New taxa and records of Troctopsocidae (Psocoptera)

Autor(en): **Lienhard, Charles / Mockford, Edward L.**

Objekttyp: **Article**

Zeitschrift: **Mitteilungen der Schweizerischen Entomologischen Gesellschaft = Bulletin de la Société Entomologique Suisse = Journal of the Swiss Entomological Society**

Band (Jahr): **70 (1997)**

Heft 3-4

PDF erstellt am: **12.07.2024**

Persistenter Link: https://doi.org/10.5169/seals-402683

MITTEILUNGEN DER SCHWEIZERISCHEN ENTOMOLOGISCHEN GESELLSCHAFT
BULLETIN DE LA SOCIÉTÉ ENTOMOLOGIQUE SUISSE
70, 361 – 385, 1997

New taxa and records of Troctopsocidae (Psocoptera)

CHARLES LIENHARD[1] & EDWARD L. MOCKFORD[2]

[1] Muséum d'histoire naturelle, c. p. 6434, CH-1211 Genève 6, Switzerland.
[2] Illinois State University, Department of Biological Sciences, Normal, Illinois 61790-4120, U.S.A.

Seven new Oriental species of two new genera are described: *Selenopsocus* n. gen. from West Malaysia (monotypic, 1 n. sp.) and *Thaipsocus* n. gen. from Thailand, East Malaysia and Indonesia containing *T. orientalis* (LIENHARD) n. comb. and 6 n. spp. *Sinitroctopsocus* LI FASHENG is considered as a new junior synonym of *Coleotroctellus* LIENHARD, the holotype male of *C. sui* (LI FASHENG) n. comb. is redescribed and a new Chinese species of this genus is described. Keys for the species of *Thaipsocus* and *Coleotroctellus* are given. Descriptive notes on *Coleotroctellus burckhardti* LIENHARD are included, and several new records of this Thai species are mentioned. The hitherto unknown male of *Troctopsoculus morenus* MOCKFORD is described and the species is first recorded for South America (Peru). Descriptive notes on *T. brasiliensis* NEW are included, and the species is first recorded for North America (Mexico).

Keywords: Psocoptera, Troctopsocidae, taxonomy, Oriental Region, South America, North America.

INTRODUCTION

The family Troctopsocidae belongs to the electrentomoid psocids sensu MOCKFORD (1967) (suborder Troctomorpha, family-group Amphientometae) and has been subdivided in two subfamilies by SMITHERS (1972): Troctopsocinae and Protroctopsocinae. The latter subfamily comprises three genera distributed in Central America (*Protroctopsocus* MOCKFORD, 1967) and in Southern Europe (*Chelyopsocus* LIENHARD, 1980 and *Philedaphia* LIENHARD, 1995). The phylogenetic relationships between these genera have been discussed briefly by LIENHARD (1995).

The present paper deals only with some members of the second subfamily, Troctopsocinae. It is best represented in Central and South America, from where three genera have been described: *Troctopsocus* MOCKFORD, 1967, *Troctopsocopsis* MOCKFORD, 1967 and *Troctopsoculus* MOCKFORD, 1967. The first two genera have been treated by MOCKFORD (1967) and TURNER (1975) and will not further be mentioned here. The third genus, *Trocopsoculus,* was only known from single females of two species, one collected in Mexico, the other in Brazil (MOCKFORD, 1967; NEW, 1973); for both of them new records are mentioned below. The hitherto unknown male is described on the basis of some Peruvian specimens of the type species, *T. morenus* MOCKFORD, 1967. The discovery of this male enabled us to compare both sexes of *T. morenus* and *T. orientalis* LIENHARD, 1990, an Oriental species tentatively placed in this genus (cf. LIENHARD, 1990). The differences between these two species suggest that the Oriental one belongs to a new genus, *Thaipsocus*, distributed in Thailand, Malaysia and Indonesia. Six additional new species also belonging to this genus are described below. A second new genus, *Selenopsocus*, has to be recognized for a very distinct new species from West Malaysia.

These new taxa considerably extend our knowledge about the distribution of the family in the Oriental Region, where only three other representatives were

known before: two species of *Coleotroctellus* LIENHARD, 1988 from Thailand and one species from southern China, for which the genus *Sinitroctopsocus* was defined by LI FASHENG (1993). *Sinitroctopsocus,* only known from one male of the generotype, is here considered as a junior synonym of *Coleotroctellus*. The holotype male of *C. sui* (LI FASHENG) n. comb. is redescribed and both sexes of an additional Chinese species of this genus are described. The litter dwelling females of this genus are characterized by their very particular coleopterous-like habitus while the males have the normal habitus of a fully winged psocid. Some descriptive notes on the type species, *C. burckhardti*, are included, and several new records of this Thai species are mentioned.

This contribution is intended as a first step to a new synthesis of our knowledge of the electrentomoid psocids, which will allow the re-evaluation of their phylogeny. As recent discoveries in the Neotropics have shown, this complex of families requires re-classification (GARCIA ALDRETE & MOCKFORD, 1996).

Most of the material examined is deposited in the Muséum d'histoire naturelle, Genève (MHNG), some specimens are deposited in the American Museum of Natural History, New York (AMNH), in the Insect Collection of the Beijing Agricultural University (ICBAU), in the Bohart Museum of Entomology, Davis, California (BME), and in E. L. MOCKFORD's collection (ELM).

The following abreviations are used in the descriptions. B = body length (in alcohol); A = antenna length; FW = forewing length; F = length of hind femur; T = length of hind tibia; t1–t3 = length of hind tarsomeres (from condyle to condyle); f1–f4 = length of basal flagellomeres; IO/D = shortest distance between compound eyes divided by antero-posterior diameter of compound eye, in dorsal view; P2, P4 = second, fourth (apical) segment of maxillary palpus; v1, v2, v3 = ventral, dorsal, external ovipositor valvula.

DESCRIPTIONS

Thaipsocus n. gen.

Diagnosis. Similar to *Troctopsoculus* MOCKFORD and *Coleotroctellus* LIENHARD. Differing from both in having first flagellomere, at least in female, longer than second and third combined (f1 ≤ f2 in *Troctopsoculus*, f1 only slightly longer than f2 in *Coleotroctellus*); lacinial tip with lateral cusp usually elongate and slender (relatively short and stout in *Troctopsoculus*, *Coleotroctellus* and in *Thaipsocus sarawakensis* n. sp.); forewing usually with a continuous clear apical area (only some clear marginal spots in *Troctopsoculus*, *Coleotroctellus* and in *Thaipsocus sarawakensis* n. sp.); distal comb on inner side of front tibia weakly developed, with only a few stout setae (well developed, with 12-16 stout setae, in *Troctopsoculus* and *Coleotroctellus*); hypandrium concave in the middle of the hind margin (slightly convex in *Troctopsoculus* and *Coleotroctellus*).

Also differing from *Coleotroctellus* in the following: antenna with 11 segments (13 segments in *Coleotroctellus*); posterior margin of vertex on each side lacking a small depression (depressions present in *Coleotroctellus*); hypandrium lacking an anterior sclerotized area separated from posterior part by a narrow membranous band (sclerotized area present in *Coleotroctellus*); female with normally shaped wings and normal venation (female coleopterous-like in *Coleotroctellus*, venation strongly modified).

Also differing from *Troctopsoculus* in the following: disto-lateral margins of labrum fringed with microtrichs (smooth in *Troctopsoculus*); P2 curved (straight in

Troctopsoculus); P4 elongate and cylindrical (shorter and with a broad middle region in *Troctopsoculus*); subgenital plate with 4 stout setae on distal margin (no stout setae or only 2 in *Troctopsoculus*); spermathecal duct lacking sclerotized sheath around distal end (sheath present in *Troctopsoculus*); phallosome V-shaped, lacking «tails» (broader and U-shaped with 2 basal «tails» in *Troctopsoculus*).

Other characters. Ecdysial line in vertex distinct, ending at ocellar field; frontal lines not visible. Ocelli large, close together. Spermatophore with a complexly convoluted tubular part.

Generotype: *Thaipsocus siamensis* n. sp.

Remarks. See *Selenopsocus* (below).

Key to the species of *Thaipsocus*

1 Forewing-tip with a continuous clear area. Lacinial tip with lateral cusp elongate and slender (Figs 1e, 3e, 4b) 2
– Forewing-tip only with two clear marginal spots, within the cells R3 and M2 (Fig. 11a). Lacinial tip with lateral cusp relatively short and stout (Fig. 11c) ..... *T. sarawakensis* n. sp.

2 Clear area of forewing-tip including distal part of veins R4+5 and M3, no dark spots at the apex of veins M1 and M2 (Fig. 4d). Subgenital plate: internal sclerite (T-sclerite) with well developed, pigmented lateral arms (Fig. 4f) 3
– Clear area of forewing-tip not including distal part of veins R4+5 and M3, apex of veins M1 and M2 with a small dark spot (Figs 1a, 2a, 3a). Subgenital plate: internal sclerite reduced, without pigmented lateral arms (Figs 1c, 2g, 3i) 5

3 Central part of forewing with a large hyaline transversal band (cf. LIENHARD, 1990: Fig. 3). Cu1a in forewing free ..... *T. bau* n. sp.
– Central part of forewing with only some small hyaline patches (Fig. 4d and LIENHARD, 1990: Fig. 1) 4

4 Cu1a in forewing free ..... *T. orientalis* (LIENHARD) n. comb.
– A crossvein present between Cu1a and M3 ..... *T. borneensis* n. sp.

5 Cu1a in forewing free ..... *T. siamensis* n. sp.
– A crossvein present between Cu1a and M3 6

6 Female (male not known): Forewing length 2.3 mm, internal sclerite of subgenital plate Y-shaped with very short anterior arms (Fig. 3i), subgenital plate with concentric membranous folds on inner side (Fig. 3h, dashed lines), spermapore very characteristic (Fig. 3g) ..... *T. thamluang* n. sp.
– Female (male not known): Forewing length 3.3 mm, internal sclerite of subgenital plate Y-shaped with relatively long anterior arms (fig. 2g), internal membranous structures of subgenital plate different (Fig. 2g, dashed lines), spermapore very characteristic (Fig. 2c) ..... *T. doisuthep* n. sp.

Thaipsocus siamensis n. sp.

Material. Holotype ♂, allotype ♀ (AMNH), 1 ♂ and 3 ♀♀ paratypes (ELM), 1 ♂ and 1 ♀ paratypes (MHNG), Thailand: Nakhon Ratchasima Province: Khao Yai National Park, 11–24 April 1990, yellow pans and Malaise trap, leg. E. FULLER.

Male color (in alcohol). Body and appendages primarily dusky brown, variegated with dull creamy white; the latter forming 2 lengthwise bands through ver-

