

The spider genus *Indicoblemma* Bourne, with description of a new species (Araneae: Tetrablemmidae)

Matthias Burger

Natural History Museum, Department of Invertebrates,
Bernastrasse 15, CH-3005 Bern, Switzerland

Summary

A new tetrablemmid spider from Thailand, *Indicoblemma lannaianum* sp. n. is described from both sexes. The generic names *Indicoblemma* Bourne, 1980 and *Chavia* Lehtinen, 1981 are synonymised, with *Indicoblemma* having priority. The type species of *Chavia*, *C. monticola* Lehtinen, 1981, is thus transferred to the genus *Indicoblemma*, the female is redescribed and the previously unknown male is described for the first time. The type species of *Indicoblemma*, *I. sheari* Bourne, 1980, is briefly redescribed from both sexes. Criteria for the differentiation of the species, the shape of the male palpal bulb, and aspects of the sex-linked characters are discussed.

Introduction

The family Tetrablemmidae O. Pickard-Cambridge, 1873 comprises armoured spiders with up to six eyes, which live mainly in tropical regions (e.g. Deeleman-Reinhold, 1980; Bourne, 1980; Lehtinen, 1981). Their distribution ranges from Africa via the Indo-Pacific areas to South America, with South-east Asia considered to be the centre of diversity (Brignoli, 1974; Shear, 1978; Lehtinen, 1981). The pattern of abdominal sclerotisation in Tetrablemmidae is characteristic and males often show strong modifications of the clypeus, chelicerae and carapace, or even of the anterior legs (e.g. Shear, 1978, 1988; Bourne, 1980; Lehtinen, 1981; Schwendinger, 1989, 1994). Almost nothing is known about the biology and ecology of tetrablemmids. Most of them are soil-dwellers and occur in the tropical forest litter habitat. Some tetrablemmid spiders live in caves and have their eyes reduced in size and number (Lehtinen, 1981; Deeleman-Reinhold, 1993). However, such modifications are also found in soil-inhabiting tetrablemmids.

Shear (1978) presented an excellent work which contributed to a better understanding of the taxonomic relationships within the Tetrablemmidae. The most detailed and comprehensive survey of the family was provided by the world revision of Lehtinen (1981). Shortly before the publication of Lehtinen's work, Bourne (1980) produced his paper on some new tetrablemmid spiders from New Ireland and northern India. Apparently it was too late for both authors to check the species against each other's and to make changes to their manuscripts in order to avoid synonyms. Thus, Lehtinen created a new monotypic genus *Chavia* Lehtinen, 1981 (type species *C. monticola* Lehtinen, 1981) and Bourne a new monotypic genus *Indicoblemma* Bourne, 1980 with the type species *I. sheari* Bourne, 1980. However, the genus *Indicoblemma* was apparently considered by Lehtinen himself to be very similar to his genus *Chavia* (Bourne, 1980; Lehtinen, 1981).

Material and methods

The new species described here was discovered and recognised by Dr P. Schwendinger (Geneva Natural History Museum, Switzerland) in the higher hill regions of northern Thailand. Additional collecting by A. Jacob, C. Kropf and M. Burger on Doi Suthep near Chiang Mai (Thailand) revealed more specimens. The spiders were collected by sieving. Because the spiders usually hide under small pieces of litter it was necessary to check thoroughly every piece of soil in order to detect the specimens (this method was first used by A. Jacob, pers. comm.).

Most of the spiders were brought alive to Switzerland and kept in the laboratory. Additional specimens of the new species, material of *Indicoblemma monticola* (Lehtinen, 1981) and of *I. sheari* were kindly provided for examination by Dr P. Schwendinger. The holotype of *I. monticola* was kindly provided by Dr M. I. Saaristo of the Zoological Museum, Centre for Biodiversity, University of Turku, Finland.

Various ratios were calculated in the new species and in *I. sheari*: **A**=width of eye field E divided by maximum width of carapace C (Fig. 1) for both males and females; **B**=distance between grooves G on preanal plate of females divided by width of preanal plate P (Fig. 2). In five male palps of each species the ratio **D**=length L divided by width X of genital bulb (Fig. 3), and the ratio of length divided by width of femur were calculated. Values are given as mean \pm standard deviation with *n* for the number of the sample. The systematic and anatomical terminology proposed by Shear (1978) is maintained in this paper. Abbreviations used in the text (see also Figs. 4, 6): MHNG=Geneva Natural History Museum, Switzerland; MZT=Zoological Museum, Department of Biology, University of Turku, Finland; NMBE=Natural History Museum Bern, Switzerland; ap=anal plate; l_1 – l_4 =pairs of strap-like lateral plates (designated dorsal to ventral); p_1 – p_3 =posterior strap-like plates (designated dorsal to ventral); pa=preanal plate; peg=perigenital plates; pog=postgenital plate; pu=pulmonary plate. All measurements are in mm.

Taxonomy

Family TETRABLEMMIDAE O. Pickard-Cambridge, 1873

Subfamily TETRABLEMMINAE O. Pickard-Cambridge, 1873

Indicoblemma Bourne, 1980

Indicoblemma Bourne, 1980: 308–310, 314–315, figs. 25–30, plates 1–2.
Chavia Lehtinen, 1981: 12, 30, 107–110, figs. 32, 39, 41, 48, 56, table 3.

New synonymy.

Remarks: Both genera were monotypic until now. After having checked the holotypes of both type species, the diagnostic characters for the genus *Chavia* given by Lehtinen (1981) were found to be practically identical in *Indicoblemma*: the eye patterns do not differ in any respect (cf. Figs. 29, 31, 45, 50) and pits on the

pulmonary plates are present in both species and do not allow unambiguous separation (cf. Figs. 39, 40, 46, 52). I was not able to find any further characters supporting two separate genera.

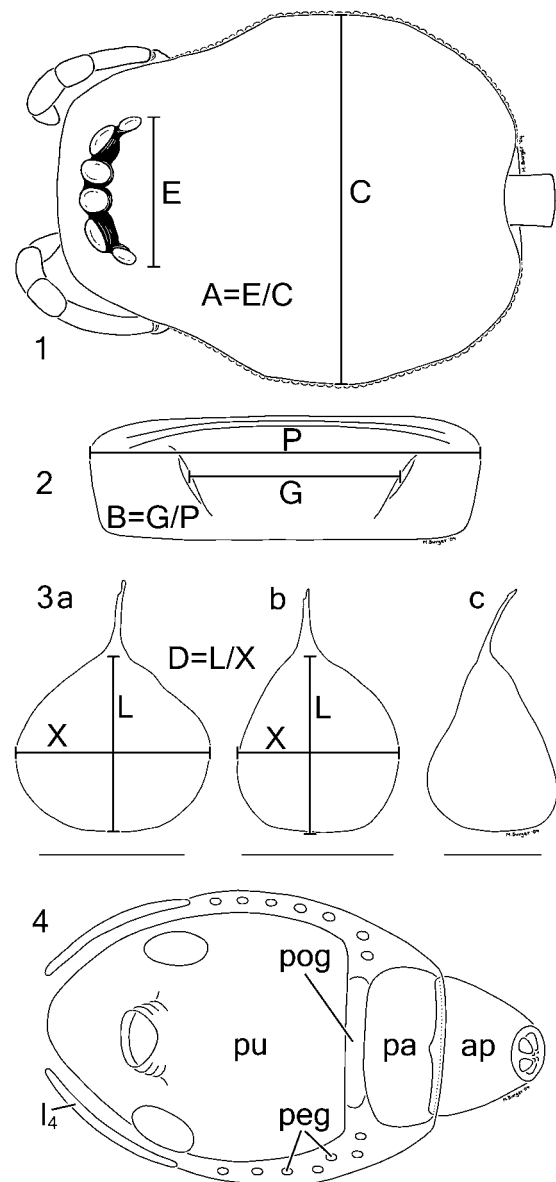
Diagnosis: My diagnosis for the genus *Indicoblemma* is only a slight modification of that given by Bourne (1980): small, orange-brown spiders with six eyes arranged closely together in a recurved transverse row; eyes almost contiguous but not touching each other; sternum and carapace with a mosaic-like stripe pattern; sternum and ventral plates of opisthosoma lack large round punctuations; hairs on sternum and ventral plates arising from small depressions; male chelicerae with anterior apophyses; tibia of male palp enlarged; bulbus globular or pyriform; sclerotised parts of female vulva shining through ventral scutum; genital opening near posterior edge of pulmonary plate leading into paired copulatory ducts; paired receptacula large and sac-like.

