



Research article

Checklist of the Tribe Spilomelini (Lepidoptera: Crambidae: Pyraustinae) in Thailand

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Abstract

In total, 100 species in 40 genera of the tribe Spilomelini were confirmed to occur in Thailand based on the specimens preserved in Thailand and Japan. Of these, 47 species were new records for Thailand. *Conogethes tenuialata* Chaovalit and Yoshiyasu, 2019 was the latest new recorded species from Thailand. This information will contribute to an ongoing program to develop a pest database and subsequently to a facilitate pest management scheme in Thailand.

Introduction

The tribe Spilomelini Guenée (1854) is one of the largest tribes and belongs to the subfamily Pyraustinae, family Crambidae; it consists of 55 genera and 5,929 species worldwide with approximately 86 genera and 220 species of Spilomelini being reported in North America (Hodges et al., 1983). Yamanaka and Yoshiyasu (1992) reported 87 genera and 217 species in Taiwan, while 125 genera and 360 species have been reported in Australia (Shaffer et al., 1996) and 91 genera and 241 species have been recorded in Japan (Yoshiyasu, 2013).

The Spilomelini moths are characterized by adults that are small to medium in size (wingspan 12–20 mm). The head is usually smooth-scaled, but sometimes has an anterior tuft of scales. Ocelli are usually present. Chaetosemata are absent. Labial palpus are upturned or porrect. Abdominal hearing organs, tympanal organ, are distinct. Praecinctorium is well developed. The wing venation with CuP is absent and 1A + 2A has a large basal fork in the forewing.

The tribe Spilomelini is one of the major pests in tropical and subtropical regions. Moths in this tribe have been considered as the major pests of economic crops such as rice, sugarcane, bean pods and corn (Khan et al., 1988; Hill, 2007), durian (Kuroko and Lewvanich, 1993), citrus, peach and macadamia, (Common, 1990), mulberry (Sharifi et al., 2013), ginger (El-Sayed et al., 2013) and cabbage, broccoli, mustard, eggplant, radish and all Brassicaceae (Aria et al., 1982; Mewis et al., 2003). The larval stage of some Spilomelini genera (*Chanapochocis*, *Conogethes*, *Diaphania*, *Glyphodes*, *Herpetogramma*, *Maruca*, *Leucinodes*, *Omiodes*) are important pests of certain tropical crops in the families Poaceae, Fabaceae, Cucurbitaceae, Solanaceae, Bombacaceae, Sapindaceae, Sapindaceae and Apocynaceae (Munroe, 1976; 1995; Robinson et al., 1994; Lewvanich, 2001; Yoshiyasu, 2013). The larvae are leaf feeders, leaf rollers, leaf miners, stem borers and sometimes a combination of these that can cause high crop yield losses (Solis, 1996; Mewis et al., 2001). The aim of this study was to document the species of Thai Spilomelini based on the morphological characters of the adult. This study will hopefully contribute to pest management and an ongoing program to develop a pest database in Thailand.

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Materials and Methods

The materials used in this study were based on the preserved specimens in the Entomology and Zoology Group, Plant Protection Research and Development Office, Department of Agriculture, Bangkok, Thailand (DOA), the Entomological Laboratory, Osaka Prefecture University (OPU), Japan and the National Museum of Natural History of Japan (NMJ) Tokyo, Japan. The abbreviations used for collectors of main materials in OPU based on a collection of expeditions to Thailand in 1981, 1983, 1985 and 1987 are: SM = S. Moriuti; TS = T. Saito; YA = Y. Arita; YY = Y. Yoshiyasu; HK = H. Kuroko. The adults were killed using the ammonia. All specimens were set on spreading boards and dried in an oven at 50°C for at least 2wk. They were photographed using a Canon DS126311 with a Macro Lens EF – S 60 mm. The genitalia dissection was prepared and made following Robinson (1976), Maes (1985) and Common (1990).

Identification to the species level was based on comparisons with published descriptions, illustrations and type specimens. Type specimens were examined in consultation with the Crambidae specialist, Professor Yutaka Yoshiyasu (University of Osaka Prefecture, Japan).

Results

In total, 100 species representing 40 genera in the tribe Spilomelini were confirmed to occur in Thailand: *Aetholix*, *Agathodes*, *Agrioglypta*, *Agrotera*, *Antigastra*, *Arthroschista*, *Bocchoris*, *Botyodes*, *Cnaphalocrocis*, *Conogethes*, *Cotachena*, *Cydalima*, *Diaphania*, *Euclasta*, *Eurrhapharodes*, *Filodes*, *Glyphodes*, *Haritalodes*, *Herpetogramma*, *Heterocnephes*, *Lamprophaia*, *Leucinodes*, *Maruca*, *Meroctena*, *Nausinoe*, *Nevrina*, *Omiodes*, *Omphis*, *Pagyda*, *Palpita*, *Parotis*, *Pleuroptya*, *Prooedema*, *Prorodes*, *Pygospila*, *Sameodes*, *Sisyrophora*, *Syllepte*, *Synclera* and *Terastia*. The following are the species of the tribe Spilomelini in Thailand, where the symbols ♂ and ♀ represent male and female, respectively:

1. *Aetholix flavibasalis* (Guenée, 1854)* (Fig. 1) Material examined: Thailand: 1♂(DOA), Chanthaburi, 23 VII 2002, S. Suwongsaksri; 1♂(DOA), Chanthaburi, 27 XII 1999, K. Poochan. Distribution: Brunei, India, Indonesia, Malaysia, Papua New Guinea, the Philippines, Singapore, Sri Lanka and Thailand. Larval host plant: *Garcinia mangostana*.

2. *Agathodes ostentalis* (Geyer, 1837) (Fig. 2) Material examined: Thailand: 1♂(DOA), Chaiyaphum, 31 I 2013, A. Lewvanich. 1♀(DOA), Ratchaburi, 12 VI 2012, S. Chaovalit. Distribution: Australia, China, Hong Kong, India, Indonesia, Japan, Taiwan and Thailand. Larval host plant: *Erythrina variegata*, *Rauwenhoffia siamensis*.

3. *Agathodes caliginosalis* Snellen, 1895* (Fig. 3) Material examined: Thailand: 1♀(DOA), Chaiyaphum, 31 I 2013, S. Chaovalit; 9♀1♂(OPU), Chiang Mai, 18 VIII 1981, HK, SM, YA, YY. Distribution: Brunei, Indonesia, the Philippines, Singapore and Thailand. Larval host plant: *Erythrina variegata*.

4. *Agrioglypta eurytusalis* (Walker, 1859) Material examined: Thailand: 1♂(OPU), Chanthaburi, 6 VI 1983, HK, SM, YA, YY; 1♀(DOA), Chiang Mai, 17 XI 1998, A. Lewvanich. Distribution:

Australia, Cambodia, India, Indonesia, Japan, Sri Lanka, Taiwan and Thailand. Larval host plant: Unknown.

