

Some linyphiid spiders from south-east Asia

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Summary

More linyphiid spiders from south-east Asia are recorded. Descriptions are given of 9 new genera, namely *Chiangmaia*, *Cyphonetria*, *Diplophrys*, *Nentwigia*, *Pronasoona*, *Racata*, *Thainetes*, *Thaiphantes* and *Tomohyphantes*, and 22 new species, namely *Erigone rutila*, *Ceratinopsis locketi*, *Diplophrys pallida*, *D. cracatoa*, *Nasoona locketi*, *N. silvestris*, *Pronasoona sylvatica*, *P. aurata*, *Locketiella merretti*, *Dubiaranea deelemanae*, *Thainetes tristis*, *Racata grata*, *Cyphonetria thaia*, *Nentwigia diffusa*, *Tomohyphantes niger*, *T. opacus*, *Chiangmaia sawetamali*, *C. rufula*, *Thaiphantes milneri*, *T. similis*, *Laetesia asiatica* and *Lepthyphantes latrobei*. *Chaetophyma* Millidge, 1991 is synonymised with *Nasoona* Locket, 1982; *Ceratinopsis monticola* (Simon) is a new combination for *Lygarina monticola* Simon, 1894, and *Nasoona coronata* (Simon) is a new combination for *Neriene coronata* Simon, 1894. The linyphiid fauna of south-east Asia has strong similarities to that of South America, and a speculative hypothesis to account for this fact is proposed.

Introduction

This paper describes some linyphiid spiders collected in Krakatoa, Java (Indonesia), Thailand, eastern Indonesia and eastern Malaysia.

The collection from Krakatoa was supplied by Prof. W. Nentwig (Bern), and comprises material collected by himself in 1990 and 1991, and by members of the La Trobe University (Melbourne, Australia) in expeditions to Krakatoa in 1984, 1985 and 1990. Krakatoa consists of four islands: Anak Krakatoa, approximately 40–50 years old, with a still active crater, is three-quarters uncovered sand and lava, the remainder grassland and forest; Rakata, Sertung and Panjang are older, c. 110 years, and are covered in rich tropical rain forest. Most of the collecting was done on Rakata. (Information supplied by Prof. Nentwig.)

The material from Thailand was collected by Mr J. E. D. Milner (London) during a succession of trips to that country. This material is particularly interesting, since only one linyphiid species has previously been reported from Thailand.

The material from eastern Indonesia and eastern Malaysia was provided by Mrs C. Deeleman (Ossendrecht), and represents but a small part of large collections of linyphiids made by C. L. & P. R. Deeleman in south-east Asia.

A total of 9 new genera and 22 new species is described. Many of the species are unfortunately represented by only one sex. An earlier paper (Millidge & Russell-Smith, 1992) lists the linyphiid species previously recorded from south-east Asia.

Palps figured are the right palp, unless otherwise stated. All measurements are in mm. Abbreviations: MHNG=Muséum d'Histoire naturelle, Geneva; MNHN=Muséum national d'Histoire naturelle, Paris; NHM=Natural History Museum, London.

Genus *Erigone* Audouin, 1826

Erigone bifurca Locket, 1982

This species was taken in Anak Krakatoa: 1♂ by sweeping grass in forest, August 1990; 1♂ in pitfall trap in forest, August–September 1990 (both leg. W. Nentwig); 1♀ in water trap, shore, August 1985 (La Trobe Expedition 1985).

Erigone rutila, new species (Figs. 1–4)

Type: Male holotype from Mae Seriang, west Thailand, December 1985 (leg. J. E. D. Milner); deposited in NHM.

Etymology: The specific name is an adjective meaning “golden brown”.

Diagnosis: The female is diagnosed by the epigynum (Fig. 4), but this is not very distinctive. The male is diagnosed by the palp (Figs. 1, 2), coupled with the raised carapace (Fig. 3) which has small warts on the elevation. In both sexes, additional diagnostic characters are the colour, the small size and the locality of capture.

Female: Total length 1.35–1.55. Carapace, length 0.55–0.65, orange-brown. Abdomen grey dorsally, black ventrally, sometimes completely black. Sternum orange, mottled with dark brown. Legs bright orange-brown; TmI c. 0.4. Epigynum (Fig. 4): the epigynal area is barely distinguishable from the surrounding integument.

Male: Total length 1.45–1.55. Carapace, length 0.75–0.80, raised anteriorly (Fig. 3), with a few warts dorsally and small teeth on lateral margins. Chelicerae with 5–6 stout curved teeth anteriorly. Colour and chaetotaxy as female. Palp (Figs. 1, 2).

Material examined: Paratypes: At type locality, 5♀ 1♂; Ban Bo Luang, 70 km east of Mae Seriang, W. Thailand, December 1985, 1♀; Salween River, W. Thailand, December 1989, 1♀; Chiang Mai, in garden, December 1988, 1♀; Chiang Rai, N. Thailand, wet grass by river, March 1984 and December 1988, 2♀ 2♂; Chiang Rai, garden, December 1988, 1♀; 10 km SW of Chiang Rai, November 1985, 1♀. (1♀ paratype deposited in NHM, rest in Milner coll.)

Distribution: Known only from Thailand.

Genus *Ceratinopsis* Emerton, 1882

Ceratinopsis monticola (Simon, 1894), new combination (Figs. 5, 6)

Lygarina monticola Simon, 1894: 648; Roewer, 1942: 675; Bonnet, 1957: 2674.

The male holotype (MNHN, examined) is a typical *Ceratinopsis*; it is a tiny species (total length 1.05) generally similar to *C. occidentalis* Locket, but the palpal tibia (Figs. 5, 6) is rather differently shaped.

Ceratinopsis locketi, new species (Figs. 7–11)

Type: Male holotype from pitfall trap, Anak Krakatoa, Indonesia, December 1991 (leg. W. Nentwig); deposited in NHM.

Etymology: The specific name is a patronym in memory of my friend G. H. Lockett.

Diagnosis: The female is diagnosed by the epigynum (Fig. 11), which is very similar to that of *C. occidentalis*, but significantly larger. The male is diagnosed by the palp (Figs. 7–10). The male is close to *C. blesti* Lockett, from which it differs by the absence of a trichobothrium on metatarsus IV and by the shape of the palpal tibia. *C. locketi* male is also remarkably similar to *C. obscura* Emerton, 1919, a North American species.

Female: Total length 1.3–1.45. Carapace, length 0.65, pale orange to orange. Abdomen grey to black. Sternum slightly rugose, orange suffused with brown. Legs pale orange; tibial spines 1111, TmI c. 0.4. Epigynum (Fig. 11).

Male: Total length 1.35–1.55. Carapace length 0.65. Colour, etc. as female, except that legs are paler. Palp (Figs. 7–10).

Material examined: Paratypes: 19♂ 1♀, in pitfall traps and leaf litter, Anak Krakatoa, September 1990, April and December 1991 (W. Nentwig); 2♀, from leaf litter, Sertung, Krakatoa, November 1984 (La Trobe Expedition 1984). (1♀ paratype deposited in NHM, rest in Nentwig coll.).

Distribution: Known only from Krakatoa, Indonesia.

Genus *Nematogmus* Simon, 1884

Nematogmus dentimanus Simon, 1886

One male of this species (redescribed by Van Helsdingen, 1979) was taken in a trap on Anak Krakatoa, August 1985 (La Trobe Expedition 1985). There are already records of this species from Java and elsewhere in south-east Asia, including Thailand.

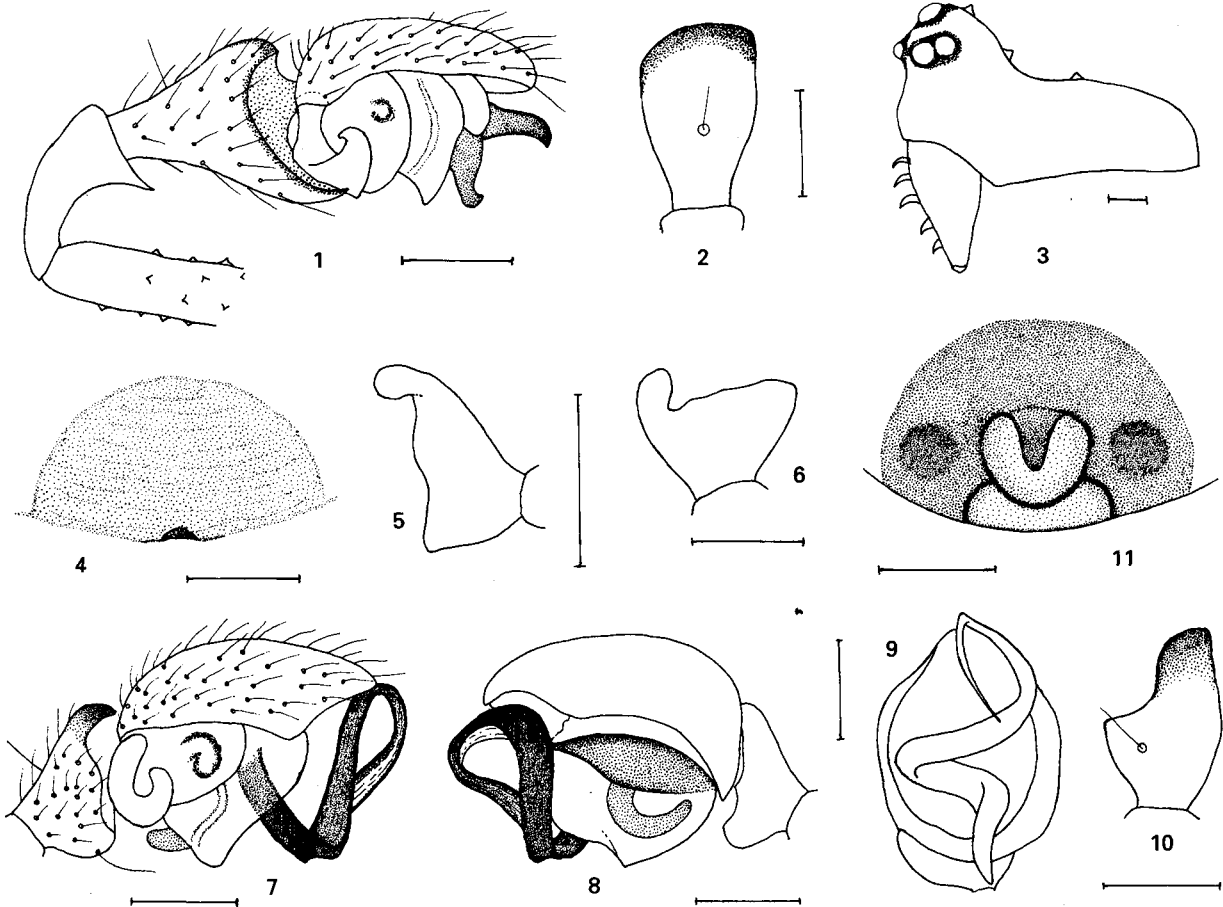
Genus *Diplophrys*, new genus

Type species: *Diplophrys pallida*, new species.

Etymology: From the Greek “diplos”, double, and “ophrys”, forehead; gender feminine.

Diagnosis: Females are diagnosed by the small size, pale colour, chaetotaxy and epigynum (Fig. 16), but the latter is simple and not very distinctive. Males are diagnosed by the carapace lobe (Figs. 14, 21, 22), the chaetotaxy and the palpal form (Figs. 12, 13, 19, 20).

Description: Pale coloured spiders of total length 1.5–2.0. Male carapace elevated into a bifid lobe which carries the PM eyes (Figs. 14, 21, 22); post-ocular sulci with holes lie along base of lobe laterally. Eyes moderate



Figs. 1–4: *Erigone rutila*, n.sp. 1 Male palp, ectal; 2 Male palpal tibia, dorsal; 3 Male carapace, lateral; 4 Epigynum, ventral.

Figs. 5–6: *Ceratinopsis monticola* (Simon). 5 Male palpal tibia (left), lateral; 6 Ditto, dorsal.

