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The Genus *Phylladothrips* (Thysanoptera, Phlaeothripinae) from East Asia

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Abstract The East Asian species of the genus *Phylladothrips* PRIESNER is revised. *Paradexiothrips* OKAJIMA is newly synonymized with it. Nine species are included, seven of them being new to science: *P. bispinosus* (OKAJIMA), comb. n. from the Philippines, *P. fasciae* sp. n. from Sulawesi, *P. gracilis* sp. n. from Sulawesi, *P. karnyi* PRIESNER from Java, *P. lateralis* sp. n. from Bali, *P. niger* sp. n. from West Malaysia, *P. pallidus* sp. n. from Taiwan, *P. pictus* sp. n. from Taiwan, and *P. similis* sp. n. from the Philippines. A key is provided to these nine species.

The genus *Phylladothrips* is a group of small-sized fungus-feeding Thysanoptera belonging to the subfamily Phlaeothripinae of the family Phlaeothripidae. The tribal status of this genus is not certain, and the present author considers that it could well be included in the tribe Phlaeothripini, although PRIESNER placed it in the tribe Haplothripini.

The genus was erected by PRIESNER (1933, pp. 80–81) for *karnyi* from Java, Indonesia, and has scarcely been referred to since its original description. ANANTHAKRISHNAN (1969) recorded *karnyi* from India, and this is the only subsequent use of this generic name so far as the present author knows. In East Asia, however, *Phylladothrips* species are common at some sites. They are found mainly on dead leaves and branches of evergreen trees, on dead Palmae fronds, or rarely in grass tussocks. Moreover, in many cases, they are found with other common fungus-feeding phlaeothripines, *e.g.*, *Apelaunothrips* and *Stigmothrips*. It is interesting that these three genera show similar patterns of coloration. There are three colour patterns, uniformly yellow, uniformly brown and bicolorous yellow and brown. Some authors (RITCHIE, 1974; PITKIN, 1976, 1977; OKAJIMA, 1979) pointed out that these were related to the habitats of the species, but many exceptions appear to have been found.

The macropterous forms of phlaeothripine species usually have one or two pairs of wing retaining setae on the second to seventh abdominal tergites and none on the eighth. However, some unusual genera have these setae on the eighth tergite, *e.g.*, *Solomonthrips* MOUND, 1970. The genus *Phylladothrips* also has these setae, usually two pairs but rarely one pair, on the eighth tergite. This condition may be considered apomorphic. However, this character does not seem to indicate relationships, at least between *Solomonthrips* and *Phylladothrips*. They

are probably well separated from each other, thus suggesting homoplasy in this character.

Genus ***Phylladothrips*** PRIESNER

Phylladothrips PRIESNER, 1933, pp. 79–80. Type-species: *Phylladothrips karnyi* PRIESNER, by monotypy.

Paradexiothrips OKAJIMA, 1984, p. 730. Type-species: *Paradexiothrips bispinosus* OKAJIMA, by monotypy. *Syn. nov.*

Diagnosis. Small-sized Phlaeothripinae. Head almost as long as wide, or wider than long, usually slightly wider than long; antennae eight-segmented, segments III and IV with three (1+2) and four (2+2) sense-cones respectively; mouth-cone short and rounded, maxillary stylets retracted far into head capsule, maxillary bridge weakly present or absent. Pronotal aa setae weak; epimeral sutures incomplete; praepectus and prospinasternum reduced; metathoracic sternopleural sutures absent; foretarsi unarmed; forewings weakly constricted medially, without duplicated cilia. Abdominal tergite VIII with one or two pairs of wing retaining setae.

Comments. This genus was originally placed in the tribe Haplothripini by PRIESNER. Recently, however, the synonymous genus *Paradexiothrips* was treated in the tribe Apelaunothripini by OKAJIMA (1984) because of its broad maxillary stylets. Moreover, he indicated that the Apelaunothripini was the sister group of the Phlaeothripini or possibly should be included within the Phlaeothripini. The breadth of the maxillary stylets, the only apomorphy defining the tribe Apelaunothripini, are variable, narrow to moderately broad, in the species described below. In view of this, the present author considers that the genus *Phylladothrips* is placed in the tribe Phlaeothripini.

Most of the species described below including *karnyi*, type of the genus, have two pairs of wing retaining setae on the eighth abdominal tergite and the postocellar setae pointed, although *bispinosus*, type of the synonymous genus *Paradexiothrips*, has only one pair of these setae on the eighth tergite and long and expanded postocellar setae. However, *pallidus*, newly described below from Taiwan, is intermediate in structure, in having two pairs of wing retaining setae on the eighth tergite and long and expanded postocellar setae.

Key to the Species

1. Postocellar setae long and expanded at apex (Fig. 9) ..... 2.
— Postocellar setae short or long, sharply pointed at apex ..... 3.
2. Prothorax brown, head, pterothorax and abdomen brownish yellow with brown lateral margins; antennal segment III almost as long as segment IV, largely brown; prothoracic am setae longer than aa, but slender; tergite VIII with a pair of wing retaining setae near posterior margin; B_2 setae on tergite IX

sharply pointed at apex, longer than tube ..... *P. bispinosus* (OKAJIMA), comb. nov.

— Head, thorax and abdomen largely yellow, tube dark brown with yellow base; antennal segment III yellow, much shorter than segment IV; prothoracic am reduced; tergite VIII with two pairs of wing retaining setae; B_2 setae on tergite IX weakly expanded or blunt at apex, almost as long as tube ..... *P. pallidus* sp. nov.

3. Head brown to dark brown ..... 4.
— Head largely yellow ..... 8.
4. Body uniformly dark brown ..... 5.
— Body bicolorous yellow and brown, at least abdominal segment II yellow..... 6.
5. Cheeks distinctly narrowed towards base (Fig. 7) ..... *P. niger* sp. nov.
— Cheeks almost parallel..... *P. karnyi* PRIESNER.
6. Body largely brown, except for yellow abdominal segment II; dorsal surface of head generally sculptured (Fig. 1)..... *P. fasciae* sp. nov.
— At least, prothorax and abdominal segments II and III yellow; dorsal surface of head sculptured postero-laterally (Figs. 11, 13) ..... 7.
7. Abdominal segments II to IX yellow, tergites III to VII each with a brown marking anteriorly; midfemora yellow, sometimes tinged with brown, but at least much paler than pterothorax; male aedeagus slightly widened apically (Fig. 19)..... *P. pictus* sp. nov.
— Abdominal segments II and III yellow, IV, V and IX brown, VI to VIII brown to brownish yellow, gradually paled posteriorly; midfemora brown, concolorous with pterothorax; male aedeagus slightly narrowed apically (Fig. 20)..... *P. similis* sp. nov.
8. Head yellow, anterior margin shaded with brown; tube yellow at anterior half, brown at posterior half; apical portion of male aedeagus slender (Fig. 17) .. *P. gracilis* sp. nov.
— Head yellow, anterior and lateral margins brown; tube largely brown, with extreme base yellow; apical portion of male aedeagus distinctly enlarged ... *P. lateralis* sp. nov.

