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Taxonomical Description of Terebrantian Thrips (Insecta: Thysanoptera) of Taiwan

Chin-Ling Wang



Taiwan Agricultural Research Institute

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Introduction

Insects of Order Thysanoptera are devidied into two suborders, Terebrantia and Tubulifera. These two suborders are separated by their morphological structures, especially by the shape and structure of abdominal terminals. There were 5000 species of Thysanoptera recorded worldwide, about 2000 specdies were Terebrantia and 3000 species were Tubulifera （Mound and Toulon, 1995). With more surveys and research, the estimation of known species increased to approximately 6000 now (http://en.wikipedia.org/wiki/Thrips, 2015).

Thrips are small and slender, usually about 1 mm in length. Both larvae and adults take food through their piercing-sucking mouths. Feeding habits of Terebrantia and Tubulifera are

Comparison and number of species of two suborders with different feeding habits in Taiwan

Thrips	Phytophagous	Saprophagous	Predacious	Unknown
	---------- species ----------			
Suborder Terebrantia				
Aeolothripidae	0	0	2	
Merothripidae	0	2	0	
Thripidae				
Panchaetothripinae	23	0	0	
Thripinae	100	0	3	
Suborder Tubulifera				
Aeolothripidae				
Idolothripinae	0	25	0	
Phlaeothripinae	39	40	10	6
Total	162	67	15	6

(Wang, 2014)

different, and hence these two suborders are with different economic importance to us. Most of the Tubuliferan thrips are saprophagous or fungiphapous exist on dead wood or dropping leaves. Some predacious or phytophagous species are usually live on wild shrubs, trees or grasses. While most of the Terebrantian thrips are phytophagous, feeding on flowers or leaves of cultivated crops, and many of them cause serious losses on agricultural production.

An early survey recorded 17 genera and 46 species of Terebrantia in Taiwan (Takahashi, 1936). The member increased to 43 genera and 93 species (Lu, 1993). The book published by the author: THRIPS OF TAIWAN, BIOLOGY AND TAXONOMY, described the biology of Terebrantian thrips and recorded 47 genera and 120 species (Wang, 2014). Here the English taxonomical description of the known species of this suborder were prepared.

Terebrantia is divided into 3 families, Aeolothripidae (2 spp.), Merothripidae (2 spp.) and Thripidae (126 spp.). Thripidae is then divided into sublevels as subfamilies and/or tribes. To avoid confusing for readers here, the taxonomical system used in this book is mainly matched with it on the Chinese edition published in 2002 and the web edition in 2014. TRIBES (Dendrothripini, Sericothripini and Thripini) are used instead of SUBFAMILIES which were appeared in some websites such as Wikipedia and ThripsWiki.

Order Thysanoptera can be devided into two suborders by female morphological structures:

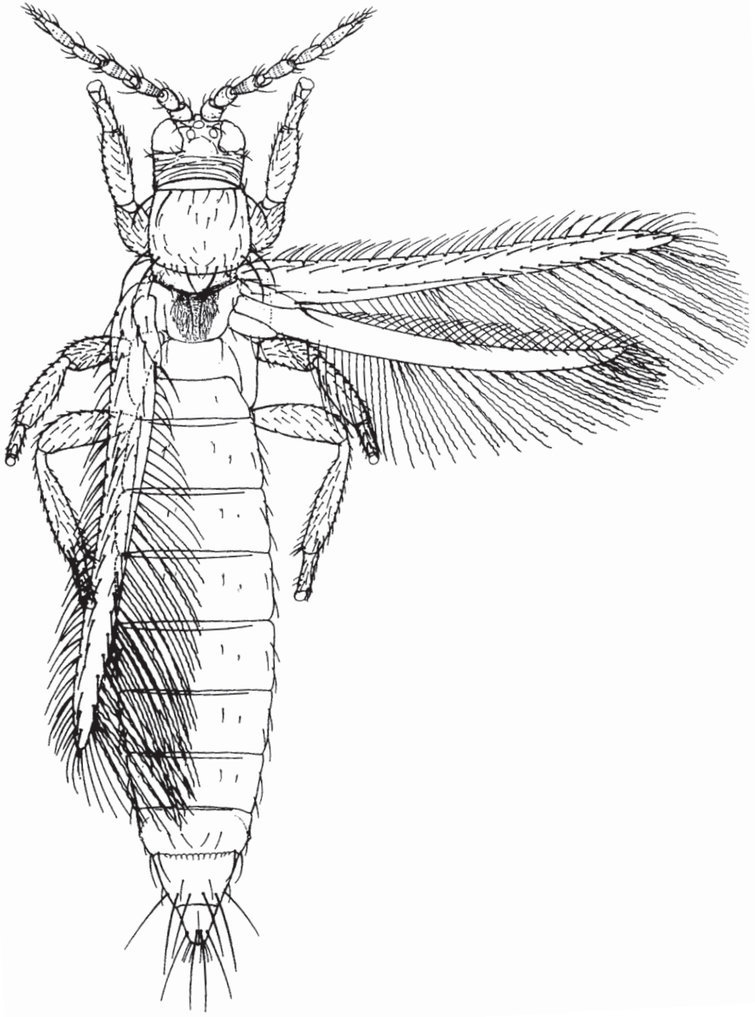
1. Suborder Terebrantia

Body generally smaller than Tubulifera, in yellow to dark brown color. Abdominal terminal coniform; edge of ovipositor saw-like; forewing with upper and lower veins, veins with vein setae; surface of forewing with microtrichia.

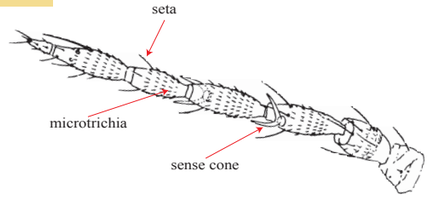
2. Suborder Tubulifera

Body gnerally larger than Terabrantia, in dark brown to black color. Abdominal terminal tubular, ovipositor lacking; forewing without vein or vein setae; wing surface without microtrichia.

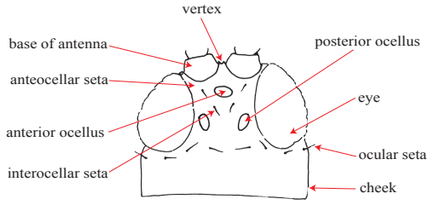
SUBORDER TEREBRANTIA



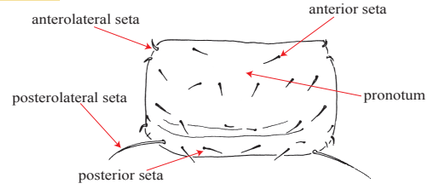
antenna



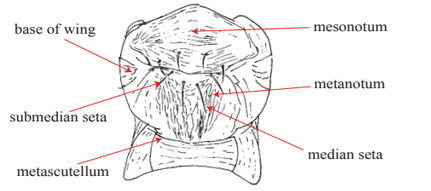
head



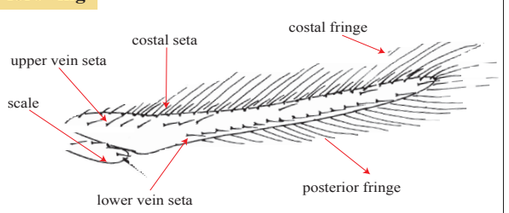
prothorax



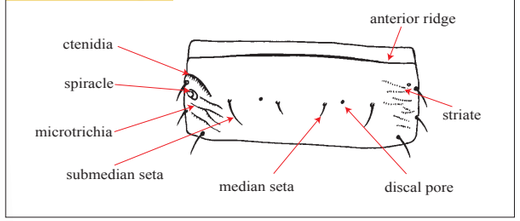
pterothorax



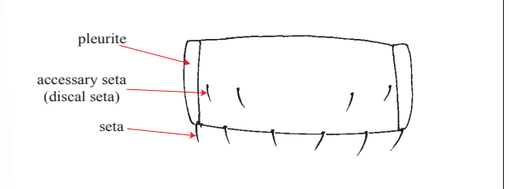
forewing



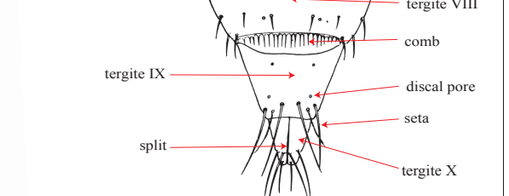
abdominal tergite



abdominal sternite



abdominal terminal



Suborder Terebrantia

Diagnosis Head quadrate, long or broad, some species no longer than compound eyes; maxillary on mouth parts not expended; antennae 6 to 9-segmented, with sense organs on surface or extruded, most species with forked sense cone on segments III and IV. Pronotum complete, not divided into parts; macropterous, brachypterous, or apterous; forewing of macropterae with at least one longitudinal vein, arranged with vein setae, with or without microtrichia. Abdominal tergites without sigmoid wing-holding setae; segment X cone-shaped; sternite VIII of female with saw-like ovipositor; male sternites may have glandular area.

Eight living families (Aeolothripidae, Merothripidae, Thripidae, Heterothripidae, Adiheterothripidae, Fauriellide, Melanthripidae, Uzelothripidae) and five fossil families (Hemithripidae, Jezzinothripidae, Karataothripidae, Scudderothripidae, Triassothripidae) are in this suborder (Mound, 2011). For the living families, only Aeolothripidae, Merothripidae, and Thripidae are found in Taiwan.

In Taiwan, thrips reported to cause agricultural losses in recent years include: *Dichromothrips corbetti* (Priesner), *D. smithi* (Zimmermann), *Frankliniella intonsa* (Trybom), *F. williamsi* Hood, *Megalurothrips usitatus* (Bagnall), *Rhipiphorothrips cruentatus* Hood, *Scirtothrips dorsalis* Hood, *Stenchaetothrips biformis* (Bagnall), *Thrips tabaci* Lindeman, *T. alliorum* (Priesner), *T. coloratus* Schmutz, *T. hawaiiensis* (Morgan), *T. palmi* Karny, and *T. simplex* (Morison) (Wang, 2007). All of them are Terebrantia. These thrips damage plant by direct feeding, and/or by transmitting pathogens of plant diseases, such as tospovirus.

Key to family of Terebrantia in Taiwan

1. Forewing apex rounded, with cross vein between upper and lower veins; ovipositor turned upwards towards body; antennae 9-segmented, segments III and IV with glandular sense organ.....AEOLOTHRIPIDAE
-- Forewing apex narrow and sharped, without cross vein; ovipositor turned downwards towards the body; antennae 6-9 segmented, segments III and IV with various sense organs 2

2. Antennae 8 or 9-segmented, moniliform, each segment rounded and separated; ovipositor weakly developed; tergite X with one pair of trichobothria (sensory seta emerged from specialized bases); fore and hind femora enlarged; usually apterous ....MEROTHRIPIDAE
-- Antennae 6 to 9-segmented, terminal composed of 1-3 segments; ovipositor normal; tergite X without trichobothria, if present, then very small; macropterous, brachypterous or apterous 3

3. Antennae 9-segmented, segments III and IV with multiple small sense organs to form a circle; distal end of fore tarsus with a tooth..... HETEROTHRIPIDAE (not in Taiwan)
-- Antennae 7 to 8-segmented, rarely 6- or 9-segmented, segments III and IV with simple or forked sense cone; fore tarsus without tooth..... THRIPIDAE

Family Aeolothripidae

Maxillary palpi geniculate, 3-segmented, segment II longer than III; labial palpi 3 to 5-segmented. Antennae 9-segmented, segments III and IV elongated, at least 10 times as long as wide, sensoria of III and IV linear. Fore tarsal claw present. Forewing broad and rounded at apex, with or without cross veins, costal fringe on front margin short or not exist. Ovipositor well-developed.

Genus *Franklinothrips* Back

Franklinothrips Back, 1912: 75. Type species: *Aeolothrips vespiformis* Crawford, 1909.

Body large, ant-like. Head small, wider than long, anterior half rounded, posterior margin straight, closely fitted against the prothorax, forming with the prothorax a compact elliptical mass. Compound eyes prominent; ocelli present and large in size. Antennae 9-segmented, slender, segment III extremely long.

Prothorax broader anteriorly, discal setae weak and inconspicuous, no longer setae on angles; all legs slender; forewing with 2 longitudinal veins, without cross veins, veins and costa with setae developed. Abdomen narrow at base for a waist, expand to the widest point at segment VI, narrowed again to terminal of abdomen.

About 16 species in this genus. Both larvae and adults prey on small insects and mites, moving quickly, rarely jump.

Key to species of *Franklinothrips* in Taiwan

1. Antennal segments I and II dark brown; forewing with subbasal, median and terminal pale bands; abdominal segments I-III brown..... *suzukii*

-- Antennal segments I and II whitish yellow; forewing with subbasal and median pale bands; abdominal segments I-III whitish yellow..... *vespiformis*

Franklinothrips suzukii Okajima (Fig. 1)

Franklinothrips suzukii Okajima, 1979: 399-401.

Female body length on slide 2.8-2.9 mm. Dark brown, with red pigment, color of abdomen paler than head and thorax; antennal segments III and IV yellow, rest segments dark brown; forewings light brown, with subbasal and median pale areas, the median one broader; legs brown, with red pigment, tarsi yellowish brown.

Head small, about 2/3 as long as wide; compound eyes prominent, not protruding from head, anterior half of head rounded. Anterior ocellus smaller than posterior ocelli; anteocellar setae 3 or 4 pairs, one pair of interocellar setae in ocellar triangular area; 2 pairs of postocular setae, median pair longer. Posterior margin straight, closely fitted against the prothorax. Antennae 9-segmented, slender, especially slender with segments III and IV, these 2 segments with linear sensoria, segments shorter toward the end.

Prothorax subtrapezoid, broadest across anterior margin, with a few minute setae. Forewing near parallel-sided, slightly narrowed medially, both veins prominent, vein setae and costal setae well-developed; legs slender.

Abdomen with segment I narrowest, broader towards the median, broadest with segment VI, narrowed toward the terminal; posterior margin of tergite IX with 2 pairs of long setae; tergite X with 2 pairs of long median setae.

Male unknown.

Distribution: Taiwan.

Habitat: Predaceous, prey on small insects and mites on bushes and grasses.

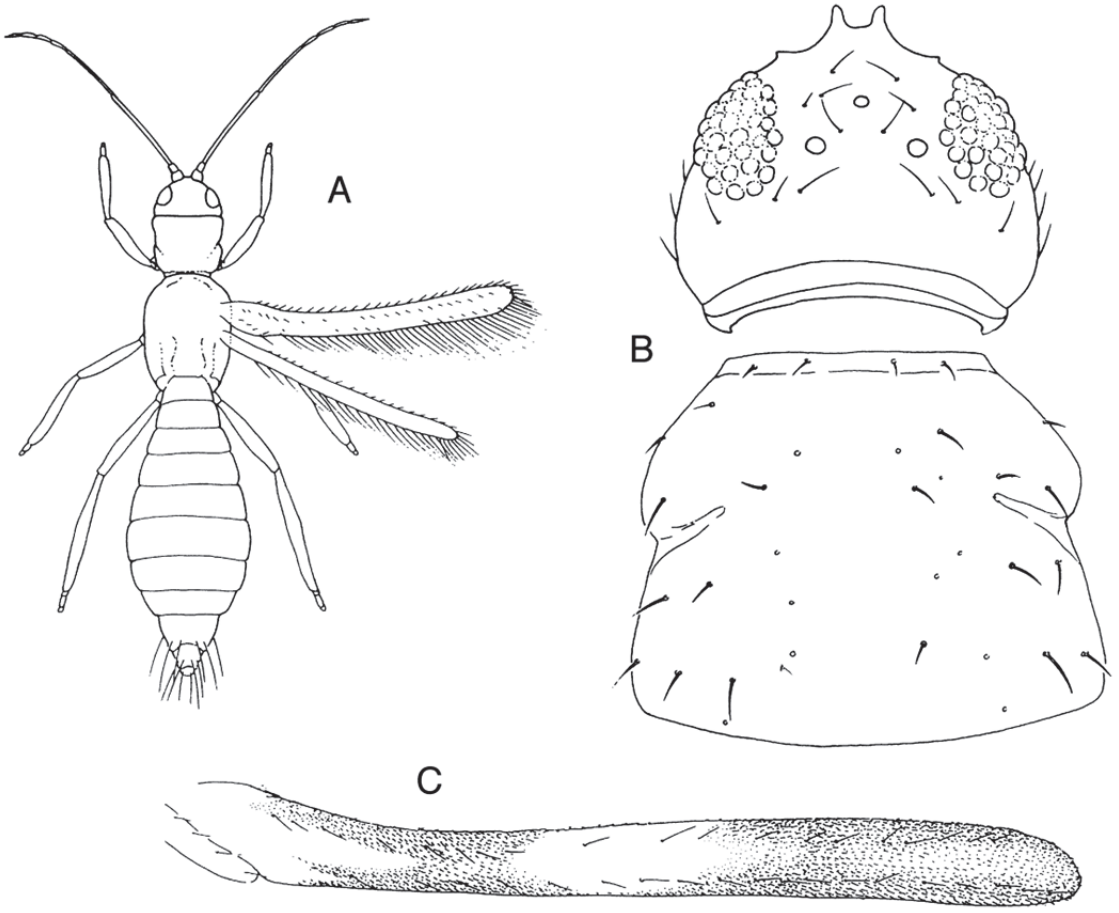


Fig. 1. *Franklinothrips suzukii* (♀) A. body shape; B. head and pronotum; C. forewing.

Franklinothrips vespiformis (Crawford) (Fig. 2)

Vespiform thrips

Aeolothrips vespiformis Crawford, 1909: 109.
Franklinothrips vespiformis (Crawford) Back, 1912: 75,76.

Female body length 2.8 mm on slide. Dark brown, with red pigment, head and thorax brown, abdomen segments I-III whitish yellow except the overlapped areas brown, segments IV-IX brown, segment X whitish yellow; antennal segments I-III whitish yellow, the rest segments brown; forewings brown, with subbasal, median and terminal pale areas, the subbasal one smallest, median one broadest; legs brown, with red pigment, ends of femora whitish yellowish.

Head small, about 2/3 as long as wide; eyes prominent, not protruding from head, anterior half of head rounded. Anterior ocellus smaller than posterior ocelli; one pair of anteocellar setae; 2 pairs of interocellar setae, posterior pair longer than the front pair but shorter than diameter of posterior ocellus; 2 pairs of postocular setae, median pair longer. Posterior margin straight, closely fitted against the prothorax. Antennae 9-segmented, slender, especially slender with segments III and IV, these 2 segments with linear sensoria, segments shorter toward the end.

Prothorax subtrapezoid, broadest across anterior margin, with about 25 minute setae. Forewing near parallel-sided, both veins prominent, vein setae and frontal setae developed. Legs slender.

Abdomen with segment I narrowest, broader towards the median, broadest with segment VI, narrowed toward the terminal; posterior margin of tergite IX with 2 pairs of long setae; tergite X with 2 pairs of long median setae.

Male smaller than female, base of abdomen not narrowed.

Distribution: Taiwan, US, Central and South America.

Habitat: predaceous, prey on small insects and mites on various plants, common in Taiwan.

This species have been found on leaves of Leguminosae, *Codiaeum variegatum, Piper kadsura, Allamanda cathartica, Crium asiaticum,* and *Mallotus japonicus*

Remarks: Larvae are brightly colored with yellow and red: head and prothorax red, pterothorax yellow with reddish only on lateral, abdominal segment I red in anterior half and yellow in the rest, II-VI red, VII-X yellow, VIII and IX each with a red ring; antennae grayish brown; fore femora red and brown, mid and hind femora red and yellow. Abdomen rounded, broadest with segments III-V. Mature larvae make sparce silky cocoon on leaf surface and pupate inside.