5. *Agrioglypta itysalis* (Walker, 1859)* (Fig. 5) Material examined: Thailand: 2♂1♀(DOA), Loei, 19 VIII 1987, SM, TS, YA, YY. Distribution: India, Indonesia and Thailand. Larval host plant: Unknown.

6. *Agrotera basinotata* Hampson, 1891 (Fig. 6) Material examined: Thailand: 1♂2♀(DOA), Lopburi, 27 VIII 2000, S. Suwongsaksri. Distribution: Australia, Hong Kong, Japan and Thailand. Larval host plant: *Lagerstroemia loudonii*, *L. undulata*.

7. *Agrotera leucostola* Hampson, 1896* (Fig. 7) Material examined: Thailand: 1♂3♀(DOA), Bangkok, 12 XI 1991, H. Kuroko. Distribution: Indian, Taiwan and Thailand. Larval host plant: *Lagerstroemia floribunda*, *Mussaenda sanderiana*, *Syzygium jambos*.

8. *Antigastra catalaunalis* (Duponchel, 1833) (Fig. 8) Material examined: Thailand: 3♂3♀(DOA) Chiang Mai, 2 VIII 1972, B. Sirichan. Distribution: Southern widespread in tropical, subtropical regions and Thailand. Larval host plant: *Sesamum indicum*, *Tecoma alata*, *T. capensis*.

9. *Arthroschista hilaralis* (Walker, 1859)* (Fig. 9) Material examined: Thailand: 1♂(DOA), Chaiyaphum, 14 IV 1987, A. Lewvanich; 2♀(DOA), Saraburi, 17 IX 1983, K. Thanchabosin. Distribution: Australia, Cambodia, India, Indonesia, Myanmar, Sri Lanka and Thailand. Larval host plant: *Neolamarckia cadamba*.

10. *Arthroschista tricoloralis* (Pagenstecher, 1888) (Fig. 10) Material examined: Thailand: Nakhon Nayok, 1♂1♀(DOA), 7 VIII 1987, SM, TS, YA, YY. Distribution: Australia, Indonesia, Malaysia, the Philippines and Thailand. Larval host plant: Unknown.

11. *Bocchoris artificialis* (Lederer, 1863) (Fig. 11) Material examined: Thailand: 1♂1♀(DOA), Bangkok, 4 IV 1934, A. Manyeegul. Distribution: Australia and Thailand. Larval host plant: *Parthenocissus quinquefolia*.

12. *Botyodes Asialis* Guenée, 1854 (Fig. 12) Material examined: Thailand: 1♂1♀(DOA), Bangkok, 13 IX 1919, E. J. Godfrey. Distribution: Australia, Cameroon, DR Congo, Fiji, France, Hong Kong, India, Madagascar, Papua New Guinea, the Philippines, Rwanda, Samoa, South Africa, Sri Lanka, Zimbabwe and Thailand. Larval host plant: *Casearia kerrii*, *C. grewiaefolia*, *Erythrina variegata*.

13. *Botyodes principalis* Leech, 1889 (Fig. 13) Material examined: Thailand: 1♂2♀(DOA), Chiang Mai, 16 IX 1987, SM, TS, YA, YY. Distribution: China, India, Japan, Russia, Taiwan and Thailand. Larval host plant: Unknown.

14. *Cnaphalocrocis exigua* (Butler, 1879) (Fig. 14) Material examined: Thailand: 1♀(DOA), Chiang Mai, 2 II 2015, A. Rakkasikorn. Distribution: China, Fiji, Japan and Thailand. Larval host plant: *Cynodon dactylon*, *Dactyloctenium aegyptium*, *Echinochloa colona*, *E. crus – galli*, *Imperata cylindrica*, *Leersia hexandra*, *Leptochloa chinensis*, *Oryza sativa*, *Panicum repens*, *Paspalum conjugatum*, *P. distichum*, *Sorghum bicolor*, *Urochloa mutica* and *Zea mays*.

15. *Cnaphalocrocis medinalis* (Guenée, 1854) (Fig. 15) Material examined: Thailand: 20♂, 18♀(DOA), Bangkok, 14 V 1987, A. Lewvanich. Distribution: Australia, Hong Kong, Sri Lanka, Taiwan and Thailand. Larval host plant: *Brachiaria mutica*, *Oryza sativa*, *Zea*

mays, *Triticum* sp., *Saccharum* sp. and *Sorghum* sp.

16. *Cnaphalocrocis patnalis* (Bradley, 1981) (Fig. 16) Material examined: Thailand: 8♂8♀(DOA), Chachoengsao, 29 IX 1985, V. Koontong. Distribution: India, Indonesia, Malaysia, the Philippines, Sri Lanka and Thailand. Larval host plant: *Cynodon dactylon*, *Dactyloctenium aegyptium*, *Echinochloa colona*, *E. crus – galli*, *Imperata cylindrica*, *Leersia hexandra*, *Leptochloa chinensis*, *Oryza sativa*, *Paspalum conjugatum*, *P. distichum*, *P. scrobiculatum*, *Saccharum officinarum*, *Sorghum bicolor*, *Zea mays*, *Cyperus difformis*, *C. iria*, *C. rotundus*.

17. *Cnaphalocrocis poeyalis* (Boisduval, 1833) (Fig. 17) Material examined: Thailand: 11♂(DOA), Bangkok, 20 IX 1935, P. Pholboon. Distribution: Africa, Australia, China, India, Indonesia, Japan, Myanmar, Sri Lanka and Thailand. Larval host plant: *Brachiaria mutica*, *Oryza sativa*.

18. *Cnaphalocrocis ruralis* Walker, 1859 (Fig. 18) Material examined: Thailand: 1♂(DOA), Bangkok, 23 II 1969, P. Pholboon; 1♀(DOA), Nakhon Si Thammarat, 28 II 1966, A. Samruadkit. Distribution: Africa, Australia, Fiji, India, Indonesia, Myanmar, Sri Lanka and Thailand. Larval host plant: Unknown.

19. *Cnaphalocrocis sanitalis* Snellen, 1880* (Fig. 19) Material examined: Thailand: 11♂9♀(DOA), Bangkok, 31 XII 1968, P. Pholboon. Distribution: Indonesia and Thailand. Larval host plant: *Oryza sativa*.

20. *Cnaphalocrocis stereogona* (Meyrick, 1886)* (Fig. 20) Material examined: Thailand: 1♂, 3♀(OPU), Bangkok, 6 VI 1983, SM, TS, YA, YY. Distribution: Fiji and Thailand. Larval host plant: Unknown.

