

Some remarkable, new or little-known pluridentate salticid spiders from Bornean tree canopy (Araneae: Salticidae)

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Summary

A strange ant-mimicking salticid spider from the canopy of tropical rainforest in Borneo was identified as a close relative of the African species *Depreissia myrmex* Lessert. An illustrated description of the male of this species (*Depreissia decipiens* n. sp.) is presented. From the same area, *Bocus angusticollis* n. sp., *Neobrettus xanthophyllum* n. sp. and *N. cornutus* n. sp. are described and figured from both sexes; a female of *N. tibialis* (Prószyński) is described and figured.

Introduction

Changes in communities of canopy arthropods of primary and disturbed forests were investigated by insecticidal fogging in a long-term study by one of us (A. F.). These analyses were aimed at understanding the mechanisms influencing the structure of highly diverse arthropod communities (Floren & Linsenmair, 2000; Floren *et al.*, 2001). Most of this research was carried out in tropical rainforest in northern Borneo.

The senior author (C. D.-R.) is assessing the taxonomy of the spider fauna of these canopies for the purpose of analysing ecological problems concerning the canopy spider fauna. What is the species composition of the spider communities, how do the species of different forest types or tree species relate to each other, how much overlap between species of primary forest and various stages of regenerating secondary forest do we find? What can we conclude about the effects of human disturbance? Results will be published in a separate paper (Deeleman & Floren, in prep.).

Two recent spider surveys in northern Borneo have been reported on, one in the ground storey, one in the canopy. During the Mulu expedition to eastern Sarawak in 1977–1978, approximately 360 spider species were collected (Wanless & Hillyard, 1984). The dominant family was the Salticidae with 80 species. Of these, 22 could be identified to named species. In primary forest in Brunei (Russell-Smith & Stork, 1995), 10 trees of different species, mostly Dipterocarpaceae, were fogged. All spiders, including last stages of immatures, were counted and identified to family and, if possible, to genus or even species. In the tree crowns, the Theridiidae were by far the most rich in species. Salticidae came second in number of individuals, and third in species richness, after Theridiidae

and Araneidae: 19 salticid species were reported, of which six were *Myrmarachne*, one *Portia* and 12 unidentified species.

In our Bornean research plots in several types of forest in the Kinabalu area in western Sabah, spiders accounted on average for 5% of the total number of arthropod individuals (Floren & Linsenmair, 1997, 1999), with Theridiidae, Salticidae and Thomisidae being the dominant families. The major problem in assessing the material is that the taxonomy of spiders from Borneo has been grossly underworked. The fact that descriptions of most species dating from the nineteenth century are totally inadequate adds to this problem. Most of these taxa have never again been recorded, let alone revised, which makes identification often impossible without examining the type. In groups in which recent revisions exist (Clubionidae, Corinnidae, Hersiliidae, some Salticidae), 70–80% of the species encountered appear to be new to science (Deeleman-Reinhold, 2001; Baehr & Baehr, 1993). For the whole of Borneo, altogether 91 described species of Salticidae have been listed (Platnick, 2002). Many were described by Peckham & Peckham (1907), who described 42 species from Sarawak, including 7 new genera. The descriptions are inadequate for reliable identification of these species. It is most fortunate that Wanless devoted a series of excellent revisions to the jumping spiders of the tropical Orient, mainly pluridentates. These papers enabled us to recognise several genera. In our project we were able to distinguish 105 salticid species.

One specimen among our spider material was outstanding: an ant-mimic, exhibiting such an odd morphology, both somatic and genitalic, that it could not be associated with any known genus from Asia. Tamas Szűts and Domir de Bakker drew my attention to *Depreissia*, a monotypic African genus exhibiting very similar features. Another ant-mimicking spider could be recognised as a species of *Bocus*, a genus which has been recorded only from the Philippines. Three other species could be assigned to the genus *Neobrettus*: the type species, *Neobrettus tibialis* (Prószyński), and two undescribed species. Both of the new species were found more or less in clusters, confirming the suggestion by Murphy & Murphy (2000: 324) that *Neobrettus* is gregarious. This genus had also hitherto not been recorded from Borneo.

Methods

In the Mount Kinabalu National Park in Sabah, East Malaysia (6°2'75"N, 116°42'2"E), arthropods were collected by fogging with natural pyrethrum as insecticide in four different forest types. For primary forest, Poring Hot Springs was selected, consisting of mixed lowland hill forest, at c. 700 m a.s.l. Annual rainfall averages 2540 mm. Arthropods from the lower canopy, height 20–30 m, of eighteen individual trees were fogged; some of these trees were refogged after different periods of time (see Floren & Linsenmair, 1997): five *Aporusa lagenocarpa*, five *A. subcaudata* (Euphorbiaceae), four trees of an as yet unidentified

Meliaceae species of the genus *Aglaiia* (February and March 1996), and four trees of *Xanthophyllum affine* (Polygalaceae) (January–May 1992, refog January–April 1993).

In February and March 1997, the canopy of 10 trees in each of three secondary forest plots replacing the original forest which had been cut for crop cultivation were sampled in the same way. All plots are situated within the Park, adjacent to the primary forest. The first (SI) had been abandoned to regenerate for five years, and all fogged trees belonged to the dominant species *Melochia umbellata* (Stapf) (Sterculiaceae). The second (SII) had been left to regenerate for 15 years, and SIII had regenerated for 40 years. Neither *Melochia* nor any of the primary forest species grew in SII and SIII, so we were obliged to select another tree species in these forest types (for details about the study site and trees chosen for the study see Floren *et al.*, 2001). In the latter two forest types *Vitex pinnata* (Verbenaceae) trees were chosen.

Ten days of hand-collecting and litter sieving were carried out in the ground storey of the primary forest experimental site at Poring; none of the species described here was seen.

Abbreviations: RMNH=former Rijksmuseum van Natuurlijke Historie Leiden, now Nationaal Natuurhistorisch Museum “Naturalis”; AME=anterior median eyes; ALE=anterior lateral eyes; PME=posterior median eyes; PLE=posterior lateral eyes; SI, SII and SIII=study plots representing three stages of secondary forest regrowth. The holotypes and most paratypes are deposited in RMNH. All measurements are in mm.

Genus *Depreissia* de Lessert, 1942

Depreissia Lessert, 1942: 11.

