

On a collection of *Myrmarachne* spiders (Araneae: Salticidae) from peninsular Malaya

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Summary

Thirteen species of the salticid genus *Myrmarachne* are described from peninsular Malaya of which six were previously found a century ago and described as new species by Badcock in 1918, and a seventh is the well-known *M. plataleoides* (O. Pickard-Cambridge, 1869). Badcock identified a further species as *M. maxillosa* (C. L. Koch, 1846), but because of uncertainty as to whether our specimens are conspecific with the true *maxillosa*, we have described them here as a new species, *M. aureonigra*. Five further new species are described here: *M. hispidacoxa*, *M. grossa*, *M. wanlessi*, *M. malayana* and *M. hirsutipalpi*. Three new synonyms are proposed: *Myrmarachne albicurata* Badcock, 1918 and *M. lateralis* Badcock, 1918 are considered to be junior synonyms of *Myrmarachne ramosa* Badcock, 1918, and *Myrmarachne daitarensis* Prószyński, 1992 is considered to be a junior synonym of *M. plataleoides* (O. Pickard-Cambridge, 1869).

Introduction

Myrmarachne is a large genus of salticid spiders with remarkable mimetic similarities in morphology and behaviour to ants (reviewed by Wanless, 1978). The males are also unusual in having enormous chelicerae that are used both in courtship and in male-male fighting (Jackson & Willey, 1994). These are often so large that they detract from the mimicry of ants and they also impair prey capture ability so that males have a more restricted diet than females.

The principal paper describing *Myrmarachne* from the Malayan peninsula is Badcock (1918), but recent papers describing species of *Myrmarachne* from Vietnam (Žabka, 1985) and the Philippines (Barrion & Litsinger, 1995) have also been consulted since these may also occur in Malaysia. Additional drawings of Philippine species of *Myrmarachne* are given in the Internet monograph of Prószyński (2001). Older literature (e.g. Thorell, 1877, 1890) is of limited value without access to type specimens because of the lack of drawings. Drawings in the literature of *Myrmarachne* species elsewhere in Asia have also been consulted (shown in the Internet monograph of Prószyński, 2001).

Wanless (1978), in his revision of African *Myrmarachne* and *Belippo*, describes and illustrates the morphological characters that he considers to be of systematic value in distinguishing species. He also presents a series of ratios of different body parts, but most of these appear to be of limited systematic value. There is no consensus as to which body dimensions and ratios

provide good systematic characters in these spiders, and different workers present different information (Barrion & Litsinger, 1995). For measurements of leg length, Badcock (1918) and Barrion & Litsinger (1995) include the coxa and trochanter, but Žabka (1985) and Berry *et al.* (1998) do not; in this paper we have measured all 7 leg segments and then summed them to give total leg length. However, the joint between the patella and tibia is sloping, so that the length of the two when measured separately in lateral view is greater than that of the two segments combined, thus giving a slight overestimate of the true leg length. We agree with Wanless that good descriptions are required of the size and shape of the carapace, sternum, pedicel and abdomen, the pedipalp and chelicerae of the male and the epigyne of the female. There is also variation in the relative sizes of the leg segments, which we refer to in some species. We have therefore followed the methods of Wanless but with some modifications. Thus, for most species we make no mention of eyes, clypeus, maxillae or labium because these appear to be very similar in almost all of the species. The anterior row of eyes is either straight or very slightly procurved, with white setae surrounding them. The clypeus is fringed with pale setae, and there are always stout black setae on the maxillae. The coloration of the carapace, abdomen and legs also provides good characters for distinguishing some species, but these are variable in others; we give quite long descriptions of these characters because these may be of value to workers in the field, but some of the colours change with time in alcohol. However, in all species the area immediately around the eyes has more black pigment than the rest of the head. Detailed measurements and ratios have only been given where they are of systematic value, but measurements of most adult spiders have been made and are available on request from ME. The material has been deposited in the Natural History Museum, London, accession numbers BMNH(E) 2002-33 to 39.

An attempt has been made to identify the colour photographs of *Myrmarachne* from Malaysia and Singapore by Koh (1989) and Murphy & Murphy (2000), but this is not easy because colours in life are not identical with colours of preserved material: species that are black in life, for example, tend to be much browner when preserved.

The spiders were all collected by ME during January and February 1989. Most were collected at three sites: the campus of the Universiti Malaya, Kuala Lumpur; the Universiti Malaya Field Studies Centre, Genting Forest Reserve; and the Genting Highlands. Other sites are described under appropriate species. ME is responsible for the morphological descriptions and measurements of each species as well as field observations and comparisons with Badcock's types; JP contributed all of the drawings (except for Figs. 53, 54, 55 and 121), analysis of the genital organs, and most of the systematic comments. Unfortunately one packet of spiders was mislaid, so only partial descriptions and drawings of these individuals can be given. The species described in this paper are as follows (valid names in bold, synonyms in normal typeface):

- Myrmarachne albicurata* Badcock, 1918: p. 301
Myrmarachne aureonigra n. sp.: p. 321
Myrmarachne biseratensis Badcock, 1918: p. 309
Myrmarachne cornuta Badcock, 1918: p. 304
Myrmarachne cuneata Badcock, 1918: p. 309
Myrmarachne daitarensis Prószyński, 1992: p. 298
Myrmarachne gedongensis Badcock, 1918: p. 308
Myrmarachne grossa n. sp.: p. 313
Myrmarachne hirsutipalpi n. sp.: p. 319
Myrmarachne hispidacoxa n. sp.: p. 311
Myrmarachne lateralis Badcock, 1918: p. 301
Myrmarachne malayana n. sp.: p. 317
Myrmarachne platalaeoides (O. Pickard-Cambridge, 1869): p. 298
Myrmarachne ramosa Badcock, 1918: p. 301
Myrmarachne turriiformis Badcock, 1918: p. 306
Myrmarachne wanlessi n. sp.: p. 315

Range of variation of genital organs in *Myrmarachne*

The structures of the male palpal organ and female epigynum are characteristic features of the 173 species of *Myrmarachne* illustrated by Prószyński (2001). The palpal organ comprises a round bulbous containing a broad, translucent loop of the internal channel of the sperm reservoir along its edge (Fig. 51) (often hidden by coils of the embolus) and, in some species, an additional small, narrow loop in the anterior half of the bulbous (Fig. 33). The embolus is coiled around the bulbous, usually 2 or 3 times, and for most of its length it is broad and white, thereby hiding the marginal sperm reservoir channel. The tibial apophysis is very similar in many species, usually short, either straight or curved (Figs. 104, 112, 113), often with a flange, and ending in a prominent hook (Figs. 34, 35).

The epigynum consists of a pair of superficial white membranous “windows” separated by a flat, narrow septum, with translucent internal parts (Figs. 62, 108). The internal structures include a pair of irregularly looped copulatory channels, which vary in length and diameter in different species (Fig. 63). These channels have usually been overlooked because they are transparent, soft, and either removed from the preparation or disregarded, but they can be seen after staining with Chlorazol Black E. They are difficult to interpret, even when stained, owing to overlapping and folding of the coils. Each copulatory channel originates from an indistinct slit at the median rim of the “window”, runs posteriorly, then anteriorly, and finally bends again posteriorly to join the posterior end of one of the paired sclerotised spermathecae. Each spermatheca comprises a sclerotised tube, which begins near the posterior end of the superficial “window”, runs anteriorly until beyond the “window” where it dilates and is joined to the typically triangular fertilisation channel. There are small “scent pores”, usually forming a minute swelling in the wall of the spermathecal tube near the connection with the soft copulatory channel (Fig. 68); there are some internal spines inside the spermathecal dilation; and there are also minute “nutritive pores” in this part of the duct. The shape of the dilated anterior end of the

spermatheca varies from just a slight swelling of the tube (as in *M. grossa*, Fig. 79), to a small simple chamber (e.g. in *M. aureonigra*, Fig. 118), or a larger chamber (as in *M. malayana*, Fig. 109). Some species (e.g. *M. hispidacoxa*, Fig. 68) have the spermathecal tube forming a transverse loop anterior to the superficial “windows”, after which it continues anteriorly and ends in a dilation. The spermathecal tube has a long but simple transverse loop in *M. ramosa* (Fig. 29), and a number of loops coiled around the transverse part of the tube in *M. cornuta* (Fig. 39). In some species, such as the Palaearctic *M. formicaria* (De Geer, 1778), there is an even more complicated system of external coils twisted around internal coils. In some species other translucent parts are visible through the surface of the epigynum, e.g. a sclerotised vaginal roof, a posterior opening in the tegument of the epigynum, or small sclerotised armatures (as in *M. ramosa*, Figs. 28, 29).

The genitalia in *Myrmarachne* are very variable, but there seems to be no consistent correlation between variation in the male and female organs, nor between genital organs and body features such as constrictions of the abdomen or cephalothorax, or the length of the pedicel. Thus the genus *Myrmarachne* presents a mosaic of uncorrelated characters.

There are several *Myrmarachne* species occurring in Central and South America, with spermathecae of a single tube type, ending in a swollen vesicle, and with abdomens which are either not constricted, or only slightly depressed. The lost type species of the genus from Cuba, *M. melanocephala* MacLeay, 1839, most probably also had this kind of epigynum. The South and Central American species are rather uniform, while the greatest diversity of *Myrmarachne* is in South-east Asia, suggesting that this is the area where the genus originated.

Myrmarachne platalaeoides (O. Pickard-Cambridge, 1869) (Figs. 1–7)

Salticus platalaeoides O. P.-Cambridge, 1869: 68, figs. 61–65 (♂), India, Sri Lanka; Peckham & Peckham, 1892: 33, fig. 1.

Myrmarachne platalaeoides: Koh, 1989: 132.

Myrmarachne daitarensis Prószyński, 1992: 185–186, figs. 80–89 (♀♂).

Syn. n.

Material examined: MALAYSIA (PENINSULAR MALAYA): Universiti Malaya, 3♂, 3 imm., 8–27 February 1989.

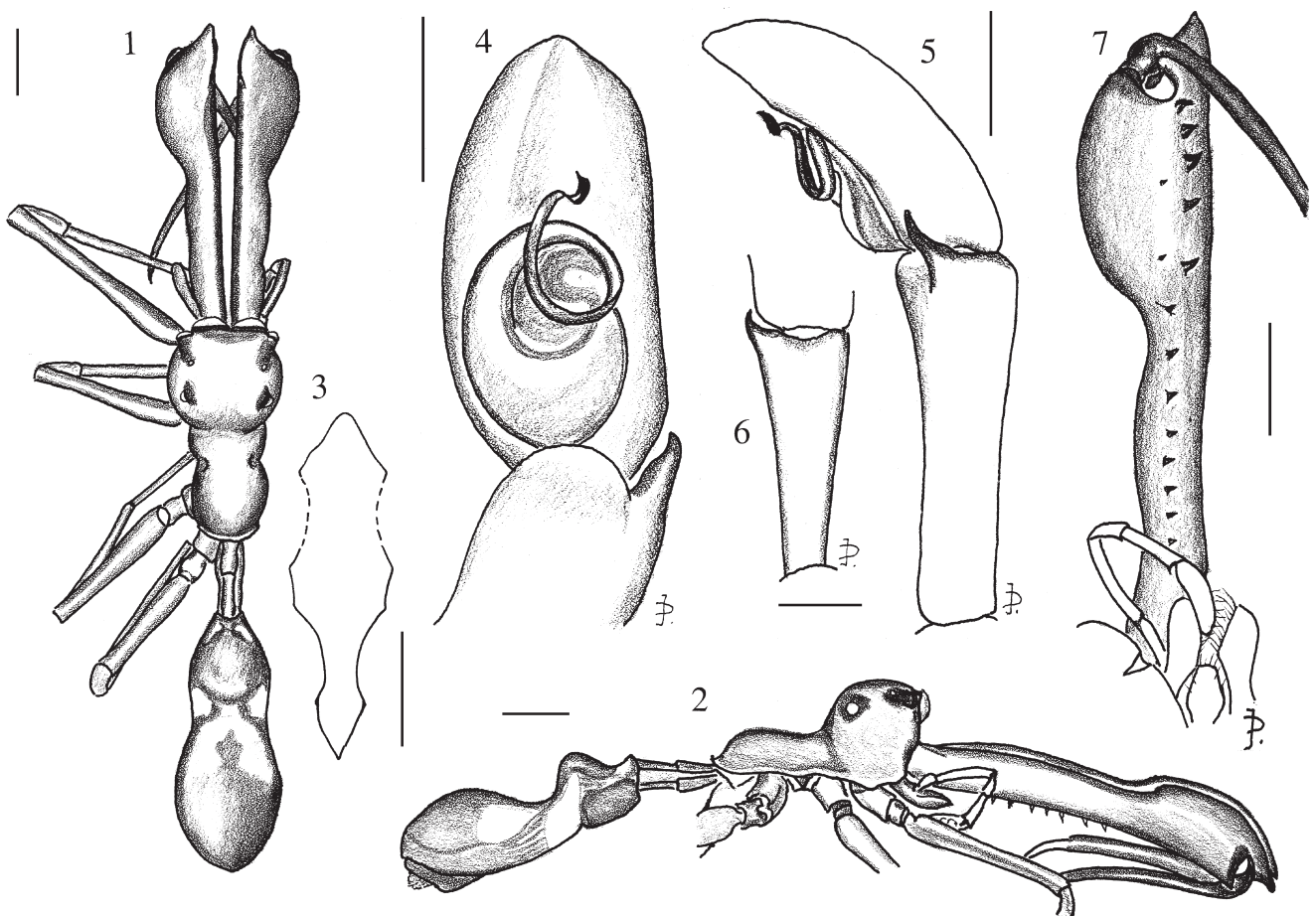
Diagnosis: Large size, orange colour, usually associated with *Oecophylla* ants; pedicel, sternum and all legs very long relative to carapace length (Table 1); male with slender chelicerae, swollen distally and much longer than carapace. Body lengths of three males 7.0–9.1 mm, with carapace lengths 2.7–4.1 mm. Other measurements and proportions are given in Table 1.

Description: *Male*: *Carapace*: Bright orange; head twice as high as thorax, separated by distinct step (Fig. 2); with very short sparse colourless hairs and two or three pairs of long, dark hairs on head. *Chelicerae*: Enormous, longer than carapace (Table 1), slender, but bulbous distally (Figs. 1, 2, 7); bright orange dorsally with black spot at bulbous tip, yellower at base,

ventrally with longitudinal black band on inner face; 4–6 large prolateral teeth distally and 10–13 smaller retro-lateral teeth more or less evenly spaced along full length of chelicera (Fig. 7); no fang apophysis. *Sternum*: Long, 60% of carapace length, orange (Fig. 3). *Pedicel*: Long, 40% of carapace length, segments equal in length (Figs. 1, 2). *Abdomen*: Slender, slightly longer than carapace, with dorsal indentation at one third of its length (Fig. 2); orange-brown with darker suffusion anteriorly and posteriorly on upper surface, cream laterally below notch; cream and brown ventrally. *Legs*: Leg I coxa and trochanter pale, creamy buff; femur and patella orange, tibia orange merging to yellow distally; metatarsus brownish yellow; tarsus cream; 5 pairs of large spines on tibia, 2 on metatarsus. Leg II similar to leg I, but metatarsus paler, creamy yellow; 2 pairs of spines on both tibia and metatarsus. Leg III coxa orange; femur brighter orange; trochanter, patella and tibia orange-yellow; metatarsus and tarsus yellow. Leg IV coxa orange-yellow or white; trochanter cream; femur orange; patella orange above, cream below; tibia orange merging to orange-yellow distally; metatarsus orange merging to creamy yellow, tarsus yellow. Compared with other species, coxae I and II short, less than 12% of femur I length, trochanters III and IV also short, 12 and 20% of femur I length respectively. *Pedipalp*: Orange-yellow; characterised by very broad

basal part of first coil of embolus, which occupies about half length of bulbus (Figs. 4, 5); anterior part of this coil narrows abruptly, forms a second coil (about half bulbus in diameter) and ends anterior to bulbus in a small hook. A small loop of seminal receptacle channel in anterior part of bulbus, partly hidden by coils of embolus. Tibia long, thin, about as long as cymbium (Fig. 5), in other species usually shorter. Tibial apophysis a short, pointed process, slightly inclined ventrally, bent apically; no flange or prominent hook (Figs. 4–6).

Immature female: *Carapace*: As male but paler, duller orange, with less pronounced notch, with some white hairs at sides of carapace between head and thorax. *Chelicerae*: Brownish orange, with sparse black hairs. *Sternum*: As male. *Abdomen*: As male but more creamy brown and less orange. *Legs*: Leg I coxa and trochanter creamy white; femur to metatarsus yellow with black stripe on femur, patella, metatarsus and proximal part of tibia (tibia black all round proximally in one specimen), tarsus pale yellow. Leg II similar to leg I but with paler black stripes and metatarsus pale yellow. Leg III coxa to femur orange with brown suffusion; patella to metatarsus orange-yellow; tarsus yellow. Leg IV coxa orange with brown suffusion; trochanter creamy white; femur orange with brown suffusion; patella yellow with brown suffusion; tibia orange-yellow with brown or



Figs. 1–7: *Myrmarachne plataleoides* (O. Pickard-Cambridge), adult male. 1 Dorsal view; 2 Lateral view; 3 Sternum; 4 Left palpal organ, ventral view; 5 Ditto, lateral view; 6 Left palpal tibia, dorsal view; 7 Right chelicera, ventral view. Scale lines=1.0 mm (1, 2, 7), 0.5 mm (3), 0.25 mm (4–6).

black proximally; metatarsus orange-yellow suffused with brown merging to yellow distally; tarsus yellow. *Pedipalp*: Yellow.

The present collection contains no adult female specimen, but judging from specimens accompanying the male of *M. daitarensis* from India (Prószyński, 1992: figs. 86–88; shown also in Prószyński, 2001), the membranous epigynal “windows” in this species are almost round and separated by a slender septum. There is a darker vaginal roof within each “window”, together with a small dark vesicle, visible anterior to the “window” (Prószyński, 1992: fig. 86). In microscopic slides of the epigynum, the anterior spermathecal vesicles appear as oval bodies with long internal spines, and indistinct perforations or “nutritional pores” (Prószyński, 1992: fig. 87). The vesicles pass posteriorly into long and semicircular sclerotised tubes, ending in a

posterior swelling, which is the attachment point of the transparent copulatory channel. This channel makes three loops on each side (Prószyński, 1992: fig. 88), whose exact course is difficult to trace, but almost certainly joins the copulatory opening on the median rim of each “window”. There is neither a description nor a drawing of the epigynum of *M. plataleoides* in the literature, so redescribing this female from India may be useful, although we cannot exclude the possibility that there may be some differences in the Malaysian population.

Biology: This well-known species is almost invariably found on plants overrun by the similarly coloured weaver ant, *Oecophylla smaragdina*. The male with its enormous chelicerae is said to resemble one ant carrying the dead body of another ant, with the black spot distally on the chelicerae mimicking an ant’s eye.

