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SOME PANCHAETOTHRIPINAE FROM NEPAL, MALAYSIA AND THE PHILIPPINES [THYSANOPTERA : TEREBRANTIA : THRIPIDAE]

By IWAO KUDÔ

Research Trips for Agricultural and Forest Insects in the Subcontinent of India, Scientific Report No. 50.
Systematic and Ecological Surveys on Some Plant-Parasitic Microarthropods in Southeast Asia, Scientific Report No. 22.

Abstract

KUDÔ, I. 1995. Some Panchaetothripinae from Nepal, Malaysia and the Philippines [Thysanoptera : Terebrantia : Thripidae]. *Ins. matsum. n. s.* 52 : 81-103, 1 tab., 9 figs.

Helionothrips longisensibilis and *Oneilliella pallidizonata* n. spp. are described from Semenanjung Malaysia. The males of three species, *Astrothrips chisinliaoensis, Copidothrips octarticulatus* and *Panchaetothrips stephani*, are described for the first time. New locality records are given for 17 species. Geographic distribution is noted for 47 species occurring in Japan, Southern China, Nepal and Southeast Asia.

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Contents. Introduction — Descriptions and records — Geographic distribution — Acknowledgements — References.

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INTRODUCTION

The present paper is a report on the taxonomic study of the Panchaetothripinae collected by myself in connection with the projects Systematic and ecological surveys on some plant-parasitic microarthropods in Southeast Asia and Research trips for agricultural and forest insects in the Subcontinent of India. The Panchaetothripinae are mostly distributed in the tropics and subtropics, having many peculiar features. Although the present collection covers only about half the species of the subfamily known in Southeast Asia, the collected specimens are valuable because of insufficient information in this area.

About half the specimens of Malaysian species and those of Philippine species, including the holotypes of the new species, will be deposited in Entomology Section, Forest Research Institute of Malaysia (FRIM), Kepong, Selangor, Malaysia, and in Museum of Natural History, University of the Philippines at Los Baños (UPLB), Laguna, the Philippines, respectively. The host plants of Malaysian material, those of Philippine material and those of Nepalese material were identified by Mr. K.M. Kochummen, ex-Botanist, FRIM, by Dr. E.S. Fernando, UPLB, and at the Katmandu Herbarium, respectively. The abbreviations used below are as in Kudô (1984).

DESCRIPTIONS AND RECORDS

Anisopilothrips venustulus

Heliothrips venustulus Priesner 1923: 89-91.

Anisopilothrips venustulus, Stannard and Mitri 1962: 187; Wilson 1975: 32-33; Kudô 1980: 345; Mound and Walker 1987: 79; Kudô 1992c: 471-474.

This species, so far known mainly from the Pacific Islands in the tropics, is newly recorded from Sarawak. It is similar to *Elixothrips brevisetis* but differs in having peculiar paired areas of sculpture on abdominal segments III-VII.

Specimens examined. Semenanjung Malaysia — Kedah: Kuala Munda: Gurun, 1♀ (*Canthium* sp., Rubiaceae), XI.10.1991; Pulau Pinang: Bukit Cendana, 1♀ (*Calophyllum canum*, Guttiferae), XI.18.1991; Selangor: Kepong, 3♀ (*Gomphandra quadrifida*, Icacinaceae), 3♀ (*Microdesmis casearifolia*, Euphorbiaceae), XI.1.1991. Sarawak — Kuching: Reservoir Park, 1♀ (*Ficus benjamina*, Moraceae), X.5.1991.

Astrothrips chisinliaoensis

Chen 1980: 174-175; Chen 1981: 118-119.

This species, so far known only from Taiwan with the female, is newly recorded from Semenanjung Malaysia. Some quantitative characters in the female are as follows: A_3-A_6 L/W 3.54-4.00, 2.00-2.25, 1.38-1.65 and 2.50-3.13 respectively. Metascutellum W/L 3.50-4.46. Fore wing with 28-30 anterior and 53-54 posterior FH; with 13-18 setae on costa, 10-14 on fore vein and 6-10 on hind vein. Hind wing with 68-70 FH. $T_9L/T_{10}L$ 0.76-0.83. B_1-B_3 on T_9 0.53-0.66, 0.47-0.56 and 0.39-0.72 as long as T_9 respectively. B_1 on T_{10} 0.58-0.76 as long as T_{10}. Ovipositor 2.35-2.48 times as long as pronotum.

The male is recorded here for the first time: Abdomen lighter than head and thorax; metascutellum W/L 4.81; B_1 on T_{10} as long as T_{10} (Fig. 1.5); S_6 and S_7 with

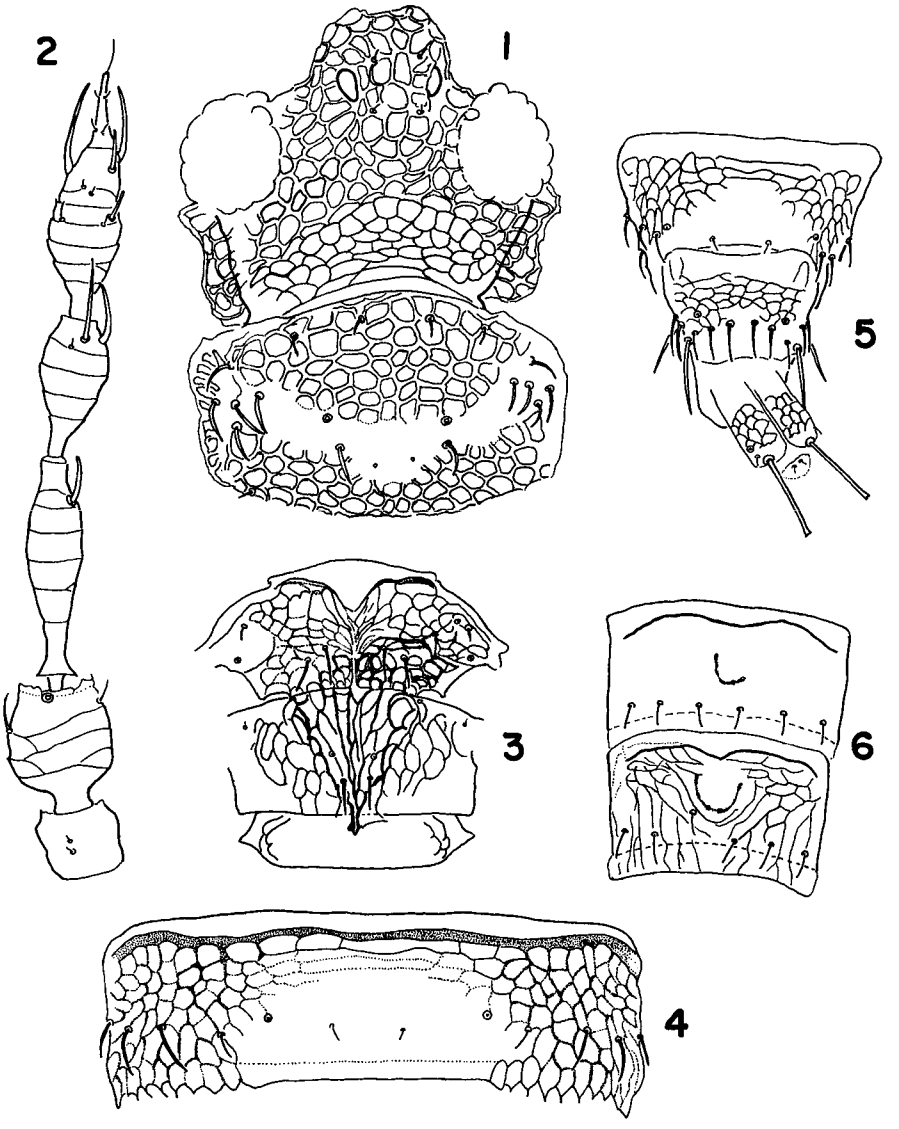

Fig. 1. *Astrothrips chisinliaoensis*. 1, ♀, head and pronotum. 2, ♀, right antenna. 3, ♀, meso- and metanotum. 4, ♀, T_5. 5, ♂, T_8-T_{10}. 6, ♂, S_6 and S_7.

U-shaped glandular area (Fig. 1.6). Body L 0.9 mm.

The Malaysian specimens examined are slightly different from the Taiwanese ones in their smaller size and the abdominal terga (Fig. 14) more clearly polygonally reticulate by sharp striae, while in the Taiwanese specimens the terga are more longitudinally elongately reticulate posteriorly by dull striae.

A. chisinliaoensis differs from the congeners in having a pair of apically expanded setae on T_{10}. This species almost agrees with *A. aucubae* in the head with a strongly elevated ocellar hump (Fig. 1.1), the pronotum with raised sculpture on

posterolateral areas and without a transverse carina close to the posterior margin, and A_4 with an additional sense cone reaching or surpassing the apex of simple primary cone (Fig. 1.2). Besides the expanded setae on T_{10} the following differences are noted: metascutum (Fig. 1.3) without a median longitudinal ridge of sculpture against with the ridge in *A. aucubae* and ovipositor 2.35-2.48 times as long as pronotum against 1.91-2.13 times in *A. aucubae*.

Specimens examined. Semenanjung Malaysia — Kedah: Kuala Munda: Gurun, 4♀ 1♂ (*Carallia brachiata*, Rhizophoraceae), 1♀ (*Canthium* sp., Rubiaceae), XI.10.1991. Taiwan: Puli, 1♀ (*Rhus* sp., Anachardiaceae), 1♀ (dry grass), III.7. 1974.

Astrothrips globiceps

Heliothrips globiceps Karny 1913, Arch. Naturgesch. 79: 125.

Astrothrips globiceps, Karny 1923: 331; Stannard and Mitri 1962: 195-197; Wilson 1975: 49-50; Kudô 1980: 345-346; Reyes 1994: 139-140.

