distribution:* Taiwan; Mainland China; Japan; Vietnam; Indonesia; Phillipines; India; Sri Lanca; Australia.

**20. *Glyphodes itysalis* Walker, 1859** (Figs. 96-100)

*Material examined.* Pintung: Kenting, 25 April 1990, *Ficus irisana*, 2 specimens, (NMNS-LCN:263); 20 January 1994, *Ficus irisana*, 2 specimens (NMNS-LCN:26).

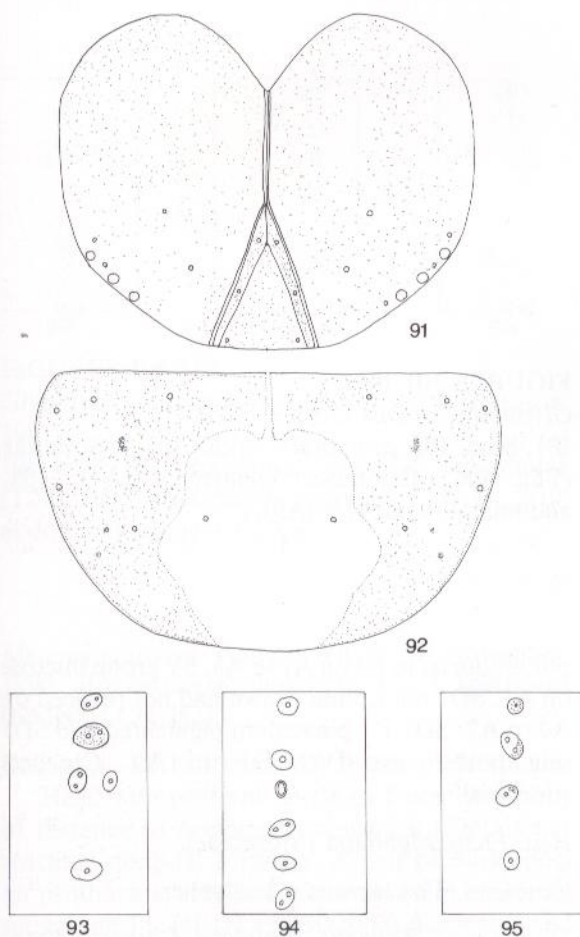
*Description.* TW:24-25mm; HW:1.5mm; BW:3.2mm.

Head with posterior angle of frons less than half of distance to occipital foramen; adfrontals not reaching occipital foramen. No pair of dark spots on prothoracic shield. L pinaculum not enclosing spiracle on T1. D1-D2 and SD2-SD1 pinaculum not touching on T2. SD2-SD1 pinaculum pigmented with fuscous spot; anterior to the L1-L2 pinaculum with square, fuscous spot on T2. D1 seta dorsal to D2 on T2 and T3. SD2 seta posterodorsal to SD1 on T2 and T3. SD2-SD1 pinaculum pigmented with fuscous spot on T3. L1 seta dorsal to L2 on T2 and T3. D1 pinacula not fused on dorsum of A1 to A8. L1 seta posterodorsal to L2 on A1 to A8. SV group bisetose on A1. SD1 pinaculum not reduced on A2 and A7. SD1 seta posterior to D1 on A9. Crochets triordinal.

*Host:* *Ficus irisana* (Moraceae).

*Comments.* The larva is solitary in a web on the back of a leaf and attached to the other leaves.

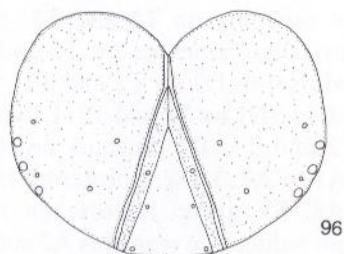
*Distribution:* Taiwan; Mainland China; Japan; Indian; Sri-Lanca; Vietnam; Indonesia; Austria; Africa.



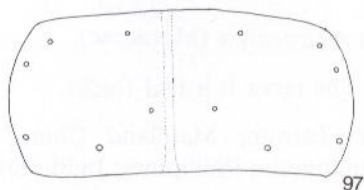
FIGURES 91-95

*Glyphodes bivitalis* Guenée, 1854

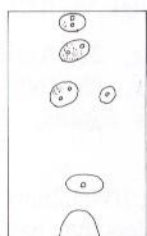
91, head. 92, prothoracic shield. 93, mesothorax (T2). 94, abdominal segment 1 (A1). 95, abdominal segment 9 (A9).