Species	<i>plataleoides</i>	<i>ramosa</i>	<i>ramosa</i>	<i>ramosa</i> variant	<i>cornuta</i>	<i>cornuta</i>	<i>turriiformis</i>	<i>gedongensis</i>	<i>cuneata</i>	
Sex	♂	♂	♀	♀	♂	♀	♂	♂	♀	
n	3	7	6	1	4	4	1	9	3	
Dimensions in mm										
Total length	7.6	6.3	6.2	3.3	7.0	6.1	3.8	6.2	7.0	
Cephalothorax length	3.2	2.9	2.5	1.5	2.7	2.3	1.8	3.0	3.5	
Leg I length	10.2	5.9	4.4	2.5	5.4	3.6	4.7	8.4	7.8	
% Cephalothorax length										
Cephalothorax width	51	54	51	53	55	49	58	51	43	
Cephalothorax height	43	46	39	39	46	40	56	43	32	
Eye field length	37	37	38	39	39	40	47	44	39	
Chelicera length	134	73	25	17	101	25	89	69	26	
Pedicel length	36	30	34	15	43	44	25	15	14	
Abdomen length	109	91	120	100	122	120	86	87	86	
Abdomen width	49	37	53	53	34	47	50	50	48	
Sternum length	58	56	57	52	56	53	56	50	48	
Sternum max. width	16	15	14	20	15	15	25	20	15	
Leg I	326	208	178	165	203	155	261	274	222	
Leg II	234	158	145	126	151	124	203	194	154	
Leg III	250	177	168	140	166	151	236	231	190	
Leg IV	366	261	255	207	231	224	328	324	297	
Sternum maximum width/width at coxa II										
Sternum proportion	1.7	2.0	1.6	1.5	1.7	1.8	1.5	1.4	1.5	
% Leg I length										
Leg II	71	76	82	76	75	80	78	71	69	
Leg III	76	85	94	85	82	98	90	84	86	
Leg IV	112	125	144	125	114	144	126	118	134	
% Femur I										
Leg I	tibia	93	96	91	80	95	89	100	105	104
	metatarsus	57	55	51	45	51	49	56	47	46
	tarsus	27	29	31	35	32	31	36	26	26
Leg II	femur	74	79	82	75	76	80	76	71	63
	tibia	60	63	66	60	60	63	64	65	60
	metatarsus	44	44	43	40	43	45	48	43	43
	tarsus	16	24	26	25	27	29	28	24	26
Leg III	femur	73	87	92	80	80	99	92	85	80
	tibia	61	65	62	65	57	65	68	68	72
	metatarsus	59	63	73	55	62	71	64	70	65
	tarsus	20	26	32	35	28	36	32	27	26
Leg IV	femur	110	127	143	125	111	143	136	121	129
	tibia	94	103	118	100	90	119	96	104	118
	metatarsus	87	95	109	90	87	103	104	93	101
	tarsus	24	32	36	40	33	43	40	32	35

Table 1: Measurements and ratios of six species of *Myrmarachne*. Ratios are given as % length of cephalothorax, % length of leg I and % length of femur I; the sternum proportion is the ratio of its maximum width to its width at the level of coxa II. Values are means where $n > 1$.

Distribution: Widespread in forest, secondary forest and gardens in Asia, including India (Mathew, 1934), Sri Lanka, China, Thailand, Singapore (Koh, 1989; Prószyński, 2001).

Remarks: This species is easily recognised by its large size, orange-red colour and the enormous chelicerae in the male, but there are similar but distinct species in the Philippines (*M. assimilis* Banks, 1930 and *M. markaha* Barrion & Litsinger, 1995). It is probable that isolated populations on islands in South-east Asia have undergone speciation so that there may be several more similar species yet to be described from this region. *M. daitarensis* Prószyński (1992) from India appears to be a junior synonym of *M. platalaeoides*, syn. n.

In spite of the bodily resemblance of *M. platalaeoides* to *M. assimilis* Banks, 1930 from the Philippines (which has similar large chelicerae), the palp (Fig. 4) can be distinguished by the broad basal first coil of the embolus, which occupies about half the length of the bulbus. The embolus and bulbus are exactly similar to those of specimens from India, shown by Prószyński (1992: 185–186, figs. 83–85) as *M. daitarensis*.

Myrmarachne ramosa Badcock, 1918 (Figs. 8–29)

Myrmarachne ramosa Badcock, 1918: 303, fig. 8 (♂), Bukit Besar and Biserat.

Myrmarachne albicrurata Badcock, 1918: 306, fig. 9a (imm. ♀), Ban Sai Kau, Nandock, and K. Mahek, Jalor. **Syn. n.**

Myrmarachne lateralis Badcock, 1918: 310, fig. 9b (♀), Bukit Besar and Sungkei. **Syn. n.**

Material examined: MALAYSIA (PENINSULAR MALAYA): Universiti Malaya, 4♂, 6♀, 11 imm., 8–27 February 1989; Genting Forest, 1♂ 17 January, 2♂ 15–20 February 1989; Penang Island, north-west forest, 1♂, 31 January 1989. SINGAPORE: University of Singapore, 1♀, 28 February 1989.

Diagnosis: Thorax orange-brown to dark brown; thoracic constriction narrow dorsolaterally, with triangles of white setae laterally; abdomen dark to blackish brown; femora I and II with dark lateral stripes. Male body length 5.2–7.2 mm with carapace length 2.5–3.2 mm, female body length 5.9–7.0 mm with carapace length 2.3–2.7 mm (excluding one much smaller female with body length 3.3 mm and carapace 1.53 mm). Other measurements and proportions are given in Table 1.

Description: Male: Carapace: Head glossy black dorsally, merging to brownish black or orange-brown at rear and sides, with some long and many short setae dorsally; thorax narrower than head (Figs. 8, 16, 21), varying from brownish orange to brownish black, with short appressed setae and two pairs of long bristles dorsally just behind head; head higher than thorax, sloping down at rear to meet it at angle of about 90°; very narrow groove dorsolaterally behind head, widening below to conspicuous triangle of dense short white setae above leg II. *Chelicerae:* Equal to or slightly less than length of carapace (Figs. 8, 16, 21); dorsally inner side straight, outer side convex with base and tip of same width, dark brown; ventrally inner edge

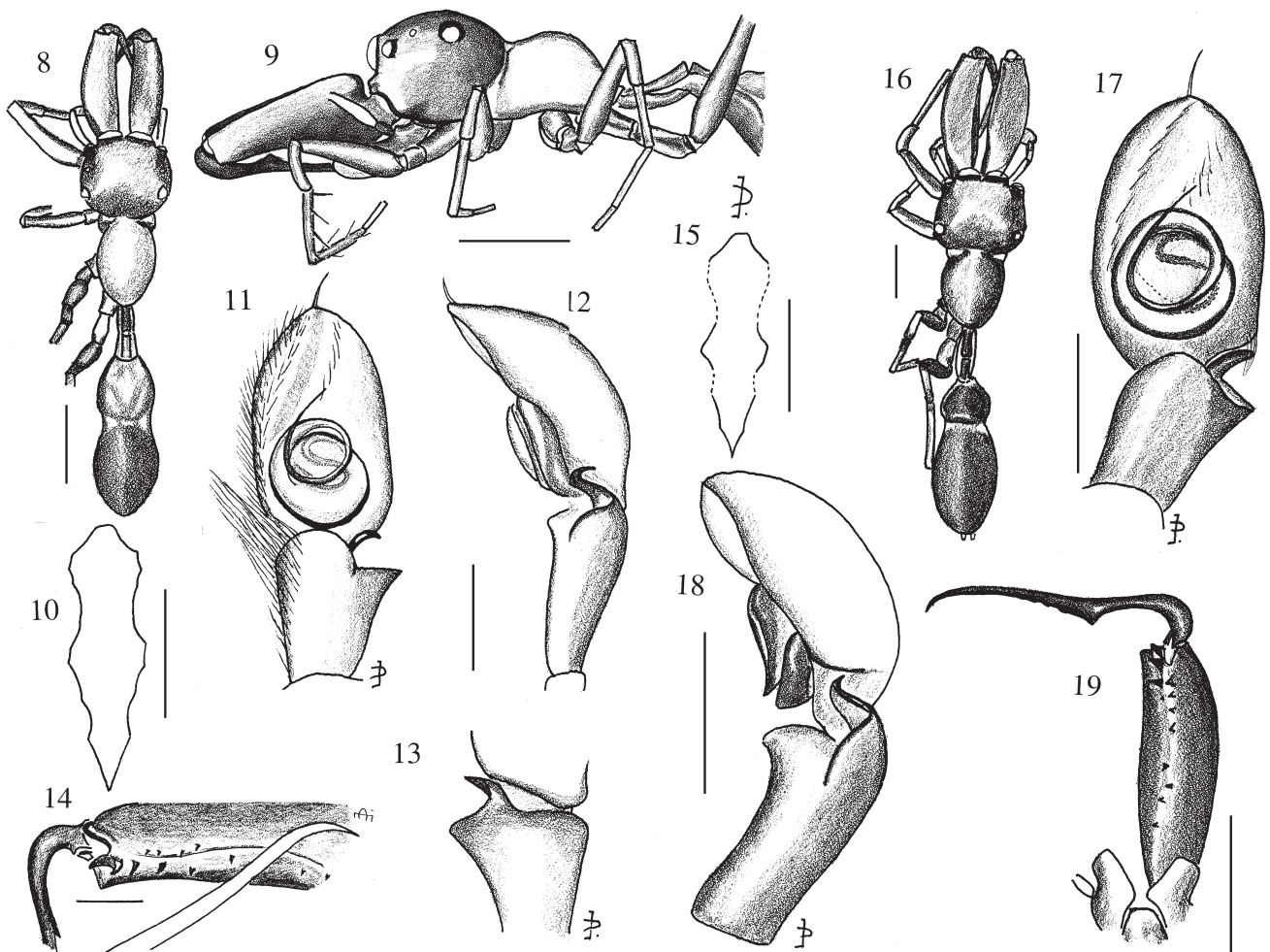
concave, parallel to outer side, orange-brown, with 6–11 prolateral teeth along full length, and 4–8 small retrolateral teeth distally (Figs. 14, 19, 24). Fang with apophysis at one third of its length and with 3–6 corrugations distal to it (Fig. 19); brownish orange to dark brown, with tip brighter orange. *Sternum:* Elongate, rounded to square anteriorly, tapering posteriorly (Figs. 10, 15, 20); orange to brown. *Pedichel:* First segment longer than second, orange to brown, second segment buffish orange to yellowish brown. *Abdomen:* Elongate (Figs. 8, 16, 21), typically brownish orange or brownish yellow dorsally followed by a buff saddle extending laterally and posteroventrally, then dark brown to blackish brown to spinnerets; ventrally yellow or orange-brown anteriorly, then buff or pale yellow with remaining two thirds pale yellow largely obscured by black pigment medially and black lines laterally; a few specimens with entire abdomen blackish brown anteriorly, black posteriorly. *Legs:* All orange to yellow with dark brown or black markings. Leg I coxa entirely dark or with pale ventral stripe; trochanter dark above, pale ventrally; femur with broad stripe on inner face, narrower stripe on outer face, both petering out distally, sometimes with outer stripe missing; patella occasionally with stripe on outer and inner surfaces; tibia with complete stripe on inner surface, outer stripe often petering out; metatarsus either pale, entirely dark or with outer and inner stripes; tarsus dark basally, tip pale; one pair of spines on patella, 5 on tibia and 2 on metatarsus. Leg II coxa and trochanter entirely brown or blackish brown, or with ventral pale area; femur and patella as leg I; tibia occasionally with stripe; metatarsus and tarsus pale; 3 pairs of spines on tibia, 2 on metatarsus. Leg III coxa dark; trochanter dark, but often pale ventrally; femur dark; patella pale or with dorsal dark mark widening distally; tibia, metatarsus and tarsus pale or (in dark specimens) suffused with brown. Leg IV coxa and trochanter pale with dark stripes laterally, pale trochanter especially noticeable; femur dark, sometimes paler ventrally; patella as leg III but dark mark more prominent; tibia usually with some suffusion of brown, metatarsus and tarsus paler. *Pedipalp:* Tibia about three-fifths length of cymbium; tibial apophysis twisted (as in many species of *Myrmarachne*), with well developed flange; embolus forms two coils, small loop of seminal vesicle channel anteriorly in bulbus (Figs. 11–13, 17, 18, 22, 23).

Female: Carapace: Head brownish orange to blackish brown dorsally, paler laterally, black round eyes, with pale short and long setae dorsally but almost none laterally; thorax narrower (Fig. 27), orange; head higher than thorax, meeting at angle of about 90°, with narrow thoracic constriction and triangle of dense short white setae (as in male). *Chelicerae:* Orange, sharply convex on upper surface, with 6–9 small, evenly spaced prolateral teeth and a similar number of retrolateral teeth distally. *Sternum:* Orange or yellow, as in male, but more pointed anteriorly (Fig. 26). *Pedichel:* First segment longer than second (Fig. 27), orange; second segment pale yellow. *Abdomen:* Pale yellow or buff, with suffusion of grey or black so that anterior third dorsally pale, then a broad

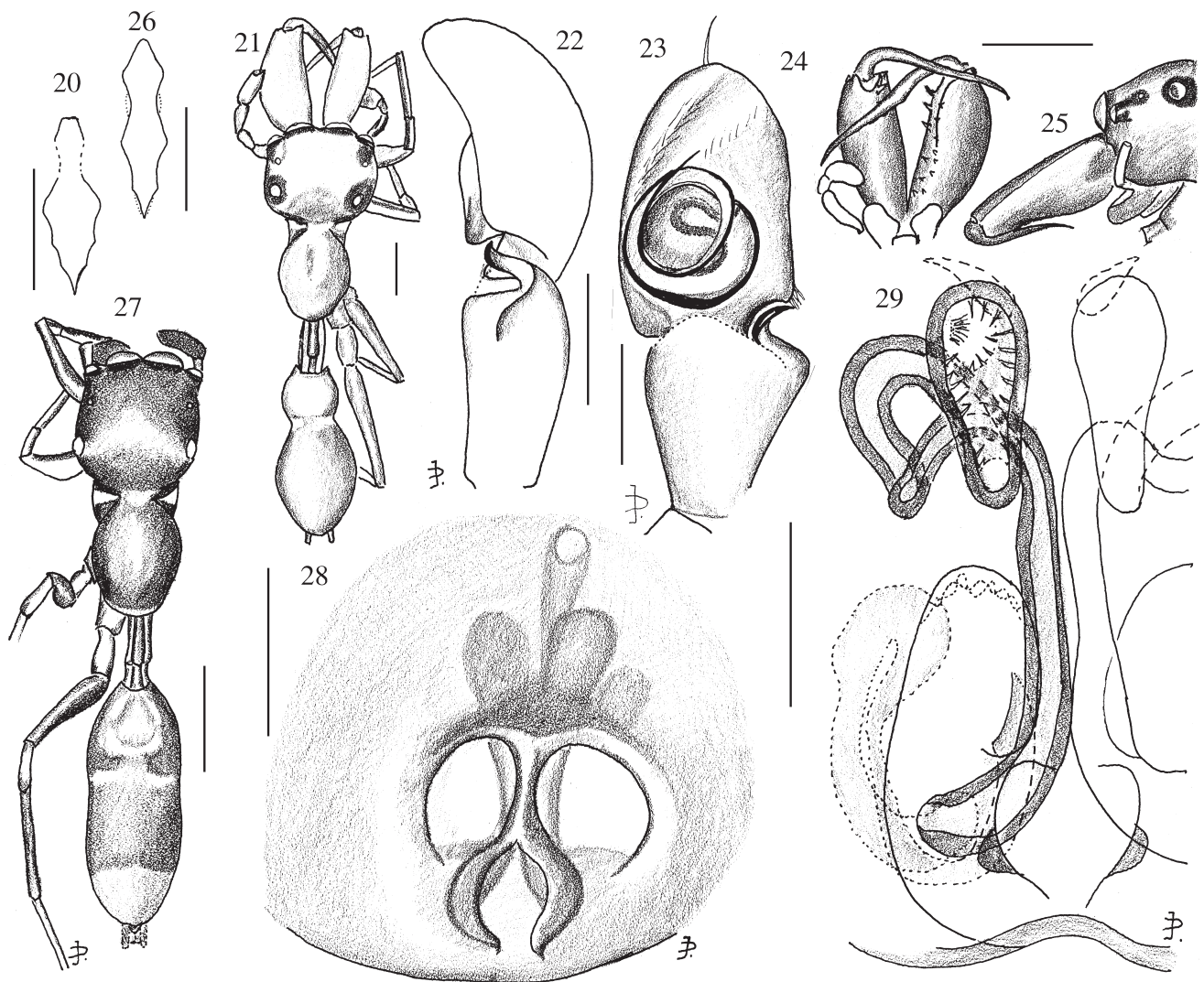
grey band, with posterior third slightly paler; ventrally anterior two-fifths pale, posterior dark; pale lateral band runs diagonally backwards from anterior dorsal patch; branchial opercula brown. *Legs*: Mostly yellow or cream, but III and IV more orange. Leg I coxa and trochanter grey above, cream below; femur yellow to cream, sometimes with partial grey stripes on inner and outer sides; patella and tibia yellow with black stripe on inner side; metatarsus and tarsus yellow; one minute spine usually present on outer side of patella, 5 pairs of spines on tibia (only 3 pairs in one small mature female), 2 on metatarsus. Leg II coxa and trochanter cream; remaining segments yellow, femur with prominent black stripe on inner side, patella and tibia with faint stripe on inner side; 3 pairs of spines on tibia, 2 on metatarsus. Leg III coxa orange, trochanter yellow, both with black sides; femur brownish orange; patella cream, often with black mark distally; tibia orange or yellow; metatarsus and tarsus yellow. Leg IV coxa orange, sometimes with stripe on each side; trochanter cream, with black stripe on outer side and black spot distally on inner side; femur orange suffused with brown, especially on outer side where it may form a poorly defined stripe; patella cream with dorsal black mark distally; tibia orange-yellow with darker stripe on outer side; metatarsus and tarsus yellow

or brownish yellow. *Pedipalp*: Orange with some brown suffusion, darker on distal segments which have many black setae. *Epigynum*: Epigynal windows oval (Fig. 28), darker and more heavily sclerotised posteriorly. Septum separating windows divided posteriorly, forming heart-shaped opening with pair of small sclerotised pockets medially, more clearly seen in stained preparation (Fig. 29). Sclerotised spermathecal channels straight anterior to "windows", then make two loops, and end in oval vesicle, swollen anteriorly, with long internal spines and indistinct "nutritive gland" structures.

Variation: There is considerable variation in coloration in this species, with specimens from the forest generally darker than those from the secondary parkland of the university campus, but the body morphology and pattern of dark markings are broadly similar in all specimens. Because of this variability we have included drawings of three different males to indicate the range of variation. The male from Penang Island in particular showed minor differences from Kuala Lumpur males, but its pedipalps and general colour pattern were similar to those of other specimens, so we are confident it belonged to the same species. This specimen was unfortunately mislaid. One adult female from the Universiti Malaya campus is much smaller in all dimensions than



Figs. 8–19: *Myrmarachne ramosa* Badcock. 8–14 Adult male from Universiti Malaya. 8 Dorsal view; 9 Lateral view; 10 Sternum; 11 Left palpal organ, ventral view; 12 Ditto, lateral view; 13 Left tibial apophysis, dorsal view; 14 Left chelicera, ventral view. 15–19 Adult male from Genting Forest. 15 Sternum; 16 Dorsal view; 17 Left palpal organ, ventral view; 18 Ditto, lateral view; 19 Left chelicera, ventral view. Scale lines=1.0 mm (8–10, 15, 16), 0.25 mm (11–13, 17–19), 0.5 mm (14).



Figs. 20–29: *Myrmarachne ramosa* Badcock. 20–25 Adult male from Genting Forest. 20 Sternum; 21 Dorsal view; 22 Left palpal organ, lateral view; 23 Ditto, ventral view; 24 Chelicerae, ventral view; 25 Lateral view of head. 26–29 Adult female from Singapore. 26 Sternum; 27 Dorsal view; 28 Epigynum; 29 Internal structure of epigynum showing spermatheca and channel. Scale lines=1.0 mm (20, 21, 24–27), 0.25 mm (22, 23), 0.1 mm (28), 0.05 mm (29).

other adults from the same site (Table 1). However, most of the ratios are similar to those of typical females, apart from the pedicel and leg lengths relative to cephalothorax length. These ratios probably differ because the relationships with cephalothorax length are allometric rather than simply proportional. Compared with other females, this specimen was also generally paler in colour, with the head brownish orange centrally and the dark markings on the legs smaller and paler. However, the pattern of markings on body and legs and the epigyne were similar to those of normal sized females.