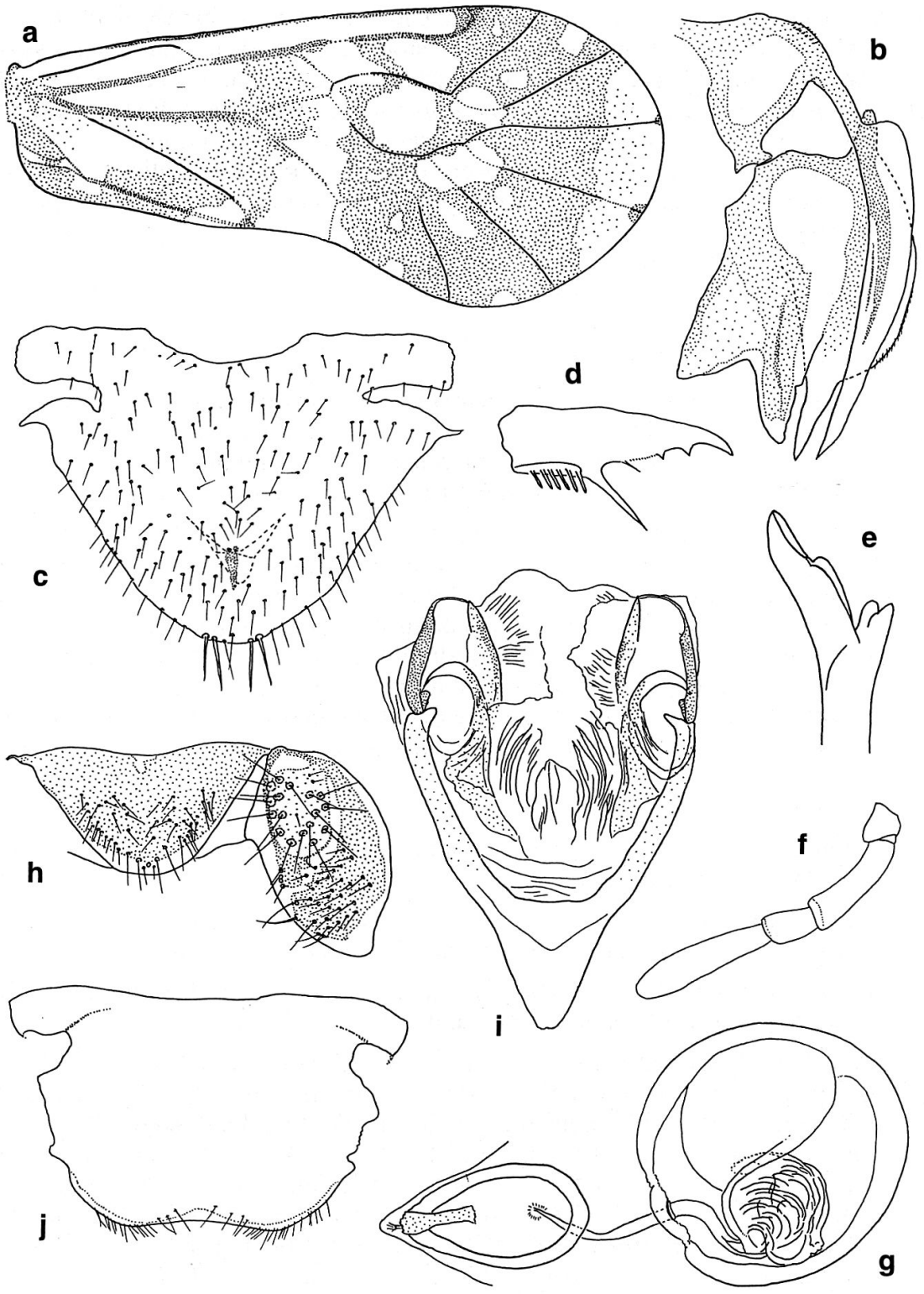

Fig. 1. *Thaipsocus siamensis* n. sp.: a, forewing ♀; b, ovipositor valvulae; c, subgenital plate; d, claw ♂; e, lacinial tip ♂; f, maxillary palpus ♂; g, spermatheca; h, epiproct and right paraproct ♂; i, phallosome; j, hypandrium (pilosity only represented on posterior margin).

tex, an U-shaped mark covering sides and upper margin of frons, a band over middle and hind leg bases, and rings on preclunial abdominal segments alternating with dusky brown rings. Forewing (cf. Fig.1a) complexly marked with a transverse

brown band in basal half and a broad transverse band covering much of distal two-thirds of wing but leaving a broad area of wing-tip clear (clear area not including distal part of veins R4+5 and M3, slightly clouded and with a brown spot on margin at veins M1 and M2), also some clear marginal, radial, and basal spots present. Hindwing unmarked, membrane with pale brown wash.

Male structural characters. Antennal flagellum: f1 ca. 2x length of f2; entire flagellum sparsely beset with long, upright, wavy setae. Lacinial tip (Fig. 1e) with median cusp distinctly bidenticulate, lateral cusp with rather prominent subapical denticle, cusp beyond denticle somewhat incurved. Maxillary palpus as in Fig. 1f, P4 ca. 3.7x as long as greatest width, bearing group of 5 thin-walled setal sensilla from middle to distal four-fifths. Head sculptured with small polygonal areoles enclosing short, irregularly arranged bacilloid lines. Front tibia on inner side with distal longitudinal row of 7 moderately stout setae separated at their bases by ca. length of a seta; the row terminating in one large, stout spur, much larger and stouter than preceding seta. Claw as in Fig. 1d. Forewing venation (cf. Fig. 1a) essentially as in *Troctopsoculus* but pterostigma longer and slenderer, median stem longer, and M3 straight; cell Cu1a free, with an angular roof. Hypandrium (Fig. 1j) simple, slightly bilobed on distal margin, setose over entire surface, most densely on distal margin. Phallosome (Fig. 1i) with broad basal apodeme, stout arms each terminating in complex sclerotizations; entire phallosome except extreme base surrounded by heart-shaped membrane. Epiproct (Fig. 1h) bearing numerous setae over entire surface except basal one-third and narrow lateral margins; setae concentrated along sides adjacent to narrow bare margins. Paraprocts (Fig. 1h): sensorium large, elongate, with 15/19 trichobothria on weakly developed basal rosettes; sensorium separated almost completely by a narrow band of membrane from more ventral paraproctal sclerotization.

Male measurements (holotype). B = 1.92 mm; A = 1.62 mm; FW = 2.47 mm; F = 545 µm; T = 878 µm ; t1 = 379 µm; t2 = 69 µm; t3 = 82 µm; f1 = 575 µm; f2 = 235 µm; f3 = 209 µm; f4 = 153 µm; IO/D = 1.12.

Female color (in alcohol). As described for male except rings of dark pigmentation of abdomen not so distinct. Forewing markings precisely the same (Fig. 1a).

Female structural characters. Length relation of f1:f2 as in male; setae of flagellum straight, not wavy, much sparser than in male, absent on f1, single seta near distal end on f2, more abundant beyond f2. Lacinial tip as in male. Proportions of P4 as in male; P4 bearing 6 thin-walled setal sensilla. Head sculpture, front tibial characters, and forewing characters as in male. Subgenital plate (Fig. 1c) slightly flattened on apex in middle; flattened area bearing 4 stout setae separated by 2 weaker ones; internal sclerite (T-sclerite) lacking pigmented arms but subtended by a membranous area with lateral arms. Spermatheca (Fig. 1g): duct opening externally on an elongated ring bearing a distal process directed towards middle of ring; duct opening on spermathecal sac through a rounded cap; sac rounded, thin-walled, containing a convoluted spermatophore. Ovipositor valvulae (Fig. 1b): v1 elongate, slightly curved, densely beset with microtrichs over its median surface; v2 overlapping v3 but separate except at base, pointed apically; v3 with apex deeply divided. Epiproct as described for male. Paraprocts with sensorium smaller than in male, but with 16/19 trichobothria on weak basal rosettes; sensorium not separated from rest of paraproctal sclerotization.

Female measurements (allotype). B = 2.03 mm; A = 1.60 mm; FW = 2.62 mm; F = 546 µm; T = 908 µm ; t1 = 383 µm; t2 = 69 µm; t3 = 82 µm; f1 = 419 µm; f2 = 183 µm; f3 = 188 µm; f4 = 164 µm; IO/D = 1.56.

Remarks. On the basis of the wing pattern and the form of the internal sclerite of the subgenital plate the species is related to the other Thai species, *T. doisuthep* and *T. thamluang*. It differs from these species by the absence of the crossvein between Cu1a and M3 and by the characteristic spermapore sclerification which very much resembles that of *T. orientalis* and *T. borneensis*.

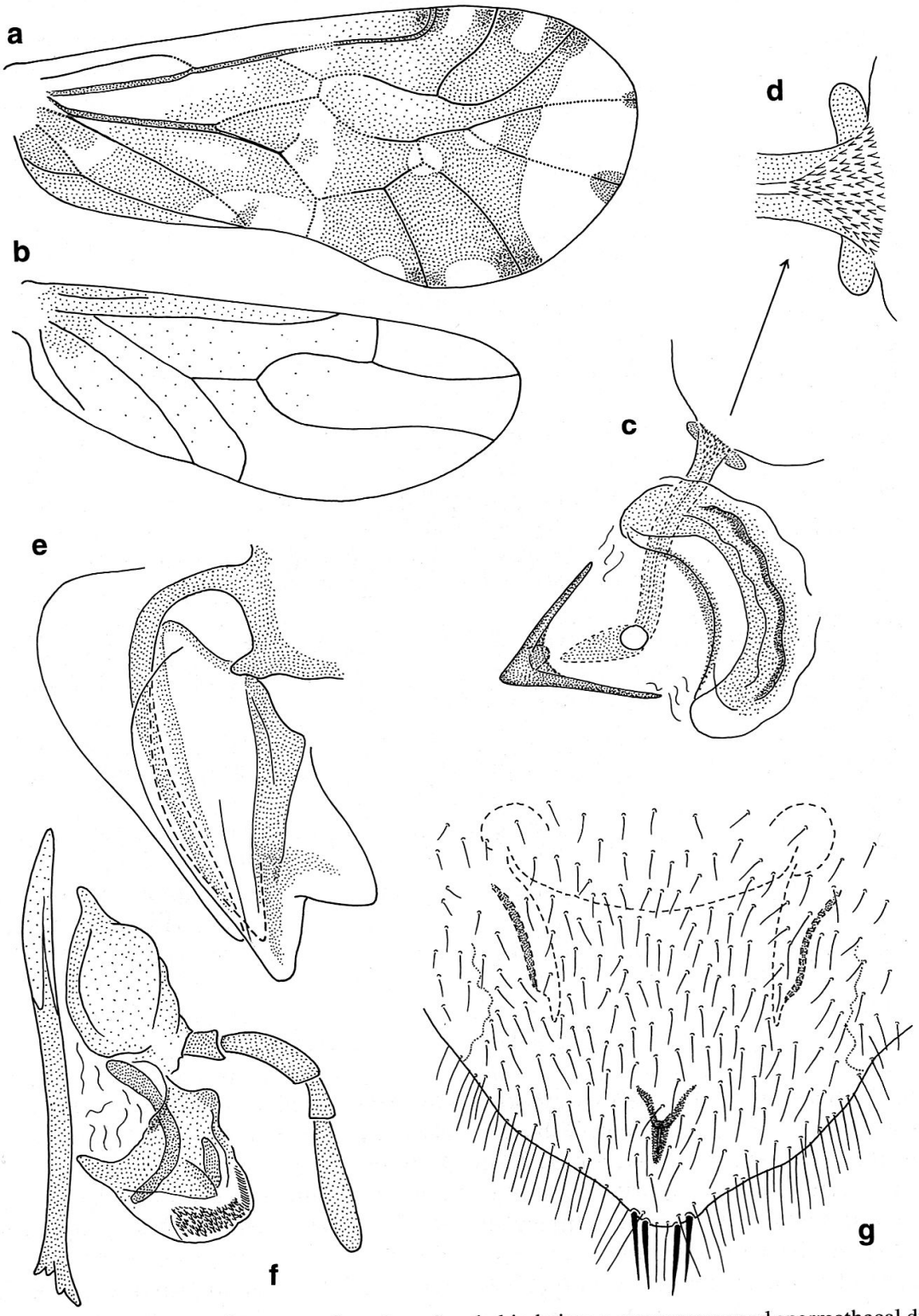

Fig. 2. *Thaipsocus doisuthep* n. sp., ♀: a, forewing; b, hindwing; c, spermapore and spermathecal duct; d, detail of proximal part of spermathecal duct; e, ovipositor valvulae; f, maxilla; g, subgenital plate.

Thaipsocus doisuthep n. sp.

Material. Holotype ♀ (MHNG), Thailand: Chiang Mai Province (Chiang Mai District): Doi Suthep, 950 m, pitfall trap, 2 January–5 March 1987, leg. P. SCHWENDINGER.

Female color (in alcohol). Body clear-brown to medium-brown, frons and abdomen with some red-brown epidermal pigment. Compound eyes black. Vertical line clear, not easy to observe. Vertex with some slightly darker pigmented areas near compound eyes and along vertical line. Antennae, legs and terminalia brown. Forewing with characteristic color pattern (Fig. 2a), clear zone on wing-tip not including the distal part of the veins R4+5 and M3, apex of veins M1 and M2 with a small dark spot. Hindwing almost colorless (Fig. 2b).

Female structural characters. Both antennae intact, with 11 segments. Antennal flagellum: f1 2.2x length of f2; only a few very short hairs on f1 (these microscopic hairs shorter than diameter of the flagellomere), other flagellomeres sparsely beset with some straight setae (these setae several times longer than diameter of the flagellomeres). Lacinia and maxillary palpus as in Fig. 2f; P4 4.3x as long as its greatest width, bearing 7 thin-walled setal sensilla. Head sculptured with small polygonal areoles enclosing short irregularly arranged bacilloid lines (on some parts of the head no areoles recognizable). Comb of front tibia weakly developed, consisting of a distal longitudinal row of about 8 moderately stout setae including apical spur, the latter much larger and stouter than preceding seta. Claw as illustrated for *T. thamluang* (cf. Fig. 3c). Forewing venation as in Fig. 2a, crossvein between Cu1a and M3 distinctly longer than basal portion of M3, in both forewings of the holotype a small spur vein on cubital stem. Hindwing venation as in Fig. 2b. Subgenital plate (Fig. 2g) with 4 stout apical setae separated in the middle by two weaker setae; in basal half some characteristic internal membranous structures (dashed lines in Fig. 2g); internal sclerite Y-shaped, with relatively long anterior arms. Spermatheca containing a complexly convoluted spermatophore, spermapore with characteristic sclerification (Fig. 2c), spermathecal duct without longitudinal folds, its proximal part surrounded by a bulging ring, inner surface of this zone finely denticulate (Fig. 2d), membrane of spermathecal sac completely smooth. Ovipositor valvulae as in Fig. 2e; v3 with apex distinctly divided. Epiproct as described for *T. siamensis*. Paraproct as in *T. thamluang* (cf. Fig. 3f), but long subapical seta only weakly knobbed.