Phylladothrips bispinosus (OKAJIMA), comb. nov.

Paradexiothrips bispinosus OKAJIMA, 1984, p. 731. Holotype ♀, Mindanao (examined).

This species is most similar to *pallidus* described below from Taiwan, and the differences between them are discussed under the latter species.

The eighth abdominal tergite of this species has only one pair of wing retaining setae which are simply curved and situated near the posterior margin. However, most other features are typical of the genus.

Material examined. Philippines: Mindanao, Mt. Apo, Agko, alt. about 1,300 m, holotype ♀ and paratypes 1 ♀ 1 ♂ on dead Palmae fronds, 4-VIII-1979, S. OKAJIMA leg. (Tokyo University of Agriculture).

Phylladothrips fasciae sp. nov.

(Figs. 1-2, 15-16)

Female (macroptera). Colour bicolorous; head, thorax and abdominal segments III to X (=tube) dark brown; abdominal segment II yellow, with anterior margin shaded with brown; femora brown, tibiae and tarsi yellow, but the foretibiae are tinged with brown; antennal segments I, II and IV to VIII dark brown, segment III yellowish, shaded with greyish brown apically, segments IV and V brown to dark brown, with pale bases; forewing shaded with pale greyish brown at base and apical half, but extreme base pale; major setae yellowish.

Head (Fig. 1) almost as long as broad, or a little broader, dorsal surface generally sculptured with transverse rows of reticulation; cheeks gradually narrowed towards base; postocular setae expanded at apex; postocellar setae slightly longer than diameter of ocellus. Eyes about 0.4 times as long as head, well separated from each other. Ocelli about 15 μm in diameter; posterior pair 26–28 μm apart from each other, about 15 μm apart from anterior one. Antenna 2.3–2.4 times as long as head; segment IV a little longer than III (Fig. 26). Maxillary stylets retracted to eyes; maxillary guides developed, sometimes with weak maxillary bridge, but usually incomplete.

Pronotum weakly sculptured posteriorly; am setae short and slender, blunt or pointed at apex, other major setae expanded at apex.

Pelta distinct (Fig. 2); tergite VIII with two pairs of wing retaining setae, posterior pair slender (Fig. 15); B_1 setae on tergite IX expanded at apex, a little shorter than tube, B_2 setae on IX weakly expanded, almost as long as B_1. Tube about 0.6 times as long as head, 1.6–1.7 times as long as basal width. Anal setae almost as long as tube.

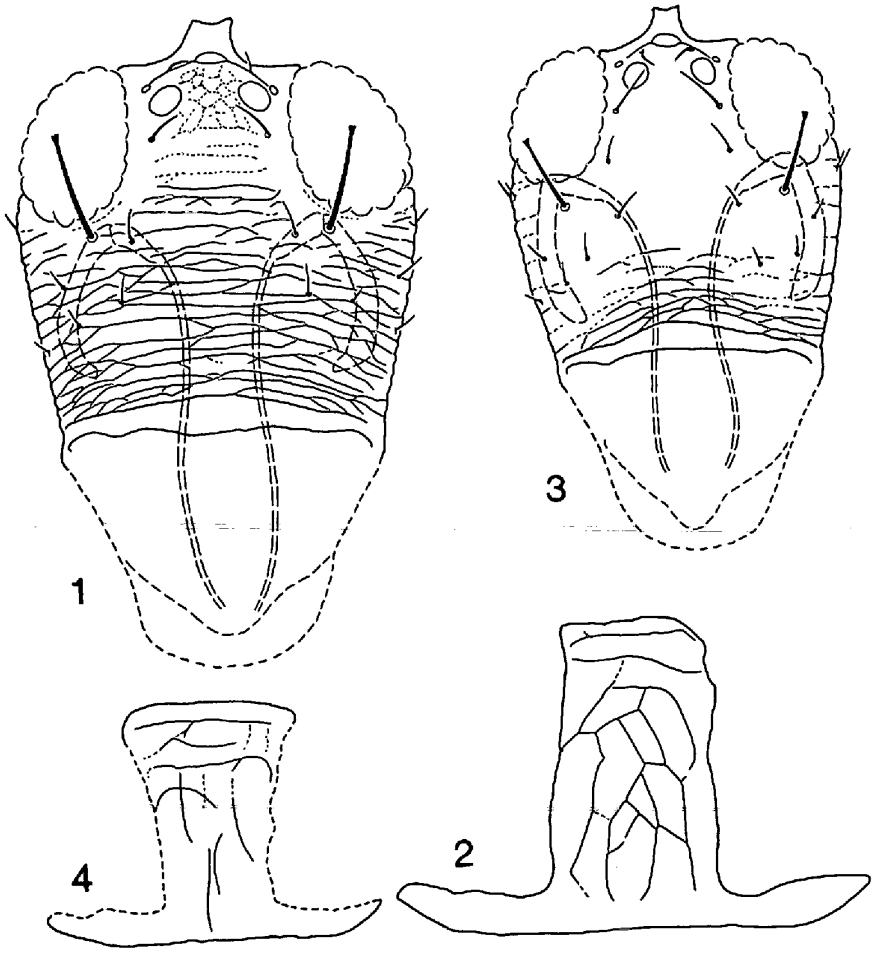
Measurements of holotype (female in μm). Total body length 1,880 (distended). Head length 176, maximum width across cheeks 189, minimum width near base 153; eye length 73, width 56. Pronotum median length 112, width 230; forewing length 816. Pelta length 76, width 117. Abdominal tergites median length (width) as follows: II 89 (290); IV 97 (306); VI 97 (270); VIII 86 (198); IX 72 (137). Tube length 101, basal width 61, apical width 31. Antennal segments I to VIII length (width) as follows: 37 (37); 46 (30); 61 (30); 66 (31); 58 (26); 52 (25); 40 (20); 35 (11).