Figs. 7–11: *Ceratinopsis locketi*, n.sp. 7 Male palp, ectal; 8 Ditto, mesal; 9 Ditto, ventral; 10 Male palpal tibia, dorsal; 11 Epigynum, ventral. Scale lines=0.1 mm.

in size, with PME (female) *c.* 1d apart. Legs relatively short and stout, with tibia I 1/d (female) *c.* 7. Tibial spines 2211 in female, but weak, and in male very weak or absent; femora and metatarsi spineless. TmI *c.* 0.8, metatarsus IV with trichobothrium. Tracheal form erigonine, with tracheoles extending into prosoma. Female epigynum simple (Fig. 16); internally (Fig. 17) the duct from the spermatheca to the opening is short and coiled. Male palpal tibia with a short pointed apophysis distally (Figs. 15, 18). Palpal organ with a prominent suprategular apophysis (Figs. 13, 19) and embolic division with a lightly sclerotised radical part from which a pointed, sclerotised member projects ventrally, while the short, stout embolus projects anteriorly (Figs. 13, 20).

Included species: The type species and *D. cracatoa*, new species.

Taxonomic position: This genus is erigonine in its tracheal form. The embolic division of the male palp bears some resemblance to that of the South American genus *Onychembolus* Millidge, which has the simple, linyphiine form of tracheae, but this resemblance may be coincidental. The taxonomic position of *Diplophrys* must at present remain obscure.

Distribution: Thailand and Krakatoa, Indonesia.

***Diplophrys pallida*, new species (Figs. 12–17)**

Type: Male holotype from bank of Kok River, Chiang Mai, Thailand, December 1986 (leg. J. E. D. Milner); deposited in NHM.

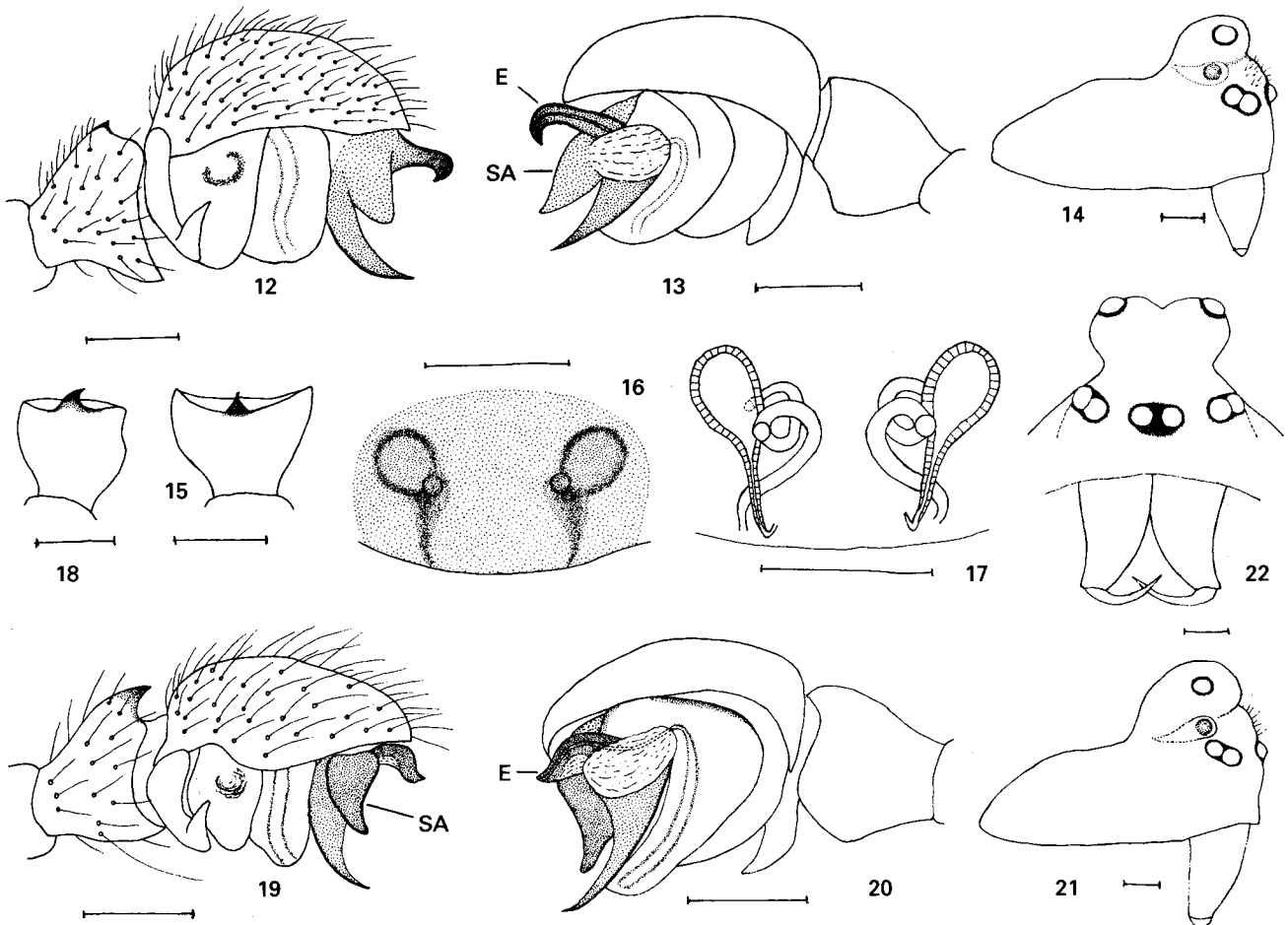
Etymology: The specific name is an adjective meaning pale in colour.

Diagnosis: The female is diagnosed by the epigynum (Figs. 16, 17), coupled with the chaetotaxy and the pale colour. The male is diagnosed by the large cephalic lobe (Fig. 14) and the palp (Figs. 12, 13, 15); it is distinguished from *D. cracatoa* by the differently shaped embolus and the shorter vertical process of the embolic division.

Female: Total length 1.8–2.0. Carapace, length 0.7–0.75, pale yellow to pale yellow-brown, slightly darker anteriorly. Abdomen pale whitish yellow to pale yellow, with dorsally a few blackish spots or bars, and darkened around spinners. Sternum pale yellow-brown, with darker margins. Legs pale yellow-brown; TmI *c.* 0.8. Epigynum (Figs. 16, 17).

Male: Total length 1.5–1.6. Carapace, length 0.7–0.75, with large, bifid lobe (Fig. 14). Colour as female. TmI *c.* 0.8. Palp (Figs. 12, 13, 15).

Material examined: Paratypes: 6♀ 4♂, type locality, December 1986; 6♀ 11♂, from wet grass, river bank,



Figs. 12–17: *Diplophrys pallida*, n.sp. **12** Male palp, ectal; **13** Ditto, mesal; **14** Male carapace, lateral; **15** Male palpal tibia, dorsal; **16** Epigynum, ventral; **17** Epigynum, internal, dorsal.

Figs. 18–22: *Diplophrys cracatoa*, n.sp. **18** Male palpal tibia, dorsal; **19** Male palp, ectal; **20** Ditto, mesal; **21** Male carapace, lateral; **22** Ditto, anterior. Abbreviations: E=embolus, SA=suprategular apophysis. Scale lines=0.1 mm.

Chiang Rai, December 1985; 1♂, grass lawn, Chiang Rai, December 1988; 1♂, edge of lake, 10 km SW of Chiang Rai, November 1985; 1♀, river bank, Ubon Ratchathani, November 1989; all Thailand, leg. J. E. D. Milner. (1♀ paratype deposited in NHM, rest in Milner coll.).

Distribution: Thailand.

***Diplophrys cracatoa*, new species** (Figs. 18–22)

Type: Male holotype from Anak Krakatoa, Indonesia, August 1990 (leg. W. Nentwig); deposited in NHM.

Etymology: The specific name is an adjective, latinised from “Krakatoa”.

Diagnosis: The male is diagnosed by the large cephalic lobe (Figs. 21, 22) and the palp (Figs. 19, 20); it is distinguished from *D. pallida* by the differently shaped embolus and the longer ventral process of the embolic division. The female is unknown.

Male: Total length 1.5–1.6. Carapace, length 0.7–0.75, pale yellow to pale orange, slightly darker anteriorly, where it is raised into a large bifid lobe (Figs. 21, 22). Abdomen whitish to pale yellow, with two longitudinal

broken bars dorsally; darkened around spinners. Sternum pale yellow to yellow-brown, with margins sometimes darker. Legs pale orange; TmI c. 0.8. Palp (Figs. 18–20).

Material examined: The holotype, by sweeping grass; 3♂ paratypes, from Malaise traps, August 1985 and September 1990 (La Trobe Expeditions 1985 and 1990); all Anak Krakatoa (paratypes in Nentwig coll.).

Distribution: Only Krakatoa, Indonesia.

Genus *Nasoona* Locket

Nasoona Locket, 1982: 366; type species *Nasoona prominula* Locket, from western Malaysia.

Chaetophyma Millidge, 1991: 123; type species *Neriene coronata* Simon, 1894, from Venezuela. **New synonymy.**

The conical, spiny elevation of the carapace, and the palpal form, show clearly that *N. coronata* belongs in *Nasoona*, and consequently *Chaetophyma* is a junior synonym of *Nasoona*. The tracheal system of *Nasoona* comprises two wide median tracheae which branch anteriorly into numerous tracheoles which run into the prosoma; lateral tracheae appear to be absent.

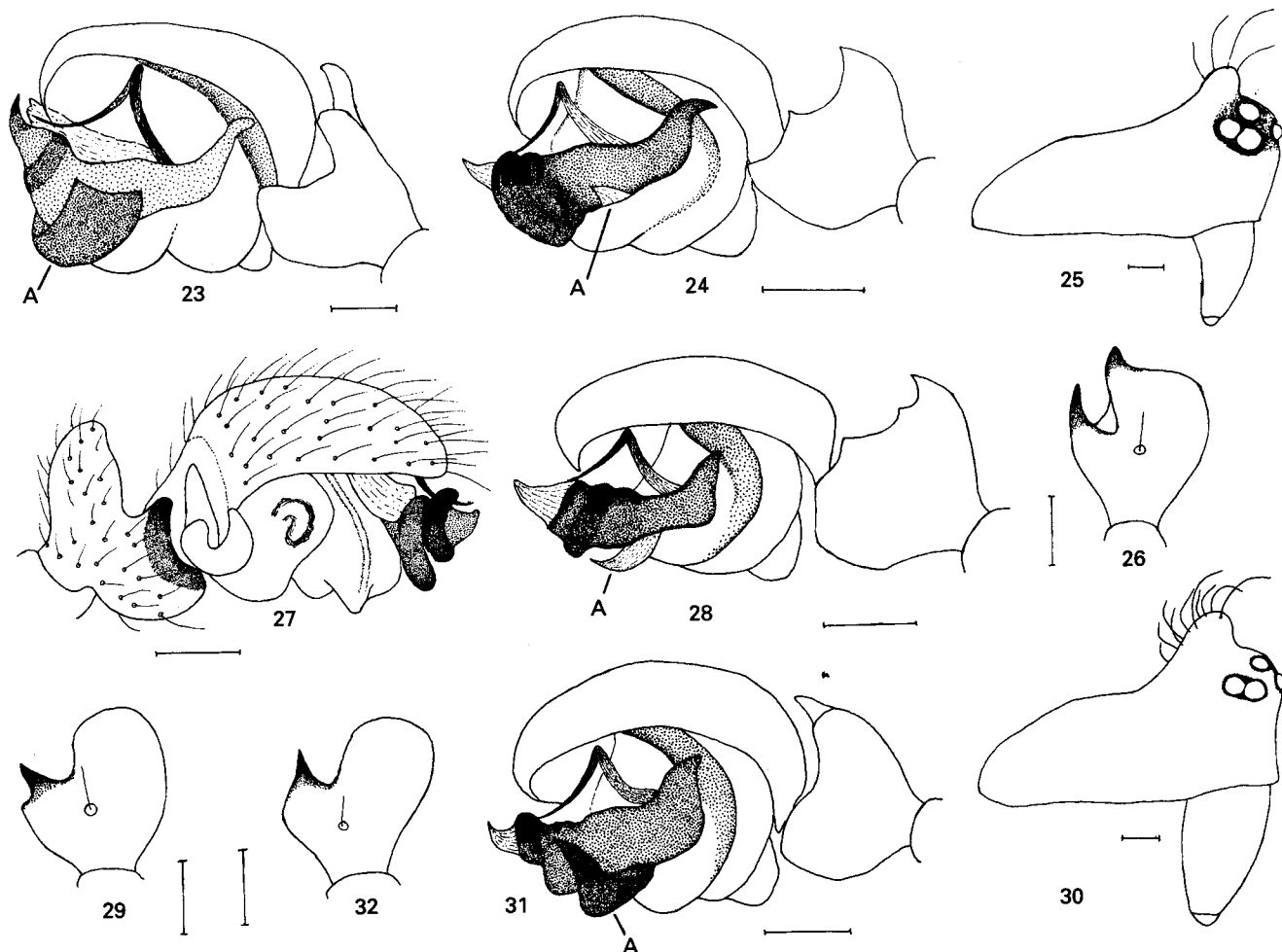


Fig. 23: *Nasoona coronata* (Simon). Male palp, mesal.

