

TWO NEW SPECIES OF THE ARBOREAL TRAPDOOR SPIDER GENUS *SASON* (ARANEAE: BARYCHELIDAE) FROM SOUTHEAST ASIA

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ABSTRACT. – Two new species, *Sason sundaicum* (males + females) from Thailand and Malaysia, and *S. hirsutum* (male) from Indonesia, are described and compared with the male holotype of *S. andamanicum* (Simon). Notes on the biology and distribution of the new species are given; biogeography, taxonomic characters and relationships in the genus *Sason* are discussed.

KEY WORDS. – Southeast Asia, Arachnida, Araneae, *Sason*, new species, taxonomy.

INTRODUCTION

In a brief compilation of records of orthognathous spiders from Thailand (Schwendinger, 1996) I mentioned that no Barychelidae were then known from that country. As, however, four barychelid species [i.e. *Rhianodes atratus* (Thorell), *Sipalolasma aedificatrix* Abraham, *S. ophirensis* Abraham, *Idioctis litoralis* Abraham] had been recorded from Peninsular Malaysia and Singapore, it appeared likely that representatives of these species, or at least of these genera, occur in Thailand as well. Indeed, I subsequently succeeded in finding barychelid spiders in southern Thailand (and later also in Malaysia and Indonesia), but surprisingly not from any of the genera mentioned above. Instead, the newly discovered barychelid spiders belong to the enigmatic bark-dwelling trapdoor spider genus *Sason*, which has not yet been reported from mainland Southeast Asia.

In a revision of this genus, Raven (1986) recognised six valid species (available material and occurrence in parentheses): *S. andamanicum* (Simon) (male; Andaman Islands), *S. colemani* Raven (male + females; northeastern Australia), *S. maculatum* (Roewer) (females; western Pacific islands), *S. pectinatum* Kulczyński (juvenile; northeastern New Guinea), *S. robustum* (O. P.-Cambridge) (male + females; southern India, Sri Lanka) and *S. sechellanum* Simon (misspelled *seychellanum* by Raven, 1986 and 1994: 701) (females; Seychelle Islands). Two new species are described here; one from four islands in southern Thailand and northern Malaysia, the other one from an island in the Lingga Archipelago, Indonesia. They are compared with the geographically and phylogenetically close *S. andamanicum*, for which additional taxonomic characters are given.

MATERIAL AND METHODS

External structures were studied and drawn with a ZEISS SV11 stereomicroscope, the vulvae (as temporary mounts embedded in glycerine) with a NIKON Optiphot compound microscope (each with a drawing tube). Measurements of body length include the chelicerae but not the spinnerets. Leg articles were measured on their dorsal side, from midpoint of distal to midpoint of proximal margin. All measurements are given in mm, except when stated otherwise.

Abbreviations and museum acronyms used in the text: AME, ALE, PME, PLE = anterior (posterior) median (lateral) eyes; Fe = femur; MOQ = median ocular quadrangle; Mt = metatarsus; Pa = patella; PMS, PLS = posterior median (lateral) spinnerets; Ta = tarsus; Ti = tibia. MHNG = Muséum d'histoire naturelle de Genève; MHNP = Muséum National d'Histoire Naturelle de Paris; ZRC = Zoological Reference Collection of the Raffles Museum of Biodiversity Research, National University of Singapore.

TAXONOMY

Sason Simon, 1887

Diagnosis. – Small barychelid spiders, characterised by: carapace, opisthosoma and legs with pronounced colour pattern; eye tubercle very low or absent; clypeus indistinct; labium distally with transvers row of short stout (present in all females and in males of some species) and/or filiform cuspules (in males of other species); PLS with conical apical segment; paired tarsal claws with few denticles in one row or edentate (in males of some species); cymbium short, undivided; palpal claw tufts of females weak or absent.

For synonymy and detailed description, see Raven (1986: 49; 1994: 700).

***Sason andamanicum* (Simon, 1888)**

(Figs. 1-5)

Satzicus andamanicum Simon, 1888: 287 (description of male holotype).

Sason andamanicum – Simon, 1892: 130 (synonymisation of *Satzicus*); Pocock, 1900: 174; Raven, 1986: 54 (revision of *Sason*).

Material examined. – Holotype - male (MHNP no. 9763 and AR 4562), Port Blair (11°40'N, 92°45'E), South Andaman Island, India, coll. R. D. Oldham, no date.

Remarks. – This species was diagnosed and the male holotype re-described in the course of a generic revision by Raven (1986), but the following details were not mentioned: cuspules in transverse row distally on labium of male (erroneously reported as absent in earlier descriptions; Simon, 1888; Pocock, 1900; Raven, 1986) long and slender (filiform), similar to nearby setae (Fig. 5); prolateral megaspine inclined from axis of tibia I by about 40°; retroventral spines on tibia I strong and blunt (Fig. 2); embolus of left palp slightly sigmoid in ventral view (Fig. 4), its base wide and abruptly narrowing beyond the proximal

third (Fig. 3) [right palp rather different in shape (presumably deformed)]; opisthosomal pattern faded, but dark central patch discernible on dorsum, indicating similar pattern as in the male of *S. hirsutum*, new species (Fig. 33).