***Indicoblemma lannaianum* sp. n.** (Figs. 6–26)

Types: Holotype ♂, Thailand, Chiang Mai Province, Chiang Mai District, Doi Suthep, 1600 m, 11–21 July 2003, sieving leaf litter, leg. M. Burger, deposited in MHNG. Paratypes, 2♂ 2♀ (MHNG), 2♂ 2♀ (NMBE), same data as holotype.

Etymology: The species is named after the old Thai name “lanna” for northern Thailand.

Diagnosis: Males of *I. lannaianum* sp. n. are distinguished from those of *I. monticola* by their smaller size. The anterior apophyses on the chelicerae of *I. lannaianum* sp. n. are small and dark (Figs. 7, 9, 10), whereas they are much larger with a hook-like, almost transparent, apical part in *I. monticola* (Figs. 28, 30, 32). The palpal bulb in *I. lannaianum* sp. n. is globular with a short embolus (Figs. 12, 13), but in *I. monticola* the bulb is pyriform and longer (Figs. 34, 35). Females of *I. lannaianum* sp. n. are smaller than those of *I. monticola* and have lengthwise lateral grooves on the preanal plate of the opisthosoma (Figs. 23, 25, 26), which are lacking in *I. monticola* (Figs. 39, 42). Males of *I. lannaianum* sp. n. are distinguished from those of *I. sheari* by the shape of the genital bulb (Fig. 3). It is almost globular in *I. lannaianum* sp. n. (Figs. 12, 13), whereas it is pyriform and relatively longer in *I. sheari* (Figs. 53, 54). The ratio **D** (length *L* divided by width *X* of bulb) is 0.9 ± 0.04 ($n=5$) for *I. lannaianum* sp. n. and 1.1 ± 0.04 ($n=5$) for *I. sheari* (Fig. 3). Regarding the palpal femur, the ratio of length divided by width is 2.3 ± 0.1 ($n=5$) in *I. lannaianum* sp. n. (Figs. 12, 13) and 1.9 ± 0.06 ($n=5$) in *I. sheari* (Figs. 53, 54). A further diagnostic character is the ratio **A** (width of eye field *E* divided by maximum width of carapace *C* (Fig. 1)), which is 0.40 ± 0.02 ($n=10$) and 0.37 ± 0.02 ($n=10$) for males of *I. lannaianum* sp. n. (Fig. 7) and *I. sheari* (Fig. 44) respectively. For females of *I. lannaianum* sp. n. and *I. sheari* the ratio **A** is 0.43 ± 0.02 ($n=10$) and 0.37 ± 0.01 ($n=10$) respectively (Figs. 18, 51). The opisthosoma of *I. lannaianum* sp. n. is distinctly longer than wide (Figs. 23, 24), whereas it is more roundish in *I. sheari* (Figs. 46, 52). The lateral profile of



Figs. 1–4: *Indicoblemma*, schematic. **1** Prosoma, dorsal view, calculation of ratio **A**; **2** Preanal plate of female, calculation of ratio **B**; **3** Palpal bulbs of males and calculation of ratio **D**; **a**: *I. lannaianum* sp. n.; **b**: *I. sheari*; **c**: *I. monticola*; **4** Ventral plates. For details and abbreviations see text. Scale lines=0.1 mm.

the carapace in *I. lannaianum* sp. n. (Figs. 6, 17) is different from that in *I. sheari* (Figs. 43, 49).

Description: Male: Measurements ($n=1$): Prosoma length 0.43, width 0.38, height 0.36. Opisthosoma length 0.63, width 0.45. Appendage lengths:

	Fe	Pa	Ti	Mt	Ta	Total
Leg I	0.38	0.11	0.28	0.18	0.21	1.16
Leg II	0.33	0.11	0.23	0.19	0.20	1.06
Leg III	0.28	0.11	0.20	0.19	0.18	0.96
Leg IV	0.38	0.11	0.30	0.24	0.19	1.22
Palp	0.20	0.04	0.11	—	0.03	0.38

Ratios: **A**= 0.40 ± 0.02 ($n=10$) (Fig. 1); **D**= 0.9 ± 0.04 ($n=5$) (Fig. 3a); length divided by width of palpal femur= 2.3 ± 0.1 ($n=5$). **Colour:** Prosoma, chelicerae, and scuta of opisthosoma orange-brown; palps and legs orange, patellae lighter than other leg segments; apophyses on chelicerae dark-orange with black anterior part;

spinnerets pale yellow; soft areas white. *Carapace*: Moderately raised in lateral profile (Fig. 6); covered with fine mosaic-like stripe pattern; U-shaped band of hairs on dorsal surface (Fig. 7); hair-bearing tubercles near and along lateral borders (Figs. 6–9). *Eyes*: Six; not touching each other; arranged in recurved transverse row; PME almost contiguous; PLE smallest, ALE largest (Figs. 7, 8). *Clypeus*: Steeply ascending; approximately five diam. of PME high (Figs. 6, 8). *Sternum and pleurae*: Sternum as long as wide; covered with short hairs and fine mosaic-like sculpture; separating coxae IV by approximately their diameter; pleurae sclerotised, fused with carapace and sternum; hairs on sternum arising from

small depressions (Fig. 9). *Labium*: Semicircular; twice as wide as long; separated from sternum (Fig. 9). *Chelicerae*: Anterior proximal part of basal segment strongly swollen, cuticle squamous; small blunt dark apophysis on anterior distal surface, covered with fine lengthwise ridges (Fig. 10); typical thin transparent membrane on mesal margin protecting tip of fang; one distal denticle; groove on posterior surface; fang with small proximal teeth (Figs. 10, 11). *Palp*: Cuticle of femur squamous on prolateral side (Fig. 12); tibia enlarged, ovoid, with one trichobothrium dorsally near distal end; cymbium short, with several long hairs dorsally at distal end (Figs. 12, 13). *Palpal bulb*: Globular;