Figs. 24–26: *Nasoona prominula* Locket. 24 Male palp, mesal; 25 Male carapace, lateral; 26 Male palpal tibia, dorsal.

Figs. 27–30: *Nasoona locketi*, n.sp. 27 Male palp, ectal; 28 Ditto, mesal; 29 Male palpal tibia, dorsal; 30 Male carapace, lateral.

Figs. 31–32: *Nasoona silvestris*, n.sp. 31 Male palp, mesal; 32 Male palpal tibia, dorsal. Abbreviation: A=basal apophysis of embolic division. Scale lines=0.1 mm.

The dorsal tibial spines of the male of *N. locketi* n.sp. (1111) differ from those described for the type species, *N. prominula* Locket (2211).

***Nasoona coronata* (Simon, 1894), new combination** (Fig. 23)

A new figure (Fig. 23) is given of the male palp; the basal apophysis of the embolic division is rectangular rather than triangular as in the south-east Asian species (Fig. 23: A, cf. Figs. 28, 32: A).

***Nasoona prominula* Locket, 1982** (Figs. 24–26, 33, 34)

A new figure (Fig. 24) is given of the male palp, for comparison with those of the other species. This species has now been found in Thailand; 2♀ 3♂ 1 subadult ♂, from Nan, March 1986 (J. E. D. Milner).

***Nasoona locketi*, new species** (Figs. 27–30, 35–37)

Type: Female holotype from summit of Rakata, Krakatoa, 813 m, 18–19 September 1984 (La Trobe Expedition 1984); deposited in NHM.

Etymology: The specific name is a patronym in honour of my late friend G. H. Locket.

Diagnosis: The female is diagnosed by the epigynum (Figs. 35–37), which differs from that of *N. prominula* by the presence of short, blunt apophyses which project from either side of the atrium. The male is very close to *N. prominula*, with only very small differences in the embolic division of the palp (Fig. 28 cf. Fig. 24) and the palpal tibia (Fig. 29 cf. Fig. 26); the latter is also very close to that of *N. silvestris* (Fig. 32). The conical elevation in *N. prominula* male is slightly more indented anteriorly than in *N. locketi* (Fig. 25 cf. Fig. 30), but whether this small difference is constant is not certain. *N. locketi* appears to be rather lighter in colour (more orange than brown), and the tibial spines in male seem to be 1111 rather than 2211 as in *N. prominula*.

Female: Total length 2.05. Carapace, length 0.9, orange-brown with narrow blackish margins. Abdomen black, with a broad whitish stripe dorsally, ventrally with a pale brown stripe, and white around spinners. Sternum orange, suffused with brown, particularly on margins. Legs orange-yellow to orange; dorsal tibial spines 2211, TmI c. 0.6. Epigynum (Figs. 35–37).

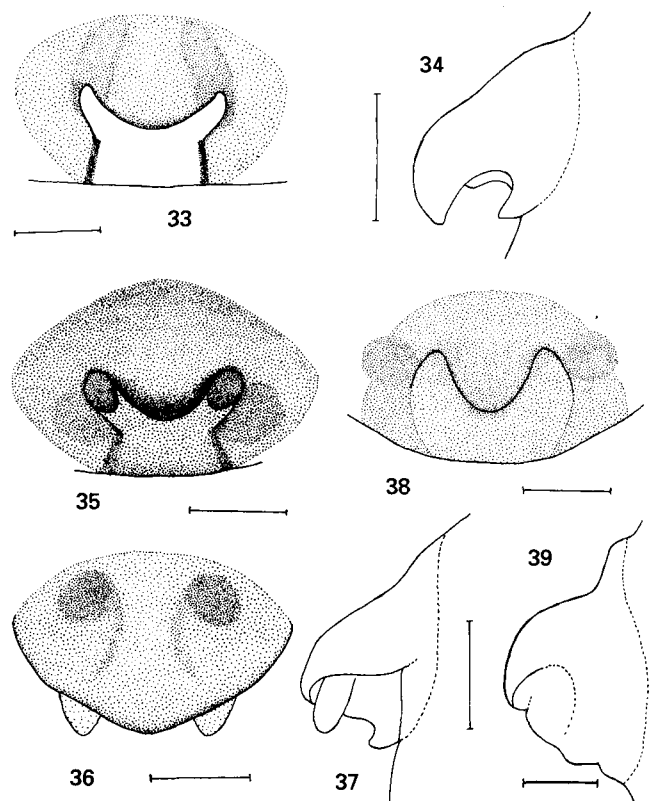
Male: Total length 2.0–2.3. Carapace, length 0.9–1.0, with conical elevation (Fig. 30); orange. Abdomen black. Sternum orange. Legs orange-yellow to orange; dorsal tibial spines 1111, TmI c. 0.6. Palp (Figs. 27–29).

Material examined: Paratypes: 2♂, with holotype; 1♀ 1♂, from Rakata, probably in forest, August 1985 (La Trobe Expedition 1985). (1♂ paratype deposited in NHM, rest in Nentwig coll.).

Distribution: Known only from Krakatoa, Indonesia.

***Nasoona silvestris*, new species** (Figs. 31, 32, 38, 39)

Type: Male holotype from dry riverine forest litter, 13 km west of Waingapu, Lesser Sunda Island Sumba,



Figs. 33–34: *Nasoona prominula* Locket. **33** Epigynum, ventral; **34** Ditto, lateral.

Figs. 35–37: *Nasoona locketi*, n.sp. **35** Epigynum, ventral; **36** Ditto, anteroventral; **37** Ditto, lateral.

Figs. 38–39: *Nasoona silvestris*, n.sp. **38** Epigynum, ventral; **39** Ditto, lateral. Scale lines = 0.1 mm.

Indonesia, 13 August 1992 (leg. C. L. Deeleman); deposited in MHNG.

Etymology: The specific name is an adjective meaning "of woodland".

Diagnosis: The female is diagnosed by the epigynum (Figs. 38, 39), which is of the same general form as in the other species of the genus, but distinguishable. The male is diagnosed by the palp; the basal apophysis of the embolic division is larger and darker (Fig. 31) than in the other species, and the tibial apophysis (Fig. 32) is also somewhat different; the male carapace is similar to that of *N. locketi*.

Female: Total length 1.9–2.25. Carapace, length 0.75–0.9, pale brown to orange-brown. Abdomen grey-brown to black, with white patches or bars dorsally, laterally and ventrally. Sternum yellow to orange-brown, suffused with brown on margins. Legs pale brown to orange-brown, with femora rather paler; dorsal tibial spines 2211, TmI c. 0.4. Epigynum (Figs. 38, 39); the atrium is only weakly delineated.

Male: Total length 2.0. Carapace, length 0.8, raised into conical lobe as in *N. locketi* (Fig. 30). Colour as female. Palp (Figs. 31, 32).

Material examined: Paratypes: 2♀, type locality; 2♀ 1♂, from degraded secondary forest litter along the road, 500 m, Moni, Lesser Sunda Island Flores, Indonesia, 19 August 1992 (leg. C. L. Deeleman). (1♀ paratype deposited in MHNG, rest in Deeleman coll.).

Distribution: Known only from eastern Indonesia.

Genus *Pronasoona*, new genus

Type species: Pronasoona sylvatica, new species.

Etymology: From the Latin *pro*, "instead of", and *Nasoona*, a current generic name; gender feminine.

Diagnosis: The female is diagnosed by the epigynum (Figs. 44, 46) and by the position of the metatarsal trichobothria, but both of these characters are fairly close to those of *Nasoona*. The male is diagnosed by the conical elevation on the carapace (Fig. 42, present only in the type species, and similar to that in *Nasoona*), by the palpal organ (Figs. 40, 41), which has a long slender embolus arising from a translucent, lightly sclerotised radical part, and by the form of the palpal tibia (Fig. 43).

Description: The known species have total length 1.8–2.35. Female carapace unmodified; in the male, only the type species has a conical post-ocular elevation, clothed posteriorly with curved bristles (Fig. 42). Eyes moderately large, with PME (female) less than 1d apart. Chelicerae with weak lateral files. Female palp clawless. Legs moderately long, with tibia I l/d c. 10; tibial spines 2211, femora and metatarsi spineless. TmI c. 0.6; the type species has a trichobothrium on metatarsus IV, but this is absent in *P. aurata*. Tracheal form not known but probably erigonine. The epigynum has a weakly projecting lip (Figs. 44, 46), and the genital openings appear to lie at the

anterior ends of the two dark lines; the internal duct system is a short coil (Fig. 45). Male palpal tibia extended distally into two broad apophyses (Fig. 43), paracymbium well developed (Fig. 40). Palpal organ with a lightly sclerotised radical part, from which arises a broad pointed apophysis anteriorly and a long slender curved embolus, which has a membranous margin (Figs. 40, 41).

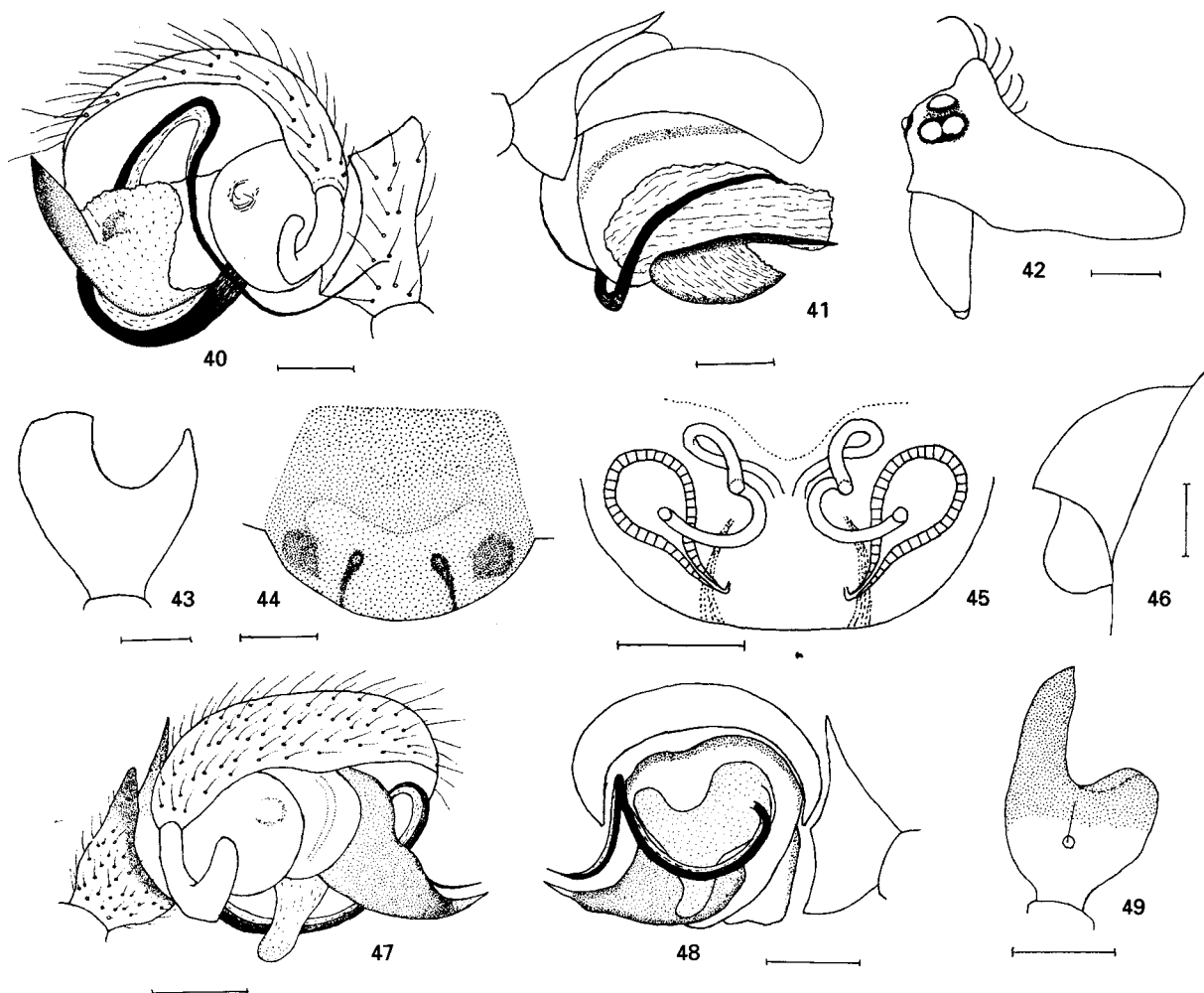
Included species: The type species and *P. aurata*, new species; the latter, because of some differences from the type species is placed provisionally in *Pronasoona*. It seems probable that *Nasoona chrysanthusi* Locket should be moved into *Pronasoona*.