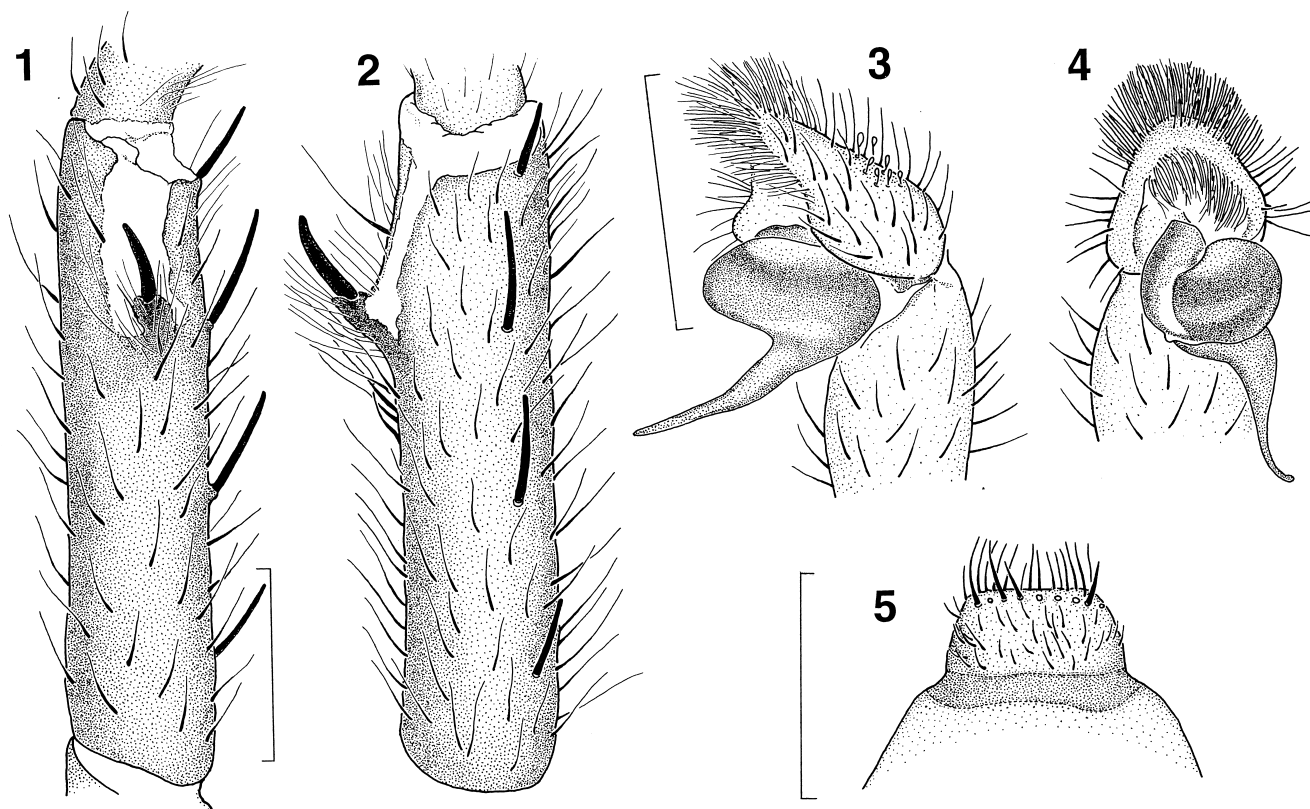
Measurements. – Body length 8.8; carapace 4.7 long, 4.4 wide; opisthosoma 4.4 long, 3.4 wide.

***Sason sundaicum*, new species**

(Figs. 6-32)

Material examined. – Holotype – male (MHNG), Tone Sai Waterfall, Khao Phra Thaeo Non-hunting Area (7°59'N, 98°22'E), 50 m, Thalang District, Ko [= Island] Phuket, Thailand, coll. P. J. Schwendinger, 22-27 Sep.1997.

Paratypes – 1 male, 6 females, same data as for the holotype; 1 male (matured early Oct.1997), 2 females (MHNG), from the type locality, 22 Oct.1996; 2 females (MHNG), Ko Siray, east coast (7°53'06.8"N, 98°26'13.6"E), 30 m, off Ko Phuket, Thailand, 11 Dec.2001 and 26 Jul.2002; 2 males, 1 female (MHNG), Ko Siray, Laem [=Cape] Nga (7°54'42.2"N, 98°26'06.7"E), 20m, 20./23.V.2003; 3 males (matured 16 Apr.1966, 23 Apr. 1996, 1 Mar.1997, respectively) (MHNG, ZRC), 3 females (MHNG, ZRC), forest behind Ao [=Bay] Molae (6°35'N, 99°40'E), 30 m, Ko Tarutao, Satun Province, Thailand, 12 Jan.1996; 3 females (MHNG, ZRC), forest outside Gua [=Cave] Landak, near Pantai [=Beach] Beringin (6°18'14.5"N, 99°51'28.8"E), 60 m, Pulau



Figs. 1-5. *Sason andamanicum* (Simon), male holotype. 1, left tibia I, prolateral view; 2, the same, ventral view; 3, distal part of palpus, retrolateral view (bulb illustrated disproportionately larger than other parts); 4, the same, ventral view; 5, labium, ventral view. Scale lines (1+2; 3+4; 5) = 1.0 mm.

[=Island] Langkawi, Kedah, Malaysia, 29 Nov.2001. All specimens coll. P. J. Schwendinger.

Others – 3 juveniles (MHNG), Ko Phuket; 5 juveniles (MHNG), Ko Tarutao; 1 subadult male (MHNG), Pulau Langkawi. All specimens coll. P. J. Schwendinger.

Diagnosis. – Similar to *S. andamanicum*, distinguished by: body distinctly smaller; median labial cuspules of males short (only lateral ones filiform); prolateral megaspine on shorter spur more strongly inclined from axis of tibia I; embolus straight (not sigmoid), narrower at base, gradually tapering towards the tip (Figs. 13, 14); scopula on metatarsus III indistinct or absent.

Description. – Male (holotype). Coloration generally light brown, slightly more reddish on pars cephalica of carapace, on dorsal chelicerae and labium. Area anterior to eye group subdivided into posterior, fully pigmented zone with fringe of hairs separating it from anterior hyaline zone (Fig. 7). Ocular area very dark. Carapace with pairs of darkened bands (widening towards the periphery) radiating from fovea towards ocular area and (less distinctly) towards leg coxae. Distal part of chelicerae dark. Legs with dark lateral patches on distal portion of patellae (lighter on anterior legs); dark distal ring on tibiae broken by two light paramedian longitudinal stripes (leaving isolated dark median longitudinal stripe); entire dark ring present on metatarsi (shorter on anterior legs) (see Figs. 21, 22, female). Palp with darkened lateral patches distally on patella and tibia. Opisthosoma light grey-yellow, with conspicuous dark pattern dorsally and ventrally (Figs. 6, 10).

Carapace (Fig. 6) hirsute, with dark bristles and fine light hairs on pars cephalica and on coxal elevations of pars thoracica; long bristles along lateral carapace margins. Ocular tubercle low; eye group rectangular, arranged in three rows; ALE in front of others; AME largest (Fig. 7). Fovea very deep, slightly recurved.

Chelicerae weak, cheliceral groove with six teeth on promargin, long reddish bristles on retromargin and five/six tiny denticles basally between them. Rastellar area with one thick seta on each side.

Maxillae (Figs. 8, 9) with two moderately elongated cuspules on prolateral-proximal corner.

Labium (Figs. 8, 9) with transverse distal row of 11 cuspules; the median ones fairly short (with slightly bulbous base and peg-like apex); the lateral ones long, filiform and tapering to a point, similar to nearby setae but darker, basally wider, and more distinctly standing up from surface of labium.

Sternum (Fig. 9) separated from labium by shallow groove (narrowest in the middle); only posterior two pairs of small, oval, submarginal sigilla discernible.