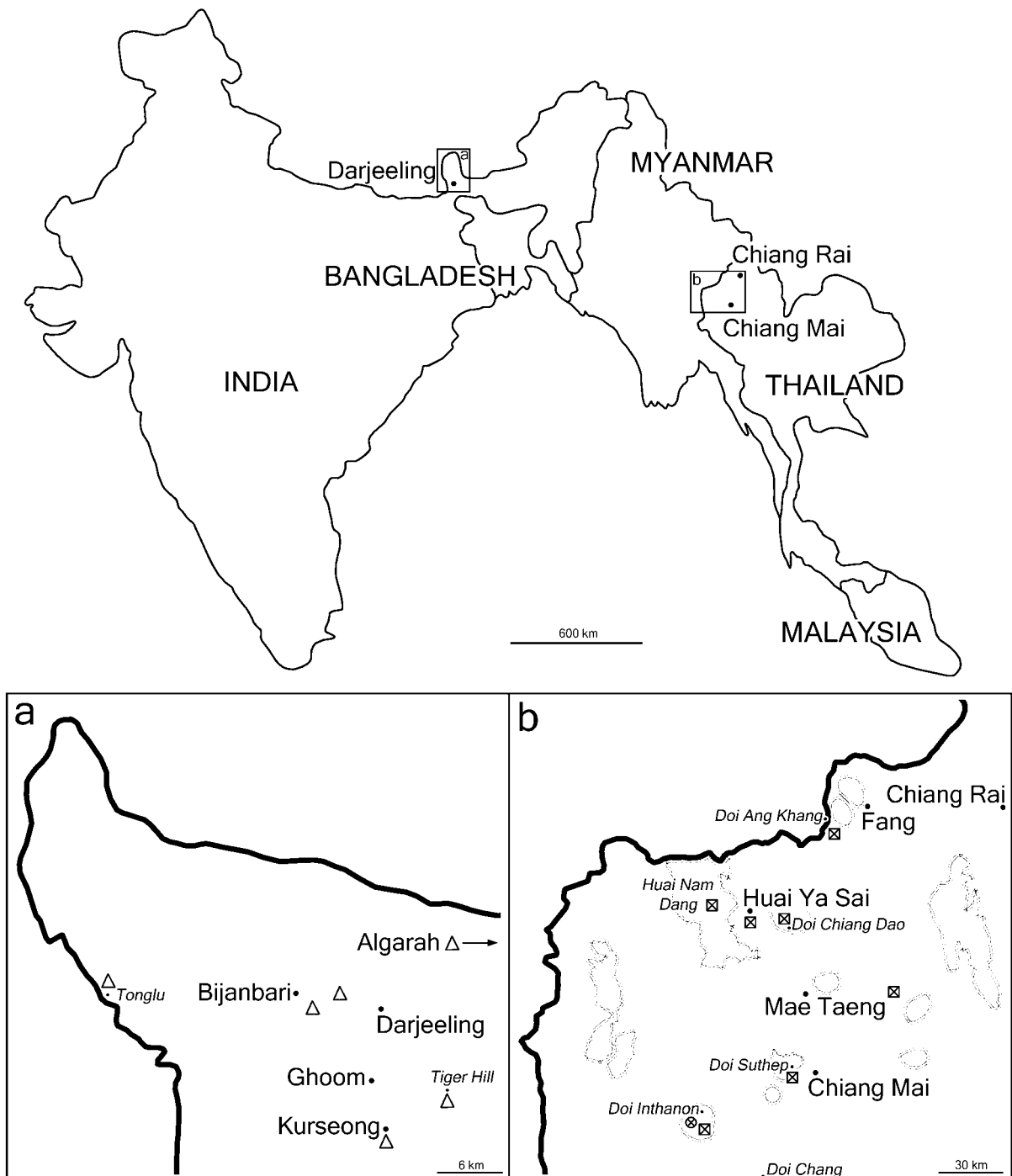
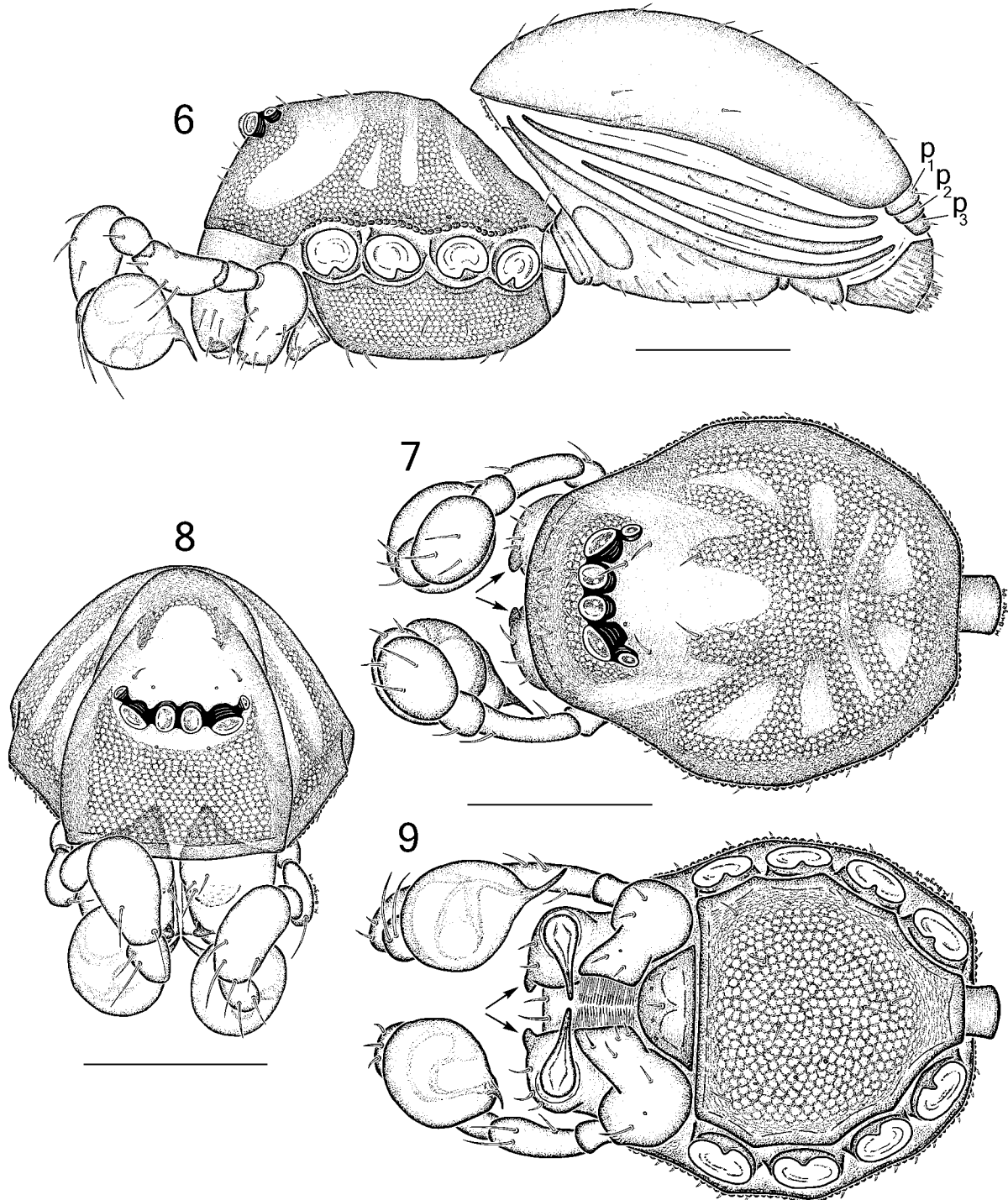


Fig. 5: Distribution of *Indicoblemma*. **a**: *I. sheari* (open triangles) in West Bengal, India; **b**: *I. lannaianum* sp. n. (crosses in squares) and *I. monticola* (cross in circle) in northern Thailand. Dotted lines=National Parks.

embolus short with simple tip (Figs. 12–14). *Legs*: IV-I-II-III; cuticle of femora squamous; patellae small; tibiae with three trichobothria dorsally; metatarsi with one trichobothrium; two serrated tarsal claws (Figs. 15, 16). *Opisthosoma*: Ovoid; large sclerotised plate covering dorsal surface (Fig. 6); ventrally covered by four sclerotised plates (Figs. 4, 24): a large pulmonary plate (pu) with rounded anterior margin, surrounding pedicel and bearing simple book-lungs, followed posteriorly by short postgenital plate (pog), broad preanal plate (pa) without lengthwise lateral grooves, and conical anal plate

(ap) surrounding spinnerets; laterally with four pairs of strap-like plates (l_1 – l_4), most ventral ones shortest (l_4), followed by three short strap-like posterior plates (p_1 – p_3) situated between dorsal plate and anal plate (Fig. 6); two rows of small perigenital plates (peg) ventrally, each bearing a hair; additional perigenital plates near preanal plate and anteriorly; anterior part of pulmonary plate with few pits and slight furrows; hairs on ventral plates arising from small depressions (Fig. 24).

Female: Very similar to male. Only differences from male are described. *Measurements* ($n=1$): Prosoma



