ARTICLE

Taxonomic review and illustrated key to identify species of Thysanoptera in subfamily Panchaetothripinae (Thripidae) from the Philippines

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ABSTRACT

The paper provides a review of 16 species in 12 genera under subfamily Panchaetothripinae (Thysanoptera: Thripidae) from the Philippines including new host plant records for *Selenothrips rubrocinctus* (Giard). Identification keys to genus and species were developed using morphology-based diagnostics of adult female thrips. Photomicrographs of female, and male thrips when available are provided. Reviewed and redefined are the morphological characteristics of *Astrothrips aucubae* Kurosawa, *Astrothrips globiceps* (Karny), *Astrothrips tumiceps* Karny, *Caliothrips striatopterus* (Kobus), *Copidothrips octarticulatus* (Schmutz), *Elixothrips brevisetis* (Bagnall), *Helionothrips annosus* Wang, *Helionothrips guttatus* Reyes, *Helionothrips kodaliphilus* (Ramakrishna & Margabandhu), *Heliothrips haemorrhoidalis* (Bouche), *Hemingia glandula* Reyes, *Panchaetothrips stepheni* Reyes, *Phibalothrips peringueyi* (Faure), *Retithrips javanicus* Karny, *Rhipiphorothrips pulchellus* Morgan, and *Selenothrips rubrocinctus* (Giard). Species identity confirmation using molecular techniques is recommended for the three species of *Helionothrips* Bagnall. All 16 species of thrips infest crop plants, fruit trees, grasses, and ornamentals. *Caliothrips striatopterus* (Kobus), *Heliothrips haemorrhoidalis* (Bouche), and *Selenothrips rubrocinctus* (Giard) are pests of mangosteen, and other high value crops in the Philippines.

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INTRODUCTION

Thrips (Thysanoptera) are small insects with economic, environmental, and scientific importance. They possess piercing-sucking mouthparts, four broad or narrow wings that are usually well-developed with long fringe of marginal cilia, and body color varying from pale yellow, light brown to dark brown, black or bicolored. Like other arthropods, thrips

KEYWORDS

biodiversity, insects, mangosteen, pests, terebrantia, thrips

reproduce sexually, asexually or both, and male thrips are few or rare in nature (Nault *et al*. 2006; Reyes *et al*. 2021a; Woldemelak 2020).

Many species of thrips under family Thripidae are important as crop pests. They damage plants directly through feeding and oviposition that could induce leaf curling or distortions on actively growing plant tissues, silvering and bronzing appearance of leaves, buds, and flowers, and scarring in young fruits, and indirectly by transmitting viral, bacterial or fungal pathogens (Mound *et al*. 2022; Reyes *et al*. 2021b; Reyes *et al*. 2022).

On the other hand, many species of thrips are beneficial to man as pollinator of plants (Moog *et al*. 2002), and some are useful as biomarkers or indicators of air pollution, and soil quality in urban centers (Vasiliu-Oromulu *et al*. 2009). A number of thrips species are predators of other arthropods including mites, coffee berry borers, and scale insects (Hoddle 2003; Ng and Eow 2012; Jaramillo *et al*. 2010; Lewis 1973; Saengyot 2016) while many feed on fungi on leaf litter, dead leaves and branches of trees, and contribute to nutrient recycling (Mound *et al*. 2022; Tree and Walter 2012).

The insect order Thysanoptera includes extant species of thrips, and fossil taxa or extinct species in about 1, 270 genera, and 7, 700 species known worldwide (Ghosh *et al*. 2021; Mound and Hastenpflug-Vesmanis 2022).

The suborder Terebrantia is classified into eight extant families, namely: Aeolothripidae, Fauriellidae, Heterothripidae, Melanthripidae, Merothripidae, Stenurothripidae, Thripidae, and Uzelothripidae, and six extinct families (Buckman *et al*. 2012; Thrips Wiki 2023).

Thripidae is the largest family in Terebrantia, and it is divided into subfamily Dendrothripinae, Panchaetothripinae, Sericothripinae, and Thripinae. The members of subfamily Panchaetothripinae are distinctive in having their body and legs covered with strong or raised polygonal reticulation or rugose sculpture, and 6 to 8-segmented antennae. Adult and thrips larvae usually feed on leaves, flowers and fruit of plants including avocado, cacao, cashew, guava, and mangosteen (Chen 1981; Kudo 1995; Pableo and Velasco 1994; Reyes 2021; Wilson 1975).

In 1994, Reyes published a monograph on Philippines thrips which remain an effective base for all future studies but thrips were not illustrated except for the many new species she described. An accurate species identification is crucial for the development of appropriate insect pest management program. Given the importance of many invasive thrips species as crop pests, and the challenge to identify thrips due to its small size, the study aimed to provide an illustrated key for the identification of thrips species known in the Philippines under subfamily Panchaetothripinae. The paper is intended for students and researchers, especially for those who are working in crop protection centers, and plant quarantine stations. The paper is the first in a series of educational materials that was developed under the initiative to digitize thrips collections at the National Museum of Natural History, National Museum of the Philippines (NMP).

MATERIALS AND METHODS

Specimens used in the study consisted of 351 glass slide-mounted thrips in balsam in the C. P. Reyes collection including specimens she received for identification from M. Alba, M. M. Arcelo, J. Balatibat, N. M. Barbecho, V. J. Calilung, M. Navasero, P. S. Raros, and L. C. Raros at NMP, and type materials deposited in Australia National Insect Collection (ANIC), and Natural History Museum, United Kingdom (NHM). These specimens were collected sometime in 1975, 1977, 1981, 1982, 1984, 1985, 1987, 1998, 2022, and 2023 from the National Capital Region (Manila; Muntinlupa; Parañaque; Taguig), Cordillera Administrative Region (Baguio), Region 2 (Cagayan; Isabela), Region 4A (Laguna), Region 4B (Palawan), Region 5 (Camarines Sur), Region 6 (Guimaras; Negros Occidental), Region 8 (Leyte); Region 9 (Zamboanga), Region 11 (Davao), and Region 12 (North Cotabato; South Cotabato).

The classification of Thysanoptera was adopted from the Thrips Wiki (2023), a widely accepted website. The genera and species under Panchaetothripinae were listed, and arranged alphabetically. The keys for the identification of 16 species in 12 genera were developed using morphology-based diagnostics of female thrips which is used worldwide. The taxonomic keys rely on superficial character states in guiding users toward thrips species identification, and photomicrographs of female, and male thrips when available were taken using Nikon Eclipse E200, and Olympus BX63 microscope. The principal structures used in characterizing female thrips were illustrated, and shown in Figures 1 and 2.

RESULTS AND DISCUSSION

Order Thysanoptera Haliday
Thysanoptera Haliday,1836: 439.

The insect order Thysanoptera comprise of 6,418 extant species worldwide (Thrips Wiki 2023) of which 213 species were recorded in the Philippines (Reyes 1994, 2021).

Suborder Terebrantia Haliday
Terebrantia Haliday,1836: 439.

Terebrantia comprise of 2,609 extant species worldwide (Thrips Wiki 2023) of which 97 species were recorded in the Philippines (Reyes 1994, 2021).

Family Thripidae Stephens
Thripidae Stephens,1829: 363.

Thripidae comprise of 288 extant genera and 2,199 extant species worldwide (Thrips Wiki 2023) of which 43 genera and 95 species were recorded in the Philippines (Reyes 2021). It is the largest family in suborder Terebrantia, and the second largest family in order Thysanoptera. It is divided into 4 subfamilies, namely: Dendrothripinae, Panchaetothripinae, Sericothripinae, and Thripinae (Thrips Wiki 2023).

Key to Subfamily of Thripidae Stephens

1. Antennae 6 to 8- segmented; mesosternal furca with or without median spinula; body sculpture with transverse striae, rugose or polygonal reticulation 3

Antennae 7 to 9- segmented; mesosternal furca with median spinula; body sculpture complex 2

2. Antennae 7 to 9-segmented; maxillary palpi 2-segmented; tarsi 1-segmented; ..... Dendrothripinae Priesner

Antennae 7 to 8-segmented; maxillary palpi 3-segmented; tarsi 2-segmented ..... Sericothripinae Karny

3. Body surface including legs with strong or raised polygonal reticulation or rugose sculpture; mesonotal sculpture entire or notched along midline; antennae 6 to 8-segmented ..... Panchaetothripinae Bagnall

Body surface with transverse striae or reticulation but not raised; antennae 7 to 8-segmented ..... Thripinae Stephens

Subfamily Panchaetothripinae Bagnall
Panchaetothripinae Bagnall,1912: 257-258.

There are 42 extant genera and 146 extant species listed in this subfamily (Thrips Wiki 2023) of which 12 genera and 16 species (10.95%) were recorded from the Philippines (Reyes 2021).

Diagnostic characters.

Head wider than long or longer than wide, with polygonal reticulation or rugose sculpture, with or without posterior collar. Ocellar area raised into small or large hump, setae pair I, II, and III present. Eyes medium-sized or large. Antennae 6- to 8-segmented, segments III and IV each with a simple or forked sense cone, segments V to VIII formed into compact unit or not. Maxillary palpi 2-segmented. Mouthcone short or elongate, rounded. Tarsi 1- or 2-segmented. Pronotum with polygonal reticulation or rugose sculpture, setae small or developed. Forewings with or without brown cross band, anterior vein completely fused to costal vein or at fork of veins, setae, small or well developed, anterior fringe cilia present or absent. Mesonotal sculpture entire or notched along midline, median sculpture in the form of triangle or not. Mesosternal and metasternal furcae without median spinula. Metasternal furca enlarged, lyre-shaped or not. Abdominal tergites reticulate, posterior margin of tergite VIII with or without comb of long microtrichia or developed teeth, tergite X tapered or tube-like.

Key to Philippine Genera of Panchaetothripinae Bagnall

1. Antennae 7-segmented, segments III and IV each with a simple sense cone (Fig.15); head with polygonal reticulation, posterior collar absent; forewings anterior vein fused to costal vein, setae small ..... *Phibalothrips* Hood

Antennae 6 to 8-segmented, segments III and IV each with simple or forked sense cones; head with polygonal reticulation, posterior collar present or absent; forewings anterior vein fused to costa or at fork of veins, setae small or well developed 2

2. Tarsi 2-segmented; forewings anterior vein setae well developed 3

Tarsi 1-segmented; metasternal furca normal or enlarged 4

3. Abdominal tergite II with sculpture laterally, median half smooth, tergite X tapered or tube-like; head reticulate, posterior collar protruded laterally (Fig.14); pronotum reticulate, setae small; forewings brown except for wedge-like white patch at fork of veins, anterior vein fused to costal vein, setae strong ..... *Panchaetothrips* Bagnall

Abdominal tergite ll with dense mat of trichoid cuticular processes laterally; head reticulate, posterior collar absent (Fig. 7); pronotum reticulate, setae small; forewings with 2 brown cross bands; anterior vein fused to costa at fork only, setae strong ..... *Copidothrips* Hood

4. Metasternal furca lyre-shaped (Fig. 6); head with polygonal reticulation, reticules with internal vermiform wrinkles; forewings with brown cross band, anterior vein setae well developed; abdominal tergites II to VII with polygonal reticulation or transverse striae in lateral thirds ..... *Caliothrips* Daniel

Metasternal furca not enlarged; head with polygonal reticulation or rugose in sculpture; forewings with or without brown cross band, anterior vein setae small or well developed 5

5. Head with posterior collar; antennal segments V to VIII formed into compact unit or not 6

Head without posterior collar or depressed into pseudocollar; antennal segments V to VIII not formed into compact unit 8

6. Head with rugose sculpture (Fig. 17); ocellar area not raised into hump; forewing anterior vein setae small; legs stout ..... *Rhipiphorothrips* Morgan

Head hexagonally reticulate in sculpture; ocellar area raised into small or large hump; forewings anterior vein setae well developed 7

7. Antennal segments V to VII formed into compact unit or joined by suture partially (Fig.4); forewings slender, with brown cross band, anterior vein setae well developed; abdominal tergite II with cuticular processes laterally in the form of pointed ridges, stalked microtrichia or wart-like tubercles ..... *Astrothrips* Karny

Antennal segments V to VIII not formed into compact unit (Fig.10); forewings brownish, with small white patch subbasally, anterior vein setae small; abdominal tergites with developed or thickened antecostal line forming large, median scallops ..... *Helionothrips* Bagnall

8. Head depressed into pseudocollar posteriorly (Fig. 18); ocellar hump large; forewings brown with small, pale subbasal area, anterior vein setae well developed; posterior margin of abdominal tergite VIII with comb of developed teeth ..... *Selenothrips* Karny

Head posterior collar absent; meso and metanota not unusually broad; posterior margin of abdominal tergite VIII with or without comb of microtrichia or teeth 9

9. Meso and metanota broad (Fig. 16); forewings with 2 calluses between costal and anterior veins; abdominal tergites reticulate, lateral reticules with internal dot-like thickenings ..... *Retithrips* Marchal

Meso and metanota normal; forewings with or without brown cross band 10

10. Forewings shaded with brown, with subbasal and median white patches, anterior vein setae well developed (Fig. 8); posterior margin of tergite VIII without comb of microtrichia ..... *Elixothrips* Stannard & Mitri

Forewings with brown cross band or yellow in color; anterior vein setae small; posterior margin of tergite VIII with or without microtrichia or teeth 11

11. Forewings with 2 brown cross bands, anterior vein setae small (Fig. 13); cheeks deeply incut behind eyes; posterior margin of tergite VIII without comb of microtrichia or teeth ..... *Hemingia* Reyes

Forewings yellow, anterior vein setae minute (Fig. 12); head constricted at base; posterior margin of abdominal tergite VII and VIII each with complete comb of developed teeth ..... *Heliothrips* Holiday

***Astrothrips* Karny**

Astrothrips Karny,1921: 239. Type species: *Heliothrips globiceps* Karny,1913, by subsequent designation of Moulton,1932.

There are 13 extant species in the genus (Thrips Wiki 2023) of which *Astrothrips aucubae* Kurosawa, *Astrothrips globiceps* Karny, and *Astrothrips tumiceps* Karny were recorded from the Philippines (Wilson 1975; Reyes 2021).

Diagnostic characters.

Head wider than long, with polygonal reticulation, posterior collar with large reticules. Ocellar area raised into hump, setae pair I, II and III present. Eyes large. Antennae 7-segmented with segments V to Vll formed into compact unit or joined by suture partially; segments III and IV each with simple sense cones. Maxillary palpi 2-segmented. Mouthcone short, rounded. Tarsi 1-segmented. Pronotum reticulate, setae small. Forewings slender, with brown cross band; anterior and posterior vein setae well developed. Mesonotal sculpture shallowly or deeply notched along midline, median sculpture in the form of a triangle. Abdominal tergite II constricted, waist-like at base, smooth medially and laterally with cuticular processes in the form of pointed ridges, stalked microtrichia, or wart-like tubercles; reticules on lateral abdominal tergites smooth or with numerous internal wrinkles; posterior margin of tergite VIII without microtrichia, tergite X tapered.