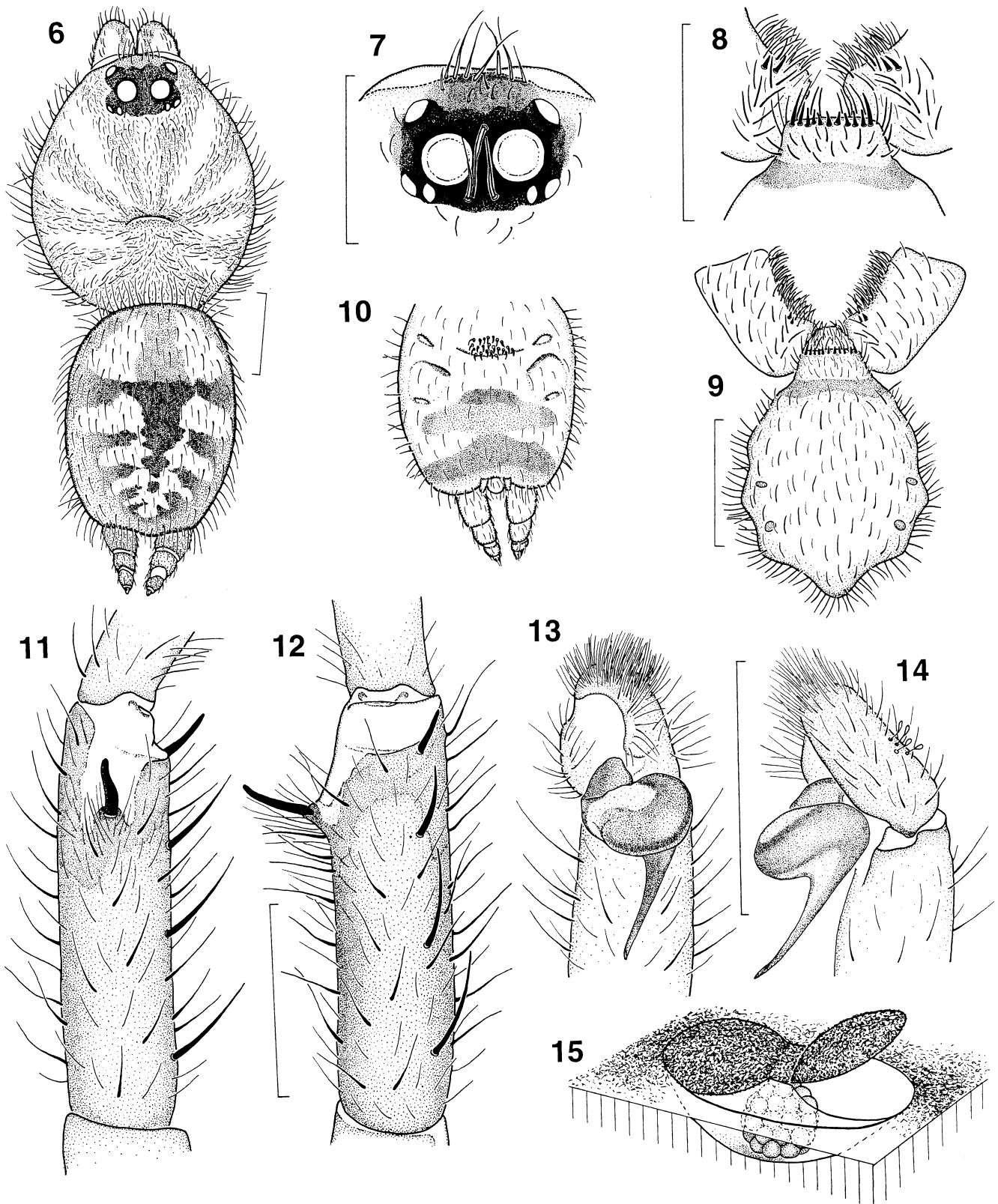
Palpus (Figs. 13, 14) with cymbium carrying thin distal scopula dorsodistally and filiform, spatulate and clavate trichobothria dorsoproximally. Bulbus ovoid, with fairly straight and slender embolus evenly narrowing towards tip.

Legs 3124. Paired tarsal claws without teeth. Thin ventral scopula distinct on tarsi I and II, and in distal portion of metatarsi I and II, indistinct on tarsus III, in distal portion of metatarsus III, and in distal portion of tarsus IV. Filiform trichobothria in two parallel rows dorsally on tibiae and metatarsi; three/four clavate and spatulate trichobothria in proximal half of tarsi, and triangular field (widening distally) of filiform trichobothria in distal half. All femora with longitudinal row of about five long, curved spines (or stiff bristles) dorsally. Low prolateral coupling spur on tibia I carrying slender, blunt, slightly curved megaspine pointing away from tibia at almost right angles; spur distinctly remote from distal margin of tibia I; prolateral-distal edge of tibia I deeply invaginated (retreated), i.e. fairly large area distal to (and on both sides of) tibial spur glabrous and unpigmented; four strong spines (the distal one fairly short and blunt, the proximal ones long and tapering) aligned in retroventral, longitudinal row on tibia I (Figs. 11, 12). Four retroventral spines and one proventral-distal spine (not raised on spur and situated more distally) present also on tibia II, but less pronounced than on tibia I. Patellae I and II with one or two (in transverse row) retrolateral-distal spines.

Spinnerets (Fig. 10): PMS short, digitiform; PLS three-segmented, apical segment short, with distal cluster of spigots.

Female (from the type locality). As male, but with relatively smaller AME (Figs. 16, 17); carapace with distinctly fewer hairs; hyaline zone in front of eye group with median pigmentation; chelicerae stronger (Fig. 16), with seven teeth on promargin of cheliceral groove and with single spinule plus one/two thick setae in rastellar area on each side; maxillae and labium carrying shorter and stouter cuspules of uniform size (Fig. 18); legs 1=324, shorter, with much denser scopula on anterior legs (but also indistinct on tarsus IV); palpal claw with three denticles; palpal tarsus without claw tufts; pattern of dark markings on body and limbs more pronounced (Figs. 16, 20-22). Spination of palp: four spines proventrally in distal portion of femur, two proventrally and one retroventrally on patella, three proventrally and three retroventrally on tibia. Spination of legs I and II: two spines (in transverse row) retroventral-distally on patellae, one proventrally and four retroventrally on tibiae. All legs with longitudinal row of up to nine spines dorsally on femora. Vulva containing two widely separated spermathecae with rounded tips (Fig. 23).