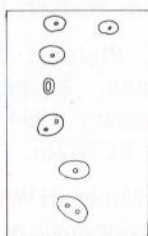
96



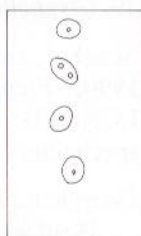
97



98



99



100

## FIGURES 96-100

*Glyphodes itysalis* Walker, 1859

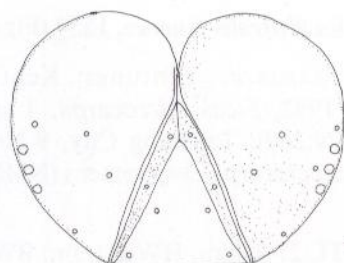
96, head. 97, prothoracic shield. 98, mesothorax (T2). 99, abdominal segment 1 (A1). 100, abdominal segment 9 (A9).

21. *Glyphodes stolalis* Guenée, 1854 (Figs. 101-105)

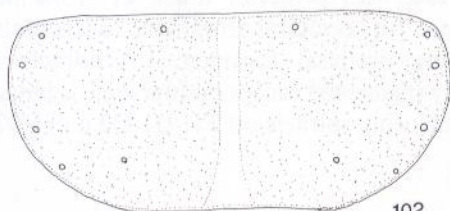
*Material examined.* Nantou: Lienhuachi, 2-3 October, 1992, *Ficus wightiana*, 3 specimens (NMNS-LCN:202).

*Description.* TL:20-21mm; HW:1.9mm; AW:3.5mm.

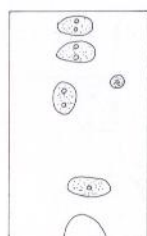
Head with posterior angle of frons two-thirds of distance to occipital foramen; adfrontals not reaching occipital foramen. Prothoracic shield brown. L pinaculum brown and not enclosing spiracle on T1. D1-D2 and SD2-SD1 pinacula brown and not touching on T2 and T3. D1 seta posterodorsal to D2 on T2 and T3. SD2 seta dorsal to SD1 on T2 and T3. D1 pinacula brown and not fused on dorsum of A1 to A8. L1 seta



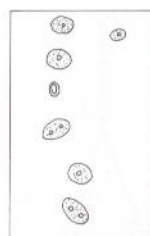
101



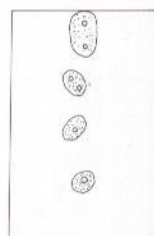
102



103



104



105

## FIGURES 101-105

*Glyphodes stolalis* Guenée, 1854

101, head. 102, prothoracic shield. 103, mesothorax (T2). 104, abdominal segment 1 (A1). 105, abdominal segment 9 (A9).

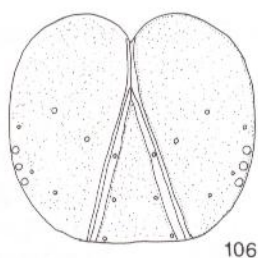
posterodorsal to L2 on A1 to A8. SV group bisetose on A1. SD1 pinaculum brown and not reduced on A2 to A7. SD1-D1 pinaculum pigmented and SD1 seta posteroventral to D1 on A9. Crochets triordinal.

*Host:* *Ficus wightiana* (Moraceae).

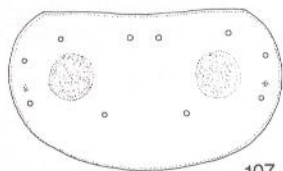
*Comments.* The larva is a leaf-roller.

*Distribution:* Taiwan; Mainland China; Japan; Vietnam; Indonesia; Philippines; India; Nepal; Sri Lanka; Australia; Africa. Fiji.

22. *Glyphodes duplicalis* Inoue, Munroe & Mutuura, 1981 (Figs. 106-110)



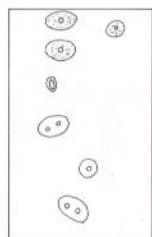
106



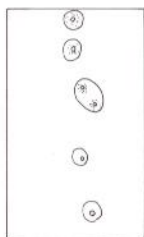
107



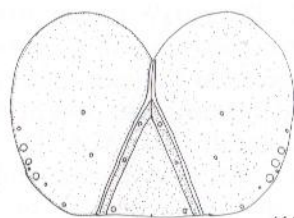
108



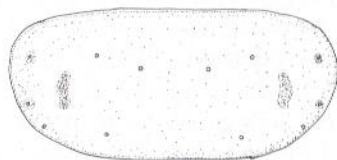
109



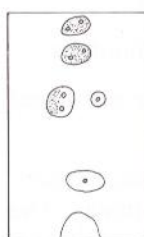
110



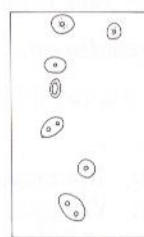
111



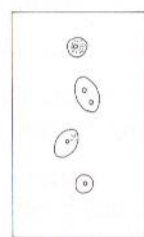
112



113



114



115

## FIGURES 106-110

*Glyphodes duplicalis* Inoue, Munroe & Mutuura, 1981

106, head. 107, prothoracic shield. 108, mesothorax (T2). 109, abdominal segment 1 (A1). 110, abdominal segment 9 (A9).