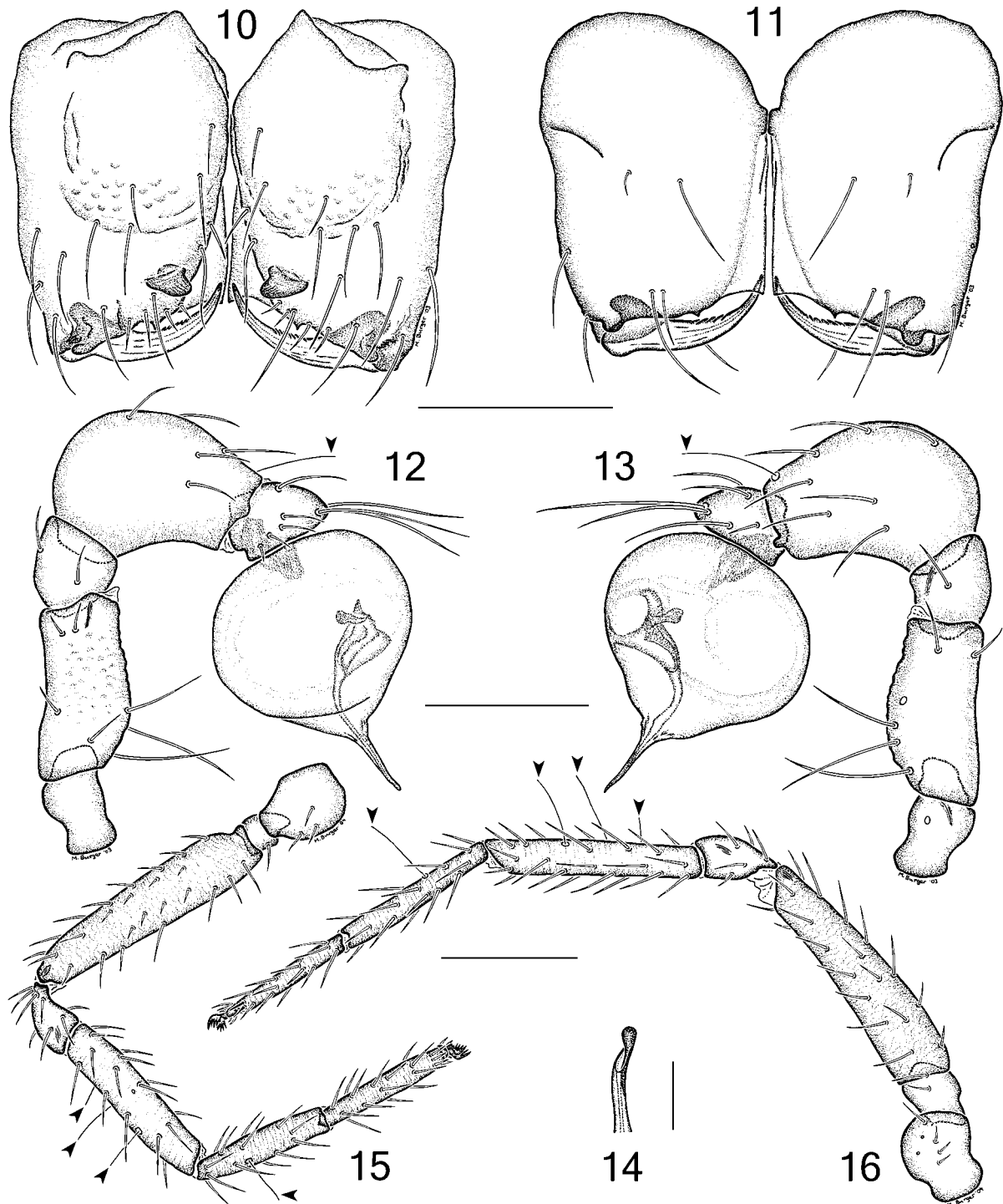
Figs. 6–9: *Indicoblemma lannaianum* sp. n., male. **6** Lateral view, only some hairs shown; **7** Prosoma, dorsal view; **8** Prosoma, anterior view; **9** Prosoma, ventral view. Arrows=apophyses on chelicerae, p_1 – p_3 =posterior strap-like plates. Scale lines=0.2 mm.

length 0.46, width 0.40, height 0.38. Opisthosoma length 0.73, width 0.54. Appendage lengths:

	Fe	Pa	Ti	Mt	Ta	Total
Leg I	0.37	0.09	0.26	0.18	0.18	1.08
Leg II	0.33	0.09	0.23	0.19	0.18	1.02
Leg III	0.27	0.09	0.20	0.18	0.18	0.92
Leg IV	0.37	0.09	0.30	0.23	0.18	1.17
Palp	0.10	0.03	0.06	—	0.09	0.28

Ratios: **A** = 0.43 ± 0.02 ($n=10$) (Fig. 1); **B** (distance between grooves G on preanal plate divided by width of preanal plate P (Fig. 2)) very variable and ranges from

0.32–0.69 (mean 0.40 ± 0.07 ; $n=66$). *Carapace*: Rounded in lateral profile; posterior half gently sloping (Fig. 17); mosaic-like stripe pattern slightly different from male (Figs. 17–19). *Eyes*: Eye field slightly wider than in male (Figs. 18, 19). *Chelicerae*: Apophyses lacking (Figs. 19, 20). *Legs*: Longer and thicker than in male (Figs. 21, 22). *Opisthosoma*: Preanal plate with lengthwise lateral grooves (Figs. 23, 25, 26); anterior margin of preanal plate distinctly folded (Figs. 23, 25, 26). *Vulva*: Contours of sclerotised parts shining through ventral scutum (Figs. 23, 25); single circular genital opening near

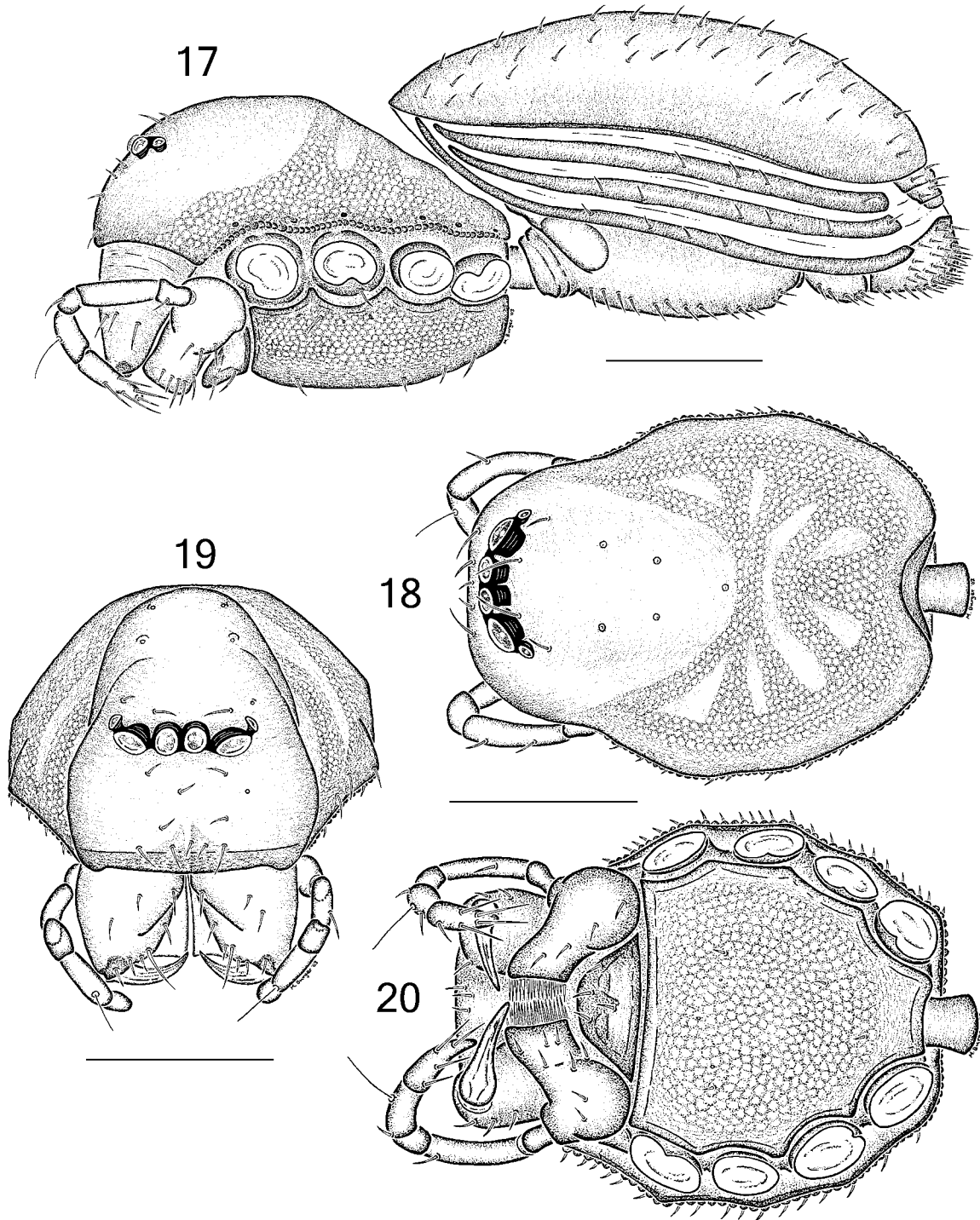


Figs. 10–16: *Indicoblemma lannaianum* sp. n., male. **10** Chelicerae, anterior view; **11** Chelicerae, posterior view; **12** Left palp, prolateral view; **13** Left palp, retrolateral view; **14** Tip of left embolus, retrolateral view; **15** Right leg I; **16** Right leg IV. Arrowheads=trichobothria. Scale lines=0.1 mm (10–13), 0.02 mm (14), 0.2 mm (15, 16).

posterior margin of pulmonary plate leading into paired copulatory ducts with strongly sclerotised posterior and weakly sclerotised anterior parts; paired receptacula large, sac-like and distinctly folded with pore fields mesally; several roundish structures variable in number visible in some receptacula (Figs. 25, 26).