This species is similar to *A. aucubae*, but differs in the pronotum with a transverse ridge of raised sculpture close to posterior margin, the metascutum with a median longitudinal ridge of sculpture indistinct, and the abdominal terga covered with more clearly polygonal reticules. This Oriental species probably feeds on the leaves of various plants.

Specimens examined. Semenanjung Malaysia — Perlis: Anak Chelong: Hutan Bintang, 2♀ (*Calopogonium mucunoides*, Leguminosae), XI.14.1991; Kedah: Kuala Munda: Gurun, 1♀ (grass), XI.10.1991; Selangor: Kuala Lumpur: Kepong, 1♀ (*Hyptis capitata*, Labiatae), VIII.7.1990, 1♀ (*Microdesmis casearifolia*, Euphorbiaceae), XI.1.1991, 1♀ (*Pleocnemia irregularis*, Dryopteridaceae), X.30.1991, 1♀ 1♂ (*Angiopteris evecta*, Marattiaceae), X.31.1991. The Philippines — Palawan: Brooke's Point: Maasin, 1♀ (*Lantana camara*, Verbenaceae), VIII.24.1993; Batarasa: Tagwayan, 1♀ (*Centrosema plumieri*, Leguminosae), VIII.18.1993; Mindoro: Calapan: Suqui, 1♀ (*Dysoxylum decandrum*, Meliaceae), VIII.12.1994.

Astrothrips lantana

Bhatti 1967: 8; Bhatti 1968a: 162-165; Wilson 1975: 50-51.

This species, so far known only from Madya Pradesh, India, is newly recorded from Nepal. The Nepalese specimens have a weak median longitudinal ridge of sculpture on the metascutum. This species differs from *A. aucubae* in the head with an ocellar hump small and the pronotum posterolaterally without raised sculpture.

Specimens examined. Nepal — Bagmati: Ramche (1,800 m), 2♀ (*Quercus* sp.), X.18.1973, Dhunche (2,000 m), 1♀ (unidentified evergreen tree), X.19.1973.

Astrothrips tumiceps

Karny 1923: 331-334; Wilson 1975: 55-56; Reyes 1994: 140-142.

Brevithrips tumiceps, Bhatti 1967: 8; Bhatti 1968a: 174-179.

This polyphagous species has so far been known from India, Burma, Java and the Philippines. It differs from the congeners in having the mesonotum deeply notched anteriorly, and the A_3 and A_4 with sense cones forked in the male and simple in the female.

Specimens examined. The Philippines — Palawan: Batarasa: Tagwayan, 1♀ (*Mallotus glandulosus*, Euphorbiaceae), 2♀ (*Centrosema plumieri*, Leguminosae), VIII.18.1993; Brooke's Point: Maasin, 1♀ (*Lantana camara*, Verbenaceae), VIII.24. 1993; Mindoro: Calapan: Suqui, 9♀ (*Dysoxylum decandrum*, Meliaceae), VIII.12. 1994.

Caliothrips graminicola

Hercothrips graminicola Bagnall and Cameron 1932: 417-419.
Caliothrips graminicola, Faure 1957: 79-88; Wilson 1975: 77-78.

This grass-living species, widely distributed in India, Sri Lanka, Thailand, South Africa and Australia, is newly recorded from Nepal.

Specimens examined. Nepal — Bagmati: Katmandu Valley: Kakani (2,000 m), 3♀ (grass), VIII.30.1983.

Copidothrips octarticulatus

Heliothrips (*Parthenothrips*) *octarticulata* Schmutz 1913: 993-994.
Copidothrips octarticulatus, Bhatti 1990: 222; Kudô 1992c: 478-479.
Copidothrips formousus Hood 1954: 188-191; Mound 1970: 52; Wilson 1975: 100-101; Reyes 1994: 146-147.
Mesostenothrips kraussi Stannard and Mitri 1962: 211-213.

This species, so far known from Seychelles, Sri Lanka and some Pacific Islands, is recorded from the Asian continent for the first time. The eye has six dark facets.

The male is recorded here for the first time: Head and thorax brown, partly yellowish; abdomen generally orange yellow, brown on entire of segments I and II, anterior parts of III-VII, posterior parts of III-VI and X, and median part of IX. T_9 (Fig. 2.1) with a pair of median setae thick, B_1 0.47, B_2 0.87, B_3 2.52 times and B_4 1. 84 times as long as T_9 respectively. S_4-S_7 (Fig. 2.2) each with a large, U-shaped glandular area. Body L 1.2 mm.

Specimens examined. Semenanjung Malaysia — Perlis: Anak Chelong: Hutan Bintang, 2♀ 1♂ (*Calopogonium mucunoides*, Leguminosae), XI.14.1991. The Philippines — Palawan: Puerto Princesa: Canigaran Beach, 7♀ (*Asystacea gigantica*, Avantaceae), VIII.15.1993.

Elixothrips brevisetis

Tryphactothrips brevisetis Bagnall 1919: 257.
Elixothrips brevisetis, Stannard and Mitri 1962: 203-205; Wilson 1975: 111-112; Okajima 1979: 8-10; Kudô 1980: 349; Reyes 1994: 148-149.

This species, mainly known from the Pacific Islands, is newly recorded from Sarawak. It is found on various plants but may breed on ferns, e.g., *Angiopteris evecta*, judging from the collection data in Kepong, Malaysia, and Mt. Makiling and Mt. Halcon, the Philippines. The eye has six dark facets. In the male specimens from Mt. Halcon, Mindoro, abdominal glandular areas show some variations: on S_6 mostly absent, when present small and circular; on S_7 usually U-shaped, medially separated, occasionally L-shaped, short transverse, or small and circular; and on S_8 mostly U-shaped, medially separated but rarely completely (see Kudô 1980: Fig. 9).

Specimens examined. Semenanjung Malaysia — Selangor: Kuala Lumpur: Kepong, 3♀ (*Pleocnemia irregularis*, Dryopteridaceae), VIII.5-23.1990, 25♀ (*An-*

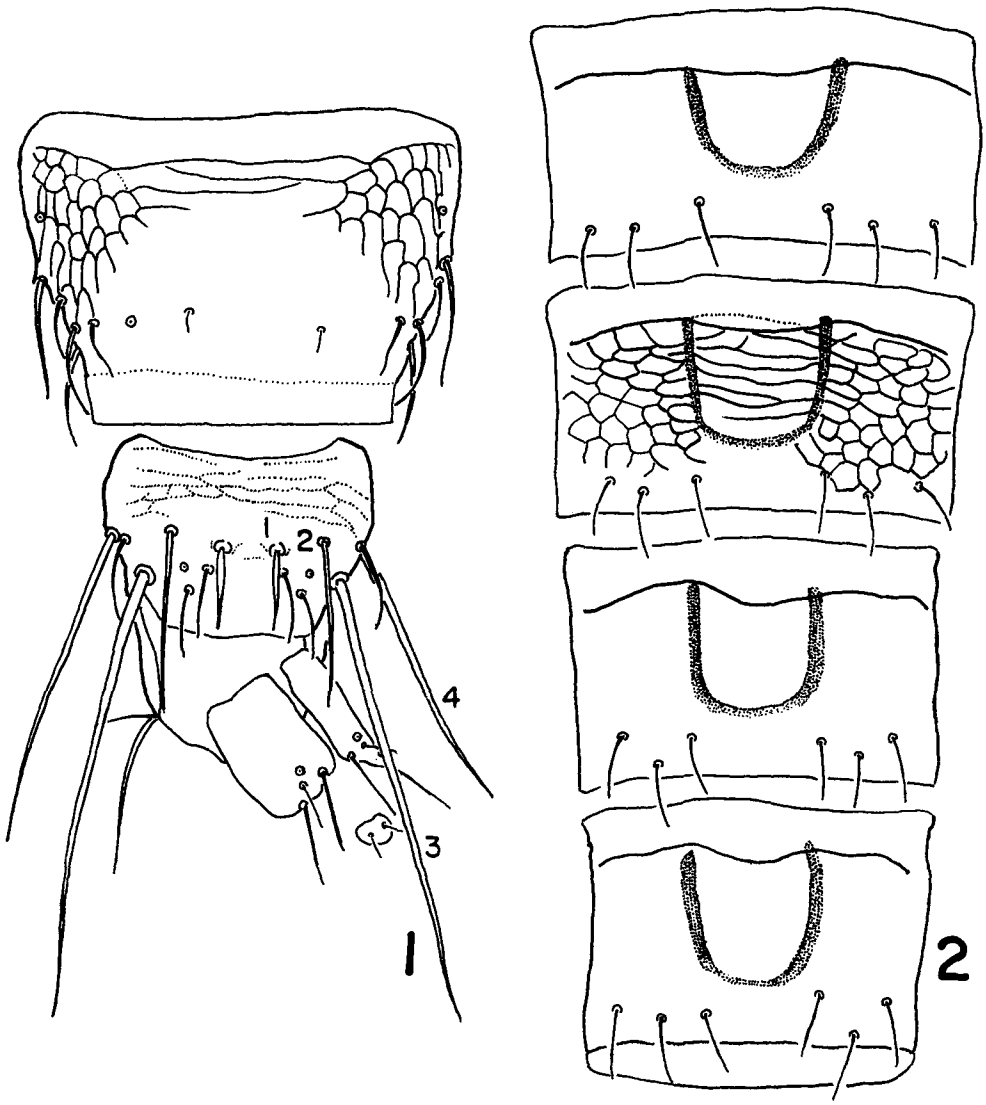

Fig. 2. *Copidothrips ocutarticulatus*, ♂. 1, T_8-T_{10}. 2, S_4-S_7.

giopteris evecta, Marattiaceae), X.31.1991; Pulau Pinang: Bukit Cendana, 1♀ (*Ixonanthes reticulata*, Linaceae), XI.16.1991, Bukit Bendera, 1♀ (grass), XI.19.1991. Sarawak — Kuching: Gunong Serapi, 1♀ (*Lophopetalum* sp., Celastraceae), IX.29. 1991, Taman Negara Bako, 1♀ (*Melastoma malabathricum*, Melastomataceae), X.8. 1991. The Philippines — Luzon: Los Baños: Mt. Makiling (200-650 m), 1♀ (*Mallotus multiglandulosus*, Euphorbiaceae) and 2♀ (*Lagerstremia speciosa*, Lythraceae), VIII.4.1993, 4♀ (*Angiopteris* sp.) and 2♀ (*Acalypha* sp., Euphorbiaceae), VIII.30.1994; Balanga: Mt. Samat, 2♀ (*Lantana camara*, Verbenaceae), VIII.18.1994; Mindoro: Mt. Halcon, 6♀ 7♂ (*Angiopteris* sp.), VIII.14.1994; Palawan: Batarasa:

Tagwayan, 5♀ (*M. multiglandulosus*), VIII.18.1993; Brooke's Point: Maasin, 2♀ (*L. camara*), VIII.24.1993.