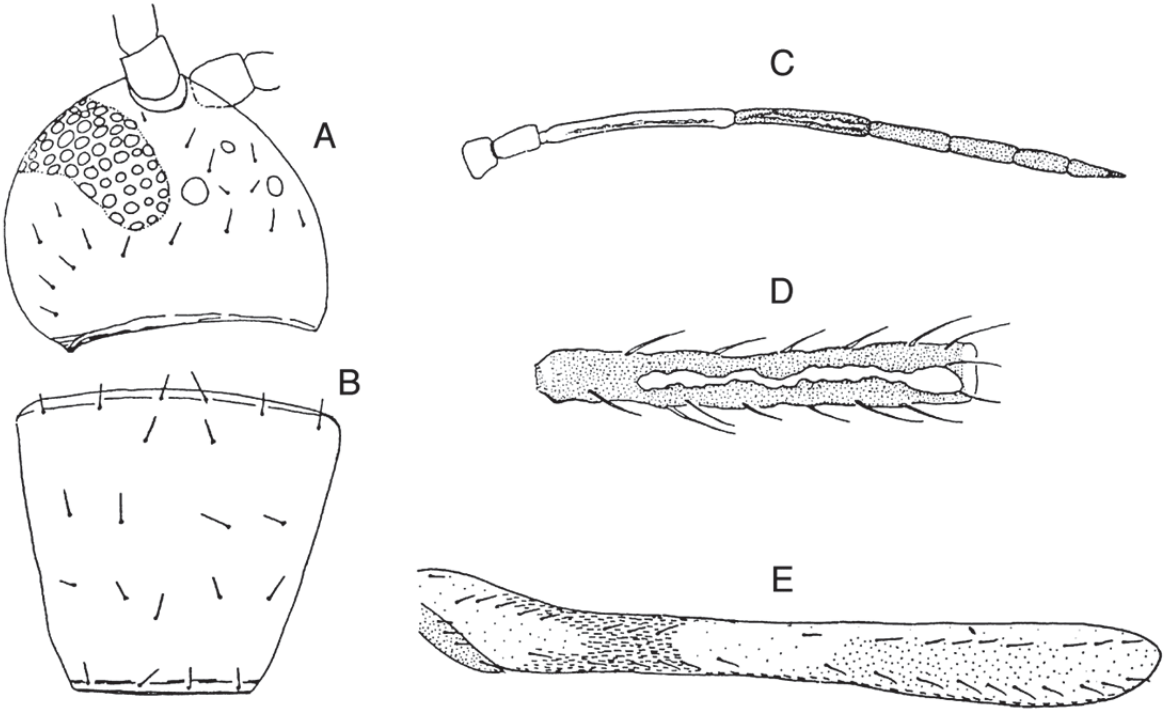


Fig. 2. *Franklinothrips vespiformis* (♀) A. dorsal lateral of head; B. pronotum; C. antenna; D. antennal segment IV; E. forewing.

Family Merothripidae

Most are pale species. Antennae moniliform, 8 or 9-segmented, sensoria on terminals of III and IV large. Abdominal sternite VIII well-developed; one pair of sense setae on tergite X; ovipositor retarded.

Genus *Merothrips* Hood

Merothrips Hood, 1912: 132. Type species: *Merothrips morgani* Hood, 1912.

Chitin on body surface weak, whitish yellow. Eyes reduced, ocelli exist or not; one pair of long setae between base of antennae and compound eyes. Antennae 8-segmented. Pronotum with 2 major setae on posterior angle, with or without wings; legs short and thickened, fore and hind femora swollen. Ovipositor weakly developed.

About 15 species in this genus. All live in the dark with leaf litter or dead twigs, saprophagous.

Key to species of *Merothrips* in Taiwan

1. Compound eyes big, composed with many ommatidia, 3 ocelli; abdominal tergites entirely sculptured with striates.....*indicus*

-- Compound eyes small, composed with 3 or 4 ommatidia, no ocelli; abdominal tergites smooth .....*laevis*

Merothrips indicus Bhatti & Ananthakrishnan (Fig. 3 B, C)

Merothrips indicus Bhatti & Ananthakrishnan, 1975: 31-43.

Female (macropterous) body length 0.9-1.3 mm on slides. Light brown, head darker, prothorax paler than head, palest in intermediate segments of abdomen; antennae brown, with segment II yellow; forewings grayish brown, paler between veins; fore legs yellow, mid and hind legs paler.

Head small, wider than long, dorsal surface smooth, cheeks short and nearly parallel. Interocellar setae long, placed just in front of posterior ocelli; eyes large, each composed of over 40 ommatidia. Mouth cone short, broadly rounded; maxillary palpi 3-segmented. Antennae moniliform, 8-segmented, sensoria on segments III and IV large, terminal of VIII not sharpened.

Pronotum with 5-6 transverse striae near posterior margin, 2 major setae on posteroangular. Mesonotum and metanotum entirely sculptured. Fore and hind femora swollen; fore tibia with a small distal spur on inner surface; ventral of hind tibia with 2 distal spurs; tarsi 2-segmented. Forewing bluntly pointed, with 2 longitudinal veins, jointed by a stout cross vein about 1/4 the wing length from the base, upper vein with 19-20 setae, lower vein with 5-18 setae in almost equal space.

Abdominal tergites entirely sculptured. Spiracles on tergite I large. Tergites II-VII with seta II (submedian seta) close to seta III, shorter than setae III to IV; tergite X with sensoria normal; tergite VIII without posterior comb; sternite sculptured, with discal (accessary) setae. Ovipositor weakly developed.

Male (aptera): Body shape and color similar to female but smaller, about 1.1 mm in length, compound eye composed of 4 ommatidia; tooth on fore tibia larger than that in female.

Distribution: Taiwan, India.

Habitat: Saprophagous, live on dead twigs, leaf litter, or dried grasses.

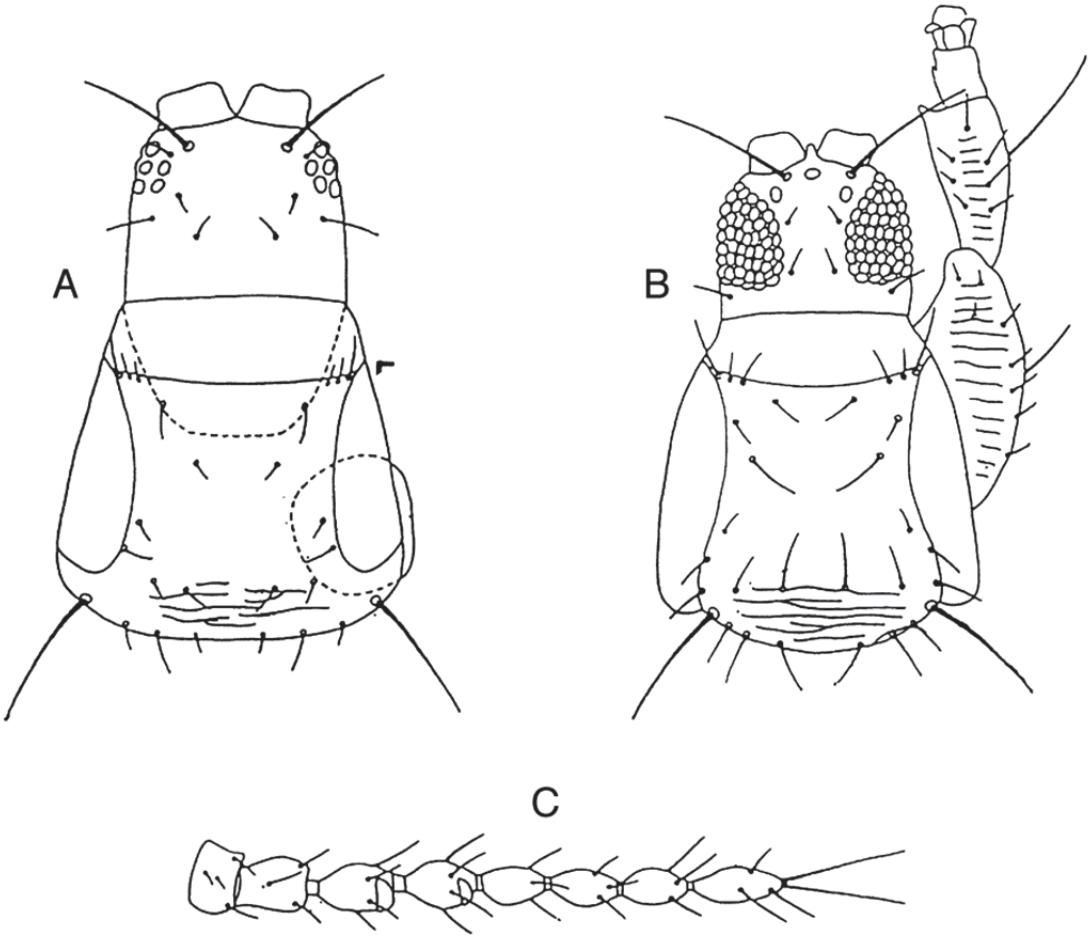


Fig. 3. *Merothrips laevis* (♀) A. head and pronotum. *Merothrips indicus* (♀) B. head and pronotum; C. antenna. (Chen, 1976)

Merothrips laevis Hood (Fig. 3A)

Merothrips laevis Hood, 1938: 350.

Female (apterotera) body length 1.1 mm on slides. Light brown, head yellowish; antennae brown, with segment I and II and base of segment III yellow; legs same color with body, but fore legs yellowish.

Head small, wider than long, dorsal surface smooth, broader near posterior margin, cheeks smooth and slightly convex. Eyes small, each composed of several ommatidia; one pair of long setae in front of compound eyes, and one pair of shorter setae behind compound eyes, other setae minute; without ocellus. Mouth cone short, semi-rounded; maxillary palpi 2-segmented. Antennae moniliform, 8-segmented, sensoria on segments III and IV large, terminal of VIII not sharpened.

Prothorax longer than wide, pronotum subtrapezoid, with 3-5 weak transverse striae near posterior margin, 2 major setae on posterior angle. Fore and hind femora swollen; fore tibia with a small distal spur on inner surface; ventral of hind tibia with 2 distal spurs; tarsi 2-segmented. Forewing bluntly pointed, with 2 longitudinal veins, jointed by a stout cross vein about 1/4 the wing length from the base, upper vein with 19-20 setae, lower vein with 5-18 setae in almost equal space.

Abdominal tergites smooth without sculpture; seta II to seta III wider apart than setae III to IV on tergites II-VII; tergite VIII without posterior comb; sternite without sculpture, with discal setae. Ovipositor weakly developed.

Male (apterous): Body shape and color similar to female but smaller, about 0.8-0.9 mm in length, tooth on fore tibia larger than that in female, transverse striae on pronotum, tergites and sternites obvious.

Distribution: Taiwan, US, French West Indies.

Habitat: Saprophagous, live in dead twigs, leaf letter, or dried grasses.

Family Thripidae

Antennae generally 7 to 8-segmented, few 6 or 9- segmented, segments III and IV with simple or forked sense cone. Ovipositor well-developed, turned downwards away from body.

Key to subfamilies of Thripidae in Taiwan

1. Body surface covered with heavy reticulated sculpture, especially dense on head and thorax, legs covered with reticulated sculpture; terminal of antenna slender and sharp .... Subfamily Panchaetothripinae

-- Body surface usually with transverse striae, seldom with reticulated sculpture (head and pronotum of Sericothripini with clear reticulations), legs never with reticulated sculpture; terminal of antenna composed of 1-2 short segments, never needle-like .... Subfamily Thripinae

Subfamily Panchaetothripinae Bagnall

Body and legs covered with heavy reticulated sculpture, especially obvious on head and thorax. Maxillary palpi 2-segmented. Antennal terminal slender, needle-like in some species. Mesofurca without spinula. Forewings not completely transparent, surface with microtrichia, base of upper vein fused to costa. Abdominal segment X may asymmetrical. Mostly distributed in tropical areas.

Key to genera of subfamily Panchaetothripinae in Taiwan

1. Abdominal tergites, at least tergite II, with lateral areas bearing dense stout-based microtrichia 2
-- Abdominal tergites without lateral microtrichia 6

2. Abdominal tergite II waist-like and with dense lateral wart-like tubucles, other tergites without lateral microtrichia 3
-- Abdominal tergite II not waist-like, tergites II-IX with dense lateral microtrichia ..... *Dendrothripoides*

3. Mesonotum with a complete median longitudinal division 4
-- Mesonotum not divided or partly divided 5

4. Forewing costal setae shorter than costal fringe; abdominal tergites and sternites III-VII with paired clusters of rounded areolae ..... *Anisopilothrips*
-- Forewing front costal setae longer than costal fringe; abdominal tergites and sternites without paired clusters of rounded areolae ..... *Elixothrips*

5. Ocellar hump exceeding vertex and antennal segment I; antennae 7-segmented, segments V-VII closely jointed; mesonotum split partially ..... *Astrothrips*
-- Ocellar hump not exceeding vertex; antennae 8-segmented, segments V-VII separated; mesonotum entire ..... *Copidothrips*

6. Forewing front margin without costal setae and fringe 7
-- Forewing front margin with costal setae or fringe or both 8

7. Antennae 7-segmented; head and pronotum with hexagonal reticulations ..... *Phibalothrips*

-- Antennae 8-segmented; head and pronotum with irregularly, rough, wrinkled surface ..... *Rhipiphorothrips*

8. Forewing upper and lower vein setae well-developed, evenly arranged 9
-- Forewing upper and lower vein setae minute, unevenly arranged 11

9. Dorsum of head with a broad and clear-margined collar, head with clear reticulations only in collar, pronotum with 2 major posterior angular setae, expanded or pointed, 3 pairs of marginal median setae ..... *Monilothrips*
-- Margin of collar weak, dorsum of head with reticulations, pronotum without major setae on posterior angle, marginal median setae less than 3 pairs 10

10. Forewing brown; comb on tergite VIII complete ..... *Selenothrips*
-- Forewing with 2 brown bands; comb on tergite VIII on laterals only ..... *Hercinothrips*

11. Collar form a line; antennal segments III and IV with simple sense cone; front margin of forewing with fringe, without costal setae ..... *Heliothrips*
-- Collar form an area; antennal segments III and IV with forked sense cone; front margin of forewing with fringe longer than costal setae ..... *Helionothrips*

Genus *Anisopilothrips* Stannard & Mitri

Anisopilothrips Stannard & Mitri, 1962: 186. Type species: *Heliothrips venustulus* Priesner, 1923.

Head with raised sculpture, cheeks convex, posterior dorsum constricted forming a broad collar. Antennae 7-segmented, segments III and IV with simple sense cone, without microtrichia. Pronotum setae flattened, same diameter from base to middle, narrowed at terminal; mesonotum with a complete median longitudinal split; forewing costal setae shorter than frontal fringe cilia; posterior fringe cilia wavy; microtrichia on veins obvious than those

between veins. Abdominal tergite II constricted, waist-like, laterals bearing dense wart-like tubucles with sharp extensions; tergites and sternites III-VII each with 2 clusters of rounded areolae.

Only one species in this genus. *Anisopilothrips* with characteristics of tergite II waist-like and with dense lateral wart-like tubucles, form a *Tryphactothrips* complex with ***Elixothrips*, *Astrothrips*, *Copidothrips***, *Noathrips*, *Hoodothripoides*, *Hoodothrips*, *Tryhactothrips*. Wilson (1975) groups these genera as Tribe Tryphactothripini.

Anisopilothrips venustulus (Priesner) (Fig. 4)

Heliothrips venustulus Priesner, 1923c: 89.

Astrothrips angulatus Hood, 1925: 50.

Hercothrips venustulus (Priesner) Moulton, 1932: 480, 481.

Tryphactothrips angulatus (Hood) Medina Gaud, 1961: 70.

Anisopilothrips venustulus (Priesner) Stannard & Mitri, 1962: 187.

Female body length 1.1-1.3 mm. Brown, meso- and metanotum dark brown in laterals, abdominal tergites yellowish brown, with tergites III and IV dark brown, frontal ridges on tergites III-VII brown; antennal segments I-VI yellow, distal ends of III-VI pale brown, VII and VIII brown; forewings brown, with subbasal, median, and distal pale areas; fore legs yellow, mid femora brown, mid tibiae brown with slender basal part yellow, hind femora brown, tibiae yellow, all tarsi yellow.

Head wider than long, dorsum with raised sculpture, cheeks rounded, convex, ocellar region slightly raised, setae minute, region of posterior dorsum constricted forming a broad collar, with sharp lateral. Maxillary palpi 2-segmented. Antennae 7-segmented (or 8-segmented with

segments VI and VII fused), segments III and IV with simple sense cone, sense cone on VI reach the end of antenna, without microtrichia.

Prothorax broad, anterior and posterior angles of pronotum protruded laterally, with reticulated sculpture, 3 pairs of flattened discal setae; mesonotum split completely; metanotum triangular area without clear margin, with one pair of flattened setae; metascutellum narrow and transverse. Forewing with 11-13 upper vein setae, 6-7 lower vein setae, unevenly arranged; veins with dark and stout pointed microtrichia which are conspicuously larger than intervenal microtrichia; frontal costal setae much shorter than frontal fringe cilia, posterior fringe cilia wavy. Distal ends of tibiae swollen, tarsi one-segmented.

Abdominal tergite I smooth; tergite II constricted, waist-like, median smooth, each side bearing about 100 wart-like tubercles with needle-like extension, posterior lateral with reticulated sculpture. Tergites and sternites III-VII with paired clusters of rounded areolae; tergite VIII with reticulation, without posterior comb; tergite IX with reticulation and microtrichia, 2 pairs of major setae on posterior margin; tergite X asymmetrical, with reticulation, split completely.

Male unknown**.**

Distribution: Taiwan, US, West Indies.

Habitat: *Machilus kusanoi*, *Piper kadsura*, *Ampelopsis* sp., *Turpinia formosana, Morus* sp., *Schefflera octophylla*, *Plumeria rubera*, *Alpinia speciosa*, *Mallotus philippensis*, grasses.

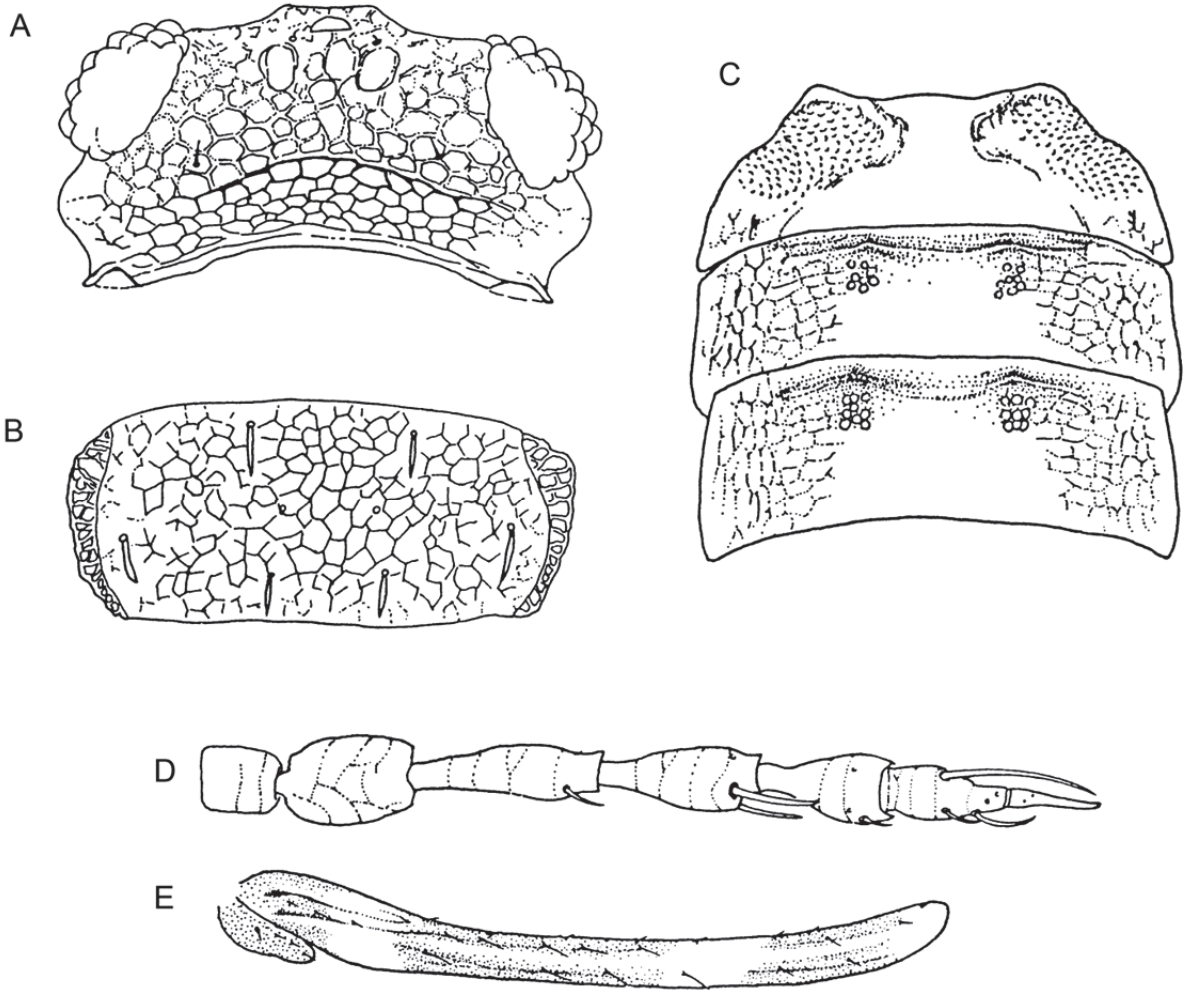


Fig. 4. *Anisopilothrips venustulus* (♀) A. head; B. pronotum; C. tergites II-IV; D. antenna; E. forewing.