*Material examined.* Nantou:Wushe, 24 November, 1990, *Broussonetia papyrifera* L., 3 specimens (NMNS-LCN:252).

*Description.* TL:18-19mm; HW:1.4mm; BW:1.8mm.

Head with posterior angle of frons two-thirds of distance to occipital foramen; adfrontals not reaching occipital foramen. A pair of dark spots on prothoracic shield. L pinaculum not enclosing spiracle on T1. D1-D2 and SD2-SD1 pigmented and not touching on T2 and T3. D1 seta posterodorsal to D2 on T2 and T3. SD2 seta posterodorsal to SD1 on T2 and T3. L1 seta dorsal to L2 on T2 and T3. D1 pinacula pigmented and not fused on dorsum of A1 to A8. L1 seta posterodorsal to L2 on A1

## FIGURES 111-115

*Glyphodes pylosalis* Walker, 1859

111, head. 112, prothoracic shield. 113, mesothorax (T2). 114, abdominal segment 1 (A1). 115, abdominal segment 9 (A9).

to A8. SV group bisetose on A1. SD1 pinaculum pigmented and not reduced A2 and A7. SD1 seta posteroventral to D1 on A9. Crochets triordinal.

*Host:* *Broussonetia papyrifera* L. (Moraceae).

*Comments.* The larva is solitary in a web on the back of a leaf folding over parts of the leaf.

*Distribution:* Taiwan; Japan.

23. *Glyphodes pyloalis* Walker, 1859 (Figs.111-115)

*Material examined.* Hualien:Minli, 8 November, 1990, *Morus australis* Poir, 4 specimens (NMNS-LCN:265).

*Description.* TL:21-22mm; HW:1.4mm; BW:2.4mm.

Head with posterior angle of frons two-thirds of distance to occipital foramen; adfrontals not reaching occipital foramen. Four pairs of dark spots on prothoracic shield; SD1, SD2, D2 pinacula pigmented with a tiny, fuscous spot, and a large, oval, fuscous spot posterodorsal to SD2. L pinaculum not enclosing spiracle on T1. D1-D2 and SD2-SD1 pinacula pigmented and not touching on T2 and T3. D1 seta posterodorsal to D2 on T2 and T3. SD2 seta posterodorsal to SD1 on T2 and T3. L1 seta dorsal to L2 on T2 and T3. D1 pigmented and not fused on dorsum of A1 to A8. L1 seta posterodorsal to L2 on A1 to A8. SV group bisetose on A1. SD1 pinaculum pigmented and not reduced on A2 and A7. SD1 seta posteroventral to D1 on A9. Crochets triordinal.

*Host:* *Morus australis* Poir (Moraceae).

*Parasitoids:* *Dolichogenidea* sp.; Ichneumonidae.

*Comments.* The larva is a leaf-folder. Leaves infested and become clear.

*Distribution:* Taiwan; Mainland China; Japan; Indian; Sri Lanka; Vietnam; Indonesia; The Philippines; Australia; Africa.

**24. *Parotis athysanota* (Hampson, 1912) (Figs. 116-120)**

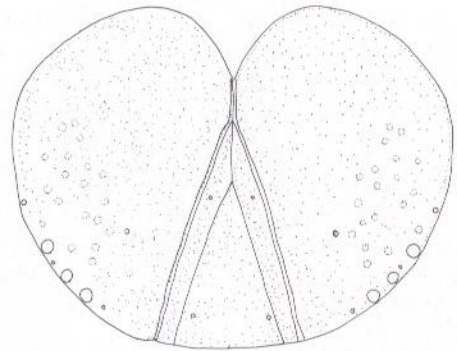
*Material examined.* Kaoshiung:Shanpin, 6-8 November, 1991, *Wendlandia uvariifolia*, 8 specimens (NMNS-LCN:190).

*Description.* TL:29mm; HW:1.9mm; AW:3.1mm.