Depreissia: Wesolowska, 1997: 715.

Type species: *Depreissia myrmex* Lessert, 1942: 11, figs. 6–10 (♂), Haut Uelé, Congo.

Diagnosis of males (females unknown) (Figs. 1, 6): Species of *Depreissia* are small orange-coloured ant-mimicking spiders. They differ from all other salticids by the shape of the carapace and the peculiar structure of the male palp. The carapace is dorsally flat with vertical sides and a transverse depression near the posterior edge with two deep pits forming a pair of lateral invaginations on either side of a median knob. The PLE are shifted backward and very wide apart, so that the eye quadrangle is considerably wider behind than in front. The ALE form a second row, whose position is highly variable. The chelicerae are vertical, arched, with two teeth on the retromargin. The pedicel is a long to very long sclerite. The leg tarsi have a small single toothless claw and thin claw tufts; scopulae are absent. Leg spines are scarce or absent. The abdomen is covered with a dorsal scutum. The palpal tegulum is constricted in a plane parallel to the alveolus, the proximal part giving rise to the coiled embolus (Fig. 3: e), and the distal section bearing tegular projections (Fig. 3: tp) which are partly sclerotised.

Relationships: Unknown. Lessert (1942) considered *Depreissia myrmex* close to the genus *Leptorchestes* Thorell, with which it is unrelated. The species was placed incorrectly in unidentati “because of the single retromarginal tooth”; when examining the type specimen I found two teeth on the retromargin. The type species has a “lyssomanine” eye arrangement with the ALE close to each other behind the AME, even further towards the centre than in *Athamas* O. P.-Cambridge; in other respects, *D. myrmex* and *Athamas* are unrelated. In *D. decipiens* the ALE are much further apart. The “lyssomanines” are an artificial grouping, and the lyssomanine eye arrangement is plesiomorphic (W. Wesolowska, pers. comm.).

Depreissia decipiens sp. n. (Figs. 1–7)

Type material: Holotype ♂ from Sabah, Mount Kinabalu N. P., 40-year-old secondary lowland forest (SIII), fogging canopy of *Vitex pinnata*, tree 9, 8 March 1997.

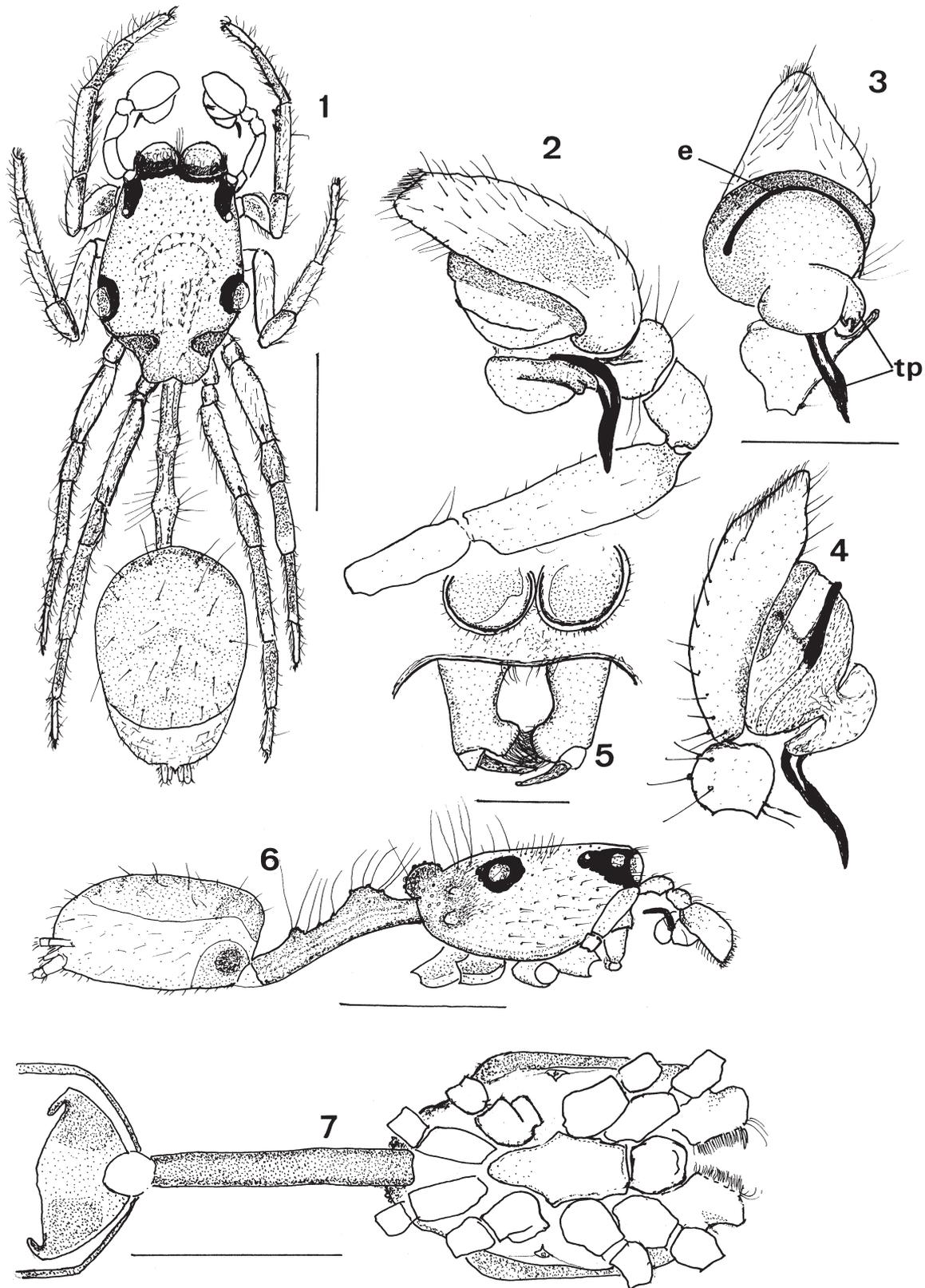
Etymology: Latin *decipiens*=one who cheats; referring to the large tegular projection giving the impression of an embolus.