Additional material examined: THAILAND: **Chiang Mai Province:** *Chomthong District:* Doi Inthanon, 3♀ 1♂, 1650 m, 7 November 1985. *Chiang Mai District:* Doi Suthep: 2♀ 1♂, 1550 m, 4 November 1985; 1♀, 960 m, 19 February–20 March 1986, pitfall traps; 1♂, 960 m, 26 June–30 July 1986, pitfall traps; 1♂, 950 m, 29 September–31 October 1986, pitfall traps; 1♀, 670 m, 31 October 1986; 1♀, 950 m, 28

October–30 November 1986, pitfall traps; 1♀, 1320 m, 27 December 1986; 1♀, 960 m, 30 November 1986–2 January 1987, pitfall traps; 2♂, 960 m, 2 January–5 March 1987, pitfall traps; 2♀, 520 m, 6 January 1987; 2♀, 850 m, 31 January 1987; 1♂, 960 m, 5 March–4 April 1987, pitfall traps; 1♂, 960 m, 28 April–30 May 1987, pitfall traps. **Chiang Mai,** road to Wah Pang An, 50 km NE Chiang Mai, 2♀, 900 m, 3 November 1985. *Chiang Dao District:* Doi Chiang Dao, 1♀ 1♂, 760 m, 16 October 1986; 2♀ 1♂, 450 m, 7 March 1987. *Mae Taeng District:* Doi Chang (near Huay Nam Dang), 1♀, 1930 m, 4 June 1986. *Fang District:* Doi Angkhang, 3♀, 920 m, 18 March 1987; 1♀, 1650 m, 22 April 1987. **Chiang Rai Province:** *Wiang Pa Pao District:* Bau Huay Ya Sai, 1♀, 780 m, 28 January 1988. All additional material leg. P. Schwendinger, except from 1985 (leg. D. Burckhardt & I. Löbl). Deposited in MHNG.



Figs. 17–20: *Indicoblemma lannaianum* sp. n., female. **17** Lateral view, only some hairs shown; **18** Prosoma, dorsal view; **19** Prosoma, anterior view; **20** Prosoma, ventral view. Scale lines=0.2 mm.

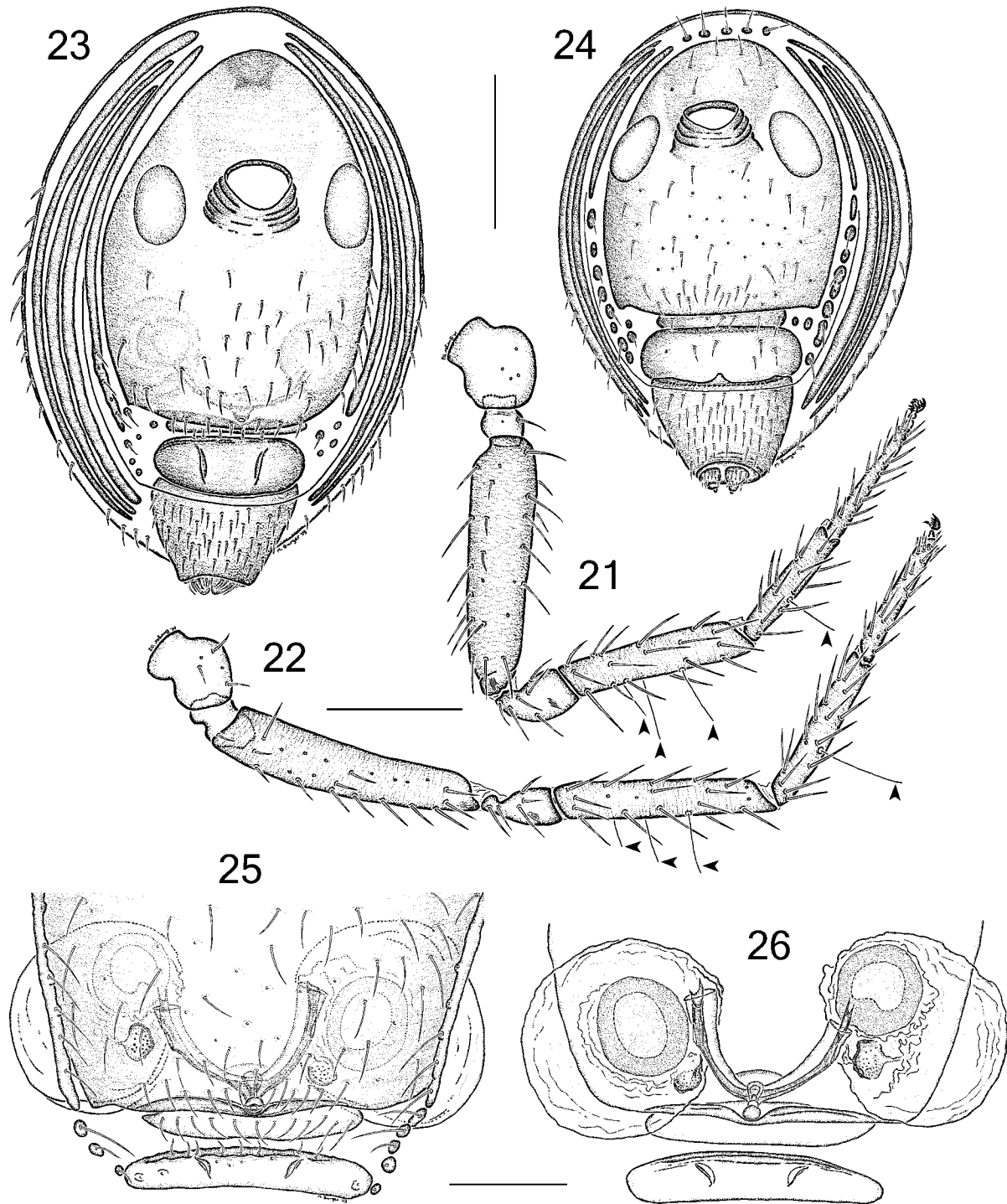
Distribution and habitat: The spiders inhabit the middle humid leaf litter layer of the higher hill regions in northern Thailand (Fig. 5b). They were found at altitudes from 450–1930 m.

Indicoblemma monticola (Lehtinen, 1981) (Figs. 27–42)

Type: Holotype ♀, Thailand, Chiang Mai Province (erroneously given as Lampang Province in Lehtinen, 1981), Doi Inthanon National Park, 1800 m, in litter of

cloud forest, 15 November 1976, leg. P. T. Lehtinen, deposited in MZT.

Diagnosis: Males of *I. monticola* are distinguished from those of *I. sheari* by their larger size. The anterior apophyses on the chelicerae of *I. monticola* have a hook-like, almost transparent, apical part (Figs. 28, 30, 32), whereas they are much smaller and dark in *I. sheari* (Fig. 47). The pyriform palpal bulb in *I. monticola* is narrower than in *I. sheari* (Figs. 3, 34, 35, 53, 54). Females of *I. monticola* are larger than those of *I. sheari*