Key to Philippine Species of *Astrothrips* Karny

1. Mesonotal sculpture deeply notched anteriorly and posteriorly along midline (Fig.5e.1); antennal segments V to VII formed into compact unit (Fig. 5b,c) .... *A. tumiceps* Karny

Mesonotal sculpture shallowly notched anteriorly along midline; antennal segments Vl joined to VII into compact unit, with or without distinct suture 2

2. Pronotum reticulate, sculpture confined to anterior half and posterior quarter, setae small (Fig. 3b); forefemora yellowish with brownish margin, tibiae pale basally and apically, brown medially; ..... *A. aucubae* Kurosawa

Pronotum reticulate, sculpture entire (Fig. 4b); forefemora yellowish with brownish margin, tibiae light brown on basal half ..... *A. globiceps* (Karny)

***Astrothrips aucubae* Kurosawa**

Astrothrips aucubae Kurosawa,1932: 230.

Material examined: 1 female, on unknown plant, Mlang, North Cotabato 16-V-1987, C. P. Reyes (NMP).

Diagnostic characters

Body dark brown. Head wider than long, with polygonal reticulation, posterior collar with median reticules smooth, arranged in transverse row (Fig.5a). Ocellar area raised into large hump, setae pair I, II, III small. Eyes large, about one-half of head length, protruded. Antennae 7-segmented, yellowish, segments III and IV each with simple sense cone; segments V to VIII formed into compact unit (Fig. 5b,c). Maxillary palpi 2-segmented. Mouthcone short, rounded. Forefemora yellowish, tibiae yellowish with brownish margins, tarsi yellow, 1-segmented. Pronotum reticulate, sculpture on anterior half, posterior quarter and lateral margins, setae small (Fig. 5b). Forewings with 2 brown cross bands, anterior and posterior vein setae well developed (Fig. 5d). Mesonotal sculpture deeply notched anteriorly and posteriorly along midline, median sculpture in the form of a triangle (Fig. 5e.1). Meta sternal furca U-shaped (Fig. 5e.2). Abdominal tergite II with trichoid-like processes on the lateral half (Fig. 5f), III to VIII smooth medially, reticulate laterally; posterior margin of tergite VIII without microtrichia, tergite X tapered. Male abdominal sternites lack glandular area (Li *et al*. 2021).

Diagnostic characters

Body dark brown. Head wider than long, slightly constricted at base, posterior collar with raised polygonal reticulation, median reticules III and IV each with simple sense cone; segment VI joined to VII with distinct suture. Maxillary palpi 2-segmented. Mouthcone short, rounded. Forefemora yellowish with brownish margin, tibiae pale basally and apically brown medially, tarsi yellow, 1-segmented. Pronotum reticulate sculpture confined to anterior half and posterior quarter, setae small. Forewings with 2 brown cross bands, anterior and posterior vein setae well developed. Mesonotal sculpture shallowly notched anteriorly along midline, median sculpture in the form of a triangle (Fig 3b). Abdominal tergite II with trichoid-like processes on lateral half (Fig. 3b,c), III to VIII smooth medially, reticulate laterally, reticules on lateral abdominal tergites smooth, without internal wrinkles; posterior margin of tergite VIII without microtrichia, tergite X tapered. Male abdominal sternites lack glandular area (Li *et al*. 2021).

Astrothrips globiceps (Karny)

Heliothrips globiceps Karny,1913: 125.

Material examined: 3 female, on leaves of spider lily, *Hymenocallis littoralis* (Jacq.) Salisb., NCPC Annex Building, UPLB, Los Baños, Laguna, 15-II-2023 and 3 female, on leaves of spider lily, *Hymenocallis littoralis* (Jacq.) Salisb., NCPC Annex Building, UPLB, Los Baños, Laguna, 11-IV-2022, N. M. Barbecho; 1 female, on unknown plant (Malvaceae), Sipit Saburan, Puerto Gallera, Mindoro Oriental, 11-V-1987, C. P. Reyes; 1 female, on leaves of 'talinom', *Portulaca pilosa* L., BFD, Brooks Point, Palawan, 29-V-1985, C. P. Reyes; 2 female, on unknown grass, VISCA Baybay, Leyte, 13-V-1987, C. P. Reyes; 1 female, on flower of 'calachuchi', *Plumiera acutifolia* Poir, Mlang, North Cotabato, 11-V-1987, C. P. Reyes; 6 female, on leaves of 'bacong', *Crinum asiaticum* L., Mlang, North Cotabato, 11-V-1987, C. P. Reyes; 1 female, on flower of 'everlasting', *Helichrysum bracteatum* Andrews, Mt. Apo, Agko, Kidapawan, North Cotabato 8.V.1987, C. P. Reyes (NMP).

Diagnostic characters

Body dark brown. Head wider than long, slightly constricted at base, posterior collar with polygonal reticulation, median reticules smooth, large (Fig.4a). Ocellar area raised into large hump, setae pair I, II, III minute. Eyes large, about one-half of head length, protruded. Antennae 7-segmented, yellowish, segment III elongate, III and IV with simple sense cone, segment VI joined to VII partially (Fig. 4b,c). Maxillary palpi 2-

segmented. Mouthcone short, rounded. Forefemora yellowish with brownish margin, tibiae light brown on basal half, tarsi yellow, 1-segmented. Pronotum reticulate, sculpture entire, setae small (Fig. 4b). Forewings with 2 brown cross bands; anterior and posterior vein setae well developed (Fig. 4d). Mesonotal sculpture shallowly notched anteriorly along midline, median sculpture in the form of a triangle (Fig.4e.1). Metasternal furca U-shaped (Fig.4e.2). Abdominal tergite II with trichoid-like processes on the lateral half (Fig.4f), III to VIII smooth medially, reticulate laterally; reticules on lateral abdominal tergites with numerous internal wrinkles; posterior margin of tergite VIII without microtrichia, tergite X tapered. Male abdominal sternites lV to Vll with U-shaped glandular area (Kudo 1980).

***Astrothrips tumiceps* Karny**
Astrothrips tumiceps Karny,1923: 331.

Material examined: 10 female, on leaves of castor bean, *Ricinus communis* L., La Granja, La Carlota, Negros Occidental, 26-V-1987, C. P. Reyes; 1 female, on leaves of castor bean, *Ricinus communis* L., Bagontapay, Mlang, North Cotabato, 10-V-1987, C. P. Reyes (NMP). **Remarks:** *A. tumiceps* feeds only on leaves, and pests of castor bean.

Diagnostic characters
Body dark brown. Head wider than long, with polygonal reticulation, posterior collar with median reticules smooth, arranged in transverse row (Fig.5a). Ocellar area raised into large hump, setae pair I, II, III small. Eyes large, about one-half of head length, protruded. Antennae 7-segmented, yellowish, segments III and IV each with simple sense cone; segments V to VIII formed into compact unit (Fig. 5b,c). Maxillary palpi 2-segmented. Mouthcone short, rounded. Forefemora yellowish, tibiae yellowish with brownish margins, tarsi yellow, 1-segmented. Pronotum reticulate, sculpture on anterior half, posterior quarter and lateral margins, setae small (Fig. 5b). Forewings with 2 brown cross bands, anterior and posterior vein setae well developed (Fig. 5d). Mesonotal sculpture deeply notched anteriorly and posteriorly along midline, median sculpture in the form of a triangle (Fig. 5e.1). Metasternal furca U-shaped (Fig. 5e.2). Abdominal tergite II with trichoid-like processes on the lateral half (Fig. 5f), III to VIII smooth medially, reticulate laterally; posterior margin of tergite VIII without microtrichia, tergite X tapered. Male abdominal sternites lack glandular area (Li *et al*. 2021).

***Caliothrips* Daniel**
Caliothrips Daniel,1904: 296. Type species: *Caliothrips woodworthi* Daniel,1904, by monotypy.

There are 23 extant species in the genus (Thrips Wiki 2023) of which *Caliothrips striatopterus* (Kobus) was recorded from the Philippines (Reyes 2021).

Diagnostic characters.
Head wider than long, with polygonal reticulation, reticules with internal wrinkles, posterior collar reticules smooth or with scattered dot-like thickenings. Ocellar area raised into small hump, setae pair I, II, III small. Eyes large**.** Antennae 8-segmented, segments III and IV each with forked sense cone. Maxillary palpi 2-segmented. Mouthcone elongate, rounded. Tarsi 1-segmented. Pronotum reticulate, reticules with internal wrinkles or with dot-like thickenings, setae well developed. Forewings small with brown cross band, anterior and posterior vein setae well developed. Mesonotal sculpture entire, median sculpture elongate. Metasternal furca enlarged, lyre-shaped. Abdominal tergites II-VII with polygonal reticulation or with transverse striations in lateral thirds, smooth or with wrinkles within reticules or between striae; median third of tergites smooth; posterior margin of tergites II-VIII with comb of microtrichia, tergite X tapered.

***Caliothrips striatopterus* (Kobus)**
Thrips striatoptera Kobus,1892: 589–590.

Material examined: 1 male, on leaves of *Ageratum* sp., Goa, Camarines Sur, 3-VI-1987, C. P. Reyes; 1 female, on leaves of squash, *Cucurbita maxima* Duchesne, Piña, Guimaras, 22.V.1987, C. P. Reyes; 6 female, 3 male, on leaves of corn, *Zea mays* L., Mt. Apo, Agko, Kidapawan, North Cotabato, 3-V-1987; 9 female, 6 male, on flower of 'everlasting', *Helichrysum bracteatum* Andrews, Mt. Apo, Agko, Kidapawan, North Cotabato, 5.V.1987, C. P. Reyes; 1 female, on unknown plant, Mt. Apo, Agko, Kidapawan, North Cotabato, 5-V-1987; 1 female, on cut logs, Mt. Apo, Agko, Kidapawan, North Cotabato, 5-V-1987, C. P. Reyes; 3 female, 5 male, on leaves of 'gabi', *Colocasia esculenta* (L.) Schott, Mt. Apo, Agko, Kidapawan, North Cotabato, 3-V-1987,C. P. Reyes; 7 female, 8 male, on leaves of 'Palawan gabi' , *Colocasia* sp., Mlang, North Cotabato, 11-V-1987, C. P. Reyes; 1 female, on unknown plant, Malungon, South Cotabato, 25-II-1985, C. P. Reyes; 1 female, on leaves of *Suzygium* sp., Gagabutan Forest, Rizal, Cagayan, 29-III-1977, L. C. Raros (NMP).

Diagnostic characters
Body dark brown. Head wider than long, with polygonal reticulation, reticules with internal wrinkles, posterior collar with transverse row of large reticules without internal wrinkles (Fig. 6a). Ocellar area raised into small hump, setae pair I, II, III small. Eyes large, about one-half of head length, protruded**.** Ocellar hump small. Antennae 8-segmented, segments l and ll brown, lll to Vlll yellow, segments III and IV each with simple sense cone (Fig. 6b,c). Maxillary palpi 2-segmented. Mouthcone elongate, rounded. Forefemora brown, base and apex pale, tibiae brown in basal two thirds, yellow in apical third, tarsi yellow, 1-segmented. Pronotum reticulate, reticules with internal wrinkles; setae small (Fig.6b). Forewings with brown cross band, anterior and posterior vein setae well developed (Fig. 6d). Mesonotal sculpture entire, median sculpture elongate (Fig. 6e.1). Metasternal furca enlarged, lyre-shaped (Fig. 6e.2). Abdomen with anastomosing striae, median half of tergite I with distinct reticules (Fig. 6f); posterior margin of tergites II to VIII with comb of microtrichia, tergite X tapered. Male abdominal sternites lll to Vll with large, transverse glandular area (Fig.6g).

***Copidothrips* Hood**
Copidothrips Hood,1954: 188. Type species: *Copidothrips formosus* Hood,1954 synonym of *Heliothrips* (*Parthenothrips*) *octarticulata* Schmutz,1913, by monotypy.

Copidothrips octarticulatus (Schmutz) is the only species in the genus (Thrips Wiki 2023).

Diagnostic characters.
Head wider than long, with polygonal reticulation, posterior collar absent. Ocellar area raised into small hump, setae pair I, II, III small. Eyes large. Cheeks slightly constricted at base. Antennae 8-segmented, segments III and IV each with simple sense cone. Maxillary palpi 2- segmented. Mouthcone elongate, rounded. Tarsi 2-segmented. Pronotum reticulate, setae well developed, lanceolate. Forewings with 2 brown cross bands, anterior vein fused to costal vein, venal setae well developed. Meso and metanota with weak sculpture**.** Abdominal tergite II constricted at base, waist-like, with dense mat of trichoid

cuticular processes laterally; tergites III-VII each with transverse striations on the anterior half, smooth on the posterior half, reticulate laterally; posterior margin of tergite VIII without comb of microtrichia, tergite X tapered.

***Copidothrips octarticulatus* (Schmutz)**
Heliothrips (Parthenothrips) octarticulata Schmutz,1913: 993.
Copidothrips octarticulatus (Schmutz), Bhatti,1990: 222.
Copidothrips formosus Hood: Reyes,1994: 146.

Material examined: 1 female, on unknown plant (Compositae), Anuling, Pamucutan, Zamboanga del Sur, 11-VII-1987, C. P. Reyes (NMP).

Diagnostic characters.
Body brown. Head wider than long, with polygonal reticulation, posterior collar absent (Fig. 7a). Ocellar area raised into small hump, setae pair I, II, III small. Eyes large, about one-half of head length, protruded. Cheeks slightly constricted at base. Antennae 8-segmented, segments l, ll , Vl brownish, lll, lV, Vll and Vlll yellowish, segments III and IV each with simple sense cone (Fig. 7b,c). Maxillary palpi 2- segmented. Mouthcone elongate, rounded. Forelegs yellow, tarsi 2-segmented. Pronotum reticulate, setae small. Forewings with 2 brown cross bands, anterior vein fused to costal vein, setae well developed (Fig. 7d). Mesonotal sculpture entire, median sculpture not in form of triangle (Fig. 7e.1). Metasternal furca U-shaped (Fig. 7e.2). Abdominal tergite II constricted at base with dense mat of trichoid cuticular processes laterally (Fig.7f); tergites III-VII each with transverse striations on anterior half, smooth on posterior half, reticulate laterally; posterior margin of tergite VIII without comb of microtrichia, tergite X tapered. Male abdominal sternites lV to Vll each with U-shaped glandular area (Goldarazena *et al*. 2021).