Immatures: These resemble the females but are yellower, with less orange and less dark pigment on carapace and legs.

Biology: The hue of the carapace of this species varies from brownish orange to brownish black, with the two darkest males from Genting forest and the darkest female from the University of Singapore. All of the specimens from the Universiti Malaya campus were more orange, as was the single male from Penang Island, and these specimens closely resembled the red weaver ant *Oecophylla smaragdina* in colour. It would appear

that specimens from forest are typically darker brown and less orange than those from savanna (or derived savanna).

Distribution: Known only from peninsular Malaysia and Singapore (Badcock, 1918; this paper). A colour photograph in Koh (1989: 130, top right) appears to be *M. ramosa*.

Remarks: ME examined the types of Badcock's species in the Natural History Museum, London, and found that *M. ramosa* Badcock, *M. albicurata* Badcock and *M. lateralis* Badcock are almost identical with the present material. The type of *M. lateralis* is female and has similar epigyne, carapace (including a triangle of white hairs on each side), sternum and markings on the legs to the present material, although much of legs I and IV are missing. The type of *M. albicurata* is immature and very damaged, but it has a similarly shaped carapace with a lateral triangle of white hairs as well as a similar sternum to the present material. The legs are missing apart from the coxae of legs I–III which have the same markings as the present material. Badcock himself questioned whether *M. albicurata* and *M. lateralis* were

conspecific, and the differences he cites are trivial. *M. lateralis* appears to be a dark form and *M. albicurata* a pale form of the same species. *M. ramosa* is based on a male which agrees closely with the present material in having a triangle of white hairs on the carapace as well as in details of the pedipalp, chelicerae and leg markings. Since live material of both sexes was collected at the same time and place in Malaya, there is no doubt that these belong to a single species. *Myrmarachne ramosa* is described first in Badcock's paper, so we give this name priority with *M. albicurata* and *M. lateralis* as junior synonyms. The body and leg measurements given by Badcock are similar to those presented here, although it seems that his specimens were rather smaller than most of those that we examined.

This species is similar to *Myrmarachne tristis* Simon, 1901, known from Libya to India, from which it differs in the longer chelicerae and in details of the genital organs.

Myrmarachne cornuta Badcock, 1918 (Figs. 30–39)

Myrmarachne cornuta Badcock, 1918: 291, fig. 5 (♂♀), Bukit Besar.

Material examined: MALAYSIA (PENINSULAR MALAYA): Universiti Malaya, 2♂, 1♀, 3 imm., 20–27 February 1989; Genting Forest, 1♂ 1♀, 11 January and 5 February 1989; Genting Highlands, 2♂ 2♀, 15 January–19 February 1989. SINGAPORE: 1♀, Singapore University, 28 February 1989.

Diagnosis: This species is easily recognised by its dark, slender body, with unusually long pedicel (>40% of carapace length); by the second pedicel segment being twice as long as the first; and by the narrow triangle of white hairs laterally on the carapace between head and thorax. Body lengths of four males 6.4–7.8 mm with carapace lengths 2.5–2.8 mm, and body lengths of four females 5.6–6.4 mm with carapace lengths 2.2 to 2.4 mm. Other measurements and ratios are given in Table 1.

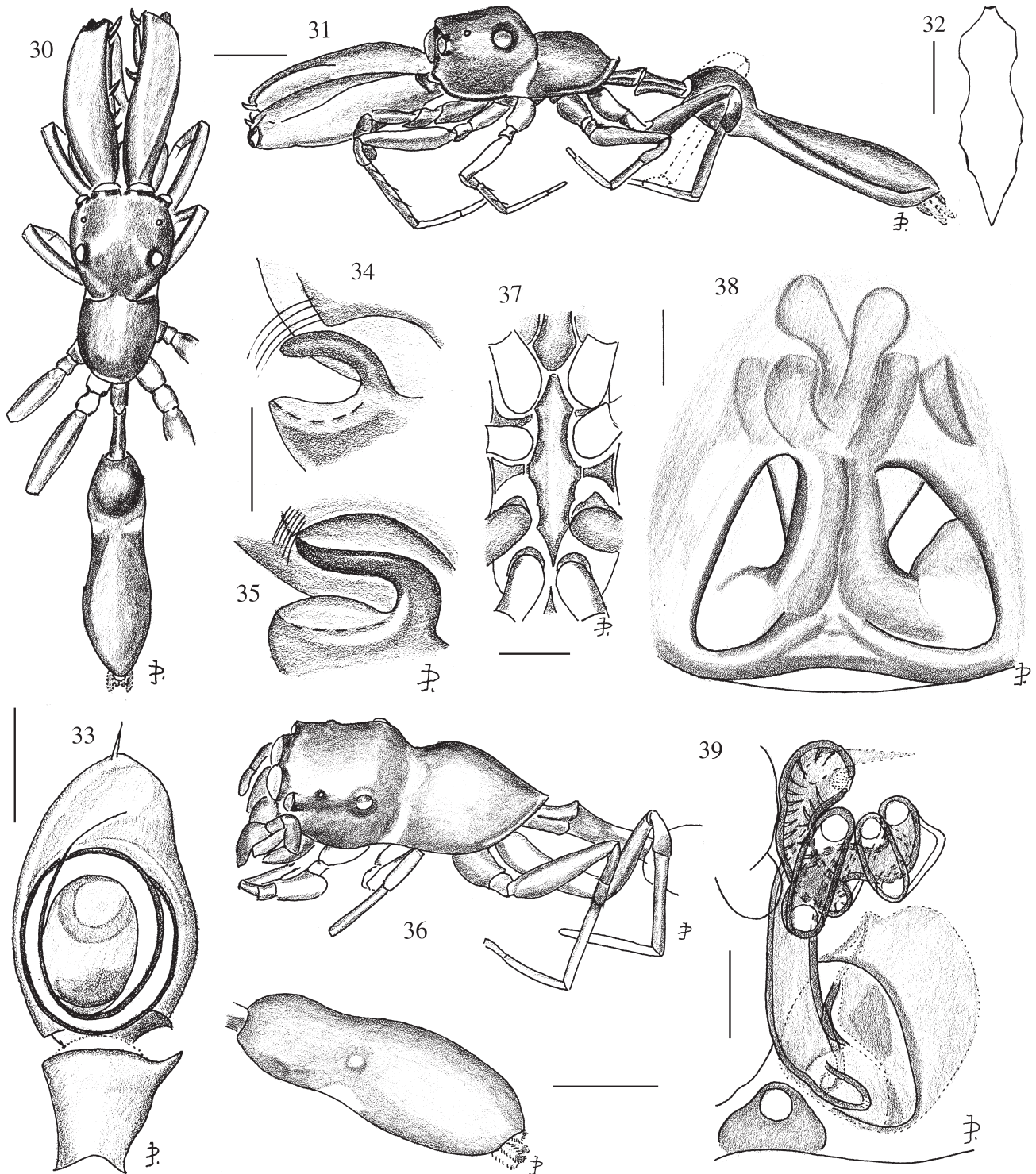
Description: *Male: Carapace:* Head dark brown, blacker dorsally, with appressed forward-pointing white hairs except below and behind posterior eyes where glabrous, and with sparser longer (0.2 mm) bristles; thorax shorter and lower than head (Figs. 30, 31), brown to dark brown, with white hairs dorsally, sparser on sides; notch a very shallow depression dorsally, with narrow triangle of dense white hairs laterally ending just above base of leg II; edge of entire carapace with narrow band of white hairs. *Eyes:* Anterior eye row distinctly procurved. *Chelicerae:* As long as or longer than carapace (Fig. 30), outer edge slightly convex, inner edge almost straight so that they appear almost parallel sided; brownish orange or brownish yellow; with large blunt distal prolateral spur, 5–6 prolateral teeth decreasing in length towards base, distal one close to spur and separated from others by wide gap; 10–15 minute retrolateral teeth; fang slightly undulating in shape, with no apophysis, yellow-brown to dark brown. *Sternum:* Rounded or straight anteriorly, pointed at rear, yellow-brown to red-brown (Fig. 32). *Pedicel:* Long, with second segment about twice as long as first (Figs. 30,

31), blackish except cream at rear of second segment. *Abdomen:* Longer than carapace, slender, narrowest at one third of its length, where a marked notch dorsally; dark brown above, grey-brown (occasionally dark brown) sides and brown or yellow-brown below, a narrow cream patch with white hairs on each side at narrowest region. *Legs:* Leg I coxa, trochanter and femur cream with black or brown stripe on outer side, and with similar stripe on inner side of femur and trochanter; occasionally stripes on coxa and trochanter reduced or absent; patella and tibia cream with dark stripe on outer and inner sides; metatarsus brown with broad blacker stripes on each side; tarsus brown, paler at tip; one retrolateral spine on patella, 4 pairs of spines on tibia and 2 pairs on metatarsus, each spine barely overlapping one distal to it. Leg II coxa and trochanter cream, usually with black stripe on outer side; femur cream with blackish stripes in distal half on both sides, outer one sometimes reduced to small spot, inner one sometimes complete and forming broad black patch; patella and tibia cream or brownish yellow with brown or blackish lateral stripes, sometimes with inner stripe reduced or absent; metatarsus and tarsus yellow-brown; with 2 pairs of short spines on tibia and 2 on metatarsus. Leg III coxa and trochanter dark brown, paler ventrally, and paler dorsally on trochanter; femur dark brown; patella cream or yellow-brown with brown stripe on each side; tibia cream or yellow-brown with dark stripe on each side; metatarsus and tarsus yellow-brown, sometimes with hint of darker lateral stripe proximally on metatarsus. Leg IV coxa cream with dark or blackish brown lateral stripes on each side; trochanter cream with dark stripe (or partial stripe) on outer side only; femur dark or blackish brown; patella cream proximally with dark brown on sides distally; tibia uniformly brown, or cream with dark brown stripes on each side; metatarsus and tarsus cream or yellow-brown. *Pedipalp:* Brown, with coxa, trochanter and femur yellow-brown below; patella and tibia dark brown; cymbium dark brown above with flattened, circular cream area near tip bearing short pale setae. Tibia shorter than cymbium, with well developed flange and long, bent and somewhat flattened apophysis (Figs. 33, 34, 35). Embolus forms two coils, first broader, white coil hides margins of bulbous, but small loop of seminal receptacle channel visible anteriorly (Fig. 33).

Female: Carapace: Head blackish brown to black dorsally, blackish brown to orange-brown laterally, with fine white appressed forwardly pointing hairs except lateral to and behind posterior eyes, some long (0.2 mm); thorax similar in size to head but lower, blackish brown, brown or orange-brown, with appressed white hairs petering out laterally; notch shallow, with wedge-shaped triangle of dense white hairs laterally (Fig. 36); edge of carapace with a few white hairs only, unlike male. *Eyes:* As in male. *Chelicerae:* Shorter than head, yellow, orange or brown, darker dorsally; 6 prolateral teeth, longest distally, and 8 slightly smaller retrolateral teeth, most of similar size. *Sternum:* Slender, pointed at front and rear (Fig. 37); yellow-brown or orange-brown. *Pedicel:* Long, 40% of carapace length,

with first segment about half as long as second, orange or brown; second segment black or brown anteriorly, cream posteriorly. *Abdomen*: Longer than carapace, slender, with slight constriction at one third of its length, grey except for small cream area ventrally just behind the epigynum and two ventro-lateral patches in region of constriction with dense white hairs. *Legs*: Leg I coxa, trochanter and femur all cream, coxa with grey stripe on upper surface in 1 specimen (out of 3); femur with black

or grey stripe on each side; patella, tibia and metatarsus cream or yellow with grey stripes on each side; tarsus yellow, occasionally with faint lateral stripe basally; patella with one retrolateral spine, tibia with 4 pairs of spines, all less than half length of tibia, and metatarsus with 2 pairs of spines reaching close to tip of metatarsus. Leg II coxa, trochanter and femur cream, coxa with grey basal spot and trochanter with grey stripe on outer surface in 1 of 3 specimens, femur with grey stripe in



Figs. 30–39: *Myrmarachne cornuta* Badcock. **30–35** Adult male from Genting Highlands. **30** Dorsal view; **31** Lateral view; **32** Sternum; **33** Left palpal organ, ventral view; **34, 35** Left tibial apophysis, dorsal view. **36–39** Adult female from Genting Forest. **36** Dorso-lateral view of cephalothorax and abdomen separately; **37** Sternum and leg bases; **38** Epigynum; **39** Internal structure of epigynum showing spermatheca and channel. Scale lines=1.0 mm (30, 31, 36), 0.5 mm (32, 37), 0.25 mm (33), 0.1 mm (34, 35), 0.05 mm (38, 39).

distal half of inner side; remaining segments cream or yellow with faint grey stripe on outer side of patella and tibia, and similar stripe on inner side but often petering out on tibia; tibia with 2–3 pairs of short spines, metatarsus with 2 pairs of spines. Leg III coxa, trochanter, femur and patella brown to blackish brown, tibia dark brown to brown basally and laterally, rest cream; metatarsus and tarsus cream. Leg IV coxa and trochanter cream with black or grey stripes on each side of coxa, on outer side of trochanter and sometimes as a spot on inner side of trochanter; femur dark brown or brown; patella cream basally, dark brown distally; tibia brown to dark brown; metatarsus and tarsus cream or yellowish. *Pedipalp*: Yellow-brown to brown with distal segments darker except for small cream patch at tip of tarsus. *Epigynum*: Membranous “windows” expanded posteriorly, almost reaching posterior end of epigynum, but posterior opening not visible (Fig. 38). Broad spermathecal channel narrows anteriorly and forms four tight coils around median part of channel, last coil running forwards to expand into terminal vesicle, which has long internal spines and indistinct “nutritive gland” structures (Fig. 39). At posterior end of spermatheca, channel forms a short flap-like branch, with indistinct “scent pores”. Indistinct copulatory channel begins at median rim of “window”, makes a short, broad loop and joins posterior end of spermatheca.

Immatures: Similar to adults but paler in all parts so that the first two legs are largely cream, while the posterior legs are mostly darker.

Biology: This slender species closely resembles *Tetraponera* ants.

Distribution: Known from numerous localities in peninsular Malaya listed here and by Badcock (1918). Two photographs of live animals from Singapore by Koh (1989: 129) appear to be of this species; the top one is a very dark male and the one below on the left is a female.

Discussion: The specimens were compared with type material of *M. cornuta* in the Natural History Museum and there is no doubt of the identification. The above description and the measurements in Table 1 agree closely with those given by Badcock (1918). The species is similar to *M. ramosa* but differs in the more slender abdomen, longer petiole, and in details of the genital organs.

Myrmarachne turriiformis Badcock, 1918 (Figs. 40–47)

Myrmarachne turriiformis Badcock, 1918: 296, fig. 6 (♂♀), Bukit Besar and Talum.

Material examined: MALAYSIA (PENINSULAR MALAYA): Fraser Hill, 2♂, 17 January 1989; Cameron Highlands, 1♂ 1♀, 2 February 1989.

Diagnosis: The male is unusual in having the head much higher than the thorax, and the back of the head is at right angles to both the head and the thorax. The species can also be distinguished by the detailed markings on the legs, the pedicel with first segment longer than the second, the broad sternum, and the triangle of white hairs on the carapace of the female, which is

absent in the male. Body length of adult male 3.8 mm with carapace 1.8 mm. Other dimensions are given in Table 1.

Description: *Male* (Fraser Hill): *Carapace*: Head almost twice as high as thorax (Fig. 40), sloping down to it at close to 90°, very small notch; orange-brown. *Chelicerae*: Orange-brown, almost as long as carapace, inner edge almost straight, outer edge slightly convex, widest at two-thirds its length (Fig. 45); 5 evenly spaced prolateral teeth and 5 retrolateral teeth. *Sternum*: Orange-brown, broad, with straight anterior edge (Fig. 41). *Pedicel*: First segment twice as long as second, orange-brown. *Abdomen*: Oval, brown, with darker lines ventrolaterally. *Legs*: All yellow-brown, leg I with tibia, metatarsus and tarsus darker proximally; leg II with darker stripe on femur, patella and tibia; legs III and IV with coxa, femur, patella, tibia and metatarsus slightly darker; markings on legs (including coxae and trochanters) more pronounced in life. Leg I with one pair of spines on patella, 5 pairs on tibia and 2 pairs on metatarsus; leg II with 3 pairs of spines on tibia and 2 pairs on metatarsus. *Pedipalp*: Basal segments orange-brown, cymbium mainly brown; bulbous and coils of embolus relatively large, three-fifths length of cymbium (Fig. 42); seminal receptacle channel broad, running along rim of bulbous, with anterior loop; tip of embolus flattened and semi-transparent. Tibia short, about two-fifths length of cymbium, without flange; apophysis conical and pointed, in lateral view straight, in ventral and dorsal view slightly bent (Figs. 42–44).