Female measurements. B = 2.3 mm; A = 1.76 mm; FW = 3.25 mm; F = 680 µm; T = 1146 µm ; t1 = 435 µm; t2 = 75 µm; t3 = 105 µm; f1 = 450 µm; f2 = 205 µm; f3 = 198 µm; f4 = 165 µm; IO/D = 1.95.

Remarks. See *T. thamluang*.

Thaipsocus thamluang n. sp.

Material. Holotype ♀ and 1 ♀ paratype (MHNG), Thailand: Chiang Rai Province (Mae Sai District): Tham Luang Forest Park, 500 m, evergreen hill forest on limestone, 29 October 1991, leg. P. SCHWENDINGER.

Female color (in alcohol). Body dark-brown, abundant red-brown epidermal pigment on abdomen. Compound eyes black. Head dark-brown with a clear curved band on each side of vertex and a clear zone on each side of frons, near anterior margin of frons on each side a small dark-brown spot within this clear zone. Dark vertical line distinct. Antennae, legs and terminalia dark-brown. Forewing with characteristic color pattern (Fig. 3a), clear zone on wing-tip not including the dis-

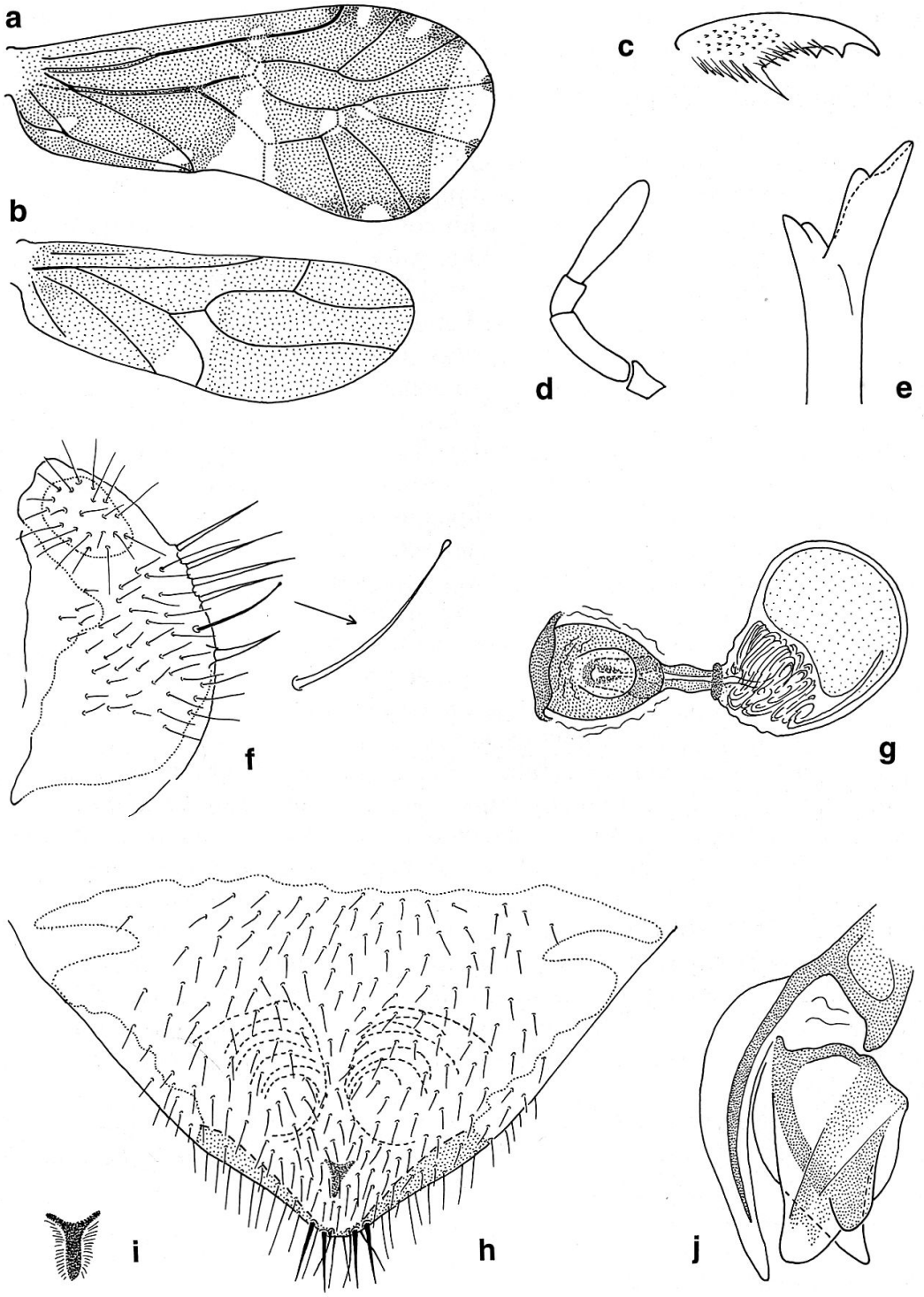

Fig. 3. *Thaipsocus thamluang* n. sp., ♀: a, forewing; b, hindwing; c, claw; d, maxillary palpus; e, lacinial tip; f, left paraproct; g, spermatheca; h, subgenital plate; i, internal sclerite of subgenital plate; j, ovipositor valvulae.

tal part of the veins R4+5 and M3, apex of veins M1 and M2 with a small dark spot. Hindwing slightly brown colored, with a clear transverse band slightly widened towards hind margin (Fig. 3b).

Female structural characters. Both antennae of holotype intact, with 11 segments. Antennal flagellum: f1 2.4x length of f2; no setae on f1, other flagellomeres sparsely beset with some straight setae. Lacinial tip as in Fig. 3e. Maxillary palpus

as in Fig. 3d; P4 3.7x as long as its greatest width, bearing 8 thin-walled setal sensilla. Head sculptured with short irregularly arranged bacilloid lines, no areoles or only weakly developed areoles recognizable. Comb of front tibia weakly developed, consisting of a distal longitudinal row of 8–11 moderately stout setae including apical spur, the latter much larger and stouter than preceding seta. Claw as in Fig. 3c. Forewing venation as in Fig. 3a, crossvein between Cu1a and M3 slightly longer than basal portion of vein M3. Hindwing venation as in Fig. 3b. Subgenital plate (Fig. 3h) with 4 stout apical setae separated in the middle by a pair of thinner setae; in apical half on inner side with concentric membranous folds (dashed lines in Fig. 3h); internal sclerite Y-shaped, with very short anterior arms (Figs 3h, i). Spermatheca (Fig. 3g) containing a complexly convoluted spermatophore, spermapore with characteristic sclerification, spermathecal duct without longitudinal folds, its proximal part surrounded by a bulging ring, inner surface of this zone finely denticulate (cf. Fig. 2d), membrane of spermathecal sac completely smooth. Ovipositor valvulae as in Fig. 3j; v3 with apex divided but outer lobe distinctly shorter than inner one. Epiproct as described for *T. siamensis*. Paraproct (Fig. 3f) with sensorium of about 20 trichobothria, basal rosettes not differentiated; basal half of paraproct with 4 strong marginal setae, ventral half with one stout marginal seta, in the middle a long, distinctly knobbed subapical seta (cf. detail in Fig. 3f).

Female measurements (holotype). B = 2.08 mm; A = 1.50 mm; FW = 2.33 mm; F = 520 µm; T = 879 µm ; t1 = 330 µm; t2 = 65 µm; t3 = 90 µm; f1 = 400 µm; f2 = 170 µm; f3 = 163 µm; f4 = 140 µm; IO/D = 1.71.

Remarks. The species stands close to *T. doisuthep* from which it can be distinguished easily by the characters mentioned in the key. These two species are more closely related to the third Thai species, *T. siamensis*, than to the four species from Borneo and Indonesia, *T. borneensis*, *T. bau*, *T. orientalis*, and *T. sarawakensis* (see remarks on these species).

Thaipsocus borneensis n. sp.

Material. Holotype ♀ (MHNG). East Malaysia: Sabah (West Coast Residency): Kinabalu Park, Poring Hot Springs, ca. 500 m, relatively dry forest of Dipterocarpaceae, beating vegetation, 6 May 1987, leg. D. BURCKHARDT & I. LÖBL.

Female color (in alcohol). Head yellowish with brown zones along vertical line, between vertex and frons and near compound eyes; frons with a brown median band and a transverse band in anterior half; postclypeus brown. Compound eyes black. Antennae, thorax, legs and terminalia brown. Abdomen yellowish with some brown epidermal pigment, especially on ventral side. Forewing with characteristical complex color pattern (Fig. 4d), clear zone on wing-tip including the distal part of the veins R4+5 and M3, no dark spot at the apex of M1 and M2; hindwing almost colorless (Fig. 4e).

Female structural characters. One antenna with 11 segments (typical number of the genus), the other with a weak subdivision of the apical segment, so that its distal third seems to form a 12th segment. Antennal flagellum: f1 2.4x length of f2; no setae on f1, other flagellomeres sparsely beset with straight setae. Lacinia tip as in Fig. 4b. Maxillary palpus as in Fig. 4c; P4 3.4x as long as its greatest width, bearing 6 thin-walled setal sensilla. Head sculptured with short, irregularly arranged bacilloid lines, no areoles recognizable. Comb of front tibia very weakly developed, only consisting of a distal longitudinal row of 6–7 moderately stout setae including apical spur, the latter much larger and stouter than preceding seta. Claws as in

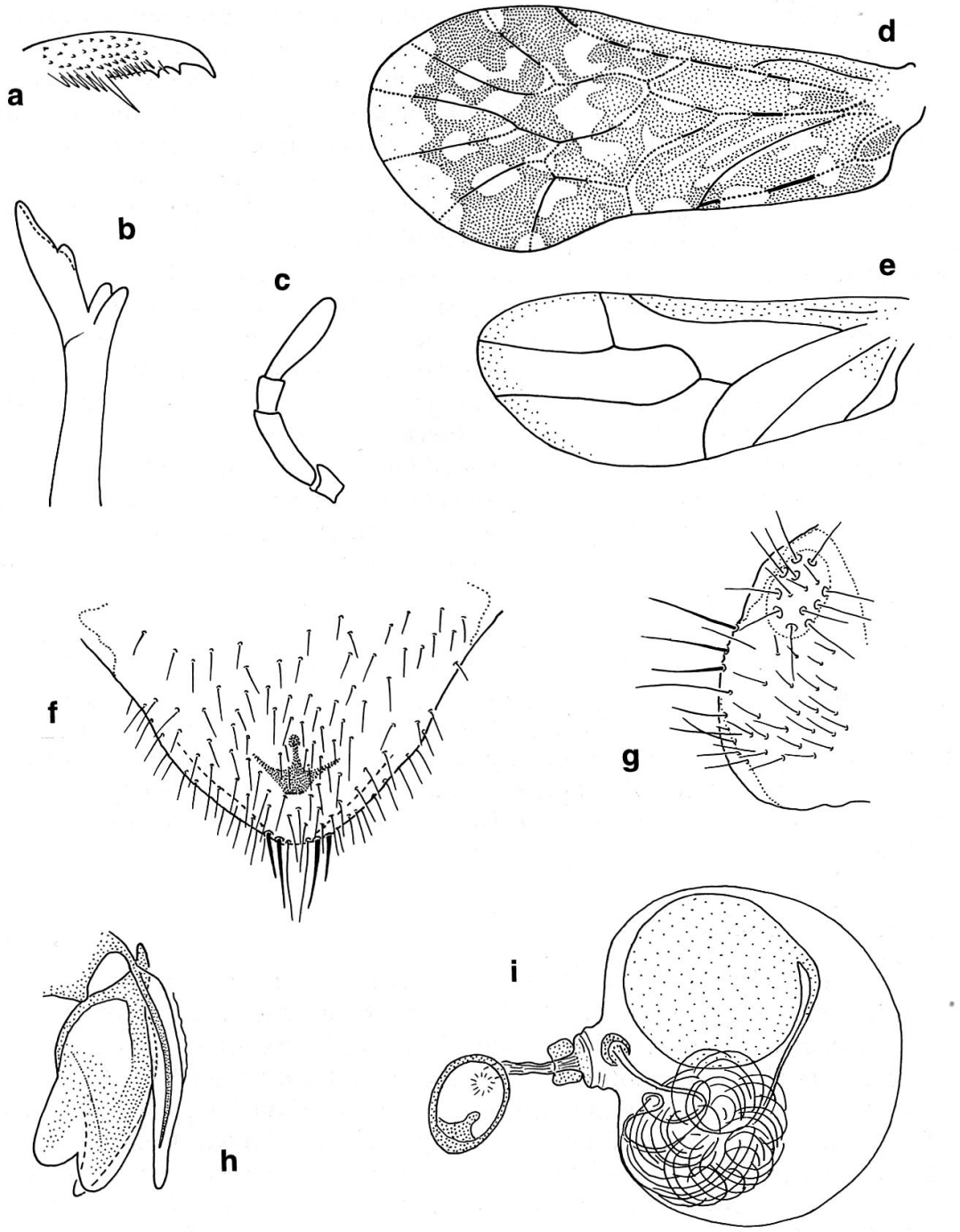

Fig. 4. *Thaipsocus borneensis* n. sp., ♀: a, claw; b, lacinial tip; c, maxillary palpus; d, forewing; e, hindwing; f, subgenital plate; g, right paraproct; h, ovipositor valvulae; i, spermatheca.