***Elixothrips* Stannard & Mitri**
Elixothrips Stannard & Mitri,1962: 202. Type species: *Tryphactothrips brevisetis* Bagnall,1921, by monotypy.

Elixothrips brevisetis (Bagnall) is the only species in the genus (Thrips Wiki 2023).

Diagnostic characters.
Head wider than long, with polygonal reticulation, posterior collar absent. Ocellar area raised into small hump, setae pair I, II, III small. Eyes large. Antennae 8-segmented; segments III and IV each with simple sense cone. Maxillary palpi 2-segmented. Mouthcone elongate, rounded. Tarsi 1-segmented. Pronotum reticulate, setae small. Forewings shaded with brown, with subbasal and median white patches, anterior vein fused to costal vein at fork of veins, venal setae well developed. Mesonotal sculpture completely divided, median sculpture in form of triangle, extended posteriorly over metascutellum. Abdominal tergite II with dense mat of trichoid processes in lateral thirds; tergites III-VII with long transverse striations on anterior median half with reticulations laterally; posterior margin of tergite VIII without comb of microtrichia, tergite X tapered.

***Elixothrips brevisetis* (Bagnall)**
Tryphactothrips brevisetis Bagnall,1921: 257, by monotypy.
Elixothrips brevisetis (Bagnall): Wilson,1975: 111-112.

Material examined: 2 female and 1 male, on leaves of *Musa* sp., Mudspring, Mt. Makiling, Laguna, 27-VI-1987, C. P. Reyes; 1 female, on *Portulaca pilosa* L., BFD, Brooks Point, Palawan, 4-VI-1985, C. P. Reyes; 1 female, on leaves of *Codiaeum variegatum* (L.) Blume, Bicol Expt. Sta., Pili, Camarines Sur, 4-V1-1987, C. P. Reyes; 2 female, on leaves of *Ficus* sp., Bicol expt. Sta., Pili, Camarines Sur, 5-VI-1987, C. P. Reyes; 1 female, on leaves of unknown vine, Bicol expt. Sta., Pili, Camarines Sur, 5-VI-1987, C. P. Reyes; 2 female, on unknown plant, FORI, Camp Susana, La Paz, Zamboanga, 12-VIII-1987, C. P. Reyes; 1 female, unknown plant (Compositae), Anuling, Pamucutan, Zamboanga, 11-VII-1987, C. P. Reyes; 1 female, *Hydrangea* sp., Mt. Apo, Agko, Kidapawan, North Cotabato, 5-V-1987, C. P. Reyes (NMP).

Diagnostic characters.
Body brownish, thoracic lateral margins darker (Fig. 8a). Head wider than long, with polygonal reticulation, posterior collar absent. Ocellar area raised into small hump, setae pair I, II, III small. Eyes large, about one-half of head length, protruded. Antennae 8-segmented, bicolored brown and yellow, segments III and IV each with simple sense cone (Fig. 8b,c). Maxillary palpi 2-segmented. Mouthcone short, rounded. Forelegs bicolored brown and yellow, tarsi yellow, 1-segmented. Pronotum reticulate, setae small. Forewings shaded with brown, with subbasal and median white patches, anterior vein fused to costal vein at fork of veins, setae developed (Fig. 8d). Mesonotal sculpture completely divided, median sculpture in form of triangle, extended posteriorly over metascutellum (Fig. 8e.1). Metasternal furca U-shaped (Fig. 8e.2). Abdominal tergite II with dense mat of trichoid processes in lateral thirds (Fig. 8f); tergites III-VII with long transverse striations on anterior median half with reticulations laterally; posterior margin of tergite VIII without comb of microtrichia, tergite X tapered. Male abdominal sternite Vl and Vll each with circular glandular area, Vlll with U-shaped glandular area (Fig. 8g).

Genus *Helionothrips* Bagnall
Helionothrips Bagnall,1932: 506. Type species: *Helionothrips brunneipennis* Bagnall,1932, by monotypy.

There are 31 species listed in the genus (Thrips Wiki 2023) of which *Helionothrips annosus* Wang, *Helionothrips guttatus* Reyes, and *Helionothrips kodaliphilus* (Ramakrishna and Margabandhu) were recorded in the Philippines (Reyes 2021).

Diagnostic characters.
Head wider than long, with polygonal reticulation, posterior collar wide, reticules smooth or with internal dot-like thickenings. Ocellar area raised into small or large hump, setae pair I, II, III small. Eyes large. Antennae 8-segmented, segments III and IV vasiform, each with long, forked sense cone. Maxillary palpi 2-segmented. Mouthcone short or elongate, rounded. Tarsi 1-segmented. Forewings brownish, with small white patch subbasally, anterior and posterior veins setae minute or small. Pronotum reticulate, setae small. Mesonotal sculpture entire or notched posteriorly, median sculpture in form of triangle with posterior margin extended or not over metascutellum. Abdominal tergites with developed or thickened antecostal line forming large, median scallops; posteromarginal margin of tergite VIII with complete or incomplete comb of microtrichia, tergite X tapered.

Key to Philippine Species of *Helionothrips* Bagnall

1. Antennal segments I, II and Vl brownish apically, lll, lV, V, Vll and Vlll yellow; forked sense cone of lV almost reaching apex of VI (Fig. 9b, c); metanotal median sculpture in form of triangle with posterior margin extended over metascutellum, metascutellum with reticulate sculpture (Fig. 9e); abdominal tergite VIII posterior margin with complete comb of microtrichia (Fig. 9f) ..... *H. annosus* Wang

Antennal segments I, ll, lll, lV, V, Vll and Vlll yellow, Vl brownish apically, forked sense cone of lV reaching basal half of Vl; metanotal median sculpture in form of triangle with

posterior margin not extended over metascutellum (Fig. 11) 3

2. Metascutellum smooth (Fig. 10e.2); segments I, ll, lll, lV, V, Vll and Vlll yellow, Vl brownish apically, segments III and IV vasiform each with long, forked sense cone, sense cone of Vl reaching basal half of segment VI; sense cone of segment Vl short (Fig. 10b,c) ..... *H. guttatus* Reyes

Metascutellum with reticulate sculpture (Fig.11e.2); abdominal tergite Vlll posterior margin with comb of microtrichia interrupted medially ..... *H. kodaliphilus* (Ramakrishna & Margabandhu)

***Helionothrips annosus* Wang**
Helionothrips annosus Wang,1994: 391.

The photomicrographs of female thrips from Sri Lanka were provided by C. U. Widanapathirana and
M. R. Ulitzka (Widanapathirana 2022).

Diagnostic characters.
Body dark brown**.** Head wider than long, with polygonal reticulation, reticules of posterior collar with internal dot like thickenings (Fig.9a). Ocellar area raised into large hump, setae pair I, II, III small. Eyes large, about one-half of head length, protruded. Antennae 8-segmented, segments I, II and Vl brownish apically, lll, lV, V, Vll and Vlll yellow; segments III and IV vasiform each with long, forked sense cone, sense cone of lV almost reaching apex of segment VI; sense cone of segment Vl long (Fig. 9b,c). Maxillary palpi 2-segmented. Mouthcone elongate, rounded. Forelegs yellow, tarsi 1-segmented. Pronotum reticulate, slightly rounded on posterior angles, setae small. Forewings brownish with small, white patch subbasally, base and apex dark, anterior vein setae minute. Mesonotal median sculpture deeply notched posteriorly, median sculpture in form of triangle with posterior margin extended over metascutellum, metascutellum with reticulate sculpture (Fig. 9e). Abdominal tergites III to VIII antecostal line with broad scallop with thickened anterior and lateral margins, posterior margin of tergite VIII with complete comb of microtrichia (Fig.9f), tergite X completely divided longitudinally, tapered. Male abdominal sternites lack glandular area (Kudo 1995; Widanapathirana *et al*. 2022).

***Helionothrips guttatus* Reyes**
Helionothrips guttatus Reyes,1994: 150.

Material examined: 8 female, on leaves of unknown tree, Bicol Expt. Sta., Pili, Camarines Sur, 5-VI-1987, C. P. Reyes; 2 female, on leaves of *Macaranga* sp., Bicol Expt. Sta., Pili, Camarines Sur, 5-VI-1987, C. P. Reyes; 1 female and 1 male, on leaves of *Ficus* sp., Bicol Expt. Sta., Pili, Camarines Sur, 5-VI-1987, C. P. Reyes; 2 female paratype, 2 male allotype on flower of 'everlasting', *Helichrysum bracteatum* Andrews, Sagpangan, Mt. Apo, Agko, Kidapawan, North Cotabato, 5-V-1987, C. P. Reyes (NMP). The female holotype and male allotype are in ANIC, and the 2 female paratype are in NHM (Reyes 2017).

Diagnostic characters.
Body dark brown**.** Head wider than long, with polygonal reticulation, posterior collar with smooth reticules (Fig. 10). Ocellar area raised into large hump, setae pair I, II, III small. Eyes large, about one-half of head length, protruded. Antennae 8-segmented, segments I, ll, lll, lV, V, Vll and Vlll yellow, Vl brownish apically, segments III and IV vasiform each with long, forked sense cone, sense cone of Vl reaching basal half of segment VI; sense cone of segment Vl short (Fig. 10b,c). Maxillary palpi 2-segmented. Mouthcone elongate, rounded. Forelegs yellow, tarsi 1-segmented. Pronotum hexagonally reticulate, rounded on posterior angles, setae small (Fig. 10b). Forewings brownish with small, white patch subbasally, base and apex darker, anterior vein setae minute (Fig. 10d). Mesonotal median sculpture deeply notched posteriorly, median sculpture in form of triangle not extended over metascutellum, metascutellum smooth (Fig. 10e.1). Metasternal furca U-shaped (Fig. 10e.2). Abdominal tergites III to VIII antecostal line with broad scallop with thickened anterior and lateral margins (Fig. 10f), posterior margin of tergite VIII with complete comb of microtrichia, tergite X completely divided longitudinally, tapered. Male abdominal sternites lll to Vlll each with elongate glandular area (Fig. 10g).

***Helionothrips kodaliphilus* (Ramakrishna & Margabandhu)**
Heliothrips kodaliphila Ramakrishna & Margabandhu,1931: 1033.
Helionothrips kodaliphilus (Ramakrishna & Margabandhu): Priesner,1936: 208.

Material examined: 1 female, on *Macaranga* sp., Mt. Apo, Agko, Kidapawan, North Cotabato, 5.V.1987, C. P. Reyes (NMP).

Diagnostic characters.
Body dark brown. Head wider than long, with polygonal reticulation, posterior collar with smooth reticules (Fig.11a). Ocellar area raised into small hump, setae pair I, II, III small. Eyes large, about 0ne-half of head length, protruded. Antennae 8-segmented, segments l, ll, lll, lV, V, Vll and Vlll yellow, Vl brownish apically; segments III and IV vasiform, each with long, forked sense cone, sense cone of lV reaching basal half of segment Vl (Fig. 11b,c). Maxillary palpi 2-segmented. Mouthcone elongate, rounded. Forefemora light brown, foretibiae yellow, tarsi yellow, 1-segmented. Pronotum hexagonally reticulate, setae short. Forewings brownish with small, white patch subbasally, base and apex darker; anterior vein setae well developed (Fig. 11d). Mesonotal median sculpture deeply notched posteriorly, median sculpture in form of triangle with posterior margin not extended over metascutellum, metascutellum with reticulate sculpture (Fig. 11e.1). Metasternal furca U-shaped (Fig. Fig. 11e.2). Abdominal tergites III to VIII antecostal line with broad scallop with thickened anterior and lateral margins (Fig. 11f), posterior margin of tergite VIII with comb of microtrichia interrupted medially, tergite X completely divided longitudinally, tapered. Male abdominal sternite Vlll with small, circular glandular area (Fig. 11g).

Genus *Heliothrips* Haliday
Heliothrips Haliday,1836: 443. Type species: *Heliothrips adonidum* Haliday,1836, synonym of *Thrips haemorrhoidalis* Bouche,1833, by monotypy.

There are 6 species listed in the genus (Thrips Wiki 2023) of which only *Heliothrips haemorrhoidalis* (Bouche) was recorded in the Philippines (Reyes 2021).

Diagnostic characters.
Head longer than wide, constricted at base, with polygonal reticulation, posterior collar absent. Ocellar area not raised, setae pair I, II, III small. Eyes medium. Antennae 8-segmented, segments III and IV each with simple sense cone. Maxillary palpi 2-segmented. Mouthcone short, rounded. Tarsi 1-segmented. Forewings yellowish, anterior vein fused to costa at fork of vein, anterior and posterior vein setae minute. Mesonotal sculpture entire or notched posteriorly, median sculpture in form of distinct triangle. Abdominal tergites with large reticulations laterally, median third smooth; posterior margin of tergites VII to VIII with complete comb of developed teeth, tergite X tapered.

***Heliothrips haemorrhoidalis* (Bouche)**
Thrips haemorrhoidalis Bouche,1833: 42.

Material examined: 5 female, on *Codiaeum variegatum* (L.) Juss., Maddela, Quezon, 11-1X-1975, P. S. Raros; 1 female, on *Nauclea orientalis* (L.) L., 27-I-1985, PNAC, Palawan, C. P. Reyes; 4 female, on *Codiaeum variegatum* (L.) Juss., VISCA, Baybay, Leyte, 13-V-1987, C. P. Reyes; 1 female, on *Glericidia* sp., VISCA, Baybay, Leyte, 12- V-1987, C. P. Reyes; 1 female on *Artocarpus* sp., VISCA, Baybay, Leyte, 13-V-1987, C. P. Reyes; 1 female, *Agathis philippinensis* Warb, VISCA, Baybay, Leyte, 13-V-1987, C. P. Reyes; 9 female, on *Muntingia calabura* L., VISCA, Baybay, Leyte, 13-V-1987, C. P. Reyes; 4 female, on unknown plant, Mt. Apo, Agko, Kidapawan, North Cotabato, 4.V.1987; 1 female, on grass, Mt. Apo, Agko, Kidapawan, North Cotabato, 5-V-1987; 1 female, on leaves of avocado, *Persea americana* Mill., Mlang, North Cotabato, 16-V-1987, C. P. Reyes; 1 female, on leaves of potato, *Ipomoea batatas* (L.) Lam., Malandag, Malungon, South Cotabato, 25-II-1985, C. P. Reyes (NMP).