Genus *Astrothrips* Karny

Astrothrips Karny. 1921: 215, 239. Type species: *Heliothrips globiceps* Karny, 1923.

Ocellar hump large. Antennal segments III and IV with simple sense cone, V and VI closely jointed but with a distinct suture. Mesonotum split partially; forewings with irregular shaded and pale areas, frontal costal setae shorter than frontal fringe cilia. Abdominal tergite II with lateral trichoid cuticular processes, without areolae.

About 12 species in this genus, distributed in tropical and subtropical areas.

Key to species of *Astrothrips* in Taiwan

1. Abdominal tergite I with posterior row of long spines; tergite X with 2 sharp setae ..... *aucubae*

-- Abdominal tergite I without posterior row of long spines; tergite X with 2 stunt setae ..... *Chisinliaoensis*

Astrothrips chisinliaoensis Chen (Fig. 5)

Astrothrips chisinliaoensis Chen, 1980: 174, 175.

Female body length 1.4 mm on slide. Brown, abdominal tergites III-VII with antecostal ridge dark brown; antennal segments I-V yellow but distal ends of IV and V dark, VI and VII brown but distal end of VII light; fore legs yellow, laterals of fore tibiae dark, mid legs brown, distal ends of tibiae and tarsi yellow, hind femora brown, tibiae and tarsi yellow with bases darker; forewings yellow, with subbasal and median irregular brown spots, subapex with a large brown band, apex pale.

Ocellar hump large, exceed antennal segment I, strong reticulated sculpture on ocellar region, ocelli placed on vertex. Maxillary palpi 2-segmented. Antennae 7-segmented, segments III and IV with simple sense cone, V-VII closely jointed to form one unit, without microtrichia.

Pronotum with raised sculpture, setae stout; mesonotum split partially, sculpture raised on posterior 2/3; metanotum median triangle obvious, sculpture reach metascutellum. Hind tarsus with one strong seta in both inner and outer margins. Forewing with 10-12 upper vein setae, 9-10 lower vein setae.

Abdominal tergites I, IX and X entirely sculptured, II-VIII with sculpture on laterals and median; tergite I with posterior row of long spines, II with dense lateral microtrichia, X asymmetrical, split completely, posterior margin with one pair of stunt setae.

Male unknown**.**

Distribution: Taiwan.

Habitat: *Morus* sp.

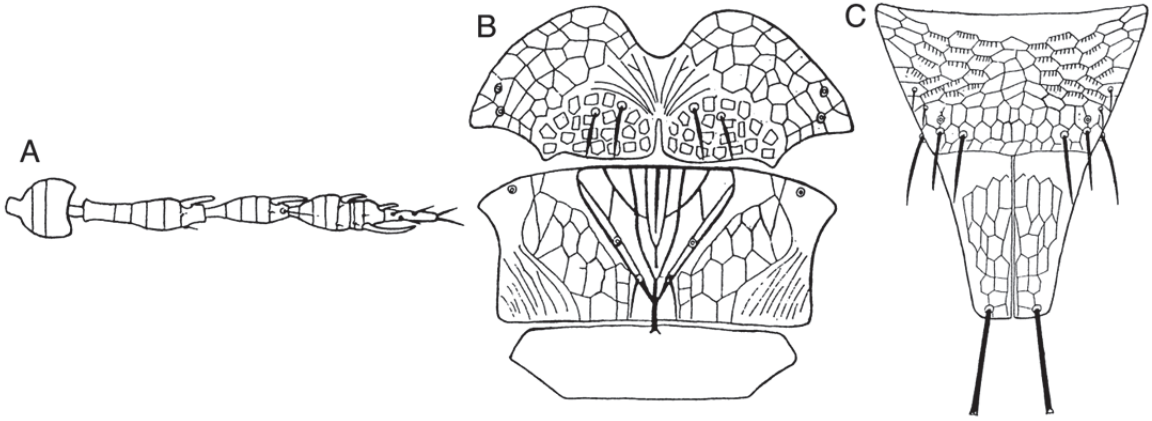


Fig. 5. *Astrothrips chisinliaoensis* (♀) A.antennal segments II-VII; B. meso- and metanotum; C. tergites IX, X. (Chen, 1980)

Astrothrips aucubae Kurosawa (Fig. 6)

Astrothrips aucubae Kurosawa, 1932a: 230-234.

Female body length 1.3 mm on slide. Color dark brown, abdominal tergites III-VII with antecostal ridge dark brown; antennal segments yellow, but distal end of segment VI and whole segment VII pale brown; fore legs yellow, mid legs brown, distal ends of tibiae and tarsi yellow, hind femora brown, tibiae and tarsi yellow; forewings yellow, subbasal and subapex with brown bands, median with irregular brown spots, apex pale.

Ocellar hump large, exceed antennal segment I, strong reticulated sculpture on ocellar region, irregular short striae inside collar reticulations, setae minute. Maxillary palpi 2-segmented. Antennae 7-segmented, segments III and IV with simple sense cone, VI with 2 simple sense cones both reach the apex of antenna, V-VII closely jointed to form one unit, without microtrichia.

Pronotum with expanded sides; mesonotum split partially, sculpture raised on posterior 2/3; metanotum median triangle obvious, sculpture reach metascutellum. All tibiae swallen. Forewing costal setae shorter than costal fringe, 10 upper vein setae, 8 lower vein setae.

Abdominal tergites I, IX and X entirely sculptured, II-VIII with sculpture on sides and median; tergite I with posterior row of long spines, II with dense lateral microtrichia, X tubular, about two and a half the length of wide, asymmetrical, split completely, posterior margin with one pair of sharp setae.

Male: Body shape and color similar to female but smaller, 1.1 mm in length; abdominal sternites III-VII each with a U-shaped glandular area; 2 pairs of setae on posterior margin of tergite IX, median pair longer; tergite X split completely, symmetrical, one pair of pointed setae on posterior margin .

Distribution: Taiwan, Japan, Philippines.

Habitat: *Aucuba Japonica*, *Thalictrum minus*, *Firmianan simplex*, *Macaranga tanarus*, *Manihot esculenta*, grasses.

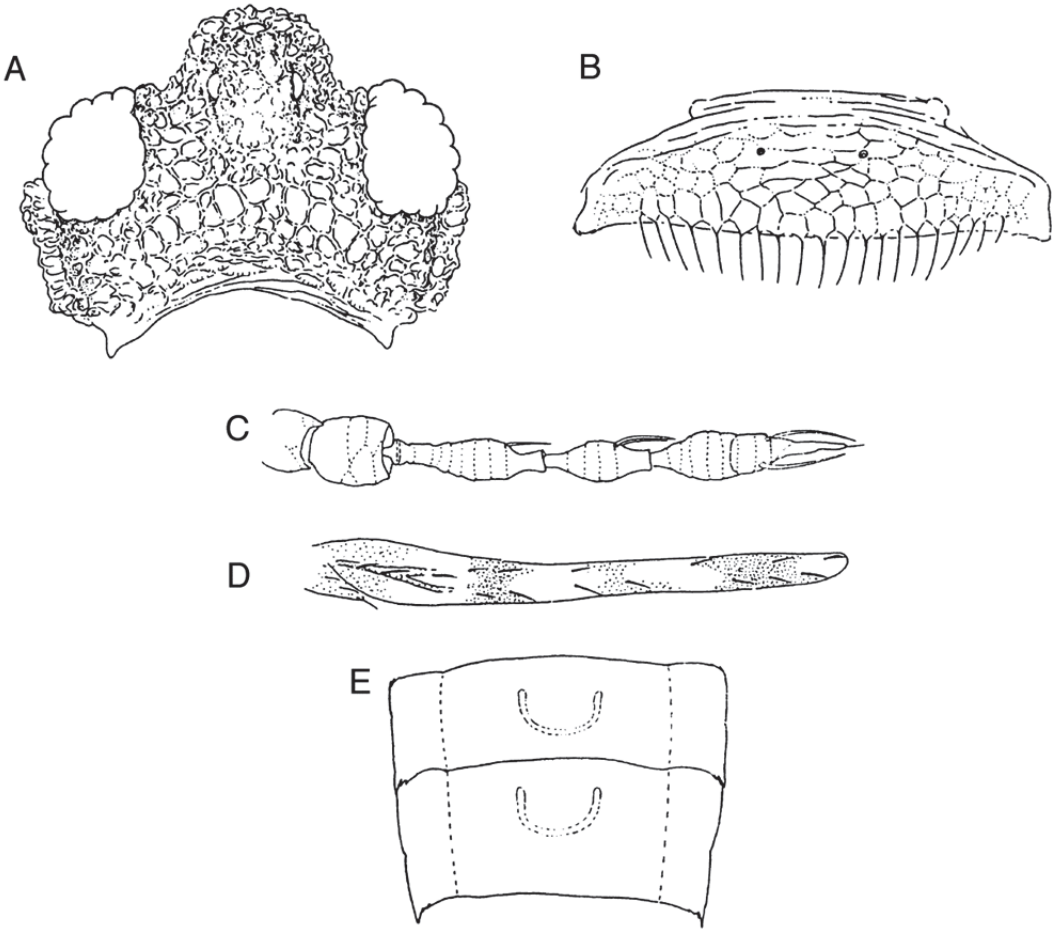


Fig. 6. *Astrothrips aucubae* (♀) A. head; B. tergite I; C. antenna; D. (♂) forewing; E. (♂) sternites IV, V.

Genus *Copidothrips* Hood

Copidothrips Hood, 1954b: 188. Type species: *Copidothrips formosus* Hood

Head and pronotum with lanceolate setae. Antennae 8-segmented, segments III and IV with simple sense cone. Mesonotum entire; forewings costal setae longer than costal frnge. Abdominal tergite II with lateral trichoid cuticular processes, without areolae. One species in this genus.

Copidothrips formosus Hood (Fig. 7)

Copidothrips formosus Hood, 1954b: 190.
Mesostenothrips kraussi Stannard & Mitri, 1962: 211.

Female body length 1.0-1.2 mm on slide. Yellowish brown, abdominal tergites III-VII with antecostal ridge dark brown; antennal segment II grayish brown, I, III-V and basal 1/3 of VI yellow, the rest of VI and segments VII and VIII grayish brown; forewings with grayish brown bands; legs yellow, mid and hind femora darker.

Head wider than long, covered with dense reticulations, cheeks rounded and convex, ocellar hump large, setae minute, one pair of postoccular lanceolate setae; posterior dorsum constricted, but lacking a distinct broad collar; maxillary palpi 2-segmented; antennae 8-segmented, segments III and IV with simple sense cone, VI with simple sense cone reaches apex of antenna, at least V with microtrichia.

Prothorax wider than head, laterals expanded, pronotum with reticulations, and 6 pairs of lanceolate setae, 2 anterior pairs, one lateral pair, 3 median pairs. Metanotum median triangle margin unclear, one pair of anterior lanceolate setae as long as triangle. Forewing costal setae longer than costal fringe, 12 upper vein setae and 11 lower vein setae, all arranged evenly. Tarsi 2-segmented.

Abdominal tergites I smooth, II constricted at base, waist-like, sides with a large dense growth of stout trichoid cuticular processes; III-VIII laterally sculptured, IX with 3 pairs of posterior setae, with microtrichia; X asymmetrical, split completely, posterior marginal setae about the same length of the segment.

Male unknown**.**

Distribution: Taiwan**,** Gilbert Islands.

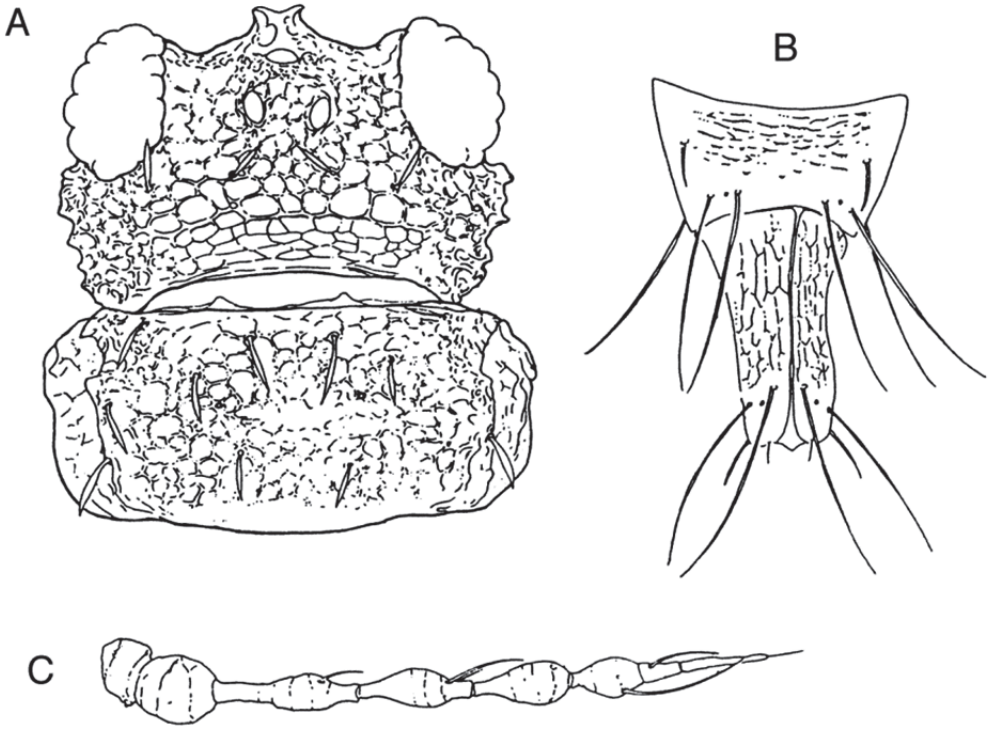


Fig. 7. *Copidothrips formosus* (♀) A. head and pronotum; B. tergites IX and X; C. antenna.

Genus *Dendrothripoides* Bagnall

Dendrothripoides Bagnall, 1923a: 624, 625. Type species: *Dendrothripoides ipomeae* Bagnall, 1923.

Head wider than long, cheeks protruded. Mouth cone reach posterior margin of prosternum; maxillary palpi 3-segmented. Antennae 8-segmented, segments III and IV with forked sense cone. Pronotum setae minute; mesonotum without split; wings narrow. Abdominal tergites II-IX bearing dense lateral median microtrichia-like processes; segment X symmetrical. Three species of this genus in the world.

Dendrothripoides innoxius (Karny) (Fig. 8)

Euthrips innoxius Karny, 1914: 359-360.
Dendrothripoides ipomeae Bagnall 1923a: 624-625.
Tryphactothrins mediostignatus Karny, 1925: 34-37.
Anaphothrips innoxius (Karny) Priesner, 1926: 54-55.
Tryphactothrips mundus Karny, 1926: 190.
Dendrothripoides innoxius (Karny) Bhatti, 1978a: 10-12.

Female body length 0.9-1.1 mm on slide. Head, pronotum, mesonotum and anterior portion of metanotum grayish yellow, posterior end of triangular area and metascutellum brown; abdomen grayish yellow or golden yellow, but anterior and laterals of tergite I brown. Antennal segments I, III and V grayish yellow, II dark yellow, base of IV grayish yellow and distal end grayish brown, base of VI grayish yellow and distal end dark brown, VII and VIII dark brown. Forewings transparent, with subbasal and median dark brown bands, subbasal band smaller, median band about 1/4 of the wing length. Legs grayish yellow.

Head wider than long, covered with reticulations, cheeks short and protruded. Interocellar setae short, ocular setae behind posterior ocelli longest. Mouth cone exceed posterior margin of prosternum; maxillary palpi 3-segmented. Antennae 8-segmented, segments III and IV with forked sense cone.

Prothorax broader posteriorly, pronotum with weak reticulations, setae minute, one stout seta on each of posteroangulars; mesonotum complete; triangular area of metanotum with weak margin, ended at anterior margin of metascutellum. Forewing narrow, with leathery wart-like pustules, obvious near base of wing, vein setae minute, without front marginal setae.

Abdominal tergites II-VIII bear dense lateral microtrichia-like processes, median pair setae on tergite II-VIII longer and further apart posteriorly, those setae on tergites V-VII longer than submedian pair setae; 2 pairs of stout setae near posterior margin of tergite IX; tergite X symmetrical, split completely.

Male shape and color similar to female but smaller, 0.76 mm in length on slide. Posterior margin of tergite IX with one pair of apex-expanded setae. Central of sternites II-VII with a small glandular area.

Distribution: Taiwan, India. Japan, Guam, Hawaii, Brazil.

Habitat: *Ipomoea reptans*, *Ipomoea cairica*, *Pachida macrocarp*.

Remarks: There are variations in color of pronotum and tergite I. Body color described above is the most common pattern in Taiwan.