Diagnosis: The ALE are almost lateral to the AME, much further apart than in *D. myrmex*. There is a large rounded knob between the lateral invaginations on the carapace, whereas in the African species there is a depression bordered by the upturned posterior edge. The chelicerae (Fig. 5). show a large hairy lobe near the base of the fang covered with long setae which are similar to and contiguous with those on the maxillae; the lobe bears two teeth. In *D. myrmex* the chelicerae are unmodified, with three teeth on the promargin and two on the retromargin. All leg femora have one disto-dorsal spine, there are two unpaired short thick spines proven- trally on tibia I and one similar on metatarsus I, and all other segments are spineless (in *D. myrmex* there are no leg spines at all). The pedicel (Figs. 1, 6) is almost as long as the abdomen (shorter in *D. myrmex*) and bears some dorsal protuberances and a series of long thin white erect setae which are also present on the carapace. The male palpal bulb is very similar to that of *D. myrmex*. The ventral-distal section of the tegulum ends posteriorly in an elongate acuminate black projection (Figs. 2–4); in *D. myrmex* this projection is in the form of a black round knot with a “handle”, and as in *decipiens* it is adjacent to a small bifid chitinous strip. The embolus surrounds the tegulum in a half circle, whereas in *D. myrmex* it is much longer with two or three full coils.

Description: *Male*: Total length 4.10. Carapace length 1.55, width 1.05, height 0.80. Pedicel length 1.25. Abdomen length 1.50, width 1.00. Clypeus height 0.10. Eye sizes: AME 0.30, ALE 0.11, PME 0.03, PLE 0.18. Eye rows widths: AME-AME 0.60, ALE-ALE 0.72, PME-PME 0.75, PLE-PLE 1.10. Leg lengths: I 2.40, II 1.95, III 2.25, IV 2.70. Sparse procumbent white hairs on sides of head, circle of short white hairs surrounding AME. Carapace and dorsal side of pedicel surface reticulate, with dispersed conical protuberances bearing

white erect feathery hairs; some sparse procumbent white hairs on sides of head and a circle of short white hairs surrounding AME. Carapace transversely invaginated behind fourth eye row, leaving a knob in middle (Figs. 1, 6). Promargin of chelicerae toothless, with hairy lobe, on which two teeth (Fig. 5). Small intercoxal

triangle between coxae II and III, with round pit (Fig. 7). Pedicel consisting of single cylindrical sclerite, dorsally bearing two hairy protuberances, enhancing the resemblance to myrmicine ants (genus *Crematogaster*?). Abdomen globular, epigastric scutum lacking anterior collar, dorsal scutum undivided. Legs: IV>I>III>II,



Figs. 1–7: *Depreissia decipiens* n. sp., male. **1** Dorsal view; **2** Left palp, retrolateral view, **3** Ditto, ventral view (e=embolus, tp=tegular projections); **4** Ditto, prolateral view, showing sperm duct leading to base of embolus; **5** Chelicerae and AM eyes, frontal view; **6** Body, lateral view; **7** Cephalothorax, pedicel and anterior part of abdomen, ventral view. Scale lines=1.0 mm (1, 6, 7), 0.25 mm (2–5).

femur I wider than femora II–IV, with distoventral excavation. Palp (Figs. 2–4): tibial apophysis long, slender, with spoon-shaped tip; embolus surrounding distal half of tegulum in a half coil (Fig. 3: e). Palpal trochanter length 0.20, femur 0.73, patella 0.15, tibia 0.12, cymbium 0.46. *Colour*: Head bright orange, thorax, pedicel and dorsal abdominal scutum darker, dorsum with anterior band suffused with grey, posteriorly three vague grey chevrons. Leg I: femur pale orange with prolateral face heavily tinged with dark brown; prolateral surface of patella, tibia and metatarsus black, retrolateral surface brown, dorsal surface yellow; tarsus white. Other legs and palp, including coxae and trochanters, predominantly dark orange with white tip to tibia, black metatarsus and white tarsus.

Female: Unknown.

Other material examined: Mount Kinabalu N. P. at Poring, 1 juv., 700 m, primary forest, *A. lagenocarpa* tree, 19 February 1996; Mount Kinabalu N. P., 1 juv., 40-year-old secondary forest (SIII), *Vitex pinnata* tree 5, 7 March 1997.

Distribution: Known only from Mount Kinabalu National Park.

Habitat: Found in the lower canopy, in primary and in 40-year-old secondary lowland forest.

Discussion: Both the African and the Asian species of *Depreissia* hold an isolated taxonomic position in their respective faunas. The many shared unusual characters such as the relative eye position, the invaginations defining a posterior knob*, the long pedicel and the male palp provide convincing evidence that, in spite of their geographical separation, the two species are closely related. The only objection against considering the two species to be congeneric lies in the great difference in the position of the ALE: in the African species this resembles the South Pacific genus *Athamas* with the ALE positioned directly behind the AME, and even shifted further towards the midline, whereas in the Asian species they are situated to the side of the AME. I take the view that in this case the eye arrangement is plastic and can easily be transformed as a consequence of the selective pressure exerted by ant-mimicry.

In the Salticidae, numerous genera are known to be distributed over tropical Africa and Asia, e.g. *Asemonea*, *Brettus*, *Carrhotus*, *Coprocossa*, *Cosmophasis*, *Cyrba*, *Harmochirus*, *Hispo*, *Hyllus*, *Marengo*, *Myrmarachne*, *Orsima*, *Pseudicius*, *Portia*, *Rhene* and *Telamonia*. The rarity of *Depreissia* specimens is exceptional. This might tentatively be explained by the small size of the spiders, the sophisticated ant-mimicry which results in their being overlooked, and the tendency to climb up in the canopy so that they can be collected only by means of specialised techniques.

*F. R. Wanless, after reading the description of *Depreissia decipiens* in the manuscript, pointed out that in the genus *Marengo* the shape of the carapace is variable and that a median knob in the thorax is also found in *Marengo thomsoni* Wanless, known only from the female. However, in the outline of the carapace, the position of the PLE, and in many other respects *M. thomsoni* differs from this species.

Genus *Bocus* Peckham & Peckham, 1892

Bocus Peckham & Peckham, 1892: 38.

Bocus: Wanless, 1978: 239–244.

Type species: *Bocus excelsus* Peckham & Peckham, 1892: 39, pl. 3, fig. 4 (♂), Luzon, Philippines.