Fig. 4a. Forewing venation as in Fig. 4d, cross-vein between Cu1a and M3 of about same length as basal portion of vein M3. Hindwing venation as in Fig. 4e. Subgenital plate (Fig. 4f) with 4 stout apical setae, separated in the middle by two long weaker setae; no particular internal membranous structures visible; T-sclerite with pigmented lateral arms. Spermatheca (Fig. 4i) almost identical to that of *T. orientalis* (cf. LIENHARD, 1990: Fig. 8), containing a complexly convoluted spermatophore, spermapore surrounded by a slightly elongated ring bearing a distal process directed towards middle of the ring, proximal part of the spermathecal duct sur-

rounded by a sheath, no denticulation in transition zone between spermathecal duct and sac, spermathecal duct with fine longitudinal folds, membrane of spermathecal sac completely smooth. Ovipositor valvulae as in Fig. 4h, v3 with apex distinctly divided. Epiproct as described in *T. siamensis*. Paraproct (Fig. 4g) with sensorium of about 10 trichobothria on weak basal rosettes, dorsal half of paraproct with 3 long marginal setae, no stout seta in ventral half and no knobbed seta present.

Female measurements. B = 1.83 mm; A = 1.20 mm; FW = 2.08 mm; F = 440 µm; T = 707 µm ; t1 = 300 µm; t2 = 60 µm; t3 = 80 µm; f1 = 300 µm; f2 = 125 µm; f3 = 115 µm; f4 = 110 µm; IO/D = 1.71.

Remarks. The species is morphologically very close to *T. orientalis*, but distinctly smaller (cf. measurements for *T. orientalis* in LIENHARD, 1990). The two species can be distinguished easily by details of the forewing color pattern (cf. LIENHARD, 1990: Fig. 1) and by the absence of a cross-vein between Cu1a and M3 in *T. orientalis*.

Thaipsocus orientalis (LIENHARD, 1990) n. comb.

Troctopsoculus orientalis LIENHARD, 1990 (female holotype) (male allotype, see *T. bau* n. sp.)

The species is only known from the female holotype from Indonesia (Java: Cibodas) (MHNG). The allotype male of *T. orientalis*, collected in East Malaysia (Sarawak), is now considered as belonging to another species (see below, *T. bau* n. sp.). The similar wing pattern, the presence of well developed pigmented lateral arms of the T-sclerite of the subgenital plate and the almost identical spermatheca indicate a close relationship to *T. borneensis* n. sp., in spite of the differences in wing venation (cf. key to species).

Thaipsocus bau n. sp.

Troctopsoculus orientalis sec. LIENHARD, 1990 partim (male allotype)

Material. Holotype ♂ (MHNG). East Malaysia: Sarawak: Bau, near Fairy Caves, 10–20 m, 3 December 1987, leg. C. LIENHARD.

Description, see LIENHARD, 1990: 340–343, Figs 3–4, 12–17.

Remarks. The discovery of *Thaipsocus siamensis* has shown that there is no sexual dimorphism in wing color pattern in *Thaipsocus*. The differences in wing coloration between the holotype female of *T. orientalis* and the male tentatively placed as allotype in the same species by LIENHARD (1990) have now to be considered as of specific value. The specimen is therefore designated here as the holotype of a new species. The phallosome is much simpler than in *T. siamensis*, resembling that of *T. sarawakensis*. The wing pattern (cf. key to species) indicates that *T. bau* is more closely related to *T. orientalis* and *T. borneensis* than to the Thai species.

Thaipsocus sarawakensis n. sp.

Material. Holotype ♂ (BME). East Malaysia: Sarawak: SW Gunung Buda, 64 km S of Limbang, 4° 13'N, 114° 56'E, 8-15 November 1996, leg. S. L. HEYDON & S. FUNG.

Male color (in alcohol). Head dark brown. Prothorax and front coxae white; remainder of front legs medium brown. Meso- and metathorax and their legs dark brown. Forewing with membrane strongly iridescent; basal veins R and M+Cu1 dark brown, other veins paler; color pattern as in Fig. 11a. Hindwing clear, with

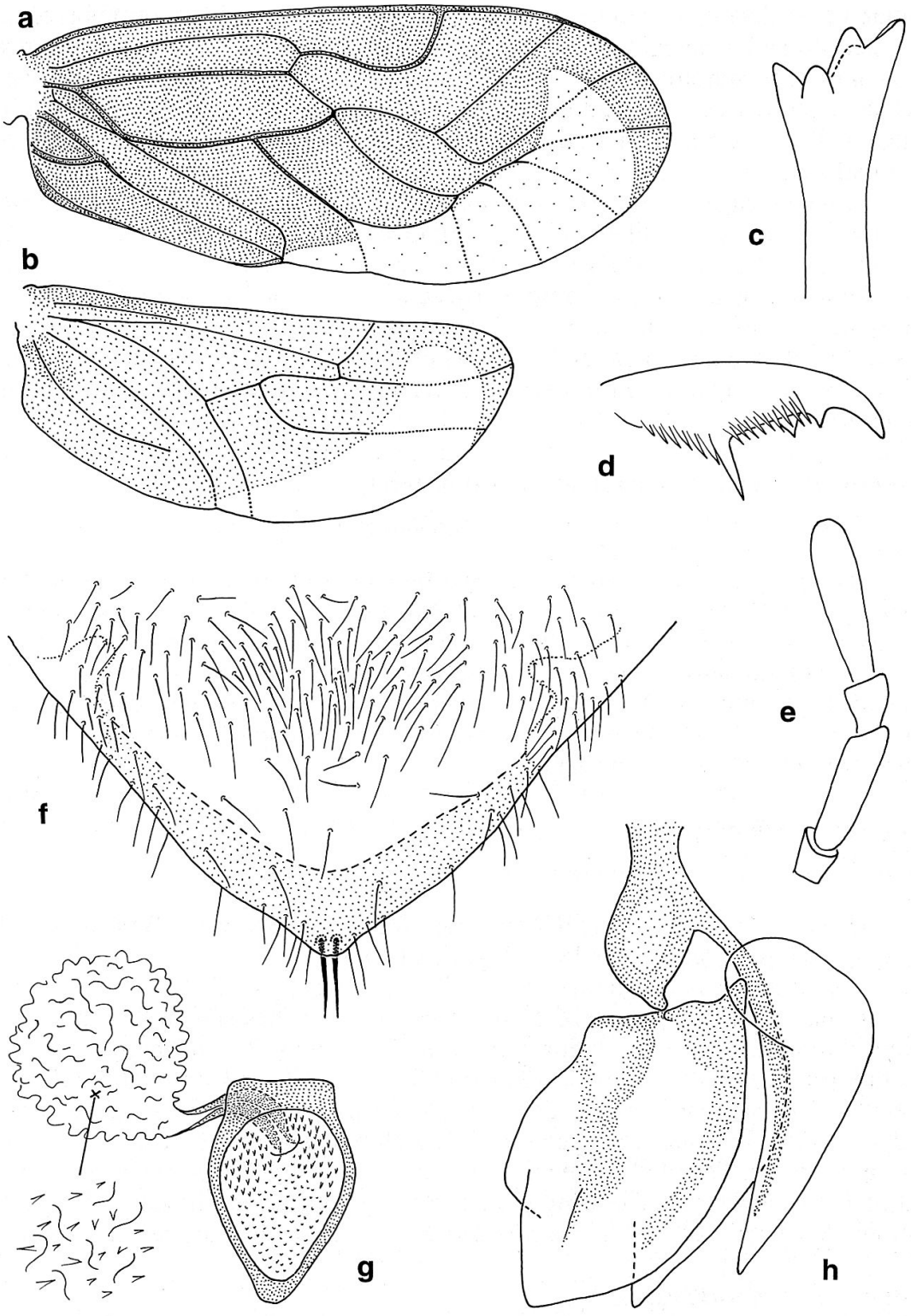

Fig. 5. *Selenopsocus schwendingeri* n. sp., ♀: a, forewing; b, hindwing; c, lacinial tip; d, claw; e, maxillary palpus; f, subgenital plate; g, spermatheca; h, ovipositor valvulae.

brown wash over much of basal half and distal end (Fig. 11b). Preclunial abdominal segments creamy white, each with a slender transverse ring of dark brown subcuticular pigment; terminal segments dark brown.

Male structural characters. Ocelli well developed, close together, the laterals slightly larger than the median. One antenna intact, with 11 segments (other antenna

broken in f1 and missing beyond that point); antennal flagellum: f1 2.3x length of f2; f1 in its entire length and all other flagellomeres sparsely beset with upright, wavy setae. Lacinial tip as in Fig. 11c. Maxillary palpus as in Fig. 11d, P2 curved, P4 3.5x as long as its greatest width, bearing 6 thin-walled setal sensilla. Antero-lateral margin of labrum densely fringed with fine microtrichs (as in Fig. 8j). Front tibia with 3 stout setae and the much larger apical spur forming a small comb. Claw as in Fig. 11e, distal preapical denticle strong, basal pecten weakly developed. Forewing (Fig. 11a) of normal shape and venation; vein Sc relatively long, joining R stem distally, cell Cu1a 1.6x as long as its greatest height; prominent veins in basal half of wing as described for *Coleotroctellus venosus* and *C. sui*, but prominence of vein An1 less striking due to slenderness of anal cell. Hindwing as in Fig. 11b. Hypandrium (Fig. 11f) lacking a distinct, separate, transverse anterior sclerotized area; posterior margin concave in middle. Phallosome (Fig. 11g) V-shaped with base somewhat widened and bluntly pointed on outer margin, apical region with a sclerotized area near tip of each paramere, apical membrane on each side with a group of pores. Epiproct and paraproct as in Fig. 11h; paraproct lacking a knobbed subapical seta, sensorium with 13 trichobothria on weakly developed basal rosettes and a few hairs lacking basal rosettes.

Male measurements. B = 1.45 mm; A = 1.23 mm; FW = 2.01 mm; F = 378 µm; T = 651 µm ; t1 = 197 µm; t2 = 61 µm; t3 = 74 µm; f1 = 342 µm; f2 = 149 µm; f3 = 137 µm; f4 = 135 µm; IO/D= 2.52.

Remarks. *T. sarawakensis* stands apart from the other species of the genus and shows some similarities to *Coleotroctellus* (see generic diagnosis). Prominent veins in basal half of male forewing have also been observed in *Coleotroctellus venosus* and *C. sui*, but not in the type species of this genus, *C. burckhardti*. Wings are strongly modified in the coleopterous-like females of *Coleotroctellus*. As long as the female of *T. sarawakensis* is not known this species is provisionally placed in the genus *Thaipsocus*.

Troctopsoculus MOCKFORD, 1967

Troctopsoculus morenus MOCKFORD, 1967

The species was previously known from a single female collected near Macuspana, Tabasco, Mexico. The male is first described here, and records are cited from Amazonian Peru, constituting a range extension of approximately 2000 km south and 2500 km east. Females collected together with the Peruvian males were the same as the Mexican female in all characters studied.

Male color (in alcohol 14 years). As described for female (MOCKFORD, 1967).