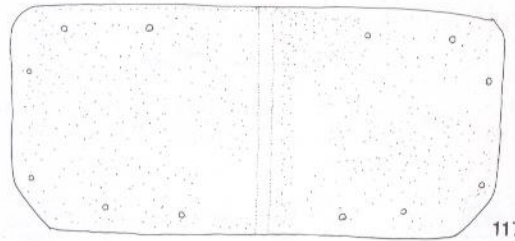
Head with posterior angle of frons half of distance to occipital foramen; adfrontals not reaching occipital foramen. Prothoracic shield fuscous. L pinaculum not enclosing spiracle on T1. D1-D2 and SD2-SD1 pinacula pigmented and not touching on T2 and T3. D1 seta directly dorsal to D2 on T2 and T3. SD2 seta posterodorsal to SD1 on T2 and T3. L1 seta dorsal to L2 on T2 and T3. D1 pinacula pigmented and not fused on dorsum of A1 to A8. L1 seta posterodorsal L2 on A1 to A8. SV group bisetose on A1. SD1 pinaculum pigmented and not reduced on A2 and A7. SD1 seta posteroventral to D1 on A9. Crochets triordinal.

*Host:* *Wendlandia uvariifolia* (Rubiaceae).

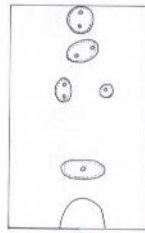
*Comments.* The larva is a leaf-folder.



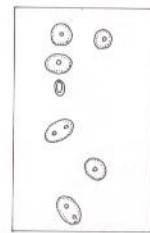
116



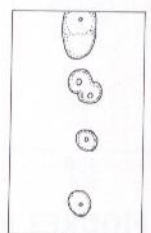
117



118



119



120

**FIGURES 116-120**

*Parotis athysanota* (Hampson, 1912)

116, head. 117, prothoracic shield. 118, mesothorax (T2). 119, abdominal segment 1 (A1). 120, abdominal segment 9 (A9).

*Distribution:* Taiwan; Mainland China.

**25. *Maruca vitrata* (Fabricius, 1787) (Figs. 121-125)**

*Material examined.* Pintung:Kenting, 20 Jan., 1994, *Phaseolus vulgaris*, 2 specimens. Tainan: Shanhu, 23 April, 1990, *Glycine max*, 2 specimens (NMNS-LCN:25).

*Description.* TL:15-16mm; HW:1.4mm; BW:2.6mm.

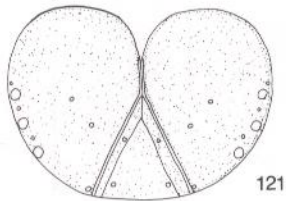
Head, prothoracic shield, and pinacula black. Head with posterior angle of frons less than half of distance to occipital foramen; adfrontals not reaching occipital foramen. Prothoracic shield

heavily pigmented except along middorsum. L pinaculum not enclosing spiracle on T1. D1-D2 and SD2-SD1 pinacula not touching on T2 and T3. D1 seta dorsal to D2 on T2 and T3. SD2 seta dorsal to SD1 on T2 and T3. L1 seta dorsal to L2 on T2 and T3. D1 pinacula not fused on dorsum of A1 to A8. L1 seta postero-dorsal to L2 on A1 to A8. SV group bisetose on A1. SD1 pinaculum not reduced on A2 and A7. SD1 seta posteroventral to D1 on A9. Crochets triordinal.

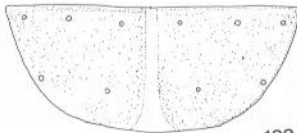
*Hosts: Phaseolus vulgaris, Glycine max* (Leguminosae).

*Comments.* The larva is a pod-borer.

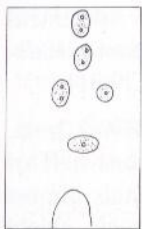
*Distribution:* Taiwan; Mainland China; Japan; Korea; India; Sri Lanka; Hawaii; Australia.



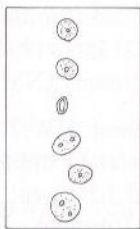
121



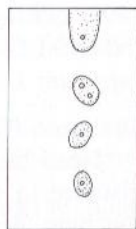
122



123



124

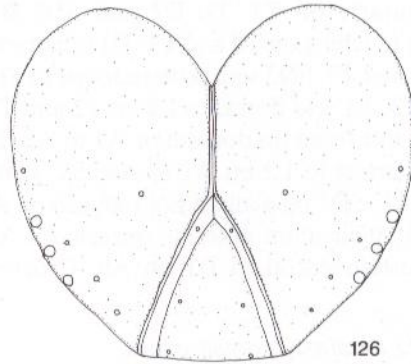


125

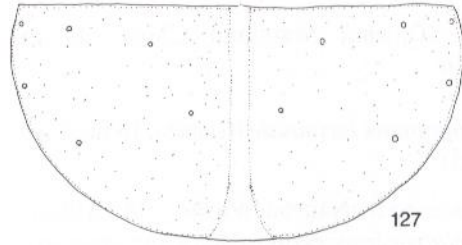
#### FIGURES 121-125

*Maruca vitrata* (Fabricius, 1787)

121, head. 122, prothoracic shield. 123, mesothorax (T2). 124, abdominal segment 1 (A1). 125, abdominal segment 9 (A9).