Measurements. – Male holotype, female paratype in parentheses. Body length 6.3 (7.7); carapace 3.1 (3.7) long, 2.8 (3.2) wide; maxillae 1.0 (1.2) long, 0.6 (0.7) wide; labium 0.3 (0.4) long, 0.6 (0.7) wide; sternum 1.7 (1.9) long, 1.5 (1.6) wide; opisthosoma 2.9 (3.7) long, 2.1 (3.0) wide; PMS 0.2 (0.2) long, PLS 1.0 (0.8) long. Eye sizes and interdistances: AME 0.32 (0.24), ALE 0.19 (0.19), PME 0.12 (0.09), PLE 0.13 (0.13); AME-AME 1.12 (0.19), ALE-ALE 0.61 (0.67), PME-PME 0.52 (0.61); eye group length 0.59 (0.60), front width 0.87 (0.93), back width 0.90 (1.00); MOQ length 0.41 (0.36), front width 0.70 (0.65), back width 0.69 (0.77).



Figs. 6-15. *Sason sundaicum*, new species. 6-14, male holotype. 6, body (without legs and palps), dorsal view; 7, eye group, dorsal view; 8, labium and proximal portion of maxillae, ventral view; 9, maxillae, labium and sternum, ventral view; 10, opisthosoma, ventral view; 11, left tibia I, prolateral view; 12, the same, ventral view; 13, distal part of palpus, ventral view; 14, the same, retrolateral view; 15, nest of female with egg sac suspended inside. Scale lines (6+10; 7; 8; 9; 11+12; 13+14) = 1.0 mm.

Palp and legs:

	Fe	Pa	Ti	Mt	Ta	Total
Palp	1.5 (1.5)	1.0 (1.2)	1.1 (1.0)	–	0.6 (1.1)	4.2 (4.8)
Leg I	2.6 (1.9)	1.7 (1.6)	2.0 (1.3)	1.6 (1.0)	1.1 (0.7)	9.0 (6.5)
Leg II	2.7 (1.9)	1.7 (1.6)	2.1 (1.3)	1.6 (1.0)	1.1 (0.7)	9.2 (6.5)
Leg III	2.5 (1.9)	1.4 (1.3)	2.1 (1.5)	1.7 (1.1)	1.0 (0.7)	8.7 (0.7)
Leg IV	3.1 (2.4)	1.8 (1.7)	2.7 (2.0)	2.3 (1.6)	1.1 (0.8)	11.0 (8.5)

Variation. – Males (n=8), females (n=15) in parentheses. Body length 5.7-6.8 (7.7-11.0), carapace length 2.8-3.2 (3.2-5.0), width 2.7-3.0 (3.8-4.6). Zero to three (two to seven) cuspules are present on the maxillae, eight to eleven (seven to ten) on the labium; one female (from Ko Phuket) possesses a deformed labium carrying about 30 cuspules (Fig. 19).

In the male holotype the retroventral-proximal spines on tibia I are slightly weaker and longer than in other males; in another male from Ko Phuket the distal spine in this row is tapering (blunt in all other males). A male from Ko Siray possesses an additional spine close to the retroventral-distal spine of its left tibia I. The scopula in the distal portion of metatarsus III is indistinct in some males from Ko Phuket and Ko Siray, indiscernible in the others. In a male from Ko Siray one of the median cuspules is filiform, otherwise no noteworthy variation in the shape of labial cuspules in males can be seen.

Females from Ko Phuket and Ko Siray have spermathecae which are entire (Fig. 23) or subdivided into two or three terminal buds (Figs. 24-27). All females from Ko Tarutao and Pulau Langkawi have the tips of their spermathecae divided into two or several buds (Figs. 28-32), giving some of them a cauliflower-like appearance. Additionally, these latter females (from the southern localities) lack the spinule in the rastellar area, and the scopula on tarsus IV is indiscernible. The number of denticles on the palpal claws of females varies between two to six.

Etymology. - The species name refers to the Sundaland, i.e. the lands of the Sunda continental shelf, west of Wallace's line.

Distribution. - The new species is known from four islands, i.e. Ko Phuket, Ko Siray, Ko Tarutao and Pulau Langkawi, off the west coast of the Malay Peninsula.

Biology. - *Sason sundaicum*, new species, occurs on trees in secondary forests and in tropical semi-evergreen rainforest (terminology according to Whitmore, 1991), or on isolated trees close to such forests. Most spiders were found near the sea: on Ko Tarutao and Pulau Langkawi only a few dozen or a few hundred metres from the coast; on Ko Siray even on trees washed by the high tide. On Ko Phuket, these spiders were collected along streams (never more than ca. 100 metres from the water), inside and at the edge of a forest situated about five kilometres from the sea.

The spiders occupy short silken nests which are equipped with two opposing trapdoors and usually fit into a depression so that the upper side of the nest is level with the surrounding surface (Fig. 15; see also Pocock, 1900: 173; Raven, 1986: 50, 59, fig. 19). Most nests were found attached to the bark of living trees, where, due to interwoven bark particles and moss and/or lichens growing on them, they are perfectly camouflaged and very difficult to see (even for the experienced eye). The spiders appear to prefer trees with a fairly smooth bark which has depressions in it, but I have never found such nests on trees (like fig trees) with a completely smooth bark. On Ko Siray, *S. sundaicum*, new species, was found to be quite abundant on stems of coconut trees. On Pulau Langkawi some nests were seen both on vertical and overhanging sides of large boulders. Nests of males were 1.6-1.9 cm long, front door 1.0-1.2 cm, hind door 0.9-1.2 cm wide; those of females were up to 2.8 cm long, front door up to 2.0 cm, hind door up to 1.8 cm wide. Silken nests on the bark of trees, very similar to those of *Sason* spp., are built by *Poecilomigas abrahami* (O. P.-Cambridge) (Migidae) from South Africa (see Griswold, 1987: 480-481, figs. 16-17). An undescribed *Poecilomigas* species from the Soutpansberg in the Northern Province of South Africa additionally builds its nest onto rock faces (personal observations; see also Filmer 1997: 119).

Mature males are present in different periods of the year: on Ko Phuket in September and October (two were collected mature in late September, one matured in early October), on Ko Tarutao in March and April (maturation in captivity) and on Ko Siray in late May (collected mature).

Females from Ko Phuket moulted twice per year, in April/May and again in October; a female from Ko Siray in mid-December; females from Ko Tarutao in January, April, June and October; a female from Pulau Langkawi in mid-April (observations in captivity).

In late September 1997 four females with egg sacs and one with newly hatched spiderlings were collected on Ko Phuket. Egg sacs were lenticular, about 8 mm long and 6 mm wide, attached along their narrow side (for ca. 3 mm) to the ceiling of the maternal nest (Fig. 15). One egg sac contained 40 first instar juveniles (white, immobile) with the cast egg membranes between their legs; in another egg sac 21 first instar juveniles and an unfertilised egg (1.4 mm in diameter) were found. The remaining two egg sacs were devoured by the females during transport from the forest. In late May 2003 two females were seen with well-developed (at least

third instar), very active juveniles (in one case 18 spiderlings counted) in their nests on Ko Siray.