The male from the Cameron Highlands was lost before a full description could be made but it showed some differences from the Fraser Hill males, notably a generally paler coloration. *Carapace*: Head much higher than thorax, with posterior face almost at right angles to top of head and to top of thorax; brown above, orange-brown with black suffusion laterally; thorax brown with two orange spots dorsally just behind head and orange-buff spot laterally above base of leg II. *Chelicerae*: As long as carapace, straight inner side, convex outer side, grey with orange-buff base and buff tip, with 5 prolateral and 6 retrolateral teeth; fang grey with orange base and pink tip. *Sternum*: Broad, with straight anterior border, brown. *Pedicel*: Blackish brown, with first segment longer than second. *Abdomen*: Oval, broadest at two-thirds its length, blackish brown with faint buff marks on shoulders and as band at one-third its length; ventrally buff and brown anteriorly, black posteriorly; spinnerets black. *Legs*: Leg I coxa and trochanter brownish yellow; femur buff with dark brown dorsal stripe; remaining segments brownish yellow with grey stripes on patella, tibia and metatarsus. Leg II brownish yellow with paler coxa and grey or brown stripes on femur, patella and proximally on tibia. Spination on legs I and II as in Fraser Hill males. Leg III coxa and trochanter mainly black; femur buff below, dark black to red-brown stripe above; remaining segments brownish yellow with dark stripes on patella distally and tibia proximally. Leg IV coxa and trochanter pale yellow with black stripe; femur buff merging to red-brown distally with black stripe, remaining segments brownish yellow

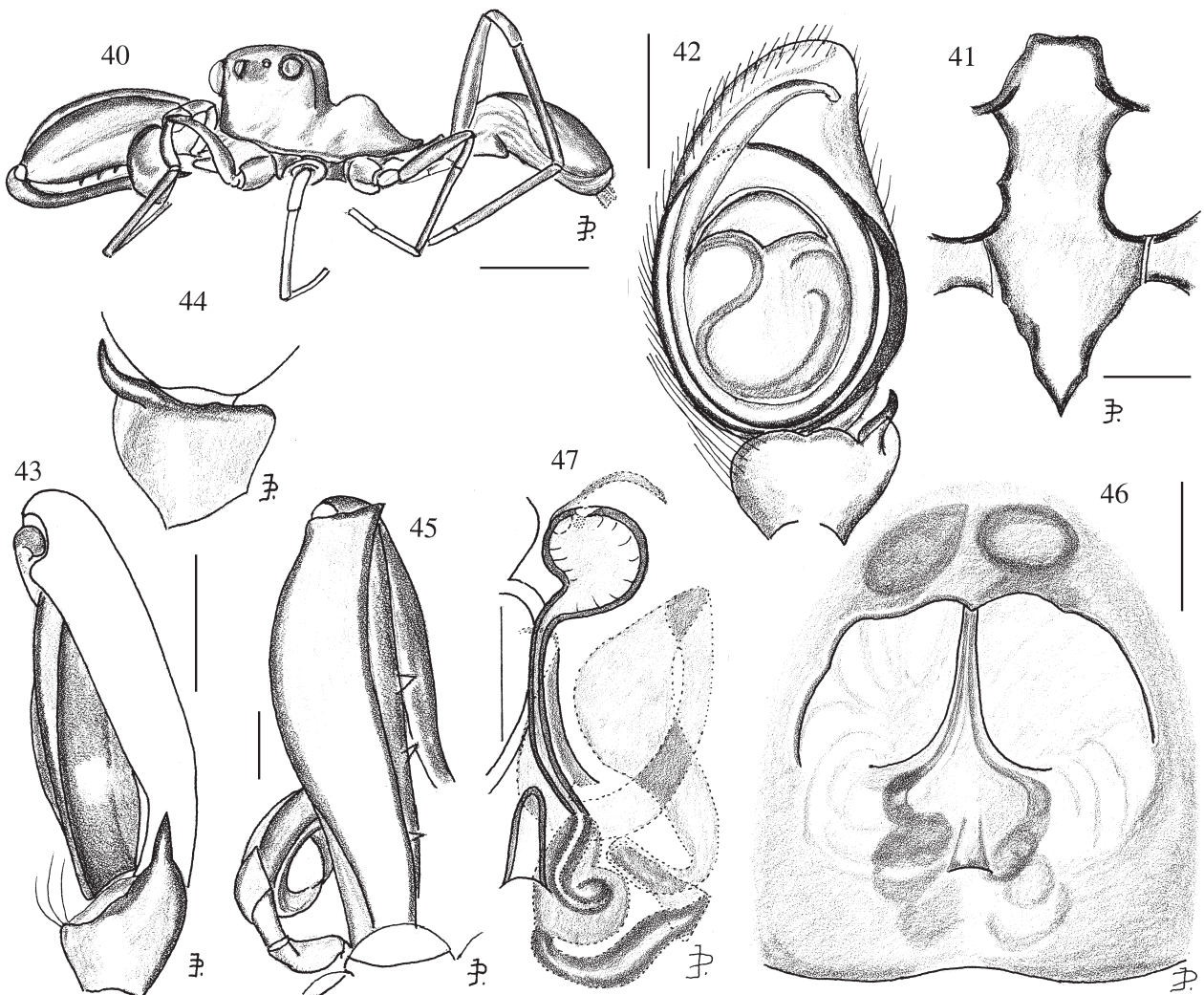
with black stripes on patella distally and tibia and metatarsus proximally. *Pedipalp*: Parallel-sided with long tibial apophysis.

Female: *Carapace*: Head higher than thorax, sloping gradually without pronounced notch; brown above, orange-brown laterally; thorax brown with orange patch close to notch and narrow triangle of white hairs above base of leg II. *Chelicerae*: Short, pale orange. *Sternum*: Broad, brown, slightly rounded anteriorly. *Abdomen*: Pear-shaped, blackish, with cream band and lateral patch of white hairs at one-third its length, epigynal region buff, spinnerets black and cream. *Legs*: Leg I coxa, trochanter and tarsus cream; remaining segments brownish yellow with dark stripes; spines as in male. Leg II as leg I but dark stripe on femur absent proximally; spines as in male. Leg III coxa and trochanter black; femur brownish orange with black stripe; patella brownish orange with black distally, tibia and metatarsus brownish yellow with black proximally on tibia; tarsus cream. Leg IV coxa and trochanter black and cream; femur as leg III but dark stripe ventral rather than dorsal; patella, tibia and metatarsus brownish yellow with blackish stripes on tibia, distally on patella and

proximally on metatarsus; tarsus cream. *Epigynum*: Characterised by wavy anterior rims of "windows", whose membranous surface also appears wavy (Fig. 46); septum between "windows" narrow anteriorly, expanding posteriorly and ending halfway down epigynum. Small, narrow, but distinct vaginal roof posteriorly in epigynum. Spermatheca a thin longitudinal tube, ending anteriorly in a spherical vesicle containing thin internal spines and indistinct pores of "nutritive gland" (Fig. 47). Relatively narrow membranous copulatory channels originate from copulatory opening at median rim of septum, make 5 turns, and join posterior ends of spermathecal tubes.

Distribution: Known only from the localities in peninsular Malaya given here and by Badcock.

Remarks: ME examined four type specimens of *Myrmarachne turiformis* in the Natural History Museum, London, including a 5 mm long female (accession number 1917.137). Carapace of this specimen brownish red, blacker round eyes, with triangle of white hairs above base of leg II; head higher than thorax, with shallow rounded notch; first segment of pedicel longer than second; sternum broad with rounded front edge.



Figs. 40–47: *Myrmarachne turiformis* Badcock. 40–45 Adult male from Fraser Hill. 40 Lateral view; 41 Sternum; 42 Left palpal organ, ventral view; 43 Ditto, lateral view; 44 Left tibial apophysis, dorsal view; 45 Left chelicera, dorsal view. 46–47 Adult female from Cameron Highlands. 46 Epigynum; 47 Internal structure of epigynum showing spermatheca and channel. Scale lines=1.0 mm (40), 0.25 mm (41–45), 0.1 mm (46, 47).

Legs I and II largely pale, III and IV dark, and similar in pattern to female described above. This type of *M. turriformis* resembles the female described above in the long first segment of the pedicel, oval abdomen, superficial shape of epigynum, white hairs on carapace, broad sternum, pattern of markings on legs III and IV, and spination of legs I and II (identical except for 4 instead of 3 pairs of spines on tibia II). It differs in having a more rounded head, more rounded anterior border to the sternum, and fewer dark markings, but this last may be due to fading. The male *turriformis* as described by Badcock (1918) has the same characteristic shape of the head and thorax in side view as that described here. There are slight differences between the Fraser Hill and Cameron Highland males, but we consider these to be minor; they may represent local variation in two isolated montane populations. There are sufficient similarities between our material and Badcock's for us to identify it confidently as *M. turriformis*. The structure of the palpal organ resembles that of other *Myrmarachne* species, but the relative proportions are similar to those of *Damoetas* (Prószyński, 2002).

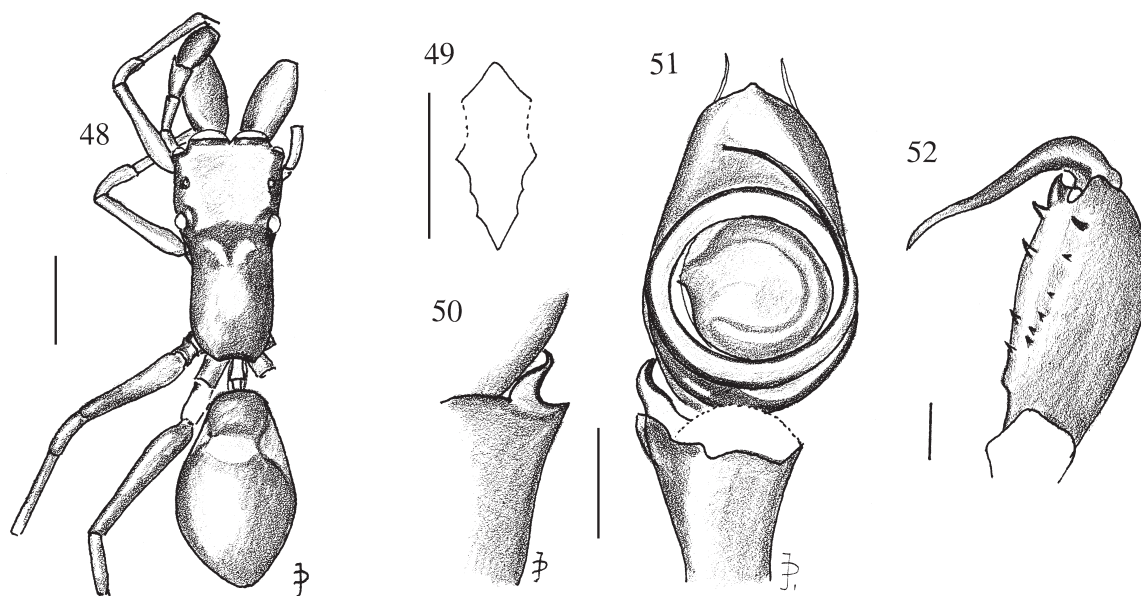
***Myrmarachne gedongensis* Badcock, 1918** (Figs. 48–52)

Myrmarachne gedongensis Badcock, 1918: 315, fig. 11 (♂), Bukit Besar and Gedong.

Material examined: MALAYSIA (PENINSULAR MALAYA): Genting Highlands, 7♂, 20 January–19 February 1989; Genting Forest Reserve, 1♂, 27 January 1989; Pansoon Forest Reserve, 1♂, 26 February 1989.

Diagnosis: This is a large dark species, with chelicerae usually shorter than carapace, two orange spots dorsally in thoracic notch, broad sternum triangular at front, chelicerae with a gap between proximal and distal prolateral teeth, and pedipalp with flange and twisted tibial apophysis. Body length of adult males 5.3–7.7 mm with carapace 2.6–3.7 mm. Other dimensions are given in Table 1.

Description: **Male:** **Carapace:** Entirely blackish brown, or with slightly paler thorax, apart from a pair of orange marks in thoracic notch dorsally which diverge anteriorly towards lateral eyes (Fig. 48); with scattered appressed white hairs all over; head higher than thorax, with shallow U-shaped notch. **Chelicerae:** Shorter than carapace in small specimens, but of equal length in large ones (varying from 1.5 to 3.2 mm long); outer side convex, inner side slightly convex to straight, red- or orange-brown; with 5–7 prolateral teeth, proximal ones shorter, separated by a gap from 3–4 distal teeth (Fig. 52); with 6–8 small unevenly spaced retrolateral teeth; fang two-thirds to three-quarters length of chelicera, with no apophysis, black basally, reddish brown distally. **Sternum:** Broad, triangular, bluntly rounded anteriorly, pointed at rear, with shallow indentations for legs so that between second legs sternum one-third width of body (Fig. 49); brown or yellow-brown, sometimes paler between first coxae. **Pedicel:** Short, segments of equal length, brown. **Abdomen:** Pear-shaped, dark brown above with slightly paler patch on each side lateral to indentation in some specimens; yellow-brown to brown ventrally, slightly paler anteriorly. **Legs:** Leg I coxa and trochanter brownish yellow (transparent in life) with brown stripe on each side (coxal stripes sometimes very faint); femur brown or dark brown, paler proximally ventrally in some specimens; patella and tibia dark brown or brown on sides, yellowish brown above and below; metatarsus and tarsus dark brown or brown; with one pair of spines on patella, 6 or 7 pairs on tibia, longest about half tibia length, and with 2 pairs on metatarsus of similar length to metatarsus. Leg II coxa dark brown; trochanter brown, sometimes paler above and below; femur, patella and tibia brown on sides, brownish yellow above and below; metatarsus and tarsus brown or yellow-brown, sometimes with basal dark stripe laterally on metatarsus; with 3 pairs of spines on tibia and 2 on metatarsus, outer ones longer than inner. Leg III entirely dark brown or



Figs. 48–52: *Myrmarachne gedongensis* Badcock, adult male from Genting Highlands. 48 Dorsal view; 49 Sternum; 50 Right tibial apophysis, dorsal view; 51 Right palpal organ, ventral view; 52 Left chelicera, ventral view. Scale lines=1.0 mm (48, 49), 0.25 mm (50–52).

brown, slightly paler on sides of patella and on tarsus. Leg IV coxa brown to dark brown; trochanter yellowish with dark stripe on each side, sometimes reduced to dark spots proximally on prolateral side and distally on retrolateral side; femur, patella, tibia and metatarsus dark brown or brown, with paler sides to patella; tarsus brown or yellow-brown. *Pedipalp*: Cymbium relatively broad and short, tibia even shorter; yellow-brown basally merging to black on tibia and cymbium; bristles on tibia and cymbium mostly black but distal ones near tip of cymbium pale grey. Bulbus circular with broad seminal receptacle channel running along rim of bulbus, small narrow loop characteristic of many other species not visible (Fig. 51). Tibial apophysis twisted, with flange expanded ventrally into a triangular flap (Figs. 50, 51).

Distribution: Known only from the present records and those of Badcock (1918) in peninsular Malaya.

Remarks: The type of *M. gedongensis* was examined. It has a similarly shaped carapace with shallow U-shaped notch between head and thorax, two orange marks in thoracic notch, chelicerae with gap between 3 proximal and 4 distal prolateral teeth, 8 pairs of spines on tibia I, 4 outer and 3 inner spines on tibia II, metatarsus I spines as long as metatarsus, pale striped coxa I, and twisted tibial apophysis on pedipalp. The shapes of sternum, chelicerae and other body parts are also similar to those in the present material, which can therefore be firmly identified as *M. gedongensis*.

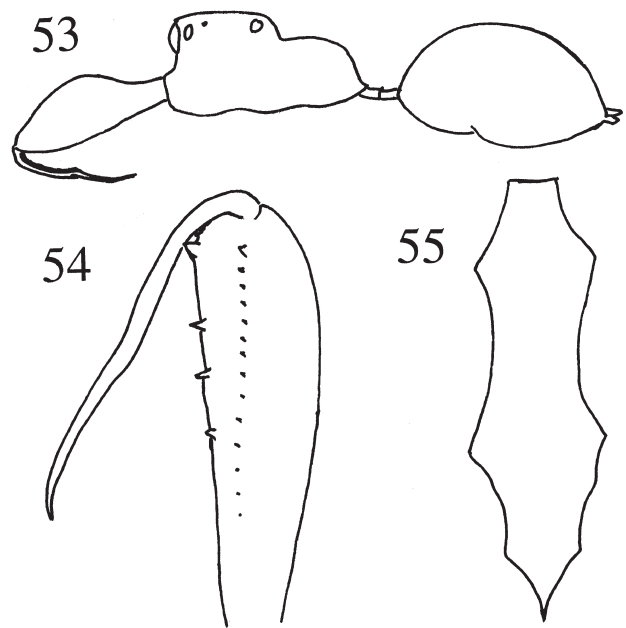
***Myrmarachne biseratensis* Badcock, 1918 (Figs. 53–55)**

Myrmarachne biseratensis Badcock, 1918: 312, fig. 10 (♂), Biserat.

Material examined: MALAYSIA (PENINSULAR MALAYA): Penang Forest Reserve, Penang Island, 1♂, 30 January 1989.

Diagnosis: This species was almost black in life with the broad abdomen covered with golden hairs; chelicerae broadest distally with 4 prolateral teeth distally and about 14 small retrolateral teeth; a large gap between the two proximal spines of tibia I; sternum cut square anteriorly. The specimen was unfortunately mislaid before a complete description had been made, but the colour markings, cheliceral spines and shape of the sternum are probably good specific characters.

Description: *Male*: *Carapace*: Head black, higher than thorax (Fig. 53) which was blackish brown. *Chelicerae*: Slightly shorter than carapace, widest at distal third, brownish yellow merging to brown on outer edge; with 4 large prolateral teeth in distal half and 14 smaller retrolateral teeth more or less evenly spaced; fang brownish orange merging to pink at tip, with blunt apophysis angle about halfway along (Fig. 54). *Sternum*: Brown, abruptly truncate at front (Fig. 55). *Pedichel*: Short, blackish. *Abdomen*: Black with fine dense gold hairs dorsally and white hairs posteriorly; bluntly pear-shaped, about same length as carapace; ventral surface buff densely mottled with grey, spinnerets buff. *Legs*: Pale brownish yellow with blackish markings. Leg I coxa pale with dark base; trochanter pale; femur with dark dorsal and partial ventral stripes; patella and tibia with dark ventral stripes; metatarsus and tarsus dark; 4



Figs. 53–55: *Myrmarachne biseratensis* Badcock, adult male from Penang Forest Reserve, drawn from photographs and annotated sketches, hence no scale. **53** Lateral view; **54** Left chelicera, ventral view; **55** Sternum.

pairs of spines on tibia and 2 on metatarsus. Leg II coxa and trochanter dark; femur, patella and tibia as leg I; metatarsus and tarsus pale; 2 pairs of spines on tibia and 2 on metatarsus. Leg III coxa and trochanter dark; femur, patella and tibia dark red-brown; metatarsus and tarsus pale. Leg IV coxa dark; trochanter pale; femur and tibia dark red-brown; patella with dark stripe; metatarsus and tarsus pale. *Pedipalp*: Broadly similar to that of *M. ramosa*.

Distribution: Known only from Penang Island and Badcock's type locality.

Discussion: The specimen closely resembled the type in the Natural History Museum in shape and colour of carapace, pedipalp, pedicel and abdomen, arrangement of teeth on chelicerae (type with 4 prolateral and 14 retrolateral on one chelicera, 4 and 15 on the other), and sternum ending squarely at front. The legs had similar markings except that in the type coxa I is entirely dark and trochanter IV striped, and there are five pairs of spines on tibia I instead of 4. The two proximal spines on tibia I are more widely spaced than the distal spines in both the type material and the present specimen. With such close agreement we have no hesitation in identifying the present specimen as *Myrmarachne biseratensis*.

***Myrmarachne cuneata* Badcock, 1918 (Figs. 56–63)**

Myrmarachne cuneata Badcock, 1918: 300, fig. 7 (♀), Bukit Besar, Talum and Gedong.