Included species: The type species (♂♀) and *B. philippinensis* Wanless, 1978 (♂), both from Luzon.

Diagnosis: *Bocus* is closely related to *Myrmarachne*, and can be distinguished from that genus by the narrowing of the carapace between head and thorax (“neck”, Figs. 8, 9). The intercoxal plate between coxae I and II is much wider than the space between the other coxae (Fig. 10).

Bocus angusticollis sp. n. (Figs. 8–17)

? *Bocus* n.sp. Wanless & Hillyard, 1984: 62 (Sarawak, Mulu N.P.).

Type material: Holotype ♂ from Sabah, Mount Kinabalu N. P., 40-year-old secondary forest, fogging canopy of tree 1 (SIII, *Vitex pinnata*), 5 March 1997. Paratypes: 1 ♂ 2 ♀, same data; 1 ♂, same data except tree 10, 8 March 1997. Four juveniles were found with the adults; 1 juvenile was collected in a younger, 15-year-old forest (SII, *Melochia umbellata*).

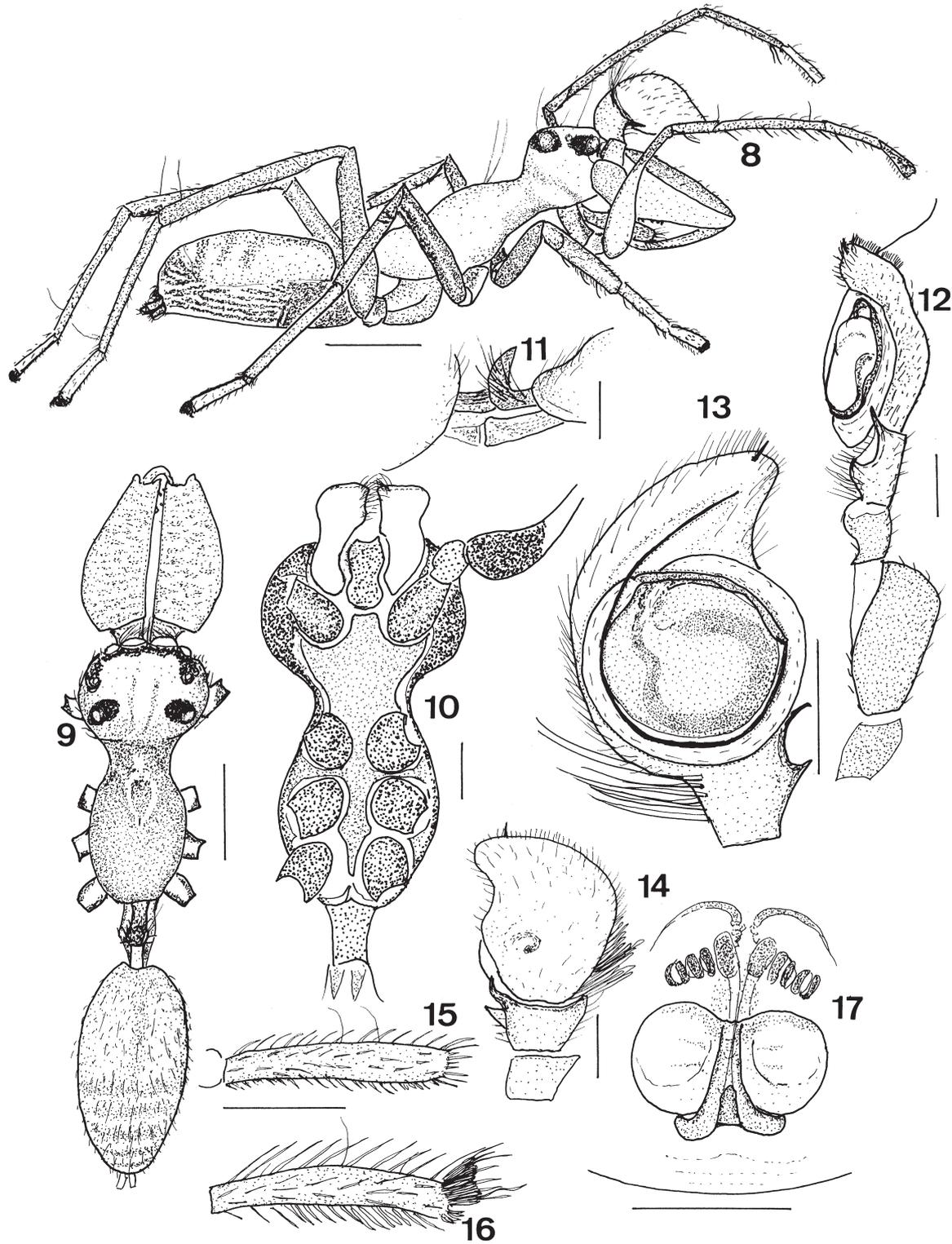
Etymology: Latin *angusticollis*=with narrow neck.

Diagnosis: Distinguished from other species of *Bocus* by the wider rounded head, the narrower “neck” (Figs. 8, 9), the steep rear slope of the head, and the conical excrescence on the pedicel (Fig. 11). In the females there is a conspicuous white wedge-shaped patch on either side of the carapace, marking the neck. In males this patch is indistinct. In both sexes coxa I is distinctly narrower than coxae II–IV, and femur I inflated at the base, but distally thin and stick-like. The head is sexually dimorphic.