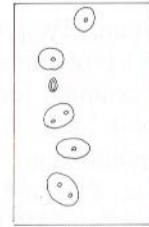
126



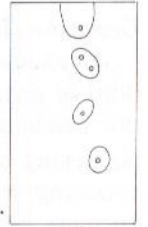
127



128



129



130

#### FIGURES 126-130

*Omphisa anastomosalis* (Guenee, 1854)

126, head. 127, prothoracic shield. 128, mesothorax (T2). 129, abdominal segment 1 (A1). 130, abdominal segment 9 (A9).

#### 26. *Omphisa anastomosalis* Guenée, 1854 (Figs. 126-130)

*Materials examined.* Tainan:Shanhua, 23 April, 1990; *Ipomea batatas*, 10 specimens (NMNS-LCN: 155).

*Description.* TL:23-24mm; HW:2.4mm; BW:3.4mm.

Head brown, with posterior angle of frons half of distance to occipital foramen; adfrontals not reaching occipital foramen. Prothoracic shield pale yellow with no pair of dark spot. L-pinaculum

enclosing spiracle on T1. D1-D2 and SD2-SD1 pinacula not touching on T2 and T3. D1 seta dorsal to D2 on T2 and T3. SD2 seta posterodorsal to SD1 on T2 and T3. L1 seta dorsal to L2 on T2 and T3. D1 pinacula not fused on dorsum of A1 to A8. L1 seta posterodorsal to L2 on A1 to A8. SV group bisetose on A1. SD1 pinaculum not reduced on A2 and A7. SD1 pinaculum anterior spiracle on A8. SD1 seta posteroventral to D1 on A9. Crochets triordinal.

Host: *Ipomea batatas*, *Ipomea edulis*.

Comments. Larva is a tuber-borer.

Distribution: Taiwan; Mainland China; Japan; Korea; India.

**27. *Herpetogramma luctuosale* (Guenée, 1854) (Figs. 131-135)**

Material examined. Nantou:Wushe, 16 August, 1990 *Ampelopsis brevipedunculata* var. *hancei*, 1 specimen (NMNS-LCN:244).

Description. TL:27-28mm; HW:1.4mm; BW:2.8mm.

Head fuscous, with posterior angle of frons two-third of distance to occipital foramen; adfrontals not reaching occipital foramen. Thoracic shield pigmented except middorsum. L pinaculum not enclosing spiracle on T1. D1-D2 and SD2-SD1 pinacula not touching on T2 and T3. D1 seta posterodorsal to D2 on T2 and T3. SD2 seta posterodorsal to SD1 on T2 and T3. L1 seta directly dorsal to L2 on T2 and T3. D1 pinacula not fused on dorsum of A1 to A8. L1 seta posterodorsal to L2 on A1 to A8. SV group trisetose on A1. SD1 pinaculum not reduced on A2 and A7. SD1 seta posteroventral to D1 on A9. Crochets triordinal.

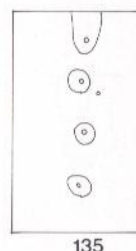
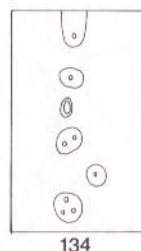
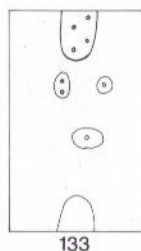
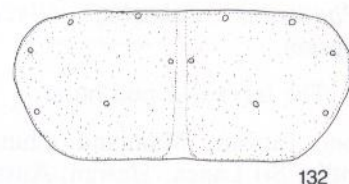
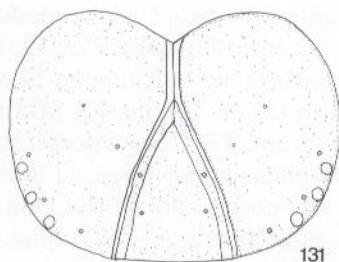
Hosts: *Ampelopsis brevipedunculata* var. *hancei*, *Parthenocissus tricuspidata*; *Vitis vinifera*; *Vitis ficifolia* (Vitaceae).

Parasitoids: *Dolichogendicea* sp. and Ichneumonidae.

Comments. Larva is a solitary leaf-roller, rolling the foliage at the tip, webbing the leaf from outside to inside and become tube-shaped.

Distribution: Taiwan; Mainland China; Japan.