Length of setae: Postoculars 50–52. Prothoracic aa about 30, am about 20, ml 45, pa 62–66, epim 50–54. Metanotal medians 20–24. Subbasals of forewing: B_1 36–38, B_2 36–40, B_3 56–58. B_1 on tergite IX 86–87, B_2 on IX 86–88. Anals about 100.

Male (macroptera). Very similar in colour and structure to female. B_2 setae on tergite IX a little shorter than B_1, blunt at apex; apical portion of aedeagus broad (Fig. 16).

Measurements of paratype (male in μm). Total body length 1,440 (distended). Head length 158, maximum width across cheeks 170, minimum width near base 138; eye length 66, width 50–51. Pronotum median length 107, width 204; forewing length 668. Pelta length 57, width 86. Abdominal tergites median length (width) as follows: II 70 (214); IV 71 (204); VI 71 (176); VIII 70 (138); IX 68 (98). Tube length 78, basal width 51, apical width 26. Antennal segments I to VIII length (width) as follows: 35 (36); 40 (25); 54 (27); 62 (27); 51 (24); 46 (21); 36 (18); 31 (11).

Length of setae: Postoculars 45–47. Prothoracic aa about 30, am about 20, ml 40, pa 46–50, epim 40–45. Metanotal medians about 20. Subbasals of forewing: B_1 35–37, B_2 35–37, B_3 41–46. B_1 on tergite IX 65–67, B_2 on IX 61. Anals about 76.



Figs. 1–2. *Phylladothrips fasciae*, ♀; 1, head; 2, pelta. —— 3–4. *Phylladothrips gracilis*, ♀; 3, head; 4, pelta.

Holotype ♀. Indonesia: Central Sulawesi, 31 km W from Palopo, Puncak, alt. about 1,300 m, on dead leaves and branches, 16–VIII–1984, S. OKAJIMA leg.

Paratypes. Indonesia: 4 ♀♀ 1 ♂, collected with holotype; 17 ♀♀ 16 ♂♂, data very similar to those of holotype, but 19–VIII–1984; 1 ♂, Bali Is., 20 km NE from Gilimanuk, Banyuwedan, sea level, on dead branches, 28–VIII–1984, S. OKAJIMA leg.

Non-paratypical material. Philippines: Mindanao, Mt. Apo, Agko, alt. about 1,300 m, 1 ♀ on dead Palmae fronds, 4–VIII–1979, S. OKAJIMA leg.

Comments. This species can easily be distinguished from all the other members of the genus by the body colour. The second abdominal segment of this species is clear yellow in contrast to the rest of brown body. A non-paratypical female listed above from the Philippines has the body setae much longer, *e.g.*, the postocular head setae are a little longer than eye, and has the third to fifth antennal segments more or less darker.

Phylladothrips gracilis sp. nov.

(Figs. 3–4, 17)

Female (macroptera). Colour yellow; anterior margin of head, lateral margins of metathorax and posterior half of tube shaded with brown; antennal segments I to III yellow, slightly shaded with grey, segments IV to VIII greyish brown; major setae yellowish.

Head (Fig. 3) a little broader than long, dorsal surface weakly sculptured posteriorly; cheeks very weakly rounded, gradually narrowed towards base; postocular setae expanded at apex; postocellar setae well developed, long and sharply pointed at apex, but very slender. Eyes 0.44–0.46 times as long as head. Ocelli 13–14 μm in diameter; posterior pair 20–21 μm apart from each other, 10–11 μm apart from anterior one. Antenna 2.4–2.5 times as long as head. Maxillary stylets retracted to eyes; maxillary guides weak, not forming a bridge.

Pronotum smooth, very weakly sculptured near posterior margin; am setae reduced, very slender and sharply pointed at apex, other major setae expanded at apex.

Pelta weak (Fig. 4); tergite VIII with two pairs of wing retaining setae, posterior pair slender; B_1 setae on tergite IX about three-fourths the length of tube, weakly expanded at apex, B_2 setae on IX almost as long as tube, weakly expanded at apex. Tube a little longer than 0.6 times the length of head, 1.7 times as long as basal width. Anal setae almost as long as tube.

Measurements of holotype (female in μm). Total body length 1,560 (distended). Head length 145, maximum width across cheeks 156, minimum width near base 126; eye length 66, width 45–47. Pronotum median length 110, width 179; forewing length 636. Pelta length 61, width ?. Abdominal tergites median length (width) as follows: II 73 (225); IV 77 (240); VI 78 (219); VIII 69 (166); IX 61 (115). Tube

length 92, basal width 54, apical width 26. Antennal segments I to VIII length (width) as follows: 36 (30); 38 (26); 50 (25); 56 (25); 49 (24); 45 (23); 36 (18); 30 (11).

Length of setae: Postoculars 40–45; postocellars 25–30. Prothoracic aa 30–35, am less than 15, ml about 40, pa 51–56, epim 51–53. Metanotal medians 20–25. Subbasals of forewing: B_1 32–34, B_2 35–39, B_3 48–51. B_1 on tergite IX 65–67, B_2 on IX 92–93. Anals 92–94.

Male (macroptera). Very similar in colour and structure to female. B_2 setae on tergite IX almost as long as or a little longer than B_1; aedeagus slender (Fig. 17).

Measurements of paratype (male in μm). Total body length 1,370 (distended). Head length 137, maximum width across cheeks 143, minimum width near base 116; eye length 57, width 39–41. Pronotum median length 100, width 168; forewing length about 570. Pelta length 57, width ?. Abdominal tergites median length (width) as follows: II 68 (189); IV 62 (188); VI 62 (164); VIII 64 (121); IX 58 (86). Tube length 77, basal width 46, apical width 25. Antennal segments I to VIII length (width) as follows: 30 (28); 36 (24); 48 (24); 55 (23); 48 (22); 43 (20); 36 (17); 30 (12).

Length of setae: Postoculars 44–45; postocellars 25–27. Prothoracic aa about 30, am less than 15, ml 33–36, pa 45, epim 37–42. Metanotal medians 20–25. Subbasals of forewing: B_1 30, B_2 ? 30, B_3 37–42. B_1 on tergite IX 62, B_2 on IX 62–64. Anals 80–86.