21. *Cnaphalocrocis suspicalis* (Walker, 1859)* (Fig. 21) Material examined: Thailand: 10♂6♀(DOA), Nakhon Ratchasima, 16 VIII 1985, Bunsoom. Distribution: Australia and Thailand. Larval host plant: *Zea mays*.

22. *Conogethes evaxalis* (Walker, 1859) (Fig. 22) Material examined: Thailand: 2♂(OPU), Chanthaburi, 6 VI 1983, HK, SM, YA, YY; 1♂(DOA), Kamphaeng, 28 II 2013, S. Chaovalit. Distribution: India, Indonesia and Thailand. Larval host plant: *Dipterocarpus crinitus*, *D. grandiflorus*.

23. *Conogethes haemactalis* (Snellen, 1890)* (Fig. 23) Material examined: Thailand: 1♂(OPU), Chanthaburi, 25 VIII 1987, HK, SM, YA, YY, 1♀, Prachuap Khiri Khan, 13 IX 2014, S. Chaovalit. Distribution: Australia, India, Indonesia and Thailand. Larval host plant: Unknown.

24. *Conogethes parvipunctalis* Inoue and Yamanaka, 2006* (Fig. 24) Material examined: Thailand: 2♂1♀(OPU), Nakhon Nayok, 18 VI 1983, HK, SM, YA. Distribution: China, Japan and Thailand. Larval host plant: Euphorbiaceae.

25. *Conogethes pinicolalis* Inoue and Yamanaka, 2006* (Fig. 25) Material examined: Thailand: 1♂1♀(OPU), Chiang Mai, 7 IX 1987, HK, SM, YA, YY. Distribution: China, Japan and Thailand. Larval host plant: Pinaceae.

26. *Conogethes pluto* (Butler, 1887) (Fig. 26) Material examined: Thailand: 1♀(DOA), Bangkok, 7 IX 1987, S. Varathip; 1♂(OPU), Nakhon Nayok, 24 VIII 1981, HK, SM, YA, YY. Distribution:

Australia, Myanmar and Thailand. Larval host plant: Unknown.

27. *Conogethes punctiferalis* (Guenée, 1854) (Fig. 27) Material examined: Thailand: 1♂(DOA), Kamphaeng Phet, 26 II 2013, S. Chaovalit; 1♂(DOA), Kanchanaburi, 19 IX 2013, S. Chaovalit. Distribution: Australia, China, England, India, Japan, Netherlands, Pakistan, U.S.A, South – east Asia and Thailand. Larval host plant: *Durio zibethinus*, *Nephelium lappaceum*, *Litchi chinensis*, *Punica granatum*, *Psidium guajava*, *P. guajava*, *Ricinus communis*, *Sorghum bicolor*.

28. *Conogethes tenuialalis* Chaovalit and Yoshiyasu, 2019 (Fig. 28) Material examined: Thailand: 2♂2♀(OPU), Nakhon Nayok, 9 VIII 1987, SM, YA, YY. Distribution: Thailand. Larval host plant: Unknown.

29. *Cotachena alysoni* Whalley, 1961* (Fig. 29) Material examined: Thailand: 11♀(DOA), Chanthaburi, 12 VIII 1981, HK, SM, TS, YA; 2♂(OPU), Nakhon Nayok, 15 VI 1983, HK, SM, YA, YY. Distribution: China and Thailand. Larval host plant: Unknown.

30. *Cotachena brunnealis* Yamanaka, 2001 (Fig. 30) Material examined: Thailand: 2♂(DOA), Chiang Mai, 16 V 1983, HK, SM, YA, YY. Distribution: Japan and Thailand. Larval host plant: Unknown.

31. *Cotachena hicana* (Turner, 1915)* (Fig. 31) Material examined: Thailand: 3♂(OPU), Chanthaburi, 6 VI 1983, HK, SM, TS, YA. Distribution: Australia and Thailand. Larval host plant: Unknown.

32. *Cotachena histricalis* (Walker, 1859)* (Fig. 32) Material examined: Thailand: 1♂(DOA), Chanthaburi, 4 V 1937, C. Thongyai; 1♂(DOA), Chiang Mai, 14 VIII 1970, A. Wattanapongsiri. Distribution: Australia, China, Indonesia and Thailand. Larval host plant: Unknown.

33. *Cydalima conchylalis* (Guenée, 1854) (Fig. 33) Material examined: Thailand: 2♂(DOA), Bangkok, 22 XI 1931, A. Manyeegul; 1♂(DOA), Chiang Mai, 12 VIII 1973, A. Lewvanich. Distribution: India, Myanmar and Thailand. Larval host plant: Unknown.

34. *Cydalima laticostalis* (Guenée, 1854) (Fig. 34) Material examined: Thailand: 1♂(DOA), Bangkok, 22 XI 1931, A. Manyeegul; 1♀(DOA), Nakhon Nayok, 27 VII 1981, A. Lewvanich. Distribution: Australia, India, Malaysia, Myanmar, Sri Lanka and Thailand. Larval host plant: *Aglais dookoo*.

35. *Diaphania indica* (Saunders, 1851) (Fig. 35) Material examined: Thailand: 10♀(DOA), Bangkok, 20 XII 1989, C. Pitak; 1♂1♀(DOA), Bangkok, 20 XI 1957, Prachob. Distribution: Native to southern Asia and Thailand. Larval host plant: Cucurbitaceae, Fabaceae.

36. *Euclasta filigeralis* Lederer, 1863* (Fig. 36) Material examined: Thailand: 1♂(DOA), Bangkok, 31 VI 1969, P. Pholboon; 2♂(DOA), Chachoengsao, 29 XI 1931, P. Pholboon. Distribution: India and Thailand. Larval host plant: *Amphineurion marginata*.

37. *Euclasta maceratalis* Lederer, 1863* (Fig. 37) Material examined: Thailand: 1♂1♀(DOA), Bangkok, 4 X 1932, Seenual. Distribution: Australia and Thailand. Larval host plant: Unknown.

38. *Eurrhyarodes accessalis* (Walker, 1859)* (Fig. 38) Material examined: Thailand: 1♀(DOA), Nakhon Nayok, 27 VIII 1981,

A. Lewvanich; 1♀(DOA), Nakhon Si Thammarat, 18 I 1966, A. Lewvanich. Distribution: Japan and Thailand. Larval host plant: Unknown.