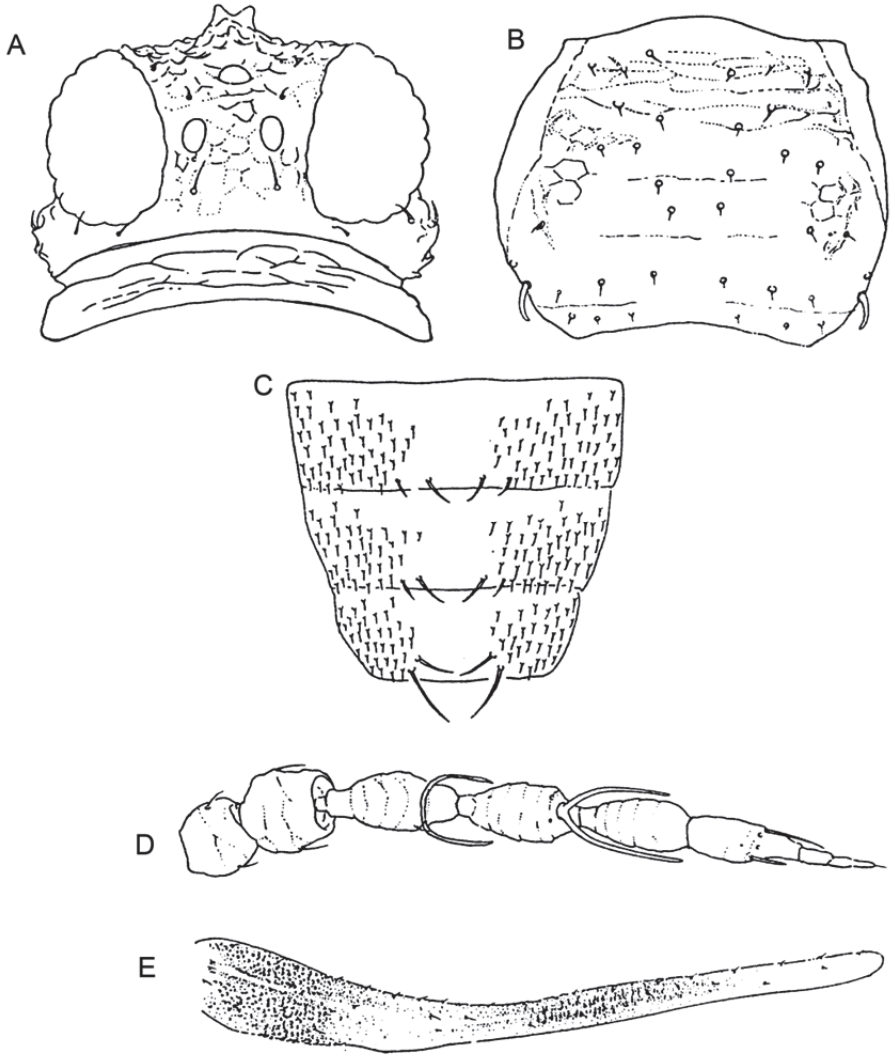


Fig. 8. *Dendrothripoides innoxius* (♀) A. head; B. pronotum; C. tergites VI-VIII; D. antenna; E. forewing.

Genus *Elixothrips* Stannard & Mitri

Elixothrips Stannard & Mitri, 1962: 186, 202. Type species: *Tryphactothrips brevisetis* Bagnall, 1919.

Antennae 8-segmented, segments III and IV with simple sense cone, with microtrichia. Mesonotum longitudinal split completely; forewings costal setae longer than costal fringe. Abdominal segment II waist-like, with dense growth of trichoid processes in lateral thirds; segment X asymmetrical, posterior margin with short and apex-expanded setae. One species in this genus.

Elixothrips brevisetis (Bagnall) (Fig. 9)

Tryphactothrips brevisetis Bagnall, 1919: 257.
Tryphactothrip rutherforde (Bagnall) Moulton, 1936a: 263.
Asterothrips angulatus Hood; Takahashi, 1936: 429.
Dinurothrips guamensis Moulton, 1942: 7.
Elixothrips brevisetis (Bagnall) Stannard & Mitri, 1962: 203.

Female body length 1.0-1.2 mm on slide. Head and thorax dark brown, abdomen yellowish brown, tergites III-VII with antecostal ridge brown, posterior 3/4 of tergite VI and tergites VII and VIII brown; forewings yellowish brown and basal area grayish brown, with several irregular dark brownish blocks or spots; fore legs yellowish brown, mid legs brown, hind femora brown, hind tibiae and all tarsi yellow.

Head broad, covered with dense reticulations, ocellar area raised, collar region contrived to

form hook-like edges. Maxillary palpi 2-segmented. Antennae 8-segmented, segments III and IV with simple sense cone, IV-VI with microtrichia, simple sense cone on VI reach antennal apex.

Prothorax same wide as head, pronotum covered with reticulations; mesonotum longitudinal split complete; metanotum median triangular area obvious, reach posterior margin of metascutellum; pterothorax about twice the wide of prothorax. Forewing veins stout, vein setae irregular, upper vein with 4 setae, lower vein 5-7 setae. Tarsi one-segmented.

Abdominal tergite I smooth; tergite II waist-like, with dense growth of trichoid processes in lateral thirds; tergites III-VII reticulated on lateral, median pair setae minute; tergite VIII without posterior comb; tergite IX with 3 pairs of posterior marginal setae, median pair longest; tergite X asymmetrical, split completely, posterior margin with one pair of stout and apex-expanded setae.

Male unknown.

Distribution: Taiwan, Philippines, Islands in Pacific Ocean.

Habitat: *Morus* sp., *Schefflera octophylla*, *Ficus* sp., *Alpinia* sp., *Codiaeum variegatum*, *Aleurites moluccana*, grasses.

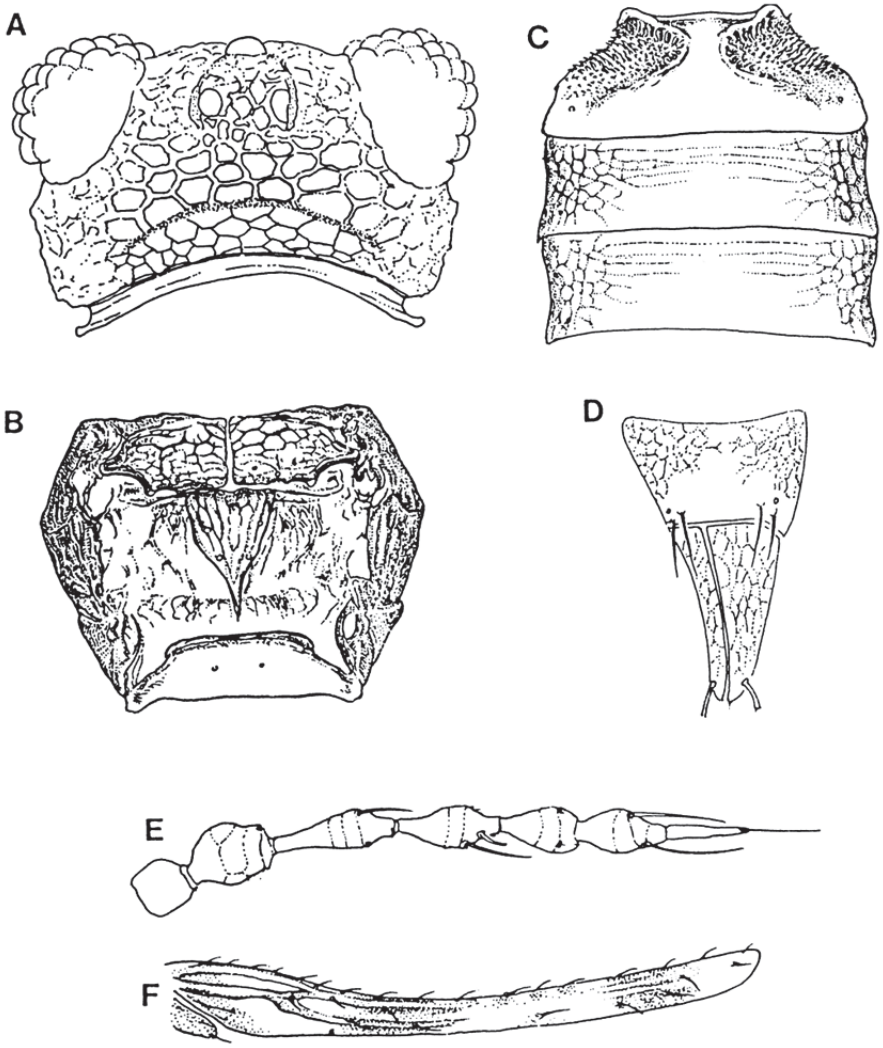


Fig. 9. *Elixothrips brevisetis* (♀) A. head; B. mesonotum, metanotum and tergite I; C. tergites II-IV; D. tergites IX and X; E. antenna; F. forewing.

Genus *Helionothrips* Bagnall

Helionothrips Bagnall, 1932a: 506. Type species: *Heliothrips brunneipennis* Bagnall, 1915.

Body dark brown, covered with reticulations. Head wider than long, with collar area. Maxillary palpi 2-segmented. Antennae 8-segmented, segments III and IV with forked sense cone. Pronotum broad, length slightly longer than head, anterior and posterior angular areas rounded. Forewings slender, anterior and posterior margins about parallel, anterior marginal fringe longer than costal setae. Antecostal ridges on abdominal tergites dark and clear. About 27 species in the world.

Key to species of genus *Helionothrips* in Taiwan

1. Comb of abdominal tergite VIII complete; antennal segment I yellowish brown, II-V and basal half of VI yellow; posterior laterals of metascutellum not extruded; veins of forewing minute; abdominal segment IX longer than wide; male abdominal sternites without glandular area ..... *annosus*
-- Comb of abdominal tergite VIII lacking in middle 2

2. Metascutellum with posterior laterals extruded; antennal segments I, II and VI brown, segments III-V yellow; veins of forewing developed; abdominal segment IX broad; male abdominal sternites VII and VIII with glandular area ..... *errans*
-- Posterior laterals of metascutellum not extruded 3

3. Antennal segments I-V yellow; reticulations of pronotum and mesonotum without wrinkles 4
-- Antennal segments I and II yellowish brown to brown, darker than segments III-V; reticulations of pronotum or mesonotum with wrinkles 5

4. Male abdominal sternites VII and VIII with glandular area .....*aino*
-- Male abdominal sternites VI-VIII with glandular area..... *mube*

5. Antennal segments I and II darker than VI; pronotum reticulations all with wrinkles; abdominal segment IX longer than VIII .....*cephalicus*
-- Antennal segments I and II same color as VI, or paler; pronotum reticulations without wrinkles or with wrinkles only in reticulations of posterior half; abdominal segment IX as long as VIII 6

6. Compound eyes without dark pigment; antennal segments I and II brown, same color as VI .....*unitatus*
-- Compound eyes with dark pigment; antennal segments I and II yellowish brown to brown, paler than VI, segment VI dark brown.....7

7. Metanotum reticulations without wrinkles; male abdominal sternite VIII with glandular area..... *linderae*
-- Metanotum reticulations with wrinkles; male abdominal sternite VII and VIII with glandular area..... *communis*

Helionothrips aino (Ishida) (Fig. 10)

Heliothrips aino Ishida, 1931: 34.
Helionothrips compressus Hood, 1954b: 192.
Helionothrips antennatus Kurosawa, 1968: 15-46.
Helionothrips aino (Ishida); Jacot-Guillarmod, 1971: 260.

Female body length 1.3-1.4 mm on slide. Dark brown, eyes dark, ocelli with red pigment; antennal segments I and II golden yellow or grayish brown or yellowish brown, III-V pale yellowish, VI dark brown, VII brown, VIII grayish brown; forewings with base dark brown, followed by a transparent band, median brown, the rest of wing whitish yellow; fore femora yellowish, fore tibiae yellow with inner and outer margins dark, mid and hind femora and tibiae brown with both ends of tibiae yellow; tarsi yellow.

Head wider than long, ocellar area elevated; dorsal area between compound eyes polygonally reticulate; anterior margin of collar almost parallel to posterior margin, reticulations in collar with minute black granules. Antennae 8-segmented, segments III and IV with forked sense cone, that on IV reaching base of VI; IV-VI with microtrichia.

Pronotum polygonally reticulate. Mesonotum and metanotal triangle polygonally reticulate. Forewing covered with microtrichia, vein setae minute, posterior fringes wavy.

Abdominal tergites reticulated; antecostal ridges on tergites III-VIII dark and form arches, one on median, 3 on each side; lateral arches on tergite VIII not clear, tergite VIII with long comb on laterals, lacking in the middle; tergite X dorsal longitudinal split completely.

Male color and shape similar to female. Abdomen slender, sternites at least VII and VIII with small and rounded glandular area; tergite IX with 2 pairs of thorn-like setae arranged in 2 rows, anterior pair longer and further apart, about 10 dark warts followed these setae.

Distribution: Taiwan, Japan.

Habitat: Flower of *Poa annum*, *Trifolium* sp., *Actinidia arguta*, *Aristolochia* sp., *Musa sapientum*, *Cunninghamia* sp., *Ipomoea reptans*, *Prunus* sp., *Litsea* sp., *Colocasia* sp.

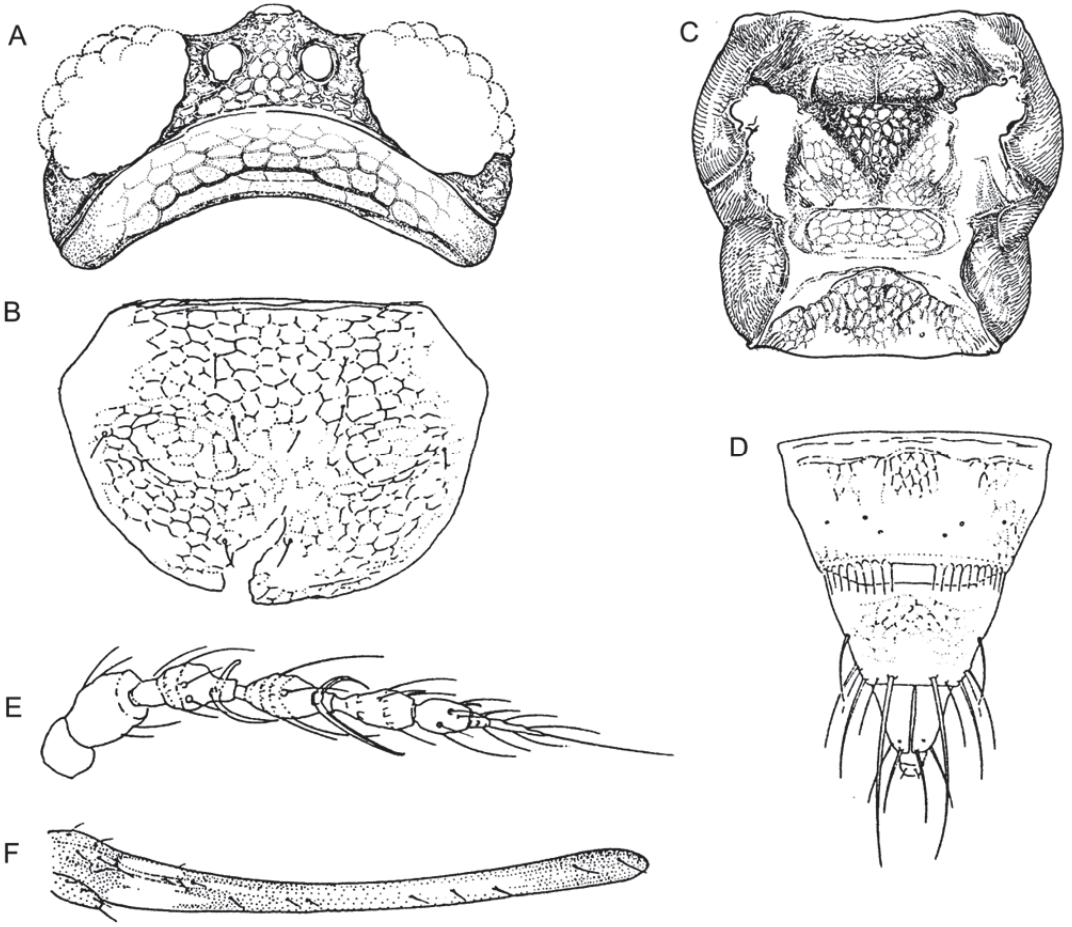


Fig. 10. *Helionothrips aino* (♀) A. head; B. pronotum; C. meso-, metanotum and tergite I; D. tergites VIII-X; E. antenna; F. forewing.

Helionothrips annosus Wang (Fig. 11)

Helionothrips annosus Wang, 1993b: 391, 392.

Female body length 1.4-1.6 mm on slide. Dark brown, abdominal segments II-VII darkest of all; antennal segments I yellowish brown, II-VI pale yellowish with distal third of VI grayish brown, VII and VIII grayish brown; forewings base and scale dark brown, followed by a transparent band, the rest of wing brown with the apex slightly darker; fore femora dark brown with distal third yellowish, fore tibiae yellow with inner and outer margins dark, mid and hind femora and tibiae dark brown with both ends of tibiae yellow, tarsi yellow; major setae of body pale brown.

Head wider than long, ocellar area elevated, cheeks subparallel, slightly concave behind compound eyes; dorsal area between compound eyes polygonally reticulate; anterior margin of collar almost parallel to posterior margin; reticulations in collar with minute black granules. Maxillary palpi 2-segmented. Antennae 8-segmented, segments III and IV with forked sense cone, that on IV reaching middle of VI; IV-VI with microtrichia.

Prothorax rounded, and broad; pronotum polygonally reticulate, setae minute. Mesonotum and metanotal triangle polygonally reticulate. Forewing covered with microtrichia; vein setae minute; posterior fringes wavy.

Abdominal tergites reticulated; antecostal ridges on tergites I-VIII dark and almost straight medially; anterolateral margin of tergite VIII and IX swollen; tergite VIII with complete comb; tergites IX and X comparatively long in contrast with other species of the genus; IX with 2 pairs of major setae along posterior margin; X split completely.

Male color and shape similar to female. Abdomen slender, anterolateral margin of VIII and IX not significantly swollen as in female; tergite IX with 2 pairs of thorn-like setae arranged in 2 rows, followed by several dark warts.

Distribution: Taiwan.

Habitat: *Litsea* sp.

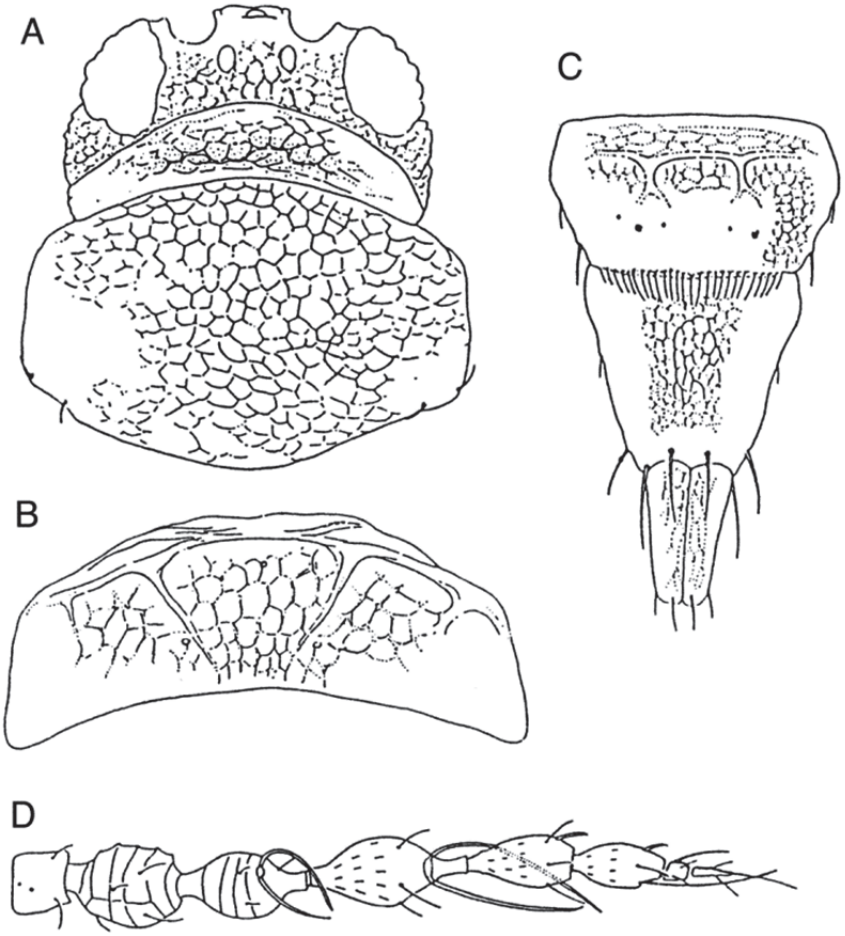


Fig. 11. *Helionothrips annosus* (♀) A. head and pronotum; B. tergite I; C. tergites VIII-X; D. antenna.

Helionothrips cephalicus Hood (Fig. 12)

Helionothrips cephalicus Hood, 1954b: 191.