Taxonomic position: The conical elevation on the carapace of the type species closely resembles that of *Nasoona*, and the female epigynum is also of a somewhat similar form to those of *Nasoona*; the male palpal organ, however, is quite different in form. Despite this latter difference, it seems probable that *Pronasoona* is fairly closely related to *Nasoona*.

Distribution: Known only from Sabah (East Malaysia) and Thailand.

Pronasoona sylvatica, new species (Figs. 40–46)

Type: Male holotype from primary forest, 500 m, Poring Hot Springs, Kinabalu National Park, Sabah



Figs. 40–46: *Pronasoona sylvatica*, n.sp. 40 Male palp (left), ectal; 41 Ditto, mesal; 42 Male carapace, lateral; 43 Male palpal tibia (left), dorsal; 44 Epigynum, ventral; 45 Epigynum, internal; 46 Epigynum, lateral.

Figs. 47–49: *Pronasoona aurata*, n.sp. 47 Male palp, ectal; 48 Ditto, mesal; 49 Male palpal tibia, dorsal. Scale lines=0.1 mm.

(Borneo), East Malaysia, 2 May 1991 (leg. C. L. Deeleman); deposited in MHNG.

Etymology: The specific name refers to its habitat in forest.

Diagnosis: The female is diagnosed by the epigynum (Figs. 44–46), which appears to be close to that of *Nasoona chrysanthusi*. The male is diagnosed by the carapace form (Fig. 42) and the palp (Figs. 40, 41, 43).

Female: Total length 1.8–2.0. Carapace, length 0.8–0.9, yellow-brown. Abdomen dorsally white with brown or blackish folium; black ventrally, with white stripe laterally. Sternum dark brown. Legs yellow-brown to orange-brown; TmI *c.* 0.6, metatarsus IV with trichobothrium. Epigynum (Figs. 44–46).

Male: Total length 2.35. Carapace, length 0.95, raised into conical lobe behind eyes (Fig. 42). Colour as female. TmI *c.* 0.55. Palp (Figs. 40, 41, 43).

Material examined: Two female paratypes taken with the holotype (1♀ deposited in MHNG, 1♀ in Deeleman coll.).

Distribution: Known only from Sabah (Borneo), East Malaysia.

Pronasoona aurata, new species (Figs. 47–49)

Type: Male holotype from Doi Inthanun Forest, above 1500 m, Thailand, December 1985 (leg. J. E. D. Milner); deposited in NHM.

Etymology: The specific name is a Latin adjective meaning “golden”.

Diagnosis: The male is diagnosed by the palp (Figs. 47–49). The female is unknown.

Male: Total length 1.9. Carapace, length 0.9, orange-brown, ocular area suffused with black; not elevated into lobe. Abdomen whitish, with weak brown markings and dark brown spot on either side of spinners. Sternum orange, suffused with brown on margins. Legs orange; TmI *c.* 0.6, metatarsus IV without trichobothrium. Palp (Figs. 47–49).

Material examined: Only the holotype.

Distribution: Known only from Thailand.

Genus *Locketiella* Millidge & Russell-Smith, 1992

The dorsal tibial spines of *L. merretti* n.sp. (2211) differ from those described for the type species, *L. parva* Millidge & Russell-Smith (1100), but the epigyna and male palps are similar.

Locketiella merretti, new species (Figs. 50–54)

Type: Male holotype from summit of Rakata, 813 m, Krakatoa, Indonesia, 24 August 1985 (La Trobe Expedition 1985); deposited in NHM.

Etymology: The specific name is a patronym of my friend and colleague Dr P. Merrett.

Diagnosis: The female is diagnosed by the epigynum (Figs. 53, 54); the external epigynum is close to that of *L. parva* Millidge & Russell-Smith (from Brunei), but probably distinguishable, but the internal structure, with the double helical duct, clearly separates the two species. The male is diagnosed by the palp (Figs. 50, 51) and by the

ocular turret (Fig. 52); the palpal organ is close to that of *L. parva*, but the membrane arising from the radical part of the embolic division is differently shaped. The turret carrying the eyes has two short horns (Fig. 52). The tibial spines in both sexes are 2211, cf. 1100 in *L. parva*.

Female: Total length 1.8. Carapace, length 0.65, orange. Abdomen greyish white, darkened around spinners. Sternum pale yellow to pale orange. Legs orange, tibial spines long and slender, 2211; TmI *c.* 0.65. Epigynum (Figs. 53, 54).

Male: Total length 1.45. Carapace length 0.65. Colour and chaetotaxy as female. Carapace raised anteriorly into short turret carrying the eyes (Fig. 52). Palp (Figs. 50, 51).

Material examined: One female paratype taken with the holotype (deposited in NHM).

Distribution: Known only from Krakatoa, Indonesia.

Genus *Dubiaranea* Mello-Leitão, 1943

The species described below has the appearance of a typical South American *Dubiaranea* species. The posterior median eyes are enlarged, and located on shallow black tubercles. The epigynum is externally very similar to those of some S. American species, while internally the spermathecae are U-shaped and the duct is a flattened double helix; the latter is, however, slightly differently placed. The male palp is of the *Dubiaranea* form, similar to those of some species from northern South America, except that the embolus has a flat membranous margin. This south-east Asian species is clearly very closely related to the S. American *Dubiaranea* species, and for the present it is thought best to place it in this genus; if, however, more south-east Asian species are discovered with the same character differences, then it may be desirable to erect a new genus for the south-east Asian species.

Dubiaranea deelemanae, new species (Figs. 55–59)

Type: Male holotype from rain forest, 1550 m, Kinabalu National Park, Sabah (Borneo), East Malaysia, 29 June 1979 (leg. P. R. & C. L. Deeleman); deposited in MHNG.

Etymology: The specific name is a patronym in honour of Christa Deeleman.

Diagnosis: Both sexes are diagnosed by the generic characters and genital organs, coupled with the south-east Asian locality of capture.

Female: Total length 3.0. Carapace, length 1.2, pale yellow to yellow, with wide dark brown margin posteriorly, and ocular area black. Posterior median eyes on shallow tubercles (Fig. 57). Abdomen black, with white spots laterally and broad bars dorsally. Sternum dark brown. Legs pale yellow to yellow-brown, with tarsi slightly darker, fairly long and slender with tibia I l/d *c.* 12. Tibiae with two dorsal spines, one prolateral, one retrolateral and one or two ventral; metatarsi with one dorsal, one prolateral and one ventral, TmI *c.* 0.15. Palpal tarsus with claw. Epigynum (Figs. 58, 59).

Male: Total length 2.8. Carapace, length 1.3, colour as female but brown margin less pronounced. Abdomen

pale brown with dorsally two white spots and weak black spots. Otherwise as female, but leg spines uncertain because of missing segments. Palp (Figs. 55, 56).

Material examined: Two female paratypes taken with the holotype (1♀ deposited in MHNG, 1♀ in Deeleman coll.).

Distribution: Known only from Sabah (Borneo), East Malaysia.

Genus *Thainetes*, new genus

Type species: *Thainetes tristis*, new species.

Etymology: From Thai, and the Greek "netes", a spinner; gender masculine.

Diagnosis: The male is diagnosed by the form of the embolic division of the palp (Fig. 61). The female is unknown.

Description: The single known specimen (male) has total length 1.65. Carapace unmodified; chelicerae fairly long, with weak lateral files. Eyes of moderate size, with posteriors less than 1d apart. Legs long and slender, with tibia I l/d c. 15. Spinal armature of legs unknown, since many segments are missing and the spines have been rubbed off those present; TmII 0.25, both metatarsi IV

missing. Palpal tibia with no apophysis, paracymbium large (Fig. 60). Palpal organ has tegulum slightly swollen, and there appears to be no suprategular apophysis. Embolic division comprises a large curved plate (clearly visible from the ectal side) with a beak-like extension anteriorly (Fig. 61) and a pointed tooth basally; the slender, curved embolus, which has a membranous margin, arises from the inner side of the plate (Fig. 61).

Included species: Only the type species.

Taxonomic position: The embolic division of the palp is similar to that of the S. American genus *Vesicapalpus* Millidge, and *Thainetes* should almost certainly be regarded as a member of the Dubiaraneinae.

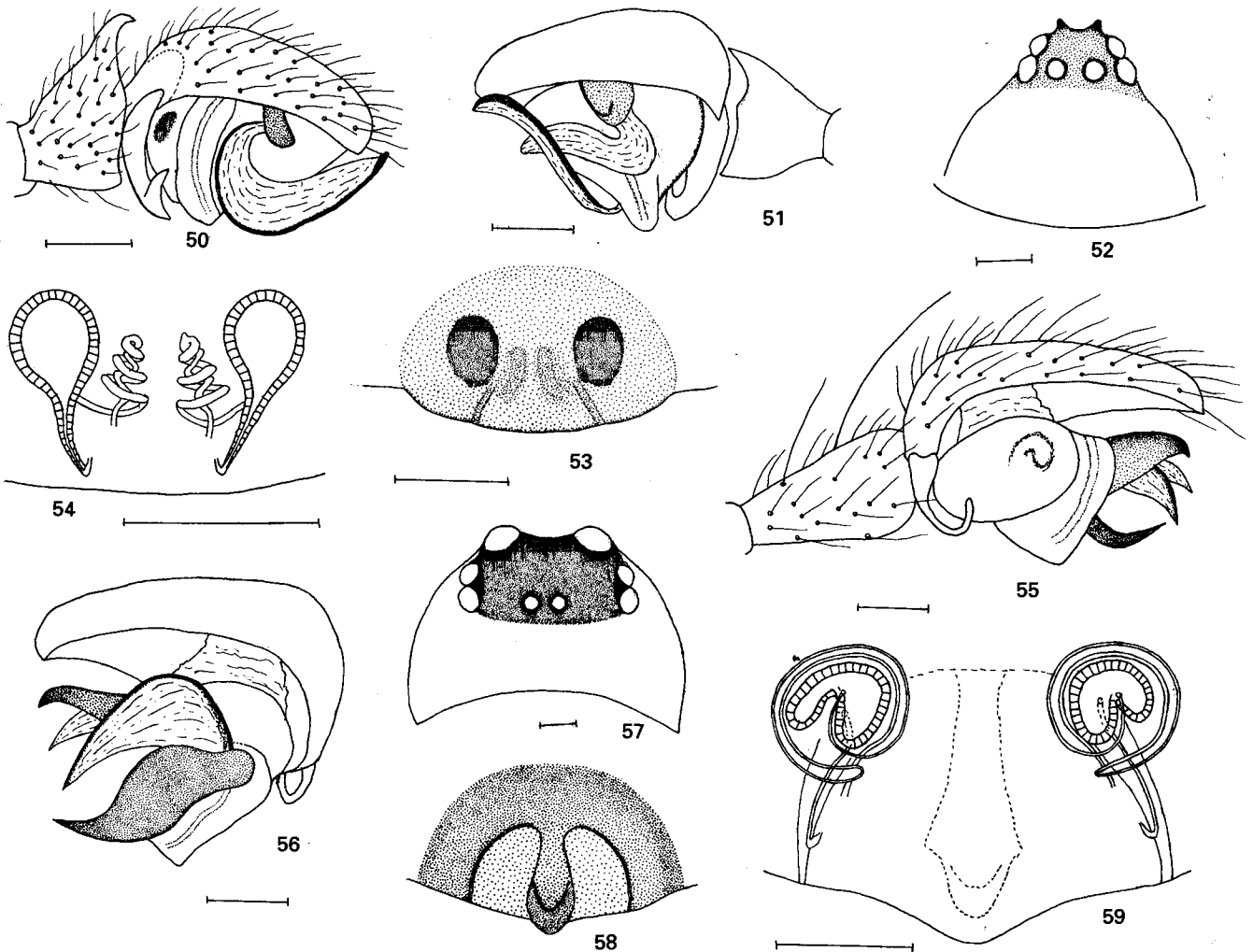
Distribution: Known only from Thailand.