Helionothrips aino

Heliothrips aino Ishida 1931: 34-36.

Helionothrips aino, Jacot-Guillarmod 1971, Ann. Cape Prov. Mus. (Nat. Hist.) 7: 260; Wilson 1975: 122-123; Kudô 1992b: 272-275.

Helionothrips antennatus Kurosawa 1968: 15-16, 79-80; Wilson 1975: 122.

Helionothrips compressus Hood 1954: 192-193; Wang 1993: 390.

This species, so far known from Saghalien, Korea, Japan, Taiwan and Southern China, is newly recorded from Nepal. The eye has six dark facets. The Nepalese specimens listed below slightly differ from the Japanese form in the mid and hind tibiae yellow in apical half, in male S_7 and S_8 with a little larger glandular area, and in some quantitative characters, particularly ovipositor L/pronotum L larger, and matascutellum W/L and B_2 on T_9/T_9L smaller (Fig. 3). These differences are here regarded as geographic variations, because the Japanese form is also considerably variable in many quantitative characters (Kudô 1992b: 275). Closer studies are required on various populations in respective areas.

Specimens examined. Nepal — Bagmati: Rasuwa: Thare (1,900 m), 26♀ 30♂ (*Elsholtzia fruticosa*, Labiatae), IX.9.1983.

Helionothrips annosus

Wang 1993: 391-392.

This species was described from five females and one male collected on *Litsea* sp., Lauraceae, by R. Takahashi in Taiwan in 1936, and is newly recorded from the Philippines, Semenanjung Malaysia and Sarawak. It feeds on *Cinnamomum iners*

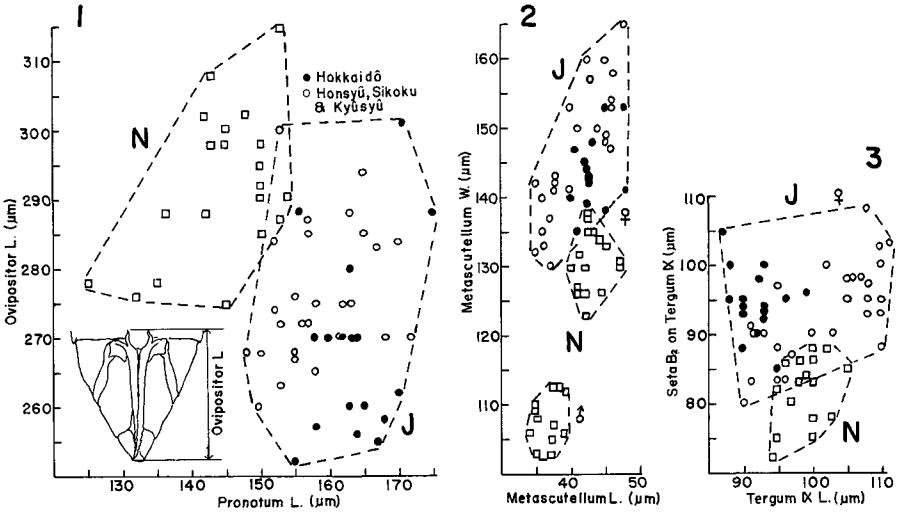

Fig. 3. Differences between the Japanese form (J) and the Nepalese form (N) of *Helionothrips aino* in three ratios. 1, ovipositor length per pronotum length. 3, metascutellum width per metascutellum length. 2, seta B_2 length on T_9 per T_9 medial length.

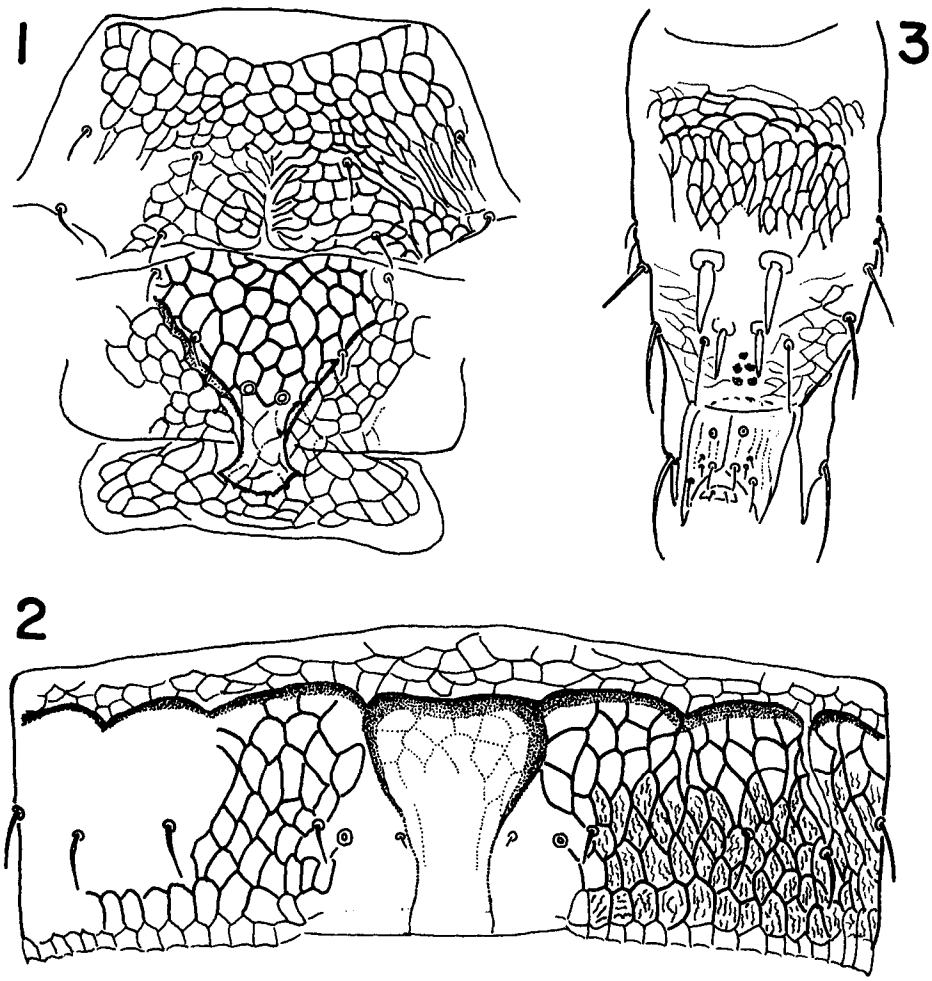

Fig. 4. *Helionothrips annosus*. 1, ♀, meso- and metanotum. 2, ♀, T_5. 3, ♂, T_9 and T_{10}.

and *Litsea* spp., Lauraceae. The eye has no dark facets. The metascutum (Fig. 4. 1) has a raised triangle of sculpoture extending onto the metascutellum. The abdominal terga (Fig. 4.2) are reticulate nearly throughout and have wrinkles in reticules on posterior two-thirds of each tergum. Male T_9 (Fig. 4.3) has two pairs of thick setae.

This species is very distinct in having a complete comb of microtrichia on T_8 and slender abdominal segments IX and X. The Philippine *H. guttatus* Reyes (1994 : 150-153) almost agrees with *H. annosus* in having the above characters, but the original description of *H. guttatus* states that the male has a transversely elongate glandular area on each of S_3 to S_8.

Specimens examined. Semenanjung Malaysia — Selangor : Templer Park, 23 ♀ 12♂ (*Cinnamomum iners*, Lauraceae), VIII.27.1990. Sarawak — Kuching : Reservoir Park, 5♀2♂ (*C. iners*), X.5.1991 ; Bahagian Samarahan : Serian : Ranchan, 1

♀ (dead plant), IX.30.1991. The Philippines — Luzon: Bataan: Bagac, 5♀6♂ (*Litsea* sp., Lauraceae), VIII.22.1994.

Helionothrips cephalicus

Hood 1954: 191-192; Wilson 1975: 126-127; Kudô 1992b: 281-283.

This grass-living species, so far known from Japan, Taiwan and Hongkong, is newly recorded from Nepal and Semenanjung Malaysia. It differs from the congeners in having a large abdominal segment IX and in the head and thorax with many prominent wrinkles in reticules. The eye has six dark facets.

Specimens examined. Nepal — Janakpur: Suri Dhoban (1,100 m), 5♀ (grass), VIII.29.1983. Semenanjung Malaysia — Kedah: Jitra: Bukit Wang, 2♀ (grass), XI.12.1991; Pulau Pinang: Bukit Bendera, 5♀ (grass), XI.19.1991.

Helionothrips longisensibilis n.sp.

Diagnosis. Sense cones extremely long, forked sense cones on A_3 and A_4 more than 2.0 times as long as respective segments. Head and thoracic nota with wrinkles in reticules. Fore wing fasciate, with a cluster of dark and enlarged microtrichia at fork of veins. In male T_9 with 2 pairs of stout setae subequal in length, without wartlets on posteromedian area; S_7 and S_8 with oval glandular area.