Diagnostic characters.
Body dark brown. Head longer than wide, constricted at base, with polygonal reticulation, posterior collar absent (Fig. 12a). Ocellar area not raised, setae pair I, II, III small. Eyes medium-sized, less than one-half of head length, protruded. Ocellar area not raised into hump. Mouthcone short, rounded. Antennae 8-segmented, segments I and II brownish yellow, segments III and IV each with simple sense cone (Fig. 12b,c). Maxillary palpi 2-segmented. Forelegs yellowish, tarsi 1-segmented. Forewings yellowish, anterior and posterior vein setae minute (Fig. 12d). Mesonotal sculpture entire or notched posteriorly, median sculpture in form of distinct triangle (Fig. 12e.1). Metasternal furca with thickened lateral arms (Fig. 12e.2). Abdominal tergites with large reticulations laterally, median third smooth (Fig. 12f), posterior margin of tergites VII to VIII with complete comb of developed teeth, tergite X tapered. Male abdominal sternites lll to Vll with transverse, oblong glandular area (Priesner 1936).

Genus *Hemingia* Reyes
Hemingia Reyes,1994: 157. Type species *Hemingia glandula* Reyes,1994, by monotypy.

Hemingia glandula Reyes is the only species in the genus (Thrips Wiki 2023).

Diagnostic characters.
Head longer than wide, with hexagonal reticulation, posterior collar absent. Cheeks deeply incut behind eyes and at base. Ocellar area raised into small hump, setae pair I, II, III small. Eyes large. Mouthcone elongate, rounded. Antennae 8-segmented, segment III and IV vasiform, each with 1 simple sense cone. Maxillary palpi 2-segmented. Tarsi 1-segmented. Forewings with 2 brown cross bands, base brown, apex pale, anterior and posterior vein setae minute or small. Mesonotal sculpture completely divided, median sculpture in form of distinct triangle with ridges extended to posterior margin of metascutellum. Abdominal tergite II with dense growth of trichoid processes on lateral thirds, posterior margin of tergite VIII without comb of microtrichia, tergite X tapered.

***Hemingia glandula* Reyes**
Hemingia glandula Reyes,1994: 157.

The female holotype and male allotype is in ANIC, and the 2 female paratype are in NHM, on *Sarcocephalus orientalis* (L.) Merr. in Mt. Apo, Agko, Kidapawan, North Cotabato on 5-V-1987 by C. P. Reyes (Reyes 2017).

Diagnostic characters.
Body yellowish brown. Head longer than wide, with polygonal reticulation, posterior collar absent (Fig. 13a). Cheeks deeply incut behind eyes and at base. Ocellar area raised into small hump, setae pair I, II, III small. Eyes large, about one-half of head length, protruded. Antennae 8-segmented, segment III and IV vasiform, each with 1 simple sense cone. Maxillary palpi 2-segmented. Mouthcone elongate, rounded. Forelegs and hindlegs slender, middle legs slender or stout, bicolored yellow and brown, tarsi yellow, 1-segmented. Forewings with 2 brown cross bands, base brown, apex pale, anterior and posterior vein setae minute or small. Mesonotal sculpture completely divided, median sculpture in form of triangle with ridges extended to posterior margin of metascutellum (Fig. 13b). Abdominal tergite II with dense growth of trichoid processes on lateral thirds (Fig. 13b); posterior margin of tergite VIII without comb of microtrichia, tergite X tapered. Tergite X completely divided longitudinally. Male abdominal sternites Vl to Vlll with a pair of longitudinal, linear ridge-like glandular area (Reyes 1994).

Genus *Panchaetothrips* Bagnall
Panchaetothrips Bagnall,1912: 258. Type species: *Panchaetothrips indicus* Bagnall,1912, by monotypy.

There are 6 species listed in the genus (Thrips Wiki 2023) of which only *Panchaetothrips stepheni* Reyes was recorded in the Philippines (Reyes 2021).

Diagnostic characters.
Head wider than long, with polygonal reticulation reticules with or without internal dot-like thickenings, posterior collar wide, protruded laterally. Ocellar area raised into small hump, setae pair I, II, III small. Eyes large. Cheeks slightly bulged. Mouthcone short or elongate, rounded. Antennae 8-segmented, segment III and IV vasiform, each with simple or forked sense cone. Maxillary palpi 2-segmented. Tarsi 2-segmented. Pronotum wider than long, covered by transverse reticules. Forewings brown except for small wedge-like white patch at fork of veins, anterior vein fused to costal vein, setae well developed. Mesonotal sculpture entire, median sculpture in form of triangle. Abdominal tergite II with lateral sculpture, posterior margin of tergite VIII without comb of microtrichia, tergite X tapered or tube-like.

***Panchaetothrips stepheni* Reyes**
Panchaetothrips stepheni Reyes,1994: 160.

Material examined: 1 female, on *Mussaenda* sp., Sipit Saburan, Puerto Gallera, Oriental Mindoro, 19-VI-1987, C. P. Reyes; 1 female, on flower of unknown plant, Mt. Makiling rainforest, Laguna, 27-VI-1987, C. P. Reyes; 2 female paratype, on leaves of unknown plant (Rubiaceae), Mudspring of Mt. Makiling, Laguna, 27-VI-1987, C. P. Reyes (NMP). The female holotype and 1 female paratype of *P. stepheni* are in ANIC and 2 female paratype are in NHM (Reyes, 2017).

Diagnostic characters.
Body dark brown. Head wider than long, with polygonal reticulation, reticules with internal dot-like thickenings, posterior collar wide, protruded laterally with transverse striae medially (Fig. 14). Ocellar area raised into small hump, setae pair I, II, III small. Eyes large, more than one-half of head length, protruded. Cheeks slightly bulged, incut behind eyes. Antenna 8-segmented; segment l yellowish brown, ll brown, lll yellow, lV and V yellow basally, brownish apically, Vll and Vlll yellowish grey; III and IV vasiform, III with forked sense cone, IV with a forked and simple sense cones (Fig. 14b,c). Maxillary palpi 2-segmented. Mouthcone elongate, rounded. Forefemora brown medially, yellow basally and apically, tibiae yellowish

brown, tarsi yellow, 2-segmented. Pronotum wider than long, covered by transverse reticules. Forewings brown except for small wedge-like white patch at fork of veins, anterior vein fused to costal vein, setae strong, well developed (Fig. 14d). Mesonotal sculpture entire, median sculpture in form of unraised triangle (Fig. 14e.1). Metasternal furca U-shaped (Fig. 14e.2). Abdominal tergite I narrow with indented lateral margins, tergite II with lateral sculpture (Fig. 14f), posterior margin of tergite VIII without comb of microtrichia, tergite X completely divided, tube-like with strong setae. Male abdominal sternites lll to Vl each with transverse, linear glandular area (Kudo 1995).

Genus *Phibalothrips* Hood
Phibalothrips Hood,1918: 125. Type species: *Phibalothrips exilis* Hood,1918, synonym of *Heliothrips longiceps* Karny,1913, by monotypy.

There are 4 species listed in the genus (Thrips Wiki 2023) of which only *Phibalothrips peringueyi* (Faure) was recorded in the Philippines (Reyes 2021).

Diagnostic characters.
Head about as long as wide, with polygonal reticulation, posterior collar absent, with neck-like constriction toward base. Ocellar area raised into small hump, setae pair I, II, III small. Eyes medium. Ocellar hump small. Antennae 7-segmented, segments III and IV each with simple sense cone. Maxillary palpi 2-segmented. Mouthcone short or elongate, rounded. Tarsi 1-segmented. Pronotum slightly reticulate, setae minute. Forewings anterior vein fused to costal vein, anterior and posterior setae minute. Mesonotal sculpture entire or notched posteriorly, median sculpture in form of triangle. Abdomen reticulate on lateral thirds, reticules with internal wrinkles, posterior margin of tergites with comb of microtrichia laterally, tergite X tapered.

***Phibalothrips peringueyi* (Faure)**
Reticulothrips peringueyi Faure,1925: 145.
Phibalothrips peringueyi (Faure): Jacot-Guillarmod,1937:10.

A female thrips collected on fodder grass from Kaira, India on 29-X-1965 by T. N. Ananthakrishnan is in the C. P. Reyes thrips collection (NMP).

Diagnostic characters.
Head and thorax dark brown, abdomen yellow. Head about as long as wide, with polygonal reticulation, constricted towards base, posterior collar absent (Fig. 15a). Ocellar area raised into small hump, setae pair I, II, III small. Eyes medium, less than one-half of head length. Antennae 7-segmented, bicolored yellow and brown, segments III and IV each with simple sense cone (Fig. 15b,c). Maxillary palpi 2-segmented. Mouthcone short or elongate, rounded. Forelegs brownish yellow, tarsi yellow, 1-segmented. Pronotum slightly reticulate, setae small. Forewings yellow with dark brown base, anterior vein fused to costal vein, anterior vein setae minute (Fig. 15d). Mesonotal sculpture shallowly notched posteriorly, median sculpture in form of triangle (Fig. 15e.1). Metasternal furca without lateral arm (Fig. 15e.2). Abdominal tergites each with elongate sculpture medially (Fig. 15f), posterior margin of tergites with tooth-like comb of microtrichia laterally, tergite X tapered. Male abdominal sternites lll to Vlll with small, oval glandular area (Fig. 15g).

Genus *Retithrips* Marchal
Retithrips Marchal,1910: 17. Type species: *Retithrips aegyptiacus* Marchal,1910, by monotypy.

There are 2 species listed in the genus (Thrips Wiki 2023) of which only *Retithrips javanicus* Karny was recorded in the Philippines (Reyes 2021).

Diagnostic characters.
Head wider than long, with polygonal reticulation, posterior collar absent. Ocellar area raised into large hump, setae pair I, II, III minute. Eyes large. Antennae 8-segmented, segments III and IV each with simple sense cone. Maxillary palpi 2-segmented. Mouthcone short, rounded. Tarsi 1-segmented. Pronotum reticulate, setae small. Forewings with 2 calluses between costal and anterior veins. Meso and metanota unusually broad. Mesonotal sculpture entire or notched posteriorly, median sculpture not in form of triangle. Abdomen unusually broad, posterior margin of tergite VIII with comb of microtrichia, tergite X tapered.

***Retithrips javanicus* Karny**
Retithrips javanicus Karny,1923: 364.

Material examined: 2 female, on unknown plant, UPLB, Los Baños, Laguna, 2-II-1985, M. Navasero; 13 female, 1 male, on leaves of *Hyptis brevipes* Poit., UPLB, Los Baños, Laguna, 20-X-1982, C. P. Reyes; 11 female, *Quisqualis indica* L., Taguig, 20-X-1982, J. Balatibat; 10 male, on leaves of *Hyptis brevipes* Poit., Bicutan, Taguig, 21-X-1981, J. Balatibat (NMP).

Diagnostic characters.
Body dark brown. Head wider than long, with polygonal reticulation, posterior collar absent (Fig. 16a). Ocellar area raised into large hump, setae pair I, II, III minute. Eyes large, more than one-half of head length. Antennae 8-segmented, light brownish yellow, segments III and IV each with 2 simple sense cone (Fig.16b,c). Maxillary palpi 2-segmented. Mouthcone short, rounded. Legs bicolored brown and yellow, tarsi yellow, 1-segmented. Pronotum reticulate, setae small. Forewings brownish, with 2 calluses between costal and anterior veins, darkened on lateral margins (Fig.16d). Mesonota and metanota unusually broad. Mesonotal sculpture entire with posterior ridge, median sculpture not in form of triangle (Fig. 16e.1). Metasternal furca V-shaped (Fig.16e.2). Abdomen unusually broad, reticulate, lateral reticules with internal dot-like thickenings (Fig.16f), posterior margin of tergite VIII with comb of microtrichia, tergite X tapered. Male abdominal sternites lll to Vll with small, oblong glandular area (Fig. 16g).

Genus *Rhipiphorothrips* Morgan
Rhipiphorothrips Morgan,1913: 17. Type species: *Rhipiphorothrips pulchellus* Morgan,1913, by monotypy.

There are 5 species listed in the genus (Thrips Wiki 2023) of which only *Rhipiphorothrips pulchellus* Morgan was recorded in the Philippines (Reyes 2021).

Diagnostic characters.
Head with rugose sculpture, posterior collar present. Ocellar area not raised, setae pair I, II, III minute. Eyes large. Antennae 8-segmented, segments III and IV each with simple or forked sense cone. Maxillary palpi 2-segmented. Mouthcone short or elongate, rounded. Tarsi 1-segmented. Pronotum with rugose sculpture, setae minute or small. Forewings yellowish with brown base, anterior and posterior vein setae minute. Mesonotal sculpture divided longitudinally along midline, median sculpture in form of triangle extended posteriorly over metascutellum. Abdominal tergites with rugose sculpture except median depressed area, posterior margin of tergites with comb of microtrichia, tergite X tapered.

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

Material examined: 1 female, 1 male, on leaves of castor bean, *Ricinus communis* L., La Granja, Negros Occidental, La Carlota, Negros Occidental, 26-V-1987, C. P. Reyes; 6 female, 1 male, on leaves of *Lagerstroemia* sp., Pasonanca Park, Zamboanga, 13-VIII-1987; 4 female, 4 male, on leaves of *Rottboellia cochinchinensis* (Lour.) Clayton, Mt. Apo, Agko, Kidapawan, North Cotabato, 4-V-1987, C. P. Reyes; 5 female, 2 male, on unknown plant, Mlang, North Cotabato, 13-V-1987, C. P. Reyes; 8 female, 3 male, on leaves of castor bean, *Ricinus communis* L., Bagontapay, Mlang, North Cotabato,13-VIII-1987, C. P. Reyes; 1 female, on leaves of 'santol', *Sandoricum koetjape* (Burm.) Merr., Mlang, North Cotabato, 13-II-1985, C. P. Reyes; 1 male, on leaves of 'duhat', *Suzygium cumini* (L.) Skeels, Almazar, Alabang, Muntinlupa 2-II-1985, M. Alba; 1 female, 1 male, on rose, *Rosa* sp., Wright Park, Baguio, 8-VII-1984, Oratai & Chantana; 5 female, 2 male, on leaves of 'duhat' *Suzygium cumini* (L.) Skeels, UPLB, Los Baños, Laguna, 30-X-1982, C. P. Reyes (NMP).

Diagnostic characters.
Female. Body bicolored brown and yellow. Head with rugose sculpture, posterior collar present (Fig. 17a). Ocellar area not raised, setae pair I, II, III minute. Eyes large, about one-half of head length, protruded. Antennae 8-segmented, bicolored brown and yellow, segments III and IV vasiform, each with simple sense cone (Fig. 17b,c). Maxillary palpi 2-segmented. Mouthcone short or elongate, rounded. Legs yellow, tarsi 1-segmented. Pronotum with rugose sculpture, setae minute. Forewings yellowish with brownish base, anterior and posterior vein setae minute (Fig.17d). Mesonotal sculpture divided longitudinally along midline, median sculpture in form of triangle posterior margin extended posteriorly over metascutellum (Fig. 17e.1). Metasternal furca with short lateral arms (Fig. 17e.2). Abdominal tergites with rugose sculpture except median, depressed area (Fig. 17f), posterior margin of tergites with comb of microtrichia, tergite X tapered. Male abdominal sternites without glandular area (Fig. 17g).