Female body length 1.3-1.4 mm on slide. Dark brown, compound eyes dark, abdominal segments VIII-X paler. Antennal segments I and II dark brown, III-V and base of VI yellow, the rest of VI, VII and VIII grayish brown; forewings brown, with a submedian transparent band, apex slightly darker; fore legs yellow, femora and part of tibiae darker; mid and hind femora and both ends of tibiae yellowish, the rest dark brown.

Head quadrate, reticulations with wrinkles inside, collar obvious, anterior margin rounded, reticulations large and with minute black granules inside. Antennae 8-segmented, segments III and IV with forked sense cone, that on IV not exceeding the distal end of V. Forewing covered with microtrichia, basal setae of upper vein longer, posterior fringe wavy.

Pronotal reticulations with wrinkles inside, reticulations on median laterals larger. Mesonotal and metanotal triangular reticulations with wrinkles.

Abdominal tergites reticulated; lateral reticulations of tergites II-VIII with wrinkles; antecostal ridges rounded medially, lateral arches unobvious; posterior comb of tergite VIII only in laterals, tergite IX long, about twice the length of X, X with complete dorsal longitudinal split.

Male color and shape similar to female, about 0.9 mm on slide. Abdomen slender; sternite VIII with large elliptical glandular area, about 1/2 of the sternite; IX with 2 pairs of thorn-like setae arranged in 2 rows, anterior pair longer and further apart; followed by 5 dark warts.

Distribution: Taiwan.

Habitat: *Rhapis* sp., *Arundo donax,* grasses.

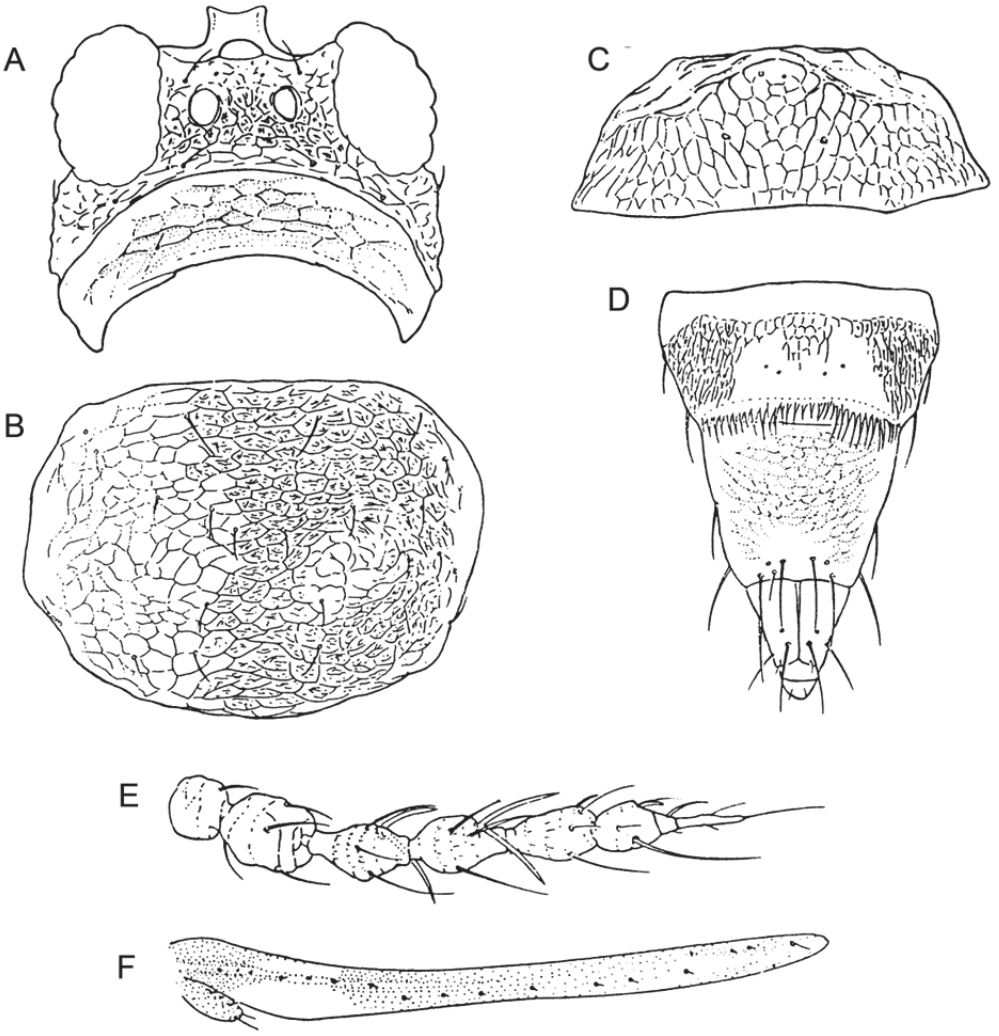


Fig. 12. *Helionothrips cephalicus* (♀) A. head; B. pronotum; C. tergite I; D. tergites VIII-X; E. antenna; F. froewing.

Helionothrips communis Wang (Fig. 13)

Helionothrips communis Wang, 1993b: 392-395.

Female body length 1.6 mm on slide. Dark brown, abdominal segments II-VII darkest of all; antennal segments I and II yellowish brown, III-V pale yellow, VI and VII dark brown, VIII grayish brown; ocelli with red pigment. Forewings with base and scale dark brown, followed by a transparent band, the rest of wing brown with slightly darker apex. Fore femora brown, fore tibiae yellowish brown; mid and hind femora and tibiae dark brown, with distal fourth of tibiae yellow; all tarsi yellow. Major setae of body pale brown.

Head wider than long, ocellar area elevated, cheeks subparallel, slightly concave behind compound eyes; dorsal area between compound eyes polygonally reticulate; anterior margin of collar almost parallel to posterior margin; reticulations in collar with minute black granules. Maxillary palpi 2-segmented. Antennae 8-segmented, segments III and IV with forked sense cone, that on IV reaching the base of VI; IV- VI with microtrichia.

Prothorax rounded, and broad; pronotum polygonally reticulate, reticulations in posteromedian portion with wrinkles; disc setae moderately long. Mesonotum and metanotal triangle polygonally reticulated and with wrinkles in reticulations. Forewing covered with microtrichia; upper vein with 6 basal setae and 2 distal setae, lower vein with 5-9 setae; posterior fringe wavy.

Abdominal tergites reticulated; median of antecostal ridges on tergites III-VIII reverse U-shaped; lateral reticulations on tergites II-VIII with wrinkles; posterolateral margin of tergite VIII with comb; tergite IX with 2 pairs of major setae along posterior margin; X split completely.

Male color and shape similar to female. Abdomen slender; tergite IX with 2 pairs of thorn-like

setae arranged in 2 rows, followed by several dark warts. Sternites VII and VIII with a small, rounded glandular area.

Distribution: Taiwan, Japan.

Habitat: *Colocasia* sp., *Musca* sp., *Solanum melongena*, *Alpinia* sp., *Ipomoea reptans*, *Rhododendron* sp.

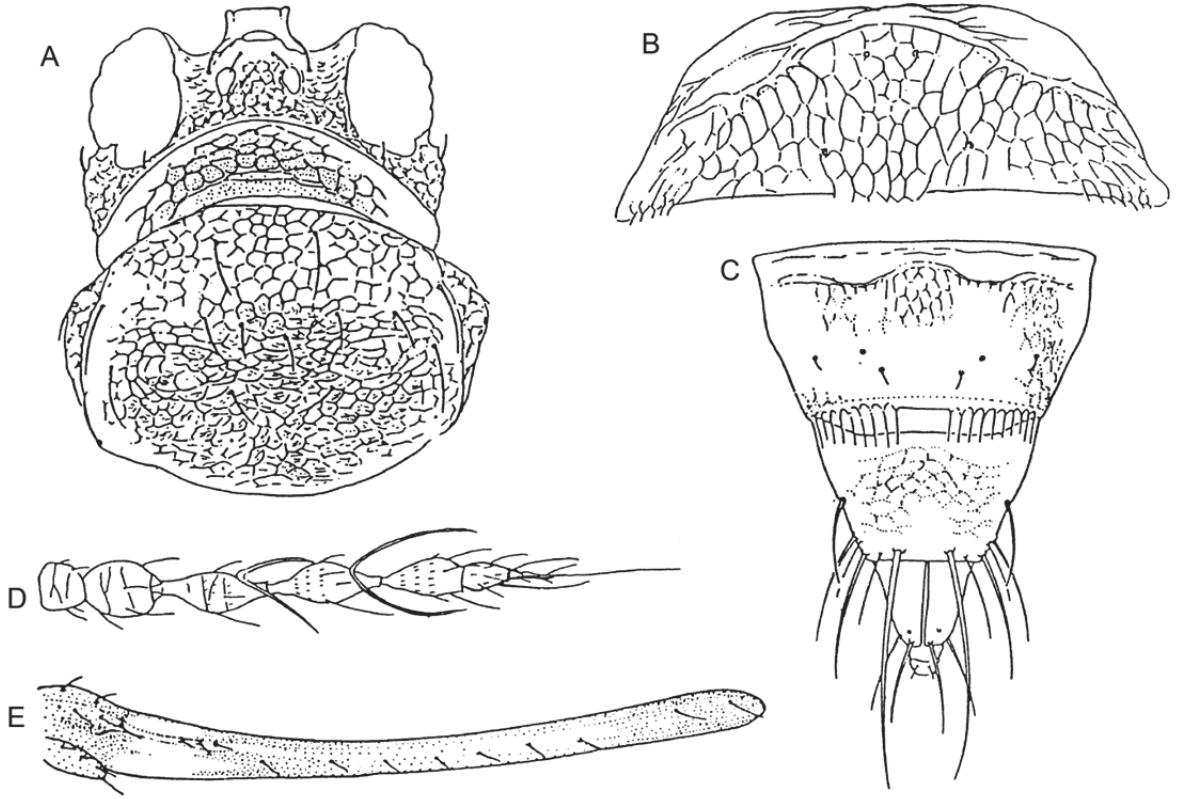


Fig. 13. *Helionothrips communis* (♀) A. head and pronotum; B. tergite I; C. tergites VIII-X; D. antenna; E. forewing.

Helionothrips errans (Williams) (Fig. 14)

Heliothrips errans Williams, 1916a: 243.
Hercinothrips errans (Williams); Priesner, 1935b: 351.
Helionothrips errans (Williams); Priesner, 1936b: 208.

Female body length 1.1-1.4 mm on slide. Dark brown, frons between bases of antennae and in front of anterior ocellus yellow; antennal segment I grayish brown, II brown, III-V grayish yellow, VI brown, VII and VIII grayish brown. Forewings grayish brown, with a light subbasal area, and the base and apex darker. Fore legs yellow; mid femora with both terminals yellow, median brown, mid tibiae yellow with basal areas grayish brown; hind femora and bases of tibiae dark brown, the rest of tibiae yellow; all tarsi yellow.

Head wider than long, covered with reticulations; anterior and posterior margin of collar about parallel, with reticulations inside. Antennae 8-segmented, simple and forked sense cone of segment IV about the same length.

Pronotum covered with reticulations, larger reticulations form 2 rectangle areas in median lateral; end of metanotal triangle with obvious spots, metascutellum with posterior laterals extruded. Forewing covered with microtrichia, posterior fringe wavy.

Abdominal tergite I with scallop-like reticulated area, median scoop about 1/3 the width of this segment; tergites III-VIII with a reverse U-shaped arch in median, and 3 smaller arches on each side; side arches on tergite VIII unobvious, submedian area smooth; posterior comb of tergite VIII with trichoid teeth, median teeth shorter, lacking about one tooth in the middle; tergite X split completely.

Male color and shape similar to female. Abdomen slender; tergite IX with 2 pairs of thorn-like setae, followed by 8-10 dark warts. Sternites VII and VIII with rounded glandular area.

Distribution: Taiwan, Japan, Russia, Kenya, United Kingdom.

Habitat: *Perrottelia arisanensis*, *Neolitsea variabillima*.

Remarks: TARI specimens of *H. errans* collected by Takahashi on cherry was reidentified as *H. aino.* According to world records, *H. errans* could be found on orchids.

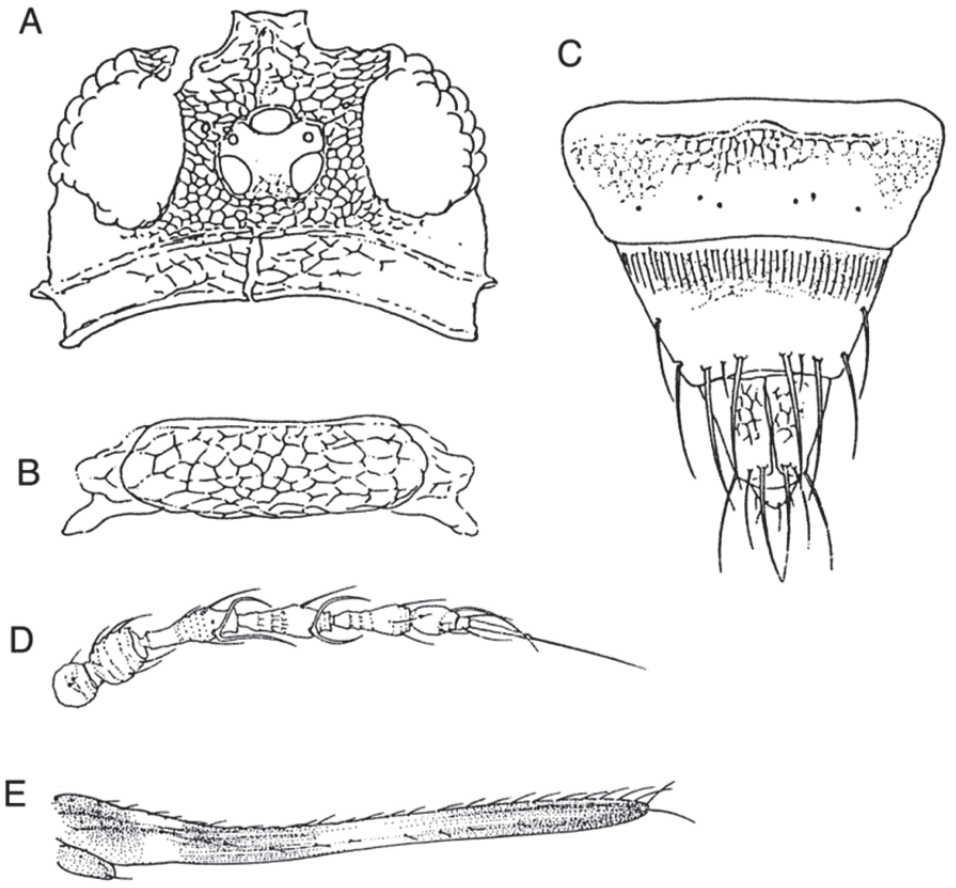


Fig. 14. *Helionothrips errans* (♀) A. head; B. metascutellum; C. tergites VIII-X; D. antenna; E. forewing.

Helionothrips linderae Kudo (Fig. 15)

Helionothrips linderae Kudo, 1992: 279-281.

Female body length 1.5-1.6 mm on slide. Dark brown, eyes dark; antennal segment I and II yellowish brown to brown, segments III-V grayish yellow, VI dark brown, VII brown, VIII grayish brown; forewings grayish brown, with a light subbasal area, and the base darker; fore legs yellow, tibiae darker on both ends; mid and hind legs with femora brown, distal 1/2-1/3 of tibiae yellow, tarsi yellow.

Head wider than long, covered with reticulations, ocellar area elevated. Collar obvious, about equal length as the rest of head, with a dark irregular transverse line inside, polygonal reticulations anterior of the line, transverse striae posteriorly, all reticulations with wrinkles inside. Antennae 8-segmented, forked sense cone on segments III and IV, forked sense cone on IV reach terminals of V, IV-VI with microtrichia.

Pronotum covered with reticulations; mesonotum with longitudinal split posteriorly, reticulations with wrinkles, larger reticulations in median lateral; metanotal triangle obvious, reticulations without wrinkles or spots, metasculleum with wrinkles. Forewing covered with microtrichia, costal setae shorter than frontal fringe, upper vein setae 8-9, lower vein setae 6-8, posterior fringe wavy.

Abdominal tergites with reticulations; tergites III-VIII with a reverse U-shaped arch in median, and 3 smaller arches on each side; side arches on tergite VIII not obvious; posterior comb of tergite VIII long, median teeth lacking; tergite X split completely.

Male color and shape similar to female. Abdomen slender; only sternite VIII with one small rounded glandular area; tergite IX with 2 pairs of thorn-like setae, anterior pair of setae larger and further apart; followed by 6 dark warts.

Distribution: Taiwan, Japan.

Habitat: *Lindera* sp., *Parabenzoin praecox*.

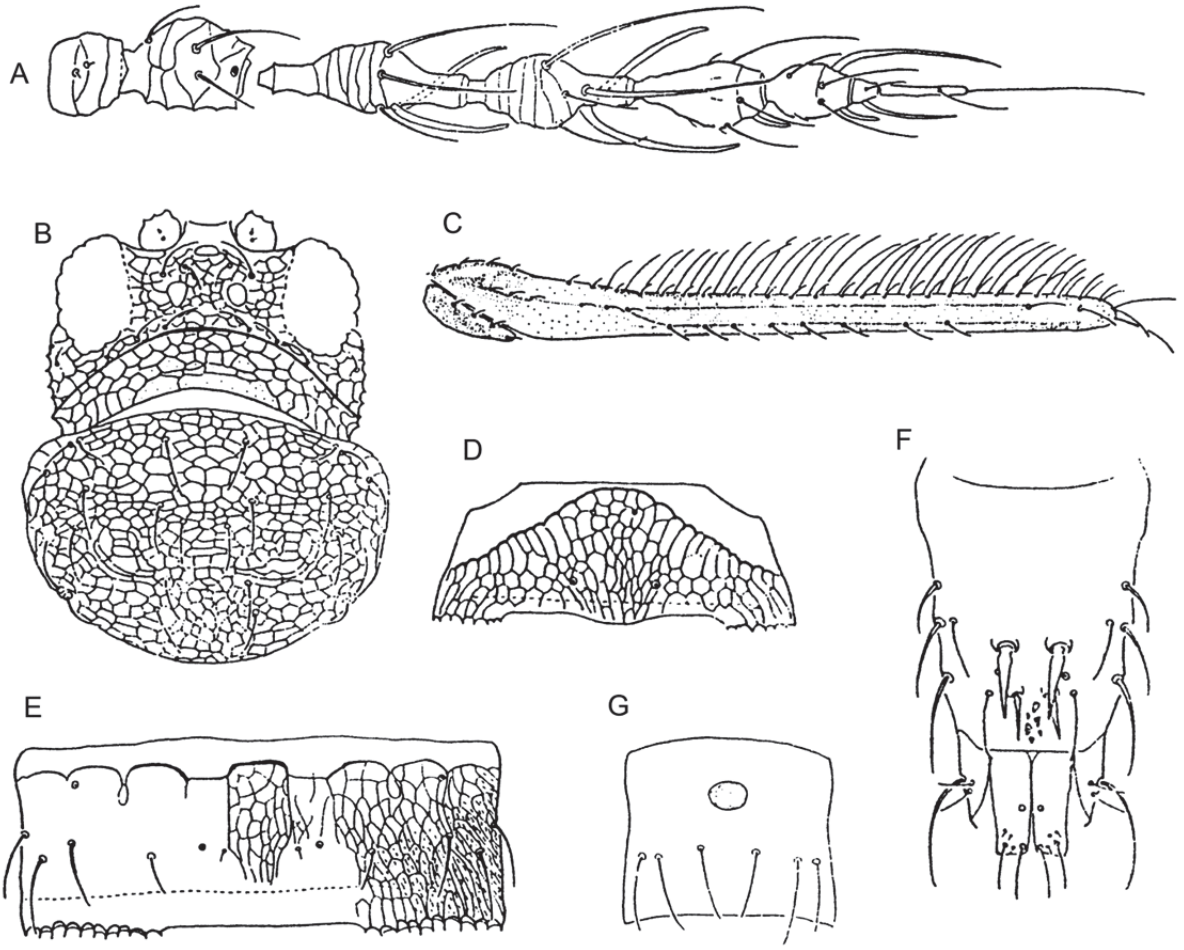


Fig. 15. *Helionothrips linderae* (♀) A. antenna; B. head and pronotum; C. forewing; D. tergite I; E. tergite V; (♂) F. tergfites IX and X; G. sternite VIII. (Kudo, 1992).