Female. Dark brown, extreme anterior margin of head paler. Fore leg brown, mid and hind legs dark brown, extreme apex of mid tibia and apical fourth of hind tibia pale; all tarsi pale. Fore wing (Fig. 5.4) dark brown, paler subbasally and pale subapically. A_1 pale brown, A_2 brown, A_3-basal half of A_6 and all of A_8 pale, apical half of A_6 and all of A_7 pale gray-brown.

Head (Fig. 5.1) W/L 1.8-2.1, with weak wrinkles in reticules; IOD/HOW 1.43-2.00 (mean±SD=1.82±0.17, n=11); OOD/IOD 1.58-1.90 (1.71±0.12, 11); eye without dark facets. Antenna (Fig. 5.2) 2.5-2.9 times as long as head; A_3 L/W 2.17-2.64 (2.30±0.16, 11), subequal to A_4 in length, 1.24-1.49 (1.35±0.08, 11) times as long as A_5, constricted apex wider than the apex of A_4 and subequal in length, forked sense cone extremely long, surpassing apex of A_5, 2.35-2.77 (2.58±0.14, 10) times as long as A_3; A_4 L/W 2.17-2.55 (2.34±0.11, 12), 1.26-1.40 (1.34±0.04, 12) times as long as A_5, forked cone surpassing apex of A_8, 2.50-2.89 (2.68±0.13, 10) times as long as A_4; A_5 L/W 1.95-2.41 (2.21±0.13, 12); A_6 L/W 1.24-1.50, inner sense cone 2.75-3.57 (3.06±0.23, 11) times as long as A_6, reaching far beyond apex of A_8; A_8L/A_7L 2.75-4.00; apical seta on A_8 2.3-3.0 times as long as A_8.

Pronotum (Fig. 5.1) covered by polygonal reticules of uniform size, with weak wrinkles in reticules. Mesonotum and metanotal triangle of sculpture (Fig. 5.3) with internal wrinkles; metascutum with campaniform sensilla placed on posterior sixth to third; metascutellum entirely reticulate, transversely elongate, W/L 3.81-4.67 (4.14±0.23, 12). Fore wing (Fig. 5.4) with a cluster of dark and enlarged microtrichia at fork of veins; with 24-29 (25.6±1.4, 13) anterior and 63-68 (65.1±1.9, 12) posterior FH; with 23-28 (26.1±1.6, 13) setae on costa, 8-9 on fore vein and 5-6 on hind vein. Hind wing with 69-81 (76.3±3.0, 12) FH.

Abdomen with wrinkles in almost all of lateral reticules on T_2-T_8 (Fig. 5.6); T_1 (Fig. 5.5) completely and T_2 almost completely reticulate; antecostal lines on T_3-T_8 divided into broad arches, but not issuing caudad into scallop areas; T_8 with comb

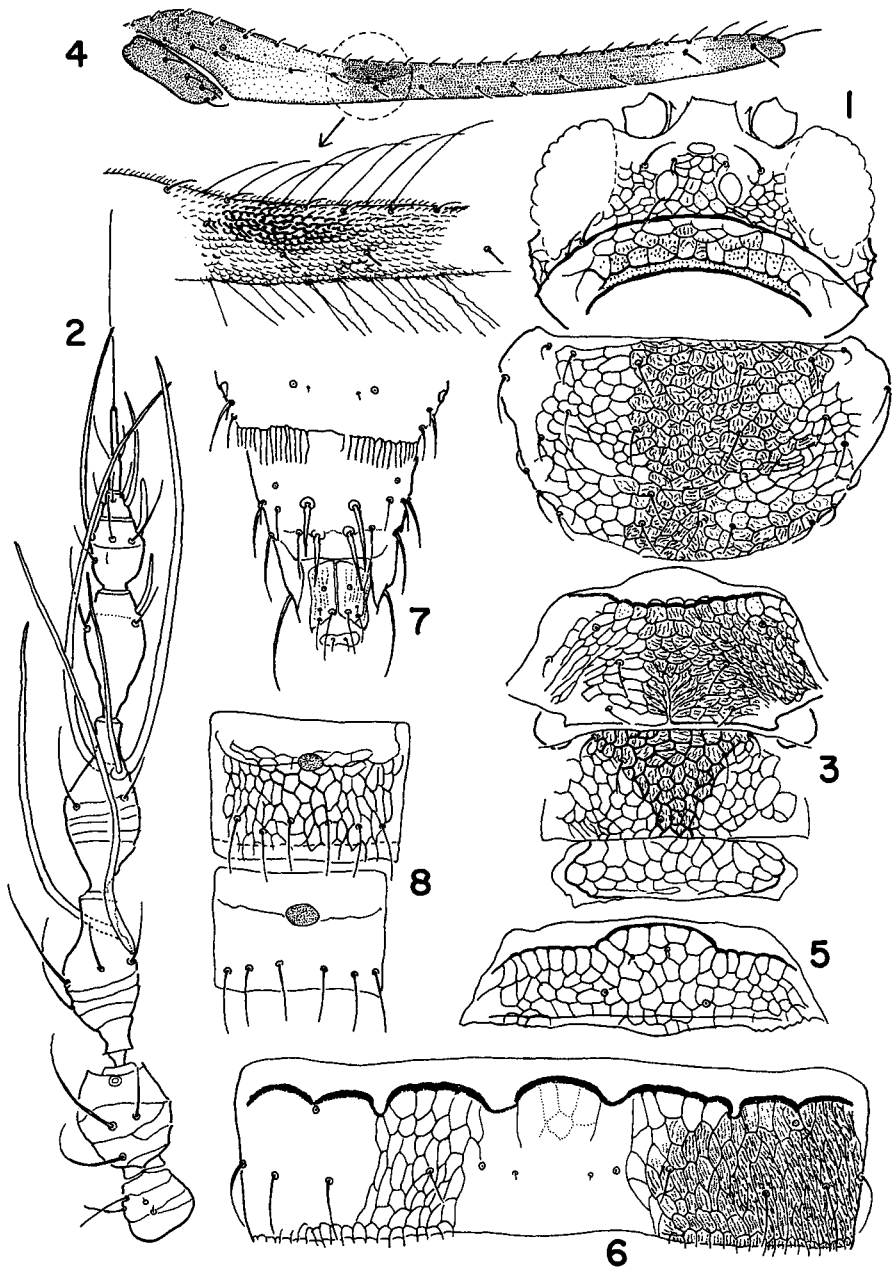

Fig. 5. *Helionothrips longisensibilis*. 1, ♀, head and pronotum. 2, ♀, right antenna. 3, ♀, meso- and metanotum. 4, ♀, fore wing. 5, ♀, T_1. 6, ♀, T_5. 7, ♂, T_8-T_{10}. 8, ♂, S_7 and S_8.

interrupted medially by the distance of combined intervals of 5-7 microtrichia; segments IX and X short and broad, ca 1.8 times and 1.6 times as wide as long respectively; $T_9L/T_{10}L$ 1.75-1.95 (1.88 ± 0.07, 11); B_1 on T_9 0.68-0.86 (0.77 ± 0.05, 11), B_2 0.75-0.89 (0.80 ± 0.04, 11) and B_3 0.53-0.60 (0.56 ± 0.02, 11) as long as T_9 respectively; B_1 on T_{10} 1.10-1.37 (1.23 ± 0.09, 11) times and B_2 1.00-1.21 times as long as T_{10} respectively; ovipositor long, 2.17-2.35 (2.26 ± 0.06, 10) times as long as pronotum.

Measurements (μm). Body L 1.1-1.2 mm. Head L 90-100, W 176-192; pronotum L 98-108; T_9L 70-80; $T_{10}L$ 37-42; B_1 on T_9 50-64, B_2 54-65, B_3 40-44; B_1 on T_{10} 44-54, B_2 40-46; ovipositor L 228-248. Antenna 246-266 in total L; L(W) of antennal segments as follows: A_1 20-22 (22-24), A_2 32-36 (28-29), A_3 52-58 (22-25), A_4 50-56 (22-24), A_5 37-43 (17-19), A_6 21-24 (16-17), A_7 6-8 (8-10), A_8 22-25 (4-5); forked sense cone on A_3 122-150, that on A_4 140-156, inner cone on A_6 62-75.

Male. Colored as in female. A_3-A_6 L/W 2.17-2.41, 2.14-2.27, 2.06-2.38 and 1.13-1.25 respectively; forked sense cone on A_3 2.00-2.28 times, that on A_4 2.38-2.46 times and inner cone on A_6 2.94-3.60 times as long as respective segments. Metascutellum W/L 3.92-4.36. Fore wing with 21-23 anterior and 53-57 posterior FH; with 20-22 setae on costa, 7 on fore vein and 5 on hind vein. Hind wing with 58-63 FH. T_9 (Fig. 5.7) with 2 pairs of stout setae subequal in length, anterior setae (32-34 μm) 0.48-0.56 and the posterior (29-33 μm) 0.45-0.51 as long as T_9 respectively; without chitinous wartlets on posteromedian area. Sterna clearly polygonally reticulate; S_7 and S_8 (Fig. 5.8) with small to medium-sized oval glandular area, that on S_7 smaller. Body L 0.9-1.0 mm.

Specimens examined. Semenanjung Malaysia — Johor: Kota Tinggi: Desaru, holotype ♀, 11♀ and 4♂ (*Neolitsea zeylanica*, Lauraceae), VIII.19.1990.

Remarks. This species is very distinct from other congeners by extremely elongate sense cones on the antenna and other characters given above.

Helionothrips parvus

Bhatti 1968b: 36-39; Wilson 1975: 135-136.