The presence of mature males at different times of the year suggests two mating periods [as also observed for the diplurid spider *Phyxioschema suthepium* Raven & Schwendinger in northern Thailand (Raven & Schwendinger, 1989: 59)]: 1) March to May and 2) September to October. Spiderlings observed in late May presumably resulted from matings in the first period, egg sacs and spiderlings collected in late September from those in the second period. It remains possible, however, that there is no limited reproductive period and that mating and egg laying actually take place all the year round.

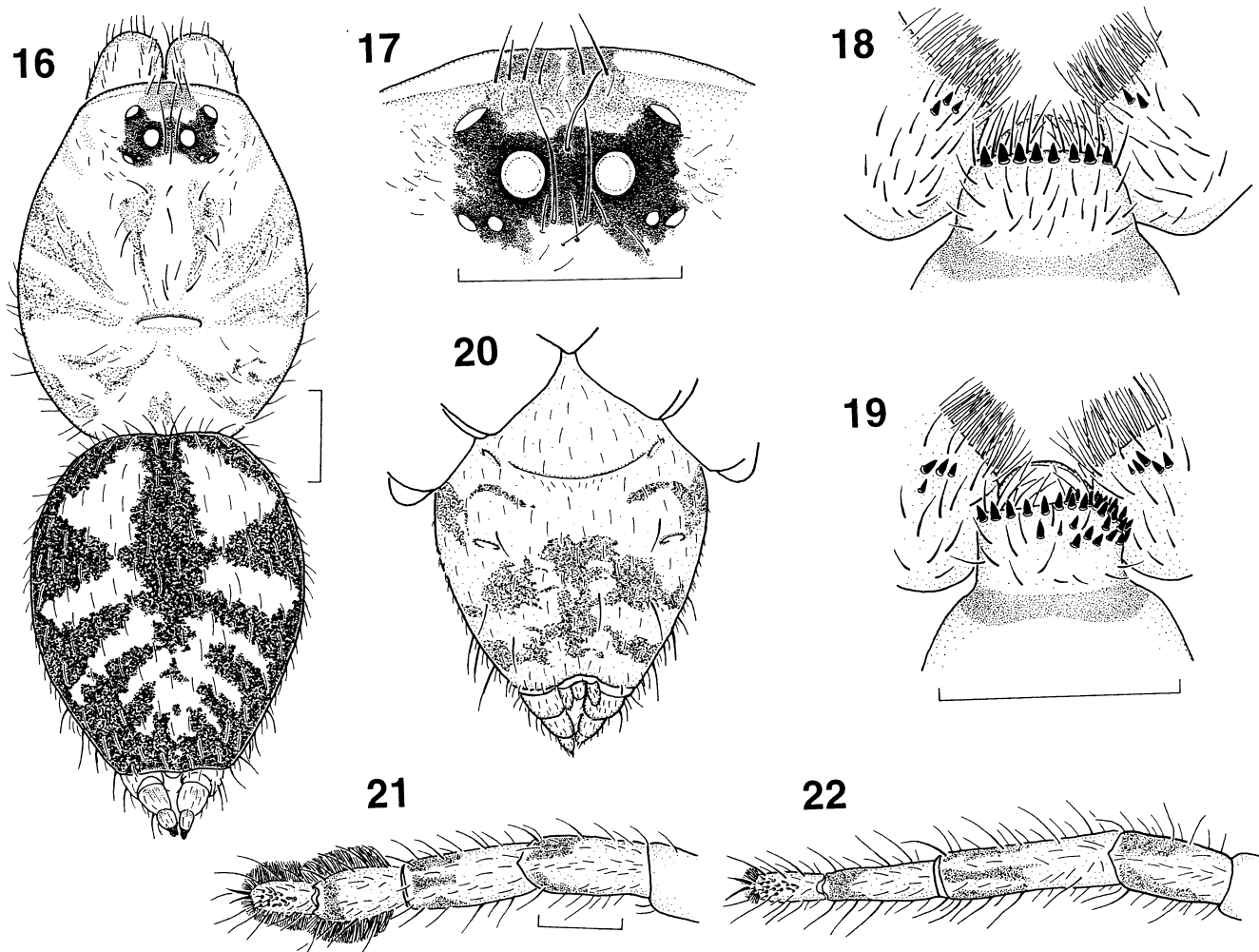
Sason hirsutum, new species
(Figs. 33-41)

Material examined. – Holotype – male (MHNG), waterfall ca. 7 km N of Daik (00°08'53.3"S, 104°36'13.2"E), 60 m, Pulau [=Island] Lingga, Riau Province, Indonesia, coll. P.J. Schwendinger, 15 Jun.2001.

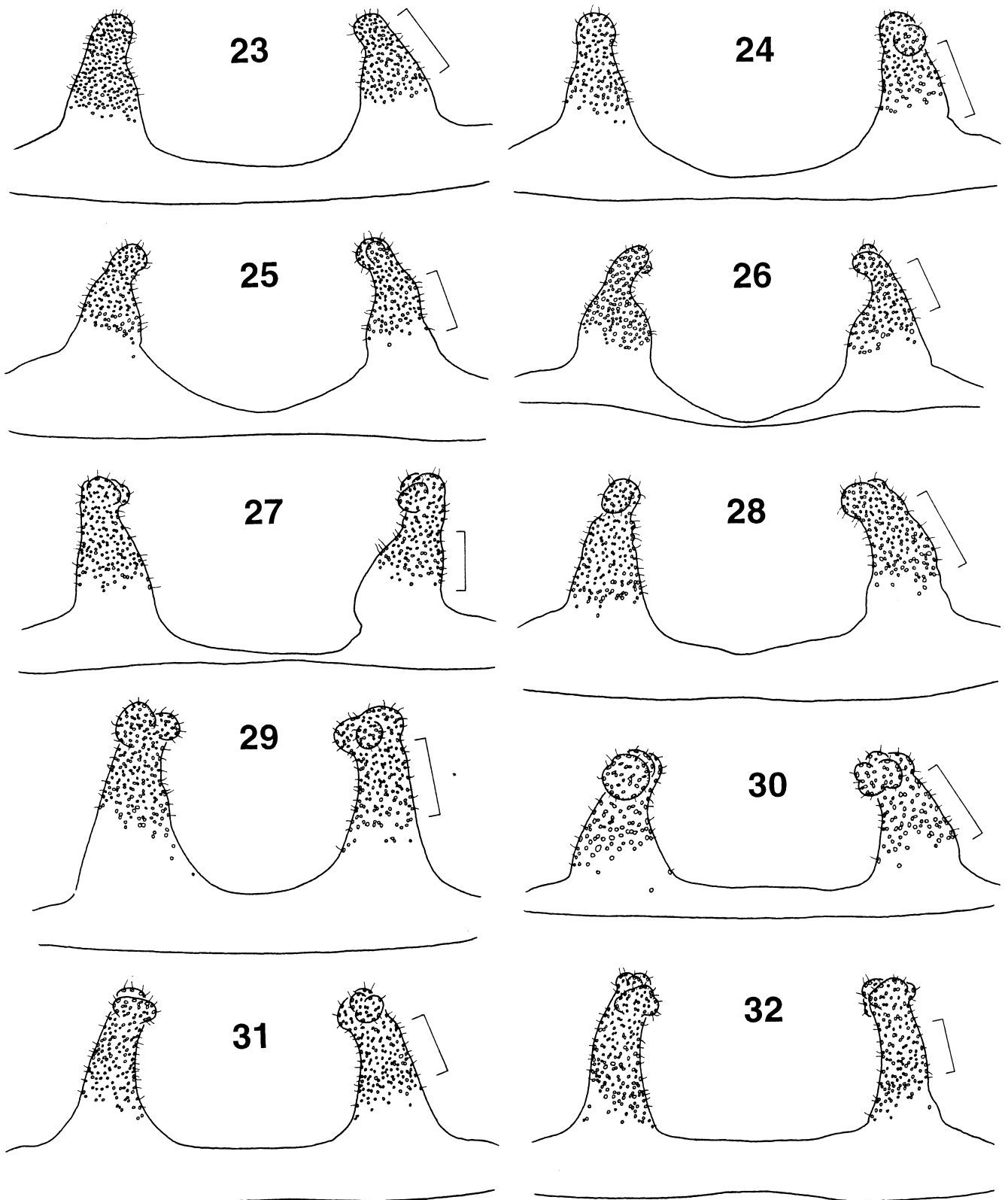
Other – 1 juvenile (8.2 mm body length; damaged) (MHNG), same data as for the holotype.