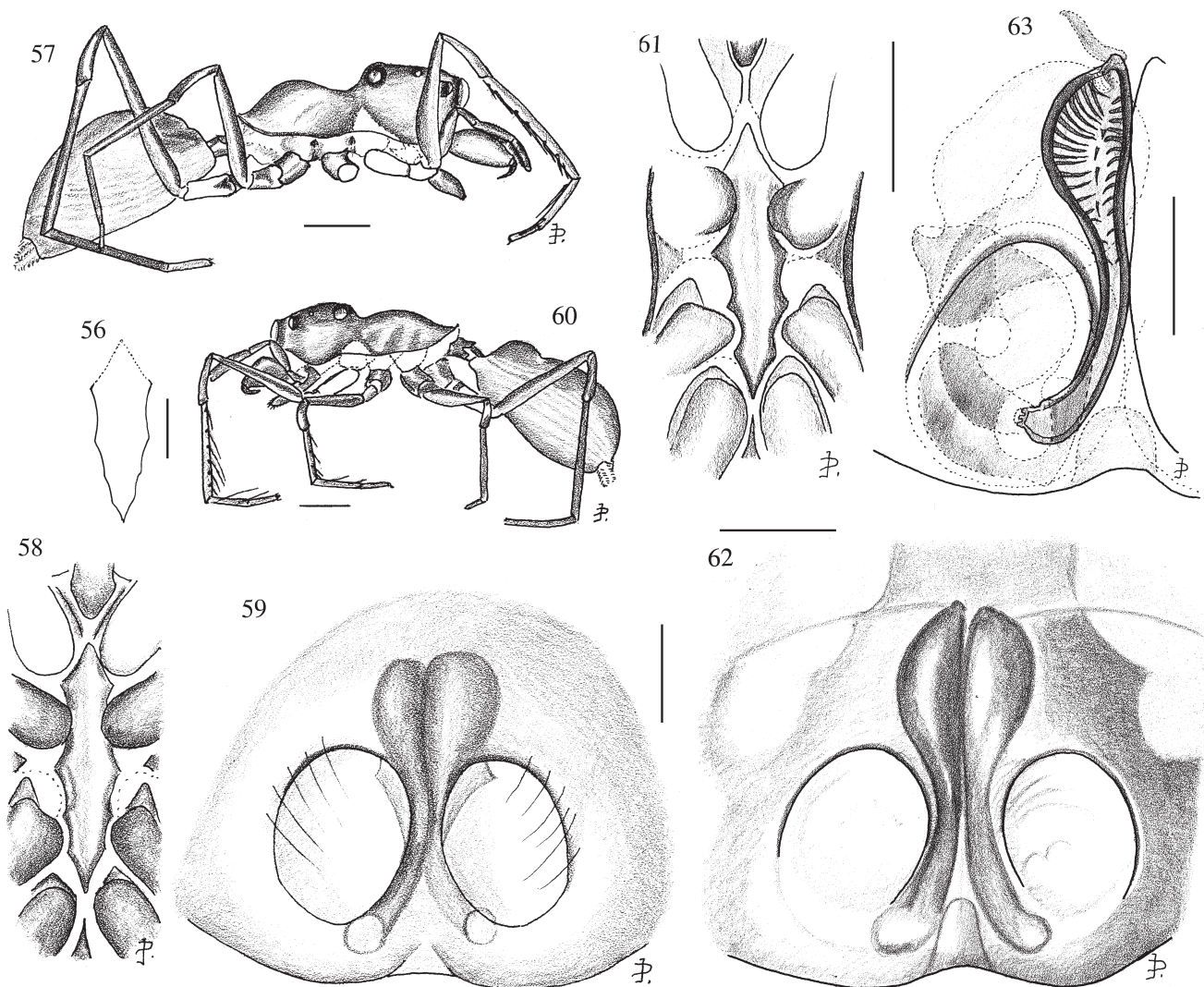
Material examined: MALAYSIA (PENINSULAR MALAYA): Genting Highlands, 3♀, 15–17 February, 11 imm., 26 January–19 February; Genting Forest, 1♀, 17 February 1989.

Diagnosis: The adult female is blackish with two pale spots in the thoracic notch, and with a pronounced cream triangle laterally between head and thorax

(transparent in life), together with pale first coxa and trochanter. Body length of adult females 6.7–7.6 mm with carapace 3.4–3.8 mm. Other dimensions are given in Table 1. The adult male is unknown.

Description: *Immature male:* *Carapace:* Predominantly orange-brown or yellow-brown, overlaid with fine blackish stippling, especially dorsally on head which appears dark, only sparse black speckling laterally on head and on thorax; notch a shallow U with thorax lower than head, with pair of spots dorsally in notch lacking dark pigment, and with triangular yellow or cream wedge laterally (transparent in life). *Chelicerae:* Shorter than head, with 4–6 prolateral teeth and 5–6 retrolateral teeth, all close together distally. *Sternum:* Pointed anteriorly, yellowish brown with fine, sparse black mottling, but cream anteriorly between first leg bases (Fig. 56). *Pedichel:* Short, grey-brown, segments of equal length. *Abdomen:* Grey-brown, about twice as long as broad, with slight indentation at one-third its length; basic colour yellowish but largely hidden by fine grey stippling so that palest areas are dorsolaterally at indentation, ventrally towards front, and at sides as series of

narrow stripes. *Legs:* Leg I coxa cream, often with trace of black distally dorsally; trochanter cream, darker on each side; femur, patella and tibia all yellow with dark stripes on both inner and outer sides, at least in darker specimens, but with darker markings petering out distally on less pigmented specimens; metatarsus and tarsus yellowish with some darker diffuse pigment especially on metatarsus; patella with one pair of spines, tibia with 8 spines on inner side and 7 on outer, longest about half length of tibia, metatarsus with 2 pairs of spines which both project slightly beneath tarsus. Leg II coxa and trochanter grey-brown, latter sometimes pale yellow ventrally; femur, patella and tibia yellowish with brown stripes on outer and inner sides; metatarsus and tarsus yellowish, sometimes with trace of darker pigment on sides of metatarsus; 3 pairs of spines on tibia and 2 pairs on metatarsus. Leg III coxa brown; trochanter grey-brown; femur and tibia brown to grey-brown; patella yellowish with dark marking distally above and at sides; metatarsus and tarsus yellowish. Leg IV coxa, femur and tibia brown to grey-brown; trochanter cream with blackish marks on outer side basally and on inner side



Figs. 56–63: *Myrmarachne cuneata* Badcock. **56** Immature male, sternum. **57–59** Adult female from Genting Highlands. **57** Lateral view; **58** Sternum and leg bases; **59** Epigynum. **60–63** Adult female from Genting Forest. **60** Lateral view; **61** Sternum and leg bases; **62** Epigynum; **63** Internal structure of epigynum showing spermatheca and channel. Scale lines=0.5 mm (56), 1.0 mm (57, 58, 60, 61), 0.1 mm (59, 62, 63).

distally; patella yellowish with darker mark on upper surface distally; metatarsus brown to grey-brown, sometimes yellowish below; tarsus yellowish. *Pedipalp*: Basal segments mainly yellow to yellow-brown, distal segments of similar colour below, but brown to grey-brown above with yellow spot near tip of cymbium from which arises a dense patch of short pale hairs; the three distal segments convex on outer edge, strongly convex on inner side, and broadest at base of cymbium.

Female: Carapace: Head blackish brown but darker round the eyes or entirely black, thorax slightly longer than head, dark brown to black, both with appressed short white hairs; notch shallow, U-shaped in side view, with thorax slightly lower than head (Figs. 57, 60), with large cream triangle on each side between head and thorax (transparent in life), and with two small orange spots, diverging anteriorly, dorsally in notch. *Chelicerae*: Almost as long as head, directed anteriorly, brownish orange to dark brown, with 6 prolateral and 7 retrolateral teeth mostly of similar size, equally spaced near tip. *Sternum*: Slender, pointed at front and rear, posteriorly orange-brown, creamy brown or black, with fine black dots, anteriorly cream (Figs. 58, 61). *Pedicel*: Short, black or brown, first segment equal to or slightly longer than second. *Abdomen*: Oval or pear-shaped, with dorsal indentation at one-third of its length; grey-brown all over including spinnerets, or black dorsally, paler ventrally and brown near epigyne; with fine white appressed hairs and longer spreading setae above and below. *Legs*: Leg I coxa and trochanter cream to yellow, with black stripe or smudge distally on coxa, and with dark stripe or suffusion on inner side of trochanter; femur yellow with dark brown or black stripe on each side; patella brownish yellow with dark stripe on each side or black above, slightly paler below; tibia brownish yellow to brown with dark stripe on each side; metatarsus and tarsus brown to dark brown, slightly paler below and at tip; patella with one or two pairs of short spines on inner side and one on outer, tibia with 7 or 8 spines on inner side and 6 or 7 on outer, longest almost reaching metatarsus, metatarsus with 2 pairs of long spines projecting slightly beneath tarsus. Leg II coxa brown or black; trochanter cream with dark marks on each side, or brown to black dorsally but yellow ventrally; femur yellow with brown to black stripe on each side; patella and tibia yellow to brown with darker stripe on each side; metatarsus yellow to yellow-brown with brown lateral stripes petering out distally; tarsus yellow or yellow-brown; 3 pairs of spines on tibia and 2 pairs on metatarsus, not quite as long as on leg I. Leg III coxa brown to dark brown; trochanter dark brown to black; femur dark brown; patella brownish yellow to brown basally and ventrally, darker brown distally and dorsally; tibia dark brown; metatarsus brown to dark brown; tarsus brown, becoming paler distally. Leg IV coxa brown to blackish brown; trochanter cream to yellow with brown or blackish mark or partial stripe on each side; femur dark or blackish brown; patella dark brown above and below, yellowish at sides; tibia and metatarsus dark brown; tarsus brownish yellow to dark brown. *Pedipalp*: Brown to dark brown, blacker distally,

with numerous pale setae and with thicker grey setae on inner edge of two distal segments which are almost straight on outer edge, strongly convex on inner side. *Epigynum*: Membranous “windows” almost circular, with indistinct vaginal roof visible between them posteriorly (Figs. 59, 62). Spermathecal tube short, expanded anteriorly into vesicles which contain dense, long internal spines (Fig. 63). Copulatory openings located anteriorly, at rims of “windows” (Fig. 59). Membranous copulatory channels long, extending anteriorly beyond “windows” to level of spermathecal dilation (Fig. 63).

Biology: The female from Genting Forest on 17 February was found inside a fallen, dead stem of bamboo resting on an egg cocoon.

Distribution: Known only from the Genting Highlands, the Genting Forest Reserve and the localities in peninsular Malaya given by Badcock (1918).

Remarks: The type material in the Natural History Museum is very similar to the females described above except that the carapace is red-brown and the abdomen pale brown, probably because the dark pigment has faded. There are two pale spots in the thoracic notch, a white triangle laterally on the carapace above the pale first coxa, and similar leg markings, spination and epigyne. The epigynum is similar to that of *M. grossa* (see below), from which it differs in relative proportions.

Myrmarachne hispidacoxa n. sp. (Figs. 64–68)

Type material: MALAYSIA (PENINSULAR MALAYA): Holotype ♀, Genting Forest Reserve, 18 February 1989. Paratypes: 1♀, Genting Forest Reserve, 11 January 1989; 1♀, Genting Forest Reserve, 7 February 1989. Deposited in Natural History Museum, London, accession number BMNH(E) 2002-35.

Other material examined: Genting Forest, 3♀, 2 imm., 11–13 January 1989; Genting Highlands, 1♀, 4 imm., 5–17 February 1989.

Etymology: The species is so named because of the long bristles on the second and third coxae.

Diagnosis: This species appears to be unique in the genus in having dense, long black bristles on the second and third coxae. It is a dark blackish species with a white triangle (transparent in life) on each side of the carapace between head and thorax, and with dark legs, but the first coxa and trochanter, second trochanter and femur and fourth trochanter are pale. Body length 4.5–5.3 mm with carapace 2.6–2.8 mm. Other dimensions are given in Table 2.

Description: Female: Carapace: Black or blackish brown, with numerous short, pale appressed hairs, thorax sometimes slightly paler than head; thoracic notch U-shaped in side view (Fig. 64), with thorax slightly lower than head, with large white triangle on each side between head and thorax (transparent in life), and sometimes a small pale spot mid-dorsally in notch. *Chelicerae*: Short, orange-brown. *Sternum*: Slender, triangular at front (Fig. 65), brown to yellow-brown posteriorly, cream anteriorly. *Pedicel*: Short, brown,

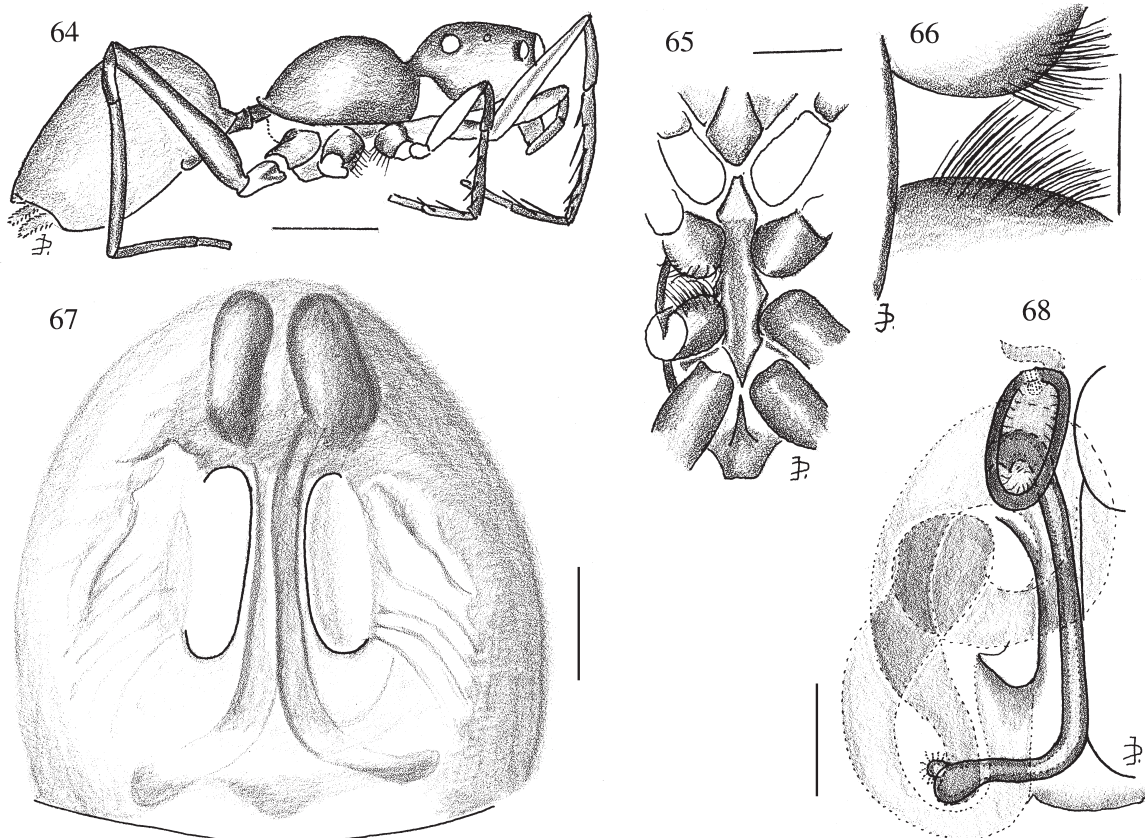
segments of equal length. *Abdomen*: Oval or pear-shaped, with slight indentation at one-third of its length, dark brown to grey-brown including spinnerets. *Legs*: Leg I coxa cream with black distally dorsally; trochanter cream or yellow-brown, darker above; femur yellow-brown with dark stripe on outer side and dark basal stripe on inner side, sometimes also distally; patella and tibia brown with dark stripe on each side; metatarsus similar basally but dark or blackish brown distally; tarsus dark or blackish brown; patella with one pair of spines, tibia with 6 spines on inner side and 6–7 on outer, longest about half length of tibia, metatarsus with 2 pairs of spines both projecting slightly beneath tarsus. Leg II coxa brown to blackish brown with bunch of long black bristles posteriorly (Fig. 66); trochanter cream with dark marks; femur cream with dark stripe on upper surface; patella dark brown; tibia yellow-brown with dark stripes on both sides; metatarsus and tarsus yellow-brown; 4 pairs of spines on tibia and 2 pairs on metatarsus. Leg III coxa brown to blackish brown with bunch of long black bristles anteriorly (Fig. 66); trochanter dark to blackish brown; all distal segments dark brown, though paler on tarsus. Leg IV coxa brown to blackish brown; trochanter cream with blackish marks on outer side basally and on inner side distally; femur dark brown; patella yellowish with black marks on upper surface basally and distally; tibia and metatarsus dark brown; tarsus dark brown to brown. *Pedipalp*:

Basal segments brown to yellow-brown; patella, tibia and tarsus blackish brown, sometimes paler at tip and covered on upper, frontal surface with short appressed hairs, these three segments almost straight on outer edge, strongly convex on inner side and broadest at base of tarsus. *Epigynum*: With narrow elongate “windows” (Fig. 67); sclerotised spermathecal tubes long, narrow, ending anteriorly in elongate oval vesicles with spines and “nutritive pores”, posteriorly bent at almost 90° and ending with pronounced “wart”-like structure, presumably “scent gland” (Fig. 68). Copulatory channels particularly long, originating at posterior rim of “windows”, running back to posterior end of epigynum, turning and running anteriorly, with intermediate loop, to anterior spermathecal vesicles, and finally running back to join posterior end of spermathecal tubes.

One specimen was much paler in all its parts with brown carapace and much yellow on the posterior legs, but markings were otherwise similar.

Immatures: An immature male was almost identical to the female in all details of coloration and patterns on legs but with much enlarged pedipalps. The small juveniles have the diagnostic black bristles on the second and third coxae, but these are sparser than in adults.

Distribution: Known only from the present records in the Genting Forest and Genting Highlands.



Figs. 64–68: *Myrmarachne hispidacoxa* n. sp., adult female from Genting Forest. **64** Lateral view; **65** Sternum and leg bases; **66** Bristles on coxae II and III; **67** Epigynum; **68** Internal structure of epigynum showing spermatheca and channel. Scale lines=1.0 mm (64), 0.5 mm (65), 0.25 mm (66), 0.1 mm (67, 68).

Remarks: This species appears to be very similar to *M. cuneata* apart from its smaller size, the presence of dense black bristles on the second and third coxae, and differences in the epigyne.

***Myrmarachne grossa* n. sp.** (Figs. 69–79)

Type material: MALAYSIA (PENINSULAR MALAYA): Holotype ♂, Genting Forest Reserve, 10 January 1989. Paratypes: 1♂, Pansoon Forest Reserve, 26 February 1989; 1♀, Genting Forest Reserve, 11 February 1989. Deposited in Natural History Museum, London, accession number BMNH(E) 2002-37.

Other material examined: Genting Forest, 1♂ 1♀, 11–16 February 1989. These were mislaid.

Etymology: The species is named *grossa* because it is one of the largest species in the genus.

Diagnosis: Very large, body length 8.5–9.4 mm; carapace long, with low ratios of carapace width, chelicera length, pedicel length, and abdomen length and width relative to carapace length compared with most other species (Table 2); body blackish brown with triangular patch of dense white setae lateral to thoracic constriction. Body lengths of three males 8.6–9.3 mm with carapace lengths 4.5–4.9 mm; body lengths of two females 8.5 and 9.4 mm with carapaces 4.3 and 4.6 mm. Other measurements and proportions of the three specimens for which full data are available are given in Table 2.