This grass-living species, so far known only from Uttar Pradesh, India, is newly recorded from Nepal. Some quantitative characters in the female are as follows: IOD/HOW 2.00-3.33, OOD/IOD 2.25-2.80. A_3-A_6 L/W 2.36-2.71, 1.82-2.09, 1.65-1.79 and 1.37-1.58 respectively; forked sense cone on A_3 0.65-0.79, that on A_4 1.16-1.29 times and inner cone on A_6 1.93-2.31 times as long as respective segments. Metascutellum W/L 2.78-3.03 (2.88 ± 0.09, 11). Fore wing with 23-29 (25.7 ± 2.1, 13) anterior and 48-58 (52.1 ± 2.8, 10) posterior FH; with 22-27 (23.6 ± 1.4, 13) setae on costa, 7-9 (7.8 ± 0.7, 15) on fore vein and 4-6 (4.5 ± 0.7, 13) on hind vein. Hind wing with 62-69 FH. $T_9L/T_{10}L$ 1.54-1.77 (1.66 ± 0.06, 11). B_1 on T_9 0.74-0.81 (0.77 ± 0.02, 11), B_2 0.73-0.85 (0.79 ± 0.04, 11) and B_3 0.50-0.58 (0.55 ± 0.03, 11) as long as T_9 respectively. B_1 on T_{10} 0.93-1.12 (1.06 ± 0.05, 11) times and B_2 0.92-1.05 times as long as T_{10} respectively. Ovipositor 1.96-2.19 (2.09 ± 0.10, 11) times as long as pronotum.

Specimens examined. Nepal — Bagmati: Katmandu Valley: Godavari (1,700 m), 7♀ (grass), VIII.14.1983; Balaju (1,500 m), 3♀ (grass), VII.23.1983; Rasuwa: Dhunche (2,200 m), 2♀ (grass), IX.10.1983.

Heliothrips haemorrhoidalis

Thrips haemorrhoidalis Bouché 1833, Naturg. Schädl. Nützl. Gart.-Ins.: 42.
Heliothrips haemorrhoidalis, Burmeister 1838, Handbuch der Entomologie 2: 412.

This widely distributed and highly polyphagous species is newly recorded from Nepal and Sarawak.

Specimens examined. Nepal — Katmandu Valley: Kakani (2,000 m), 1♀ (grass), VIII.30.1983; Bagmati: Ramche (1,800 m), 3♀ (*Quercus* sp., Fagaceae), X.18. 1983. Semenanjung Malaysia — Kedah: Kuala Munda: Gunong Jerai (700 m), 3♀ (*Strychnos* sp., Loganiaceae), XI.8.1991; Pahang: Kuala Rompin: Hutan Mencali, 3 ♀ (*Pentaphylax euryoides*, Pentaphylaceae), VIII.17.1990; Selangor: Kepong, 4♀ (*Ficus uniglandulosa*, Moraceae), VIII.7.1990. Sarawak — Kuching: Gunong Serapi, 8♀ (*Alstonia angustiloba*, Apocynaceae), IX.29.1991; Taman Negara Bako, 6♀ (*Pongamia pinnata*, Leguminosae), X.15.1991. The Philippines — Luzon: Los Baños: Mt. Makiling, 1♀ (*Celtis luzonica*, Ulmaceae), VIII.4.1993; Palawan: Puerto Princesa: White Beach, 1♀ (*Garcinia tetrandra*, Guttiferae), VIII.14.1993.

Oneilliella pallidizonata n. sp.

Diagnosis. Abdominal segment II pale. Legs yellow except for basal two-thirds of mid femur dark brown. A_1-A_5 pale yellow. Fore wing with submedian and apical pale patches along with a subbasal pale area. T_2-T_8 smooth on median half.

Female. Dark brown (Fig. 6.1); head yellowish anterior of fore ocellus and between antennal bases; abdominal segment I pale, brownish medially, II entirely pale; segments VIII-X paler. Antenna yellow, A_6 brown, A_7 and A_8 pale brown or gray. Legs yellow, coxae and basal two-thirds of mid femur dark brown. Fore wing brown, with three pale areas large and almost hyaline, submedian and apical pale areas slightly tinged with brown; wing setae white on pale areas, brown on dark areas.

Head (Fig. 6.2) W/L 1.57-1.70; polygonally reticulate, the reticules with weak longitudinal wrinkles except posteromedian ones with minute dots; hind ocelli large, IOD/HOW 1.14-1.33; OOD/IOD 3.13-3.50; eye without dark facets. Antenna (Fig. 6.3) 2.6-2.9 times as long as head; A_3 longest, L/W 3.11-3.53, constricted apex much shorter than median swollen part, and shorter and wider than the apex of A_4; A_4L/W 2.35-2.53, simple sense cone surpassing apex of forked cone and 1.28-1.39 times as long as A_4; A_5 L/W 2.10-2.56; A_6 pedicellate, L/W 1.88-2.06, inner sense cone surpassing apex of A_8 and 2.00-2.31 times as long as A_6; A_7 L/W 1.60-1.86; A_8 L/W 6.2-8.0; A_8L/A_7L 2.3-3.2; apical seta on A_8 1.63-1.86 times as long as A_8; A_4 with 2-3 dorsal and 3 ventral rows of microtrichia, A_5 with 3-4 rows, A_6 with 1-2 dorsal and 2-3 ventral rows.

Pronotum (Fig. 6.2) polygonally reticulate, with weak longitudinal wrinkles in reticules, with about 15 reticules on longitudinal middle line and on transverse middle respectively; with 26-29 setae in all. Mesonotum with weak transverse wrinkles in reticules; metanotum (Fig. 6.4) entirely polygonally reticulate, scutum with weak longitudinal wrinkles in reticules, a pair of campaniform sensilla close together at middle; scutellum W/L 3.70-4.17, without internal wrinkles. Mesosternum with about 28 setae, metasternum with 12-14. Fore wing with 20-21 anterior

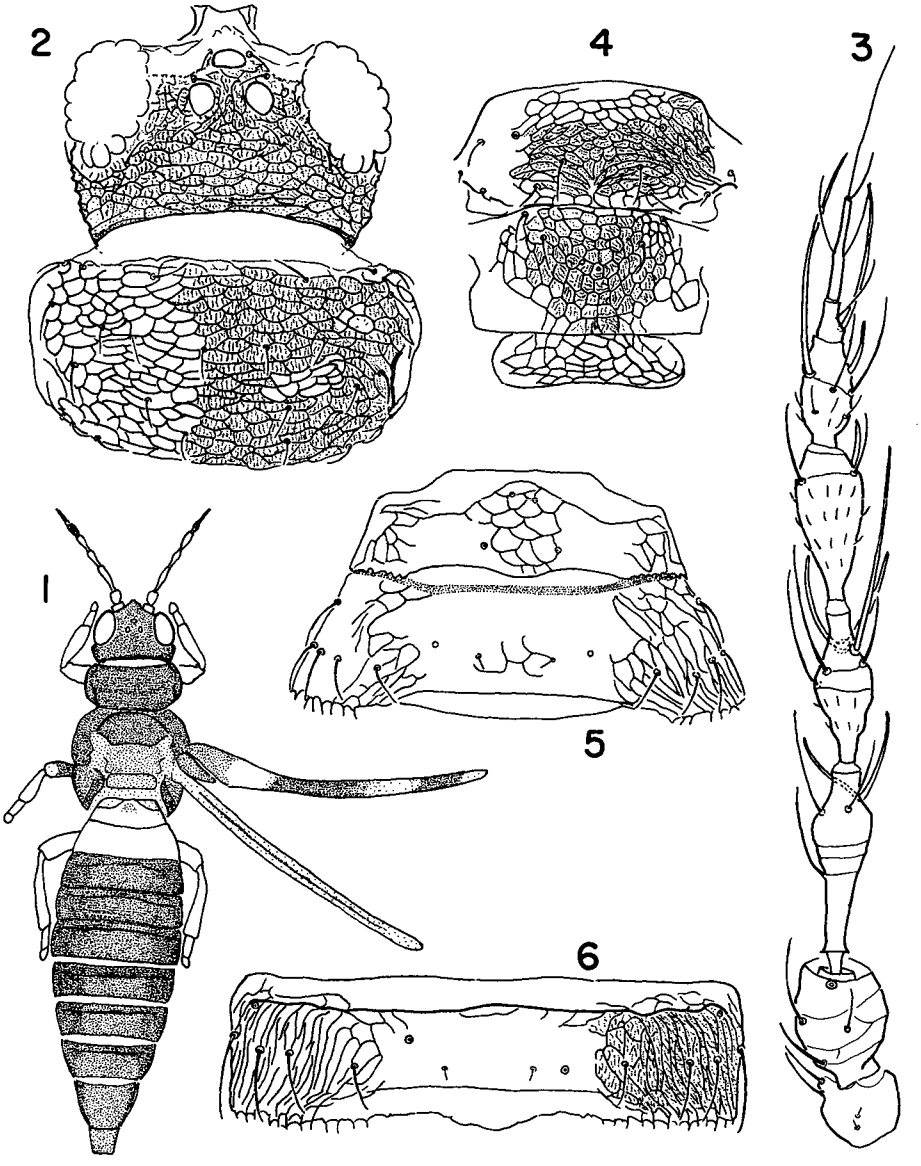

Fig. 6. *Oneilliella pallidizonata*, ♀. 1, total view showing color pattern. 2, head and pronotum. 2, right antenna. 4, meso- and metanotum. 5, T_1 and T_2. 6, T_5.

and 50-55 posterior FH ; with 19-21 setae on costa, the seta at middle of wing 0.95-1.07 times as long as wing W at middle ; with 7-8 basal and 2 apical setae on fore vein, and 5-8 on hind vein. Hind wing with 60-63 FH.