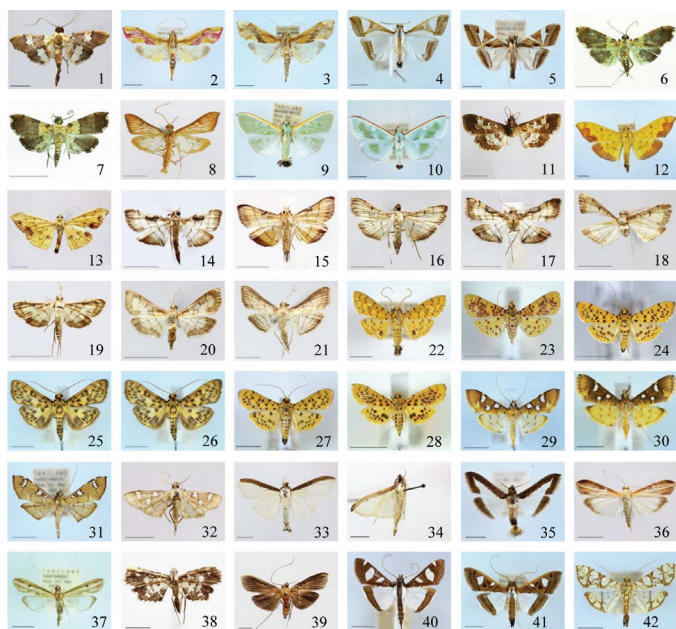
39. *Filodes fulvidorsalis* (Hübner, 1832) (Fig. 39) Material examined: Thailand: 1♂1♀(DOA), Mae Hong Son, 23 IV 1974, V. Koontong. Distribution: India, Indonesia, Myanmar, the Philippines, Sri Lanka and Thailand. Larval host plant: Unknown.

40. *Glyphodes actorionalis* Walker, 1859 (Fig. 40) Material examined: Thailand: 1♂4♀(DOA), Chanthaburi, 19 V 1937, C. Thongyai. Distribution: India, Indonesia, Japan, Malaysia, Sri Lanka, Zambia and Thailand. Larval host plant: *Erythrina variegata*, *Ficus elastica*, *F. racemosa*, *Pithecellobium dulce*.

41. *Glyphodes bivitalis* Guenée, 1854 (Fig. 41) Material examined: Thailand: 1♂(DOA), Chanthaburi, 8 VI 1983, HK, SM, YA, YY; 1♂(OPU), Kanchanaburi, 21 VIII 1981, HK, SM, YA, YY. Distribution: U.S.A and Thailand. It is native to south – east Asia. Larval host plant: *Erythrina variegata*, *Ficus benjamina*, *F. racemosa*, *Pithecellobium dulce*.

42. *Glyphodes caesalis* (Walker, 1859) (Fig. 42) Material examined: Thailand: 12♀4♂(DOA), Bangkok, 8 I 1953, P. Pholboon. Distribution: Australia, Bangladesh, Fiji, Hong Kong, India, Myanmar, Papua New Guinea, Sri Lanka and Thailand. Larval host plant: *Artocarpus altilis*, *A. heterophyllus*.

43. *Glyphodes canthusalis* Walker, 1859* (Fig. 43) Material examined: Thailand: 4♂(DOA), Chasongsao, 7 XI 1993, P. Pholboon. Distribution: Australia, India, Indonesia, Sri Lanka, Taiwan, Vietnam and Thailand. Larval host plant: Unknown.



Figs. 1–42 Adult specimens of: 1) *Aetholix flavibasalis*, 2) *Agathodes ostentalis*, 3) *Aga. caliginosalis*, 4) *Agrioglypta eurytusalis*, 5) *Agri. itysalis*, 6) *Agrotera basinotata*, 7) *Agro. leucostola*, 8) *Antigastra catalaunalis*, 9) *Arthroschista hilaralis*, 10) *Art. tricoloralis*, 11) *Bocchoris artificialis*, 12) *Botyodes Asialis*, 13) *Bot. principalis*, 14) *Cnaphalocrocis exigua*, 15) *Cn. medinalis*, 16) *Cn. patnalis*, 17) *Cn. poeyalis*, 18) *Cn. ruralis*, 19) *Cn. sanitalis*, 20) *Cn. stereogona*, 21) *Cn. suspicalis*, 22) *Conogethes evaxalis*, 23) *Con. haemactalis*, 24) *Con. parvipunctalis*, 25) *Con. pinicolalis*, 26) *Con. pluto*, 27) *Con. punctiferalis*, 28) *Con. tenuialata*, 29) *Cotachena alysoni*, 30) *Cot. brunnealis*, 31) *Cot. hicana*, 32) *Cot. histricalis*, 33) *Cydalima conchylalis*, 34) *Cy. laticostalis*, 35) *Diaphania indica*, 36) *Euclasta filigeralis*, 37) *Euc. maceratalis*, 38) *Eurrhynparodes accessalis*, 39) *Filodes fulvidorsalis*, 40) *Glyphodes actorionalis*, 41) *Gl. bivitalis*, 42) *Gl. caesalis*, (scale bar = 5 mm)

44. *Glyphodes conclusalis* Walker (1865) (Fig. 44) Material examined: Thailand: 1♂(DOA), Chanthaburi, 13 VIII 1981, HK, SM, YA, YY; 1♂, Sakaeo, 7 XI 2012, S. Chaovalit. Distribution: India and Thailand. Larval host plant: Unknown.

45. *Glyphodes cosmarcha* Meyrick, 1887* (Fig. 45) Material examined: Thailand: 1♂(OPU), Nakhon Nayok, 26 VIII 1981, HK, SM, YA, YY. Distribution: Australia, Papua New Guinea and Thailand. Larval host plant: *Ficus elastica*.

46. *Glyphodes onychinalis* (Guenée, 1854) (Fig. 46) Material examined: Thailand: 1♂1♀(DOA), Chanthaburi, 6 VI 1983, SM, TS, YA, YY; 1♂(DOA), Saraburi, 26 III 2013, S. Chaovalit. Distribution: Thailand, it is native to the Afro-Asian region. Larval host plant: Unknown.

47. *Glyphodes principalis* Walker, 1865 (Fig. 47) Material examined: Thailand: 1♂(DOA), Chanthaburi, 14 III 1974, A. Samruadkit; 2♂, Sakaeo, 7 XI 2012, S. Chaovalit. Distribution: Indonesia and Thailand. Larval host plant: Unknown.

48. *Glyphodes pseudocaesalis* Kenrick, 1912* (Fig. 48) Material examined: Thailand: 1♂(DOA), Chiang Mai, 19 XII 2016, S. Chaovalit; 1♂(DOA), Chiang Rai, 5 II 2015, S. Chaovalit. Distribution: Papua New Guinea and Thailand. Larval host plant: Unknown.

49. *Glyphodes pulverulentalis* Hampson, 1896 (Fig. 49) Material examined: Thailand: 2♂1♀(DOA), Pitsanulok, 6 IX 2010, S. Chaovalit. Distribution: Australia, China, Japan, Papua New Guinea and Thailand. Larval host plant: *Morus alba*, *Solanum melongena*.