Diagnosis. – Similar to *S. andamanicum*, male distinguished by: cuspules on labium and maxillae quite short and stout (Figs. 35, 36); tibia I with row of longer and thinner retroventral spines; tibial spur less elevated, situated more distally, carrying a megaspine less strongly inclined from axis of leg (Fig. 39); distal margin of tibia I less deeply invaginated (Fig. 38); bulb with basally thinner, not sigmoid embolus (Figs. 40, 41).

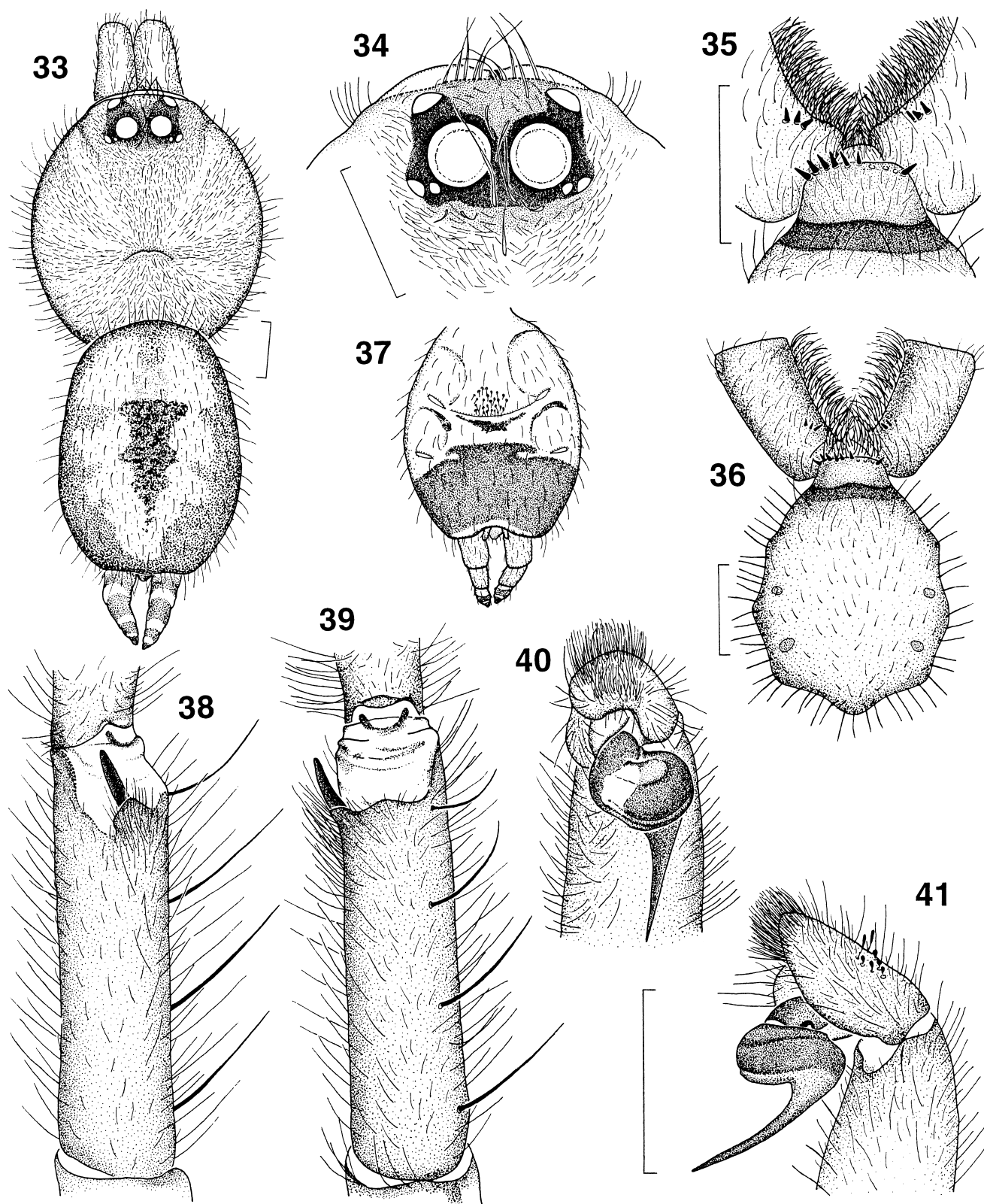
Description. – Male (holotype). Coloration uniformly light reddish brown on dorsal side, ventral side lighter. Opisthosoma cream, with dark brown-violet pattern dorsally (Fig. 33) and ventrally (Fig. 37). Ocular area dark; posterior zone in front of eyes grey, anterior zone hyaline with black median patch (Fig. 34). Leg tarsi and distal part of metatarsi ventrally white; distal portion of tibia IV and lateral sides of patella IV slightly darkened. Dorsodistal portion of cymbium white.