**28. *Herpetogramma licarsisale* (Guenee, 1854) (Figs. 136-140)**



FIGURES 131-135

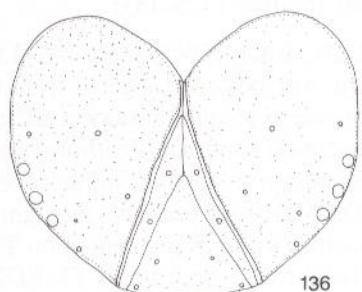
*Herpetogramma luctuosale* (Guenee, 1854)

131, head. 132, prothoracic shield. 133, mesothorax (T2). 134, abdominal segment 1 (A1). 135, abdominal segment 9 (A9).

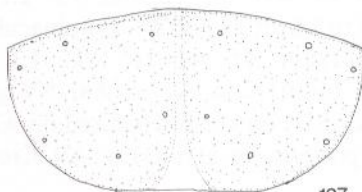
Material examined. Nantou:Wushe, 22-23 Oct., 1991, *Solanum verbascifolium* L., 5 specimens (NMNS-LCN:197). 20 Jan., 1994, *Solanum pseudocapsicum* L., 5 specimens (NMNS-LCN:31).

Description. TL:21-22mm; HW:1.8mm; BW:3.2mm.

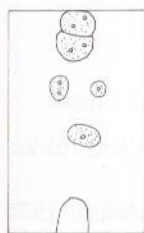
Head black, posterior angle of frons half of distance to occipital foramen; adfrontals almost touching occipital foramen. Prothoracic shield black. L pinaculum not enclosing spiracle on T1. D1-D2 and SD2-SD1 pinacula fused on T2. D1 seta posterior to D2 on T2 and T3. SD2 posterodorsal to SD1 on T2 and T3. L1 dorsal to L2 on T2 and T3. D1 pinacula not fused on A1 to A8. L1 seta posterodorsal to L2 on A1 to A8. SV group trisetose



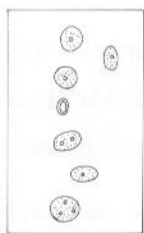
136



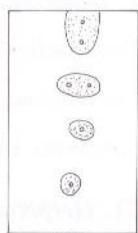
137



138



139



140

## FIGURES 136-140

*Herpetogramma licarsisale* (Guenee, 1854)

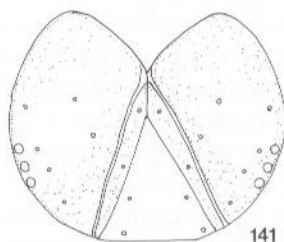
136, head. 137, prothoracic shield. 138, mesothorax (T2). 139, abdominal segment 1 (A1). 140, abdominal segment 9 (A9).

on A1. SD1 pinaculum not reduced on A2 and A7. SD1 seta posterior to D1 on A9. Pinaculum conspicuous and heavily pigmented. Crochets triordinal.

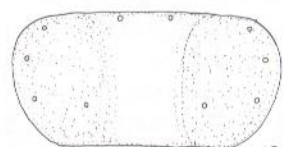
*Hosts:* *Solanum verbascifolium* L., *Solanum pseudocapsicum* L., *Solanum capsicastrum* (Solanaceae).

*Comments.* Larva is a leaf-roller, rolling the foliage at the tip, webbing the leaf by silken threads, and become ball-shaped, usually several larvae fed together.

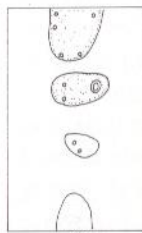
*Distribution:* Taiwan; Japan.



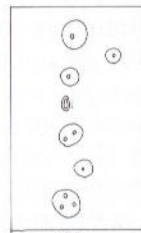
141



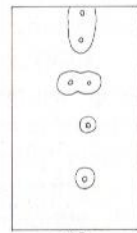
142



143



144



145

## FIGURES 141-145

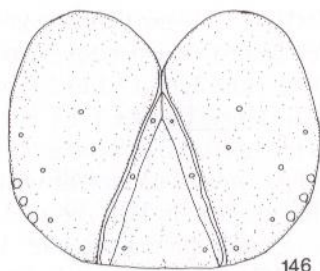
*Herpetogramma basale* (Walker, 1866)

141, head. 142, prothoracic shield. 143, prothorax (T1). 144, abdominal segment 1 (A1). 145, abdominal segment 9 (A9).

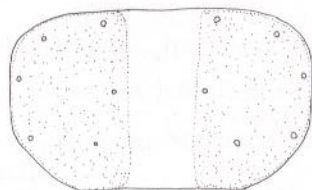
29. *Herpetogramma basale* (Walker, 1866) (Figs. 141-146)

*Material examined.* Nantou:Wushe, 27-29 August, 1991, *Amaranthus spinosus* L., 5 specimens (NMNS-LCN:212).