Genus *Selenothrips* Karny
Heliothrips (*Selenothrips*) Karny,1911: 179. Type species: *Physopus rubrocincta* Giard,1901, by monotypy.

Selenothrips rubrocinctus (Giard) is the only species in the genus (Thrips Wiki 2023).

Diagnostic characters.
Head with polygonal reticulation, depressed into pseudocollar posteriorly. Ocellar area raised into small hump, setae pair I, II, III minute. Eyes large. Antennae 8-segmented, segments III and IV vasiform, each with forked sense cone. Maxillary palpi 2-segmented. Mouthcone short, rounded. Tarsi 1-segmented. Pronotum with transverse striae, setae small. Forewings brown with small pale subbasal area, anterior and posterior veins setae well developed. Mesonotal sculpture entire, median sculpture in form of triangle. Abdominal tergites with polygonal reticulation except median third, posterior margin of tergites with comb of developed teeth, tergite X tapered.

***Selenothrips rubrocinctus* (Giard)**
Physopus rubrocincta Giard,1901: 264.
Selenothrips rubrocinctus (Giard): Hood,1913:150.

Material examined: 1 female, on leaves of rose, *Rosa* sp. (**new host record**), BPI Station Bago-Oshiro, Davao City, 25-V-2022, M.M. Arcelo; 2 female, on fruit of mangosteen, *Garcinia mangostana* L., BPI Station, Bago-Oshiro, Davao City, 20-VI-2022, M.M. Arcelo; 5 female, on leaves of mango, *Mangifera indica* L. (**new host record**), Luneta Park, Manila, 2-XI-1998, C. P. Reyes; 4 female, on leaves of 'asuete', *Bixa orellana* L., Paco Park, Manila, 2-XI-1998, C. P. Reyes; 2 female, on leaves of 'aratilis', *Muntingia calabura* L. (**new host record**), Paco Park, Manila, 2-XI-1998, C. P. Reyes; 3 female, on leaves of 'alagaw', *Premna odorata* Blanco (**new host record**), Paco Park, Manila, 2-XI-1998, C. P. Reyes; 1 female, on leaves of Indian tree, *Polyalthia longifolia* (Sonn.) Thwaites (**new host record**), Mehan Garden, Manila, 2-XI-1998, C. P. Reyes; 1 female, 5 male, guava, *Psidium guajava* L., Ilagan, Isabela, 3-I-1988, E. C. Mituda; 6 female, 4 male, on flower of unknown plant, Mt. Apo, Agko, Kidapawan, North Cotabato, 5-VI-1987, C. P. Reyes; 1 female, on flower of 'calachuchi', *Plumiera acutifolia* Poir, Mlang, North Cotabato, 11-V-1987, C. P. Reyes; 7 female, on leaves of 'asuete', *Bixa orellana* L., Mlang, North Cotabato, 11-V-1987, C. P. Reyes; 2 female, on unknown plant, Mlang, North Cotabato, 13-V-1987, C. P. Reyes; 1 female, on leaves of avocado, *Persea americana* Mill., Mlang, North Cotabato, 16-V-1987, C. P. Reyes; 2 female, on leaves of 'talisay', *Terminalia catappa* L., Manila Memorial Park, Sucat, Parañaque, 7-VII-1987, C. P. Reyes; 8 female, on unknown plant, Aborlan, Palawan, 23-V-1987, C.P. Reyes; 3 female, on leaves of cashew, *Anacardium occidentale* L., PNAC, Aborlan, Palawan, 27-I-1985, C.P. Reyes; 11 female, 1 male, on leaves of croton, *Codiaeum variegatum* (L.) Juss., PNAC, Aborlan, Palawan, 27-I-1985, C.P. Reyes; 1 female, on leaves of 'bangkal', *Nauclea orientalis* (L.), Aborlan, Palawan, 27-I-1985, C.P. Reyes; 14 female, 2 male, on unknown plant, UPLB, Los Baños, Laguna, 31-VII-1984, M. Navasero; 1 female, 1 male, on unknown plant, UPLB, Los Baños, Laguna, 31-VII-1984, M. Navasero; 3 female, 1 male, on leaves of cashew, *Anacardium occidentale* L., UPLB, Los Baños, Laguna, 12-VIII-1983, C. P. Reyes; 1 female, on leaves of peanut, *Arachis hypogeae* (Kohler), UPLB, Los Baños, Laguna, 8-VIII-1983, C. P. Reyes; 1 female, on leaves of 'almasiga', *Agathis philippinensis* Warb., VISCA, Baybay, Leyte, 13-V-1982, C. P. Reyes; 4 female, on leaves of 'duhat', *Suzygium cuminii* (L.) Skeels, UPLB, Los Baños, Laguna, 30-V-1982, C. P. Reyes; 1 female, on leaves of *Eugenia jambolana* Lam., UPLB, Los Baños, Laguna, 30-X-1982, C. P. Reyes; 1 female, on leaves of 'talisay', *Terminalia catappa* L., UPLB, Los Baños, Laguna, 3-X-1982, C. P. Reyes; 9 female, on leaves of guava, *Psidium guajava* L., UPLB, Los Baños, Laguna, 12-XI-1982, J. Balatibat; 1 female, on *Ficus ulmifolia* Lam., Santa Ana, Cagayan, 31-III-1977, L.C. Raros (NMP).

Diagnostic characters.
Body dark brown. Head wider than long, depressed into pseudocollar posteriorly, with polygonal reticulation (Fig.18a). Ocellar area raised into small hump, setae pair I, II, III minute. Eyes large, more than one-half of head length, protruded. Mouthcone short, rounded. Antennae 8-segmented, bicolored, segments I and II brown, segments III and IV yellow, each with forked sense cone (Fig. 18b,c). Maxillary palpi 2-segmented. Forelegs bicolored brown and yellow, tarsi yellow, 1-segmented. Pronotum with transverse striae, setae small. Forewings brown with small pale subbasal area, anterior and posterior veins setae, strong, well developed (Fig. 18d). Mesonotal sculpture shallow notched posteriorly, median sculpture in form of triangle (Fig. 18e.1). Metasternal furca nearly V-shaped (Fig. 18e.2). Abdominal tergite I smooth on median half, tergites II to VIII reticulate except median third smooth (Fig. 18f), posterior margin of tergites with comb of developed teeth, tergite X tapered. Male abdominal sternites lll to Vll with small glandular area (Fig. 18g).

DISCUSSION

The present knowledge of thrips species in subfamily Panchaetothripinae is only 10.95% of the 146 species known worldwide. Since the Philippines is a biodiversity hotspot (Gaither and Rocha 2013), there are many more thrips species waiting to be discovered in gardens, farms, plantations, and forests in many regions especially from areas that were not surveyed, namely: Region 1, 3, 7, 10, and BARRM.

The *Astrothrips aucubae* Kurosawa was first described in Japan (Mt. Takao) in 1932 and in the country, it was recorded in Manila on orchids, and Mlang, North Cotabato on unknown plant (Reyes 1994) while *Astrothrips globiceps* Karny was first described in Papua New Guinea (New Britain) in 1913, and in the Philippines, it was recorded in Laguna, Oriental Mindoro, Palawan, Leyte and North Cotabato on numerous plants including grass, flowers of 'calachuchi', leaves of crinum lily, and leaves of spider lily (Reyes 1994; Kudo 1980, 1995). On the other hand, *Astrothrips tumiceps* Karny was first described in Indonesia (Java) in 1923, and in the country, it was recorded in Laguna, Oriental Mindoro, Palawan, Negros Occidental, and Mlang, North Cotabato on numerous plants including cotton, castor bean, and soybean (Reyes 1994).

The *Caliothrips striatopterus* (Kobus) was first described in Indonesia (Java) in 1893, and in the Philippines, it was recorded in Cagayan, Guimaras, Malungon, South Cotabato, Mt. Apo, Agko, Kidapawan, North Cotabato, and Mlang, North Cotabato on numerous plants including corn, 'gabi', and squash, rice, and mangosteen (Pableo and Velasco 1994; Reyes 1994; Reyes and Rillon 1994). In other countries, *C. striatopterus* was associated with bean, grass, and sugarcane (Mound 2011; Mound *et al*. 2022).

The *Copidothrips octarticulatus* (Schmutz) was first described in Sri Lanka 1913, and in the Philippines, it was recorded in Pamucutan, Zamboanga del Sur on unknown plant, and Puerto Princesa, Palawan on Chinese violet, *Asystasia gangetica* (L.) (Reyes 1994; Kudo 1995).

The *Elixothrips brevisetis* (Bagnall) was first described in Seychelles (Mahe) in 1919, and in the Philippines, it was recorded in Bataan, Mt. Makiling, Laguna, Brooks Point, Palawan, Batarasa, Palawan, Mt. Halcon, Baco, Oriental Mindoro, Pili, Camarines Sur, La Paz, Iloilo, Negros Occidental, Pamucutan, Zamboanga del Sur, and Mt. Apo,Kidapawan, North Cotabato on numerous plants including banana, croton, *Ficus* sp. and crape myrtle, *Lagerstroemia speciosa* (L.) (Reyes 1994; Kudo 1995). It was also recorded on banana in Brazil (Sutil *et al*. 2022).

The *Helionothrips annosus* Wang was first described in Taiwan in 1994, and in the Philippines, it was recorded in Bagac, Bataan on *Litsea* sp. (Kudo 1995). It is a pest of cinnamon, *Cinnamomum zeylanicum* Blume, in Sri Lanka (Widanapathirana *et al*. 2022) while *Helionothrips guttatus* Reyes was first described in the Philippines (Mt. Apo) on flowers of 'everlasting' plant in 1994. It was also recorded in Camarines Sur on leaves of *Ficus* sp., and *Macaranga* sp. (Reyes 1994), and it is endemic to the Philippines. On the other hand, *Helionothrips kodaliphilus* (Ramakrishna & Margabandhu) was first described in India (Coimbatore) in 1931, and in the Philippines, it was recorded in Mt. Apo on leaves of *Macaranga* sp. and unknown shrub (Reyes 1994).

The morphological characteristics of female *H. annosus* are somewhat closely related to that of *H. guttatus*, and *H. kodaliphilus*. However, the abdominal sternites of male *H. annosus* lacks glandular area (Kudo 1995) while abdominal sternite VIII of *H. kodaliphilus* has small, circular glandular area (Kudo 1980), and the abdominal sternite III to VIII of *H. guttatus* each have elongate glandular areas (Reyes 1994). Species identity confirmation using molecular techniques is recommended for these three species of *Helionothrips*.

The *Heliothrips haemorrhoidalis* (Bouche) was first described in Germany (Berlin) in 1833, and in the Philippines, it was recorded in Mt. Makiling, Laguna, Quezon, Palawan, Leyte, North Cotabato and South Cotabato on numerous plants including avocado, rice, mangosteen, potato, 'bangkal', *Nauclea orientalis* (L.) , Malayan cherry, *Muntingia calabura* L. and flower of *Gliricidia* sp. (Pableo and Velasco 1994; Reyes 1994; Reyes and Rillon 1994; Kudo 1995). *H. haemorrhoidalis* is also a pest of various plants grown in greenhouses in the United Kingdom and other parts of Europe (Scott Brown and Simmons 2006), and fruit trees including avocado, Valencia orange, navel orange, mandarin, and tangelo citrus in New Zealand (Blank and Gill 2010; Stevens *et al*. 1999).

The *Hemingia glandula* Reyes was first described in the Philippines (Mt. Apo) on leaves of 'bangkal' in 1994. (Reyes 1994). This species is endemic to the Philippines.

The *Panchaetothrips stepheni* Reyes was first described in the Philippines (Mt. Makiling) on unknown plant (Rubiacea) in 1994. It was also recorded in Puerto Gallera, Oriental Mindoro on flowers of *Mussaenda* sp., in Mlang, North Cotabato on flowers of 'calachuchi' and *Clerodendrum* sp. and *Scaevola seriaca* from Puerto Galera, Mindoro Oriental and Puerto Princesa, Palawan (Reyes 1994; Kudo 1995). Recently, it was recorded in India (Manipur, Odisha) on unidentified weed (Rachana and Varatharajan 2017).

The *Phibalothrips peringueyi* (Faure) was first described in Transvaal, South Africa in 1925, and in the Philippines, it was recorded in Manila, San Pablo, Laguna, and Puerto Princesa, Palawan on grass (Kudo 1980; Reyes 1994).

The *Retithrips javanicus* Karny was first described from Indonesia (Java) in 1923, and in the Philippines, it was recorded in Laguna, Quezon and Taguig, Metro Manila, on leaves of *Hyptis brevipes* Poit., and *Quisqualis indica* L. and *Terminalia catappa* L. (Reyes 1994; Kudo 1995).

The *Rhipiphorothrips pulchellus* Morgan was first described in the Philippines (Manila) in 1913 on 'banyan' tree. It was also recorded in Alabang, Muntinlupa, Bataan, Mt. Makiling, Laguna, Baguio City, La Carlota, Negros Occidental, Zamboanga city, Mt. Apo, and Mlang, North Cotabato on numerous plants including 'bangkal', castor bean, crape myrtle, 'duhat', and 'santol' (Reyes 1994; Kudo 1995). The species is now widespread in Asia (Reyes 2021).

Selenothrips rubrocinctus (Giard) was first described in French West Indies (Guadeloupe) in 1901, and in the Philippines, it was recorded in Isabela, Manila, Bataan, Palawan, Samar, Davao City, Mt. Apo, Agko, Kidapawan North Cotabato, and Mlang, North Cotabato on numerous plants including avocado, cashew, guava, and mangosteen (Reyes 1994; Kudo 1995). The new host plants for *S. rubrocinctus* in Manila are mango, 'aratilis and 'alagaw', and rose in Davao City.

In Australia, Peng and Christian (2007) reported *S. rubrocinctus* as an economically important pest of mango in Australia while Astridge (2001) reported that in mangosteen plantation, *S. rubrocinctus* increased in population between September and January, and active during flowering, and fruiting stage causing

a russetting blemish to fruits that resulted to downgrading or market rejection. Abroad, *S. rubrocinctus* is known as cacao thrips, and pest of numerous plants including banana, cashew, mango, and mangosteen (Jonah and Matur 2020; Taddei *et al*. 2021; Wilson 1975).

All 16 species of thrips under the subfamily Panchaetothripinae infest plants including high value crops, grasses, and ornamentals. Further studies are needed to monitor the host plants, area of distribution, and role of thrips in the agroecosystem.