Holotype ♀. Indonesia: South Sulawesi, Karaenta Forest Res., Maros to Camba, alt. about 400 m, on dead Palmae, 6-VIII-1984, S. OKAJIMA leg.

Paratypes. Indonesia: 24 ♀♀ 10 ♂♂, collected with holotype; 10 ♀♀ 12 ♂♂, data very similar to those of holotype, but 5-VIII-1984; 1 ♀, data very similar to above, but on dead branches.

Comments. This species can be easily distinguished from the other members of the genus by the largely yellowish body colour. Similar coloration is found in *lateralis* described below from Bali Is., and the differences between them are discussed under the latter species.

Phylladothrips karnyi PRIESNER

Phylladothrips karnyi PRIESNER, 1933, pp. 80–81. Holotype ♀, Java (examined).

This species was originally described on the unique holotype female. ANANTHAKRISHNAN (1969, p. 199) recorded it from India, but the present author has not examined the Indian material.

In general appearance, *karnyi* is very similar to *niger* described below from West Malaysia. However, it can be distinguished from the latter by the head proportion as given in the key.

Material examined. Indonesia: Holotype ♀, Java, Depok, zwischen zusammengeschlagenen trockenen *Ammomum*-Blättern, 22-VII-1923, H. H. KARNY leg. (Senckenberg Museum, Frankfurt).

Phylladothrips lateralis sp. nov.

(Figs. 5–6)

Male (macroptera). Colour bicolorous, but largely yellow; lateral and anterior margins of head, lateral margins of pterothorax and tube brown to dark brown, but the tube has pale extreme base; median portion of pterothorax and abdominal segment I pale brown; the rest of body yellow; midfemora tinged with pale brown; antennal segment III brownish yellow, the remaining segments dark brown, but I and II somewhat paler than IV to VIII, segment IV with pale extreme base; forewings shaded with pale brown at basal third and distal fourth, but extreme base and apices colourless; major setae yellowish.

Head (Fig. 5) almost as long as broad, dorsal surface weakly sculptured posterolaterally; cheeks gradually narrowed towards base; postocular setae expanded at apex; postocellar setae well developed, long and slender, sharply pointed at apex. Eyes 0.42–0.43 times as long as head. Ocelli 13–14 μm in diameter; posterior pair 22 μm apart from each other, 13 μm apart from anterior one. Antennae about 2.2 times as long as head. Maxillary stylets retracted to eyes; maxillary guides weak, bridge absent or very weakly present.

Pronotum smooth, very weakly sculptured near posterior margin; am setae slender, pointed at apex, other major setae expanded at apex.

Pelta (Fig. 6) with weak lateral lobes, median lobe with fine reticulation; tergite VIII with two pairs of wing retaining setae; B_1 setae on tergite IX about 0.8 times as long as tube, expanded at apex, B_2 setae on IX almost as long as B_1, weakly expanded at apex. Tube a little longer than half the length of head, about 1.8 times as long as basal width. Apical portion of aedeagus broad. Anal setae almost as long as tube.

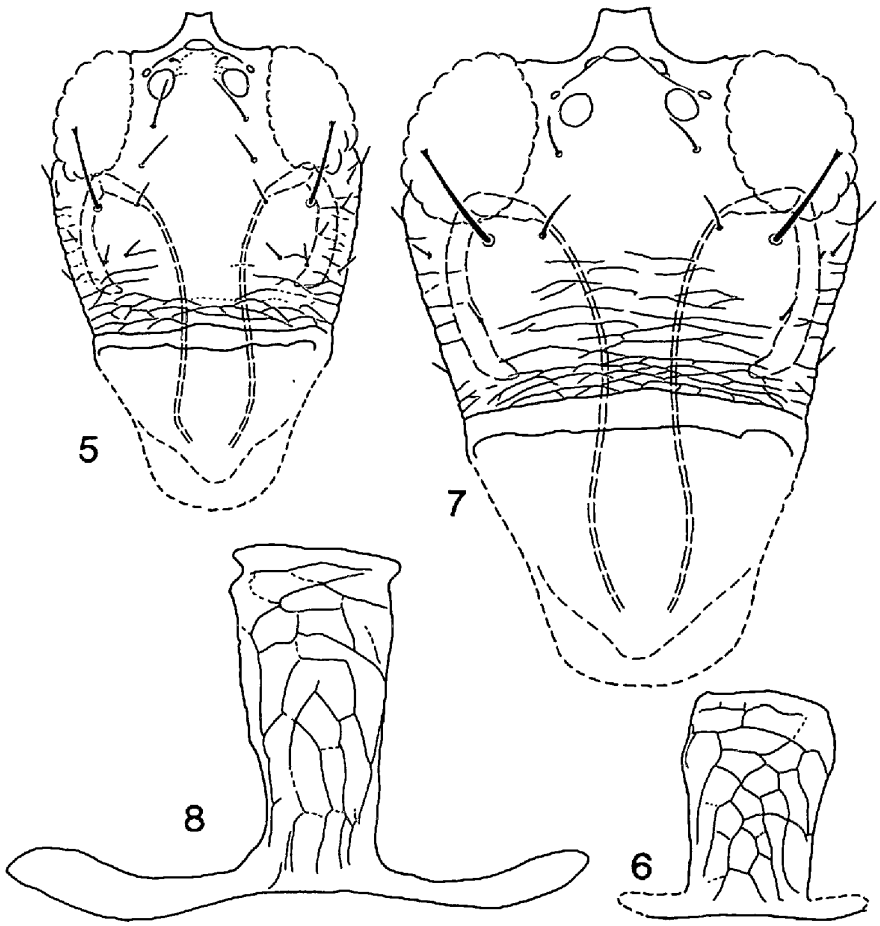
Measurements of holotype (male in μm). Total body length 1,325 (distended). Head length 143, maximum width across cheeks 148, minimum width near base 115; eye length 61, width 40–41. Pronotum median length 96, width 168; forewing length about 552. Pelta length 56, width ?. Abdominal tergites median length (width) as follows: II 63 (188); IV 61 (178); VI 65 (155); VIII 65 (122); IX 61 (86). Tube length 76, basal width 45, apical width 25. Antennal segments I to VIII length (width) as follows: 27 (30); 30 (23); 45 (22); 52 (25); 43 (22); 41 (20); 34 (17); 28 (11).