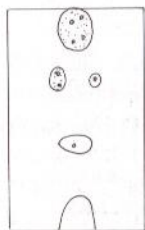
*Description.* Head with posterior angle of frons three-quarters of distance to occipital foramen; adfrontals not reaching occipital foramen. Prothoracic shield with fuscous shades as illustrated. L pinaculum enclosing spiracle on T1. D1-D2 and SD2-SD1 pinacula heavily pigmented and fused on T2. D1 seta posterodorsal to D2 on T2 and T3. SD2 seta posterodorsal to SD1 on T2 and T3. L1 directly



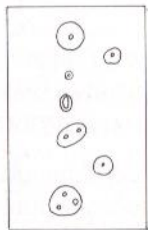
146



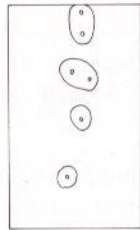
147



148



149



150

#### FIGURES 146-150

#### *Herpetogramma rude* (Warren, 1892)

146, head. 147, prothoracic shield. 148, mesothorax (T2). 149, abdominal segment 2 (A2). 150, abdominal segment 9 (A9).

dorsal to L2 on T2 and T3. D1 pinacula not fused on A1 to A8. L1 seta posterodorsal to L2 on A1 to A8. SV group trisetose on A1. SD1 pinaculum not reduced on A2 and A7. SD1 seta directly posterior to D1 on A9. Crochets triordinal.

*Host: Amaranthus spinosus* L. (Amaranthaceae).

*Comments.* The larva is a solitary leaf-folder, folding and webbing the leaves together by silken threads.

*Distribution:* Taiwan; Japan.

#### 30. *Herpetogramma rude* (Warren, 1892) (Figs. 147-150)

*Material examined.* Nantou:Wushe, 16-18 May, 1990, *Achyranthes aspera* L. var. *rubro-fusca* Hook

f., 5 specimens (NMNS-LCN:185).

*Description.* TL:20-21mm; HW:1.4mm; BW:2.8mm.

Head brown, with posterior angle of frons three-quarters of distance to occipital foramen; adfrontals not reaching occipital foramen. Prothoracic shield brown. L pinaculum enclosing spiracle on T1. D1-D2 and SD2-SD1 fused and heavily pigmented on T2, not touching and not pigmented on T3. D1 seta posterodorsal to D2 on T2 and T3. SD2 seta posterodorsal to SD1 on T2 and T3. L1 seta posterodorsal to L2 on T2 and T3. D1 pinacula not fused on dorsum of A1 to A8. L1 seta posterodorsal to SD1 on A1 to A8. SV group trisetose on A1. SD1 pinaculum reduced on A2 and A7. SD1 seta posteroventral to D1 on A9. Crochets triordinal.

*Host: Achyranthes aspera* L. var. *rubro-fusca* Hook f. (Amaranthaceae).

*Parasitoids: Glyptapantales* sp.

*Distribution:* Taiwan; Mainland China; Japan.

*Comments.* Larva is solitary leaf-roller or leaf folder.

#### 31. *Herpetogramma okamotoi* Yamanaka, 1976 (Figs.151-155)

*Material examined.* Nantou:Wushe; 16 Nov., 1992, *Dryopteris* spp. 1 specimen (NMNS-LCN:188).

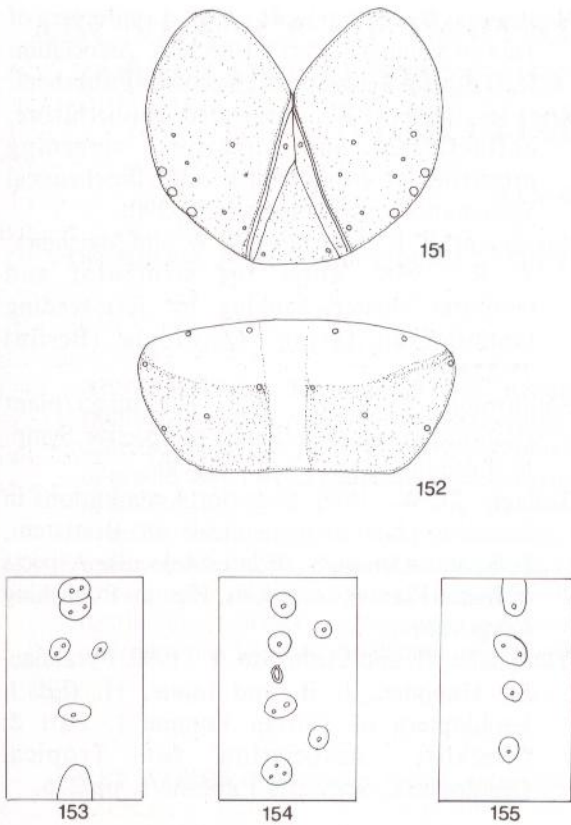
*Description.* TL:15-16mm; HW:1.4mm; BW:2.1mm.