Thainetes tristis, new species (Figs. 60, 61)

Type: Male holotype from Ban Bo Luang, 70 km east of Mae Serieng, west Thailand, December 1985 (leg. J. E. D. Milner); deposited in NHM.

Etymology: The specific name is an adjective meaning "sad, gloomy".

Diagnosis: The male is diagnosed by the palp (Figs. 60, 61). The female is unknown.



Figs. 50–54: *Locketiella merretti*, n.sp. 50 Male palp, ectal; 51 Ditto, mesal; 52 Male carapace, anterior; 53 Epigynum, ventral; 54 Epigynum, internal.

Figs. 55–59: *Dubiaranea deelemanae*, n.sp. 55 Male palp, ectal; 56 Ditto, mesal; 57 Male carapace, anterior; 58 Epigynum, ventral; 59 Epigynum, internal. Scale lines=0.1 mm.

Male: Total length 1.65. Carapace, length 0.9, yellow-brown, suffused with grey. Abdomen grey-black. Sternum brownish black. Legs yellow-brown; TmII c. 0.25. Palp (Figs. 60, 61).

Material examined: Only the holotype.

Distribution: Known only from Thailand.

Genus *Racata*, new genus

Type species: *Racata grata*, new species.

Etymology: A latinised form of Rakata, the locality of the type species; gender feminine.

Diagnosis: The male is diagnosed by the form of the embolic division of the palp (Fig. 63), coupled with the relatively slender legs and the value of TmI. The female is unknown.

Description: The single known specimen (male) has total length 1.7. Carapace slightly raised anteriorly; chelicerae with lateral file. Posterior eyes moderately large, less than 1d apart. Legs long and slender, with tibia I 1/d c. 16; the spines have been lost, apart from one prolateral on tibia I; TmI c. 0.2, metatarsus IV without trichobothrium. Tracheal form not known. Male palpal tibia with no apophysis; the paracymbium is a moderately large plate with a small hook anteriorly (Fig. 62). Tegulum carries a large sickle-shaped apophysis (Fig. 63: TA). Radical part of embolic division is a large curved plate, bent over anteriorly into a hook; slender embolus arises from posterior of plate (Fig. 63), and plate extends clearly on to ectal side of palp (Fig. 62).

Included species: Only the type species.

Taxonomic position: The general form of the palpal organ, with the prominent tegular apophysis and the basic structure of the embolic division, indicates a close relationship with the South American genus *Dubiaranea*, and *Racata* must be placed in the subfamily Dubiaraneinae.

Distribution: Known only from Krakatoa, Indonesia.

Racata grata, new species (Figs. 62, 63)

Type: Male holotype from summit of Rakata, 813 m, Krakatoa, Indonesia, 4 September 1984 (La Trobe Expedition 1984); deposited in NHM.

Etymology: The specific name is a Latin adjective meaning "pleasing".

Diagnosis: The male is diagnosed by the palp (Figs. 62, 63); the embolic division and tegular apophysis are distinctive. The female is unknown.

Male: Total length 1.7. Carapace, length 0.8, orange. Abdomen black. Sternum orange. Legs pale orange; TmI c. 0.2. Palp (Figs. 62, 63).

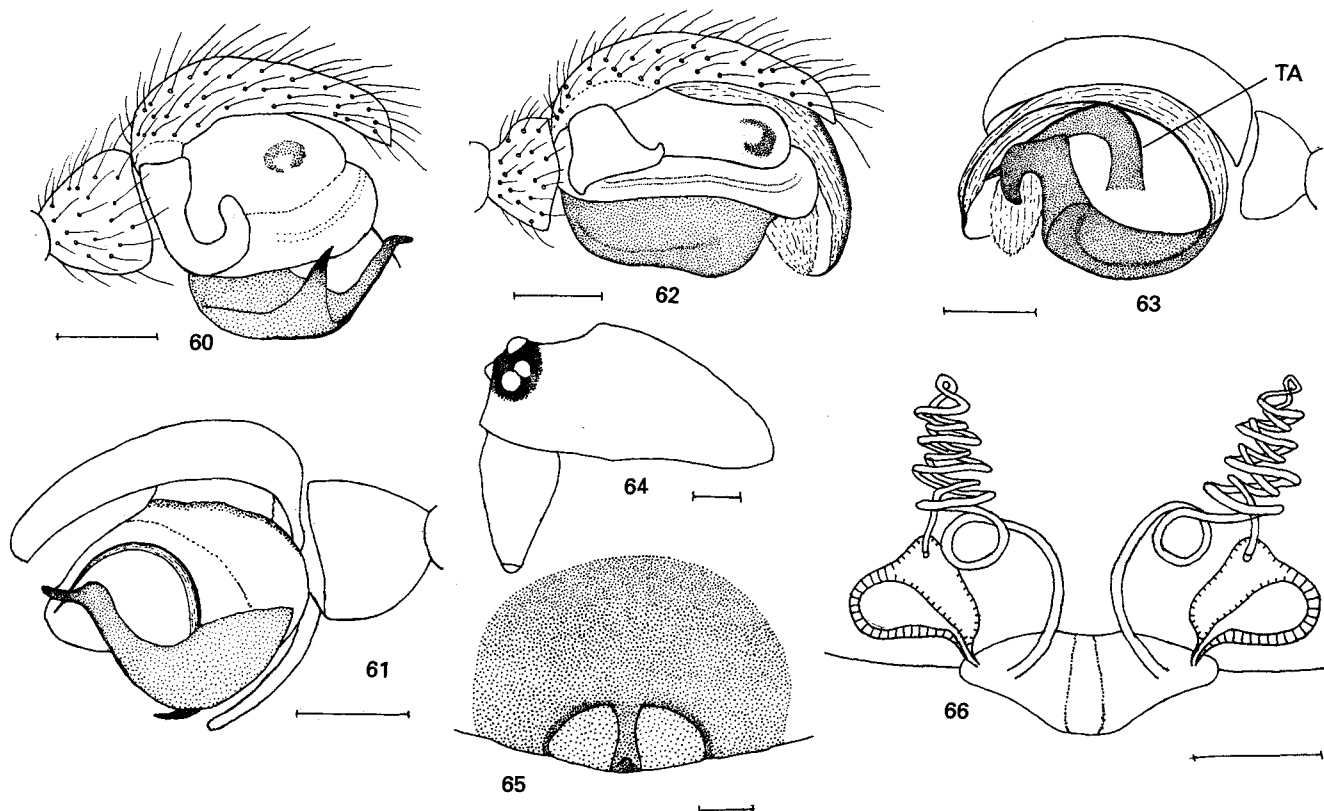
Material examined: Only the holotype, taken by hand collection in tall grass at Rakata summit.

Distribution: Known only from Krakatoa, Indonesia.

Genus *Cyphonetria*, new genus

Type species: *Cyphonetria thaia*, new species.

Etymology: From the Greek "kyphos" humped, and "netria", a female spinner; gender feminine.



Figs. 60-61: *Thainetes tristis*, n.sp. **60** Male palp, ectal; **61** Ditto, mesal.

Figs. 62-63: *Racata grata*, n.sp. **62** Male palp, ectal; **63** Ditto, mesal (TA=tegular apophysis).

Figs. 64-66: *Cyphonetria thaia*, n.sp. **64** Female carapace, lateral; **65** Epigynum, ventral; **66** Epigynum, internal, dorsal. Scale lines=0.1 mm.

Diagnosis: Females are diagnosed by the transverse ridge on the carapace (Fig. 64), and by the epigynum, both internally (Fig. 66) and externally (Fig. 65). Males are not known, but presumably would have the carapace more strongly ridged.

Description: The single known specimen (female) has total length 2.7. Carapace raised into a small ridge behind the eyes (Fig. 64). Eyes of moderate size, with posteriors *c.* 1d apart. Lateral cheliceral files weak. Female palp with a claw. Legs fairly long and slender, with tibia I 1/d *c.* 15. Dorsal tibial spines appear to be 2221, though several are missing; metatarsi spineless; TmII *c.* 0.6, metatarsus IV with trichobothrium. Epigynum (Fig. 65) with a broad atrium divided by a septum which has a socket posteriorly; internally, the duct follows a double helical path from the spermatheca to the opening in the atrium (Fig. 66). Males are unknown, but might be expected to have a larger ridge or lobe behind the eyes.

Included species: Only the type species.

Taxonomic position: The epigynum strongly resembles those of the Mynogleninae, both externally and internally. The *Cyphonetria* female, however, has no clypeal sulci or pits. The genera *Emenista* Simon (India) and *Labullinyphia* Van Helsdingen (Sri Lanka) (Van Helsdingen, 1985) appear to have a similar duct form and no clypeal sulci (Millidge, 1993), but the species in these two genera have a tubular subsidiary chamber on the spermathecae. It seems probable that *Cyphonetria*, *Emenista* and *Labullinyphia*, all of which are known only from south-east Asia (it seems probable that *E. dentichelis* Berland is incorrectly placed), are fairly closely related. The presence of the side chamber on the spermatheca in two of the genera may indicate a closer relationship to the Dubiaraneinae than to the Mynogleninae (Millidge, 1993). These relationships must remain unresolved until additional specimens, including males, of these three genera become available.

Distribution: Known only from Thailand.

Cyphonetria thaia, new species (Figs. 64–66)

Type: Female holotype from forest floor, Doi Inthanun Forest, Thailand, above 1500 m, December 1985 (leg. J. E. D. Milner); deposited in NHM.

Etymology: The specific name is an adjective referring to the country of origin of the type.

Diagnosis: The female is diagnosed by the epigynum (Figs. 65, 66) and by the cephalic ridge (Fig. 64). The male is unknown.

Female: Total length 2.9. Carapace, length 1.2, yellow, with dark brown margins, ocular area black; raised into lobe behind eyes (Fig. 64). Abdomen black ventrally and laterally, pale yellow dorsally with black spots and bars. Sternum deep brown. Legs orange-brown; TmII *c.* 0.6. Epigynum (Figs. 65, 66).

Material examined: Only the holotype.

Distribution: Known only from Thailand.

Genus *Nentwigia*, new genus

Type species: *Nentwigia diffusa*, new species.

Etymology: A patronym in honour of Prof. Dr W. Nentwig, who provided the Krakatoan material for this paper; gender feminine.

Diagnosis: Females are diagnosed by the abdominal shape (Fig. 76), the projecting clypeus (Fig. 69), and the epigynum (Figs. 67, 68); if species other than the type species are discovered, this character may be less distinctive. Males are unknown.