Helionothrips mube Kudo (Fig. 16)

Helionothrips mube kudo, 1992: 275-279.

Female body length 1.4-1.7 mm on slide. Dark brown, eyes dark; antennal segment I-V yellow, VI and VII brown, VIII grayish brown; forewings grayish brown, with a light subbasal area, the base and the terminal darker; fore legs yellow, tibiae darker on laterals; mid and hind femora brown, distal 1/2-1/3 of tibiae yellow, tarsi yellow.

Head wider than long, covered with reticulations; ocellar area elevated. Collar obvious, about equal length with the rest of head, anterior and posterior margin of collar rounded forward, with a dark transverse line, polygonal reticulations anterior of the line, flatten reticulations posterior of the line, all reticulations with wrinkles inside. Antennae 8-segmented, forked sense cone on segments III and IV, sense cone on IV reach base of VI, IV-VI with microtrichia.

Pronotum covered with reticulations, larger reticulations form 2 rectangle areas in median laterals; mesonotum with longitudinal split posteriorly; metanotal triangle obvious; metasculletum with reticulations. Forewing covered with microtrichia, costal setae shorter than frontal fringe, vein setae short, posterior fringe wavy.

Abdominal tergites with reticulations; tergites III-VIII with a reverse U-shaped arch in median, and 3 smaller arches on each side; side arches on tergite VIII not obvious; posterior comb of tergite VIII long, median teeth lacking; tergite X split completely.

Male color and shape similar to female. Abdomen slender; sternites VI, VII and VIII with small and rounded glandular area; tergite IX with 2 pairs of thorn-like setae, anterior pair stouter and further apart; followed by 10 dark warts.

Distribution: Taiwan, Japan.

Habitat: *Stauntonia hexaphylla*, grasses.

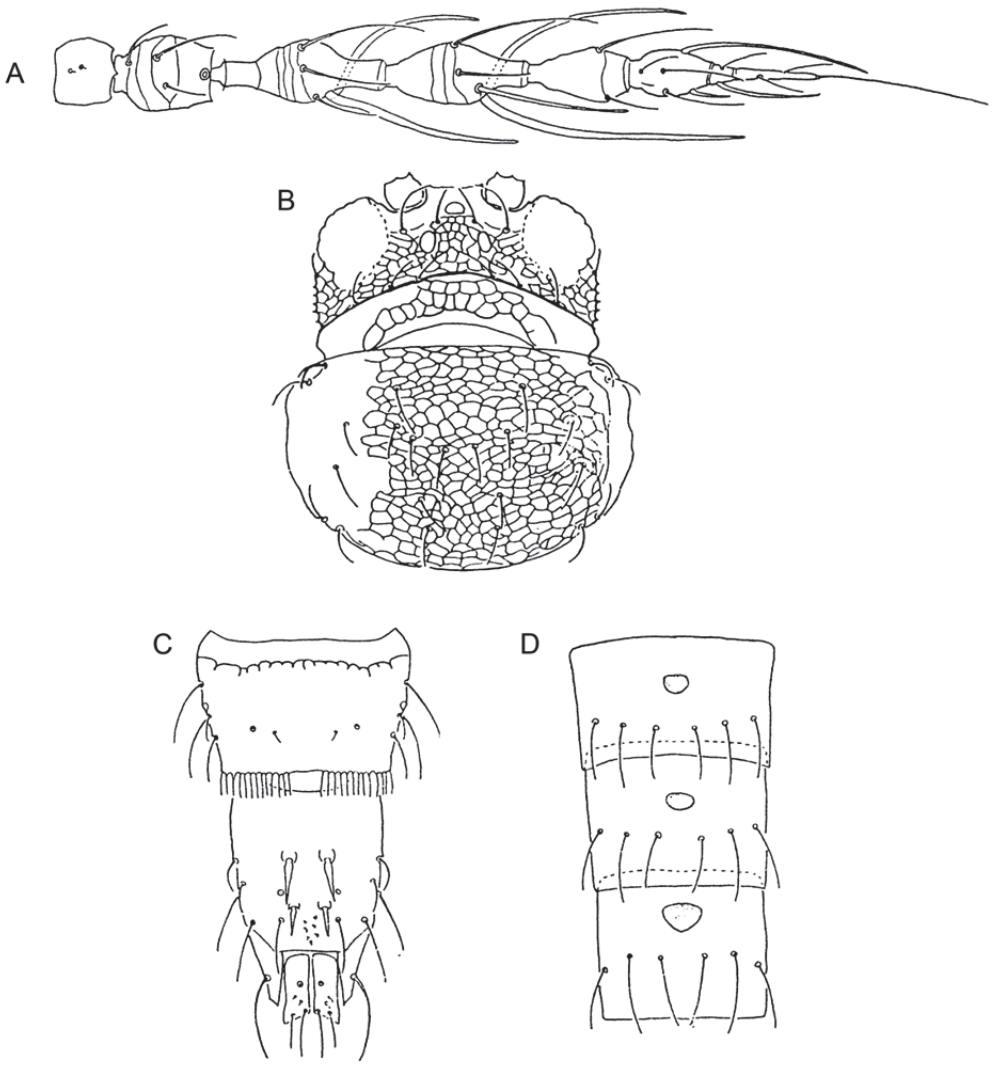


Fig. 16. *Helionothrips mube* (♀) A. antenna; B. head and pronotum; (♂)C. tergite VIII-X; E. sternite VI-VIII. (Kudo, 1992).

Helionothrips unitatus Chen

Helionothrips unitatus Chen, 1981: 121.

Female body length 1.4-1.6 mm on slide. Dark brown, eyes transparent, ocelli without red pigment. Antennal segments I, II and VI yellowish brown, III-V pale yellow, VII and VIII grayish brown; forewings with base and scale dark brown, followed by a transparent band, the rest of wing brown with slightly darker apex; fore legs grayish brown; mid and hind femora and tibiae brown, with apices of tibiae yellow; all tarsi yellow; major setae of body pale brown.

Head wider than long, ocellar area elevated; reticulations in collar with minute black granules. Maxillary palpi 2-segmented. Antennae 8-segmented, segments III and IV with forked sense cone, that on IV reaching the middle of VI; IV- VI with microtrichia.

Prothorax rounded and broad; pronotum polygonally reticulate, posterior reticulations with wrinkles; disc setae long. Mesonotum and metanotal triangle reticlulated; with wrinkles in anterior reticulations on mesonotum and posterior reticulations on metanotal triangle. Forewing covered with microtrichia, upper vein with 6 setae at base and 2 at apex, lower vein with 6-8 (mostly 7) seta, posterior fringe wavy.

Abdominal tergites reticulated; tergites III-VIII with a reverse U-shaped arch in median, and 3 smaller arches on each side; lateral reticulations on tergites II-VIII with wrinkles; comb of tergite VIII lacking in the middle; tergite IX with 2 pairs of major setae along posterior margin; X split completely.

Male: According to Chen (1981), abdominal sternites without glandular area.

Distribution: Taiwan.

Habitat: *Abrus precatorius*, *Oxalis* sp.

Remarks: 1. Holotype is unavailable. 2. This is redescription from Chen's original paper of 1981 and author's specimens. 3. This species can be separated from *H. communis* by (1) color of antennal segment II of *communis* paler than segment VI, these 2 segments are similarly shaded in *unitatus*; (2) eyes of *communis* dark, these of *unitatus* transparent.

Genus *Heliothrips* Haliday

Heliothrips Haliday, 1836: 443. Type species: *Heliothrips Adonidum* Haliday, 1836.

Body covered with reticulated sculpture; setae minute; posterior dorsum of head with clear collar line. Antennae 8-segmented, segments III and IV with simple sense cone; without microtrichia. Prothorax small; mesonotum complete; forewings posterior fringe straight; legs stout. Abdominal tergite VIII with posterior comb complete; tergite X median longitudinal split completely. Three species in the world.

Heliothrips haemorrhoidalis (Bouché) (Fig. 17)

Greenhouse thrips, Glasshouse thrips

Thrips haemorrhoidalis Bouché, 1833: 42.
Heliothrips adonidum Haliday, 1836: 443.
Thrips adonidum (Haliday); Cook, 1874: 501.
Heliothrips haemorrhoidalis (Bouché); Burmeister, 1838: 412.

Female body length 1.2-1.5 mm on slide. **Brown form**: body brown, abdominal tergites II–VIII with antecostal ridge dark brown, tergites IX and X golden yellow. **Light form**: head and thorax brown, abdomen grayish yellow. Both types with antennal segments I, II, VII and VIII grayish brown, segments III-V and base of VI grayish yellow, distal 2/3 of VI brown. Legs grayish brown. Forewings grayish yellow, lower vein pale brown.

Head wider than long, dorsum with reticulations, median of cheeks concave slightly, setae minute, posterior dorsum with a constricted collar line. Mouth cone broad and rounded, maxillary palpi 2-segmented. Antennae 8-segmented, segments III and VI with simple sense cone, segment VIII needle shaped and twice the length of segments VI + VII, without microtrichia.

Pronotum broad, posterior lateral angles rounded, covered with reticulations, setae minute. Mesonotum complete, covered with reticulations, setae minute. Metanotal triangle covered with reticulations, terminal rounded; mesonotum and metanotum unseparated. Forewing without costal setae, distal half with fringe, vein setae minute, posterior fringe straight. Fore and mid legs with femora and tibiae stout, with reticulations, all tarsi one-segmented.

Abdominal tergite I full covered with reticulations; tergites II-VIII with reticulations on laterals and in the median, submedian areas smooth; median setae longer towards posterior segments; posterior comb on tergite VIII long and complete; tergites IX and X each with 2 pairs of major setae, lateral pair longer; tergite X asymmetric, split completely.

Male rare, not found in Taiwan. Color and shape similar to male, but smaller. Abdominal tergite IX with 3 pairs of thorn-like setae, anterior pair stouter; abdominal sternites III-VII with anterior transverse glandular area.

Distribution: Cosmopolitan.

Habitat: *Aleurites moluccana*, *Excoecaria cochinchinesis*, *Codiaeum variegatum*, *sapium sebiferum*, *Mallotus japonicus*, *Sphaeropteris lepifera*, *Tagetes eracta*, *Plumiera rubera*, *Prunus salicina*, *Juniperus chinensis*, *Acer serrulatum*, *Cryptomeria japonica*, *Liquidambar formosana*, *Ardisia sieboldii*, *Styrax formosana*, *Turpinia formosana*, *Evodia lepta*, *Helicia formosana*, *Ficus septica*, *Morus* sp., *Ampelopsis brevipedunculata*, *Acacia confusa*, *Litsea* sp., *Nicotiana tabacum*, *Colocasia* sp., *Cordonia axillaries*.

Remarks: This species is common on many plants in tropical and subtropical areas. It is considered a pest in greenhouse in temperate areas. Adults and larvae stay on laterals of median vein of leaves. Larvae inactive, several individuals may stay together. Takahashi (1944) recorded this species and found it was common on various wooden trees in Taiwan all year round. The population densities are generally low, so far no economic damage has been recorded in Taiwan.

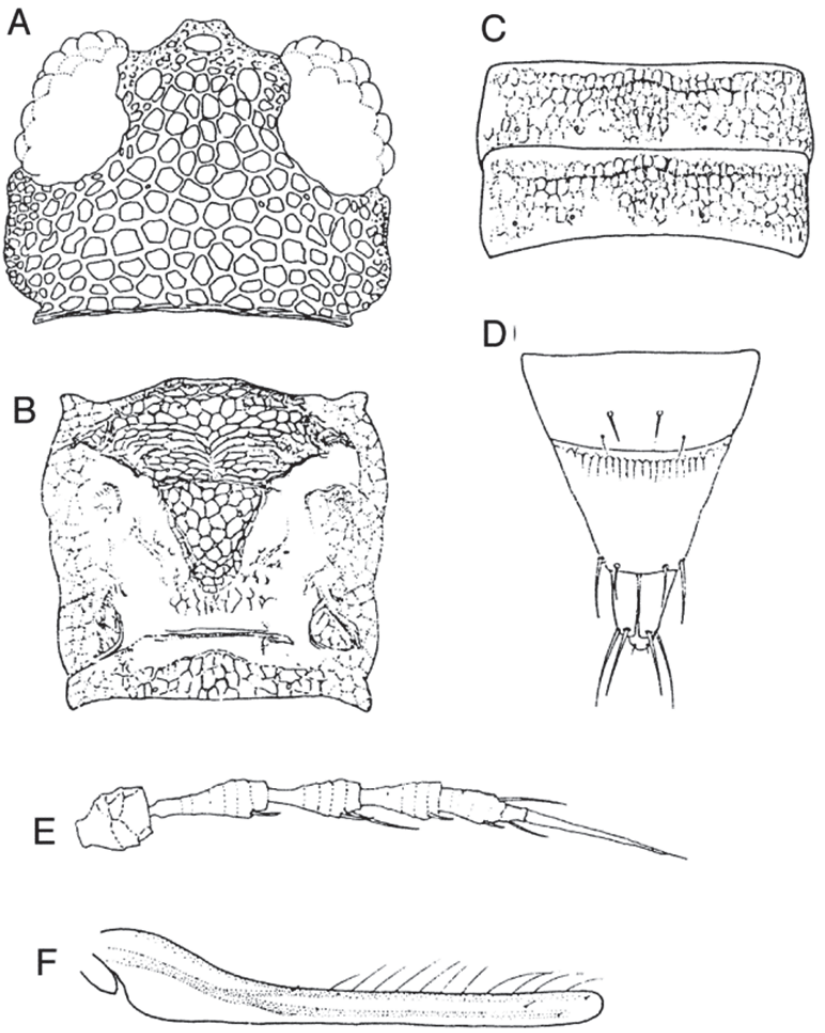


Fig. 17. *Heliothrips haemorrhoidalis* (♀) A. head; B. meso- and metanotum, and tergite I; C. tergites III and IV; D. tergites VIII-X; R. antenna; F. forewing.

Genus *Hercinothrips* Bagnall, 1932

Hercinothrips Bagnall, 1932a: 506. Type species: *Heliothrips bicinctus* Bagnall.

Head with cheeks parallel, posterior dorsum constricted to form a collar, ocellar area slightly humped, interocellar setae situated anterior of posterior ocelli. Antennae 8-segmented, segments III and IV with forked sense cone. Forewing with 2 median dark areas, covered with microtrichia, vein setae even and complete. Comb on tergite VIII only on lateral. Eight species in the world.

Hercinothrips femoralis (Reuter) (Fig. 18)

Banded greenhouse thrips, Sugar-beet thrips

Heliothrips femoralis Reuter, 1891: 166.
Heliothrips cestri Pergande, 1895: 390.
Hercinothrips femoralis (Reuter); Bagnall, 1932a: 506.
Hercothrips femoralis (Reuter); Kurosawa, 1932b: 37.

Female body length 1.2-1.6 mm on slide. Brown, cheeks and median dorsum of head darker, form two yellowish longitudinal bands, these bands extend to pronotum; abdomen brown with segments VIII-X in paler color; antennal segments I and II same color with head, basal of III-V yellowish, apical darker, VI-VIII dark brown; legs yellow, mid and hind femora brown; forewings mostly brown, with base, median and apex transparent, wing scale with brown spots, vein setae dark and long.

Head with reticulated sculpture, obvious minute spots or wrinkles inside reticulations, setae long, cheeks about same length as eyes, anterior margin of collar not clear. Sense cones on antennal segments III and IV Y-shaped.

Pronotum reticulated, with minute wrinkles inside; wrinkles inside reticulations of mesonotum unclear; metanotal median reticulations with minute and clear wrinkles Metascutellum width 4 times as length. Forewing with vein setae complete, posterior fringe wavy. Tarsi 2-segmented.

Abdominal tergite VIII with posterior comb only on laterals, teeth long and irregular, fused at bases; tergite X split completely.

Male color and shape similar to female, abdominal sternite IX with 3 pairs of posteromedian thorn-like setae, several small posterior tubucles; sternites III-VII with transverse glandular area.

Distribution: Taiwan, Africa, North and Central America, Europe.

Habitat: *Crinum asiaticum*.

Remarks: This species was mainly distributed in tropical and subtropical areas. Frequently occurred in greenhouses in temperate area. Population densities declined since the widely use of chemical insecticides.

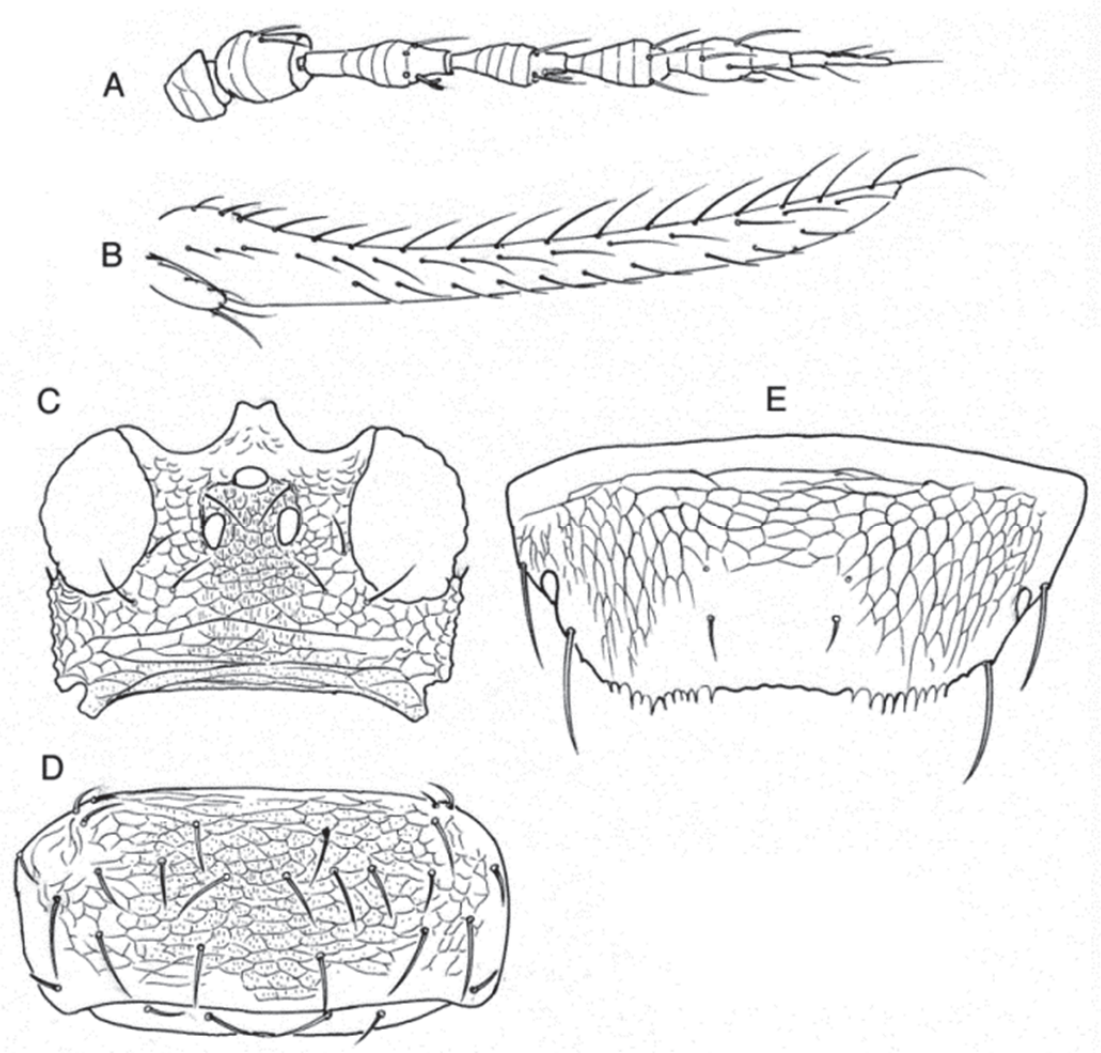


Fig. 18. *Hercinothrips femoralis* (♀) A. antenna; B. forewing; C. head; D. pronotum; E. tergite VIII.