CONCLUSION

The present knowledge of thrips species in subfamily Panchaetothripinae is low. Species identity confirmation using molecular techniques is recommended for three species of *Helionothrips*, namely: *H. annosus*, *H. guttatus*, and *H. kodaliphilus*. All 16 species of thrips infest crop plants, fruit trees, grasses, and ornamentals. *Caliothrips striatopterus* (Kobus), *Heliothrips haemorrhoidalis* (Bouche), and *Selenothrips rubrocinctus* (Giard) are pests of mangosteen, and other high value crops in the Philippines.

CONFLICT OF INTEREST

There is no conflict of interest to be disclosed by any of the authors.

CONTRIBUTIONS OF INDIVIDUAL AUTHORS

The study was conceived by all authors with CPR providing taxonomic review, supervision and direction. PACB was also responsible for taking photomicrographs of specimens and processing of images at NMP while DH was responsible for photomicrographs and processing of images of type materials at NHM.

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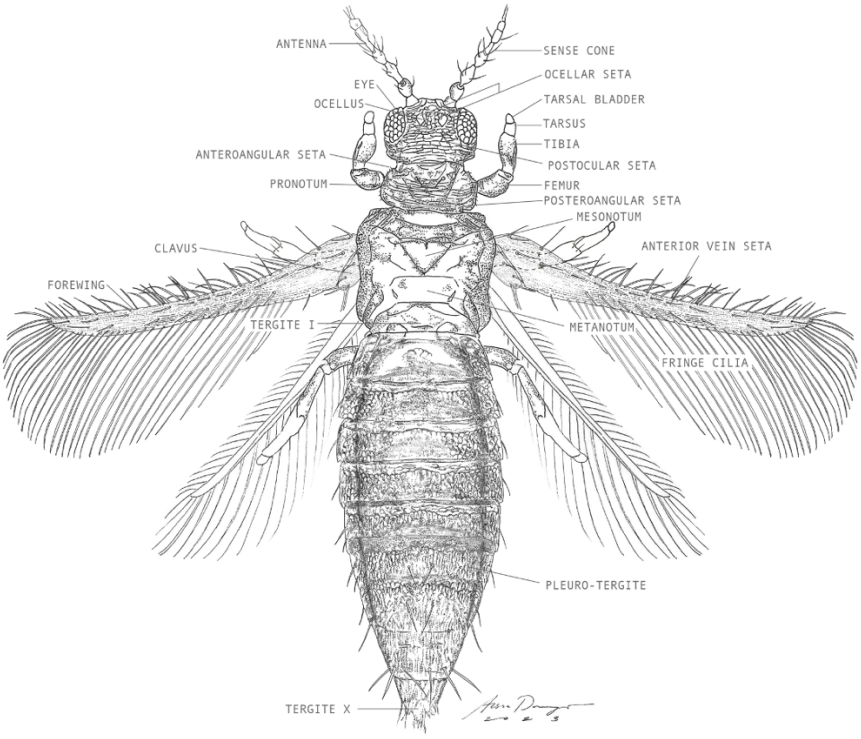


Figure 1: Principal structures of adult Terebrantia, dorsal aspect of female *Selenothrips rubrocinctus* (Giard) [Aissa Domingo]

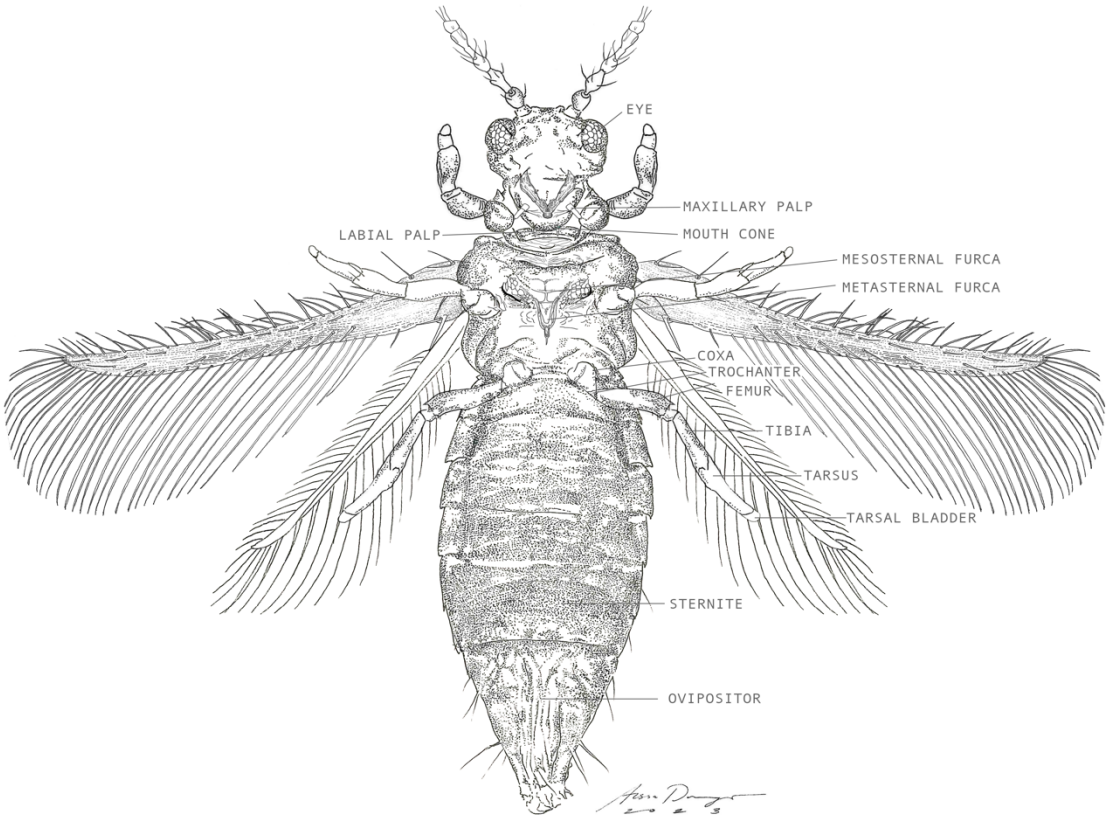


Figure 2: Principal structures of adult Terebrantia, ventral aspect of female *Selenothrips rubrocinctus* (Giard) [Aissa Domingo]



a b c

Figure 3: *Astrothrips aucubae* Kurosawa: a. female, b. head, pro, meso and metanota, abdominal tergites I and II [Manfred Ulitzka: "Astro aucubae" via a shared repository- https://species-id.net/o/index.php?title=image], c. abdominal tergites I to VI (200x)

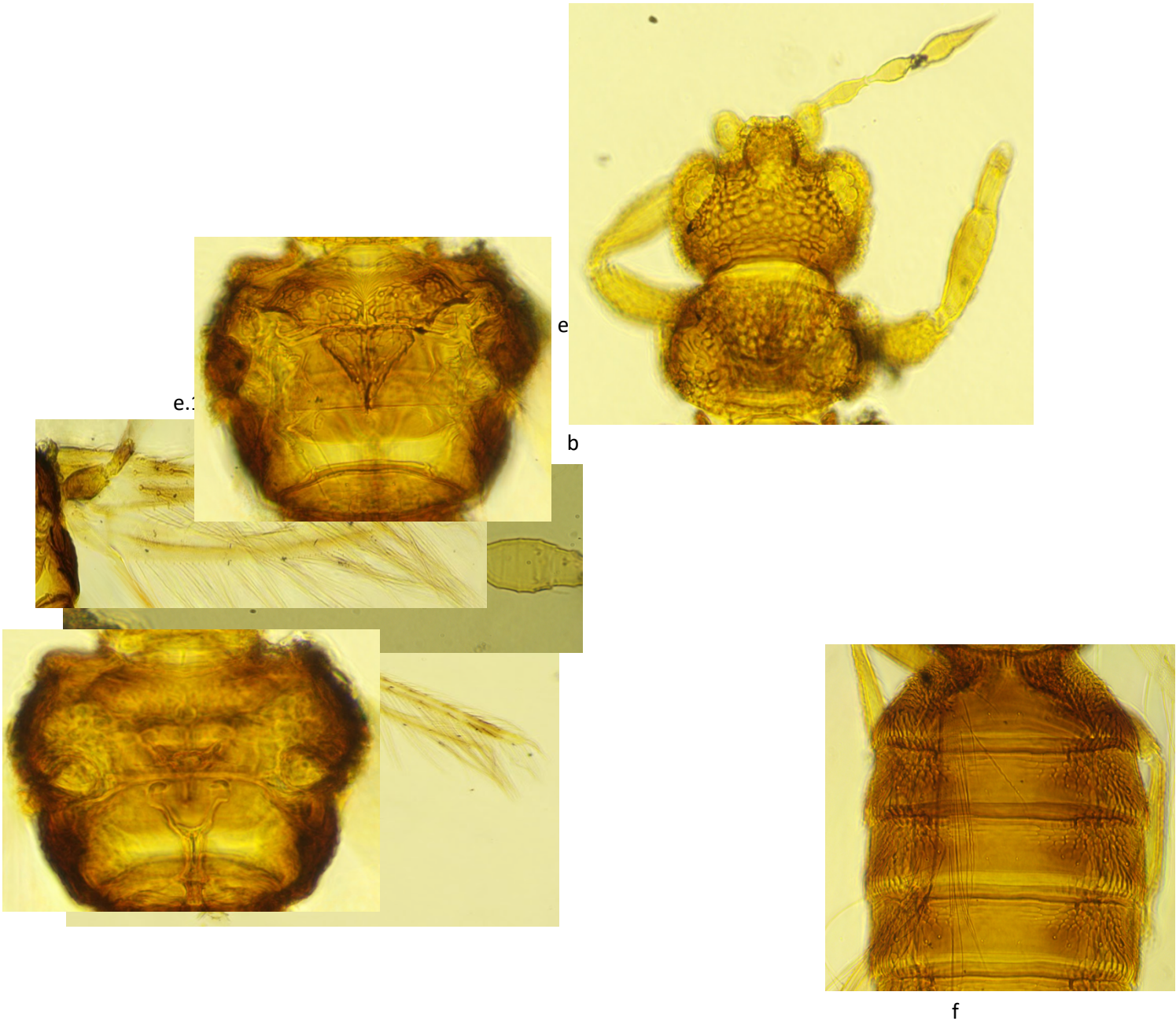


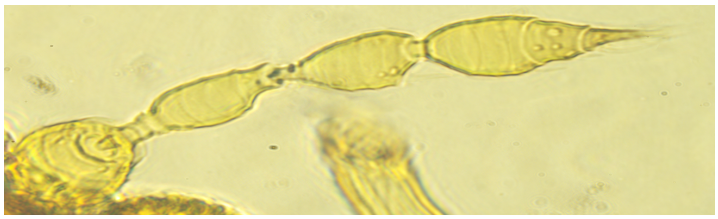
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[CP Reyes and PAC Buenavente]



a



b



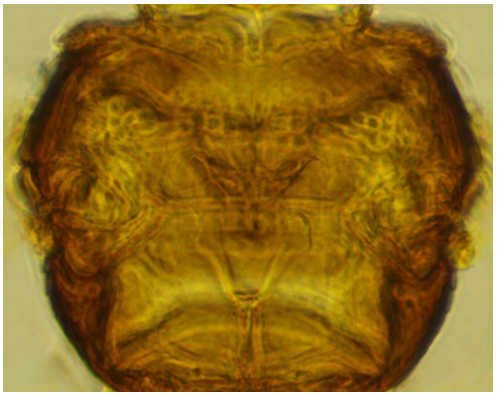
c



d



e.1



e.2



f

Figure 5: ***Astrothrips tumiceps*** **Karny: a. female (100x), b. head and pronotum (200x), c. antenna (1000x), d. forewing (200x), e.1. meso and metanota (200x), e.2. meso and metasterna (200x), f. abdominal tergites I to V (200x)**
[CP Reyes and PAC Buenavente]



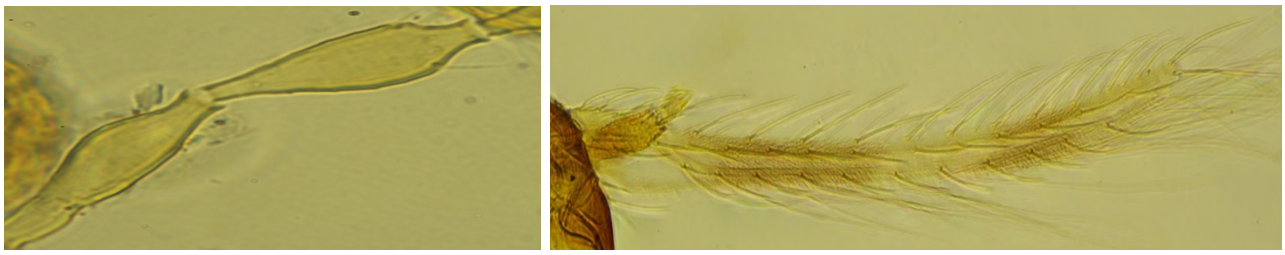


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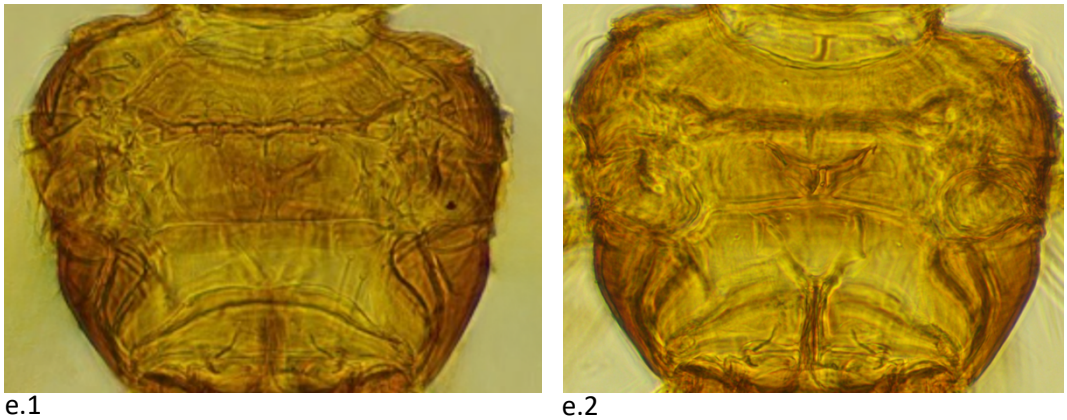
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[CP Reyes and PAC Buenavente]