Abdominal terga unsculptured at about median half ; T_1 (Fig. 6.5) with about 13 reticules, with weak wrinkles in some posterior reticules ; T_2 with some incomplete reticules between B_1, with longitudinal reticules on sides, without internal wrinkles ;

T_3-T_8 (Fig. 6.6) longitudinally striate on sides, with numerous weak internal wrinkles; T_8 with comb of long microtrichia interrupted at median third of posterior margin; T_9 with weakly transverse and broken striae; T_{10} with a few weak striae; $T_9L/T_{10}L$ 1.57-1.76; B_1-B_3 on T_9 0.73-0.78, 0.95-1.02 and 0.68-0.75 as long as T_9 respectively; B_1 and B_2 on T_{10} subequal, 0.93-1.02 as long as T_{10}. Sterna with transverse and partly anastomosing striae, with B_3 anterior to B_1 and B_2; S_7 with 2 pairs of small setae between B_1 and B_2 at posterior margin; ovipositor 2.32-2.50

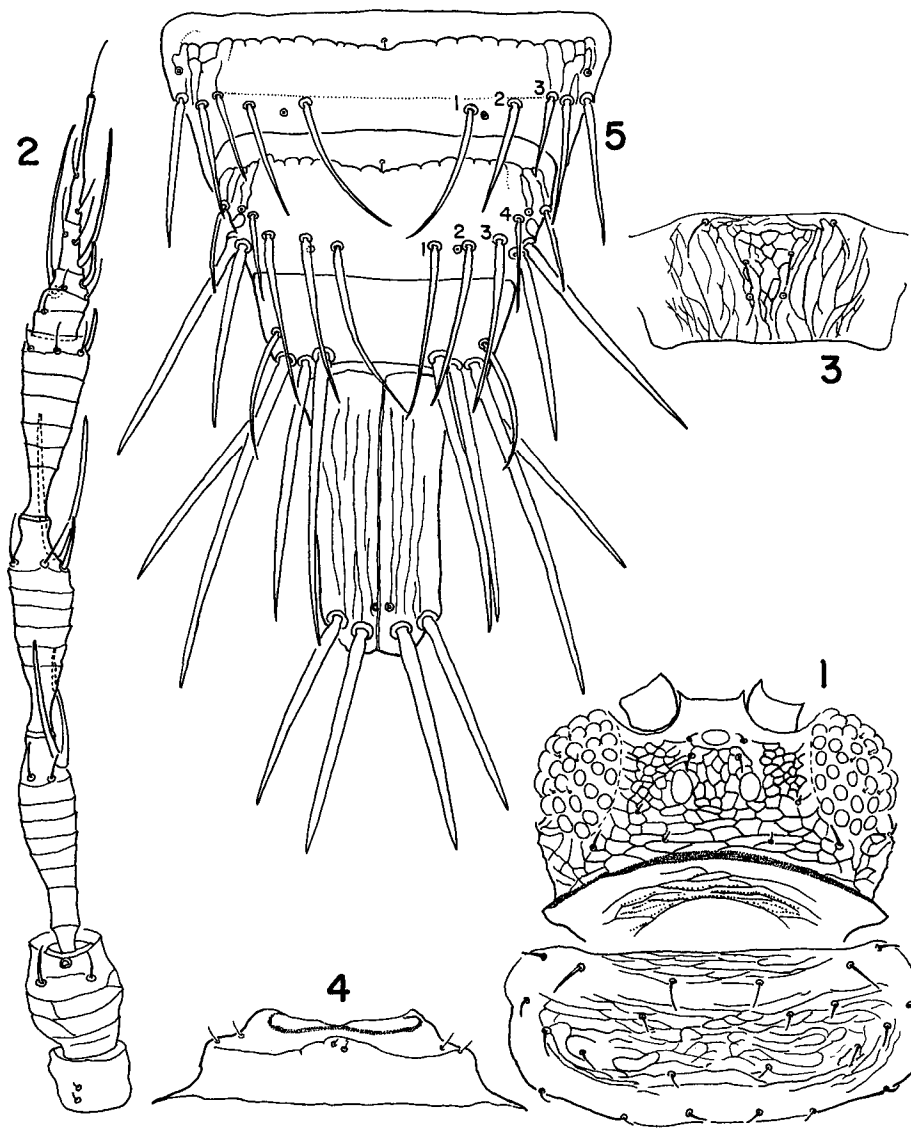

Fig. 7. *Panchaetothrips holtmanni*, ♀. 1, head and pronotum. 2, right antenna. 3, metascutum. 4, T_1. 5, T_7-T_{10}.

times as long as pronotum.

Male. Unknown.

Specimens examined. Semenanjung Malaysia — Pahang: Kuantan: Tasik Cini, holotype ♀ and 6♀ (*Selaginella* sp., Selaginellaceae), VIII.13.1990.

Remarks. This is a second species of the genus, feeding on fern, and easily distinguishable from the Trinidadian *O. williamsi* by the characters given above. In *O. williamsi*, the body is entirely blackish brown including legs except for extreme apex of tibiae and tarsi pale, basal two-thirds of A_3 and median half of A_4 are brown, the fore wing has a subbasal pale patch only, the T_2 is completely covered with polygonal reticules, and the T_3 to T_8 are smooth on posteromedian half.

Panchaetothrips holtmanni

Wilson 1975: 186-188; zur Straseen 1992: 119.

Some additional female characters are as follows: Head (Fig. 7.1) entirely polygonally reticulate except on occipital collar; IOD/HOW 2.40-3.00, OOD/IOD 1.85-2.00; eye without dark facets. Antenna (Fig. 7.2) with forked sense cones on A_3 and A_4, those about 0.6-0.7 as long as respective segments; A_3-A_6 L/W 3.76-3.77, 3.35-3.56, 2.70-2.83 and 1.40-1.43 respectively. Pronotum with 21-22 setae. Metascutum (Fig. 7.3) with median setae and campaniform sensilla widely spaced; the setae situated nearly at anterior third and the setal alveoli separated by 4-5 times their diameter; the sensilla situated nearly at posterior third and separated by 3-4 times their own diameter; metascutellum W/L ca 2.5. Fore wing with 19-21 anterior and 52-58 posterior FH; with 15-16 setae on costa and 10 on fore vein. T_1 (Fig. 7.4) with a pair of median setae nearly contiguous. B_3 on T_7 (Fig. 7.5) 0.68-0.80 as long as B_2; B_4 on T_8 0.53-0.62 as long as B_3; $T_{10}L/T_9L$ 3.24-3.37; B_1 on T_9 3.56-3.76 times, B_2 3.15-3.18 times and B_3 4.15-4.16 times as long as T_9 respectively; B_1 on T_{10} 0.78-0.88 and B_2 0.73-0.79 as long as T_{10} respectively. Ovipositor 3.36-3.76 times as long as pronotum.

Measurements (μm). Body L 1.1-1.2 mm. Head L 108-110, W 172-174; pronotum L 72-84, W 200; fore wing L 595-610, longest costal seta 92-96; T_9 L 50-54, T_{10} L 162-182; B_1 on T_9 188-192, B_2 159-170, B_3 208-224; B_1 on T_{10} 140-144, B_2 122-132; ovipositor L 278-282. L(W) of antennal segments: A_3 64-66 (17-18), A_4 57-64 (17-18), A_5 51-54 (18-20), A_6 20-21 (14-15), A_7 13-14 (6-8), A_8 36-38 (4-5).

This species, so far known from New Guinea and the Krakatau Islands, is newly recorded from Sarawak and Semenanjung Malaysia. *P. holtmanni* differs from *P. kikiri* and *P. stephani* in the following characters: larger IOD/HOW; smaller OOD/IOD; eye with small facets widely separated; shorter forked sense cones on A_3 and A_4; metascutal campaniform sensilla widely separated; larger setae B_3 on T_7 and B_4 on T_8, and shorter setae on T_9 and T_{10}. Although there is no seta nearly midway between each eye and hind ocellus in the three Indonesian specimens examined by zur Strassen (1992), in the two Malaysian specimens there is a minute seta as mentioned in the original description.

Specimens examined. Semenanjung Malaysia — Selangor: Kuala Lumpur: Kepong, 1♀ (*Vitex gamosepala*, Verbenaceae), X.30.1991. Sarawak — Bahagian Samarahan: Serian: Ranchan, 1♀ (*Sterculia* sp., Sterculiaceae), IX.30.1991.

Panchaetothrips kikiri

Kudô 1992a : 117-119.

This species was described from two females collected in Japan and Nepal. The eye has no dark facets. Two errors in the original description should be corrected as follows : 1) Indistinct campaniform sensilla probably present just in front of inner apical setae on T_{10} in the holotype but absent in the Nepalese specimen, and 2) antecostal lines on T_3-T_8 with some posteriorly directed notches, especially on T_7 and T_8 as shown in Fig. 3.6, Kudô 1992a.

This species is similar to the Philippine *P. stephani* in the long forked sense cones on A_3 and A_4, the head with a small seta nearly midway between each eye and hind ocellus, IOS just placed within ocellar triangle, median metascutal setae nearly at anterior third, metascutal sensilla usually closely placed, smaller B_3 on T_7 and B_4 on T_8, and antecostal lines on T_3-T_8 with some posteriorly directed notches. Differences between the two species are as follows. 1) In *P. kikiri*, head with transversely elongate reticules on posterior half against entirely with polygonal reticules except on occipital collar in *P. stephani*. 2) Metascutal campaniform sensilla very close to the posterior margin against placed at posterior third of the scutum. 3) Metascutellum less than 2.1 times as wide as long against more than 2.6 times. 4) Median minute setae on T_1 very closely placed, their alveoli being almost contiguous against widely separated by about 4-10 times the alveolus diameter. 5) B_1 on T_2 shorter than half the length of B_2 against longer than half the length of B_2. 6) B_1-B_3 on T_9 longer, being 4.6-5.1 times, 5.5-5.7 times and 5.6-5.8 times as long as T_9 respectively against 3.9-4.4 times, 4.0-4.4 times and 4.7-5.2 times as long as T_9 respectively.

Specimens examined. Japan — Kagosima : Sata : Ôdomari, holotype♀ (dry leaf), X.8.1978. Nepal — Narayani : Chitwan National Park, 1♀ (dead plant) VII. 24.1983.