Genus *Monilothrips* Moulton

Monilothrips Moulton, 1929b: 93, 94. Type species: *Monilothrips kempi* Moulton, 1929.

Head quadrate, anterior and posterior margins of collar straight, collar reticulated. Antennae 8-segmented, segments III and IV with forked sense cone, IV-VI with microtrichia. Pronotum with one major setae on each of anterior and posterior angles; mesonotum and metanotum with reticulations. Forewings with even setae on both upper and lower veins. Abdominal sternites with reticulations. Only one species in the world.

Monilothrips kempi Moulton (Fig. 19)

Monilothrips kempi Moulton, 1929b: 94.
Monilothrips montanus Jacot-Guillarmod, 1942: 64.

Female length 1.6 mm on slide. Brown; antennal segments I and II yellow, III grayish brown with yellow base, IV and V basal pedicel white, distal end brown, VI-VIII brown; forewings grayish brown at base, veins grayish brown, apical end slightly shaded; basal and distal ends of tibiae and tarsi yellow.

Head quadrate, 2 pairs of ocellar setae and 3 pairs of ocular setae about same length, one expanded short setae behind each compound eye. Collar area broad, rectangular, with 4 rows of reticulations. Mouth cone short and rounded; maxillary palpi 2-segmented. Antennae 8-segmented, segments III and IV with forked sense cone, IV-VI with microtrichia.

Pronotum without significant sculpture, one anterior angular setae on each side, a suture near posterior margin, 3 pairs of setae on anterior margin of suture, posterior angle with one long and

apex-expanded seta, 3 pairs of posterior marginal seta, median pair longest; meso- and metanotum with reticulations; metascutellum rectangular. Forewing costal setae longer than fringe, setae on both veins long and complete and arranged evenly. Legs long, tarsi 2-segmented.

Antecostal ridge on abdominal tergite I obviously fan shaped; the most anterior margin of reticulations on tergites II-VIII bold and dark; tergite X small, split completely. Sternites II-VIII with 3 pairs of posteromarginal setae, one pair of median setae, short and wide apart.

Male color near female but smaller and slender, 2 pairs of thorn-like setae on tergite IX, one pair on median and one pair on lateral; without glandular area.

Distribution: Taiwan, India, South Africa, Lesotho, US.

Habitat: Mostly found on fern, including *Blechum australe*, *B. punctulatun*, *Mohria caffrorum*, *Adiantum aethiopicum*, *Hypolepis sparsisora*. It was collected from *Araiostegia perdurans* in Taiwan.

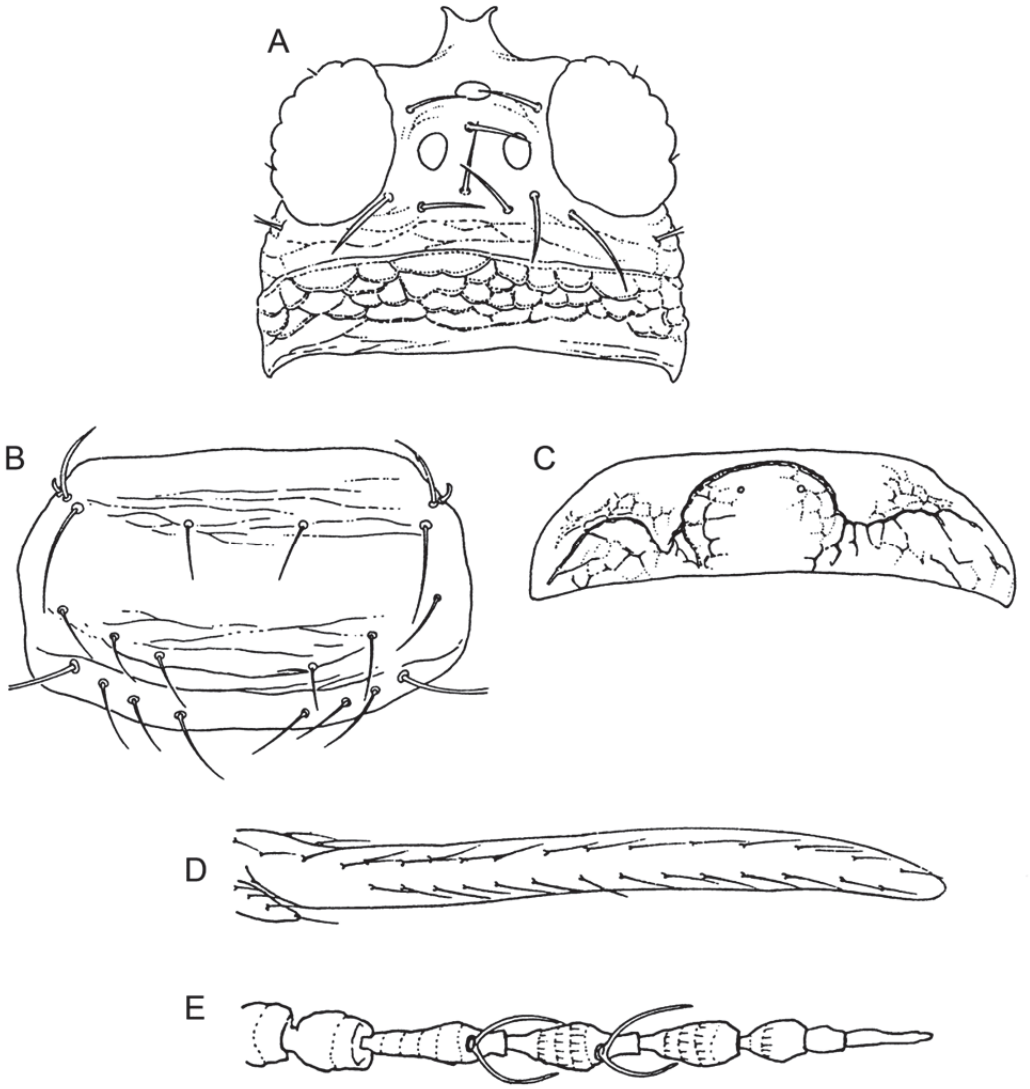


Fig. 19. *Monilothrips kempi* (♀) A. head; B. pronotum; C. tergite I; D. forewing; E. antenna.

Genus *Phibalothrips* Hood

Phibalothrips Hood, 1918: 125. Type species: *Phibalothrips exilis* Hood, 1918.

Body slender, head quadrate, posterior dorsum constricted to form collar. Antennae 7-segmented, segments III and IV with simple sense cone, without microtrichia, VII needle-like. Thorax parallel, as wide as head, pronotum without significant setae. Forewings narrow, anterior margin without costal setae or fringe cilia. Abdomen narrow. Four species in this genus.

Key to species of *Phibalothrips* in Taiwan

1. Forewing pale yellow, basal area brown ..... *peringueyi*
-- Forewing all pale yellow ..... *basis*

Phibalothrips basis Chen (Fig. 20)

Phibalothrips basis Chen, 1981: 123.

Female body length 1.3-1.5 mm on slide. Bicolored: head and thorax brown, abdomen yellow; antennal segments I-V yellow, VI and VII brown; forewings pale yellow; legs yellow.

Head quadrate, with rounded reticulations, setae minute, ocelli raised on a small anterior hump, cheeks straight, longer than compound eyes, posterior dorsum constricted to form collar. Mouth cone rounded, reach middle of prosternum; maxillary palpi 2-segmented. Antennae 7-segmented, segments III and IV elongate and with simple sense cone, without microtrichia, V and VI closely connected, terminal segment needle-like.

Pronotum lateral margin expanded, reticulations weaker than on head, setae minute. Mesonotum entire; metanotal triangle obvious; pterothorax as wide as or narrower than

prothorax. Forewing parallel-sided and narrow, vein setae minute, anterior margin without setae or fring cilia, posterior cilia weakly waving. Tarsus one-segmented.

Abdomen tergites I and X and laterals of tergites II-IX with reticulations, with minute wrinkles inside, reticulations form row of spines on posterior margin of tergites; tergite I with median pair of setae on anterior half, close to each other; tergites II-VIII with median pair of setae near posterior margin, tergite IX with one pair of major setae near posterior angle, outer pair exceeding apex of segment X, tergite X split completely.

Male about 1.3 mm, body shape and color similar to female, but smalle. Abdominal sternites II-VII with transverse glandular area near anterior margin.

Distribution: Taiwan.

Habitat: Grasses.

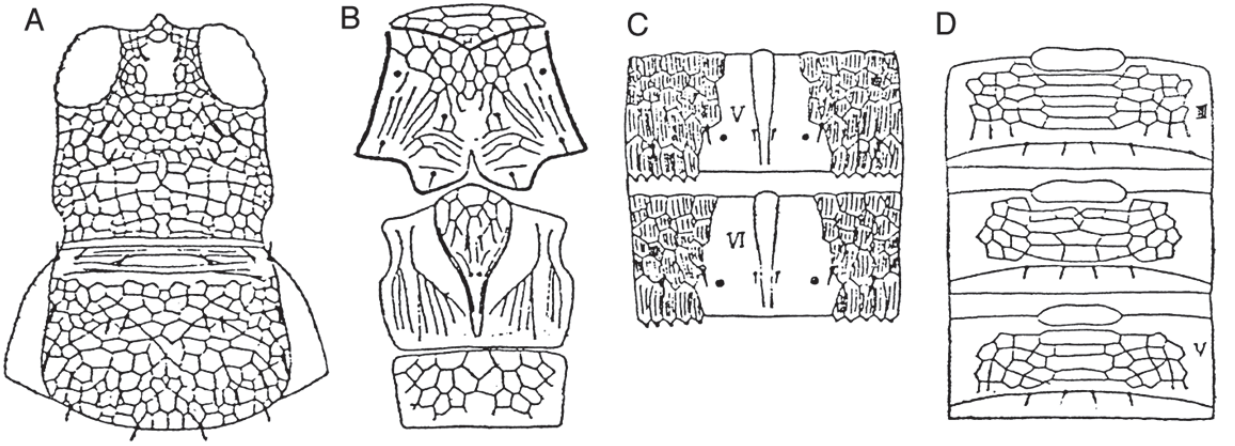


Fig. 20. *Phibalothrips basis* (♀) A. head and pronotum; B. mesonotum, metanotum and metasculleum; (♂)C.tergites V and VI; D. tergites III-V (Chen, 1981).

Phibalothrips peringuey (Fauré) (Fig. 21)

Reticulothrips peringueyi Fauré, 1925: 145.
Phibalothrips peringueyi (Fauré); Kudo, 1973: 467.

Female body length 1.25 mm on slide. Bicolored: head and thorax dark brown, abdomen yellow; antennal segments I-V yellow, VI and VII brown; forewings pale yellow but scale and basal area brown; all legs yellow but fore and mid femora brown.

Head quadrate, with rounded reticulations, setae minute, ocelli raised on a small anterior hump, cheeks straight, longer than compound eyes, posterior dorsum constricted to form collar. Mouth cone rounded, reach middle of prosternum; maxillary palpi 2-segmented. Antennae 7-segmented, segments III and IV elongate and with simple sense cone, without microtrichia, V and VI closely connected, terminal segment needle-like.

Pronotum lateral margin expanded, reticulations weaker than on head, setae minute. Mesonotum entire; metanotal triangle obvious; pterothorax as wide as or narrower than prothorax. Forewing parallel-sided and narrow, vein setae minute, anterior margin without setae or fringe cilia, posterior cilia weakly waving. Tari one segment.

Abdomen tergites I and X and laterals of tergites II-IX with reticulations, and minute wrinkles inside, reticulations form rows of spines on posterior margin of tergites; tergite I with median pair of setae on anterior half, close to each other; tergites II-VIII with median pair of setae near posterior margin, tergite IX with one pair of major setae near posterior angle, outer pair exceeding apex of segment X, tergite X split completely.

Male body shape and color similar to female, but smaller. Abdominal sternites II-VII with transverse glandular area near anterior margin.

Distribution: Taiwan, South Africa, India, Southern Rhodesia.

Habitat: Grasses.

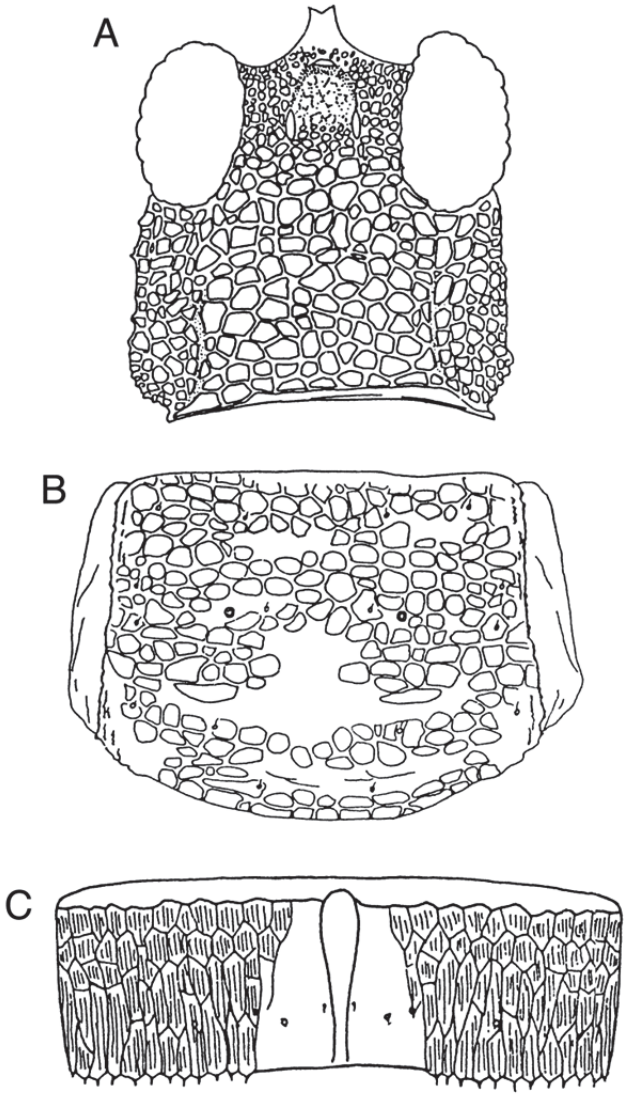


Fig. 21. *Phibalothrips peringuey* (♀) A. head; B. pronotum; C. tergites V.

Genus *Rhipiphorothrips* Morgan

Rhipiphorothrips Morgan, 1913: 17. Type species: *Rhipiphorothrips pulchellus* Morgan, 1913.

Head and pronotum regose, antennae 8-segmented, terminal of VIII needle-like. Pronotum lacking major setae; forewings upper vein setae minute, frontal margin without cilia and costal setae. Male abdominal tergite IX with a pair of apex-expanded setae on posterior margin. Five species in the world.

Key to species of *Rhipiphorothrips* in Taiwan

1. Antennal segments III and IV with forked sense cone ..... *africanus*
-- Antennal segments III and IV with simple sense cone 2

2. Head, thorax and abdomen of female uniformly dark brown; male with a tooth-like process on sides of abdominal segment IV ..... *cruentatus*
-- Female bicolored, head and pterothorax dark brown, prothorax and abdomen yellow; male lacking a process on sides of abdominal segments ..... *pulchellus*

Rhipiphorothrips africanus Wilson (Fig. 22)

Rhipiphorothrips africanus Wilson, 1975: 220-222.

Female body length 1.5 mm on slide. Dark brown; antennal segments I-VI yellow, apex of VI grayish brown, VII and VIII brown; forewings with scale brown, veins yellowish brown; legs brown, distals of tibiae and tarsi yellow.

Head strongly regose, setae minute, cheeks long and not straight; posterior dorsum form a broad collar area, with reticulations. Maxillary palpi 2-segmented. Antennae 8-segmented, segments III and IV with forked sense cone.

Prothorax rounded, pronotum with regose, without major setae; mesonotal median split complete, metanotal triangle reaches metascutellum Forewing without setae or fringe cilia on anterior margin, posterior cilia straight, veins insignificant, vein setae minute.

Abdominal tergite I with reticulations; tergites II-VII sculptured on laterals, median area smooth, median of antecostal ridges with comb of forked teeth, median setae longest; hind margin of tergites VII and VIII with one pair of stout posteromedial setae; posterior median of tergite IX and X with one pair of expanded setae.

Male similar to female. Bicolored, head and thorax dark brown, abdomen yellow. Abdominal sternites III-VII with circular glandular area. Tergite IX with one pair of expanded setae on posterior margin. (L. S. Chen, 1981)

Distribution: Taiwan, Zaire, Zimbabwe.

Habitat: *Sapium sebiferum*, *Bamboo* sp.

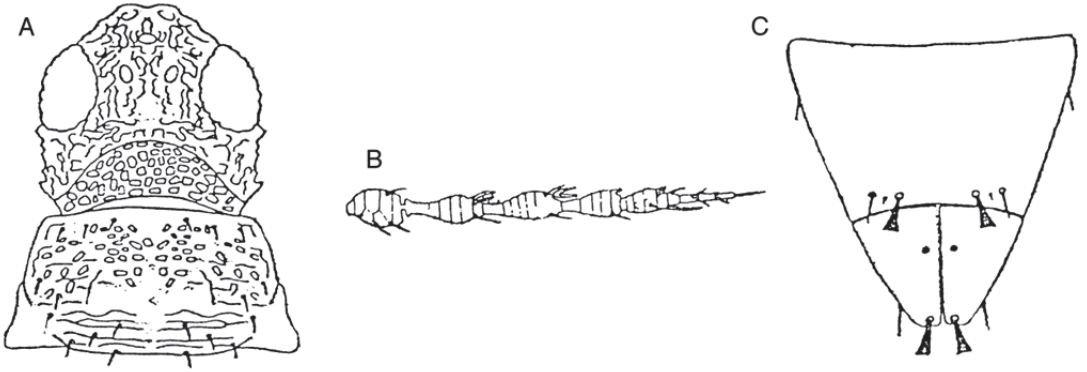


Fig. 22. *Rhipiphorothrips africanus* (♀) A. head and pronotum; B. antennal segments II-VIII; C. tergites IX and X. (Chen, 1981)

Rhipiphorothrips cruentatus Hood (Fig. 23)

Grape vine thrips

Rhipiphorothrips cruentatus Hood, 1919: 94.
Rhipiphorothrips karna Ramakrishna, 1928: 245, 252.

Female body length 1.2-1.5 mm on slide. Dark brown, yellowish on lateral of metanotal triangle and metascutellum, median 1/3 of abdominal tergites II-VII and whole of tergites VIII-X yellowish; antennal segment I golden yellow, II yellowish brown, III-V and base of VI yellow, distal end of VI, and segments VII and VIII grayish brown; forewings with scale dark brown, basal area yellowish brown, posterior margin brown, anterior margin and veins grayish yellow; legs yellow, tarsi grayish yellow.

Head strongly regose, setae minute, cheeks long and not straight; posterior dorsum form a broad collar area, anterior margin of collar strong and with reticulations inside; maxillary palpi 2-segmented; antennae 8-segmented, segments III and IV with simple sense cone.

Prothorax broad, pronotum regose, without major setae; mesonotal median split complete, metanotal triangle reaches middle of metascutellum. Forewing without setae or fringe cilia on anterior margin, posterior cilia straight, veins insignificant, vein setae minute.