50. *Glyphodes pyloalis* Walker, 1859* (Fig. 50) Material examined: Thailand: 2♂1♀(DOA), Chiang Mai, 3 VIII 1961, Chann. Distribution: China, Congo, India, Indonesia, Iran, Japan, North America, Sri Lanka, Taiwan and Thailand. Larval host plant: *Morus alba*.

51. *Glyphodes stolalis* Grenée, 1854 (Fig. 51) Material examined: Thailand: 1♂1♀(DOA), Chaiphaphum, 15 III 1981, A. Samruadkit. Distribution: Australia, Cameroon, China, Comoros, Congo, Gambia, Indian, Indonesian, Japan, Kenya, Malaysia, Myanmar, Sri Lanka, Taiwan, Uganda, Zimbabwe and Thailand. Larval host plant: *Ficus benjamina*.

52. *Haritalodes derogata* (Fabricius, 1775) (Fig. 52) Material examined: Thailand: 1♂(DOA), Chanthaburi, 6 VI 1983, V. Khoonthong; 1♂(DOA), Prachuap Kirikhan, 6 IX 1969, B. Lakagul. Distribution: Australia, China, Comoros, Congo, Fiji, France, Gambia, Ghana, India, Indonesia, Japan, Malaysia, Myanmar, Papua New Guinea, Samoa, Singapore, South Africa, Sri Lanka, Vietnam and Thailand. Larval host plant: *Gossypium herbaceum*.

53. *Herpetogramma admensalis* Walker 1859* (Fig. 53) Material examined: Thailand: 1♂(DOA), Bangkok, 13. VIII. 1963, B. Lakagul; 1♀(DOA), Bangkok, 5 XII 1931, Seenual. Distribution: France and Thailand. Larval host plant: Unknown.

54. *Herpetogramma bipunctalis* (Fabricius, 1794)* (Fig. 54) Material examined: Thailand: 8♂6♀(DOA), Chachaoengsao, 7 XI 1933, P. Pholboon. Distribution: U.S.A. and Thailand. Larval host plant: *Heliotropium indicum*, *Morinda citrifolia*, *Solanum stramonifolium*, *S. torvum*, *S. xanthocarpum*.

55. *Herpetogramma cynaralis* (Walker, 1859)* (Fig. 55) Material examined: Thailand: 1♀(DOA), Bangkok, 4 X 1932, Seenual; 3♂, Nonthaburi, 14 X 1991, H. Kuroko. Distribution: Korea and Thailand. Larval host plant: Unknown.

56. *Herpetogramma licarsialis* (Walker, 1859) (Fig. 56) Material examined: Thailand: 1♀(DOA), Bangkok, 31 XII 1948, Champee; 1♂(DOA), Phitsanulok, 23 XII 2016, S. Chaovalit. Distribution: Australia, China, Fiji, India, Japan, South – east Asia, Sri Lanka, USA and Thailand. Larval host plant: *Acanthus ebracteatus*, *Alternanthera paronichyoides*, *Gomphrena globos*, *Zea mays*.

57. *Herpetogramma luctuosalis* (Guenée, 1854)* (Fig. 57) Material examined: Thailand: 1♂1♀(DOA), Chiang Rai, 5 II 2015, A. Rukkasikorn. Distribution: Japan, Korea and Thailand. Larval host plant: Unknown.

58. *Herpetogramma phaeopteralis* (Guenée, 1854) (Fig. 58) Material examined: Thailand: 1♀(DOA), Chiang Rai, 26 III 2017, A. Rukkasikorn; 1♀(DOA), Mae Hong Son, 3 II 2015, A. Rukkasikorn. Distribution: Congo, Gambia, India, Kenya, Myanmar, South Africa, Sri Lanka, Sudan, U.S.A., Vietnam, Yemen, Zambia and Thailand. Larval host plant: Unknown.

59. *Herpetogramma salbialis* (Hampson, 1898) (Fig. 59) Material examined: Thailand: 1♂(DOA), Chiang Rai, 3 II 2015, A. Rukkasikorn. Distribution: Costa Rica, Honduras, Mexico and Thailand. Larval host plant: Unknown.

60. *Herpetogramma stultalis* (Walker, 1859)* (Fig. 60) Material examined: Thailand: 3♂2♀(DOA), Bangkok, 21 II 1952, Champee. Distribution: Australia, China, Congo, India, Japan, Malaysia, Pakistan, Papua New Guinea, Sri Lanka and Thailand. Larval host plant: *Alternanthera paronichyoides*.

61. *Heterocnephys lymphatalis* (Swinhoe, 1889)* (Fig. 61) Material examined: Thailand: 1♂(DOA), Chiang Mai, 16 XI 1987, SM, TS, YA, YY; 2♂(DOA), Chiang Mai, 12 VIII 1973, A. Lewvanich. Distribution: Cambodia, China, India, Indonesia, Malaysia, Myanmar and Thailand. Larval host plant: Unknown.

62. *Lamprophaia ablactalis* (Walker, 1859) (Fig. 62) Material examined: Thailand: 3♂(DOA), Chiang Mai, 14 V 1983, HK, SM, YA, YY. Distribution: Africa, Australia, France, Hong Kong, South – east Asia and Thailand. Larval host plant: *Sesbania grandiflora*.

63. *Leucinodes orbonalis* Guenée, 1854 (Fig. 63) Material examined: Thailand: 3♂ 1♀(DOA), Bangkok, 13 X 1997, A. Lewvanich. Distribution: Tropics in Asia and Africa, U.S.A. and Thailand. Larval host plant: *Solanum melongana*, *S. torvum*, *S. xanthocarpum*.

64. *Maruca vitrata* (Fabricius, 1787) (Fig. 64) Material examined: Thailand: 2♂4♀(DOA), Chachaoengsao, 27 I 1935, P. Pholboon. Distribution: Worldwide. Larval host plant: *Brassica juncea*, *Sesbania grandiflora*, *Saraca indica*, *Butea monosperma*, *Lablab purpureus*, *Vigna radiata*, *V. unguiculata*, *Cajanus cajan*, *Phasecolus vulgaris*, *Psophocarpus tetragonolobus*, *Sesbania javanica*.

65. *Meroctena tullalis* (Walker, 1859) (Fig. 65) Material examined: Thailand: 1♂(DOA), Kanchanaburi, 12 X 1935, C. Thongyai; 1♀(DOA),

Loei, XI. 1969, A. Samruadkit. Distribution: India and Thailand. Larval host plant: *Adinandra integerrima*, *Michelia champaca*, *Salix babylonica*.

66. *Nausinoe geometralis* (Guenée, 1854)* (Fig. 66) Material examined: Thailand: 1♂(DOA), Chiang Mai, 18 VII 1964, Seenual; 1♂(DOA), Chanthaburi, 22 VI 2010, S. Chaovalit. Distribution: Africa, Australia, India and Thailand. Larval host plant: *Jasminum auriculatum*, *J. officinale*.