Description: Small spiders of total length *c.* 2.0; only females are known in the adult state. Clypeus projecting (Fig. 69), chelicerae with weak lateral files. Eyes of moderate size, with posteriors 1-1.5d apart. Abdomen with a more or less conical projection posteriorly, extending well beyond spinners (Fig. 76). Legs fairly long and slender, with tibia I 1/d *c.* 10. Tibial spines 2222 dorsally, with 1 prolateral spine on tibia I; femur I with 1 ventral spine, metatarsi spineless; TmI 0.15–0.2, metatarsus IV without trichobothrium. Female palp with a claw. Tracheae 4 slender tubes, limited to abdomen. Epigynum (of type species) with a Y-shaped opening (Fig. 67); internally, the broad duct runs in large loops from the spermatheca to the opening (Fig. 68), which appears to lie near the posterior of the Y-shaped opening. Adult males are unknown, but a subadult male had the abdomen similarly shaped to that of the female.

Included species: Only the type species.

Taxonomic position: The general appearance of the spider is linyphiine, but the epigynum, both externally and internally, is very different from *Linyphia* and its close relatives. Until adult males are taken, it is not possible to draw any firm conclusions on the relationships of *Nentwigia*.

Distribution: Known from Krakatoa, Indonesia, and Thailand.

Nentwigia diffusa, new species (Figs. 67–69, 76)

Type: Female holotype from pitfall trap in grassland, Anak Krakatoa, Indonesia, April 1991 (W. Nentwig); deposited in NHM.

Etymology: The specific name is an adjective meaning "widespread".

Diagnosis: The female is diagnosed by the abdominal shape (Fig. 76), the projecting clypeus (Fig. 69), and the epigynum, which has a Y-shaped opening (Fig. 67). Adult males are unknown.

Female: Total length 1.9–2.3. Carapace, length 0.7–0.75, brown, suffused to variable degree with black, with black or darkened margins; clypeus projecting (Fig. 69). Chelicerae brown to black. Abdomen (Fig. 76) brownish black, with a large white spot on either side ventrally. Sternum brown with black margins. Legs pale orange-brown, with femora whitish and tibiae IV black distally; TmI 0.15–0.2. Palp dark brown to black. Epigynum (Figs. 67, 68). The Thai specimens are lighter in colour, with legs slightly stouter (tibia I 1/d *c.* 8, rather than *c.* 10), but the epigyna are identical.

Material examined: Paratypes: Anak Krakatoa: 3♀, by beating broad-leaved plants and grass, August 1985 (La Trobe Expedition 1985); 3♀, from pitfall traps and by sweeping, August 1990 and April 1991 (leg. W.

Nentwig). Sertung, Krakatoa: 1♀, by sweeping, August 1985 (La Trobe Expedition 1985). All in Nentwig coll.

Thailand: Chiang Rai, north Thailand: 1♀, river bank, December 1985; 2♀, garden, December 1988. Ban Bo Luang, 70 km east of Mae Sieriang, west Thailand, 1♀, December 1985; Ubon Ratchathani, east Thailand, 1♀, November 1989; Sutthisarn Road, Bangkok, 1♀, waste land, November 1989 (all leg. J. E. D. Milner). All in Milner coll.

Distribution: Krakatoa (Indonesia) and Thailand.

Genus *Tomohyphantes*, new genus

Type species: *Tomohyphantes niger*, new species.

Etymology: From the Greek "tomos", pointed, and "hyphantes", a weaver, referring to the abdominal shape; gender masculine.

Diagnosis: Females are diagnosed by the pointed extension of the abdomen (Figs. 77–81), the large anterior median eyes (Figs. 70, 73), the projecting clypeus, and the epigyna (Figs. 71, 74). Males are unknown.

Description: Small spiders of total length 2.0–2.5; only females are known. Clypeus projecting somewhat, as in *Nentwigia*, anterior median eyes moderately large (Figs. 70, 73); chelicerae with weak lateral files. Female palp with a claw. Abdomen with two rounded protuberances anteriorly (Figs. 79, 80), and drawn out posteriorly to a pointed tail (Figs. 77–81), which may be straight or bent over. Legs fairly long and slender, with tibia I 1/d c. 12–18. Tibial spines probably 2222 dorsally, with 1 or 2 ventrally on tibia I, and at least 1 dorsally on metatarsi, but this is uncertain because some of the spines appear to have been lost. TmI 0.2–0.25; metatarsi IV not present. Tracheal form not known, but probably as in

Nentwigia. Epigynum has a wide, shallow atrium (Figs. 71, 74), within which the outlines of the internal ducts are visible; these ducts follow a rather complex, coiled pathway from spermatheca to opening (Figs. 72, 75), which lies in the shallow atrium.

Included species: The type species, and *T. opacus*, new species.

Taxonomic position: The abdominal form indicates a relationship to *Nentwigia*, but until males are taken it is not possible to say more on the relationships of *Tomohyphantes*.

Distribution: Known only from Krakatoa, Indonesia.

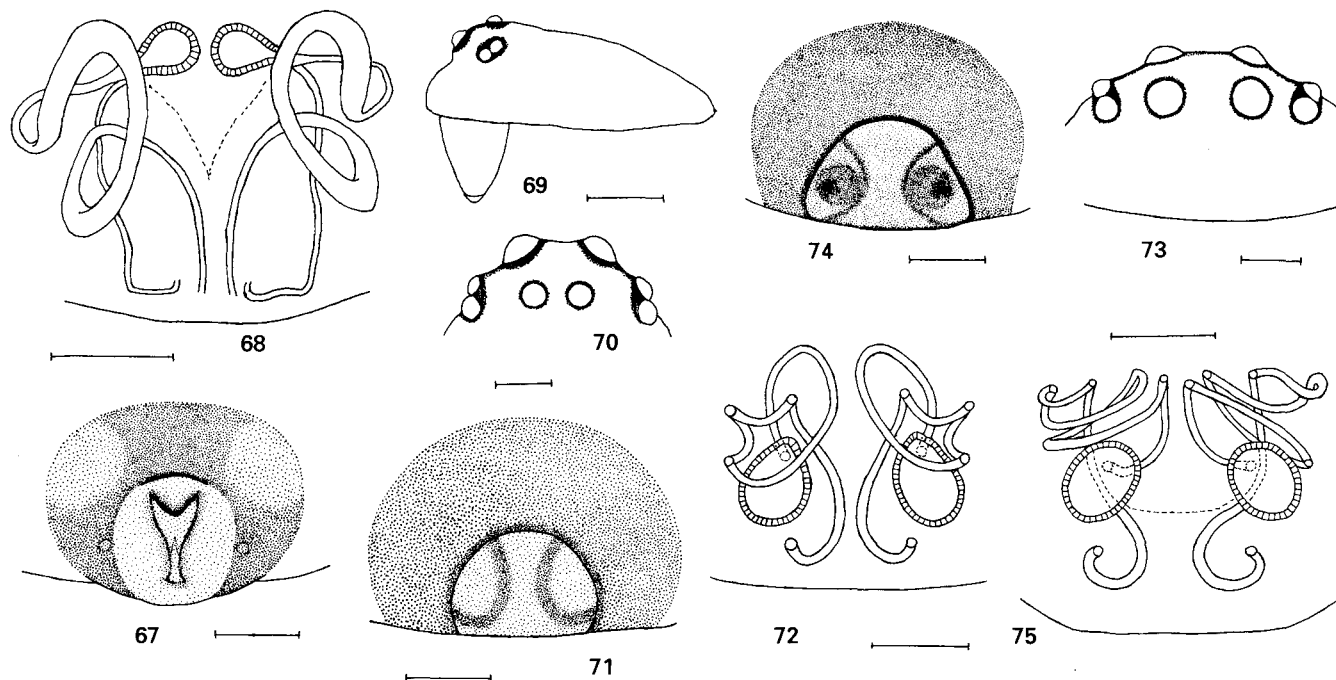
Tomohyphantes niger, new species (Figs. 70–72, 77–79)

Type: Female holotype by sweeping, Owl Bay, Rakata, Krakatoa, Indonesia, August 1985 (La Trobe Expedition 1985); deposited in NHM.

Etymology: The specific name is an adjective meaning "black".

Diagnosis: The female is diagnosed by the form of the abdomen (Figs. 77–79) and the epigynum (Figs. 71, 72); these characters distinguish *T. niger* from *T. opacus*. The male is unknown.

Female: Total length 2.4–2.5. Carapace, length 0.8–0.9, deep brown, sometimes suffused with black, particularly on margins; clypeus projecting somewhat, as in *Nentwigia* (Fig. 69). Anterior median eyes fairly large (Fig. 70). Chelicerae dark brown to black, with sometimes small white markings laterally. Sternum deep brown, mottled with black. Abdomen blackish, with whitish lateral markings towards posterior; drawn out posteriorly into narrow pointed tail (Figs. 77, 78). Legs pale yellow, tibia I 1/d c. 12; TmI c. 0.2. Palp dark brown. Epigynum (Figs. 71, 72).



Figs. 67–69: *Nentwigia diffusa*, n.sp. 67 Epigynum, ventral; 68 Epigynum, internal; 69 Female carapace, lateral.

Figs. 70–72: *Tomohyphantes niger*, n.sp. 70 Eyes, dorsal; 71 Epigynum, ventral; 72 Epigynum, internal.

Figs. 73–75: *Tomohyphantes opacus*, n.sp. 73 Eyes, from front; 74 Epigynum, ventral; 75 Epigynum, internal. Scale lines=0.1 mm, except Fig. 69=0.2 mm.

Material examined: 1♀ paratype by beating, Sertung, Krakatoa, August 1985 (La Trobe Expedition 1985). In Nentwig coll.

Distribution: Known only from Krakatoa.

***Tomohyphantes opacus*, new species** (Figs. 73–75, 80, 81)

Type: Female holotype by beating, Rakata, Krakatoa, 585 m, August 1985 (La Trobe Expedition 1985); deposited in NHM.

Etymology: The specific name is an adjective meaning "dark, gloomy".

Diagnosis: The female is diagnosed by the form of the abdomen (Figs. 80, 81) and the epigynum (Figs. 74, 75), which distinguish this species from *T. niger*. The male is unknown.

Female: Total length 2.0. Carapace, length 0.8, deep chestnut-brown, clypeus slightly projecting. Anterior median eyes fairly large (Fig. 73). Chelicerae brown. Abdomen white, with posterior brown; it is possible that the shape (Figs. 80, 81) has been exaggerated by the specimen drying at some point. Sternum brown, suffused with black. Legs pale orange; tibia I l/d c. 18; TmI c. 0.25. Palp dark brown. Epigynum (Figs. 74, 75).

Material examined: Only the holotype.

Distribution: Known only from Krakatoa, Indonesia.

Genus *Chiangmaia*, new genus

Type species: *Chiangmaia sawetamali*, new species.

Etymology: Based on the locality of capture of the type species; gender feminine.

Diagnosis: Females are diagnosed by the epigynum, which is somewhat linyphiine in appearance, with an atrium on either side of a broad median septum (Figs. 82, 84); internally the duct from spermatheca to opening is a short coil (Figs. 83, 85). Males are unknown.

Description: Small spiders of total length 2.2–3.1; only females are known. Female carapace unmodified; chelicerae with weak lateral files. Eyes of moderate size, with posterior medians 1d or slightly less apart. Female palp clawless. Legs of moderate length, with tibia I l/d 8–9. Tibial spines 2211, femora and metatarsi spineless; TmI c. 0.65–0.7, metatarsus IV without a trichobothrium. Tracheal form not determined. Epigynum with two atria separated by a broad septum which has no socket (Figs. 82, 84); internally the duct from the spermatheca follows a short helical path (Figs. 83, 85).

Included species: The type species and *Chiangmaia rufula*, new species.

Taxonomic position: The epigynal form indicates that this genus, probably falls in the Linyphiinae s. str., but discovery of the male is necessary to confirm this.

Distribution: Known only from Thailand.

***Chiangmaia sawetamali*, new species** (Figs. 82, 83)

Type: Female holotype from grass in garden, Chiang Mai, Thailand, December 1988 (leg. J. E. D. Milner); deposited in NHM.

Etymology: The specific name is a patronym in honour of Mr Sawetamal, owner of the garden in which this and other Thai spiders were captured.