Male structural characters. Vertical and frontal ecdysial lines distinct. Sculpture of head, details of lacinial tip, and shape of P4 as described for female. P4 with 4 thin-walled setal sensilla; most basal one longer than others, curved, acuminate-tipped. Antenna: f1 slightly shorter than f2; entire flagellum very sparsely beset with long, straight setae. Setal comb of front tibia well developed, consisting of 12 stout setae including distal spur, the latter much longer and stouter than preceding seta. Pretarsal claw as in female, with 2 preapical denticles, short basal pecten, and a row of minute serrulations before first preapical denticle. Hypandrium simple, with curved distal margin sparsely beset with long setae; rest of hypandrium with sparse shorter setae; surface sculptured with rows of small papillae forming transverse areoles enclosing single rows of smaller papillae; a longitudinal row of larger, nearly bare areoles along each lateral margin. Phallosome (Fig. 6a) broad U-shaped with

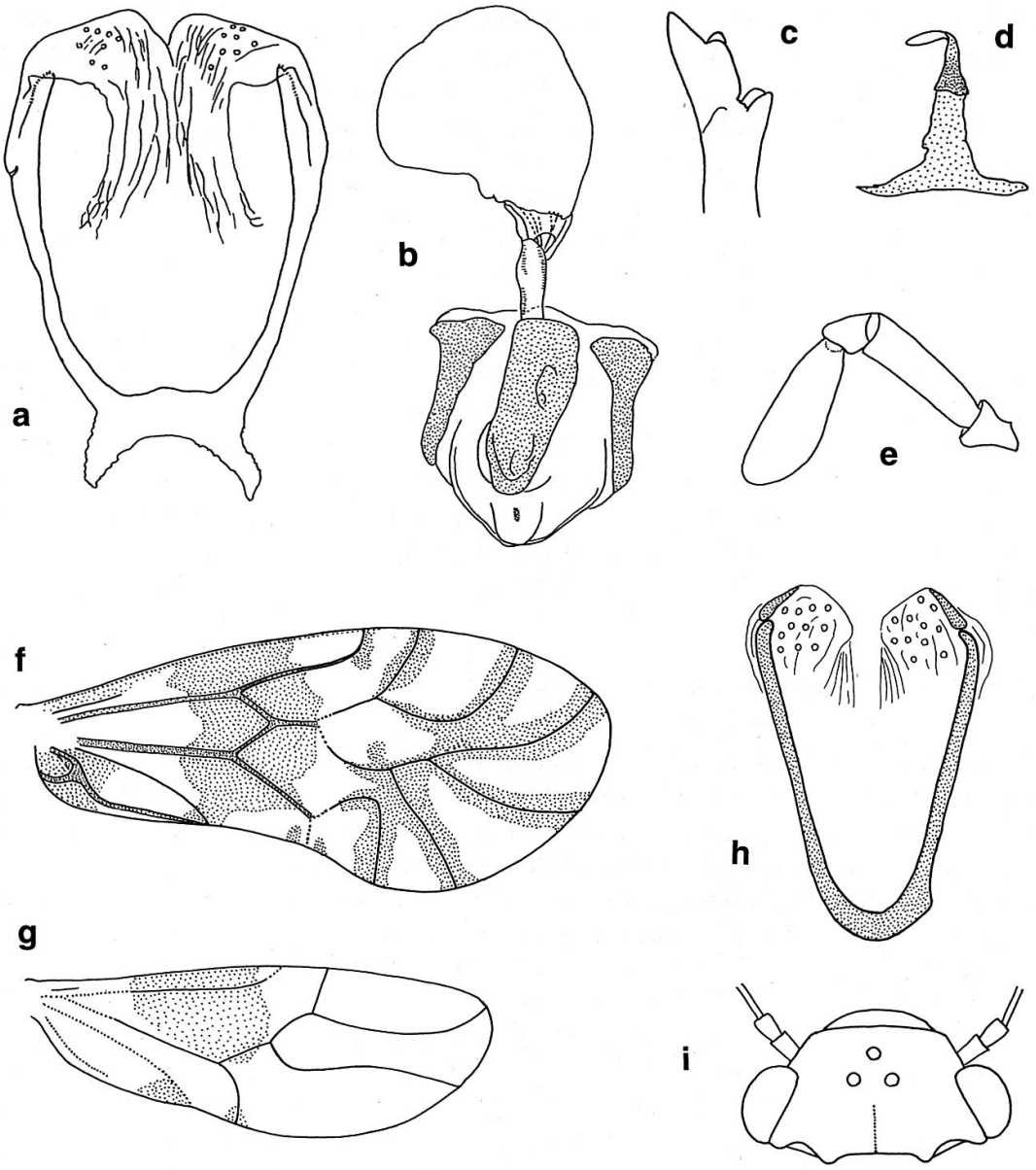

Fig. 6. *Troctopsoculus morenus* MOCKFORD: a, phallosome. – *Troctopsoculus brasiliensis* NEW (Mexican ♀): b, spermatheca; c, lacinial tip; d, T-sclerite of subgenital plate; e, maxillary palpus. – *Coleotroctellus sui* (LI FASHENG), ♂ holotype: f, forewing; g, hindwing; h, phallosome; i, head, dorsal view.

pair of short appendages projecting forward from anterior margin; basal struts divided at ca. three-quarters their length, producing an outer and an inner paramere; outer paramere abruptly bent mediad, much expanded and membranous beyond bend, the membrane bearing pores, and membranes of opposite sides meeting in middle; inner parameres with row of denticles on outer surface, dissipating into membrane distally. Epiproct bare in basal half, bearing 17 setae across surface in distal half. Paraproct with slightly elongate sensorium bearing 7 trichobothria with weakly developed basal rosettes; sparse setae below sensorium.

Male measurements. A = 0.84 mm; FW = 1.41 mm; F = 234 µm; T = 431 µm; t1 = 190 µm; t2 = 43 µm; t3 = 51 µm; f1 = 86 µm; f2 = 98 µm; f3 = 96 µm; f4 = 99 µm; IO/D = 1.42.

Records (1 ♀ and 1 ♂ MHNG, other specimens ELM). Peru: Loreto Province: Explorama Lodge at Yanamono, 21 March 1981, beating dead palm leaves in for-

est, 3 ♂♂, 2 ♀♀, leg. E. L. MOCKFORD; same locality, 9 May 1986, beating palms in forest, 1 ♂, leg. E. L. MOCKFORD; same locality, 19 May 1988, miscellaneous beating in forest, 1 ♀, leg. E. L. MOCKFORD; Explorama Camp ("ACEER") on Rio Sucusari, 11 August 1992, miscellaneous beating, mostly palms, 1 ♀, leg. E. L. MOCKFORD.

Troctopsoculus brasiliensis NEW, 1973

The species was originally described from a single female collected near the bank of Rio Suia Missu, Mato Grosso, Brazil. The specimens reported below are from southern Veracruz State, Mexico, thus representing the First North American record of the species, and a range extension northward of approximately 3750 km, and westward of approximately 4700 km. The Brazilian female lacked a head, and several head characters are included in the descriptive notes below. The only notable differences between the Mexican and Brazilian females are presence of some sclerotizations at the base of the spermathecal sac (Fig. 6b) and a small, hyaline, curved appendage from the base of the T-sclerite in the Mexican females (Fig. 6d) which may have been omitted in the figures of the Brazilian female.

Descriptive notes. Compound eyes black. Rest of head and antennae uniformly dusky brown. Vertical ecdysial line distinct; frontal lines very fine, visible only for short distance out from ocellar field. Head sculpture: small irregular polygons enclosing minute granulations over most of head and enclosing short, curving lines in ocellar region. Antenna: f1≅f2 in length; setae very sparse on flagellum (none on f1–f3), not more than 2 on any flagellomere. Lacinial tip (Fig. 6c) approximately as in *T. morenus*, but lateral cusp slightly longer and slenderer. P4 longer than in *T. morenus* (Fig. 6e), bearing 4 thin-walled setal sensilla grouped in middle. Comb of front tibia consisting of 15 stout setae, including distal spur.

Records. Mexico: Veracruz: Los Tuxtles Field Station of UNAM near Montepio, 26 June 1979, on trunks of large trees in rain forest, 3 ♀♀, leg. E. L. MOCKFORD (ELM).

Selenopsocus n. gen.

Diagnosis (female). Similar to *Thaipsocus* (see diagnosis above), differing in following: Head antero-posteriorly flattened, vertex narrowly rounded, almost sharp-edged (head not flattened, vertex broadly rounded in *Thaipsocus* and in all other genera of Troctopsocidae); lacinial tip with lateral cusp relatively short and stout (similar to *Thaipsocus sarawakensis*); P2 straight. Forewing and hindwing with a clear half moon shaped area on posterior margin. In forewing Sc ending on R1 and basal part of R1 crossvein-like, forming an angle with radial stem and with distal part of R1 (in *Thaipsocus* Sc ending on radial stem, the latter in line with R1); first segment of vein Cu1a forming a concave roof of the areola postica, the latter joined to the medial stem by a short crossvein (in *Thaipsocus* areola postica free or joined to M3 by a crossvein, first segment of Cu1a straight). In hindwing apical part of R2+3 fused to R1, basal part of R2+3 crossvein-like (in *Thaipsocus* R2+3 not fused to R1); vein An almost reaching Cu2 (in *Thaipsocus* An ending near wing margin, far from Cu2). Subgenital plate with 2 stout apical setae, lacking T-sclerite. Ovipositor valvulae: membranous part of v1 with a bulging basal swelling (no such swelling in *Thaipsocus*); v3 only weakly divided, external lobe very shallow (v3 distinctly divided in *Thaipsocus*).

Other characters. Ecdysial line in vertex distinct; frontal lines weakly developed but visible. Ocelli large, close together.

Generotype. *Selenopsocus schwendinger*i n. sp.

Remarks. The presence of a strongly elongated first flagellomere can be interpreted as a synapomorphy of *Selenopsocus* and *Thaipsocus*. But *Selenopsocus* does not show the clear area on forewing-tip usually present in *Thaipsocus*; the genus is characterized by a clear half moon on posterior wing margin (in Greek: "selene" = moon) and several other autapomorphies concerning head shape, wing venation and genitalia (cf. diagnosis).

Selenopsocus schwendingeri n. sp.

Material. Holotype ♀ (MHNG), West Malaysia (Perak State): Maxwell Hill (Bukit Larut), 900–1200 m, evergreen rain forest, Taiping, on tree trunk, 24–26 January 1995, leg. P. SCHWENDINGER.

Female color (in alcohol). Body dark-brown, abundant brown epidermal pigment on abdomen. Compound eyes black. Head uniformly dark-brown, vertical line black. Antennae, legs and terminalia brown. Forewing (Fig. 5a) dark-brown with yellowish half moon shaped zone on posterior margin, reaching from the middle of cell R3 to apex of vein Cu2, veins dark-brown in the pigmented part, yellow in the clear zone. Hindwing clearer but with similar color pattern (Fig. 5b).

Female structural characters. One antenna intact, with 11 segments. Antennal flagellum: f1 2.7x length of f2; f1 with some very short hairs in basal half (these microscopic hairs shorter than diameter of the flagellomere) and 3 longer setae near apex; other flagellomeres sparsely beset with some straight or slightly wavy setae (these setae several times longer than the diameter of the flagellomere). Lacinial tip as in Fig. 5c. Maxillary palpus as in Fig. 5e; P4 3.6x as long as its greatest width, bearing 8 thin-walled setal sensilla. Head finely sculptured with very short and densely packed bacilloid lines, no areoles recognizable. Comb of front-tibia very weakly developed, consisting of a distal longitudinal row of about a dozen weakly thickened setae including apical spur, the latter much larger and stouter than the preceding seta. Claw as in Fig. 5d. Wing venation as described in generic diagnosis (Figs 5a, b). Forewing relatively broad in basal half and slightly vaulted (slight tendency to elytroptery). Subgenital plate (Fig. 5f) with narrowly rounded tip, 2 strong subapical setae inserted on dorsal side of tip, no internal sclerite but internal membrane densely covered with fine microtrichs; pilosity of subgenital plate concentrated in basal half, apical half only with some loosely distributed hairs, posterior border dorsally with a relatively broad sclerified zone (dashed line in Fig. 5f). Spermatheca (Fig. 5g) empty and shrivelled (species probably parthenogenetic, cf. remarks), membrane of spermathecal sac with fine spiculae in the region near the origin of the duct (cf. detail in Fig. 5g), spermapore surrounded by a sclerified frame, membrane within this frame beset with fine spiculae. Ovipositor valvulae (Fig. 5h) as described in generic diagnosis. Epiproct triangular, basal two-thirds brown, apical one-third and narrow lateral borders hyaline and bare, the numerous setae concentrated along sides in middle one-third, basal one-third bare. Paraproct with sensorium of 9 trichobothria with well developed basal rosettes and some hairs without basal rosettes, posterior margin of paraproct with several long and strong setae, none of them distinctly knobbed.