67. *Nausinoe insolitalis* Walker, 1862 (Fig. 67) Material examined: Thailand: 1♀(DOA), Bangkok, 27 XI 1926, M.R.S. Ladel; 1♀(DOA), Chachaoengsao, 27 I 1935, P. Pholboon. Distribution: Madagascar and Thailand. Larval host plant: Unknown.

68. *Nausinoe perspectata* (Fabricius, 1775)* (Fig. 68) Material examined: Thailand: 1♀(OPU), Nakhon Nayok, 6 VIII 1981, HK, SM, YA, YY; 1♂(DOA), Phetchabun, 12 VIII 2010, S. Chaovalit. Distribution: Australia, China, Congo, India, Papua New Guinea, Sri Lanka, Taiwan and Thailand. Larval host plant: Unknown.

69. *Nevrina procopia* (Stöhl, 1781) (Fig. 69) Material examined: Thailand: 1♂1♀(DOA), Nakhon Nayok, 10 VIII 1987, SM, YA, YY. Distribution: Bhutan, India, Sri Lanka and Thailand. Larval host plant: Unknown.

70. *Omiodes anastrepta* Meyrick, 1899 (Fig. 70) Material examined: Thailand: 1♂(DOA), Phitsanulok, 23 XII 2016, S. Chaovalit. Distribution: Japan, U.S.A. and Thailand. Larval host plant: Unknown.

71. *Omiodes barcalis* (Walker, 1985)* (Fig. 71) Material examined: Thailand: 2♂1♀(DOA), Kanchanaburi, 24 VII 1993, A. Lewvanich. Distribution: Malaysia and Thailand. Larval host plant: *Cassia fistula*, *Crinum Asiaticum*, *Dalbergia cultrata*, *Senna alata*.

72. *Omiodes decialis* (Walker, 1866)* (Fig. 72) Material examined: Thailand: 2♀(DOA), Nakhon Nayok, 24 VIII 1981, HK, SM, YA, YY. Distribution: Australia, China, Indonesia, Japan and Thailand. Larval host plant: *Pachyrhizus erosus*.

73. *Omiodes diemenalis* (Guenée, 1854) (Fig. 73) Material examined: Thailand: 2♂2♀(DOA), Saraburi, 24 V 1961, Lamoon. Distribution: Australia, China, India, Indonesia, Papua New Guinea, Sri Lanka, Tasmania and Thailand. Larval host plant: *Glycine max*, *Vigna sinensis*.

74. *Omiodes indicata* (Fabricius) (Fig. 74) Material examined: Thailand: 1♂1♀(DOA), Roi-et, 15 X 1956, A. Manyeegul. Distribution: Australia, Cameroon, Congo, India, Mauritius, Mexico, Nigeria, Saudi Arabia, South Africa, U.S.A. and Thailand. Larval host plant: *Dolichos lablab*, *Glycine max*, *Phasolus ayreus*, *Vigna radiata*, *V. sinensis*.

75. *Omiodes miserus* (Butler, 1879)* (Fig. 75) Material examined: Thailand: 4♂(DOA), Chiang Mai, 16 IX 1987, SM, TS, YA, YY. Distribution: Japan and Thailand. Larval host plant: Unknown.

76. *Omiodes origoalis* (Walker, 1859)* (Fig. 76) Material examined: Thailand: 7♂(DOA), Chachaoengsao, 7 X 1933, P. Pholboon. Distribution: India, Indonesia and Thailand. Larval host plant: Unknown.

77. *Omphisa anastomosalis* Guenée, 1854 (Fig. 77) Material examined: Thailand: 21♂18♀(DOA), Nakhon Pathom, 21 II 1956, P. Penjit. Distribution: Cambodia, China, India, Indonesia, Japan, Laos, Malaysia, Myanmar, Papua New Guinea, the Philippines, Sri Lanka, Taiwan, U.S.A., Vietnam and Thailand. Larval host plant: *Cassia fistula*, *Ipomoea batatas*.

78. *Omphisa repetitalis* Snellen, 1890* (Fig. 78) Material examined: Thailand: 1♂(DOA), Chanthaburi, 5 X 1985, HK, SM, YA, YY; 1♀(DOA), Loei, 17 IV 1968, A. Wattanapong. Distribution: India and Thailand. Larval host plant: Unknown.

79. *Pagyda arbiter* (Butler, 1879)* (Fig. 79) Material examined: Thailand: 5♂2♀(DOA), Mae Hong Son, 24 VIII 1974, A. Lewvanichi. Distribution: Indonesia, China, Japan and Thailand. Larval host plant: Unknown.

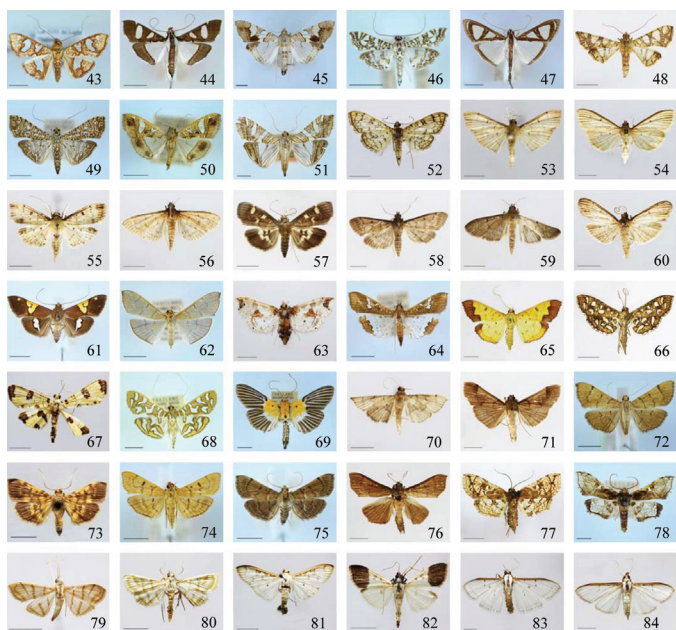
80. *Pagyda salvalis* Walker, 1859 (Fig. 80) Material examined: Thailand: 3♂1♀(DOA), Lop Buri, 9 IX 2013, S. Chaovalit. Distribution: Indonesia, China, Hong Kong, India, Indonesia, Japan, Myanmar, Papua New Guinea, the Philippines, South Africa, Sri Lanka and Thailand. Larval host plant: Unknown.

81. *Palpita annulata* (Fabricius, 1794)* (Fig. 81) Material examined: Thailand: 7♂3♀(DOA), Bangkok, 12 VIII 1962, Kit. Distribution: Australia, China, India, Myanmar, Queensland, Sri Lanka, Taiwan and Thailand. Larval host plant: Unknown.