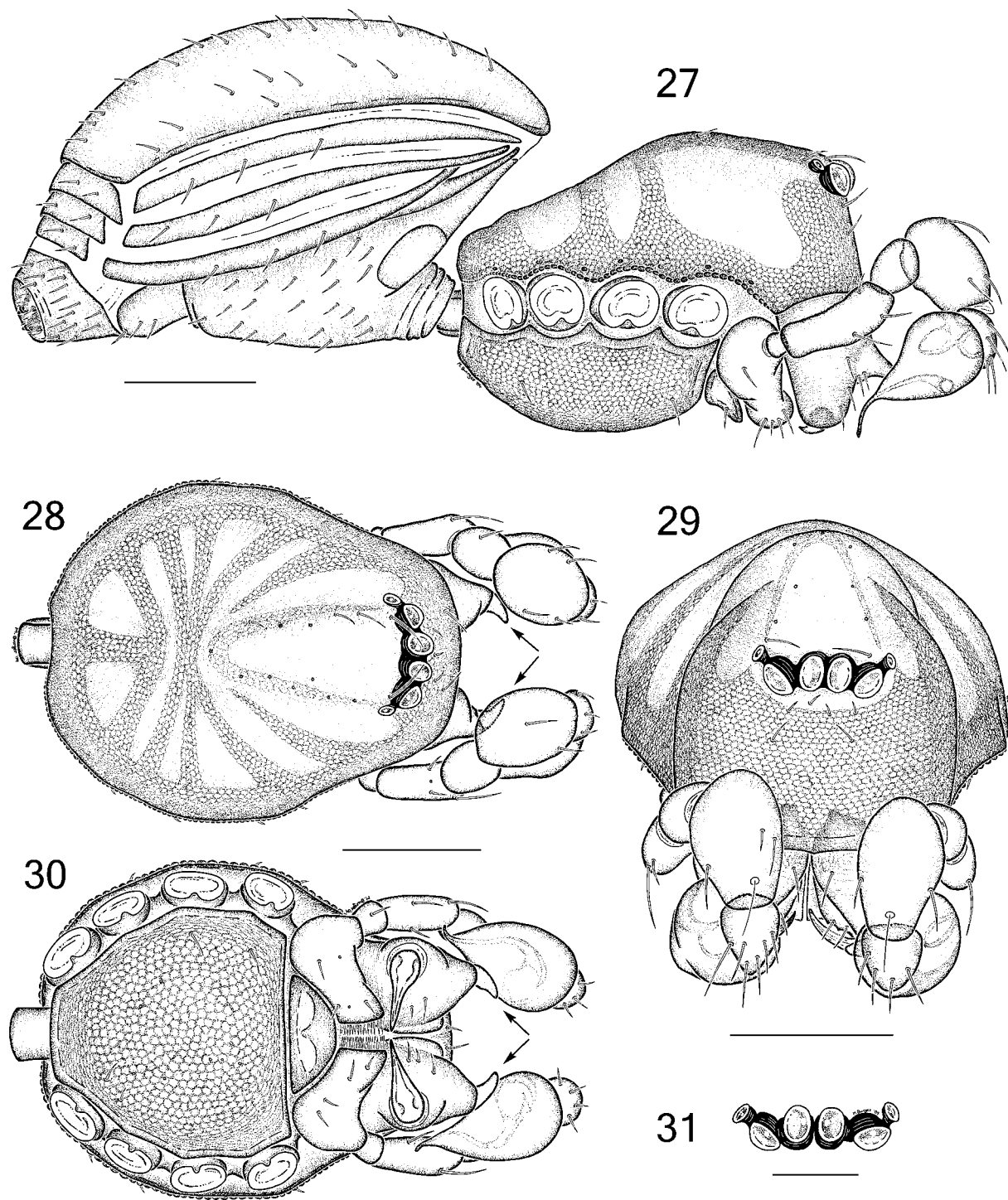
Figs. 21–26: *Indicoblemma lannaianum* sp. n. **21** Right leg I of female; **22** Right leg IV of female; **23** Female opisthosoma, ventral view; **24** Male opisthosoma, ventral view; **25** Vulva, ventral view; **26** Vulva, dorsal view. Arrowheads=trichobothria. Scale lines=0.2 mm (21–24), 0.1 mm (25, 26).

and lack lengthwise lateral grooves on the preanal plate of the opisthosoma (Figs. 39, 42), which are present in *I. sheari* (Figs. 52, 55). Diagnostic characters for distinguishing *I. monticola* from *I. lannaianum* sp. n. are listed under that species.

Description: *Male:* Only differences from *I. lannaianum* sp. n. are described. **Measurements** ($n=1$): Generally larger than *I. lannaianum* sp. n. Prosoma length 0.58, width 0.47, height 0.46. Opisthosoma length 0.80, width 0.62. Appendage lengths:

	Fe	Pa	Ti	Mt	Ta	Total
Leg I	0.41	0.11	0.30	0.21	0.24	1.27
Leg II	0.37	0.11	0.27	0.21	0.22	1.18
Leg III	0.30	0.11	0.24	0.20	0.20	1.05
Leg IV	0.44	0.11	0.34	0.26	0.23	1.38
Palp	0.14	0.08	0.15	—	0.06	0.43

Carapace: Raised in lateral profile; posterior 2/3 gently sloping (Fig. 27); mosaic-like stripe pattern slightly different from that in *I. lannaianum* sp. n. (Figs. 27–29).

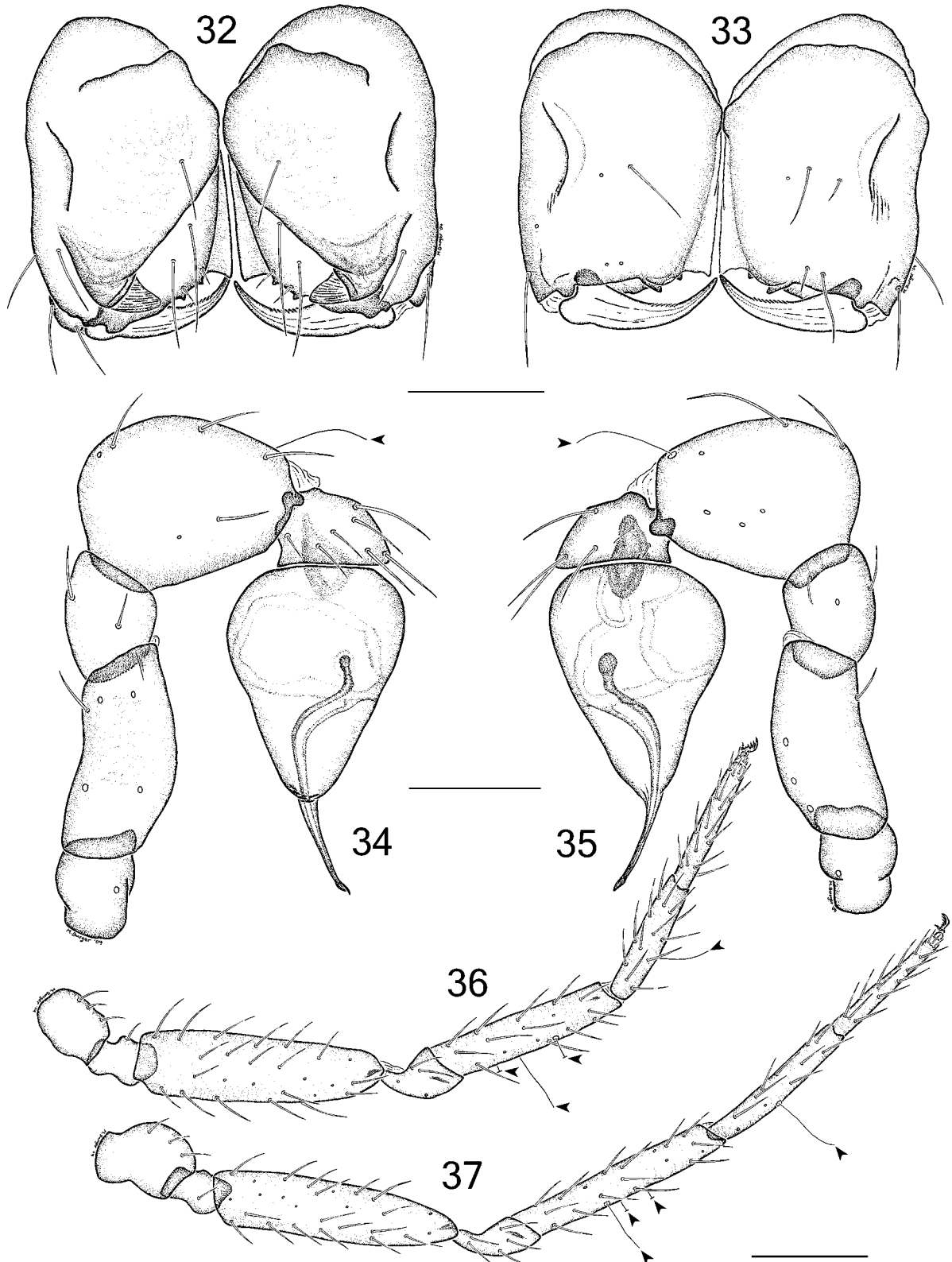


Figs. 27–31: *Indicoblemma monticola*. **27** Male, lateral view, only some hairs shown; **28** Male prosoma, dorsal view; **29** Male prosoma, anterior view; **30** Male prosoma, ventral view; **31** Female eyes, anterior view. Arrows=apophyses on chelicerae. Scale lines=0.2 mm (27–30), 0.1 mm (31).

Sternum and pleurae: Sternum separates coxae IV by more than their diameter (Fig. 30). *Labium*: More than twice as wide as long (Fig. 30). *Chelicerae*: Anterior proximal part of basal segment strongly swollen (Fig. 32), cuticle squamous and crenate, produced distally into large, dark protruding apophysis with almost transparent, hook-like apical part, covered with fine lengthwise ridges; two distal denticles (Figs. 32, 33).

Palpal bulb: Pyriform; longish; embolus short with simple tip (Figs. 34, 35). *Legs*: Position of tibial trichobothria different from *I. lamaianum* sp. n., especially pronounced in leg IV (Figs. 36, 37). *Opisthosoma*: Anterior margin of pulmonary plate almost pointed (Fig. 40).