Figs. 16-22. *Sason sundaicum*, new species, two female paratypes. 16, body (without legs and palps), dorsal view; 17, eye group, dorsal view; 18, labium and proximal portion of maxillae, ventral view; 19, the same, different specimen; 20, opisthosoma, ventral view; 21, distal part of left leg I, dorsal view; 22, distal part of left leg IV, dorsal view. Scale lines (16+20; 17; 18+19; 21+22) = 1.0 mm.



Figs. 23-32. *Sason sundaicum*, new species, vulvae of 10 female paratypes. 23-26, specimens from Ko Phuket; 27, specimen from Ko Siray; 28-30, specimens from Ko Tarutao; 31-32, specimens from Pulau Langkawi. Scale lines = 0.1 mm.



Figs. 33-41. *Sason hirsutum*, new species, male holotype. 33, body (without legs and palps), dorsal view; 34, eye group, dorsal view; 35, labium and proximal portion of maxillae, ventral view; 36, maxillae, labium and sternum, ventral view; 37, opisthosoma, ventral view; 38, left tibia I, prolateral view; 39, the same, ventral view; 40, distal part of palpus, ventral view; 41, the same, retrolateral view. Scale lines (33+37; 34; 35; 36; 38-41) = 1.0 mm.

Palp and legs:

	Fe	Pa	Ti	Mt	Ta	Total
Palp	2.1	1.4	1.7	–	0.9	6.1
Leg I	3.5	2.4	2.6	2.2	1.5	12.2
Leg II	3.6	2.2	2.8	2.2	1.4	12.2
Leg III	3.4	1.9	2.9	2.3	1.3	11.8
Leg IV	4.1	2.5	3.7	3.1	1.4	14.8

Carapace (Fig. 33) hirsute, with dark bristles and fine light hairs on pars cephalica and on coxal elevations of pars thoracica; long bristles along lateral carapace margins. Ocular tubercle low; eye group slightly rhomboidal, arranged in three rows; ALE in front of others; AME largest (Fig. 34). Fovea very deep, recurved.

Chelicerae (Fig. 33) weak, cheliceral groove with six/seven teeth on promargin, long reddish bristles on retromargin and one/two tiny denticles basally between them. Rastellum absent.

Maxillae (Figs. 35, 36) with three strong, short cuspules on prolateral-proximal corner.

Labium (Figs. 35, 36) with 10 fairly short, strong cuspules in transverse row distally, median cuspules slightly more slender (but not recognisably shorter) than lateral ones.

Sternum (Fig. 36) separated from labium by shallow groove; only posterior two pairs of small, oval, submarginal sigilla discernible.

Palpus (Figs. 40, 41) with cymbium carrying scopula dorsodistally and filiform, spatulate and clavate dorsal trichobothria dorsoproximally. Bulbus ovoid; embolus fairly straight and slender, with narrow base.

Legs (left leg IV regenerated) 31=24, densely covered with quite long hairs. Paired tarsal claws without teeth. Thin ventral scopula on all tarsi and on metatarsi I and II. Scopuliform hairs on metatarsi distinctly longer than on tarsi. Filiform trichobothria in two parallel rows dorsally on tibiae and metatarsi; three to six clavate and spatulate trichobothria dorsally in proximal half of tarsi and triangular field (widening distally) of filiform trichobothria in distal half. All femora with longitudinal row of five to six long, curved spines (or stiff bristles) dorsally. Low prolateral coupling spur on tibia I carrying strong, blunt megaspine pointing away from axis of tibia at acute angle. Spur only slightly set back from distal margin of tibia I. Prolateral distal edge of tibia I moderately invaginated, i.e. small unpigmented area extending from distal margin of tibia to prolateral (but not proventral) base of tibial spur (Fig. 38). Four long, pointed, curved spines (the distal one weakest) in longitudinal retroventral row on tibia I (Figs. 38, 39). Same arrangement of spines also present on tibia II, but there prolateral-distal spine thin, tapering, not raised on spur. Spinnerets (Fig. 37): PMS short digitiform; PLS three-segmented, apical segment short, with cluster of distal spigots.

Female. Unknown.

Measurements. – Body length 9.3; carapace 4.3 long, 3.9 wide; maxillae 1.4 long, 0.8 wide; labium 0.3 long, 0.7 wide; sternum 2.4 long, 2.1 wide; opisthosoma 4.4 long, 3.0 wide; PMS 0.3 long, PLS 1.3 long. Eye sizes and interdistances: AME 0.50, ALE 0.25, PME 0.14, PLE 0.17; AME-AME 1.12, ALE-ALE 0.73, PME-PME 0.83; eye group length 0.77, front width 1.18, back width 1.31; MOQ length 0.52, front width 1.04, back width 1.02.

Remark. – Palpal claw tufts are not discernible in the damaged juvenile, which indicates that they may also be absent in females.

Etymology. – Latin adjective “hirsutum” = shaggy, hairy. The species epithet refers to the long dense hair on the legs of the male holotype.

Distribution. – This species is known only from its type locality, an island in the Lingga Archipelago, off the east coast of Sumatra.

Biology. – The spiders were collected from silken nests on trunks of living trees (as described above for *S. sundaicum*, new species) in tropical evergreen rainforest along a stream, several kilometres from the coast. About 30 nests were found, all on trees close to the stream, none further away than ca. 50 m, but only two nests were occupied.

The male holotype was mature when collected in mid-June; its nest was 2.5 cm long, the front door 1.6 cm and the hind door 1.4 cm wide.

DISCUSSION

Taxonomic characters and interspecific relationships. – Raven (1986: 53) distinguished three species groups within *Sason*: 1) *S. andamanicum* and *S. colemani*, which share the apomorphic “absence” of labial cuspules and the presumably apomorphic invaginated (retreated) distal edge of tibia I in males (males unknown for *S. maculatum*, *S. pectinatum* and *S. sechellanum*); 2) *S. pectinatum* and *S. maculatum*, which share a rhomboidal (back row wider than front row) eye group as their synapomorphy; 3) *S. robustum* and *S. sechellanum*, which lack any obvious synapomorphies. However, when looking at the new *Sason* material, these distinctions are no longer clear-cut.

In all *Sason* species, the back row of the eye group is actually wider than the front row; in some species more obviously so than in others. The ratio of back row width/front row width is distributed as follows (partly based on measurements from Raven, 1986): *S. sechellanum* (female 1.02), *S. sundaicum*, new species (male 1.03, female 1.08), *S. andamanicum* (male 1.05), *S. colemani* (male 1.06, female 1.08), *S. robustum* (female 1.09), *S. pectinatum* (juvenile 1.09), *S. hirsutum*, new species (male 1.11), *S. maculatum* (female 1.19). No distinct gaps in these measurements are discernible which would allow a grouping of species.