82. *Palpita nigricollis* (Snellen, 1895) (Fig. 82) Material examined: Thailand: 1♂(DOA), Chonburi, 28 XII 1963, P. Pholboon; 2♂(DOA), Nakhon Ratchasima, 21 I 2011, S. Chaovalit. Distribution: Cambodia, Indonesia, the Philippines, West Malaysia and Thailand. Larval host plant: Unknown.

83. *Palpita nigropunctalis* (Bremer, 1864)* (Fig. 83) Material examined: Thailand: 2♂(DOA), Phichit, 24 III 2011, S. Chaovalit. Distribution: China, Japan, Korea, Russia, Taiwan and Thailand. Larval host plant: Unknown.

84. *Palpita pajinii* Kirti and Rose, 1992 (Fig. 84) Material examined: Thailand: 1♂(DOA), Chanthaburi, 31 V 1991, A. Lewvanich; 1♂(DOA), Kanchanaburi, 24 I 1975, A. Samruadkit. Distribution: Australia, China, India, Indonesia, Myanmar, Nepal, Papua New Guinea, the Philippines, Taiwan, Vietnam and Thailand. Larval host plant: Unknown.



Figs. 43–84 Adult specimens of: 43) *Glyphodes canthusalis*, 44) *Gl. conclusalis*, 45) *Gl. cosmarcha*, 46) *Gl. onychinalis*, 47) *Gl. principalis*, 48) *Gl. pseudocaesalis*, 49) *Gl. pulverulentalis*, 50) *Gl. pyloalis*, 51) *Gl. stolalis*, 52) *Haritalodes derogata*, 53) *Herpetogramma admensalis*, 54) *He. bipunctalis*, 55) *He. cynaralis*, 56) *He. licarsisalis*, 57) *He. luctuosalis*, 58) *He. phaeopteralis*, 59) *He. salbialis*, 60) *He. stultalis*, 61) *Heterocnephys lymphatalis*, 62) *Lamprophaia ablactalis*, 63) *Leucinodes orbonalis*, 64) *Maruca vitrata*, 65) *Meroctena tullalis*, 66) *Nausinoe geometralis*, 67) *Na. insolitalis*, 68) *Na. perspectata*, 69) *Nevrina procopia*, 70) *Omiodes anastrepta*, 71) *Om. barcalis*, 72) *Om. decialis*, 73) *Om. diemenalis*, 74) *Om. indicata*, 75) *Om. miseris*, 76) *Om. origoalis*, 77) *Omphisa anastomosalis*, 78) *Omp. repetitalis*, 79) *Pagyda arbiter*, 80) *Pag. salvalis*, 81) *Palpita annulata*, 82) *Pal. nigricollis*, 83) *Pal. nigropunctalis*, 84) *Pal. pajinii*, (scale bar = 5 mm)

85. *Parotis incurvata* (Warren, 1896)* (Fig. 85) Material examined: Thailand: 1♀(OPU), Chanthaburi, 6 VI 1983, HK, SM, TS, YA, YY; 1♀(DOA), Loei, 19 VIII 1987, SM, TS, YA, YY. Distribution: Australia, Indonesia and Thailand. Larval host plant: Unknown.

86. *Parotis marginata* (Hampson, 1893)* (Fig. 86) Material examined: Thailand: 1♂(DOA), Chanthaburi, 4 VI 1983, HK, SM, TS, YA; 1♀(OPU), Chiang Mai, 15 VII 1981, SM, TS, YA, YY. Distribution: Australia, Bangladesh, China, Fiji, India, Japan and Thailand. Larval host plant: Unknown.

87. *Parotis marinata* (Fabricius, 1794)* (Fig. 87) Material examined: Thailand: 2♂(OPU), Nakhon Nayok, 24 VIII 1981, HK, SM, YA, YY. Distribution: Australia, Congo, India, Papua New Guinea, South Africa, Sri Lanka and Thailand. Larval host plant: Unknown.

88. *Parotis punctiferalis* (Walker, 1866)* (Fig. 88) Material examined: Thailand: 1♂(DOA), Chanthaburi, 11 VIII 1981, HK, TS, YA, YY; 1♀(OPU), Chanthaburi, 6 VI 1983, HK, SM, TS, YA. Distribution: Australia, China, Papua New Guinea and Thailand. Larval host plant: Unknown.

89. *Parotis suralis* (Lederer, 1863)* (Fig. 89) Material examined: Thailand: 1♂(DOA), Yala, 27 VII 1973, A. Samruadkit. Distribution: Australia, Hong Kong, Japan and Thailand. Larval host plant: Unknown.

90. *Pleuroptya iopasalis* (Walker, 1859) (Fig. 90) Material examined: Thailand: 4♂(DOA), Nakhon Ratchasima, 25 VI 2009, S. Poonchaisri. Distribution: China, India, Indonesia, Myanmar, Papua New Guinea, the Philippines, Sri Lanka, Taiwan and Thailand. Larval host plant: Unknown.

91. *Pleuroptya plagiatalis* Walker, 1859* (Fig. 91) Material examined: Thailand: 3♂, 1♀(DOA), Chiang Mai, 14 X 1965, Chan. Distribution: Japan and Thailand. Larval host plant: *Streptocaulon juvenas*.

92. *Pleuroptya quadrimaculalis* (Kollar, 1844)* (Fig. 92) Material examined: Thailand: 1♂(OPU), Chiang Mai, 29 V 1983, HK, SM, YA, YY; 1♀(DOA), Chiang Mai, 21 V 1983, HK, SM, YA, YY. Distribution: Bhutan, China, Congo, India, Indonesia, Japan, Korea, Nepal, Russia, Taiwan and Thailand. Larval host plant: Unknown.

93. *Prooedema incisalis* Walker, 1896 (Fig. 93) Material examined: Thailand: 6♂3♀(DOA), Bangkok, 19 XII 1956, Boonprasuat. Distribution: Australia and Thailand. Larval host plant: Unknown.

94. *Prorodes mimica* Swinhoe, 1894* (Fig. 94) Material examined: Thailand: 5♂3♀(DOA), Nakhon Nayok, 20 IX 1969, B. Lekagul. Distribution: Australia, India, Malaysia, Myanmar, Papua New Guinea and Thailand. Larval host plant: Unknown.

95. *Pygospila tyres* (Cramer, 1780) (Fig. 95) Material examined: Thailand: 1♂(DOA), Bangkok, 2. XI. 1931, A. Manyeegul; 1♀(DOA), Chaiphaphum, 27 VIII 1997, A. Lewvanich. Distribution: Australia, Hong Kong, India and Thailand. Larval host plant: *Wrightia arborea*.