a b



c d



e.1 e.2



f

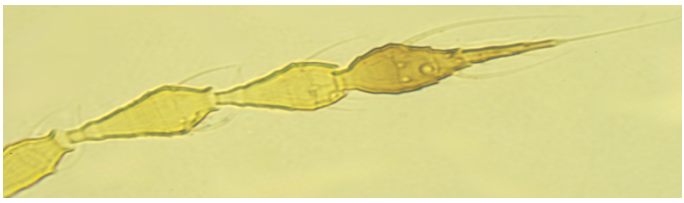
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[CP Reyes and PAC Buenavente]



a



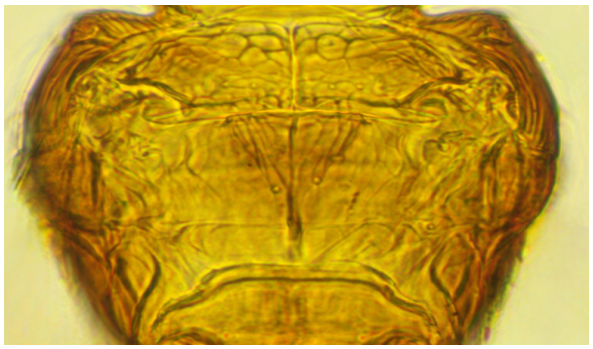
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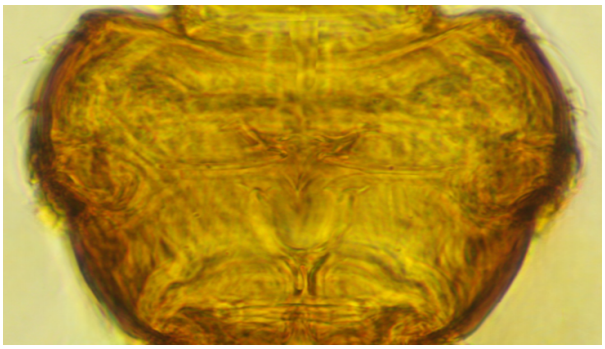
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d



e.1



e.2

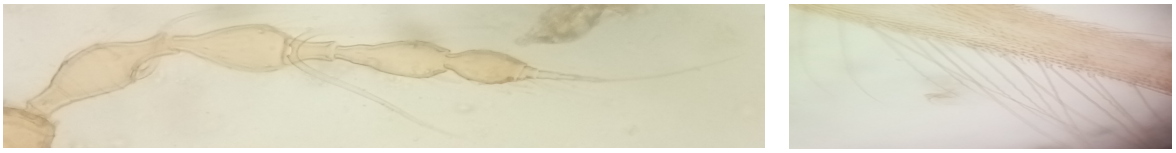


f g

Figure 8: ***Elixothrips brevisetis*** **(Bagnall): a. female (100x), b. head and pronotum (200x), c. antennal segments III to VI (1000x), d. forewing (200x), e.1. meso and metanota (200x), e.2. meso and metasterna (200x), f. abdominal tergites I to V (200x), g. male (100x)**
[CP Reyes and PAC Buenavente]



a b

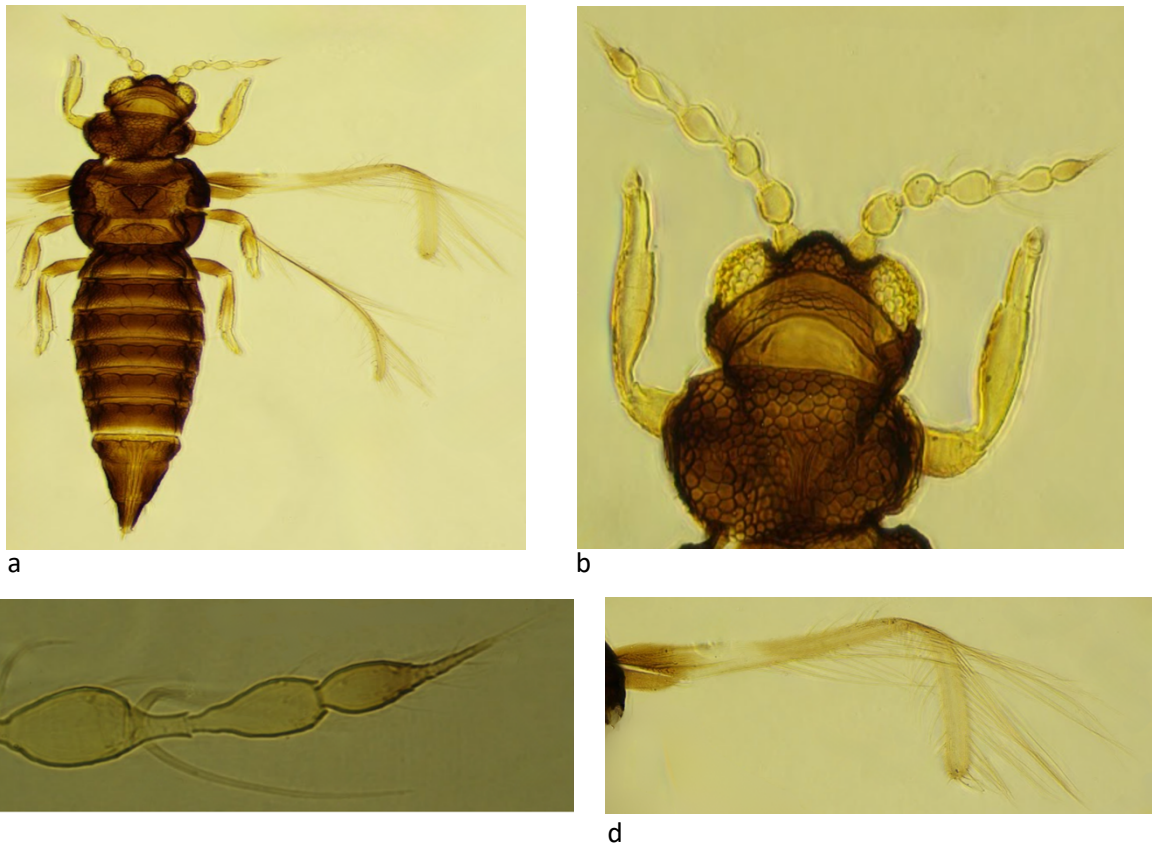


c d



e f

Figure 9: ***Helionothrips annosus*** **Wang: a. female, b. head and pronotum, c. antenna, d. portion of forewing e. meso and metanota, f. abdominal tergites VII to IX**
[Chinthaka Widanapathirana and Manfred Ulitzka]



a b c d



Figure 10: ***Helionothrips guttatus*** **Reyes: a. female (100x), b. head and pronotum (200x), c. antenna (1000x), d. forewing (200x), e.1. meso and metanota (200x), e.2. meso and metasterna (200x), g. anterior abdominal tergites (200x), h. male (100x) [CP Reyes and PAC Buenavente].**

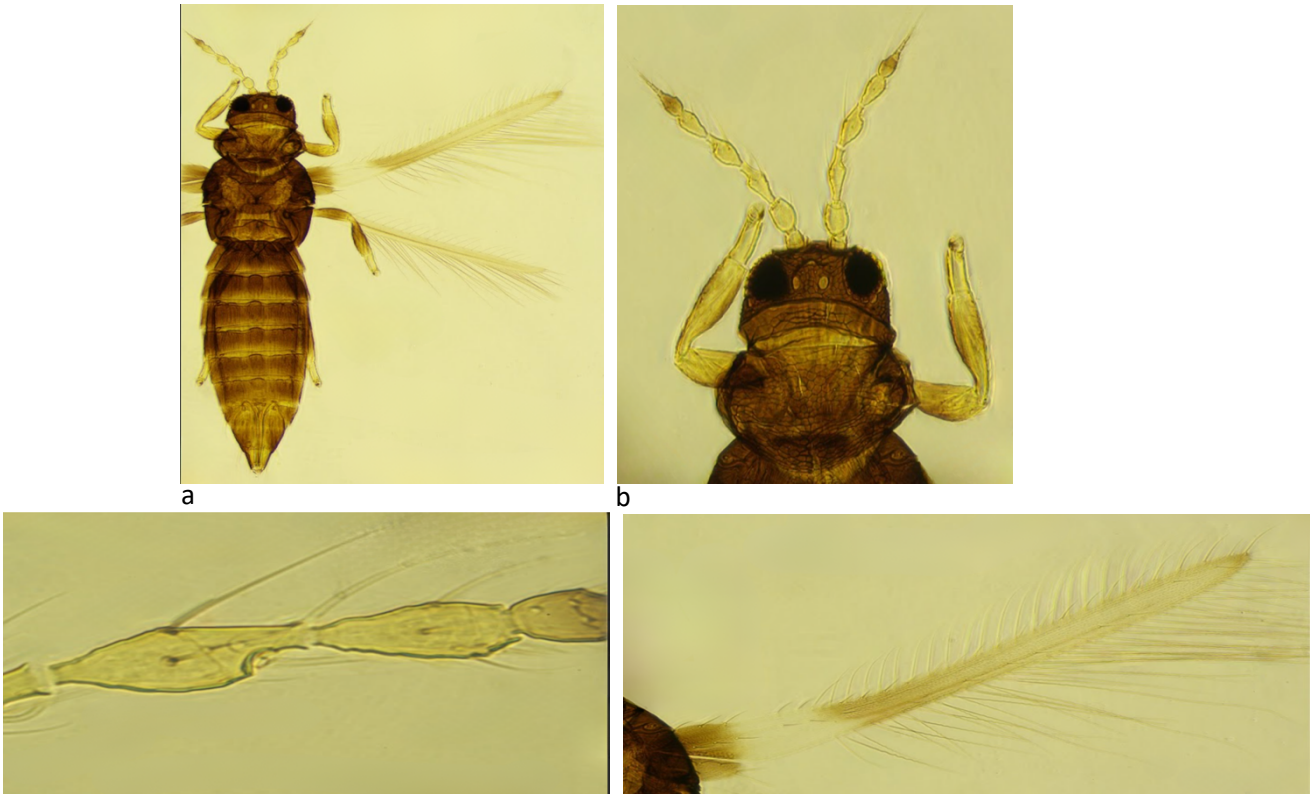
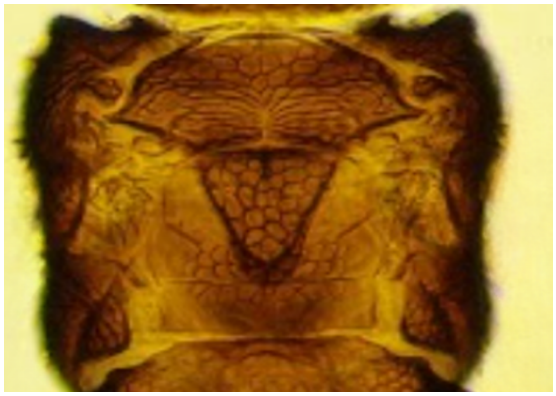


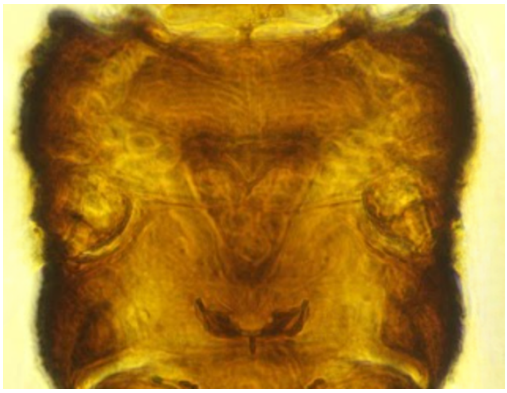


Figure 11: ***Helionothrips kodaliphilus*** **(Ramakrishna & Margabandhu): a. female (100x), b) head and pronotum (200x), c. antenna (1000x), d. forewing (200x), e.1. meso and metanota (200x), e.2. meso and metasterna (200x), f. abdominal tergites I to V (200x) [CP Reyes and PAC Buenavente] g. male [D Hall]**





e.1



e.2

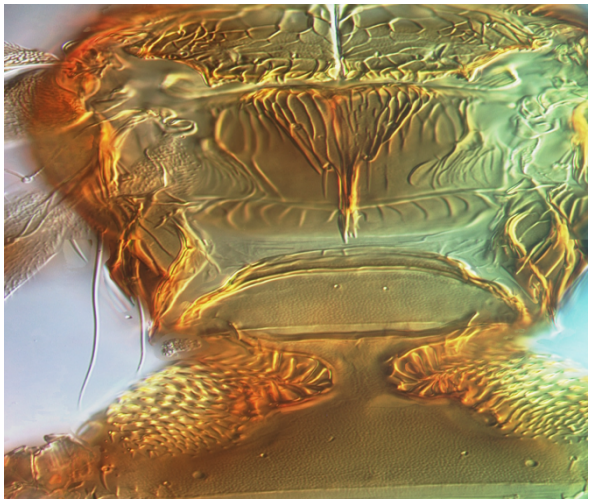


f

Figure 12: ***Heliothrips haemorrhoidalis*** **(Bouche): a. female (100x), b. head and pronotum (200x), c. antennal segments III to VI (1000x), d. forewing (200x), e.1. meso and metanota (200x), e.2. meso and metasterna (200x), f. abdominal tergites I to V (200x)**
[CP Reyes and PAC Buenavente]



a



b

Figure 13: ***Hemingia glandula*** **Reyes: a. female [Dan Hall], b. male meso and metanota, abdominal tergites I to II [Laurence Mound: Via a shared repository - https://species-id.net/o/index.php?title=Image:Hemingia_MaleMesMetTergII.tif]**



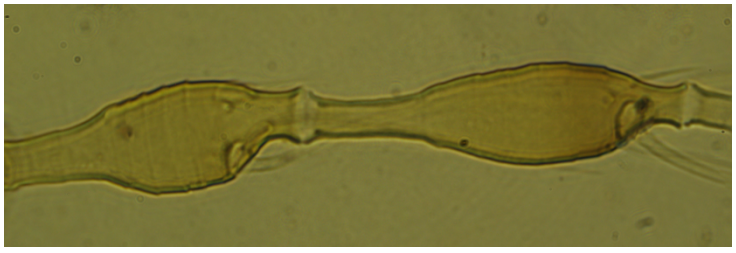
a.1



a.2



b



c



d



e.1



e.2



f

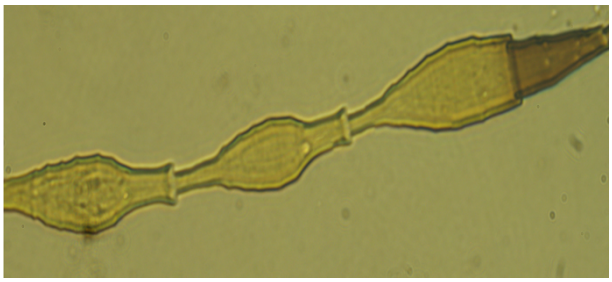
Figure 14: *Panchaetothrips stepheni* Reyes: a.1. female with aberrant right antenna [Dan Hall], a.2. female (100x), b. head and pronotum (200x), c. antennal segments III to VI (1000x), d). forewing (200x) e.1. meso and metanota (200x), e.2. meso and metasterna (200x), f. abdomen (200x)
[CP Reyes and PAC Buenavente].