Description: *Male* (holotype): Total length 4.80 excluding chelicerae; other male 5.65. Cheliceral length variable. Carapace length (holotype) 2.65, head width 1.10, neck width 0.65, thorax width 0.95. Abdomen length 2.00. Clypeus very narrow. Eye sizes: AME 0.38, ALE 0.17, PME 0.05, PLE 0.15. Eye rows widths: AME-AME 0.76, ALE-ALE 1.05, PME-PME 0.90, PLE-PLE 0.95. Leg lengths: I 4.32, II 3.70, III 4.40, IV 5.95. Head falling steeply towards thorax (Fig. 8). Clypeus with fringe of long hairs, “cheeks” clothed in long white procumbent hairs. Carapace and abdomen lightly hirsute. Chilum a transverse parallel-sided strip. Chelicerae: dorsal surface flat with reticulate surface, laterally smoothly tapering, lateral margins keeled; promargin with 3 distal teeth, 1 large apical tooth and 1 tooth+1 denticle at base; retromargin with 7 widely separated denticles in basal half. Carapace with one pair of trichobothria dorsally behind neck, sometimes a single long hair between AME, and near ALE and PLE. Plate between coxa I and maxillae narrow, triangular, coxa I separated from coxa II by wide plate (Fig. 10). Pedicel consisting of two sclerites, anterior one with dorsal conical excrescence (Fig. 11). Abdomen not constricted, covered with dorsal scutum. Coxa I narrower than coxae II–IV, femur I inflated at base (Fig. 8), width

of distal part one third of maximal width in proximal half; patella I with 1 pv, 1 rv, tibia with row of 6 pl spines and 5 rl spines, metatarsus 1-1pl, 1-1 rl. Leg II: patella 1 rv only, tibia with 3 pv and 3 rv, metatarsus 2 pv and 2 rv. Legs III and IV spineless. Tarsus I slightly inflated distally, claw tufts absent (Fig. 15), tarsi II–IV with thick claw tufts (Fig. 16); tarsal claws reduced. Palp (Figs. 12–14): femur considerably broadened and flat-

tened, tibial apophysis ventro-retrolaterally excavated (Fig. 13), cymbium and bulb wide, flat, embolus with sheath surrounding basal transverse section only, abruptly transgressing into distal filiform section (Fig. 12). Palpal femur length 0.50, patella 0.22, tibia 0.25, cymbium 0.75. *Colour*: Head, chelicerae and palps bright orange (specimens from tree 1) to dark brown (male from tree 10), carapace and abdomen one shade



Figs. 8–17: *Bocus angusticollis* n. sp. 8–16 Male. 8 Lateral view; 9 Body, dorsal view; 10 Cephalothorax, ventral view; 11 Pedicel, lateral view; 12 Left palp, retrolateral view; 13 Ditto, ventral view; 14 Ditto, dorsal view; 15 Tarsus I, lateral view; 16 Tarsus IV, lateral view; 17 Female, epigyne, vulva showing through integument. Scale lines=1.0 mm (8, 9), 0.25 mm (10–17).

darker; area within ocular quadrangle paler by yellow guanine, neck with light middle line, thorax with light drop-shaped mark in middle, with radiating pale streaks towards coxae II–IV. Abdomen dorsally in anterior half with white guanine patches on either side of midline, in posterior half four transverse dark bars joining dark venter. Femur I pale orange marked with thin black longitudinal line, other segments of leg I brown with dorsal surface pale yellow; other legs dark brown with pale yellow trochanters and tarsi.

Female: Total length 6.15 excluding chelicerae. Carapace length 2.95, head width 1.15, neck width 0.60, thorax width 0.90. Abdomen length 2.50. Clypeus very narrow. Eye rows widths: AME-AME 0.75, ALE-ALE 1.15, PME-PME 1.05, PLE-PLE 1.10. Leg lengths: I 4.00, II 3.45, III 4.60, IV 5.37, palp femur 0.50, patella 0.25, tibia 0.30, tarsus 0.65. All segments of palp laterally compressed. Head with parallel sides, lacking rounded “cheeks” of male, thorax relatively more slender. Hair fringe on clypeus present, “cheek” hairs reduced or absent. Chelicerae vertical, promargin with 3 teeth, retromargin with 5–6 closely set denticles. Legs as in male. Abdomen without scuta. Epigyne and vulva (Fig. 17): copulatory openings probably in posterior position, spermathecae anteriorly in four coils, fertilisation ducts arching in front. *Colour*: Conspicuous white triangular patch marking neck on either side, lacking in male, extending to ventral side between coxae I and II; white area hairless. Abdomen pale grey, transverse bars more contrasting than in male.

Distribution: Known only from secondary forest in Mount Kinabalu National Park.

Habitat: Found only in lower canopy in 40-year-old secondary forest bordering primary forest, in 6 out of a total of 15 samples; one immature was found in an adjacent 15-year-old secondary forest. All specimens were found only in the first fog of the trees.

Genus *Neobrettus* Wanless, 1984

Neobrettus Wanless, 1984: 181.

Type species: *Neobrettus tibialis* (Prószyński, 1978).

Included species: The type species (♂♀) and *N. phui* Žabka, 1985 (♂) from Viet Nam. *Neobrettus xanthophyllum* sp. n. and *N. cornutus* sp. n. are described here.

Diagnosis and description: Small, squat, hairy spiders, distinguishable from *Brettus* and other Spartaecinae by the stiff erect fringes on the first legs, and by the profile of the carapace, which is high, straight, with the highest point much backward, where it drops steeply to the rear edge (Fig. 28). The anterior face of the abdomen is concave, with a tuft of hairs on the front. Sometimes there are patches of iridescent hairs on the abdomen. All species treated here have long thin curved tarsal claws lacking teeth (Fig. 34); first legs are 10–20% longer than second legs. Male palpal tibia with various apophyses with tubercles, interlocking with sclerotised plate on retrolateral proximal part of cymbium. Female palps have white fringes on either side (Fig. 27). In

N. xanthophyllum sp. n. and *N. cornutus* sp. n., the copulatory openings are situated in a hood anteriorly in the epigyne. In *N. tibialis* the copulatory openings have moved over 270° outwards and in a spiral, causing a shift of the spermathecae towards each other. The spermathecae are elongate and more or less bipartite in each of the three species of which females are known. The two new species described here are less fluffy than *N. tibialis* and lack protruding hair tufts on the abdomen.

Habitat and biology: All specimens came from the primary forest canopy at Poring; no *Neobrettus* specimens were found in any of the secondary forest samples, or in the ground storey. At Genting, Malay Peninsula, a colony of *N. tibialis* was found in camouflage among dead fronds on a banana tree (Murphy & Murphy, 2000: 324), “the first impression gained was that one was looking at a rotting frond with small patches of grey mould starting to grow. In life, the grey hairs stand up on end much as one sees in a certain type of modern hair style”. It is suggested that the “spiders actually mimic a particularly unsavoury caterpillar”. Distributional data obtained from the present project confirm a tendency to a gregarious life style. The two species presented here are less fluffy and possibly not so cryptic as is *N. tibialis*.