Female measurements. B = 3.32 mm; A = 2.16 mm; FW = 4.12 mm; F = 870 µm; T = 1358 µm ; t1 = 540 µm; t2 = 80 µm; t3 = 115 µm; f1 = 680 µm; f2 = 250 µm; f3 = 220 µm; f4 = 185 µm; IO/D = 1.56.

Remarks. The absence of a spermatophore in the mature female examined (empty and shrivelled spermathecal sac) indicates that the species probably reproduces by thelytokous parthenogenesis. According to its collector, Dr. P. SCHWENDINGER, to whom we gratefully dedicate the species, the female, while sitting on a tree trunk, had a somewhat beetle-like habitus (in alcohol the wings were opened).

Coleotroctellus LIENHARD, 1988

Sinitroctopsocus LI FASHENG, 1993, n. syn.

Concerning wing pattern and general morphology the holotype male of *S. sui* LI FASHENG (cf. redescription below), the only known specimen of the type species of *Sinitroctopsocus*, is extremely close to the male of *C. burckhardti*, type species of *Coleotroctellus*. There is no reason to place these two species in different genera, that is why we consider here *Sinitroctopsocus* as a junior synonym of *Coleotroctellus*.

Key to the species of *Coleotroctellus*

1 Habitus coleopterous-like, wings elytriform, female 2
– Normal habitus of fully winged psocid, male 4

2 Forewing with numerous longitudinal veins: from R1 to An1 at least 10 branches reaching wing margin (Figs 8a, 9b, 10d) ..... *C. venosus* n. sp.
– From R1 to An1 not more than 8 branches reaching wing margin (Fig. 9a; cf. also figures in LIENHARD, 1988) 3

3 Forewing glossy (Fig. 10a), M unbranched (Fig. 9a), anal cell about half as wide as basicubital cell (folded inside in mounted wing). Dorsal membrane in the middle of the forewing finely granulate, sometimes very slightly wrinkled and usually with a network of hexagonal areas (cf. figures in LIENHARD, 1988) ..... *C. burckhardti* LIENHARD
– Forewing dull and coarse (Fig. 10b), M 2-branched, anal cell about as wide as basicubital cell (usually not folded inside in mounted wing). Dorsal membrane in the middle of the forewing finely granulate and very coarse and rugose (cf. figures in LIENHARD, 1988) ..... *C. loebli* LIENHARD

4 In forewing veins M1 and M2 slightly bent forwards (Fig. 6f) ..... *C. sui* (LI FASHENG) n. comb.
– M1 and M2 straight (Figs 7a, g) 5

5 Forewing length < 2 mm; vein An1 not particularly prominent (Fig. 7g and LIENHARD 1988: Fig. 23). Phallosome U-shaped, with slightly flattened base (LIENHARD 1988: Fig. 26) ..... *C. burckhardti* LIENHARD
– Forewing length > 2 mm; vein An1 running on top of a prominent crest (folded in slide-mounted wing, cf. Fig. 7a). Phallosome V-shaped, with regularly rounded base (Fig. 7c) ..... *C. venosus* n. sp.

Coleotroctellus burckhardti LIENHARD, 1988

Since the publication of the original description 18 females from different localities in Thailand were received and 5 males from the type locality (cf. records). Part of the forewing was missing on the male used for the wing illustration in the original description (LIENHARD, 1988: Fig. 23), therefore a complete wing is illus-

trated here (Fig. 7g). Also to the original description may be added the following: (1) in both sexes posterior border of vertex on each side with a small depression; (2) in both sexes antero-lateral margins of labrum fringed with microtrichs; (3) in both sexes first flagellomere distinctly shorter than second and third combined; (4) in both sexes fore tibia on inner side with well developed comb consisting of 13–16 stout setae including distal spur; (5) hypandrium consisting of 2 sclerotized areas separated by a narrow membranous band (Fig. 7 f).

Records. Thailand: 5 ♂♂ (1 ♂ MHNG, 4 ♂♂ ELM), Nakhon Ratchasima Province: Khao Yai National Park, 11–24 April 1990, Malaise trap in forest, leg. E. FULLER. 1 ♀ (MHNG), Nakhon Ratchasima Province (Pak Chong District): Khao Yai National Park, Khao Khieo, 1020 m, semi-evergreen rain forest, 24 December 1992, leg. P. SCHWENDINGER. 1 ♀ (MHNG), Nakon Si Thammarat Province: Khao Yai, 400 m, 4 Mai 1987, leg. P. SCHWENDINGER. 1 ♀ (MHNG), Chiang Mai Province (Chiang Dao District): Doi Chiang Dao Wildlife Sanctuary, Huay Mae Kok, 1500 m, evergreen patch in mixed deciduous forest, 27 January 1996, leg. P. SCHWENDINGER. 1 ♀ (MHNG), Chiang Mai Province (Chiang Dao District): Doi Chiang Dao Wildlife Sanctuary, 510 m, pitfall trap, 23 November–22 December 1990, leg. P. SCHWENDINGER. 1 ♀ (MHNG), Chiang Mai Province (Chiang Dao District): Doi Chiang Dao, 450 m, 7 March 1987, leg. P. SCHWENDINGER. 1 ♀, Chiang Mai Province: Doi Chiang Dao, 1000 m, 4 July 1985, bamboo litter (Berlese), leg. L. DEHARVENG. 1 ♀ (MHNG), Chiang Mai Province (Mae Taeng District): Huay Nam Dang, 1400 m, 17 December 1990, leg. P. SCHWENDINGER. 1 ♀ (MHNG), Chiang Mai Province: Bau Mae Sanam, 1080 m, road side vegetation, 1 October 1991, leg. P. SCHWENDINGER. 1 ♀ (MHNG), Chiang Mai Province (Chiang Mai District): Doi Suthep, 1100 m, pitfall trap, 22 April–7 June 1986, leg. P. SCHWENDINGER. 2 ♀♀ (MHNG), Chiang Mai Province (Chiang Mai District): Doi Suthep, 1180 m, pitfall trap, 4 January–7 February 1988, leg. P. SCHWENDINGER. 2 ♀♀ (MHNG), Chiang Mai Province (Chiang Mai District): Doi Suthep, 1100 m, pitfall trap, 18 March–22 April 1986, leg. P. SCHWENDINGER. 2 ♀♀ (MHNG), Chiang Mai Province (Chiang Mai District): Doi Suthep, 960 m, pitfall trap, 5 March–4 April 1987, leg. P. SCHWENDINGER. 1 ♀ (MHNG), Chiang Mai Province (Chiang Mai District): Doi Suthep, 1180 m, pitfall trap, 1–30 March 1987, leg. P. SCHWENDINGER. 1 ♀ (MHNG), Phitsanulok Province: Phu Hin Rongkla National Park, 1200 m, 12 September 1990, leg. P. SCHWENDINGER. 1 ♀ (MHNG), Mae Hong Son Province: Khao Soi Dao, 300 m, 7 Mai 1987, leg. P. SCHWENDINGER.

Coleotroctellus loebli LIENHARD, 1988

This species is still only known from the holotype female collected in the Kaeng Krachan National Park (Thailand: Phetchaburi Province) (cf. LIENHARD, 1988). It is easy to distinguish from the three other species by some wing characters (see key to species).

Coleotroctellus venosus n. sp.

Material. Holotype ♀, allotype ♂ (MHNG), China: Eastern Hubei Prov., ca. 25 km NE of Macheng, 500 m, litter, 25 May 1995, leg. S. KURBATOV.

Female color (in alcohol). Head yellowish-brown, some red-brown epidermal pigment on frons; vertical line and frontal lines not visible. Compound eyes black. Antennae, thorax and legs brown. Abdomen whitish, terminalia light brown. Forewings brown, only weakly transparent.

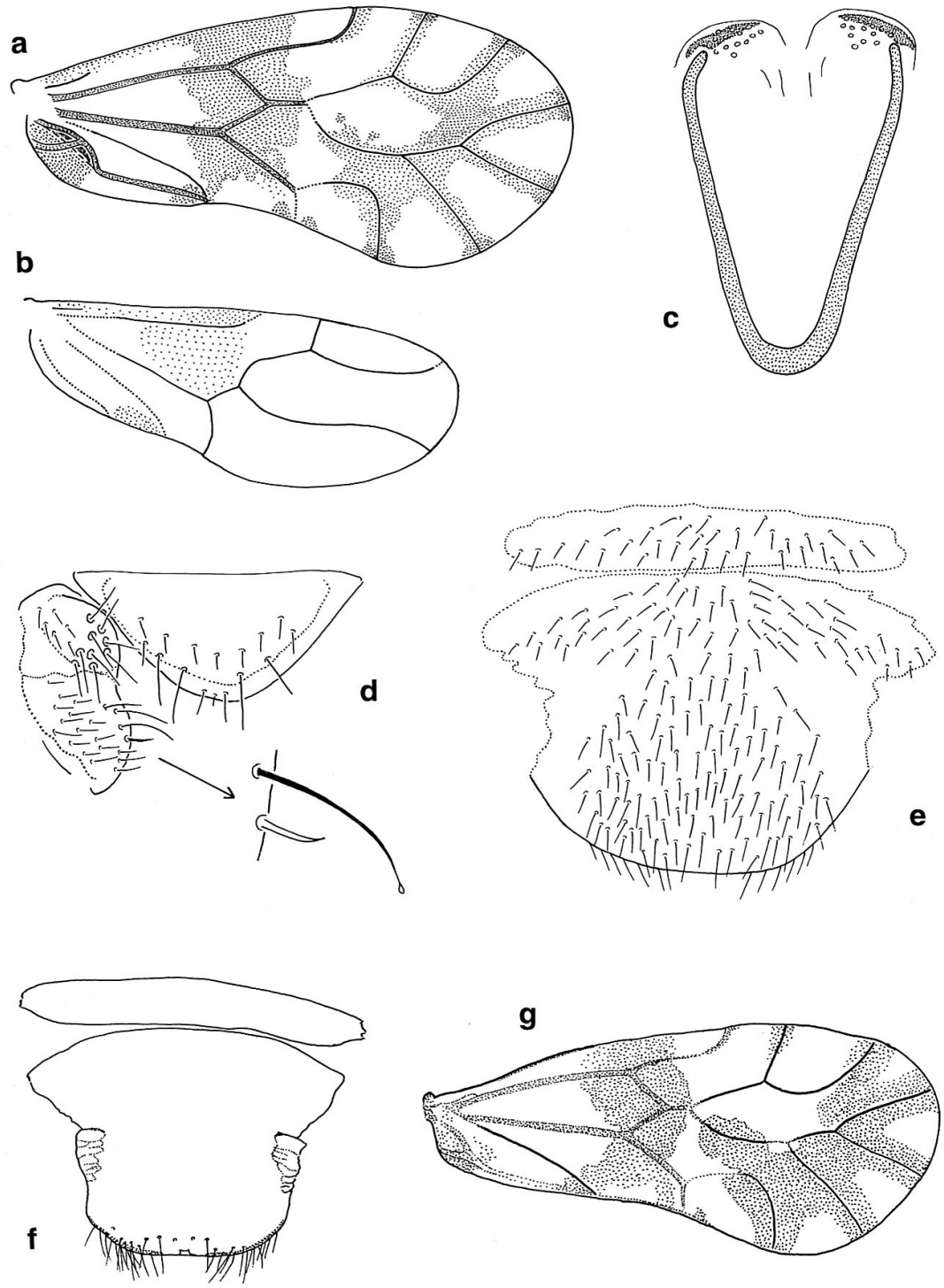

Fig. 7. *Coleotroctellus venosus* n. sp., ♂: a, forewing; b, hindwing; c, phallosome; d, epiproct and left paraproct; e, hypandrium. – *Coleotroctellus burckhardti* LIENHARD, ♂: f, hypandrium (pilosity only represented on posterior margin); g, forewing.