Length of setae: Postoculars 43–48; postocellars about 25. Prothoracic aa ? (more than 20), am about 20, ml 30–35, pa 41–43, epim 40–43. Metanotal medians 23–24. Subbasals of forewing: B_1 30–32, B_2 about 30, B_3 36–40. B_1 on tergite IX 56–58, B_2 on IX 58–60. Anals 73–76.

Female. Unknown.

Holotype ♂. Indonesia: Bali Is., 6 km NE from Gilimanuk, Cekik, sea level, on dead Palmae fronds, 29–VIII–1984, S. OKAJIMA leg.

Paratype. Indonesia: 1 ♂, collected with holotype.



Figs. 5–6. *Phylladothrips lateralis*, ♂; 5, head; 6, pelta. —— 7–8. *Phylladothrips niger*, ♀; 7, head; 8, pelta.

Comments. This species is somewhat similar to *gracilis*, but it can be distinguished by the following features: Lateral margins of head and pterothorax, antennal segments I and II, and tube brown to dark brown; midfemora tinged with pale brown; forewings shaded with pale brown at basal third and apical fourth; apical portion of aedeagus broad.

Phylladothrips niger sp. nov.

(Figs. 7–8)

Female (macroptera). Colour uniformly dark brown; femora and tibiae with pale extreme apices, tarsi yellowish; antennal segments I, II and VI to VIII dark brown, a little paler than head, segments III to V dark brown with basal third to fourth yellow; forewings shaded with brown; major setae brownish, but wing retaining setae yellowish.

Head (Fig. 7) much broader than long, dorsal surface weakly sculptured in

posterior half; cheeks almost straight, distinctly constricted towards base; postocular setae expanded at apex; postocellar setae a little longer than diameter of ocellus. Eyes 0.43–0.44 times as long as head. Ocelli 18–19 μm in diameter; posterior pair 34–35 μm apart from each other, 19–20 μm apart from anterior one. Antennae about 2.5 times as long as head, segment IV much longer than III. Maxillary guides distinct, with weak maxillary bridge.

Pronotum sculptured posteriorly; am setae short and slender, other major setae expanded at apex. Praepectus weakly present; mesopraesternum incomplete, divided into two lateral triangular plates. Subbasal wing setae well developed, long and expanded at apex.

Pelta (Fig. 8) distinct, with fine reticulation, lateral lobes well developed; tergite VIII with two pairs of wing retaining setae, posterior pair as stout as anterior pair; B_1 setae on tergite IX almost as long as tube or a little shorter, expanded at apex, B_2 almost as long as B_1, weakly expanded at apex. Tube a little shorter than 0.6 times the length of head, about 1.5 times as long as basal width. Anal setae shorter than tube.

Measurements of holotype (female in μm). Total body length 1,950 (distended). Head length 178, maximum width across cheeks 215, minimum width near base 158; eye length 77, width 62–64. Pronotum median length 122, width 255; forewing length 925. Pelta length 86, width 142. Abdominal tergites median length (width) as follows: II 85 (316); IV 96 (362); VI 116 (333); VIII 96 (236); IX 73 (146). Tube length 102, basal width 67, apical width 33. Antennal segments I to VIII length (width) as follows: 37 (40); 45 (30); 66 (32); 81 (30); 67 (28); 56 (26); 41 (20); 36 (13).

Length of setae: Postoculars 55–60; postocellars ? about 25. Prothoracic aa ?35, am about 20, ml 45, pa 58, epim 68–72. Metanotal medians 26–28. Subbasals of forewing: B_1 56–61, B_2 66–68, B_3 68–70. B_1 on tergite IX 97–100, B_2 on IX 100–104. Anals 77–81.

Male (macroptera). Very similar in colour and structure to female. B_2 setae on tergite IX longer than B_1.

Measurements of paratype (male in μm). Total body length 1,590 (distended). Head length 160, maximum width across cheeks 189, minimum width near base 144; eye length 71, width 56–61. Pronotum median length 112, width 224; forewing length 753. Pelta length 76, width 112. Abdominal tergites median length (width) as follows: II 76 (256); IV 76 (254); VI 87 (226); VIII 81 (168); IX 76 (108). Tube length 87, basal width 57, apical width 28. Antennal segments I to VIII length (width) as follows: 35 (35); 42 (26); 57 (29); 67 (28); 57 (26); 55 (23); 41 (19); 36 (11).

Length of setae: Postoculars 53–56; postocellars about 20. Prothoracic aa 30–33, am less than 15, ml 33–36, pa 52–56, epim 50–60. Metanotal medians about 25. Subbasals of forewing: B_1 55–57, B_2 56–57, B_3 56–61. B_1 on tergite IX 72–76, B_2 on IX 78–88. Anals 65–67.

Holotype ♀. West Malaysia: Cameron Highland, Tanah Rata, on dead

leaves, 2–III–1976, W. SUZUKI leg.

Paratypes. West Malaysia: Same locality as holotype, 2 ♀♀ 1 ♂ on dead leaves, 24–VII–1976, S. OKAJIMA leg.; Gnung Jasar, 1 ♀ on dead leaves, 29–V–1983, T. SENOH leg.

Non-paratypical material. West Malaysia: NE 13 km from Tapah, 1 ♀ on dead leaves, 27–VII–1976, S. OKAJIMA leg. Philippines: Luzon, Bicol National Park, 1 ♂ on dead leaves, 12–VIII–1979, S. OKAJIMA leg.

Comments. A non-paratypical male listed above from the Philippines is exceptional small (1,270 μm in body length). It has a broader head and a shorter fourth antennal segment. However, non-paratypical female listed above from West Malaysia has intermediate structure between the type-series and this male. The variations in these specimens may be related to body size.

Phylladothrips pallidus sp. nov.

(Figs. 9–10, 18)

Female (macroptera). Colour largely yellow; anterior margin of head, anterior halves of cheeks and lateral margins of pterothorax tinged with greyish brown; tube dark brown with yellow base; abdominal tergites III to VI each with a median pale brown marking anteriorly; antennal segments I and II greyish brown, segment III yellow, weakly shaded with brown anteriorly, segments IV and V dark brown, with pale bases, segments VI to VIII dark brown; forewings shaded with grey at base and near middle; major setae hyaline.