No *Neobrettus* were listed for Mulu, East Sarawak (Wanless & Hillyard, 1984).

Neobrettus tibialis (Prószyński, 1978) (Figs. 23–26)

Cyrra tibialis Prószyński, 1978: 19–21, figs. 25–26, holotype ♂ from Bhutan.

Neobrettus tibialis: Wanless, 1984: 183, fig. 24A–H, ♂♀ from Malaysia; Murphy & Murphy, 2000: 324, 327, pl. 32:2(♀).

Material examined: Mount Kinabalu N. P. at Poring, canopy of primary forest, 700 m, 1 ♀, 1 subadult ♂, night-fogging *Aporosa lagenocarpa*, 27 February 1996.

Diagnosis and description: The female of this species was described for the first time by Wanless (1984) from Genting Highlands, Malaysia. On the abdomen, a wide tuft of mixed stout black hairs and fine white hairs as described by Wanless is present on the anterior edge. From the sides emerge serial tufts of protruding white hairs, and two very long erect white setae originate dorsally from the middle. No iridescent hairs, noted by Wanless, were observed (rubbed off?). Femur of leg I with scanty dorsal and ventral fringe with white and stiff black hairs, patella and tibia with ventral white fringe, tibia dorsally with a few erect white setae, one very long stout seta near base. Femora and tibiae of legs II–IV ventrally with fringes of long white hairs. Tibiae I–IV slightly concave. Copulatory openings in middle of epigyne, copulatory duct in a spiral. *Colour*: Carapace light brown in ocular area and on sides, dark brown behind fovea; three pairs of vertical dark bars run straight down sides to between coxae. Abdomen with three dark transverse bars in anterior half, alternating with areas with white guanine.

Distribution: Recorded from Bhutan, peninsular Malaysia and northern Borneo.

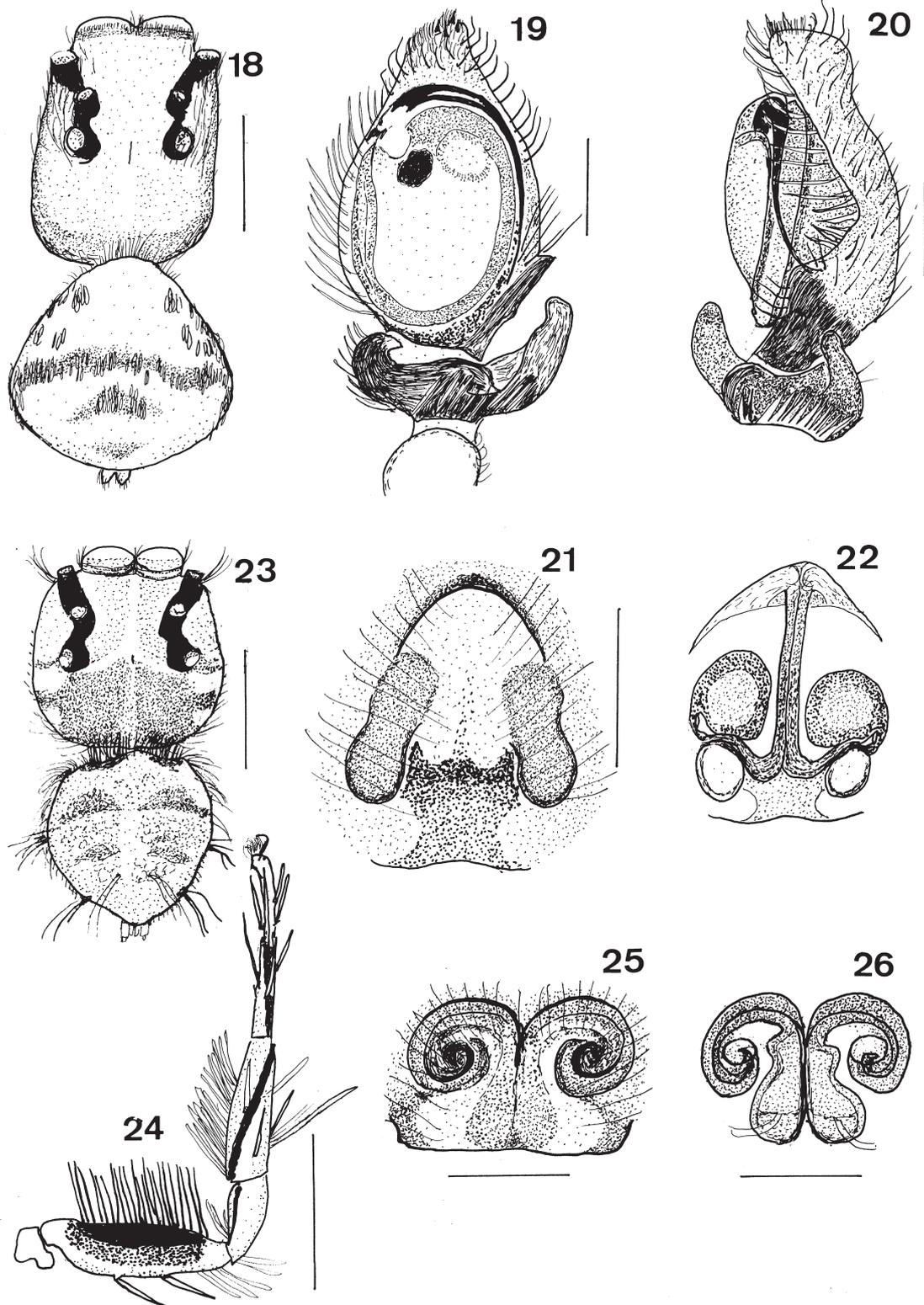
Neobrettus xanthophyllum sp. n. (Figs. 18–22)

Type material: Holotype ♂ from Sabah, Mount Kinabalu N. P., Poring Hot Springs, primary forest, on *Xanthophyllum affine*, tree 5, 23 January 1992. Para-

types: 1 ♀ with holotype; 1 ♂ 1 ♀, tree 4, 20 January 1992; 1 ♂ 1 ♀, refog of tree 4, 10 March 1993. Two additional subadult males were found with the holotype on tree 5.

Etymology: A noun in apposition, after the tree from which this species was obtained.