Female structural characters. Head capsule on posterior border of vertex on each side with a small depression (Fig. 9c); ocelli not developed. Both antennae intact, with 13 segments; antennal flagellum: f1 1.2x length of f2, no setae on f1, other flagellomeres sparsely beset with some straight or slightly wavy setae. Lacinial tip as in Fig. 8e. Maxillary palpus as in Fig. 8c; P2 curved, P4 3.7x as long as its greatest width, bearing 8 thin-walled setal sensilla. Antero-lateral margin of

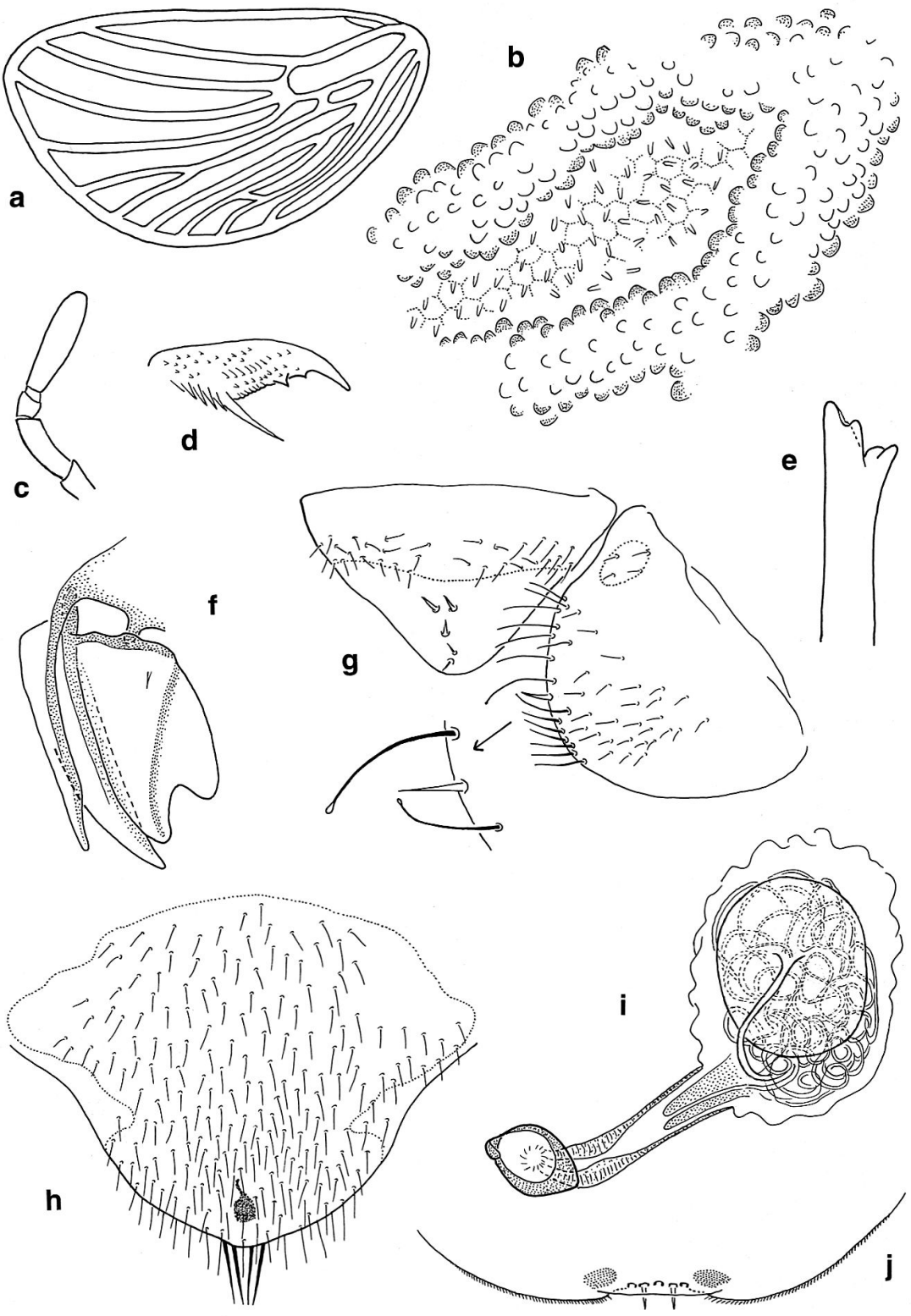

Fig. 8. *Coleotroctellus venosus* n. sp., ♀: a, left forewing; b, sculpture of veins and wing membrane in central part of the forewing; c, maxillary palpus; d, claw; e, lacinial tip; f, ovipositor valvulae; g, epiproct and right paraproct; h, subgenital plate; i, spermatheca; j, distal margin of labrum.

labrum densely fringed with fine microtrichs (Fig. 8j). Head sculpturing with small but very distinct scale-like areoles, no tubercles present. Comb of front tibia well developed, consisting of a dense longitudinal row of about 15 stout setae including

apical spur, the 4 setae preceding apical spur almost as stout as the spur. Claw as in Fig. 8d, distal preapical denticle weakly developed.

Forewings elytriform, strongly vaulted, dorsally and ventro-laterally enveloping the soft membranous abdomen (Figs 10c, d); wing membrane somewhat thickened. Veins distinctly thicker than in a normally shaped wing (cf. male), with tubercular sculpture (Fig. 8b). Ventral wing membrane with small spinules (distance between them usually more than twice their length), dorsal membrane finely granulate and in central part of wing with more or less distinct hexagonal areas (Fig. 8b). Wing venation (Figs 8a; 9b, c; 10c, d): most of the bifurcations of the veins concentrated in basal half of the wing, therefore central and apical parts dominated by numerous parallel longitudinal veins, some asymmetries observable between right wing (Fig. 9b) and left wing (Fig. 8a). Sc weakly developed, very short, reaching wing margin near wing base (Figs 8a, 9b); between R1 and An1 eleven branches reaching wing margin (Figs 8a, 9b); An1 thickened and forming a continuation of marginal vein (Fig. 9c); An2 weakly developed and difficult to observe, very short, running from base of An1 to wing margin; anal cell forming a sharp angle with the adjacent cubital cell, therefore posterior margin at wing base only visible in dorsal view (Fig. 9c), this part of wing margin fitting in a groove delimited by some prominent ridges of meso- and metanotum so that the forewing is locked to the thorax in resting position. Hindwing very much reduced, veinless.

Subgenital plate (Fig. 8h) with 4 stout apical setae, internal sclerite subrectangular with an anterior "tail". Spermatheca (Fig. 8i) containing a complexly convoluted spermatophore, membrane of spermathecal sac completely smooth, spermapore surrounded by a slightly elongated sclerified ring bearing a small, curved dis-

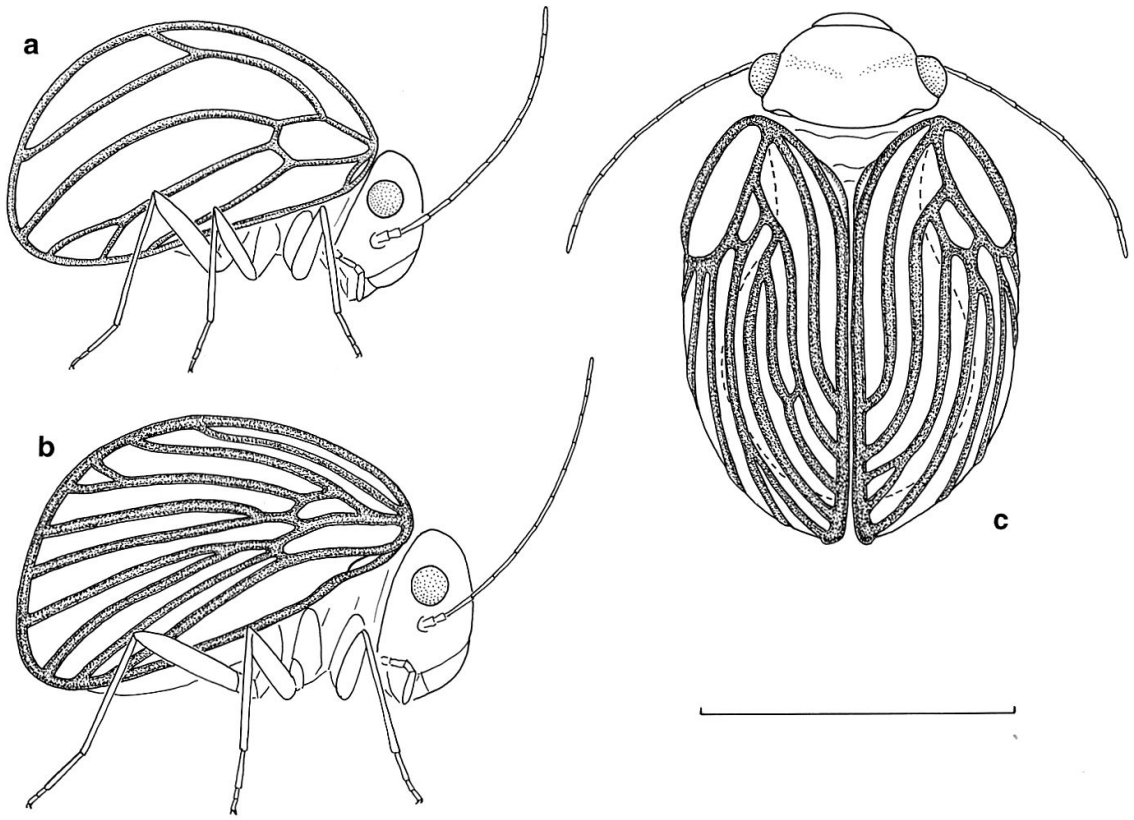

Fig. 9. *Coleotroctellus burckhardti* LIENHARD, ♀: a, habitus, lateral view. – *Coleotroctellus venosus* n. sp., ♀: b, habitus, lateral view; c, habitus, dorsal view. – Scale = 1 mm.

tal process. Ovipositor valvulae as in Fig. 8f; v3 distinctly but not very deeply divided, in basal half with 1–2 relatively long isolated seta-like microtrichs. Epiproct and paraproct as in Fig. 8g, paraproct with a stout apical seta and two knobbed subapical setae, sensorium very weakly differentiated, with 4 short setae lacking basal rosettes.

Female measurements. B = 1.33 mm; A = 1.04 mm; FW = 1.44 mm; F = 380 µm; T = 550 µm ; t1 = 228 µm; t2 = 53 µm; t3 = 93 µm; f1 = 120 µm; f2 = 100 µm; f3 = 98 µm; f4 = 103 µm; IO/D = 2.22.

Male color (in alcohol). Body and appendages brown, some red-brown epidermal pigment on frons, genae and postclypeus and on abdomen. Compound eyes black. Vertical line and frontal lines not visible. Forewing (Fig. 7a) with characteristic color pattern, hindwing only with some pale brown washes (Fig. 7b).

Male structural characters. Head capsule as in female but ocelli well developed, close together. Both antennae intact, with 13 segments; f1 1.4x length of f2; all flagellomeres beset with straight or slightly wavy setae. Mouthparts and comb of front tibia as in female. Head sculpturing as in female but some areoles enclosing a few minute tubercles. Claw as in female but distal preapical denticle very weakly developed or absent. Forewing (Fig. 7a) of normal shape and venation, but radial stem, medio-cubital stem and especially vein An1 prominent, membrane forming concave cells between these veins, anal cell forming a sharp angle with cell Cu2 (anal zone usually folded in slide-mounted wing, cf. Fig. 7a). Hindwing as in Fig. 7b. Hypandrium (Fig. 7e) with an anterior transverse sclerotized area separated from posterior part by a narrow membranous band. Phallosome (Fig. 7c) V-shaped, with relatively broad, regularly rounded base; within the membranous apical zone a sclerotized area near tip of each paramere; apical membrane on each side with a group of pores. Epiproct and paraproct as in Fig. 7d, paraproct with only one knobbed subapical seta, sensorium with 9 trichobothria in weakly developed basal rosettes and some hairs lacking basal rosettes.

Male measurements. B = 1.60 mm; A = 1.44 mm; FW = 2.13 mm; F = 430 µm; T = 707 µm ; t1 = 330 µm; t2 = 51 µm; t3 = 88 µm; f1 = 235 µm; f2 = 165 µm; f3 = 160 µm; f4 = 140 µm; IO/D = 2.27.

Remarks. On the basis of the male characters *C. venosus* is most closely related to *C. sui* (the female of this species is not known), but these males can be distinguished easily by the wing characters mentioned in the key. Concerning general morphology of both sexes and wing pattern of male *C. venosus* stands also close to the generotype *C. burckhardti*, from which it can be distinguished by the wing characters mentioned in the key. The present material of *C. venosus* was collected in eastern Hubei Province (southeastern part of China), in a low altitude biotope showing a general faunal composition of the Oriental type in spite of its geographical situation in an intermediate zone between Oriental and Palaearctic Region (pers. comm. by S. KURBATOV).

Coleotroctellus sui (LI FASHENG, 1993) n. comb.