Panchaetothrips stephani

Reyes 1994 : 160-162.

This Philippine species differs from *P. holtmanni* in its large size, widely separated median setae on the T_1, and the characters mentioned under the latter species. Some additional characters are as follows.

Female. Head (Fig. 8.1) entirely polygonally reticulate except on occipital collar ; with a small seta nearly midway between each eye and hind ocellus ; IOS placed within ocellar triangle ; IOD/HOW 1.25-1.75 ; OOD/IOD 2.29-2.67 ; eye without dark facets. Forked sense cone on A_3 reaching the base of simple cone on A_4, that on A_4 reaching the base to middle of A_6 ; A_3-A_6 L/W 3.28-3.63, 3.65-4.00, 3.10-3.40 and 1.76-1.88 respectively. Pronotum with 21-27 setae. Metascutum (Fig. 8.2) with median setae at anterior third, and with campaniform sensilla at posterior third, usually separated by twice their own diameter but occasionally contiguous or more widely separated by 5-6 times the diameter ; metascutellum W/L 2.67-3.26. Fore wing with 22-26 anterior and 68-80 posterior FH, with 16-19 setae on costa and 9-12 on fore vein. Hind wing with 84-90 FH. Antecostal lines on T_3-T_8 with some weak and posteriorly directed notches. Median minute setae on T_1 (Fig. 8.3) more widely separated by 4-10 times their alveolus diameter ; B_1 on T_2 0.61-0.78 as long

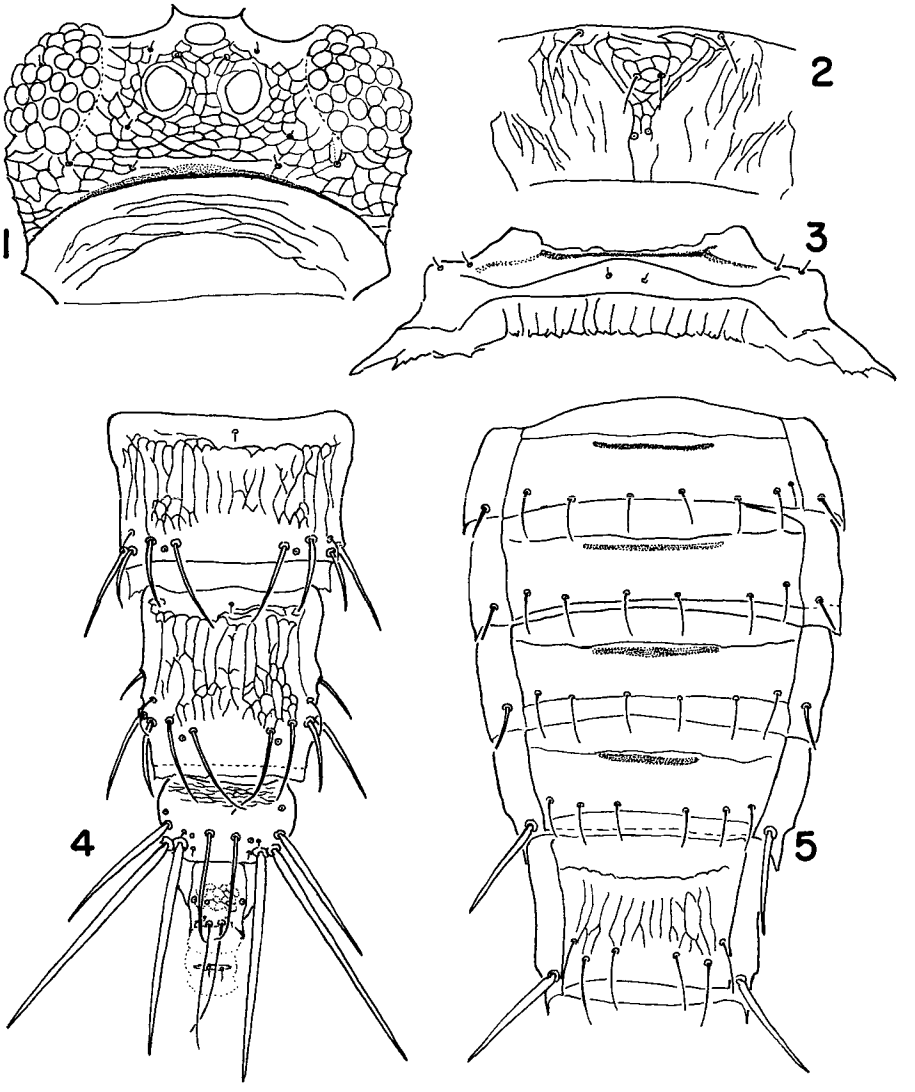

Fig. 8. *Panchaetothrips stephani*. 1, ♀, head. 2, ♀, metascutum. 3, ♀, T_1. 4, ♂, T_7-T_{10}. 5, ♂, S_4-S_8.

as B_2 ; B_3 on T_7 0.44-0.65 as long as B_2 ; B_4 on T_8 0.35-0.42 as long as B_3 ; $T_{10}L/T_9$ L 3.56-4.21 ; B_1 on T_9 3.88-4.41 times, B_2 4.03-4.41 times and B_3 4.69-5.18 times as long as T_9 respectively ; B_1 and B_2 on T_{10} subequal, 0.85-1.03 times as long as T_{10} ; ovipositor 3.29-3.47 times as long as pronotum.

Male. Head and thorax brown, abdomen dull orange yellow. IOD/HOW 1.00-1.22 ; OOD/IOD 2.82-3.00. Pronotum with 23-28 setae. T_7 and T_8 (Fig. 8.4) medially with longitudinal striae, reticules in part ; B_1 on T_9 1.30-1.34 times, B_2 2.63-3.13 times, B_3 1.80-2.03 times and B_4 3.12-3.30 times as long as T_9 respectively ; T_{10}

reticulate, undivided longitudinally, with a pair of long apical setae (114-130 μm). S_3-S_6 (Fig. 8.5) with a transverse and linear glandular area. Body L 1.4-1.6 mm.

Specimens examined. The Philippines — Mindoro: Puerto Galera: Villaflor, 1 ♀ (*Scaevola seriaca*, Goodeniaceae), VIII.13.1994; Palawan: Puerto Princesa: Katduang, 8♀3♂ (*Clerodendrum* sp., Verbenaceae), VIII.13.1993.

Phibalothrips peringueyi

Reticulothrips peringueyi Faure 1925: 145-150.

Phibalothrips peringueyi, Jacot-Guillarmod 1937: 10; Wilson 1875: 197-198; Kudô 1980: 350-351; Kudô 1992a: 120-122; Reyes 1994: 163-164.

This grass-living species, so far known from South Africa, India, Sri Lanka, Thailand, Southern China, Java, the Philippines, Taiwan and Japan, is newly recorded from Nepal, Semenanjung Malaysia and Sarawak.

Specimens examined. Nepal — Janakpur: Malepu (1,000 m), 2♀4♂ (grass) and Suri Dhoban (1,100 m), 6♀ (grass), VIII.29.1983. Semenanjung Malaysia — Kedah: Jitra: Bukit Wang, 3♀ (*Selaginella* sp., Selaginellaceae), XI.12.1991; Pahang: Kuantan, 2♀ (grass), VIII.15.1990; Pulau Pinang: Telok Bahan, 2♀5♂ (*Ischaemum muticum*, Gramineae), XI.20.1991; Selangor: Kepong, 1♀ (*Sonerila heterostemon*, Melastomataceae), XI.1.1991; Johor: Kota Tinggi: Desaru, 4♀1♂ (grass), VIII.18.1990. Sarawak — Kuching: Matang, 2♀ (*Ischaemum* sp.), X.21.1991. The Philippines — Palawan: Puerto Princesa: White Beach, 1♀2♂ (grass), VIII.14.1993.

Phibalothrips rugosus

Kudô 1980: 351-353.

This species, so far known only from Kuala Lumpur, Semenanjung Malaysia, is newly recorded from Sarawak by a second female.

Specimen examined. Sarawak — Kuching: Matang, 1♀ (*Pternandra* sp., Melastomataceae), X. 21.1991

Retithrips javanicus

Karny 1923: 364-367; Wilson 1975: 213-214; Kudô 1980: 353; Reyes 1994: 165-166.

This species has so far been known from Burma, Java, the Krakatau Islands and the Philippines. It has been reported to be rare in the former three localities but is probably common in Luzon (Reyes 1994). This species is probably polyphagous.

Specimens examined. The Philippines — Luzon: Manila: Quezon, 6♀4♂ (*Terminalia catappa*, Combretaceae), VIII. 29. 1993.

Rhipiphorothrips concoloratus

Zhang and Tong 1993: 52-53.

This species, so far known only from Yunnan, China, is newly recorded from Semenanjung Malaysia. The Malaysian specimens were compared with a female and a male paratype. Although the original description stated that a pair of posterolateral setae on male T_9 are pointed apically, their tips are distinctly expanded. In the male paratype the setae look pointed because they are oriented laterally.

The eye has no dark facets.

R. concoloratus and the African *R. africanus* and *R. miemsae* are similar, being separated from one another only by minor differences as summarized below based on the descriptions and figures of the two African species (Jacot-Guillarmod 1937, Priesner 1939 and Wilson 1975).

R. concoloratus: Brown, abdomen slightly paler; fore wing with scale brown; fore and mid legs brown, hind leg yellow with apical half of tibia brownish; sense cones on A_3 and A_4 with stalked base short and indistinct; T_1 nearly completely sculptured but indistinctly at submiddle.

R. africanus: Dark brown; fore wing with scale pale; all tibiae yellow at apical third; sense cones on A_3 and A_4 with stalked base short and indistinct; T_1 completely reticulate.