Diagnosis: Small, dull-coloured spiders, with large fringes on leg I, and a rhomboid abdomen. Light fluffy

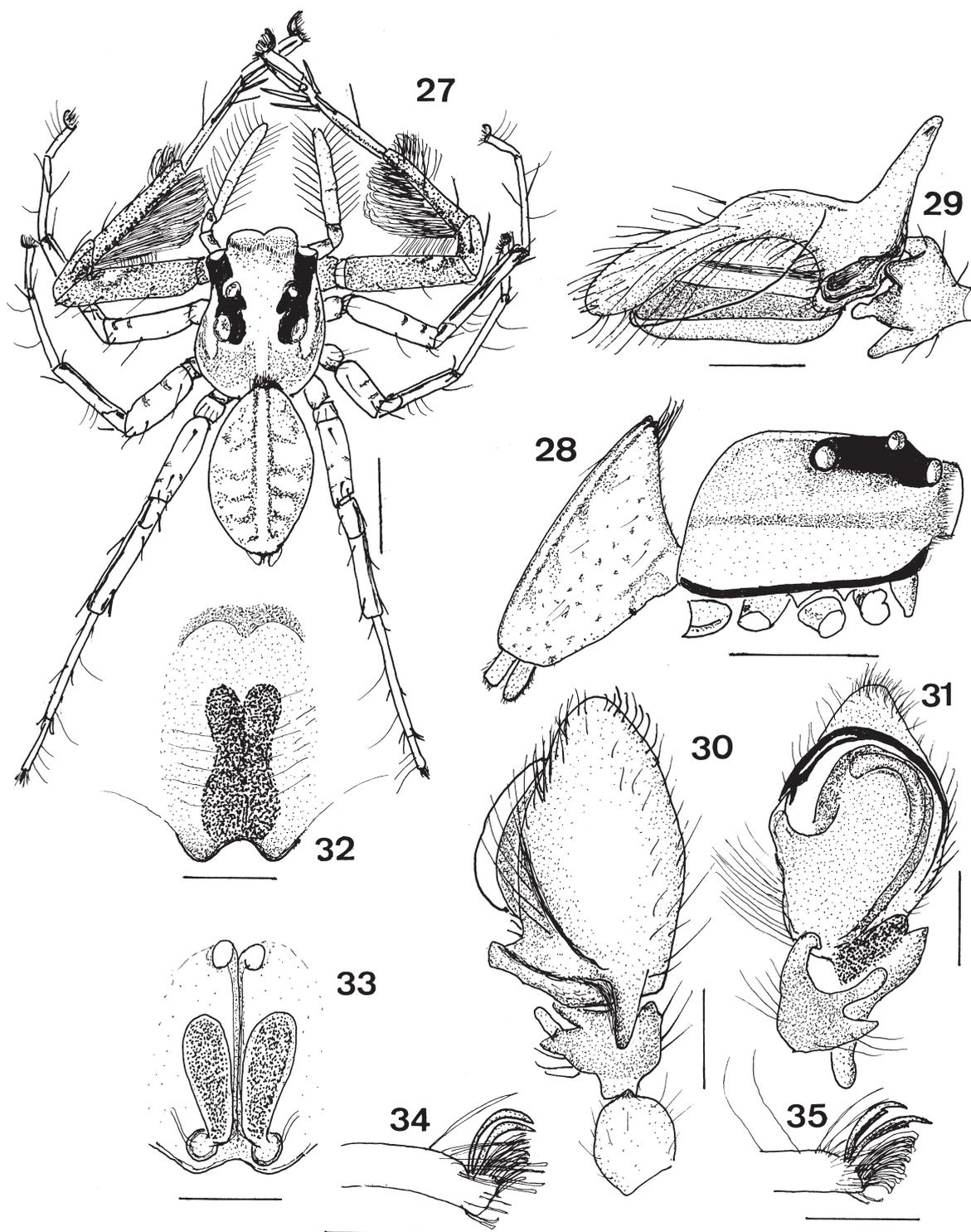


Figs. 18–26: 18–22 *Neobrettus xanthophyllum* n. sp. 18 Female, body, dorsal view; 19 Male, left palp, ventral view; 20 Ditto, ventro-retrolateral view; 21 Epigyne; 22 Vulva, dorsal view, in clove oil. 23–26 *Neobrettus tibialis* (Prószyński), female. 23 Body, dorsal view; 24 Right leg I, prolateral view; 25 Epigyne; 26 Vulva, dorsal view, in clove oil. Scale lines=1.0 mm (18, 23, 24), 0.25 mm (19–22, 25, 26).

setae are present only on the female palps and in the clypeal area. The dull colour, the shape of the abdomen, with a wide black area on the venter, and the genital organs, are distinctive. This species is distinguished from other *Neobrettus* species by the deep triangular invagination on the retrolateral margin of the male cymbium. The ventral apophysis of the palpal tibia is reduced to a low keel. The epigyne is characteristic.

Description: Male: Total length 3.30. Carapace length 1.90, width 1.40, height 1.00. Abdomen length 1.60,

width 1.40. Clypeus narrow. Eye sizes: AME 0.42, ALE 0.21, PME 0.18, PLE 0.20. Eye rows widths: AME-AME 0.85, ALE-ALE 1.27, PME-PME 0.85, PLE-PLE 1.15. Cheliceral retromargin with row of five denticles. Carapace covered with short appressed white hairs, except on dorsal surface where may be rubbed off; white moustache of long setae on clypeus and base of chelicerae. Thoracic groove between and behind PLE. Abdomen anteriorly acuminate, with tuft of mixed black and white hairs, dorsal surface with short appressed



Figs. 27–35: *Neobrettus cornutus* n. sp. 27 Female, dorsal view; 28 Female, body, lateral view; 29 Left male palp, retrolateral view; 30 Ditto, dorsal view; 31 Ditto, ventral view; 32 Epigyne; 33 Vulva, dorsal view, in clove oil; 34 Female, tarsus I; 35 Female, tip of tarsus IV. Scale lines = 1.0 mm (27, 28), 0.25 mm (29–35).