Head brown with posterior angle of frons three-quarters of distance to occipital foramen; adfrontals reaching occipital foramen. L pinaculum not enclosing spiracle on T1. D1-D2 and SD2-SD1 pinacula touching on T2 but not on T3. D1 seta posterodorsal to D2 on T2 and T3. SD2 seta posterodorsal to SD1 on T2 and T3. L1 seta posterodorsal to L2 on T2 and T3. D1 pinacula not fused on dorsum of A1 to A8. L1 seta posterodorsal to L2 on A1 to A8. SV group trisetose on A1. SD1 pinaculum not reduced on A2 and A7. SD1 seta posteroventral to D1 on A9. Crochets triordinal.

*Host: Dryopteris* spp. (Dryopteridaceae).

*Comments.* The larva is solitary leaf-roller, and webbing the leaf together by silken threads, becoming ball-shaped.

*Distribution:* Taiwan; Japan.



FIGURES 151-155

*Herpetogramma okamotoi* Yamanaka, 1976

151, head. 152, prothoracic shield. 153, mesothorax (T2). 154, abdominal segment 1 (A1). 155, abdominal segment 9 (A9).

## DISCUSSION

Leaf-tying, leaf-rolling, stem-, and fruit-boring are the characteristic feeding modes of the 31 species of pyraustine larvae. These larval feeding behaviors may have been initially responses to pressure inflicted by natural enemies and/or mechanisms to optimize the microclimate of the developing larva (Chauvin, 1967).

Shelters constructed by the pyraustine larvae serve many functions. Similar to other phytophagous insects, the pyraustine larvae must deal with a plant's chemical defenses, desiccation, and maintain a foodhold on the plant surface (Southwood, 1973). The feeding shelter provides a

microenvironment which supports the feeding larva and minimizes the problem of desiccation. The shelter also provides a measure of protection from visually-hunting predators (Ruehlmann *et al.* 1988).

Leaf-rolling or leaf-tying, reduced the possibility of desiccation and the impact of natural enemies. Leaf ties built of old leaves were more effective at reducing predation than were those built of young leaves, probably because older leaves maintained their shape, while young leaves wilted.

In many plants the proportion of crude protein in leaves decrease at the leaves age increase. Meanwhile, that of structural carbohydrates increases and fats remain more or less constant. Low nutritional quality of mature plant leaves generally leads to slow growth of insects. Slow growth is thought to increase the vulnerability of insects to their natural enemies. By attacking mature foliage, leaf chewers may avoid toxins or repellents present in high concentrations in the young leaves of some plants (Rhoades 1977, Cates 1980).

In most of the pyraustine moths, larvae preferred nutritionally poor old leaves arranged to form a shelter rather than nutritionally superior young leaves without shelter, indicating that protection from enemies was more important than nutrition to the larvae. Slow growth in the leaf tying shelter need not invariably lead to greater exposure of insects to natural enemies (Damman, 1987).

Phytophagous insects have the capacity to develop behavioral, physiological and biochemical resistance mechanisms in response to chemical selection pressures. A behavioral defense against a toxic chemical may be conceived as a behavior that allows an insect to feed on a plant despite the presence of toxicants in or on it. The trenching and the vein-cutting by several pyraustine larvae may probably have similar behavioral defense against a toxic chemicals in squash beetle when feeding on cucurbits containing cucurbitacins (Tallamy, 1986) and are directed against a mechanical obstacle to feeding (gumming of the mandibles). Further studies must be conducted to ensure they have a similar defense mechanism.

## ACKNOWLEDGEMENTS

Thanks are given to Mr. C. K. Lin, and MS. C. M. Wang, Botany Department, National Museum of Natural Sciences for identifying the host plants. Thanks are also given to Dr. L. I.

Chou, Applied Zoology, Taiwan Agricultural Research Institute, for identifying the parasites. The author would like to thank the National Science Council R. O. C. for financial support of this manuscript under Contract No.NSC 81-0211-B-175-501.

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Revised manuscript accepted July 17, 1995

## 描述31種台灣野螟終齡幼蟲形態

林政行

### 摘要

本報告描述31種台灣野螟終齡幼蟲形態特徵，並附圖及檢索表說明及介紹幼蟲取食習性及天敵。

關鍵詞：野螟、幼蟲、寄主植物、寄生蜂