The statement by previous authors that labial cuspules are absent in males of *S. andamanicum* and *S. colemani* deserves discussion. Labial cuspules are actually present in all male specimens examined, but in *S. andamanicum* they are not short and stout as in females, but filiform (i.e. long, thin and tapering to a point), similar to nearby bristles (Fig. 5). In males of *S. sundaicum*, new species, the lateral labial cuspules are also filiform, whereas the median ones are short and stout (Fig. 8). This species is therefore intermediate between Raven's (1986) first species group and the two others. Raven (1994: 307) mentioned that labial cuspules in barychelids may be sexually dimorphic, weaker or even absent in males. This is obviously the case in *S. andamanicum* and to some extent also in *S. sundaicum*, new species, but in both of them labial cuspules are easily identifiable as being arranged in a straight transverse row along the distal edge of the labium. Nearby bristles, which may look quite similar to these filiform labial cuspules, are always irregularly arranged and standing away from the surface of the labium at a slightly different angle. A re-examination of males of *S. colemani* is required to verify the apparent absence of labial cuspules. Filiform (or absent) labial cuspules in *Sason* males are probably secondary reductions and possibly synapomorphic for *S. colemani* and *S. andamanicum* (see Raven, 1986: 53), and also for *S. sundaicum*, new species.

Another character pointed out by Raven (1994: 323) also appears to be of interspecific significance. The presence of claw tufts on legs and palps is a synapomorphy for the Theraphosoidina ((Theraphosidae + Paratropididae) + Barychelidae) (Raven, 1985: 23) and therefore their reduction or loss within this taxon is apomorphic. Raven (1994: 770) stated that palpal claw tufts in females of *Sason* are weak or absent. In the same paper he remarked that they are absent in *Sason* and three other barychelid genera (Raven, 1994: 323, 333) and elsewhere that they are weak (perhaps only relevant for Australian species) (Raven, 1994: 332). This leaves the question open as to which *Sason* species actually possess weak palpal claw tufts and which ones lack them [this character was not yet recognised in Raven's (1986) revision]. The complete absence of tarsal claw tufts (observed in *S. sundaicum*, new species, and in a *S. colemani* female from northern Queensland, deposited in MHNG) may represent another synapomorphy within this genus.

The reduced or missing dentition of the paired claws of males is considered to be a synapomorphy of the Sasoninae (Raven,

1985: 42, 1986: 52, 1994: 323-324). In the males of *S. colemani* and *S. robustum* at least the anterior legs still possess dentate claws, whereas in *S. andamanicum*, *S. sundaicum*, new species, and *S. hirsutum*, new species, all claws are edentate, which possibly represents a synapomorphy for the latter three species.

The newly described species blur Raven's (1986: 53) species groups and give little support for any different grouping within *Sason*. A re-evaluation makes little sense until males and females of all species are known. For the species described in here it can be said that *S. sundaicum*, new species, is most closely related to *S. andamanicum*. Males of both species share the presumably synapomorphic modifications of filiform cuspules on the labium, of a deeply invaginated distal edge on tibia I and of edentate claws. The relationships of *S. hirsutum*, new species, are less obvious. Edentate paired tarsal claws and a moderately invaginated distal edge on tibia I of the male, as well as geographic proximity, suggest that this species is in the same phylogenetic lineage as *S. andamanicum* and *S. sundaicum*, new species.

Biogeography. - *Sason* shows a strongly disjunct Indo-Pacific distribution (Raven, 1986: fig. 3) and the newly described species occur roughly in the centre of this range. It has to be pointed out that these spiders are difficult to find and apparently only rarely come down to the ground where they can be caught by pitfall traps (reported for *S. colemani* by Raven, 1994: 701). Therefore *Sason* probably has often been overlooked and may actually be much more widely distributed in coastal areas of the Indo-Pacific region than seen at present.

It is remarkable that all specimens of the new species were found on fairly small islands, most of them quite close to the mainland. So far, I have failed to collect such spiders on mainland SE-Asia proper despite numerous collecting trips to the region, but I am convinced that they occur there as well. Most of the previously described *Sason* species were also found on islands or in the vicinity of the coast, with the exception of *S. robustum* which occurs in the interior of southern India as well as in coastal areas (see Raven, 1986: fig. 3). A general preference for humid forests near the coast and/or close to streams is evident.

Different explanations for the peculiar distribution of *Sason* have been given in the literature. Pocock (1903: 353) suggested an Indian-Sri Lankan origin of the genus *Sason*, with artificial introduction to the Maldives (although no material from there is mentioned in the literature) and to the Seychelles, but not to the Andaman Islands as quoted by Raven (1986: 52). As *S. robustum* (India, Sri Lanka), *S. sechellanum* (Seychelles) and also *S. andamanicum* (Andaman Islands) are clearly distinct species, introduction by man can be ruled out.

Legendre (1979: 46-47) attributed these disjunct occurrences on islands and/or close to the sea to long-distance dispersal by flotsam, i.e. uprooted trees carried away by torrential storms and transported by sea currents.

Raven (1986: 52-53), however, argued that vicariance events are more likely responsible for the disjunct distribution of *Sason* and referred to the high degree of narrow endemism among its species.

A combination of the latter two scenarios (rather than either on its own) more adequately explains the pattern of *Sason* distribution that we see at present. It is quite possible that pregnant females have been able to survive lengthy journeys through stretches of ocean in their arboreal nest hidden and protected between tangles of floating logs. *Sason maculatum* is known from several small islands in the Marianas and in the Carolines (Raven, 1986: 59, 61; Roewer, 1963: 114) and an unidentified *Sason* was found on Fiji (Raven, 1994: 700). These are all fully oceanic islands which emerged from the ocean floor in quite recent geological times and never have been connected to any continent (Brown & Lomolino, 1998: 312). Therefore these islands were probably colonised by dispersing spiders, and I would not be surprised if *Sason maculatum* is one day also discovered in the southern Philippines, in the Moluccas or in northwestern New Guinea.

However, cases of long-distance dispersal with subsequent successful colonisation are probably very rare in *Sason*. Most (if not all) extant species have presumably evolved through isolation of populations and subsequent allopatric speciation on fragments of the former supercontinent Gondwana. Conspecific *Sason* populations on small islands close to each other and close to the mainland (as seen in *S. sundaicum*, new species, on Ko Phuket, Ko Siray, Ko Tarutao and Pulau Langkawi) were obviously able to maintain sporadic gene exchange through passive dispersal by flotsam, as well as through modest range expansions (diffusion) and contacts during cryogenic periods in the late Neogene and Quaternary, when landbridges on the Sunda Shelf were formed by the lowering of sea levels.

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