Head (Fig. 9) a little longer than broad, dorsal surface weakly sculptured laterally; cheeks very weakly rounded, weakly narrowed towards base; postocular setae well developed, a little shorter than eye, expanded at apex; postocellar setae well developed, long and expanded at apex. Eyes more or less shorter than 0.4 times the length of head. Ocelli about 16 μm in diameter; posterior pair 27–28 μm apart from each other, 13–14 μm apart from anterior one. Antennae 2.2–2.3 times as long as head. Maxillary stylets more or less close together medially (10–12 μm apart from each other); maxillary guides weakly developed, bridge undeveloped.

Pronotum very weakly sculptured posteriorly; am reduced, other major setae well developed and expanded at apex; aa almost as long as ml.

Pelta (Fig. 10) weak with slender lateral lobes; tergite VIII with two pairs of wing retaining setae, posterior pair long and slender; B_1 setae on tergite IX expanded at apex, about three-fourths the length of tube, B_2 weakly expanded or blunt at apex, longer than B_1. Tube a little longer than 0.6 times the length of tube, about twice as long as basal width. Anal setae almost as long as tube.

Measurements of holotype (female in μm). Total body length about 2,000 (distended). Head length 190, maximum width across cheeks 178; eye length 68, width 50–51. Pronotum median length 133, width 235; forewing length 806. Pelta length 76, width 118. Abdominal tergites median length (width) as follows:

II 91 (286); IV 107 (306); VI 112 (290); VIII 97 (223); IX 81 (142). Tube length 123, basal width 63, apical width 33. Antennal segments I to VIII length (width) as follows: 46 (40); 42 (48); 62 (31); 72 (31); 62 (30); 57 (25); 40 (21): 40 (14).

Length of setae: Postoculars 64–67; postocellars 49–51. Prothoracic aa 56–61, am 15–18, ml 61–63, pa 71–73, epim 62–66. Metanotal medians 20–25. Subbasals of forewing: B_1 42–44, B_2 50–52, B_3 60–66. B_1 on tergite IX 92–94, B_2 on IX 112–118. Anals 118–122.

Male (macroptera). Very similar in colour and structure to female. B_1 setae on tergite IX longer than B_2; aedeagus slightly widened apically (Fig. 18).

Measurements of paratype (male in μm). Total body length about 1,700 (distended). Head length 173, maximum width across cheeks 163; eye length 66, width 45–46. Pronotum median length 122, width 210; forewing length 678. Pelta length 71, width 95. Abdominal tergites median length (width) as follows: II 76 (240); IV 86 (231); VI 92 (214); VIII 87 (168); IX 91 (110). Tube length 102, basal width 58, apical width 31. Antennal segments I to VIII length (width) as follows: 41 (37); 40 (26); 58 (27); 66 (28); 61 (26); 51 (24); 36 (20); 35 (13).

Length of setae: Postoculars 59–62; postocellars 45–48. Prothoracic aa 51–53, am less than 15, 55–57, pa 60–62, epim 58–60. Metanotal medians less than 20. Subbasals of forewing: B_1 37–40, B_2 45–46, B_3 48–50. B_1 on tergite IX 80–85, B_2 on IX 100–102. Anals 100–102.

Holotype ♀. Taiwan: Pintung Hsien, Kenting National Park, on dead leaves, 19-III-1984, S. OKAJIMA leg.

Paratypes. Taiwan: same locality as holotype, 14 ♀♀ 24 ♂♂ on dead leaves, 2 ♀♀ on grass, 19-III-1984, 7 ♀♀ 10 ♂♂ on dead leaves, 3 ♂♂ on dead branches, 18-III-1984, S. OKAJIMA leg.

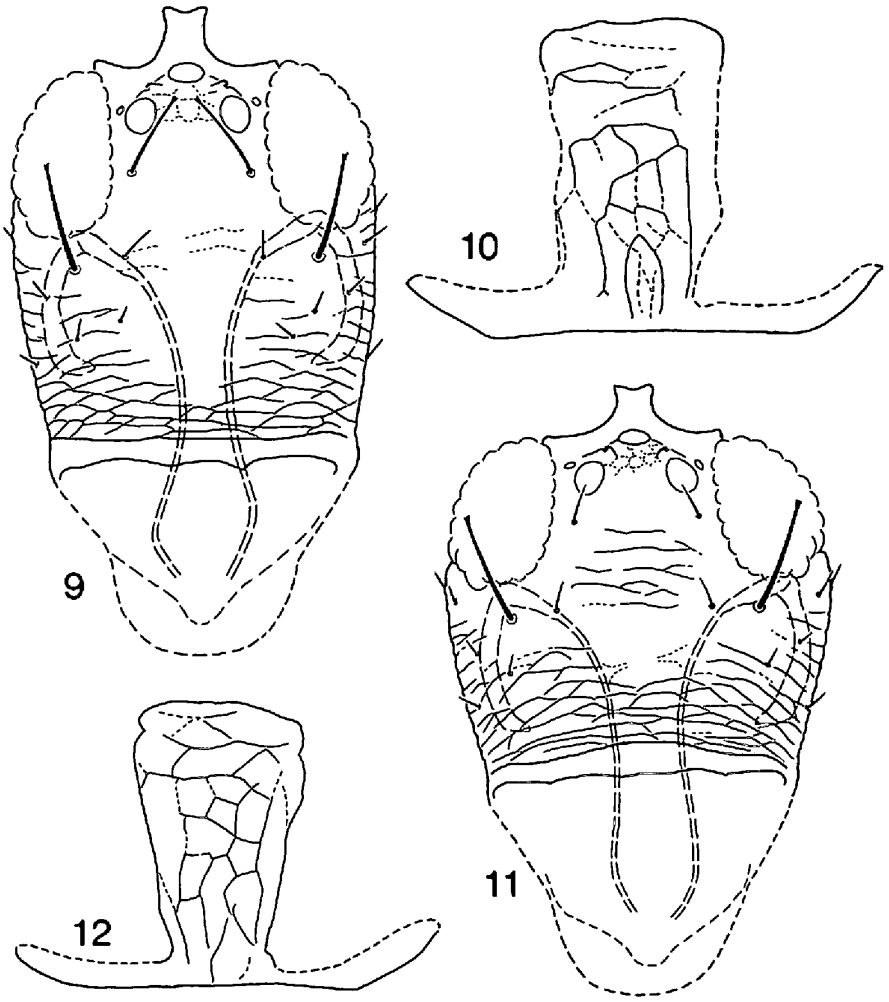
Comments. This species may be related to *bispinosus* from the Philippines. They have similar head proportions and long, expanded postocellar setae. However, it can easily be distinguished by the following features: Colour largely yellow; am setae reduced; aa almost as long as ml; tergite VIII with two pairs of wing retaining setae; maxillary stylets rather close together; antennal segment IV longer than III.