Description: Male: Carapace: Head blackish brown with short white appressed setae, densest on sides, and a few longer setae dorsally; thorax blackish brown with transverse orange band or T-shaped spot anteriorly, longer than head (Fig. 69), covered with short, white

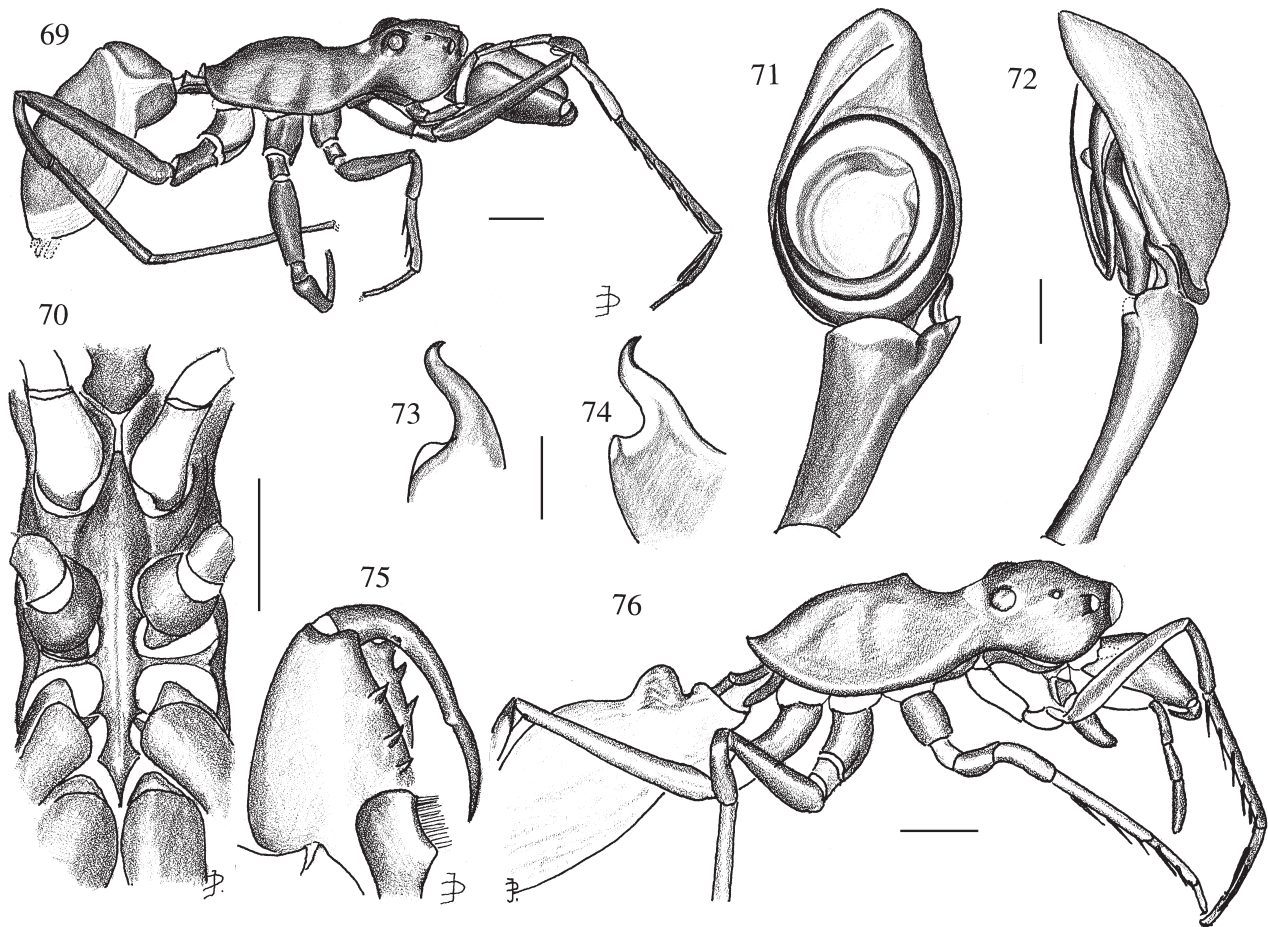
Species	<i>hispidacoxa</i>	<i>grossa</i>	<i>grossa</i>	<i>wanlessi</i>	<i>wanlessi</i> variant	<i>malayana</i>	<i>malayana</i>	<i>hirsutipalpi</i>	<i>aureonigra</i>
Sex	♀	♂	♀	♂	♂	♂	♀	♂	♀
<i>n</i>	6	2	1	7	3	1	1	2	2
Dimensions in mm									
Total length	4.9	8.9	8.5	4.9	4.4	5.4	5.2	7.1	6.0
Cephalothorax length	2.7	4.7	4.3	2.6	2.2	2.9	2.7	3.5	2.9
Leg I length	5.2	9.7	8.3	6.6	5.9	8.0	5.7	13.1	9.4
% Cephalothorax length									
Cephalothorax width	43	37	37	54	57	57	53	59	57
Cephalothorax height	33	28	28	37	44	47	41	54	48
Eye field length	35	30	29	41	42	45	37	43	43
Chelicera length	16	40	30	92	82	88	24	75	51
Pedicel length	6	13	16	11	12	9	11	13	17
Abdomen length	76	77	81	80	87	76	82	93	90
Abdomen width	49	39	41	55	56	47	62	65	74
Sternum length	45	53	55	51	50	52	47	57	52
Sternum max. width	10	10	10	16	16	19	17	22	18
Leg I	190	206	193	258	261	275	214	381	325
Leg II	134	159	143	183	176	179	160	229	203
Leg III	174	185	176	211	204	205	178	256	226
Leg IV	256	259	247	293	292	278	251	389	353
Sternum maximum width/width at coxa II									
Sternum proportion	1.6	2.4	2.5	1.7	1.8	1.1	3.0	1.5	1.0
% Leg I length									
Leg II	71	77	74	71	70	65	75	60	63
Leg III	92	90	91	82	81	75	83	67	70
Leg IV	136	126	128	114	116	101	117	102	109
% Femur I									
Leg I	tibia	104	111	100	119	120	107	101	99
	metatarsus	52	47	45	63	59	50	40	40
	tarsus	32	27	23	38	36	27	21	26
Leg II	femur	70	78	77	77	78	73	62	62
	tibia	67	68	68	67	69	67	51	52
	metatarsus	44	46	36	50	45	43	32	32
	tarsus	21	23	20	27	24	23	12	20
Leg III	femur	96	99	95	98	94	90	69	69
	tibia	70	69	64	64	67	67	52	52
	metatarsus	73	69	73	71	64	67	47	46
	tarsus	31	26	30	30	31	27	16	21
Leg IV	femur	148	123	130	132	134	120	108	111
	tibia	115	104	105	101	102	103	88	90
	metatarsus	104	102	105	96	93	107	74	81
	tarsus	38	36	30	37	38	23	18	27

Table 2: Measurements and ratios of six new species of *Myrmarachne*. Ratios are defined in Table 1 caption.

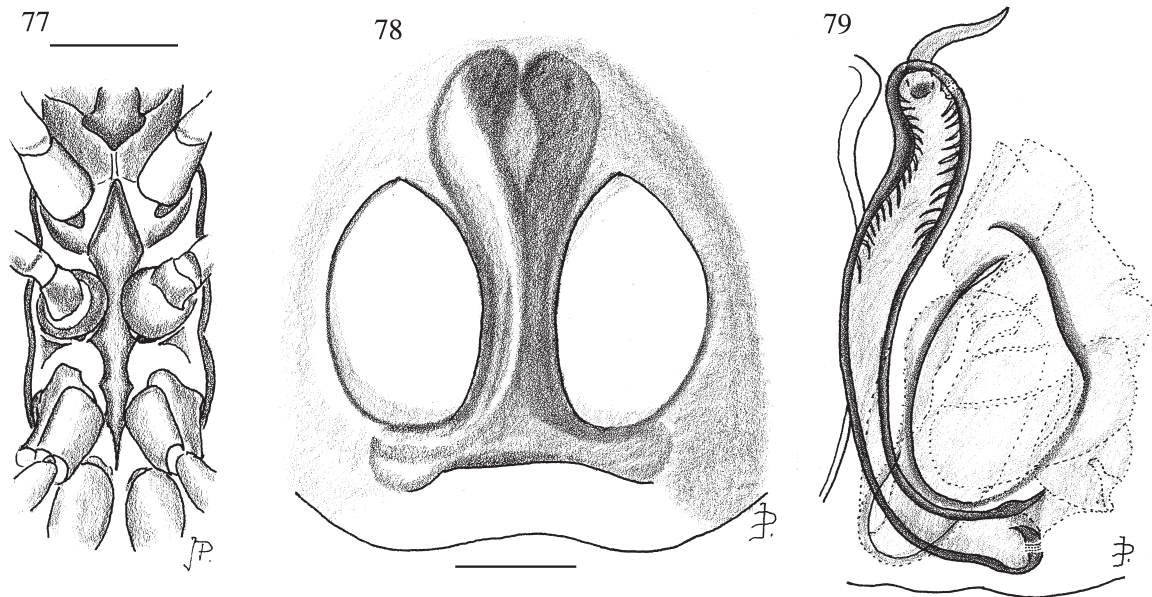
appressed setae, and with longer white hairs forming triangular tract from side of orange band diagonally to base of second legs; head separated from thorax by very shallow depression. *Chelicerae*: Less than half length of carapace (Fig. 75), broad and triangular; black or blackish red dorsally, dark red below merging to black at base; with 4–7 prolateral teeth and 5–7 retrolateral teeth, varying in position; fang without apophysis. *Sternum*: Long, narrow, broadest anteriorly (Fig. 70), orange-brown to dark red with black suffusion, especially at front; sides concave at leg bases with lateral projections between coxae (as in most other species), but with small additional lateral projections at middle of leg bases I–III. *Pedicel*: Short, first segment slightly longer than second (Fig. 69), brown to dark brown. *Abdomen*: Shorter than carapace, pear-shaped with slight indentation dorsally at a quarter to a third of its length, dark brown to black dorsally, yellow-brown largely obscured with grey or dark brown below but paler anteriorly; spinnerets buff to pale brown with black setae. *Legs*: Leg I coxa and trochanter cream to yellow, with black suffusion distally on upper, inner surface (one specimen has half coxa and three-quarters of trochanter dark); femur yellow-brown with brown or blackish stripe on each side; patella brownish yellow to dark brown; tibia, metatarsus and tarsus dark brown; one pair of spines on patella, 5–6 on outer side and 6–7 on inner side of tibia,

2 pairs on metatarsus, basal ones reaching its tip. Leg II coxa, trochanter and femur dark brown, with yellow on trochanter ventrally and at base of femur dorsally, extending towards tip in one animal; patella dark brown or brown with yellow stripe dorsally; tibia brown; metatarsus brown or yellow-brown; tarsus brownish yellow; 3–4 pairs of short spines on tibia, 2 pairs on metatarsus. Leg III dark brown, except for yellow trochanter and tarsus and yellow base to patella. Leg IV dark brown, except for yellow ventrally on trochanter, basally on patella and distally on tarsus. *Pedipalp*: Cymbium unusual in being twice as broad as tibia, with bulbus and coils of embolus occupying two-thirds of its length (Figs. 71–72). Seminal receptacle channel broad, circular, following edge of bulbus, without small loop (Fig. 71). Tibia about as long as cymbium, with apophysis relatively long and slightly twisted (“S”-like); flange well-developed, triangular in ventral view (Figs. 71–74). Basal segments yellow-brown, tibia and cymbium blackish brown with white setae distally on top of cymbium.

Female: *Carapace*: Head blackish or brown with irregular black mottling; thorax blackish or orange-brown with some darker mottling; setae, T-shaped orange mark and absence of pronounced thoracic notch as in male (Fig. 76). *Chelicerae*: Broadest in middle and sharply angled, blackish or reddish brown above, orange below; with 7 prolateral and 7 retrolateral teeth, all in



Figs. 69–76: *Myrmarachne grossa* n. sp. 69–75 Adult male from Pansoon Forest Reserve. 69 Lateral view; 70 Sternum and leg bases; 71 Left palpal organ, ventral view; 72 Ditto, lateral view; 73 Left tibial apophysis, lateral view; 74 Ditto, from slightly different angle; 75 Right chelicera, ventral view. 76 Adult female from Genting Forest, lateral view. Scale lines=1.0 mm (69, 70, 75, 76), 0.25 mm (71–74).



Figs. 77–79: *Myrmarachne grossa* n. sp., adult female from Genting Forest. 77 Sternum; 78 Epigynum; 79 Internal structure of epigynum showing spermatheca and channel. Scale lines=1 mm (77), 0.1 mm (78, 79).

distal part; fang orange. *Sternum*: As in male but paler yellow-brown (Fig. 77). *Pedicel* and *abdomen*: As male, but yellow-brown largely obscured with grey mottling except anteriorly below and in diagonal stripe on each side ventrolaterally. *Legs*: Leg I pattern as in male but paler; one pair of spines on patella, 6 spines on inner side and 5 on outer side of tibia, 2 pairs of long spines on metatarsus. Leg II coxa mostly brown; trochanter brown at sides, cream above and below; femur and patella yellow with brown stripes on each side; tibia and metatarsus yellow with brown suffusion laterally as faint stripes; tarsus yellow; 3 pairs of spines on tibia, 2 pairs on metatarsus. Leg III brownish yellow, but yellower on trochanter, patella and tarsus. Leg IV brownish yellow with more yellow ventrally on trochanter and on patella. *Pedipalp*: Basal segments yellow, distal three segments blackish brown. *Epigynum*: Septum broad, “windows” oval, rounded posteriorly but bluntly angled anteriorly (Fig. 78). Spermathecal tubes curved, gradually broadening anteriorly, without discrete vesicle, terminal part with internal spines and indistinct “nutritive pores”. Posterior tip of spermathecal tube broadened into small chamber with “scent pores”, close to junction with copulatory channel which is particularly clearly visible in this species (Fig. 79). Short copulatory channel originates from indistinct, slit-like opening along antero-medial rim of “windows”, runs to back of “window”, then forwards where it is broad with indistinct folds, and finally turns back along lateral rim of “window” to join sclerotised end of spermathecal tube as narrow, distinct channel.

Distribution: Known only from the above records in the Genting Forest and Pansoon Forest. A colour photograph of a live male which is almost certainly this species has been published in Murphy & Murphy (2000: plate 31.5).

Remarks: This is a very distinctive large species with a mixture of characters of *Belippo* and *Myrmarachne*. The absence of an anterior loop in the seminal receptacle of

the male bulbus, and the straight, simple spermathecae in the female correspond with *Belippo* (see Wanless, 1978: 5, 8, fig. 3a, e). Wanless’ conception of *Belippo* is based on the “assumption that the male of *Belippo anguina* Simon (the type species) will prove to have a movable apophysis on the palpal tibia”. However, the male of this species remains unknown, so this assumption cannot be confirmed. In other respects the male tibial apophysis of the present species resembles that typical of *Myrmarachne*, and spermathecae very similar to those of the present species have been described by Wanless from species attributed to *Myrmarachne* (e.g. *M. globosa*: Wanless, 1978: fig. 62e; Żabka, 1985: fig. 331). Thus it seems that this species can be considered as belonging to the genus *Myrmarachne*, although most probably a primitive species.

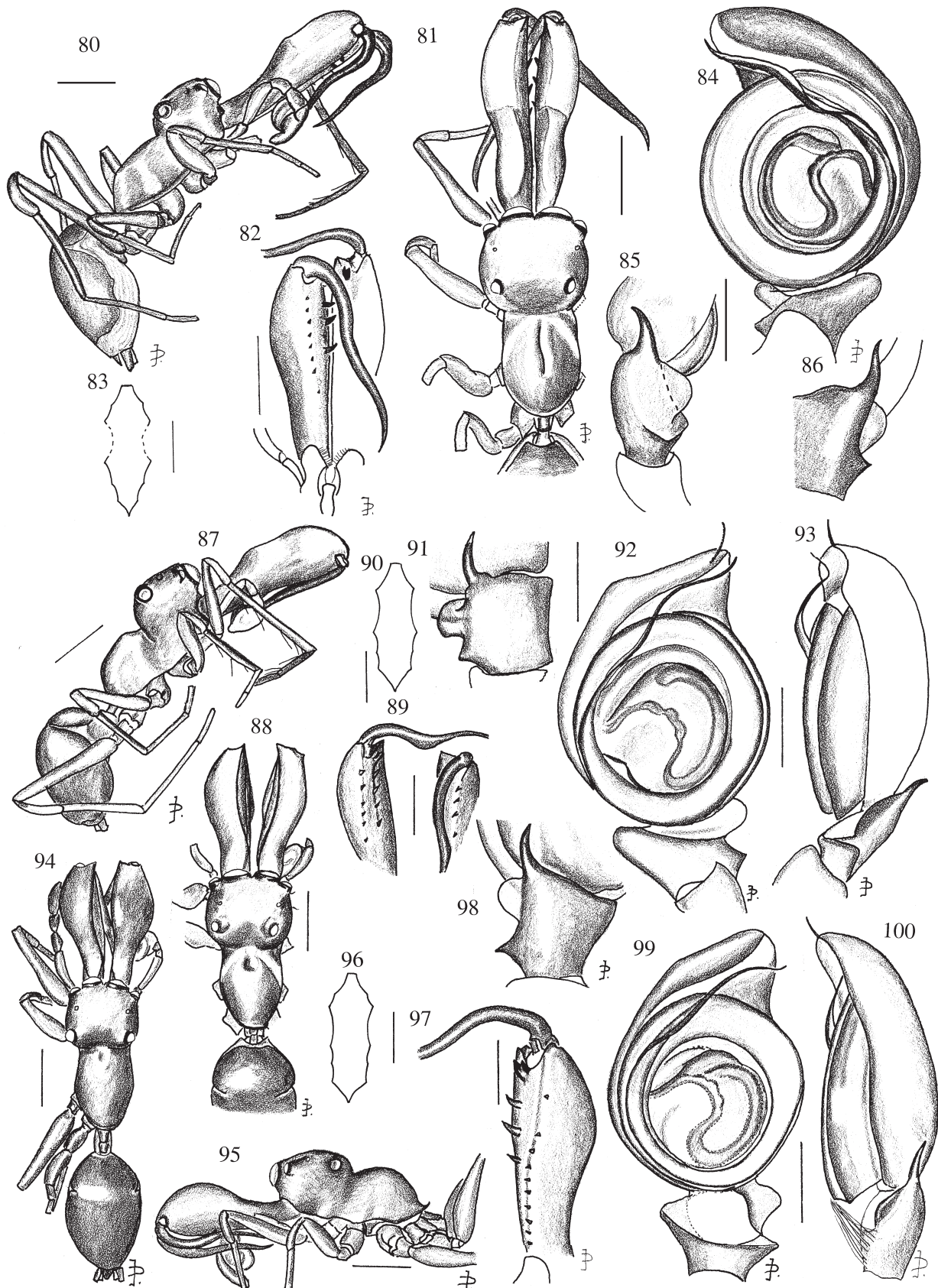
Myrmarachne wanlessi n. sp. (Figs. 80–100)

Type material: MALAYSIA (PENINSULAR MALAYA): Holotype ♂, Genting Forest Reserve, 11 January 1989. Paratypes: 1♂, Genting Forest Reserve, 17 January 1989; 1♂, Genting Forest Reserve, 11 February 1989; 1♂, Genting Forest Reserve, 20 February 1989. Deposited in Natural History Museum, London, accession number BMNH(E) 2002-36.

Other material examined: Genting Forest, 3♂, 16 January–12 February 1989; Genting Highlands, 1♂, 23 January 1989; Universiti Malaya, 1♂, 24 February 1989; Bentong, near Fraser Hill, 1♂, 6 February 1989; Pansoon Forest Reserve, 1♂, 26 February 1989.

Etymology: The species is named in honour of Fred Wanless, who worked for many years on salticids in the Natural History Museum, London, and published a massive monograph on African *Myrmarachne*.

Diagnosis: This is a dark brown species with the legs predominantly brown, only trochanters III and IV pale, and with club-shaped chelicerae in males, broadest at about three-quarters of their length. The chelicerae and



Figs. 80–100: *Myrmarachne wanlessi* n. sp. 80–86 Adult male from Universiti Malaya, Kuala Lumpur. 80 Lateral view; 81 Cephalothorax, dorsal view; 82 Right chelicera, ventral view; 83 Sternum; 84 Right palpal organ, ventral view; 85 Right tibial apophysis, lateral view; 86 Ditto, dorsal view. 87–93 Adult male from Genting Forest. 87 Lateral view; 88 Cephalothorax, dorsal view; 89 Chelicerae, ventral view; 90 Sternum; 91 Left tibial apophysis, dorsal view; 92 Left palpal organ, ventral view; 93 Ditto, lateral view. 94–100 Adult male from Genting Highlands. 94 Dorsal view; 95 Cephalothorax, lateral view; 96 Sternum; 97 Left chelicera, ventral view; 98 Left tibial apophysis, dorsal view; 99 Left palpal organ, ventral view; 100 Ditto, lateral view. Scale lines=1.0 mm (80–82, 87–89, 94, 95), 0.5 mm (83, 90, 96, 97), 0.25 mm (84–86, 91–93, 98–100).

abdomen are slightly shorter than the carapace, the pedicel is less than 15% of the carapace length, and tibia I is longer than femur I. The male pedipalp is much shorter and broader than that of another dark species, *M. biseratensis*. Body length 4.1–5.1 mm with carapace 2.1–2.7 mm. Other dimensions are given in Table 2. The female is unknown.