96. *Sameodes cancellalis* (Zeller, 1852) (Fig. 96) Material examined: Thailand: 4♂17♀(DOA), Chachoengsao, 10 X 1934. P. Pholboon. Distribution: China, Fiji, India, Indonesia, Japan, Malaysia, Myanmar, Nepal, Papua New Guinea, the Philippines, Sri Lanka, Taiwan, Southern Africa and Thailand. Larval host plant: Unknown.

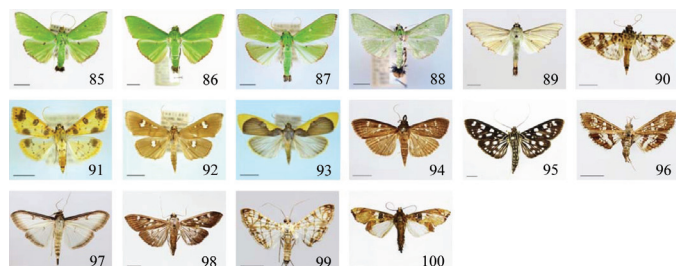
97. *Sisyrophora pfeifferae* Lederer, 1863* (Fig. 97) Material examined: Thailand: ♂(DOA), Kanchanaburi, 10 X 1935, C. Thongyai. Distribution: Australia, India, Indonesia, Myanmar, Singapore, Taiwan and Thailand. Larval host plant: Unknown.

98. *Syllepte iophanes* (Meyrick, 1894) (Fig. 98) Material examined: Thailand: 2♂2♀(DOA), Loei, 17 IV 1968, A. Wattanapong. Distribution: Cambodia, China, Indonesia and Thailand. Larval host plant: Unknown.

99. *Synclera univocalis* (Walker, 1859) (Fig. 99) Material examined: Thailand: 6♂3♀(DOA), Bangkok, 19 XII 1956, Boonprasuat. Distribution: India, Myanmar, South Africa, Sri Lanka, Syria, Yemen and Thailand. Larval host plant: *Zizyphus mauritiana*.

100. *Terastia egialealis* (Walker, 1859) (Fig. 100) Material examined: Thailand: 1♀(DOA), Chaiyaphum, 12 II 1990, V. Koontong; 1♂(OPU), Chiang Mai, 14 V 1983, HK, SM, YA, YY. Distribution: China, India, Indonesia, Malaysia, Nepal and Thailand. Larval host plant: Unknown.

* = new country record, (DOA) = the specimens were deposited in the DOA, (OPU) = the specimens were deposited in the OPU, Distribution and Larval host plant following Walker, (1859), Munroe (1976), Robinson (1976), Maes (1985), Common (1990), Lewvanich (1993), Robinson et al. (1994), Munroe (1995), Shaffer et al. (1996), Solis (1996), Kuroko and Lewvanich (2001) and Yoshiyasu (2013).



Figs. 85–100 Adult specimens of: 85) *Parotis incurvata*, 86) *Par. marginata*, 87) *Par. marinata*, 88) *Par. punctiferalis*, 89) *Par. suralis*, 90) *Pleuroptia iopasalis*, 91) *Pleuroptia plagiatalis*, 92) *Pl. quadrimaculalis*, 93) *Prooedema incisalis*, 94) *Prorodes mimica*, 95) *Pygospila tyres*, 96) *Sameodes cancellalis*, 97) *Sisyrophora pfeifferae*, 98) *Syllepte iophanes*, 99) *Synclera univocalis*, 100) *Terastia egialealis*, (scale bar = 5 mm)

Discussion

Of the 100 species in this study 47 were new country records. Furthermore, eight genera were considered as most significant crop pests: *Cnaphalocrocis*, *Conogethes*, *Diaphania*, *Glyphodes*, *Herpetogramma*, *Leucinodes*, *Maruca* and *Omiodes*. In particular, the genus *Cnaphalocrocis* is the most serious lepidopteran rice pests in various Asian countries and causes great crop losses (Khan et al., 1988). Common (1990) reported 35 species in the genus *Cnaphalocrocis* worldwide with 11 species occurring in Southeast

Asia. The current study discovered eight species, including some major pests: (1) *C. medinalis*, (2) *C. patnalis*, (3) *C. poeyalis*, (4) *C. sanitalis* and (5) *C. suspicalis*.

The genus *Conogethes* consists of 20 species occurring in the Palaearctic, Oriental, Australian regions (Robinson et al., 1994; Shaffer et al., 1996). The current study recorded seven species of this genus. Among Thai congeners, *C. punctiferalis* (the yellow peach moth) is a serious pest with a wide distribution from Australia to Asia (Inoue and Yamanaka, 2006) including Thailand (Kuroko and Leuwanich, 1993; Ek-Amnuay, 2016). The moth genus *Diaphania* comprises approximately 90 species, with three Southeast Asian species included in this genus (Robinson et al., 1994). Nevertheless, a single species, *D. indica*, was found in the current study as reported in Hutacharn, et al. (2007), Plant Protection Research and Development Office (2016) and Ek-Amnuay (2016).

The genus *Glyphodes* diverse and is distributed in tropical to subtropical regions (Common, 1990; Robinson et al., 1994). Worldwide, there are 120 species and roughly 25 species have been recorded in Southeast Asia (Robinson et al., 1994; Shaffer et al., 1996). The current study recorded 12 species, including the serious pests: (1) *Glyphodes bivitalis*, (2) *G. pyloalis*, (3) *Glyphodes caesalis* (Walker, 1859; Kuroko and Lewvanich, 1993). The genus *Herpetogramma* consists of 100 species worldwide (Nuss et al., 2015). Eighteen species were reported in Japan (Yoshiyasu, 2013) and six species in Korea (Warren, 1892). Kuroko and Lewvanich (1993) recorded one species in Thailand (*H. licarsialis*). The current study identified eight species of which *H. bipunctalis* is as an important pest.

The genus *Leucinodes* has been reported from tropical, subtropical Asia and sub-Saharan Africa. Worldwide, 20 species have been recorded (Walker, 1859). In the current study, a single species (*L. orbonalis*) was found. Likewise, Kuroko and Leuwanich (1993) reported *L. orbonalis* as a serious pest in Thailand. The genus *Maruca* consists of three species, two of which occur in Southeast Asia, namely *M. vitrata* (syn. *M. testulalis*) and *M. amboinalis*. (Robinson et al., 1994; Yoshiyasu, 2013). *M. vitrata* is considered the most serious pest of legumes in tropical Asia, sub-Saharan Africa, North America, Australia and the Pacific (Rose and Singh, 1989; Sharma, 1998). One species of this genus was found in the current study (*M. vitrata*). The genus *Omiodes* consists of 80 species worldwide with four species recorded from Southeast Asia (Robinson et al., 1994). Seven species were reported in the current study including three major pests: (1) *O. decialis*, (2) *O. diemenalis* and (3) *O. indicata*.

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