hairs. Legs: femur and tibia of leg I ventrally with long grey fringe, patellar fringe white, tibia also with dorsal fringe; femur with dorsal and distal spines, patella with a prodorsal and a retrodorsal spine, tibia and metatarsus I with dorsal, lateral and ventral spines. Legs II–IV more spiny than in *N. cornutus*, with dorsal and lateral spines and a proximal ventral spine on tibia III and on metatarsus IV. Ventral white fringes lacking on femora and tibiae of legs II–IV. Tibia IV barely concave. Tarsal claws of all legs not much different in size, claw tufts thick. Palp (Figs. 19, 20): tibia with large retrolateral and one prolateral apophysis, ventral apophysis reduced to low keel; cymbium with deep V-shaped incision centrally on retrolateral margin, proximal angle with various tubercles. Tegulum with round black spot near base of embolus. Embolus forms half turn around tegulum. Palpal femur length 0.70; patella length 0.32, width 0.25; tibia length 0.30, width 0.50; cymbium length 0.85, width 0.48. *Colour*: Carapace brown, abdomen pale brown with faint whitish chevron. Venter white, with wide black area which may occupy large part of area between epigastric fold and surrounding spinnerets. Leg I brown, legs II–IV light with faint annulations on femora and with dark prolateral stripe on patellae and tibiae.

Female: Total length 4.10. Carapace length 2.15, width 1.80. Abdomen length 2.00, width 2.00. White moustache as in male. Leg I with fringes of dark grey and white hairs, also fringe of white hairs prodorsally on tibia; femur and tibia II also with proventral black fringe, distally changing to white. Palp dark brown, white hairs retrolaterally on tibia. Epigyne (Fig. 21) a rounded plate narrowing somewhat anteriorly with wide hood, straight copulatory ducts aligned in midline, spermathecae partitioned into anterior and posterior part (Fig. 22), anterior part largest, visible through integument, 0.50 long, 0.45 wide. *Colour*: As in male, abdomen dorsally with transverse dark band in middle (Fig. 18) and with scattered patches of iridescent white and black hairs.

Distribution: Known only from Mount Kinabalu National Park at Poring (600–700 m).

Habitat: Found only in the lower canopy (20–30 m) of *X. affine* in primary forest.

Neobrettus cornutus sp. n. (Figs. 27–35)

Type material: Holotype ♂ from Sabah, Mount Kinabalu N. P., Poring Hot Springs, primary forest, *Aporosa lagenocarpa*, tree 52, 27 February 1996. Paratypes: 3 ♀, with holotype; 1 ♀, night-fogging *A. subcaudata* tree, fog 8, 26 February 1996.

Etymology: Latin *cornutus* = with horn (on male palpal cymbium).

Diagnosis: Distinguished from other *Neobrettus* species by the carapace pattern, the more elongate shape of the abdomen, and the genital organs. A longitudinal white line, bordered with black, runs from the anterior median eyes to the rear edge of the carapace and through the abdomen to the spinnerets, allowing easy recognition in the field. A horizontal black stripe

surrounds the carapace laterally (Fig. 28). The cymbium bears a strong bifid protuberance dorsally and a rounded excavation on the retrolateral margin (Fig. 29). The epigyne (Fig. 33) exhibits large elongate spermathecae.

Description: *Male*: Total length 3.25. Carapace length 1.65, width 1.25, height 1.00. Abdomen length 1.75, width 1.15. Clypeus narrow. Eye sizes: AME 0.40, ALE 0.22, PME 0.35, PLE 0.40. Eye rows widths: AME-AME 0.80, ALE-ALE 1.20, PME-PME 0.85, PLE-PLE 1.10. Cheliceral promargin with two large widely separated teeth and a small tooth basally, retromargin with 3 closely set teeth. Carapace with scattered short appressed white hairs and a few very short black setae, a pair of thin erect setae between AME; moustache on clypeus and chelicerae absent. Abdomen elongate oval, anterior margin with small tuft of white hairs on central white stripe and some black hairs on each of the bordering black stripes. Thoracic groove shallow, between and behind PLE. Legs: femur, patella and tibia of leg I with thick black fringe ventrally but none dorsally, femur with dorsal and distal spines, patella with a pro- and a retrodorsal spine, tibia and metatarsus I with dorsal, lateral and ventral spines; legs II–IV with dorsal and lateral, but no ventral spines. Ventral white fringes, present in *N. tibialis*, are lacking in this species on femora and tibiae of legs II–IV, as in *N. xanthophyllum*. Tibia IV straight. In contrast to *N. xanthophyllum* where all tarsal claws are subequal, tarsal claws long and arched on leg I (Fig. 34), with ventral keel in leg IV (Fig. 35). Claw tufts thick, no scopulae. Palp (Figs. 29–31): tibia with two retrolateral apophyses, one large ventral and one small pointed dorsally; retrolateral proximal angle of cymbium bearing large dorsal, posteriorly grooved apophysis and a heavily sclerotised ridge. Palpal femur length 0.75; patella length 0.30, width 0.25; tibia length 0.25, width 0.30; cymbium length 0.90, width 0.40. *Colour*: Carapace dark brown, paler areas within eye region, with white line, marked with black, running straight from anterior median eyes to spinnerets; clypeus black, chelicerae proximally black, distally white, sides of carapace and central median area behind fovea light. Thin sooty line bordering carapace, second black line parallel to it on flanks. Sternum pale. Abdomen white, with small scattered black dots. Venter white, with scattered black dots and median black band. Leg I dark brown with round lighter area ventrally on femur, legs II–IV white, femora II–IV with two black transverse bars on promargin, patella and tibia with longitudinal prolateral stripe. Palpal segments dark brown, edges of cymbium with grey fringe.

Female: Total length 3.25. Carapace length 1.70, width 0.90, height 1.30. Abdomen length 1.80, width 1.10. Abdomen shaped as in male. Leg I with fringes as in male, tibia with additional thin fringe dorsally. Epigyne simple, with anterior hood (Fig. 32), straight copulatory ducts aligned in midline (Fig. 33), spermathecae partitioned, anterior part large and elongate, clearly visible, 0.65 long, 0.45 wide. *Colour*: Somewhat lighter than in male, median white line less

contrasting, in ocular area merging with light background. Spinnerets surrounded by black ring.

Distribution: Known only from Mount Kinabalu National Park at Poring (600–700 m).

Habitat: Found at 20–30 m height in the canopy of primary forest only, on *Aporosa* trees.

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