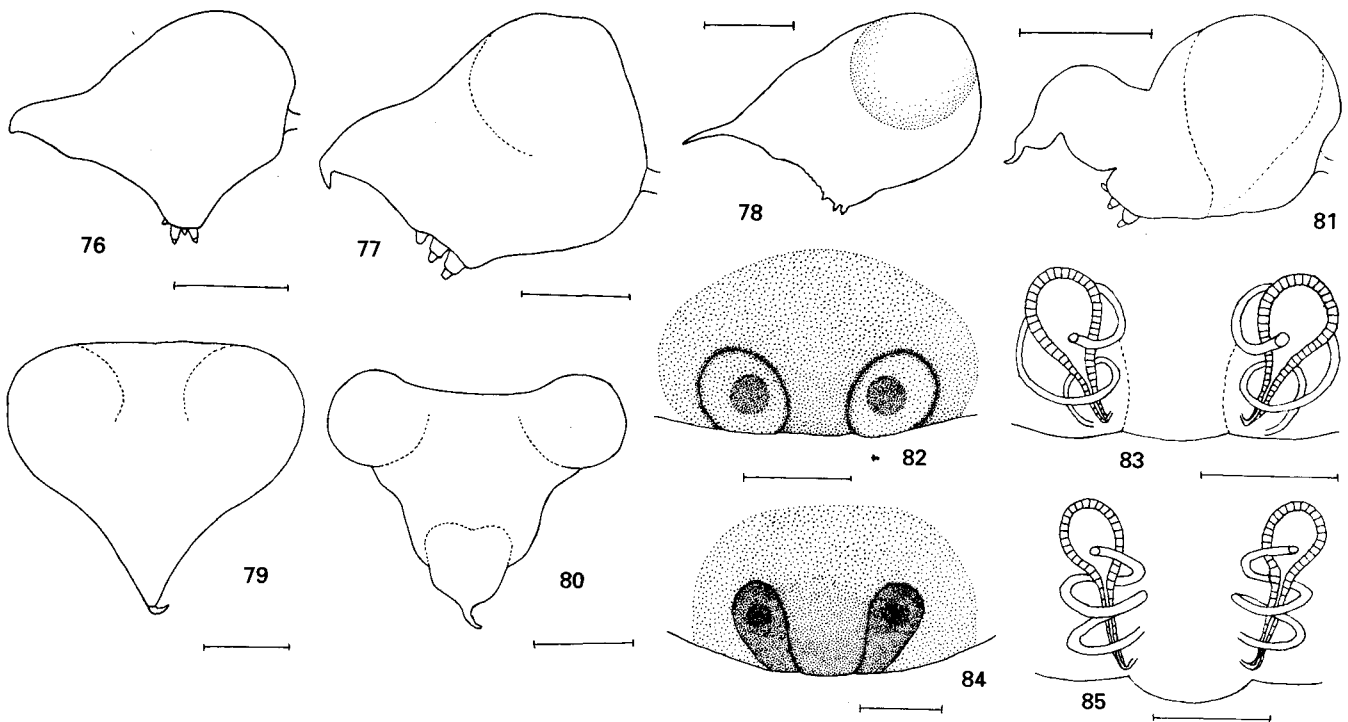


Fig. 76: *Nentwigia diffusa*, n.sp. Abdomen, lateral.

Figs. 77–79: *Tomohyphantes niger*, n.sp. 77–78 Abdomen, lateral; 79 Abdomen, dorsal.

Figs. 80–81: *Tomohyphantes opacus*, n.sp. 80 Abdomen, dorsal; 81 Abdomen, lateral.

Figs. 82–83: *Chiangmaia sawetamali*, n.sp. 82 Epigynum, ventral; 83 Epigynum, internal.

Figs. 84–85: *Chiangmaia rufula*, n.sp. 84 Epigynum, ventral; 85 Epigynum, internal. Scale lines=0.5 mm (76–81), 0.1 mm (82–85).

Diagnosis: The female is diagnosed by the epigynum (Figs. 82, 83), coupled with the chaetotaxy. The epigynal atria are broad and more rounded than in *C. rufula* (Fig. 82 cf. Fig. 84), and the coil of the internal duct is differently placed (Fig. 83 cf. Fig. 85). The male is unknown.

Female: Total length 2.2. Carapace, length 1.0, pale yellow, suffused with grey. Abdomen grey-white ventrally, with white spot posteriorly, light grey dorsally, with paler longitudinal stripe. Sternum black. Legs pale yellow-brown, with femora almost white; TmI *c.* 0.65. Epigynum (Figs. 82, 83).

Material examined: Only the holotype.

Distribution: Known only from Thailand.

Chiangmaia rufula, new species (Figs. 84, 85)

Type: Female holotype from bank of Nan River, north-east Thailand, March 1984 (leg. J. E. D. Milner); deposited in NHM.

Etymology: The specific name is an adjective meaning "reddish".

Diagnosis: The female is diagnosed by the epigynum (Figs. 84, 85), coupled with the chaetotaxy. The epigynal atria are narrower than in *C. sawetamali*, and the coil of the internal duct is differently placed. The male is unknown.

Female: Total length 2.7–3.1. Carapace, length 1.25, orange-brown, with greyish striae and margins. Abdomen grey, with bright white stripe dorsally and whitish spot ventrally, dark brown to black around spinners. Sternum orange, suffused with dark brown. Legs pale orange to orange-brown; TmI *c.* 0.7. Epigynum (Figs. 84, 85).

Material examined: One paratype female from the type locality (deposited in NHM).

Distribution: Known only from Thailand.

Genus *Thaiphantes*, new genus

Type species: *Thaiphantes milneri*, new species.

Etymology: From Thai, and the Greek "hyphantes", a weaver; gender masculine.

Diagnosis: The female is diagnosed by the epigynum, which is a sclerotised scape with 2 points distally (Figs. 88, 89, 91) and has the spermathecae U-shaped (Figs. 90, 93), coupled with the chaetotaxy. The male is diagnosed by the palpal organ, the embolic division of which is a large plate which carries a fairly stout, lightly sclerotised embolus (Fig. 87).

Description: Spiders of total length 1.65–1.85. Carapace unmodified in both sexes. Eyes moderately large, with posterior medians (female) *c.* 1d apart and less than 1d from laterals: Chelicerae with weak lateral files. Legs moderately long, with tibia I l/d (female) 8–11. Dorsal tibial spines 2211, metatarsi and femora spineless; TmI *c.* 0.40–0.45, metatarsus IV without trichobothrium. Tracheal form not determined. Epigynum a stout scape with two points posteriorly (Figs. 88, 89, 91); spermathecae U-shaped, and duct runs by a simple pathway to posterior of scape (Figs. 90, 93). Male palpal tibia has no apophysis, and paracymbium large (Fig.

86). There is a short, narrow truncated suprategular apophysis (Fig. 86); the plate of the embolic division is folded over posteriorly and truncated anteriorly, with two projecting points (Fig. 87), embolus lightly sclerotised, truncated anteriorly, and arises from plate near its posterior end (Fig. 87); a membranous apophysis arises from the junction of the embolic division and tegulum.

Included species: The type species and *Thaiphantes similis*, new species.

Taxonomic position: The forms of both the female and male genitalia indicate that the genus is closely related to the South American genus *Laminacauda* Millidge. The external epigyna of the two genera are very similar; internally, both genera have the spermathecae U-shaped, but in *Thaiphantes* the duct follows a simpler pathway. The male palp differs from those of *Laminacauda* by the absence of a tibial apophysis, while the embolic division has the plate somewhat differently shaped.

Distribution: Known only from Thailand.

Thaiphantes milneri, new species (Figs. 86–90)

Type: Male holotype from river bank, Chiang Rai, north Thailand, March 1984 (leg. J. E. D. Milner); deposited in NHM.

Etymology: The specific name is a patronym in honour of the collector.

Diagnosis: The female is diagnosed by the epigynum, a scape with two small points posteriorly (Figs. 88, 89); it is distinguishable from *T. similis* by the shape of the scape (Fig. 88 cf. Fig. 91). The male is diagnosed by the palp (Figs. 86, 87), particularly by the form of the embolic division.

Female: Total length 1.65. Carapace, length 0.9, orange-brown, suffused with black on margins. Abdomen brown-black, with dorsally a white patch anteriorly and a smaller white patch posteriorly. Sternum orange, suffused with brown on margins. Legs pale orange; TmI *c.* 0.4. Epigynum (Figs. 88–90).

Male: Total length 1.85. Carapace, length 0.9, dark brown, with paler longitudinal stripe. Abdomen black, with dorsally a transverse white bar and two white spots near spinners. Sternum orange-brown with dark brown margins. Legs pale yellow, but many segments missing. Palp (Figs. 86, 87).

Material examined: One female paratype taken with the holotype (deposited in NHM).

Distribution: Known only from Thailand.

Thaiphantes similis, new species (Figs. 91–93)

Type: Female holotype from lawn in garden, Chiang Rai, north Thailand, November 1989 (leg. J. E. D. Milner); deposited in NHM.

Etymology: The specific name is an adjective meaning "similar".

Diagnosis: The female is diagnosed by the epigynum (Fig. 91); the scape is much more indented laterally than in *T. milneri*. The male is unknown. This species is obviously close to *T. milneri*, and was taken in the same

general location, but because of the differences in the scape it is described as a different species; discovery of the male will be necessary in order to confirm this.

Female: Total length 1.7. Carapace, length 0.6, orange-brown. Abdomen grey-brown with broad white stripes laterally and ventrally, and with a white spot dorsally anterior to spinners. Sternum orange, heavily suffused with dark brown. Legs pale brown; TmI *c.* 0.45. Epigynum (Figs. 91–93).

Material examined: Only the holotype.

Distribution: Known only from Thailand.

Genus *Laetesia* Simon, 1908

The following species (female only) appears to belong in *Laetesia* on the basis of the epigynal form, but discovery of the male is necessary to confirm this diagnosis. This is the first species of the genus to be described from Asia.

Laetesia asiatica, new species (Figs. 94–96)

Type: Female holotype from river bank, Chiang Rai, north Thailand, December 1988 (leg. J. E. D. Milner); deposited in NHM.

Etymology: The specific name is an adjective referring to the region of capture of the species.

Diagnosis: The female is diagnosed by the epigynum (Figs. 94–96); this is very similar to those of some species from New Zealand (Millidge, 1988), but the lateral extensions, which hold the genital openings, are narrower, while internally the spermathecae are U-shaped rather than globular with a subsidiary chamber. The male is unknown.

Female: Total length 1.9. Carapace, length 0.8, brown, with broad longitudinal yellow band. Eyes fairly large, with posterior medians *c.* 1d apart. Abdomen fairly globular, brown-black with pattern of pale yellow

bars and spots dorsally and laterally. Sternum dark brown. Legs yellow-brown, suffused with brown, long and slender with tibia I l/d *c.* 15; spines mostly missing, but with at least two dorsal and one ventral on tibiae and one dorsal on metatarsi; TmI *c.* 0.15. Epigynum (Figs. 94–96).

Material examined: Only the holotype.

Distribution: Known only from Thailand.