Phylladothrips pictus sp. nov.

(Fig. 11, 12, 19)

Female (macroptera). Colour bicolorous; head, pterothorax and tube brown, but tube with pale extreme base; prothorax, abdominal segments II to IX yellow; abdominal tergites III to VII each with a brown marking anteriorly; antennal segment III yellow, the remaining segments brown, almost concolorous with head; forewings shaded with pale greyish brown basally and distally; major setae yellowish.

Head (Fig. 11) slightly broader than long, dorsal surface generally sculptured with weak reticulation; cheeks weakly rounded, slightly narrowed towards base; postocular setae expanded at apex; postocellar setae a little longer than diameter



Figs. 9–10. *Phylladothrips pallidus*, ♀; 9, head; 10, pelta. —— 11–12. *Phylladothrips pictus*, ♀; 11, head; 12, pelta.

of ocellus. Eyes 0.43–0.44 times as long as head. Ocelli 17–18 μm in diameter; posterior pair 23–24 μm apart from each other 11–12 μm apart from anterior one. Antennae 2.4–2.5 times as long as head. Maxillary guides weak, but with weak maxillary bridge.

Pronotum almost smooth; am short and slender, other major setae well developed, expanded at apex.

Pelta (Fig. 12) with weak lateral lobes; tergite VIII with two pairs of wing retaining setae, posterior pair slender; B_1 setae on tergite IX expanded at apex, about 0.8 times as long as tube, B_2 on IX blunt or very weakly expanded at apex, longer than B_1. Tube 0.67–0.68 times as long as head, about twice as long as basal width. Anal setae a little shorter than tube.

Measurements of holotype (female in μm). Total body length 1,770 (distended). Head length 163, maximum width across cheeks 178, minimum width near base

148; eye length 72, width 50–51. Pronotum median length 113, width 215; forewing length 752. Pelta length 68, width 86. Abdominal tergites median length (width) as follows: II 81 (260); IV 91 (273); VI 92 (255); VIII 82 (199); IX 71 (142). Tube length 107, basal width 54, apical width 28. Antennal segments I to VIII length (width) as follows: 37 (36); 41 (27); 57 (28); 65 (28); 57 (26); 51 (24); 40 (19); 33 (12).

Length of setae: Postoculars 51–55; postocellars about 20. Prothoracic aa 42–45, am about 20, ml 45–47, pa 61–63, epim 56–58. Metanotal medians 24–26. Subbasals of forewing: B_1 36–40, B_2 43–45, B_3 44–50. B_1 on tergite IX 85–86, B_2 on IX 97–103. Anals 90–92.

Male (macroptera). Colour and structure very similar to those of female. B_1 setae on tergite IX longer than B_2; aedeagus slightly widened apically.

Measurements of holotype (female in μm). Total body length 1,590 (distended). Head length 154, maximum width across cheeks 160, minimum width near base 124; eye length 67, width 48–52. Pronotum median length 107, width 194; forewing length 710. Pelta length 66, width ?. Abdominal tergites median length (width) as follows: II 77 (217); IV 76 (209); VI 80 (189); VIII 81 (148); IX 76 (100). Tube length 92, basal width 51, apical width 27. Antennal segments I to VIII length (width) as follows: 35 (34); 37 (25); 54 (26); 62 (26); 55 (24); 50 (21); 40 (19); 33 (12).

Length of setae: Postoculars 50–53; postocellars about 20. Prothoracic aa 38–40, am less than 20, ml 40, pa 61–62, epim 43–50. Metanotal medians 21–23. Subbasals of forewing: B_1 34, B_2 38–41, B_3 40–43. B_1 on tergite IX 72–76, B_2 on IX 85–86. Anals 82–85.

Holotype ♀. Taiwan: Pintung Hsien, Kenting National Park, on dead leaves, 19-III-1984, S. OKAJIMA leg.

Paratypes. Taiwan: Same locality as holotype, 53 ♀♀ 51 ♂♂ on dead leaves, 1 ♀ on grass, 19-III-1984, 48 ♀♀ 28 ♂♂ on dead leaves, 1 ♂ on dead branches, 18-III-1984, S. OKAJIMA leg.; Nantou Hsien, Nanshanchi, 2 ♀♀ 4 ♂♂ on dead branches, 26-VII-1975, 1 ♀ 1 ♂ on dead leaves, 29-VII-1975, 1 ♀ on dead leaves, 29-III-1984, S. OKAJIMA leg.