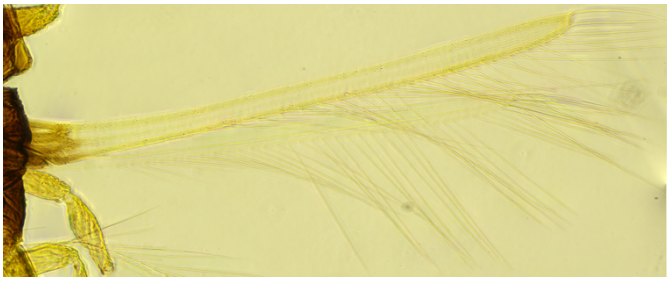
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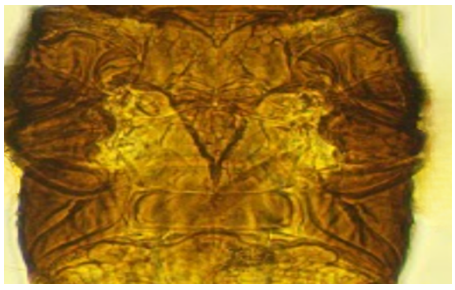
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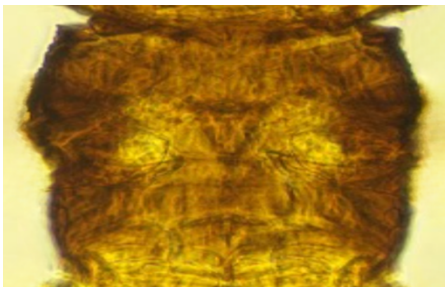
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d



e.1



e.2



f



g

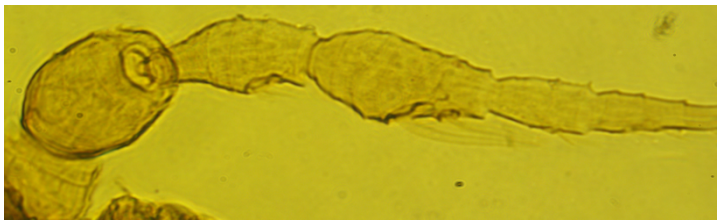
Figure 15: *Phibalothrips peringueyi* (Faure): a. female (100x), b. head and pronotum (200x), c. antennal segments III to VI (1000x), d. forewing (200x), e.1. meso and metanota (200x), e.2. meso and metasterna (200x), f. abdomen (200x) [CP Reyes and PAC Buenavente] g. male [Dan Hall].



a



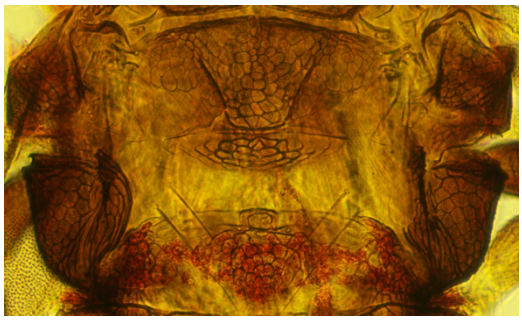
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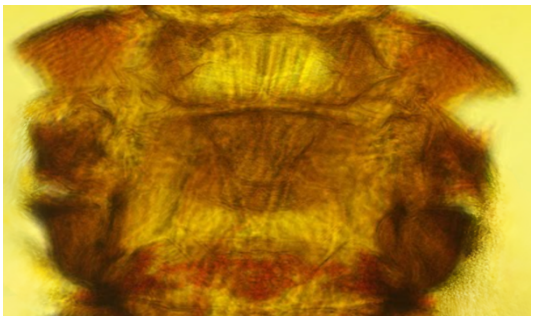
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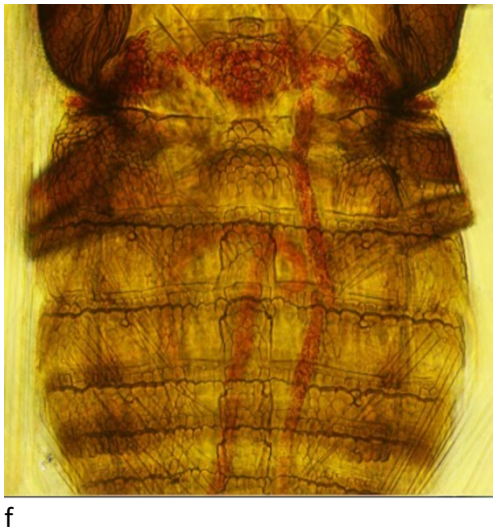
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e.1



e.2

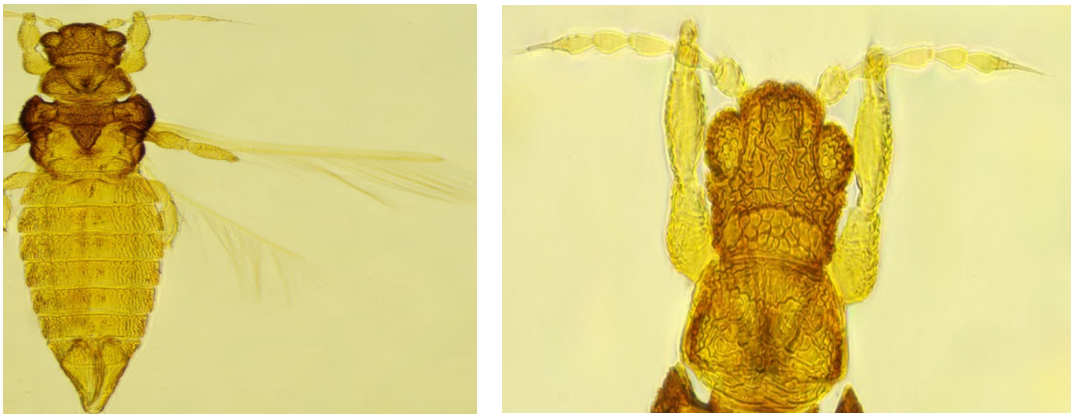


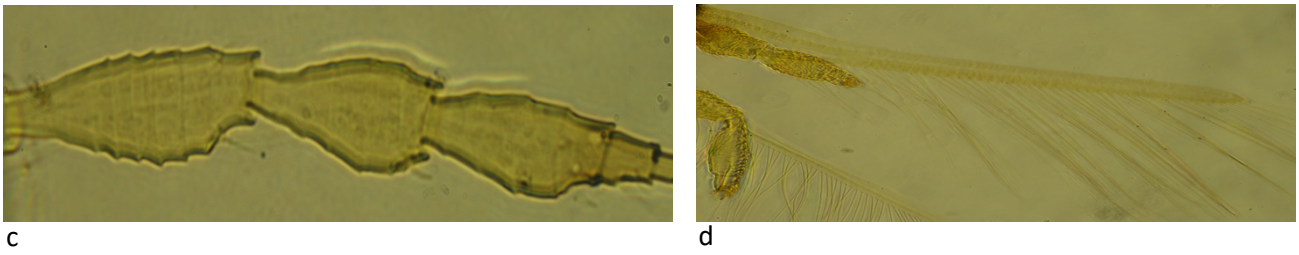
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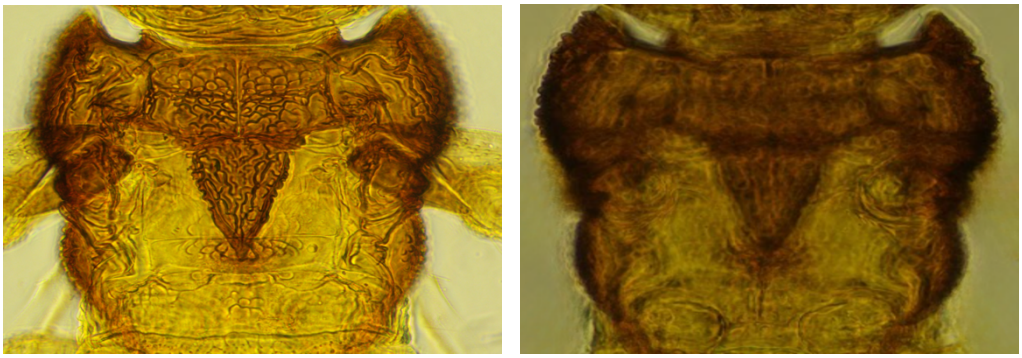


g

Figure 16: ***Retithrips javanicus*** **Karny: a. female (100x), b) head and pronotum (200x), c) antenna (1000x), d. forewing (200x), e.1. meso and metanota (200x), e.2. meso and metasterna (200x), f. abdominal tergites I to V (200x), g. male (100x)**
[CP Reyes and PAC Buenavente]







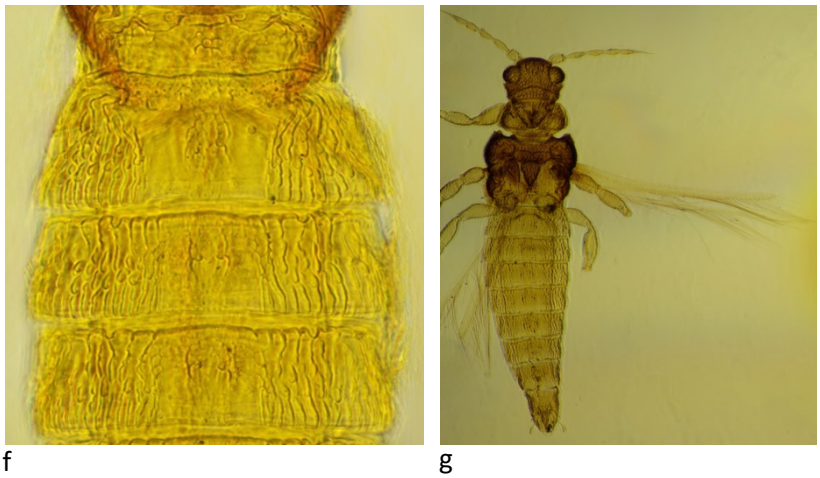


Figure 17: ***Rhipiphorothrips pulchellus*** **Morgan: a. female (100x), b) head and pronotum, (200x), c. antennal segments III to VI (1000x), d. forewing (1000x), e.1. meso and metanota (200x), e.2. meso and metasterna (200x), f. abdominal tergites I to IV (200x), g. male (100x) [CP Reyes and PAC Buenavente]**

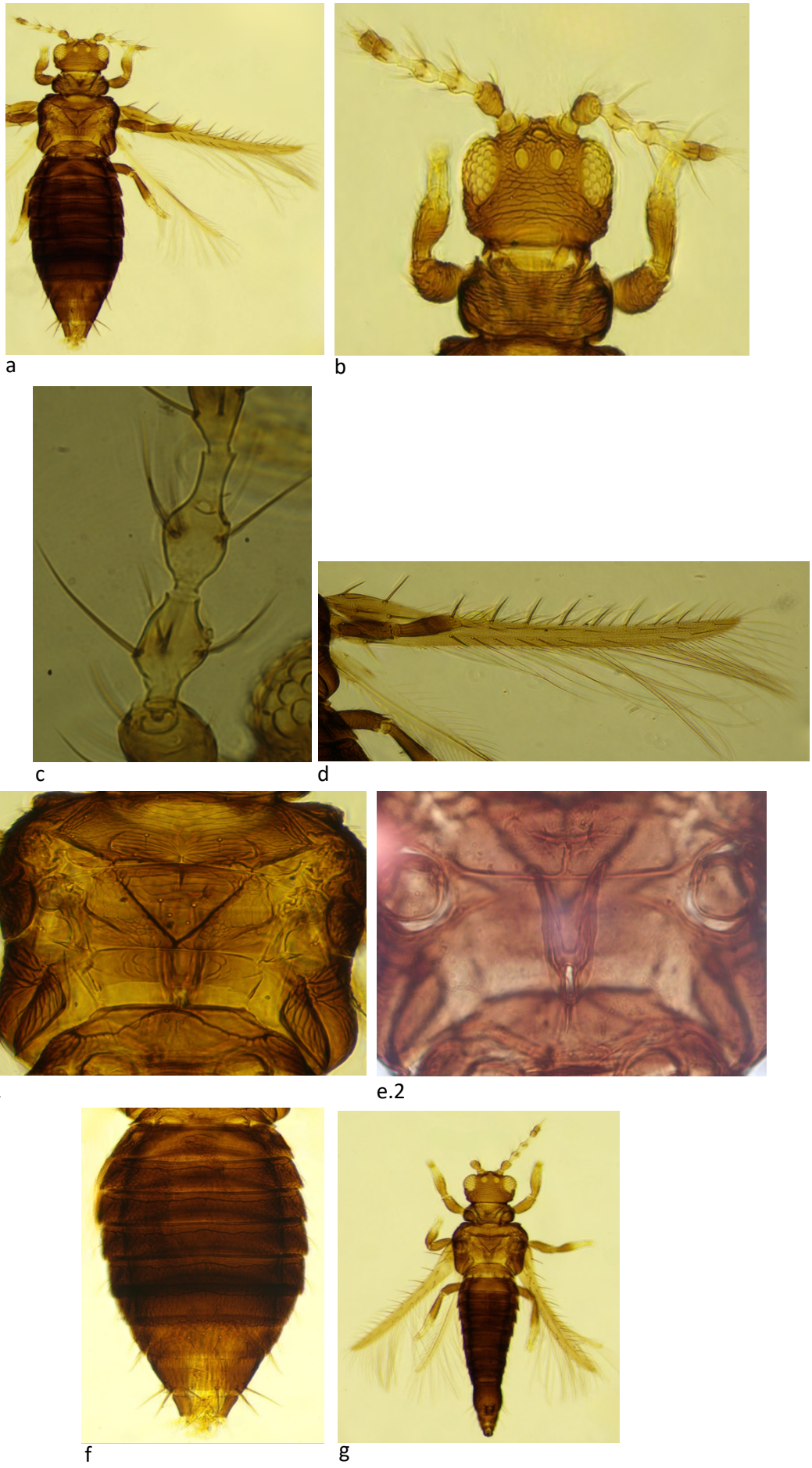


Figure 18: ***Selenothrips rubrocinctus*** **(Giard): a. female (100x), b) head and pronotum (200x), c) antennal segments I to V (1000x), d) forewing (200x), e.1. meso and metanota (200x), e.2. meso and metasterna (200x), f. abdomen (200x), g) male (100x)**
[CP Reyes and PAC Buenavente]