Genus *Lepthyphantes* Menge, 1866

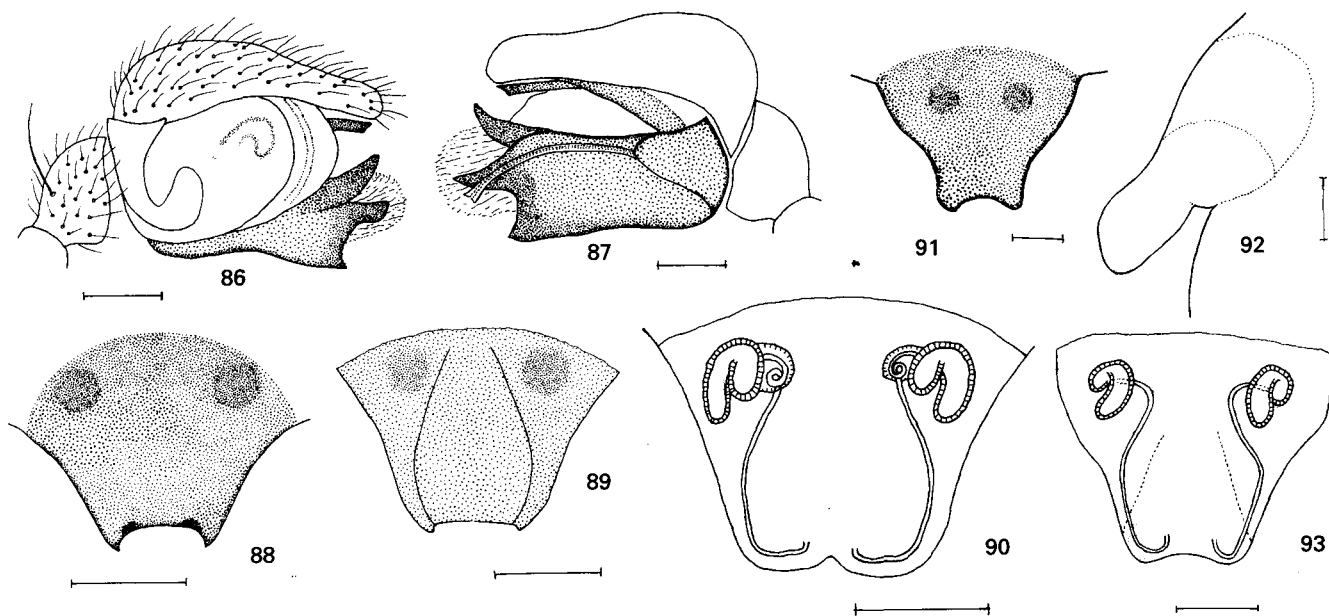
Lepthyphantes latrobei, new species (Figs. 97–99)

Type: Male holotype from pitfall trap in grassland, Anak Krakatoa, Indonesia, August 1991 (leg. W. Nentwig); deposited in NHM.

Etymology: The specific name refers to La Trobe University, whose expeditions collected some of the material from Krakatoa.

Diagnosis: The female is diagnosed by the epigynum, which has the basal part of the scape (Fig. 99) trapezoidal in shape. The male is diagnosed by the palp (Fig. 97) and particularly by the forms of the embolic division (Fig. 98) and the palpal tibia (Fig. 97). The epigynum is somewhat similar to that of *L. brincki* Van Helsdingen from Sri Lanka (Van Helsdingen, 1985), which also has no metatarsal spines. The male of *L. brincki* is unknown, and it would be unsafe on the basis of the female alone to assume that *L. latrobei* is the same species as *L. brincki*.

Female: Total length 1.3–1.35. Carapace, length 0.6–0.65, pale yellow suffused with grey, with darker margins. Eyes fairly large, with posteriors less than 1d apart. Abdomen grey-black, with broad transverse white bars dorsally extending to sides. Sternum pale yellow to yellow, with narrow black margins; sometimes suffused with brown. Legs pale yellow, with tibiae black distally and sometimes also basally. Tibial spines 2222 dorsally;



Figs. 86–90: *Thaiphantes milneri*, n.sp. **86** Male palp, ectal; **87** Ditto, mesal; **88** Epigynum, ventral; **89** Ditto, dorsal; **90** Epigynum, internal. Figs. 91–93: *Thaiphantes similis*, n.sp. **91** Epigynum, ventral; **92** Ditto, lateral; **93** Ditto, internal. Scale lines=0.1 mm.

femora and metatarsi spineless; TmI c. 0.25, metatarsus IV without trichobothrium. Epigynum (Fig. 99).

Male: Size, colour and chaetotaxy as in female, except that tibiae lack the blackened endings. Palp (Figs. 97, 98).

Material examined: Numerous paratypes of both sexes were taken on Anak Krakatoa, mainly in pitfall traps (where the male palps were usually expanded), but also by sweeping and beating vegetation, and in soil litter. A few specimens were also taken on Sertung and Rakata, Krakatoa. (1♀ paratype deposited in NHM, rest in Nentwig coll.).

Distribution: Known only from Krakatoa, Indonesia.

Discussion

The linyphiid fauna of south-east Asia would be expected to be of mixed origin; what is surprising, as pointed out earlier (Millidge & Russell-Smith, 1992) is its distinct similarity in some respects to the linyphiid fauna of South America. The view that the south-east Asian and South American linyphiid faunas are quite closely related is reinforced by the findings of the present paper. Not only has a representative of the genus *Dubiaranea* (previously thought to be endemic to South America) been found in south-east Asia, but there are now at least five genera present there which, from the palpal form, should be placed in the subfamily Dubiaraneinae (Millidge, 1993), namely *Thainetes* n. gen., *Racata* n. gen., *Prosoptonoides* Millidge & Russell-Smith, *Kenocymbium* Millidge & Russell-Smith, and *Ketamba* Millidge & Russell-Smith. In addition, the south-east Asian genus *Thaiphantes* is close to the endemic South American genus *Laminacauda*, while the genus *Nasoona*, previously recorded only from south-east Asia, is now found to be present in northern South America, but not elsewhere.

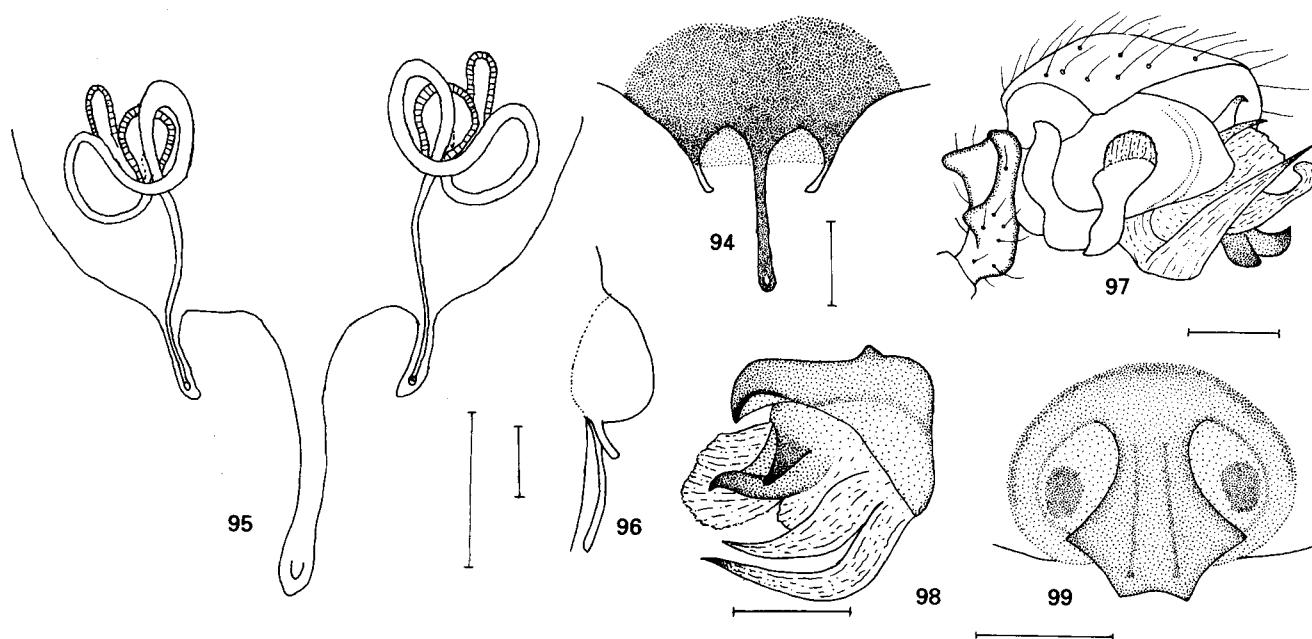
The congruences of the south-east Asian and South American linyphiid faunas are now too numerous to be dismissed as mere coincidence, and some explanation is required for this and some other aspects of linyphiid distribution.

A relatively recent dispersal of linyphiids across the width of the Pacific Ocean can be ruled out, particularly since the Pacific Islands do not have a South American type of linyphiid fauna (Beatty, Berry & Millidge, 1991).

The family Linyphiidae contains two probably primitive subfamilies, the Mynogleninae and the Dubiaraneinae (Millidge, 1993). The former subfamily is found in eastern Africa, New Zealand and (probably) Australia (including Papua New Guinea), but appears to be absent from South America and south-east Asia. The subfamily Dubiaraneinae is found in South America and south-east Asia, but appears to be absent from Africa, New Zealand and Australia. The distributions of the two subfamilies thus appear to be sharply different, with no known overlap. The distribution of the Dubiaraneinae is trans-Pacific, while that of the Mynogleninae is apparently trans-Indian Ocean.

The conventional (classic) representation of Gondwana is shown in Fig. 100, which also plots the known distribution of the Mynogleninae. This representation of Gondwana clearly accommodates the distribution of the Mynogleninae, which appear to have been restricted to the eastern or north-eastern areas of Gondwana; it is not, however, in line with the trans-Pacific distribution of the Dubiaraneinae.

The problem of accounting for the trans-Pacific distributions of some fauna was discussed briefly by Nelson & Platnick (1984), who concluded that two alternative models of the continental drift hypothesis proposed by Shields (1979: Nelson & Platnick, 1984, fig. 19) and by Nur & Ben-Avraham (1981: Nelson & Platnick, 1984, fig. 20), could both account for trans-Pacific



Figs. 94-96: *Laetesia asiatica*, n.sp. **94** Epigynum, ventral; **95** Ditto, internal, dorsal; **96** Ditto, lateral.

Figs. 97-99: *Lepthyphantes latrobei*, n.sp. **97** Male palp, ectal; **98** Male palp, embolic division; **99** Epigynum, ventral. Scale lines=0.1 mm.

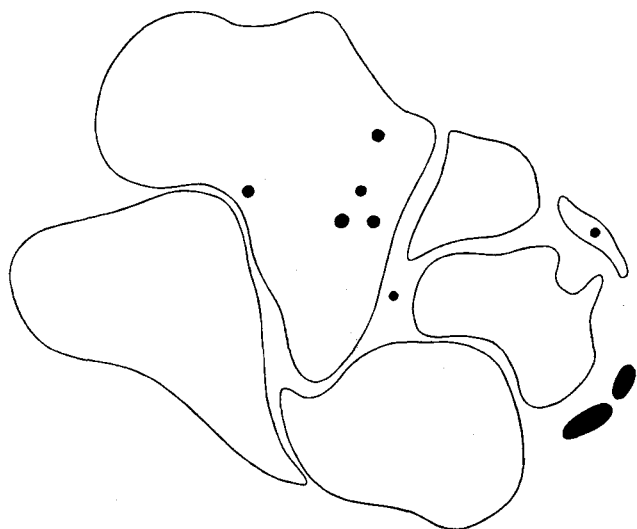


Fig. 100: Gondwana, conventional representation, showing distribution of Mynogleninae.

distribution in a general way. Neither of these hypotheses, which depict Australasia to the west of South America and far removed from Africa, is however consistent with the congruence of the African and Australasian mynoglennines.

A hybrid hypothesis of continental drift, which comprises features of both the classic theory and of Shields' theory, is that Gondwana was made up as in Fig. 100, but that an additional land projection or archipelago, which now constitutes most of south-east Asia, was attached to, or closely adjacent to, what is now northern or north-western South America, and that at the time of, or shortly before, the main break-up of Gondwana, this part moved westwards across the Pacific Ocean (which was only just opening in Jurassic times) to join eastern Laurasia, while South America moved westwards as the Atlantic Ocean opened, and Australasia and India moved eastwards and northwards to open the Indian Ocean. This scenario would be consistent with the distribution of both the Mynogleninae and the Dubiaraneinae, and would also be in line with the view that the three oceans were formed more or less contemporaneously. This theory is not inconsistent with floral and other faunal congruences of Australasia and South America, since these congruences could have arisen through land connections, within southern Gondwana, with southern South America.

On the basis of this hypothesis, if any member of the Mynogleninae is to be found in south-east Asia, it

can be inferred (Fig. 100) that India and (?) Sri Lanka would be the most likely sites, if suitable habitats still exist. A further inference is that the primitive spider genus *Liphistius* Schiödte, at present known only from south-east Asia, might conceivably be present also in tropical South America, again if suitable habitats exist.

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