Abdominal tergite I with reticulations; tergites II-VII sculptured on laterals, median area smooth, median of antecostal ridges with comb of trichoid teeth, median setae longest; hind margin of tergites VII and VIII each with one pair of stout posteromedial setae; posterior median of tergites IX and X with one pair of expanded setae.

Male similar to female. Bicolored, head and thorax dark brown, abdomen yellowish brown with red pigment on sides; antennae and legs yellowish brown; forewings with scale dark brown, veins grayish brown. Abdominal sternites III-VII with circular glandular area; lateral margins of tergite IV with one pair of teeth-like process.

Distribution: Taiwan, Sri Lanka.

Habitat: *Vitis vinifera*, *Syzygium samarangense*, *Rosa rugosa*, *Bischfia javanica*, *Sapium sebiferum*, *Eucalyptus robusta*, *Psidium guajava*, *Hedychium coronarium*, *Mangifera indica*, grasses.

Remarks: In Taiwan, this species is an pest on wax apple, guava, grape, and rose. High densities of thrips may damage leaves and young fruits. Adult females and larvae stay on lower surface and males on upper surface of a leaf. Adults and larvae are not good crawler, usually stay steady on leaves.

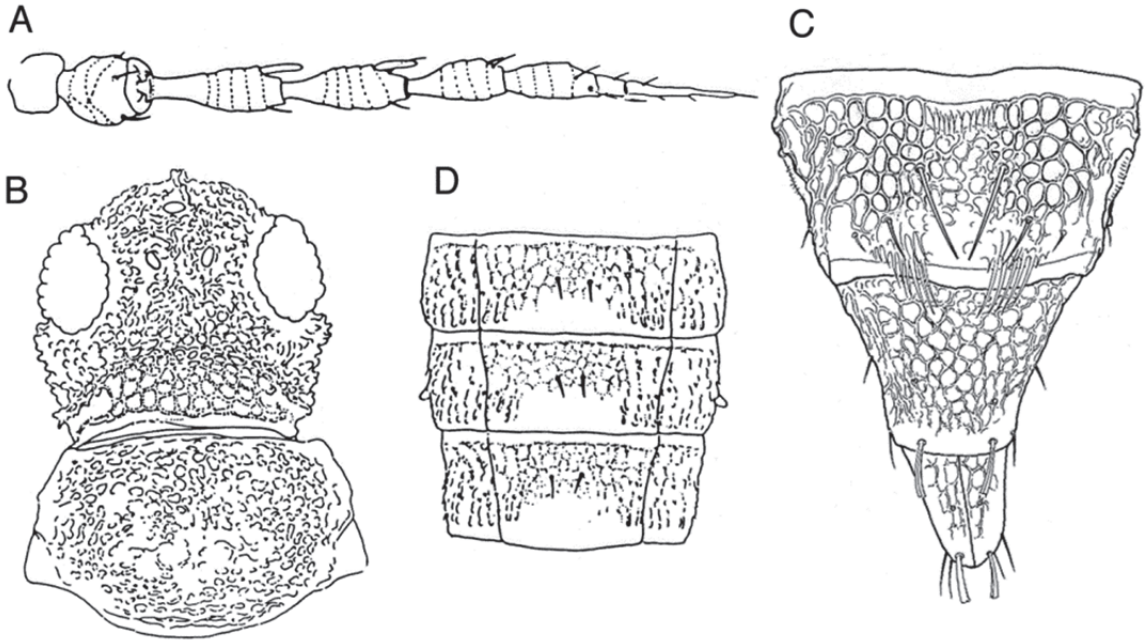


Fig. 23. *Rhipiphorothrips cruentatus* (♀) A. antenna; B. head and pronotum; C. tergites VIII – X; (♂) D. tergites III-V.

Rhipiphorothrips pulchellus Morgan

Rhipiphorothrips pulchellus Morgan, 1913: 17.
Retithrips bicolor Bagnall, 1913b: 290.

Female body length 1.5-1.7 mm on slide. Bicolored: head, mesonotum, metaepimeron and metanotal triangle brown, other parts pale brown or yellow. Antennal segment I yellow, II brownish yellow, III-V and base of VI yellow, distal end of VI and segments VII and VIII grayish brown; forewings with scale dark brown, basal area yellowish brown, posterior and anterior margin and veins grayish yellow; legs yellow.

Head strongly regose, setae minute, cheeks long and straight; posterior dorsum form a broad collar area, anterior margin of collar weak and with weak reticulations inside; maxillary palpi 2-segmented; antennae 8-segmented, segments III and IV with simple sense cone.

Prothorax broad, pronotum regose, without major setae Mesonotal median split complete; metanotal triangle reaches middle of metascutellum. Forewing without setae or fringe cilia on anterior margin, posterior cilia straight, veins insignificant, vein setae minute.

Abdominal tergite I with reticulations; tergites II-VII sculptured on laterals, median area smooth, median of antecostal ridges with comb of trichoid teeth, median setae longest; hind margin of tergites VII and VIII with one pair of stout posteromedial setae; posterior median of tergite IX with one pair of expanded or sharp (varied with individuals) setae.

Male similar to female. Bicolored, head and thorax dark brown, abdomen yellowish brown with red pigments on sides; antennae and legs yellowish brown; forewing with scale dark brown, veins grayish brown; abdominal sternites III-VII with circular glandular area, larger than in *R. abdominalis*; tergite IV without lateral teeth.

Distribution: Taiwan, Philippines, Indonesia, Sri Lanka.

Habitat: *Bischofia javanica*, *Camellia sinensis*.

Genus *Selenothrips* Karny

Selenothrips Karny, 1911b: 179, 180. Type species: *Physopus rubrocincta* Giard, 1913.

Head wider than long, posterior dorsum form a collar area; maxillary 2-segmented. Antennae 8-segmented, segments III and IV with forked sense cone. Pronotum broad, setae developed, mesonotum without suture; metanotum with triangular area. Forewings costal setae well-developed, vein setae even and complete, with microtrichia. Abdominal tergites with lateral reticulations, tergite VIII with complete comb, tergite X without split. Only one species in the world.

Selenothrips rubrocinctus (Giard) (Fig. 24)

Cacao thrips, Red-banded thrips.

Physopus rubrocinctus Giard, 1901: 264.
Heliothrips rubrocinctus (Giard): Franklin, 1908: 710.
Selenothrips rubrocinctus (Giard): Kanny, 1911: 179.
Selenothrips mendax Schmutz, 1913: 994.
Brachyurothrips indicus Bagnall, 1926a: 98.
Selenothrips indicus (Bagnall); Bagnall, 1929: 71.

Female body length 1.1-1.6 mm on slide. Brown to dark brown, abdomen darker, anterior marginal line of reticulations on tergite I-VIII dark. Antennal segments I and II brown, III and IV grayish brown with both ends paler, base of V whitish yellow to gray, distal end of V and segment VI brown, VII and VIII grayish brown; forewings brown, vein setae dark; legs brown, distal ends of tibiae and tarsi whitish yellow.

Head wider than long, anterior dorsum with reticulated sculpture, transverse striae near collar; with ocellar hump, interocellar setae situated anterior of posterior ocelli, ocular setae well-developed, cheek slightly protrude. Posterior dorsum constricted to form collar, anterior portion of collar with few transverse reticulations. Maxillary palpi 2-segmented. Antennae 8-segmented, segments III and IV with forked sense cone, without microtrichia, major setae stout.

Prothorax width twice as long, pronotum with clear transverse striae. Median pair of anterior marginal setae longest; mesonotum not divided; metanotal triangle regular, reach anterior margin of metascutellum, one pair of long setae in center of triangle area. Forewing covered with microtrichia, frontal margin with costal setae and fringe, vein setae well-developed, arranged even and complete, posterior fringe wavy. Legs covered with reticulations, tarsi one-segmented.

Reticulations on abdominal tergite I form a scallop area; laterals of tergites II-VIII with reticulations; tergite IV-VIII with more than 10 microtrichia between median setae, these microtrichia especially long and numerous (more than 20) on tergite VIII; posterior comb on tergite VIII complete; tergite X smooth, no split.

Male color and shape similar to female, but smaller. Abdominal sternite IX with 3 pairs of thorn-like setae, anterior pair largest, median pair smallest. Sternites III-VIII with small glandular area anteriorly.

Distribution: Taiwan, China, Philippines, Islands of Pacific Ocean, India, Sri Lanka, West Indies, Africa, US, Central and South America.

Habitat: *Codiaeum variegatum*, *Liquidambar formosana*, *Vitis* sp., *Cordia dichofoma*, *Alnus japonica*, *Styrax formosana*, *Turponia formosana*, *Ampelopsis brevipedunculata*, *Acacia confusa*, *Bixa orellana*, *Mangifera indica*, *Iris formosana*, *Platycladus orientalis*, *Rhododendron simsii*, *Homalanthus fastuosus*, *Eugenia uniflora*, *Alnus* sp., *Wendlandia* sp., *Elaeocarpus*

ellipticus, *Diospyros kaki*, *Castanea*, *Glochidion fotuni*, *Eugenia* sp., *Camellia sinensis*.

Remarks: This species was reported to damage coca and lemon in tropical area. It was found on various trees in Taiwan, but no economic damage was reported. Larvae are in yellow color with a middle red band.

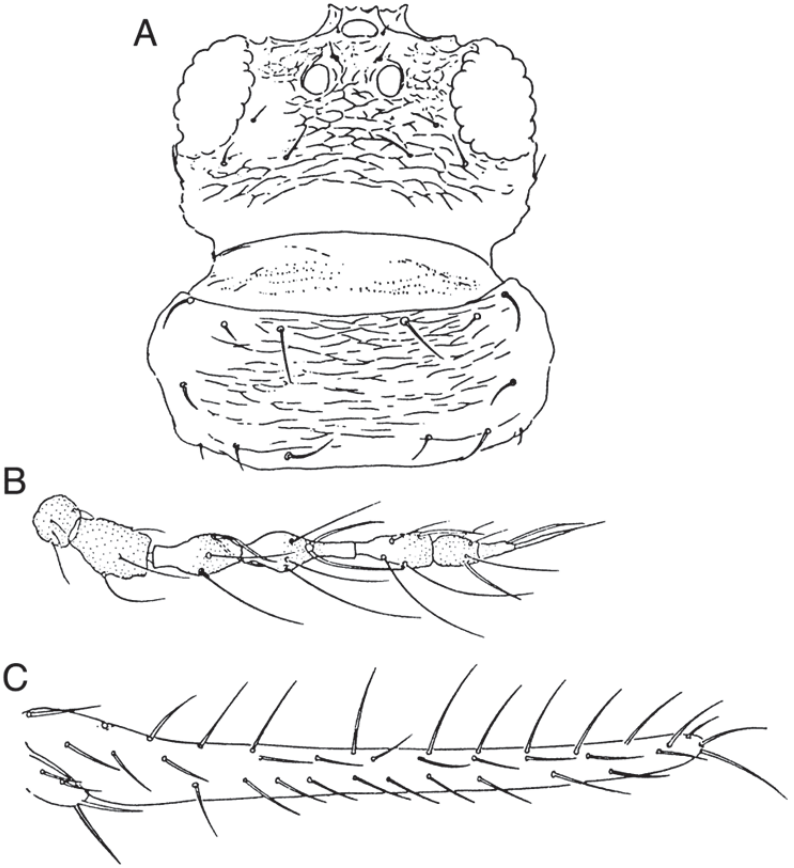


Fig. 24. *Selenothrips rubrocinctus* (♀) A. head and pronotum; B. antenna; C. forewing.

Subfamily Thripinae

Body surface may with transverse striae, seldom with reticulated sculpture, legs never with reticulated sculpture. Antennal segments III and IV with microtrichia, terminal of antennae composed of 1-2 short segments, not needle-like. Forewing with at least upper vein.

Divided into 3 tribes, Dendrothripini, Sericothripini and Thripini.

Key to tribe and genus of Thripinae in Taiwan

1. Antennal segments short and rounded; metafurca large and obvious, U-shaped, with broad ends ..... 2 (*Tribe Dendrothripini)
-- Antennal segments III to VI, or at least one of them, elongated; metafurca normal with sharp ends 3

2. Antennal segments III and IV with simple sense cone; forewing anterior margin curved downward to meet posterior margin, costal setae only on median portion, lacking on both ends ..... *Dendrothrips*
-- Antennal segments III and IV with forked sense cone; forewing front margin not curved downward, costal setae complete ..... *Pseudodendrothrips*

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* The taxonomical system is mainly matched with it on the Chinese edition published in 2002 and the web edition in 2014. TRIBES is used instead of SUBFAMILIES.

3. Head and pronotum covered with reticulations, legs never reticulated, upper vein setae of forewing complete, few lower vein setae only on apical end, laterals of abdominal tergites with dense rows of microtrichia..... 4 (*Tribe Sericothripini)
-- Head and pronotum usually with transverse striae, never clearly reticulated, laterals of abdominal tergites with or without dense rows of microtrichia ..... 5 (*Tribe Thripini)

4. Metasternum divided into 2 plates by a V shaped bone .....*Hydatothrips*
-- Metasternum not divided centrally .....*Neohydatothrips*

5. Vein setae of forewing with rounded or expended terminals, head and pronotum reticulated .....*Echinothrips*
-- Vein setae of forewing with sharp terminals, body reticulated or not 6

6. Lateral 1/4 of abdominal tergites II-VIII with dense rows of microtrichia; lateral of tergites with posteromarginal comb 7
-- Laterals of tergites II-VIII without rows of microtrichia; tergites without comb, only tergite VIII may with posteromarginal comb.....10

7. Pronotum without dense striae; forewing lower vein with more than 10 evenly arranged setae 8
-- Pronotum covered with dense transverse striae; forewing lower vein with 1-4 well separated setae 9

8. Pronotum with 2 pairs of inner setae between posteroangular setae .... *Mycterothrips* (part)
-- Pronotum with more than 2 pairs of inner setae between posteroangular setae ..... *Projectothrips*

9. Antennae 7-segmented; 3 ocular setae behind each posterior ocelli; pronotum with 5 pairs

of setae on posteromargine and posterolaterals .....*Anascirtothrips*

-- Antennae 8-segmented; 2 ocular setae behind each posterior ocelli; pronotum with 4 pairs of setae on posteromargine and posterolaterals .....*Scirtothrips*

10. Prothorax trapezoidal; head small; antennal segment II produced at out apex ...*Chirothrips*

-- Prothorax not trapezoidal, antennal segments normal 11

11. Pronotum with more than 5 pars of long setae, 2 pairs on anterior margin, one each on lateral, 4 pairs on posteroangulars..... *Scolothrips*

-- Pronotum with 1-4 pairs of long setae 12

12. Posteroangulars of pronotum with 2 pairs of expanded setae.....*Salpingothrips*

-- Posteroangulars of pronotum with sharp setae 13

13. Mouth cone reach or exceed posterior margin of prothorax; pronotum about 2-3 times longer than head; male abdominal tergites IV-VIII with posterior teeth .....*Rhamphothrips*

-- Mouth cone not reach posterior margin of prothorax; pronotum about same length of head 14

14. Head produced forwardly to form a triangular area, anterior ocellus located on this triangular area 15

-- Head normal; anterior ocellus located between compound eyes 16

15. Ovipositor retarded; one pair of anteocellar setae; anterior ocellus situated anterior to front margin of eyes; male antennal 7-segmented, segments III and VII short, IV-VI long and with long hairs.....*Plesiothrips*

-- Ovipositor normal; 2 pairs of anteocellar setae; anterior ocellus situated posterior to front margin of eyes; male antennal 6-segmented, segment V short, VI in column shape with

long hairs ..... *Sorghothrips*

16. Forewing both upper and lower veins with even and complete vein setae.....17
-- Forewing either or both veins with unevenly arranged vein setae 20

17. Ctenidia on tergite VIII situated behind spiracle ..... *Thrips* (*Isothrips*)
-- Ctenidia on tergite VIII situated in front of spiracle.....18

18. Pronotum with 5 pairs of setae between posteroangular setae, the second pair from center longest ..... *Frankliniella*
-- Pronotum with several pairs of setae between posteroangular setae, median pair as long as, or longer than, submedian pair 19

19. Interocellar setae short, 5-6 postocular setae; pronotum with 6-7 pairs of about equally small setae on posteromargin and posteroangulars, some species may have setae just a little longer on posteroangulars .....*Pseudanaphothrips*
-- Interocellar setae long, 4-5 postocualr setae; pronotum with 2 pairs of long posteroangular setae, 4 pairs of inner setae, median pair longest ..... *Parabaliothrips*

20. Abdominal tergites I-VIII with reticulated sculptures.....21
-- Abdominal tergites I-VIII without reticulated sculptures.....22

21. Head long, cheeks longer than eyes; forewings with uniform color .....*Ctenothrips*
-- Head square; forewings transparent with brown bands..... *Ayyaria*

22. Posteromargin of sternites with triangular teeth.....23
-- Posteromargin of sternites without triangular teeth, at most with sparce lateral teeth 24

23. Anteocellar setae longer than interocellar setae; pronotum with 3 pairs of posteromarginal

setae between posterolateral setae..... *Fulmekiola*

-- Anteocellar setae about same length as interocellar setae; pronotum with 5-6 pairs of posteromarginal setae between posterolateral setae..... *Microcephalothrips*

24. Forewing with 4-5 lower vein setae..... 25

-- Lower vein of forewing with 6 , usually more than 10, vein setae..... 27

25. Pronotum with 2 pairs of long posterolateral setae, 2 pairs of inner setae ..... *Bathrips*

-- Pronotum with or without long posterolateral setae, more than 2 pairs of inner setae..... 26

26. Pronotum with 5 pairs of posteroangular and posteromarginal setae; laterals of tergites VIII with stippled areas near spiracles; tergite X longitudinally split .....*Chaetanaphothrips*

-- Pronotum with 7 pairs of posteroangular and posteromarginal setae; tergites VIII without stippled areas; tergite X complete ..... *Danothrips*

27. Pronotum without long setae, setae on head and forewing short.....*Anaphothrips*

-- Pronotum with short setae and long setae, forewings with conspicious vein setae 28

28. Forewing upper vein with several basal setae, 2 distal setae 29

-- Forewing upper vein with several basal setae, 3 or more distal setae 33

29. Pronotum with 2 pairs of posteromarginal setae between posteroangular setae..... 30

-- Pronotum with more than 2 pairs of posteromarginal setae between posteroangular setae 31

30. Compound eyes big and protruding; abdominal tergite VIII without posteromarginal comb ..... *Trichromothrips*-genus group

-- Compound eyes normal; comb on abdominal tergite VIII complete..... *Mycterothrips* (part)

31. Two distal setae on upper vein of forewing situated in dark area; abdominal tergite VIII with 3-4 rows of microtrichia near anteroangular .....*Megalurothrips*
-- Distal setae of upper vein not in dark area; abdominal tergite VIII without rows of microtrichia 32

32. Pronotum with 0-1 pair of posteroangular setae..... *Dichromothrips*
-- Pronotum with 2 pairs of posteroangular setae..... *Craspedothrips*

33. Antennal segments III and IV with simple sense cone.....*Bolacothrips*
-- Antennal segments III and IV with forked sense cone 34

34. Postocular region of head with transverse foldings to form raised sculpture; forewing with brownish markings .....*Lefroyothrips*
-- Postocular region of head without transverse foldings; forewing may paler at base and apex, but mainly with uniform color 35

35. Abdominal tergite VIII with several irregularly arranged micr-otrichia in front of spiracles ..... *Taeniothrips*
-- Abdominal tergite VIII with ctendia behind spiracles 36

36. Interocellar setae about same length as anteocellar setae; mesofurca with spinula..... *Thrips* (*Thrips*)
-- Interocellar setae much longer than anteocellar setae; postocular setae long; mesofurca without spinula.....*Stenchaenothrips*