Female: Very similar to male. Only differences from male and from *I. lamaianum* sp. n. are described.



Figs. 32–37: *Indicoblemma monticola*, male. **32** Chelicerae, anterior view; **33** Chelicerae, posterior view; **34** Left palp, prolateral view; **35** Left palp, retrolateral view; **36** Right leg I; **37** Right leg IV. Arrowheads=trichobothria. Scale lines=0.1 mm (32–35), 0.2 mm (36, 37).

Measurements ($n=1$): Prosoma length 0.60, width 0.50, height 0.48. Opisthosoma length 0.96, width 0.75. Appendage lengths:

	Fe	Pa	Ti	Mt	Ta	Total
Leg I	0.47	0.13	0.32	0.22	0.26	1.40
Leg II	0.40	0.13	0.30	0.21	0.24	1.28
Leg III	0.37	0.13	0.27	0.21	0.24	1.22
Leg IV	0.51	0.13	0.40	0.28	0.26	1.58
Palp	0.15	0.04	0.07	—	0.13	0.39

Carapace: Mosaic-like stripe pattern slightly different from male and from *I. lannaianum* sp. n. (Figs. 38, 41). *Eyes*: Eye field slightly wider than in male (Fig. 31). *Vulva*: Contours of sclerotised parts shining through pulmonary plate; preanal plate without lengthwise lateral grooves but with clearly visible pair of slit sense organs (also present in the other two species but hardly visible there, Figs. 39, 42).

Additional material examined: THAILAND: **Chiang Mai Province**: Chomthong District: Doi Inthanon: 10♀ 6♂, 1650 m, 7 November 1985, leg. D. Burckhardt & I. Löbl (MHNG); 1♀ 3♂, 1630 m, 25 February 1987, leg P. Schwendinger (MHNG).

Distribution and habitat: The spiders inhabit the leaf litter layer of the higher cloud forests of Doi Inthanon, 60 km SW of Chiang Mai, Thailand (Fig. 5b). They were found at altitudes from 1630–1800 m.

Indicoblemma sheari Bourne, 1980 (Figs. 43–55)

Types: Holotype ♂, India, West Bengal, Darjeeling District, between Ghoom and Lopchu, 14 October 1978, 13 km from Ghoom, towards north, 2000 m, sieved forest litter, leg. C. Besuchet & I. Löbl, extracted by Winkler method, deposited in MHNG. Paratypes, 16♂ 50♀, same data as holotype.

Diagnosis: See diagnosis for *I. lannaianum* sp. n. and *I. monticola*.

Description: *Male*: Only differences from *I. lannaianum* sp. n. are described. *Measurements* ($n=1$): Prosoma length 0.41, width 0.37, height 0.35. Opisthosoma length 0.56, width 0.43. Appendage lengths:

	Fe	Pa	Ti	Mt	Ta	Total
Leg I	0.32	0.08	0.25	0.18	0.16	0.99
Leg II	0.28	0.08	0.21	0.16	0.17	0.90
Leg III	0.24	0.08	0.18	0.18	0.14	0.82
Leg IV	0.33	0.08	0.27	0.21	0.16	1.05
Palp	0.09	0.04	0.10	—	0.03	0.26

Ratios: **A**= 0.37 ± 0.02 ($n=10$) (Fig. 1); **D**= 1.1 ± 0.04 ($n=5$) (Fig. 3); length divided by width of palpal femur= 1.9 ± 0.06 ($n=5$). *Carapace*: Lateral profile (Fig. 43) and mosaic-like stripe pattern (Figs. 43, 44) slightly different from *I. lannaianum* sp. n. *Eyes*: Eye field slightly narrower than in *I. lannaianum* sp. n. (Figs. 44, 45). *Chelicerae*: Swollen anterior proximal part of basal segment and groove on posterior surface appear more pronounced and longish in many specimens (Figs. 47, 48). *Palpal bulb*: Pyriform; longish; embolus short with simple tip (Figs. 53, 54). *Opisthosoma*: Roundish; anterior part of pulmonary plate distinctly pitted (Fig. 46).

Female: Very similar to male. Only differences from male and from *I. lannaianum* sp. n. are described. *Measurements* ($n=1$): Prosoma length 0.42, width 0.37,

height: 0.36. Opisthosoma length 0.62, width 0.54. Appendage lengths:

	Fe	Pa	Ti	Mt	Ta	Total
Leg I	0.33	0.09	0.21	0.15	0.18	0.96
Leg II	0.30	0.09	0.20	0.15	0.16	0.90
Leg III	0.25	0.09	0.18	0.16	0.15	0.83
Leg IV	0.36	0.09	0.26	0.20	0.16	1.07
Palp	0.09	0.04	0.05	—	0.08	0.26

Ratios: **A**= 0.37 ± 0.01 ($n=10$) (Fig. 1); **B** very variable and ranges from 0.45–0.59 (mean 0.49 ± 0.03 ; $n=20$) (Fig. 2). *Carapace*: Lateral profile different from male; anterior part rounded; area behind eyes only slightly ascending (Fig. 49); mosaic-like stripe pattern slightly different from male and from *I. lannaianum* sp. n. (Figs. 49, 51). *Eyes*: Eye field slightly wider than in male (Figs. 50, 51). *Opisthosoma*: Lengthwise lateral grooves on preanal plate appear slightly longer and more V-shaped in many specimens (Figs. 52, 55).

Additional material examined: INDIA: **West Bengal**: *Darjeeling District*: Mahanadi near Kurseong, towards south, 1♀, 1200 m, 6 October 1978, sieved forest litter; Tiger Hill, 1♀, 2500–2600 m, 18 October 1978, sieved forest litter near summit; 13 km N of Ghoom (road to Bijanbari), 2♀, 1500 m, 15 October 1978, sieved litter of degraded forest; Tonglu, near summit, 1♀, 3100 m, 16 October 1978, under stones; Algarah, 1800 m, 1♀, 9 October 1978, sieved forest litter. All material except from Tonglu extracted by Winkler method. Leg. C. Besuchet and I. Löbl, deposited in MHNG.

Distribution and habitat: The spiders were found in the litter layer and under stones in the Darjeeling District, West Bengal, India (Fig. 5a). They occur at altitudes from 1200–3100 m.

Discussion

Lehtinen (1981) considered the subfamily Brignoliellinae Shear, 1978 as not monophyletic and therefore created the tribe Brignoliellini for a natural group around the type species of *Brignoliella* Shear, 1978 containing 32 species in seven genera. Plesiomorphic characters of the Brignoliellini should be the basic eye pattern as well as the male genital bulb in regard to most details. However, characters should have been developed independently in different Brignoliellini. For Lehtinen (1981) the most appropriate diagnostic characters for the classification of the species were the vulva in females and modifications of the chelicerae and the carapace in males. The subglobular shape of the male genital bulb was considered to be characteristic for the Brignoliellini but not diagnostic.