Description: Male: Carapace: Head varying from dark brown to entirely black dorsally, and orange-brown to black on sides with many short appressed white hairs; thorax orange-brown to black; head much higher than thorax and meeting it at angle of about 90° (Figs. 80, 87, 95); neck with very narrow deep groove dorsally; thorax narrower than head (Figs. 81, 88, 94). *Chelicerae:* Slightly shorter than carapace; with inner lower edge almost straight, sharply angled to upper surface, outer edge convex so that chelicera is broadest at about three quarters of its length (Figs. 82, 89, 97); yellow-brown to dark brown, paler distally; 4–5 large prolateral teeth distally, most distal one often bifid, and 8–11 small retrolateral teeth more or less evenly spaced but closer together proximally. *Sternum:* Narrow, yellow-brown to brown, with straight horizontal edge anteriorly (Figs. 83, 90, 96). *Pedicel:* Short, less than 15% of carapace length, with first segment longer than second though partly hidden by carapace in dorsal view, dark brown to yellow-brown. *Abdomen:* Broadly ovate, widest at two-thirds of its length, with no noticeable indentation, dark brown to yellow-brown. *Legs:* All mostly blackish brown to yellow-brown. Leg I often with darker stripes on each side of distal part of femur, patella and tibia, and with tarsus and metatarsus darker than rest; tibia longer than femur; one pair of spines on patella, 6 on tibia and 2 on metatarsus; tibial spines much less than half length of tibia, and shorter than longest metatarsal spine. Leg II uniformly brown except that paler individuals have darker stripes dorso-laterally on femur and (less conspicuous) on sides of patella and tibia; 4 pairs of spines on tibia and 2 on metatarsus. Legs III and IV uniformly brown except trochanter which is pale (transparent in life) with darker marks on sides, these marks less clear on trochanter III. *Pedipalp:* Yellow-brown to blackish brown, basal segments usually paler than cymbium; cymbium with pale flat area at tip covered with dense, very short, pale bristles. Bulbus and embolus occupy most of cymbium, as in *M. turiformis*, but, uniquely among *Myrmarachne*, broad white coils of embolus form almost circular shield, whose diameter is greater than width of cymbium (Figs. 84, 92, 99). First half of seminal receptacle channel, of uniform width, runs along edge of bulbus, but halfway round it bends forwards to form a U-shaped loop which varies in width in the three specimens examined. Palpal organ relatively thin in lateral view (Figs. 93, 100). Tibial apophysis slightly curved, pointed, about half length of tibia (Figs. 85, 86, 91, 98). Tibia also unusual, with semicircular plate-like extension below apophysis, and angular swelling ventrobasally (Fig. 85).

Three of the males differed from typical specimens in being smaller, with the carapace and abdomen dark

glossy brown and with very sparse short hairs on the carapace. Typical males are not so dark, lack the glossy surface, and have numerous hairs on the carapace. Two of these darker males came from Genting Highlands and Bentong forest, but the third was just 3 km above the Field Studies Centre, Genting Forest, in the same area as many of the typical males. The measurements of these males have been kept separate in Table 2, but there are no obvious differences from typical males. There are no clear differences in ecology or morphology (compare Figs. 94–100 from Genting Highlands with Figs. 80–86 and 87–93 from Universiti Malaya and Genting Forest respectively), so we do not consider the variation in size, colour and hairiness sufficient to justify separation as two species. The pedipalp in the two forms is virtually identical. These differences may therefore be either genetic or environmental adaptations to different habitats.

Female: Unknown.

Distribution: Known only from the present records.

Remarks: This species is distinct from all others in the area with its dark coloration, oval abdomen, and details of the sternum, chelicerae and pedipalp.

Myrmarachne malayana n. sp. (figs. 101–109)

Type material: MALAYSIA (PENINSULAR MALAYA): Holotype ♂, Genting Highlands, 21 February 1989. Paratype 1♀, Genting Highlands, 9 February 1989. Deposited in Natural History Museum, London, accession number BMNH(E) 2002-34.

Other material examined: Genting Highlands, 1♂ 1♀, 3 imm., 20 January–22 February 1989.

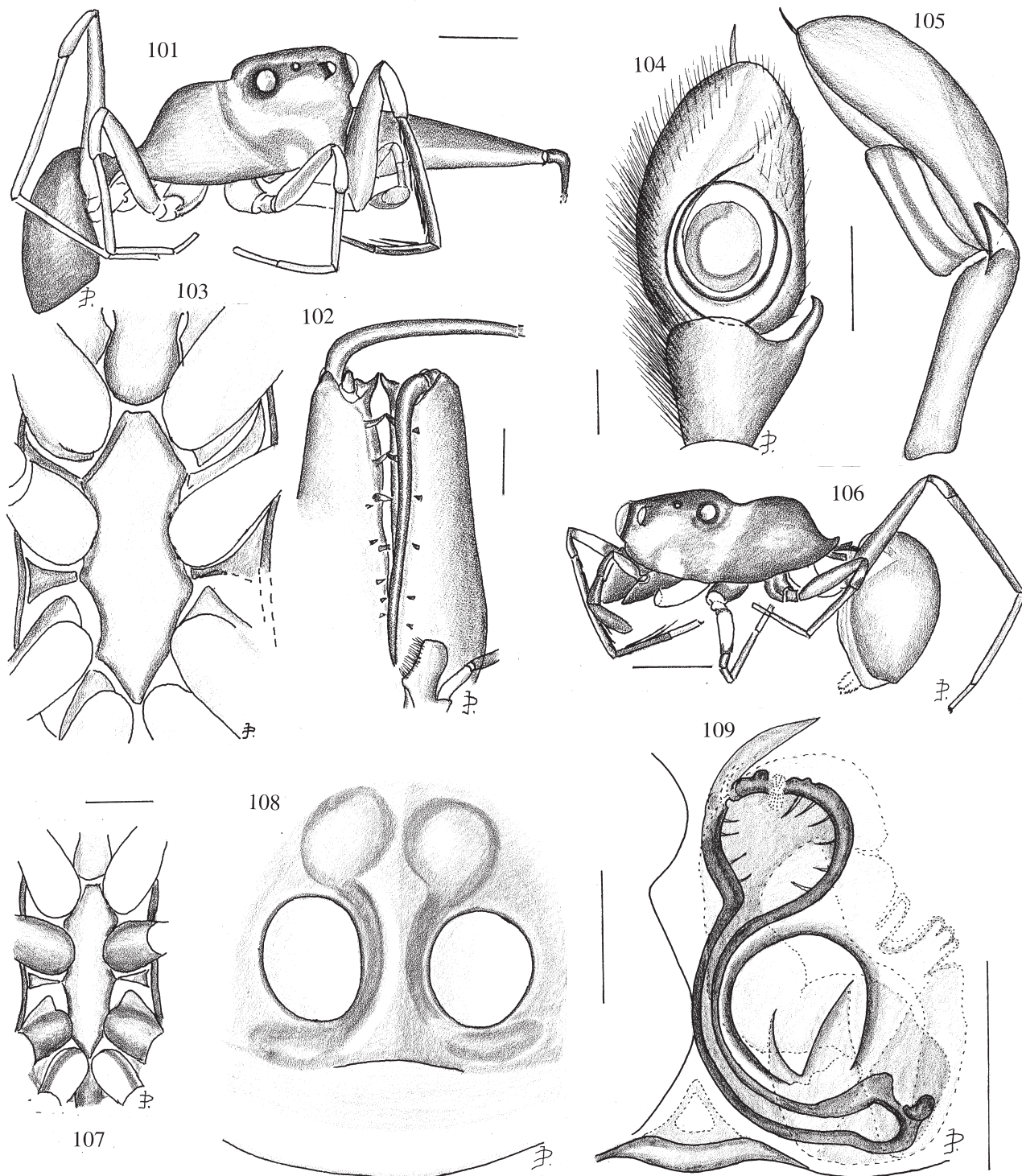
Etymology: The species is named after its occurrence in peninsular Malaya.

Diagnosis: Carapace longer than the abdomen, with head slightly higher than thorax and separated by a smooth curve; with a transverse orange band behind the eyes, white hairs scattered laterally and concentrated above base of leg I; pedicel short; legs with first and fourth coxa and trochanter pale while the third coxa and trochanter are dark; chelicerae in male tapering from a broad base in side view. Body length of adult male 5.4 mm with carapace 2.9 mm, and of female 5.2 mm with carapace 2.7 mm. Other dimensions are given in Table 2.

Description: Male: Carapace: Dark brown, much more blackish dorsally on head, with transverse crescent of brownish red dorsally behind eyes, extending antero-laterally below eyes; with appressed pale hairs dorsally on head, much sparser on thorax, and with short white hairs laterally on head above first legs, but not forming a pronounced tract; head higher than thorax, separated by a smooth curve rather than a notch (Fig. 101). *Eyes:* Apices of anterior eyes level or very slightly recurved. *Chelicerae:* Almost as long as carapace, inner edge straight, outer convex, broadest towards base; in side view tapering from broad base, with upper surface straight or concave; dark red-brown, fang red at tip; with 4 large prolateral teeth evenly spaced in distal half and one small tooth proximally very close to retrolateral

row, and with 4–5 small retrolateral teeth (Fig. 102). *Sternum*: Stout, one-third width of body; front edge blunt, straight; sides between second legs parallel, not indented (Fig. 103); yellow-brown. *Pedicel*: Very short, brown. *Abdomen*: Oval, shiny black above, with no trace of notch or indentation; yellow-brown below, darker at sides. *Legs*: Leg I coxa and trochanter yellow, suffused with brown distally on inner side of coxa and outer side of trochanter; femur, metatarsus and tarsus dark brown; patella yellow, suffused with brown stripe on outer side;

tibia brown on sides, yellowish above and below; with single spine on outer edge of patella, 7 pairs on tibia, longest less than half tibia length, and 2 pairs on metatarsus, longest almost as long as metatarsus. Leg II yellowish, with faint suffusion of brown on coxa, and brown stripe on each side of femur; with 3 pairs of short spines on tibia and 2 on metatarsus. Leg III coxa and trochanter yellowish with brown suffusion; femur orange-brown; patella and tibia brownish yellow; metatarsus and tarsus yellow. Leg IV coxa and trochanter



Figs. 101–109: *Myrmarachne malayana* n. sp. **101–105** Adult male from Genting Highlands. **101** Lateral view; **102** Chelicerae, ventral view; **103** Sternum and leg bases; **104** Left palpal organ, ventral view; **105** Ditto, lateral view. **106–109** Adult female from Genting Highlands. **106** Lateral view; **107** Sternum and leg bases; **108** Epigynum; **109** Internal structure of epigynum showing spermatheca and channel. Scale lines=1.0 mm (101, 106), 0.5 mm (102, 107), 0.25 mm (103–105), 0.1 mm (108, 109).

yellowish; femur orange-brown, slightly darker above; patella yellowish, but brown distally on upper surface; tibia orange-brown with faint brown stripes on each side basally; metatarsus and tarsus yellow. *Pedipalp*: Yellow-brown proximally, becoming darker, especially on tibia and cymbium; bristles on cymbium short, pale. Cymbium twice as long as tibia and about 25% broader, seminal receptacle channel broad, circular along edges of bulb, without a loop. Tibial apophysis relatively long, inclined, almost straight except for tip (Figs. 104, 105).

Female: *Carapace*: Blackish brown, darkest dorsally on head, with transverse orange band behind eyes dorsally; with appressed white hairs over much of surface, densest on sides of head above legs I, and absent above legs II; head slightly higher than thorax, separated by a shallow trough (Fig. 106). *Chelicerae*: Dark red-brown with 4 prominent prolateral teeth distally. *Sternum*: Brown, blunt at front, more than one-third width of body, with slight indentation for second coxae (Fig. 107). *Pedicel*: Short, dark brown. *Abdomen*: Ovale with slight pear-shaped indentation, dorsally orange-brown merging to brown posteriorly, ventrally yellowish and grey-brown. *Legs*: Leg I coxa cream; trochanter cream with dark brown stripe on anterior side; femur creamy yellow with dark brown stripe on outer side and prolateral basal two-thirds; patella, tibia and metatarsus brownish yellow with dark brown stripes on each side; tarsus brownish yellow; with one spine on outer side of patella, 6 pairs of spines on tibia, longest half its length, and 2 pairs on metatarsus, both of similar length to segment and extending below tarsus. Leg II coxa dark brown; trochanter cream; femur cream with brown spot distally on posterior side and brown stripe in distal third on anterior side; patella, tibia and metatarsus yellowish with brown stripes on sides; tarsus yellow; with 3 pairs of short spines on tibia and 2 pairs on metatarsus. Leg III coxa, trochanter and femur dark brown; patella brownish yellow with dark brown distally on upper surface; tibia brown, paler above and below; metatarsus brown basally merging to brownish yellow distally, tarsus brownish yellow. Leg IV coxa and trochanter cream with brown stripe on outer side of coxa; femur and tibia dark brown; patella brownish yellow with dark brown distally on upper surface; metatarsus brown basally and on sides, merging to brownish yellow distally; tarsus brownish yellow. *Epigynum*: With very broad septum, small circular “windows”, and circular spermathecal vesicles almost as large as “windows” (Fig. 108). Internal structure similar in outline to that of *M. grossa*, but with larger, circular spermathecal vesicle with prominent internal spines and “nutritive pores”, posterior spermathecal tube narrow, encircling “window” medially and posteriorly, with swollen terminal part located laterally to rim. Membranous copulatory channel originates in posterior half of “window”, runs anteriorly with an “S” bend to spermathecal vesicle, and then runs back to terminal end of spermathecal tube, lateral to rim of “window” (Fig. 109).

Distribution: Known only from the Genting Highlands.

Remarks: We identified the males and females as being conspecific on the following grounds; the carapace is of similar shape, in both there is a transverse orange band behind the eyes, white hairs scattered laterally, and concentrated above base of leg I; the sternum is of similar shape; the pedicel is very short; the legs have slightly different patterns of dark marks, but in both sexes coxa and trochanter I and IV are pale while coxa and trochanter III are dark; the spination on legs I–II is similar; and finally they all occurred in the same locality (Genting Highlands).

Myrmarachne hirsutipalpi n. sp. (Figs. 110–116)

Type material: MALAYSIA (PENINSULAR MALAYA): Holotype ♂, Genting Forest Reserve, 7 February 1989. Paratype 1♂, Genting Forest Reserve, 7 February 1989. Deposited in Natural History Museum, London, accession number BMNH(E) 2002-38.

Other material examined: Genting Forest, 2♂ 1♀, 13 January–7 February 1989.

Etymology: The species is named after its conspicuous hairy palps.

Diagnosis: This is a large dark species in life, more red-brown when preserved, with unusually long, mainly dark legs, but with first coxa and trochanter and second tibia, metatarsus and tarsus pale. The male is characterised by two prolateral spurs distally on the chelicerae, and dense long black bristles and a twisted tibial apophysis on the pedipalp. Body lengths of two adult males 7.4 and 6.9 mm with carapaces 3.6 and 3.4 mm. Other dimensions are given in Table 2.

Description: *Male*: *Carapace*: Dark red-brown, blackest dorsally on head; with minute appressed hairs scattered all over; head convex, centre higher than posterior eyes, higher than thorax, with shallow notch (Fig. 110). *Chelicerae*: Almost as long as thorax, with almost straight inner edge and slightly convex outer edge so that almost parallel-sided except at base; dark red-brown, with blacker spines and thickened cuticular edges; with two dorsal prolateral spurs, larger terminal one directed forwards and smaller one at three-quarters of cheliceral length on inner edge; with 8 prolateral teeth (excluding spurs) and 3–4 minute retrolateral teeth, so small as to be barely recognisable; fang lacking apophysis. *Sternum*: Bluntly rounded at front, broadest between legs I and II where more than one-third width of body (Fig. 111); yellow-brown. *Pedicel*: Short, brown, with first segment longer than second. *Abdomen*: Pear-shaped with only very slight indentation, dark red-brown above, grey-brown below but often yellower anteriorly. *Legs*: Leg I coxa and trochanter yellow, with brown base to coxa and brown stripes on outer side of trochanter and distal part of coxa; femur dark brown; patella and tibia dark brown, but yellow-brown on upper surface of patella and on distal quarter of tibia; metatarsus and tarsus dark brown; with no spines on patella, 5–6 outer and 6–7 inner spines on tibia, and 2 pairs on metatarsus, almost as long as segment. Leg II coxa, trochanter, femur and patella dark brown; tibia and metatarsus dark brown on sides, merging to more yellowish brown

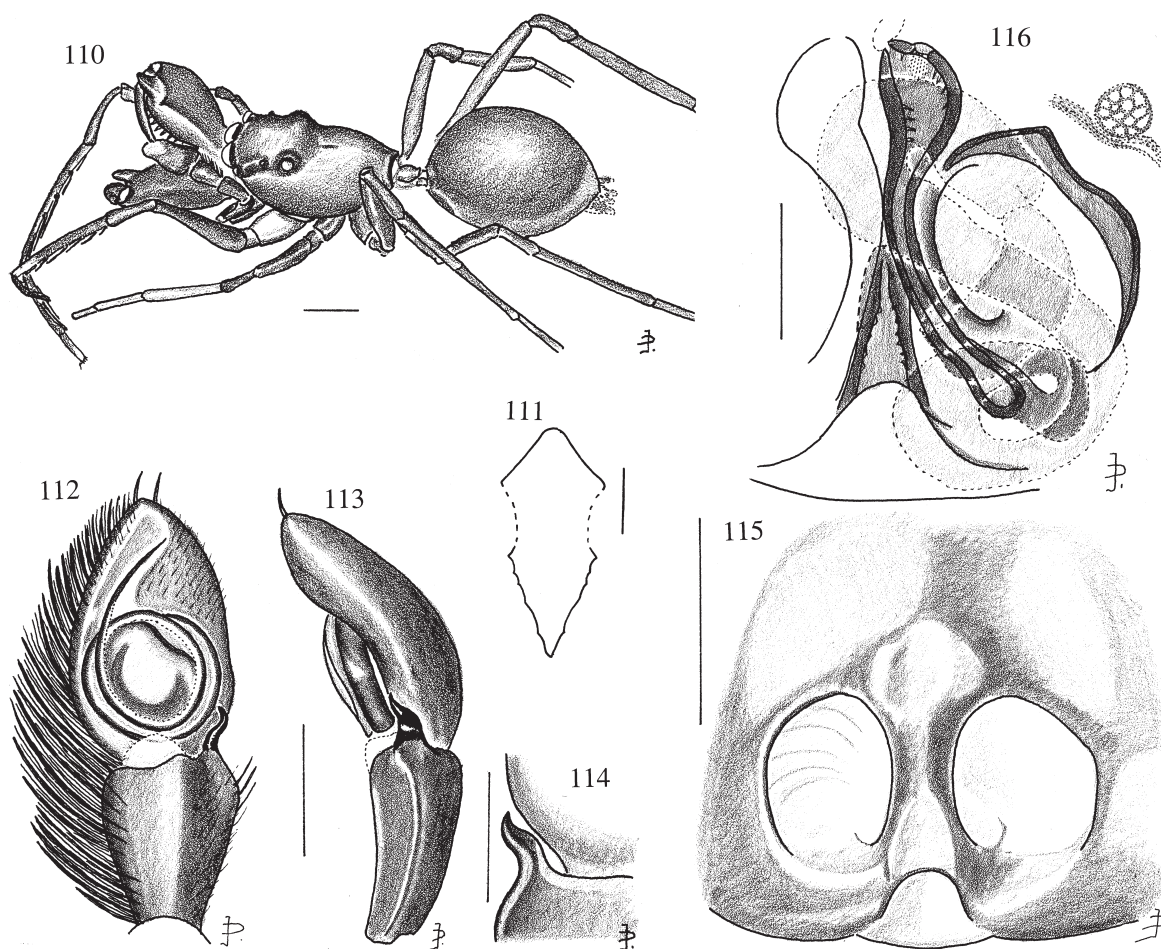
above and below; tip of metatarsus and tarsus yellow-brown; with 3 pairs of spines on tibia and 2 on metatarsus. Leg III dark brown apart from yellow-brown tarsus and occasionally paler brown on coxa. Leg IV dark brown apart from trochanter which has yellowish lower surface and smaller yellowish stripe on upper, anterior surface. *Pedipalp*: Basally orange-brown, merging to blackish brown on tibia and cymbium; tibia and cymbium with long, dense, stiff dark hairs pro-laterally (Fig. 112), retrolateral sides covered with sparse short, thin setae, and tip of cymbium with patch of short white bristles. Bulbus with circular seminal receptacle channel along rim, without a small loop (Fig. 112); half of ventral surface of tibia somewhat flattened, with distinct keel from apophysis to base (Fig. 113); apophysis sclerotised and twisted, without distinct flange (Figs. 112–114).