Sinitroctopsocus sui LI FASHENG, 1993

Material. Holotype ♂ (ICBAU), China: Guangdong Prov. (Southern China), Shixing Co., 330 m, on tree, 26 April 1991 (no other specimen of this species is known).

Redescription of the holotype. Male color (in alcohol). Head, thorax and appendages brown, abdomen greyish, terminalia brown. Compound eyes black. Ver-

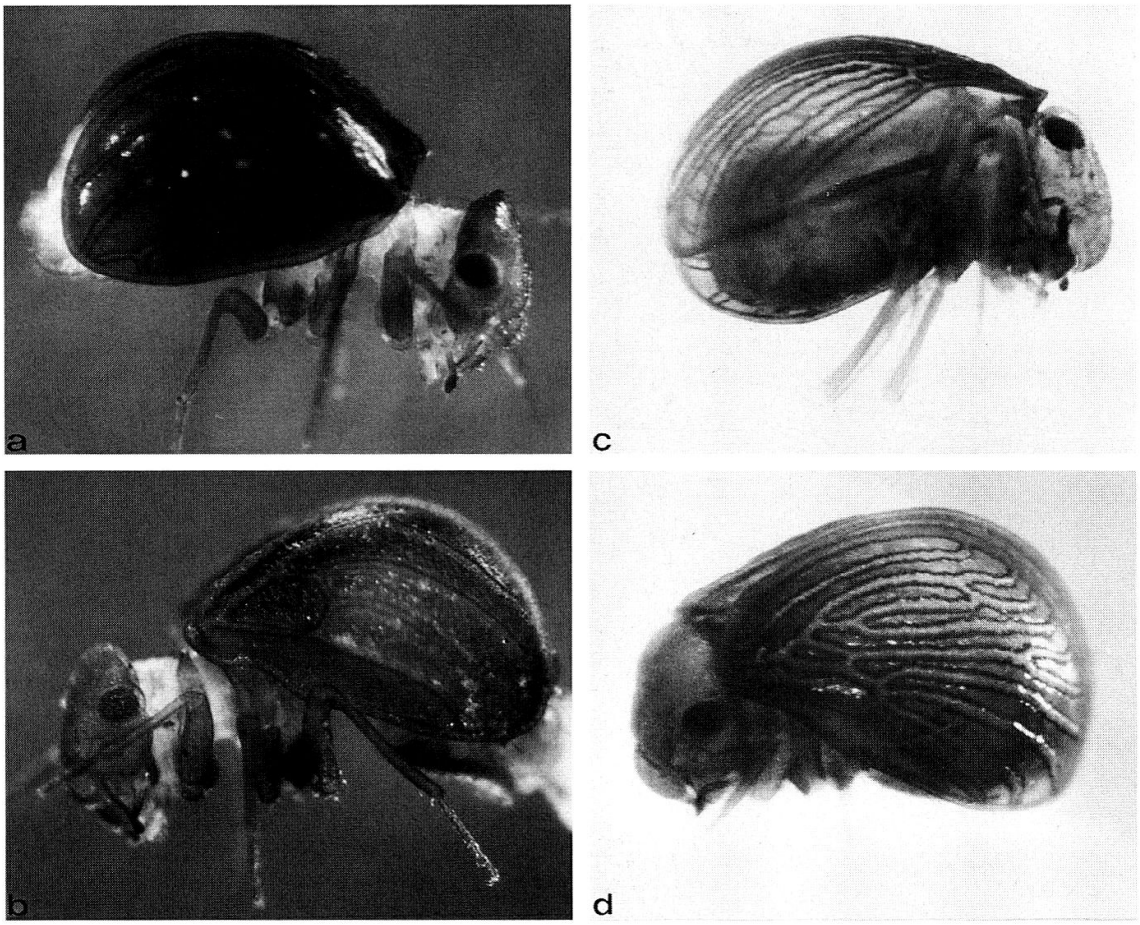

Fig. 10. *Coleotroctellus* spp., habitus ♀: a, *C. burckhardti* LIENHARD (lateral view); b, *C. loebli* LIENHARD (lateral view); c, *C. venosus* n. sp. (ventro-lateral view); d, *C. venosus* n. sp. (lateral view).

tical line weakly developed but distinct, brown, frontal lines not visible. Forewing (Fig. 6f) with characteristic color pattern, hindwing only with some pale brown washes (Fig. 6g).

Male structural characters. Head capsule on each side of posterior border of vertex with a small depression, delimited internally by a ridge which, in dorsal view, is visible as a small prominence (Fig. 6i). Ocelli well developed, close together. Both antennae intact, with 13 segments; f1 1.3x length of f2; all flagellomeres beset with straight or slightly wavy setae. Mouthparts and head sculpturing as in *C. venosus*. Comb of front tibia well developed, consisting of a longitudinal row of about a dozen stout setae including apical spur. Claw as in male of *C. venosus*, distal preapical denticle very weakly developed or absent. Forewing (Fig. 6f) of normal shape and venation, but radial stem, medio-cubital stem and especially vein An1 prominent, membrane forming concave cells between these veins, anal cell forming a sharp angle with cell Cu2 (anal zone usually folded in slide-mounted wing, cf. Fig. 6f); veins M1 and M2 slightly bent forwards. Hindwing as in Fig. 6g. Hypandrium with an anterior transverse sclerotized area separated from posterior part by a narrow membranous band, sternite preceding this transverse area also slightly sclerotized, in particular laterally. Phallosome (Fig. 6h) broadly V-shaped, with a small accessory sclerite at the tip of each paramere; apical membrane on each side with a group of pores. Epiproct and paraproct as in male of *C. venosus*, paraproct with one knobbed subapical seta and a stout, slightly curved apical seta, sensorium with

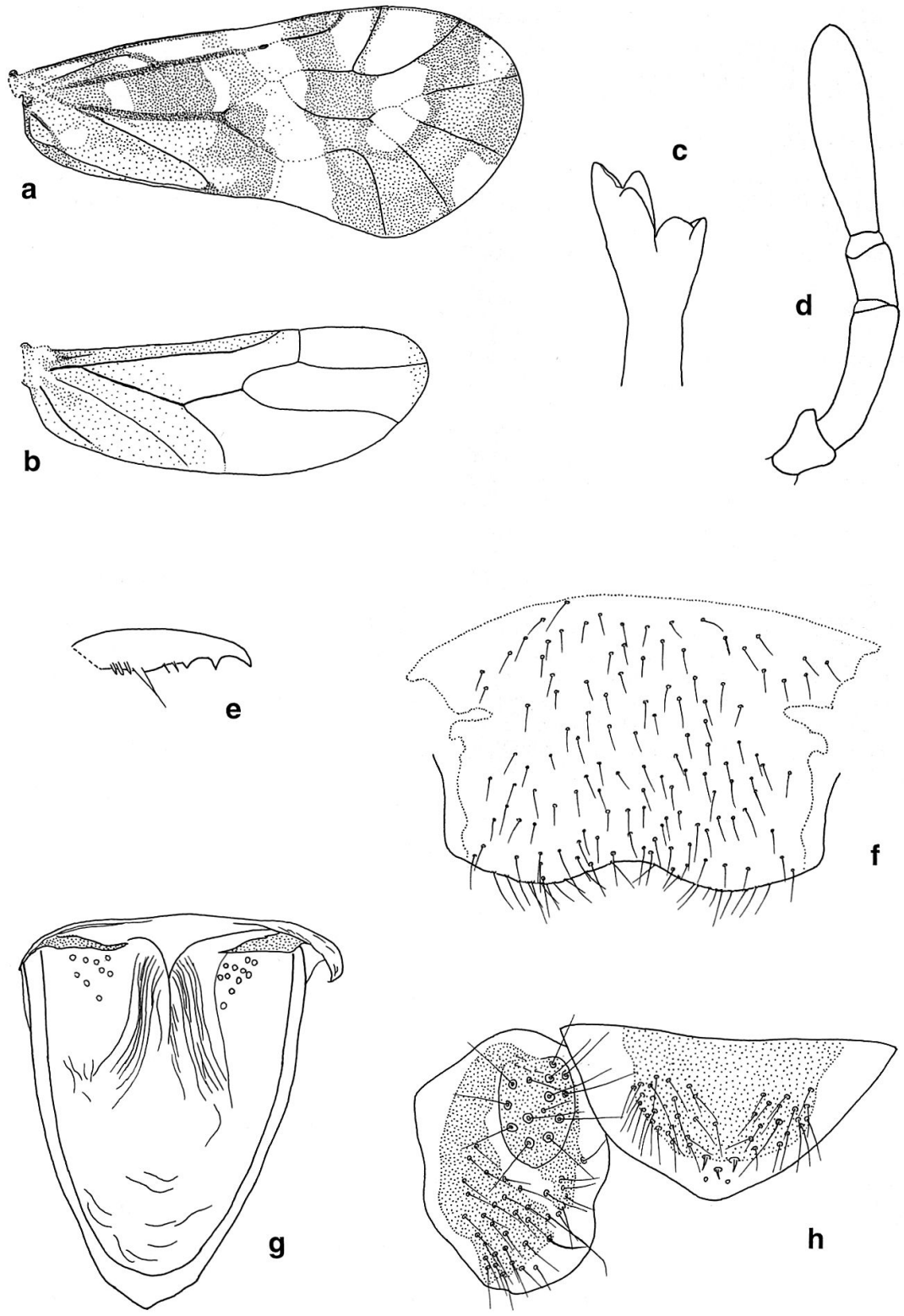

Fig. 11. *Thaipsocus sarawakensis* n. sp., ♂: a, forewing; b, hindwing; c, lacinial tip; d, maxillary palpus; e, claw; f, hypandrium; g, phallosome; h, epiproct and left paraproct.

7–9 trichobothria in weakly developed basal rosettes and some shorter hairs lacking basal rosettes.

Male measurements. B = 1.9 mm [the body length of 2.97 mm indicated by LI FASHENG (1993) is not correct]; A = 1.35 mm; FW = 2.5 mm; F = 500 µm; T =

800 µm ; t1 = 325 µm; t2 = 55 µm; t3 = 80 µm; f1 = 220 µm; f2 = 165 µm; f3 = 145 µm; f4 = 150 µm; IO/D = 1.9.

Remarks. See *C. venosus*.

ACKNOWLEDGEMENTS

We are very grateful to Dr. P. SCHWENDINGER (Chiang Mai and Innsbruck) who collected most of the Thai material examined. For the other material put at our disposal we thank Prof. Dr. LI FASHENG (Beijing), Dr. S. KURBATOV (Moscow), Dr. L. DEHARVENG (Toulouse), Dr. E. FULLER (Edmonton, Alberta, Canada), Dr. S. HEYDON (Davis, California), and Drs D. BURCKHARDT and I. LÖBL (Geneva).

REFERENCES

GARCIA ALDRETE, A.N. & MOCKFORD, E.L. 1996. A new Peruvian Musapsocid genus and species (Psocoptera: Musapsocidae). *Ent. News 107*: 88–92.

LI, FASHENG. 1993. *Psocoptera from National Chebaling Nature Reserve (Insecta: Psocoptera)*. Collected Papers for Investigation in National Chebaling Nature Reserve, Science and Technology Publishing House of Guangdong Province, pp. 313–430. (In Chinese with English summary)

LIENHARD, C. 1980. *Chelyopsocus garganicus* n.gen., n.sp., eine neue lapidicole Psocoptere aus Süditalien (Psocoptera: Troctopsocidae). *Mitt. schweiz. ent. Ges. 53*: 209–214.

LIENHARD, C. 1988. Three new extra-neotropical species of Troctopsocidae (Insecta: Psocoptera). *J. nat. Hist. 22*: 575–587.

LIENHARD, C. 1990. A new Oriental species of Troctopsocidae (Insecta: Psocoptera). *Revue suisse Zool. 97*: 339–344.

LIENHARD, C. 1995. Psocoptères (Psocoptera) nouveaux ou peu connus d'Italie, de Chypre et du Yémen. *Mitt. schweiz. ent. Ges. 68*: 335–361.

MOCKFORD, E. L. 1967. The Electrentomoid Psocids (Psocoptera). *Psyche, Camb.74*: 118–165.

NEW, T. R. 1973. A new species of *Troctopsoculus* MOCKFORD (Psocoptera, Troctopsocidae) from Brazil. *Entomologist 106*: 284–286.

SMITHERS, C. N. 1972. The classification and phylogeny of the Psocoptera. *Aust. Mus. Memoir 14*: 1–349.

TURNER, B. D. 1975. The Psocoptera of Jamaica. *Trans. R. ent. Soc. Lond. 126*: 533–609.

(received April 23, 1997; accepted July 1, 1997)