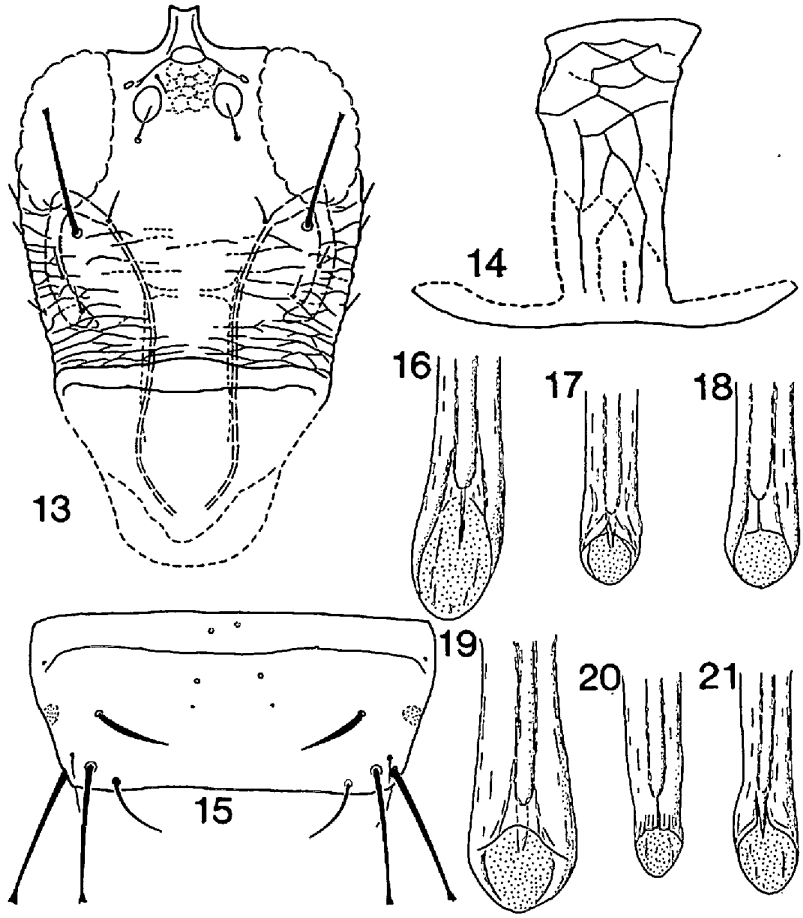
Non-paratypical material. Japan: Amami-oshima Is., Mt. Yuwan, 2 ♀♀ on dead twigs, 23-VII-1974, S. OKAJIMA leg.

Comments. Two non-paratypical females from Amami-oshima Is., Japan, have somewhat longer postocular setae, but all the other structures are very similar to those of the type series. This species is very similar to *similis* described below from the Philippines, and the differences between them are shown in the couplet 7 of the key.

Phylladothrips similis sp. nov.

(Figs. 13–14, 20)

This species is very similar to *pictus*, and is barely distinguished by the coloration and the shape of male genitalia as follows: Abdominal segments IV, V and IX brown, in contrast with yellow segments II and III, segments VI to VIII brown to



Figs. 13–14. *Phylladothrips similis*, ♀; 13, head; 14, pelta. —— 15. Abdominal tergite VIII of *Phylladothrips fasciae*, ♀. —— 16–21. Male aedeagus of *Phylladothrips* spp.; 16, *P. fasciae*; 17, *P. gracilis*; 18, *P. pallidus*; 19, *P. pictus*; 20, *P. similis*; 21, *P.* (?) *similis* from Sulawesi.

brownish yellow, gradually paled posteriorly; midfemora brown, concolorous with pterothorax, with pale apices; apex of male aedeagus slightly narrowed (Fig. 20).

Measurements of holotype (female in μm). Total body length 1,570 (distended). Head length 163, maximum width across cheeks 166, minimum width near base 128; eye length 71, width 48–51. Pronotum median length 104, width 194; forewing length 710. Pelta length 66, width 88. Abdominal tergites median length (width) as follows: II 74 (225); IV 77 (232); VI 78 (208); VIII 75 (169); IX 67 (118). Tube length 92, basal width 53, apical width 26. Antennal segments I to VIII length (width) as follows: 40 (33); 40 (26); 52 (26); 59 (26); 50 (25); 50 (23); 38 (18); 30 (10).

Length of setae: Postoculars 52–54; postocellars 22–23. Prothoracic aa 40, am about 20, ml 45–48, pa 56–60, epim 50–55. Metanotal medians about 20. Subbasals of forewing: B_1 37–40, B_2 43–46, B_3 42–45. B_1 on tergite IX 77–79, B_2

on IX 85–86. Anals 82–86.

Measurements of paratype (male in μm). Total body length about 1,400 (distended). Head length 138, maximum width across cheeks 150, minimum width near base 117; eye length 62, width 45. Pronotum median length 97, width 173; forewing length 668. Pelta length 63, width 82. Abdominal tergites median length (width) as follows: II 66 (189); IV 65 (187); VI 71 (168); VIII 71 (133); IX 70 (91). Tube length 81, basal width 48, apical width 25. Antennal segments I to VIII length (width) as follows: 35 (32); 36 (25); 50 (25); 57 (25); 50 (23); 46 (21); 35 (17); 29 (10).

Length of setae: Postoculars 49–51; postocellars 20–21. Prothoracic aa about 30, am 10–15, ml about 40, pa 50–52, epim 46–48. Metanotal medians about 20. Subbasals of forewing: B_1 35–38, B_2 40–45, B_3 40. B_1 on tergite IX 62, B_2 on IX 68–75. Anals 75–76.

Holotype ♀. Philippines: Mindanao, Mt. Apo, Agko, alt. about 1,300 m, on dead leaves, 1–VIII–1984, S. OKAJIMA leg.

Paratypes. Philippines: Same locality as holotype, 4 ♀♀ 3 ♂♂ on dead branches, 30–VII–1979, 1 ♂ on dead leaves, 2–VIII–1979, 1 ♀ on dead Palmae fronds, 4–VIII–1979, S. OKAJIMA leg.; Mindanao, North Cotabato, Ilomavis, 1 ♀ on dead leaves, 29–VII–1979, S. OKAJIMA leg.

Non-paratypical material. Philippines: Luzon, Queson National Forest Park, 1 ♀, on dead Palmae fronds, 20–VII–1979, S. OKAJIMA leg.; Luzon, Bicol National Park, 1 ♀ on dead leaves, 11–VIII–1979, S. OKAJIMA leg. Indonesia: Central Sulawesi, 31 km W from Palopo, Puncak, alt. about 1,300 m, 1 ♀ 1 ♂ on dead leaves and branches, 19–VIII–1984, S. OKAJIMA leg. Thailand: nr. Chiang Mai, Doi Suthep, alt. about 800 m, 2 ♀♀ 3 ♂♂ on dead leaves, 7–VIII–1976, S. OKAJIMA leg. West Malaysia: Cameron Highland, Tanah Rata, 1 ♀ on dead leaves, 24–VII–1976, S. OKAJIMA leg.

Comments. The non-paratypical material listed above has some differences from the type series. Two females from Luzon, the Philippines, have more or less longer body and the third antennal segments with pale pedicels. A female and a male from Sulawesi, Indonesia, have somewhat longer median setae (B_1) on the ninth abdominal tergite and male aedeagus slightly widened apically (Fig. 21). Two females and three males from Thailand have the prothorax largely brown and the third and fourth antennal segments with pale pedicels. Finally, a female from West Malaysia has the abdomen largely brown.

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