R. miemsae: Head and thorax brown, metanotum, abdomen and all legs yellow; fore wing with scale brown; sense cones on A_3 and A_4 with stalked base long and distinct; T_1 largely smooth.

Specimens examined. Semenanjung Malaysia — Pulau Pinang: Bukit Cendana, 2♀1♂ (*Ixonanthes reticulata*, Linaceae), XI.16.1991. China — Yunnan: Jinghong, 1♀1♂ paratypes (*Hibiscus syriacus*, Malvaceae), VI.11.1987, in Zhang collection, South China Agricultural University.

Rhipiphorothrips pulchellus

Morgan 1913: 17-19; Wilson 1975: 226-227; Reyes 1994: 167-168.

This polyphagous species, so far known from India, Sri Lanka, Burma, Thailand, Java, the Philippines, Taiwan and Southern China, is newly recorded from Semenanjung Malaysia and Sarawak. The eye has no dark facets.

Specimens examined. Semenanjung Malaysia — Kedah: Kuala Munda: Gurun, 12♀6♂ (*Eugenia* sp., Myrtaceae), XI.10.1991; Pulau Pinang: Bukit Cendana, 1♀2♂ (*Eugenia filiformis*), XI.16.1991. Sarawak — Kuching: Taman Negara Bako, 2♀ (*Glochidion hypoleucum*, Euphorbiaceae), 1♀ (*Ardisia* sp., Myrsinaceae), X. 14-15.1991. The Philippines — Luzon: Los Baños: Mt. Makiling, 11♀4♂ (*Lagerstroemia speciosa*, Lythraceae), VIII.4.1993; Bataan: Balanga, 5♀3♂ (*Ficus* sp., Moraceae), VIII.19.1994.

Selenothrips rubrocinctus

Physapus rubrocinctus Giard 1901: 263-265.

Selenothrips rubrocinctus, Hood 1913: 150; Wilson 1975: 230-234; Kudô 1992a: 122-124; Reyes 1994: 169-171.

This pantropical and polyphagous species is additionally recorded from Nepal and Sarawak. Males of this species are usually rare, showing ratio 0.14% to 2.33% (Wilson 1975), although reported to be occasionally abundant (Hood 1913). Reyes (1944) reported some higher ratios of males in the Philippines, e.g., 1 female and 5 males on *Psidium guajava* in Luzon and 8 females and 7 males on unidentified plant flowers in Mindanao. Also in my collection, males were rather abundant from the Philippines while absent from Malaysia as shown below. The sex ratio of this species may be variable in different areas as in *Thrips tabaci*, *Haplothrips gowdeyi* and others.

Table 1. Geographic distribution of Panchaetothripinae species in Japan, Nepal, Southern China, and Southeast Asia.

Species \ Areas	J	TA	SC	N	BU	TH	P	M	BO	I	General distribution
Heliono. ponkikiri	J										Endemic
Heliono. linderae	J	TA									Restricted
Heliono. mube	J	TA									Restricted
Heliono. communis		TA									Endemic
Heliono. unitatus		TA									Endemic
Rhipiphoro. africanus		TA									African
Monilo. kempi	J	TA									Afro-Indian
Calio. fasciatus			SC								Nearctic
Heliono. brunneipennis			SC								Singhalese
Heliono. errans		TA	SC								African
Astro. lantana				N							Indian
Heliono. parvus				N							Indian
Panchaeto. kikiri	J			N							Restricted
Heliono. aino	J	TA	SC	N							Sino-Japanese
Astro. strasseni			SC		BU						Restricted
Opimo. tubulatus						TH					Endemic
Panchaeto. indicus			SC			TH					Indian
Calio. graminicola				N		TH					Indian
Heliono. guttatus							P				Endemic
Hemingia glandula							P				Endemic
Panchaeto. stephani							P				Endemic
Heliono. kadaliphilus							P				Indian
Astro. aucubae	J		SC				P				Japanese
Astro. aureolus								M			Endemic
Galeo. seticornis								M			Endemic
Heliono. longisensibilis								M			Endemic
Heliono. minutus								M			Endemic
Oneilliella pallidizonata								M			Endemic
Astro. chisinliaoensis		TA						M			Restricted
Rhipiphoro. concoloratus			SC					M			Restricted
Astro. globiceps							P	M			Indo-Pacific
Copido. octarticulatus	J	TA					P	M			Pacific Is.
Heliono. cephalicus	J	TA	SC	N				M			E. Oriental
Phibalo. rugosus								M	BO		Malaysian
Anisopilo. venustulus	J		SC					M	BO		Tropical Is.
Heliono. annosus		TA					P	M	BO		Malaysian
Phibalo. peringueyi	J	TA	SC	N		TH	P	M	BO		Afro-Oriental
Aorato. tenuis										I	Endemic
Reti. javanicus					BU		P			I	Restricted
Panchaeto. holtmanni								M	BO	I	Malaysian
Rhipiphoro. cruentatus		TA	SC							I	Indian
Astro. tumiceps					BU	TH	P			I	Oriental
Calio. striatopterus							P			I	Indo-Austr.
Elixo. brevisetis	J	TA	SC				P	M	BO	I	Pacific Is.
Rhipiphoro. pulchellus		TA	SC		BU	TH	P	M	BO	I	Oriental
Helio. haemorrhoidalis	J	TA	SC	N	BU	TH	P	M	BO	I	Pantropical
Seleno. rubrocinctus	J	TA	SC	N	BU	TH	P	M	BO	I	Pantropical
No. of species	14	18	16	9	6	8	16	19	9	10	

J: Japan, TA: Taiwan, SC: Southern China, N: Nepal, BU: Burma, TH: Thailand, P: The Philippines, M: Malaya and Singapore, BO: Borneo, I: Indonesia, or Java, Sumatra and adjacent islands.

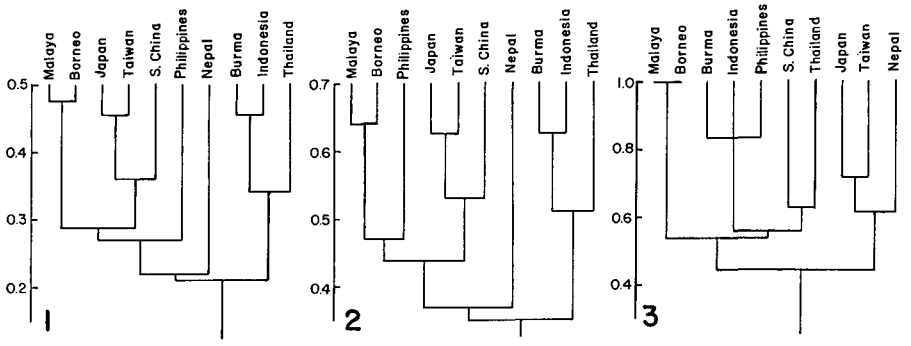

Fig. 9. Dendrograms showing faunal similarity indices for 10 areas. 1, Jaccard's Coefficient. 2, Sørensen's Coefficient. 3, Nomura-Simpson's Coefficient.

Specimens examined. Nepal — Janakpur: Dolaka (1,500 m), 2♀1♂ (*Lyonia ovalifolia*, Ericaceae), VIII. 9. 1983. Semenanjung Malaysia — Pahang: Kuantan, 1 ♀ (dry vine), VIII.13.1990; Selangor: Kepong, 4♀ (*Codiaeum variegatum*, Euphorbiaceae), VIII.4.1990; Kuala Lumpur: Bukit Nanas, 8♀ (*Ochanostachys amentacea*, Olaceae), IX.26.1991. Sarawak — Bahagian Samarahan: Serian: Ranchan, 9♀ (*Sterculia* sp., Sterculiaceae), IX.30.1991; Kuching, 22♀ (*Terminalia catappa*, Combretaceae), X.1.1991. The Philippines — Luzon: Manila: Quezon, 8♀ (*T. catappa*), VIII.29.1993; Bataan: Balanga, 20♀10♂ (*Ficus* sp., Moraceae), VIII.19.1994; Palawan: Puerto Princesa: 6♀ (*Aglaia laevigata*, Meliaceae), 4♀1♂ (*Garcinia tetranda*, Guttiferae), VIII.14-15.1993; Brooke's Point, 18♀3♂ (*T. catappa*), VIII.20.1993.

GEOGRAPHIC DISTRIBUTION

As two species have been described in the present study, 47 species in the Panchaetothripinae are now recorded from Nepal, Southern China, Southeast Asia and Japan. Table 1 presents a synopsis of the geographic distribution of each species excluding *Hercinothrips femoralis* which was collected in Japan only in glasshouses. It is still premature to discuss zoogeographic peculiarities due to lack of sufficient data in this area, in particular Burma, Thailand, Indochina and Indonesia, but some of them are noted. First, the Japanese fauna is very rich, represented by 14 species in 10 genera, especially in comparison with Europe, where no species occur in field. It is particularly remarkable that *Helionothrips aino* extends from Nepal to Southern China, and from Taiwan via the Japanese Archipelago to Saghalien, since the subfamily is principally tropical. Next, the Taiwanese fauna is also rich despite the small island, although some dubious or old records are included. This, however, probably suggests the paucity of collections in other areas of Asia.

To measure the faunal similarities between 10 areas, Jaccard's Coefficient, Sørensen's Coefficient and Nomura-Simpson's Coefficient were used. These are formulated as follows — Jaccard's: $c/(a+b-c)$, Sørensen's: $2c/(a+b)$, Nomura-Simpson's: c/b, where a and b are the total number of species in respective areas, $a \geqq b$, and c is the number of common species between them. Then results were

analyzed by cluster analysis using average-linkage method. Figure 9 shows three dendrograms based on the values of the three kinds of coefficient. The faunal similarities between the mentioned areas are different according to respective coefficients. In any case three groups are clearly recognized, namely Japan and Taiwan, Malaya and Borneo, and Burma and Indonesia. The former two are natural from their geographic positions, while the last may be caused from our poor knowledge.

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