Female: The single specimen was unfortunately mislaid before a full description could be prepared. *Carapace*: Head black, thorax blackish brown. *Chelicerae*: Black, almost as long as head. *Sternum*: Similar to male. *Abdomen*: Rounded, slightly shorter than carapace, brownish red above but blacker anteriorly; dark grey ventrally, with buff lines laterally. *Legs*: As in male mostly dark brown in alcohol, blackish in life. Brownish yellow present on tibia and patella I dorsally and on

tibia at tip; also on tibia II dorsally, and metatarsus and tarsus II; and leg III metatarsus tip and tarsus. Coxa I mostly cream, trochanter IV with cream lateral stripe. *Epigynum*: Closely resembles that of *M. cuneata*, but “windows” oval, with anterolateral rims more strongly sclerotised, forming a narrow roof, which possibly articulates with male apophysis. Vaginal roof indistinct, narrow, but longer than in *M. cuneata* (Fig. 116). Spermathecal tubes narrow, almost straight but set diagonally, with anterior ends less expanded than in *M. cuneata*, with fewer, smaller internal spines, but “nutritive pores” more distinct (Fig. 116, cf. Fig. 63). Posterior end of spermathecal tube located just behind median rim of “window”, slightly swollen, but “scent pores” not found. Copulatory channel coils long, extending from posterior end of epigynum to anterior ends of spermathecal tubes. A unique feature in this species is a circular “sieve”, a network of small and delicate punctures of unknown function, shown at top right corner of Fig. 116. This was visible only in stained preparations and could easily be overlooked in other species.

Distribution: Known only from the present records in Genting Forest Reserve.

Remarks: This is another large dark species characterised by its chelicerae and genitalia, clearly



Figs. 110–116: *Myrmarachne hirsutipalpi* n. sp. **110–114** Adult male from Genting Forest. **110** Dorso-lateral view; **111** Sternum; **112** Left palpal organ, ventral view; **113** Ditto, lateral view; **114** Left tibial apophysis, dorsal view. **115–116** Adult female from Genting Forest. **115** Epigynum; **116** Internal structure of epigynum showing spermatheca and channel. Scale lines=1.0 mm (110), 0.5 mm (111–113), 0.25 mm (114, 115), 0.1 mm (116).

distinct from *M. cuneata* and other dark species in the collection.

Myrmarachne aureonigra n. sp. (Figs. 117–121)

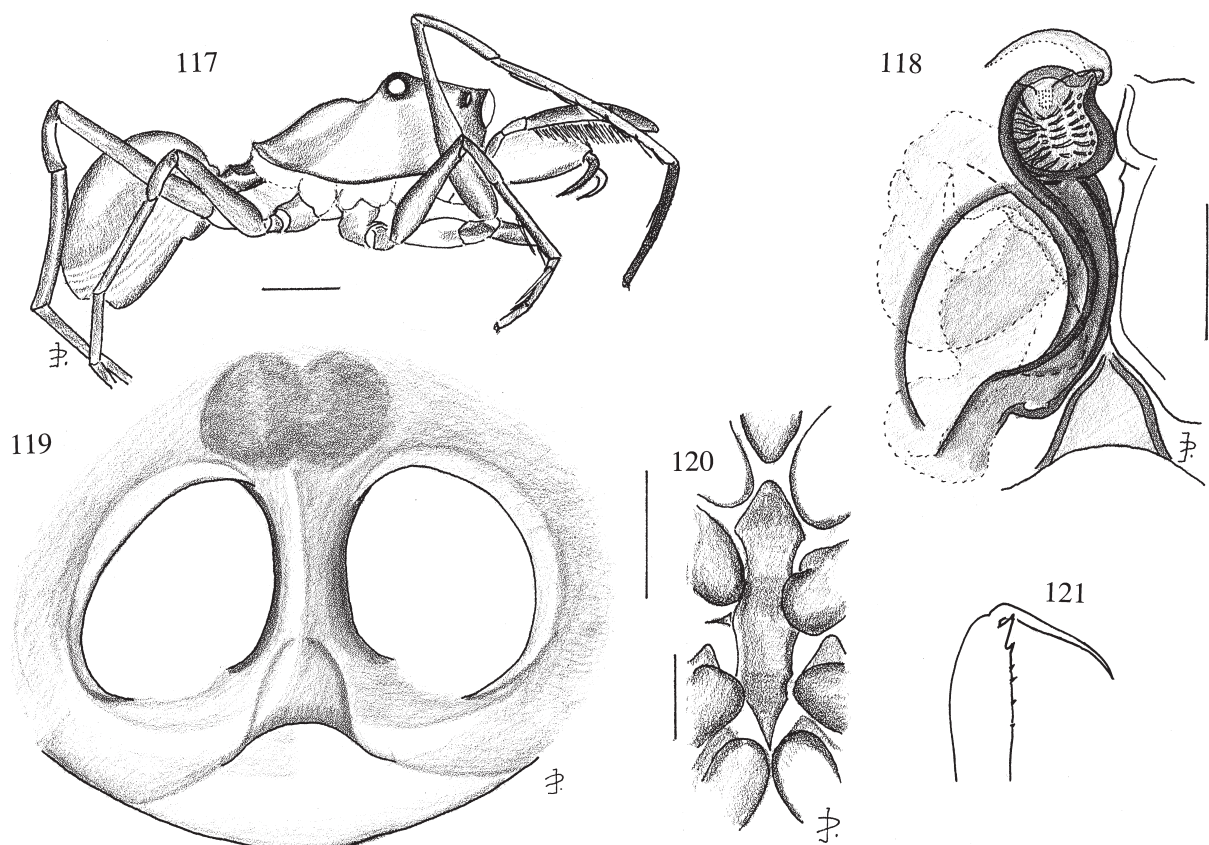
Type material: MALAYSIA (PENINSULAR MALAYA): Holotype ♀, Universiti Malaya campus, 8 February 1989. Deposited in Natural History Museum, London, accession number BMNH(E) 2002-33.

Other material examined: MALAYSIA (PENINSULAR MALAYA): Universiti Malaya, 1♀, 1 imm., 20–23 February 1989; Genting Forest, 2♀, 2 imm., 12 January–16 February 1989. SINGAPORE: University of Singapore, 1♂, 2 imm., 28 February 1989. Two females and the single adult male were unfortunately mislaid.

Etymology: The species is named because of its blackish colour with golden hairs on the abdomen.

Diagnosis: Body very dark brown with cream or gold hairs on the broad abdomen; legs long (legs I and IV more than 3 times the carapace length in females) and dark with pale coxa and trochanter I and trochanter IV; legs II and III only two-thirds the length of leg I; chelicerae of female long (half carapace length, see Table 2); male pedipalp with dense black bristles on the prolateral side. Body lengths of two females 5.7 and 6.2 mm, both with carapace 2.9 mm. Other dimensions are given in Table 2.

Description: *Male* (notes from freshly killed specimen): *Carapace*: Head dark brown, covered with dense white setae, especially at sides and rear; thorax dark brown, with white setae all over except for a strip on each side running diagonally back from thoracic notch to posterolateral edge; head slightly higher than thorax but with no pronounced notch. *Chelicerae*: Of similar length to carapace, parallel-sided and slightly concave, with pointed distal prolateral spur and smaller spur just below it (Fig. 121); dark brown dorsally, paler, more yellowish below; 5 large prolateral teeth, but details of smaller prolateral and retrolateral teeth not recorded. *Sternum*: Pointed at front, widest between bases of legs I–II. *Pedicel*: Short, two segments of similar length, dark. *Abdomen*: Blackish brown dorsally, merging to dark greenish brown laterally, covered with dense gold hairs; spinnerets brownish buff. *Legs*: Leg I coxa and trochanter white (transparent in life) with brown stripe on outer side, coxa dark brown proximally; femur, tarsus and metatarsus dark brown; patella and tibia yellow-brown above and below with dark brown stripes laterally petering out distally on tibia; 6 spines on inner side and 5 on outer side of tibia, 2 pairs on metatarsus. Leg II coxa, trochanter and femur dark brown; patella and tibia yellow-brown with dark brown lateral stripes; metatarsus and tarsus yellow-brown, tarsus paler; 3 pairs of spines on tibia, 2 on metatarsus. Leg III dark brown apart from tarsus and distal part of metatarsus



Figs. 117–121: *Myrmarachne aureonigra* n. sp. **117–120** Adult female from Universiti Malaya. **117** Lateral view; **118** Internal structure of epigynum showing spermatheca and channel; **119** Epigynum; **120** Sternum and leg bases. **121** Adult male from Singapore, right chelicera, ventral view, drawn from photographs and annotated sketch, hence no scale. Scale lines=1.0 mm (117), 0.5 mm (120), 0.1 mm (118, 119).

pale yellow. Leg IV dark brown apart from patella which is buff ventrally and trochanter which is white with brown stripe on anterior side and brown spot distally on posterior side. *Pedipalp*: Dark brown with dense black bristles on prolateral edge of tibia and cymbium, longest at base of tibia and tapering gradually to tip (similar to *M. hirsutipalpi*), cymbium with cream tip.

Female: Carapace: Head dark brown or blackish, more golden at sides and in immatures, densely covered with appressed white setae; thorax dark brown or yellow-brown, with white setae dorsally and laterally but with triangular bald area extending from thoracic notch to posterolateral margin on each side (Fig. 117); head higher and slightly longer than thorax, notch shallow. *Chelicerae*: About twice as long as maxillae and half as long as carapace (Fig. 117), orange-brown to dark brown, with about 8 prolateral and 10–13 retrolateral teeth; fang orange-brown or reddish brown, about half length of chelicera. *Sternum*: Orange-brown to brown, rounded at front and more or less straight-sided (i.e. with only minor indentations for leg bases) (Fig. 120). *Pedicel*: Short, two segments of similar length, buff overlaid with grey, brown or blackish pigment. *Abdomen*: Ovate, brown to blackish brown above (paler in immatures) covered with fine buff or gold hairs, with more buff and less grey ventrally, especially anteriorly; spinnerets buff or pale brown. *Legs*: Leg I coxa cream, with narrow basal ring dark brown or grey and usually with distal dark spot on outer side; trochanter cream with outer third dark; femur dark or blackish brown with inner, lower, distal half yellow-brown; patella yellow-brown suffused with dark brown or blackish brown, most ventral part paler; tibia yellow suffused with brown or blackish brown especially on sides as two stripes, palest distally; tarsus and metatarsus brown to dark brown; 6 pairs of spines on tibia (sometimes seven on inner side), third pair half as long as tibia, 2 pairs on metatarsus, basal pair longer than metatarsus. Leg II coxa and trochanter brown to blackish brown, trochanter usually with buff ventrally; femur and patella brown or blackish brown, with narrow yellow stripe ventrally on patella; tibia and metatarsus yellow with brown stripes laterally; tarsus yellow; 3 pairs of spines on tibia, 2 on metatarsus, basal ones much shorter than those on leg I. Leg III coxa and trochanter similar to leg II; femur brown to blackish brown; patella brown to dark brown above, yellow-brown below; tibia brown to dark brown (paler distally in immatures); metatarsus and tarsus yellow or brownish yellow, metatarsus often suffused with darker brown proximally. Leg IV coxa brown to blackish brown; trochanter cream, usually with partial or complete dark stripe on outer side (sometimes with dark spot distally on inner side); femur, patella, tibia, metatarsus and tarsus all brown to blackish brown with lower, proximal part of patella yellow, and tarsus paler brown. *Pedipalp*: Brown, with distal segments blackish brown; with numerous fine white setae all over, also with dense black setae ventrally on tibia and tarsus, especially long towards base of prolateral side of tibia. *Epigynum*: “Windows” oval, septum

broad, with small translucent anterior swellings of spermathecae and bell-shaped vaginal roof (Fig. 119). Spermathecal tube short, curved along median edge of “window”, swelling into almost circular anterior vesicle (Fig. 118). Vesicle with numerous, dense internal spines and relatively prominent “nutritive pores”; posterior end of tube with no “scent pores” visible, opening into coils of relatively short membranous copulatory channel.

Variation: Two females from near the Field Studies Centre differed in several features from the description given above. They were very dark brown to blackish brown, with practically no hairs on the carapace; abdomen with only sparse hairs; no pale yellow-brown on femur I and patella III, but with dark stripe on tarsus III.

Distribution: Known only from the University of Malaya (Kuala Lumpur), Genting Forest, and Singapore.

Remarks: This large species differs from *M. grossa* in having a shorter cephalothorax, and a rounded abdomen lacking a constriction. The bulbus is broad, of the “*Belippo*” type, with the tibia shorter than in *M. grossa*, and the tibial apophysis similar to that in other species of *Myrmarachne*. In the female the pedipalp is broad, flattened, with a dense, prolateral mane of thick black setae, very similar to that of the male. The epigynum is small in relation to the size of the specimen.

The females described here came from near Kuala Lumpur, and the male from Singapore, but we consider them to be conspecific because of the close resemblance in morphology and colour, and because two immatures from Singapore were very similar to immatures from Malaya. The females resemble specimens in the Natural History Museum identified by Badcock (1918) as *M. maxillosa* (C. L. Koch, 1846) in the general body proportions and epigyne, but they have a much more slender sternum which is rounded anteriorly instead of pointed. We have not been able to examine the type material of *M. maxillosa* but it has been reported from Burma, Indonesia, Andaman Islands, Malaysia, Singapore, Philippines, Australia, South China and Taiwan (Koh, 1989; Prószyński, 2001), and Koh’s photographs (1989: 129, 131, both labelled *M. maxillosa*) are very similar to the specimens described here. It is not clear to us if these really are all conspecific, or if there are several different species of similar appearance in South-east Asia, each with a different geographical range. We therefore describe our material as a new species, *M. aureonigra*, but recognise that subsequent more careful examination of material may show that this name is a synonym.

Discussion

The only other extensive collection of *Myrmarachne* from Malaya is that made by Annandale and Robinson in 1901–2, described by Badcock (1918). There were 55 specimens of the genus, comprising nine species including *M. maxillosa* and eight new species. The present collection comprises 138 spiders belonging to 19 species. All of Badcock’s species have been refound, but two of his new species have been synonymised, while his

M. maxillosa has been described here as a new species, *M. aureonigra*, because of uncertainty as to whether it is identical with the true *maxillosa*. In addition to these seven species, a further six species were found, including the well-known *M. plataleoides* and five species described here for the first time. Single specimens of a further five species were also found, as well as two specimens of a sixth species. These were unfortunately in the material that was mislaid. Although we have some drawings, sketches and notes on these species we have made no attempt to describe them. There are therefore at least 19 species of *Myrmarachne* from peninsular Malaya, of which 13 are described here, and no doubt additional collections will reveal even more species of the genus from this region. Žabka (1985) reported 11 species of *Myrmarachne* from Vietnam, all of them different from the species described here from Malaya. In comparison with the numbers of species of *Myrmarachne* known from Africa, Wanless (1978) recorded 14 species from both Zaire and Madagascar, 11 from Angola, 10 from both Kenya and South Africa and 8 from Ghana. From this rather sparse evidence the biodiversity of the genus thus appears to be similar in tropical Africa and South-east Asia.

Acknowledgements

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References

- BADCOCK, M. A. 1918: Ant-like spiders from Malaya, collected by the Annandale-Robinson Expedition, 1901–2. *Proc. zool. Soc. Lond.* **1917**: 277–321.
- BARRION, A. T. & LITSINGER, J. A. 1995: *Riceland spiders of South and Southeast Asia*. 1–700. CAB International in association with International Rice Research Institute.
- BERRY, J. W., BEATTY, J. A. & PRÓSZYŃSKI, J. 1998: Salticidae of the Pacific Islands. III. Distribution of seven genera, with description of nineteen new species and two new genera. *J. Arachnol.* **26** (2): 149–189.
- JACKSON, R. R. & WILLEY, M. B. 1994: Comparative study of the predatory behaviour of *Myrmarachne*, ant-like jumping spiders (Araneae: Salticidae). *Zool. J. Linn. Soc.* **110**: 77–102.
- KOCH, C. L. 1846: *Die Arachniden* **13**: 1–234. Nürnberg.
- KOH, J. K. H. 1989: *A Guide to common Singapore spiders*. 1–160. Singapore Science Centre, Singapore.
- MATHEW, A. P. 1934: The life-history of the spider (*Myrmarachne plataleoides*) (Cambr). *J. Bombay nat. Hist. Soc.* **37**: 369–374.
- MURPHY, F. & MURPHY, J. 2000: *An introduction to the spiders of South East Asia*. 1–625. Malaysian Nature Society, Kuala Lumpur.
- PECKHAM, G. W. & PECKHAM, E. G. 1892: Ant-like spiders of the family Attidae. *Occ. Pap. Wis. nat. Hist. Soc.* **2**: 1–83.
- PICKARD-CAMBRIDGE, O. 1869: Descriptions and sketches of some new species of Araneida, with characters of a new genus. *Ann. Mag. nat. Hist.* (4) **3**: 52–74.
- PRÓSZYŃSKI, J. 1992: Salticidae (Araneae) of India in the collection of the Hungarian National Natural History Museum in Budapest. *Annls zool., Warsz.* **44**: 87–163.
- PRÓSZYŃSKI, J. 2001: *Salticidae (Araneae) of the World*. <<http://spiders.arizona.edu/salticid/main.htm>>
- PRÓSZYŃSKI, J. 2002: Remarks on jumping spiders of the genus *Damoetas* related to *Myrmarachne* (Araneae: Salticidae) with description of two new species. *Annls zool., Warsz.* **51**: 517–522.
- THORELL, T. 1877: Studi sui Ragni Malesi e Papuani. I. Ragni di Selebes raccolti nel 1874 dal Dott. O. Beccari. *Annali Mus. civ. Stor. nat. Giacomo Doria* **10**: 341–634.
- THORELL, T. 1890: Diagnoses Araneorum aliquot novarum in Indo-Malesia inventarum. *Annali Mus. civ. Stor. nat. Giacomo Doria* (2) **10** (= **30**): 132–172.
- WANLESS, F. R. 1978: A revision of the spider genera *Belippo* and *Myrmarachne* (Araneae: Salticidae) in the Ethiopian region. *Bull. Br. Mus. nat. Hist. (Zool.)* **33** (1): 1–139.
- ŽABKA, M. 1985: Systematic and zoogeographic study on the family Salticidae (Araneae) from Viet-Nam. *Annls zool., Warsz.* **39** (11): 197–485.