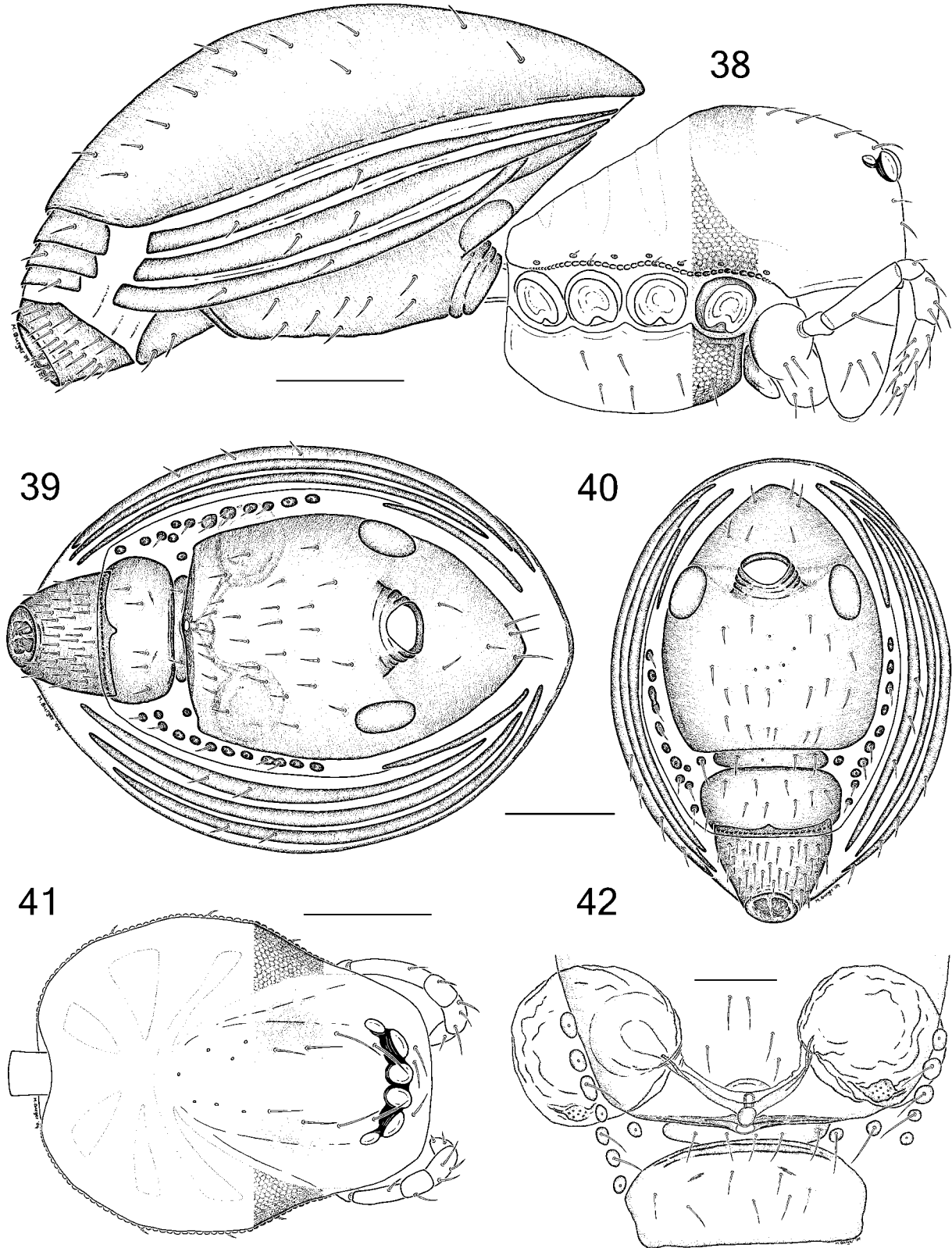
For the differentiation of the genera *Indicoblemma* and *Chavia*, Lehtinen (1981) used the eye pattern and the structure of the pulmonary plate. *Indicoblemma* should have the plesiomorphic states of the two characters, meaning an eye pattern similar to most of the Sicarioidea and ventral scuta without pits. In contrast, one row of six closely spaced eyes and a strongly pitted surface of the pulmonary plate should be apomorphic and found in *Chavia*.

I do not agree in considering these diagnostic characters to be appropriate for the separation of the two genera. For the eye pattern, I found exactly the same arrangement in all the three species, *I. lannaianum* sp. n.

(Figs. 8, 19), *I. monticola* (Figs. 29, 31) and *I. sheari* (Figs. 45, 50): the six eyes are arranged closely together in a recurved transverse row, being almost contiguous but not touching each other.

Dissecting the pulmonary plates and examination with a compound microscope revealed that pits are

present and identical in all three species. These are the depressions from where the ventral hairs arise (Figs. 23, 24, 39, 40, 46, 52). In fact, the pulmonary plate of *I. sheari* is rather more strongly pitted than that of *I. monticola* because of its anterior part (Figs. 46, 52). Taking these facts into account, the differentiation of the

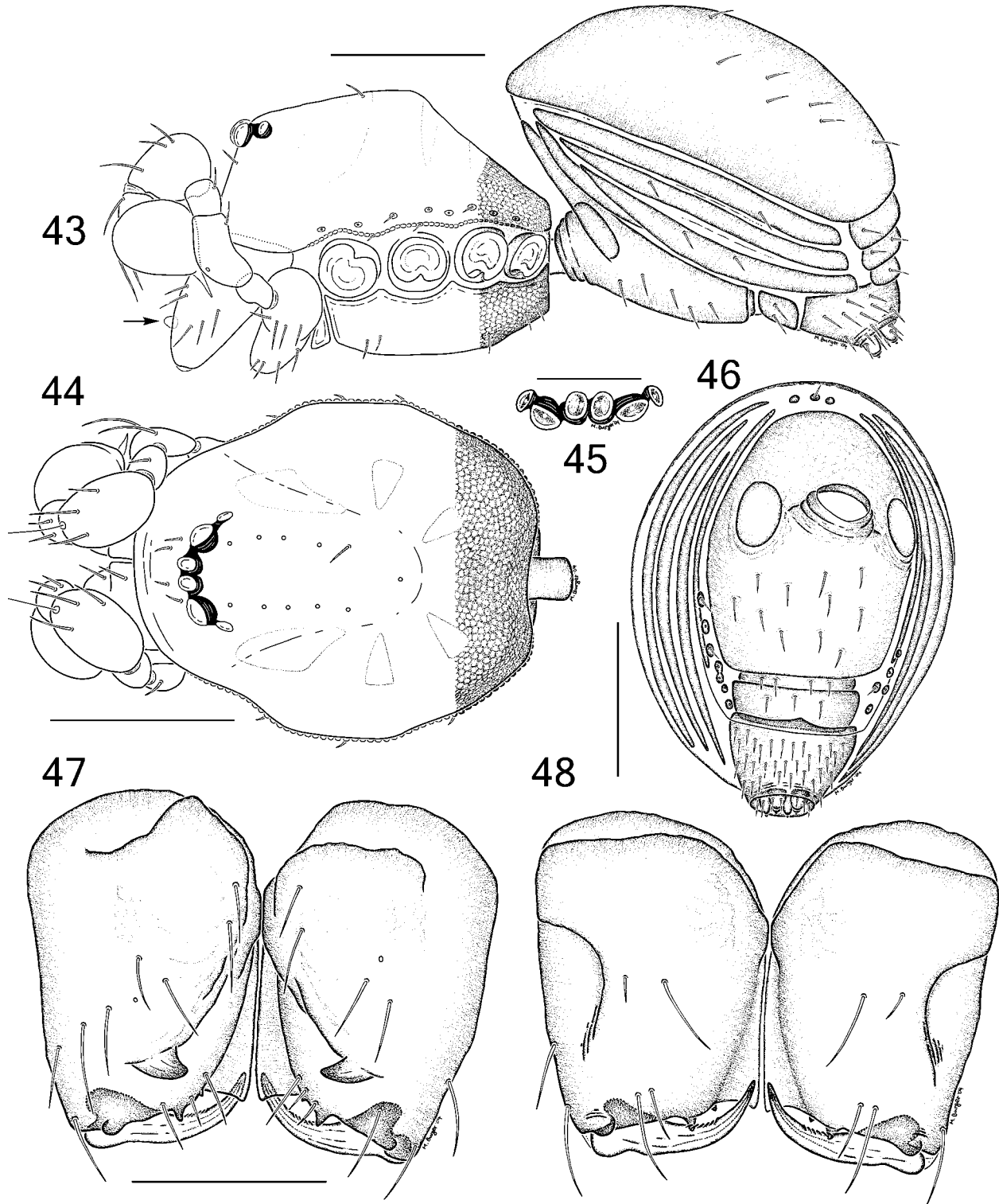


Figs. 38–42: *Indicoblemma monticola*. **38** Female, lateral view, hairs and mosaic-like stripe pattern only partly shown; **39** Female opisthosoma, ventral view; **40** Male opisthosoma, ventral view; **41** Female prosoma, dorsal view, hairs and mosaic-like stripe pattern only partly shown; **42** Vulva, ventral view. Scale lines=0.2 mm (38–41), 0.1 mm (42).

genera *Indicoblemma* and *Chavia* can no longer be supported and the names are therefore synonymised in this paper.

Lehtinen (1981) did not consider the shape of the male genital bulb as a key-character in classifying the species because its shape could be easily modified by a different origin of the embolus and different thickness and course of the ejaculatory duct. As an example, he mentioned the wide range of bulbi found within the large genus

Brignoliella. But later, Lehtinen (1981) emphasised that the origin of the embolus is always the same within a genus of Tetrableminae and that the course of the ejaculatory duct should not be fundamentally different. I agree with his latter statement; however, although these characters are probably constant, the shape of the genital bulb within *Indicoblemma* nevertheless differs between the species and so can be used for species discrimination (Fig. 3). The pyriform bulb of *I. sheari*

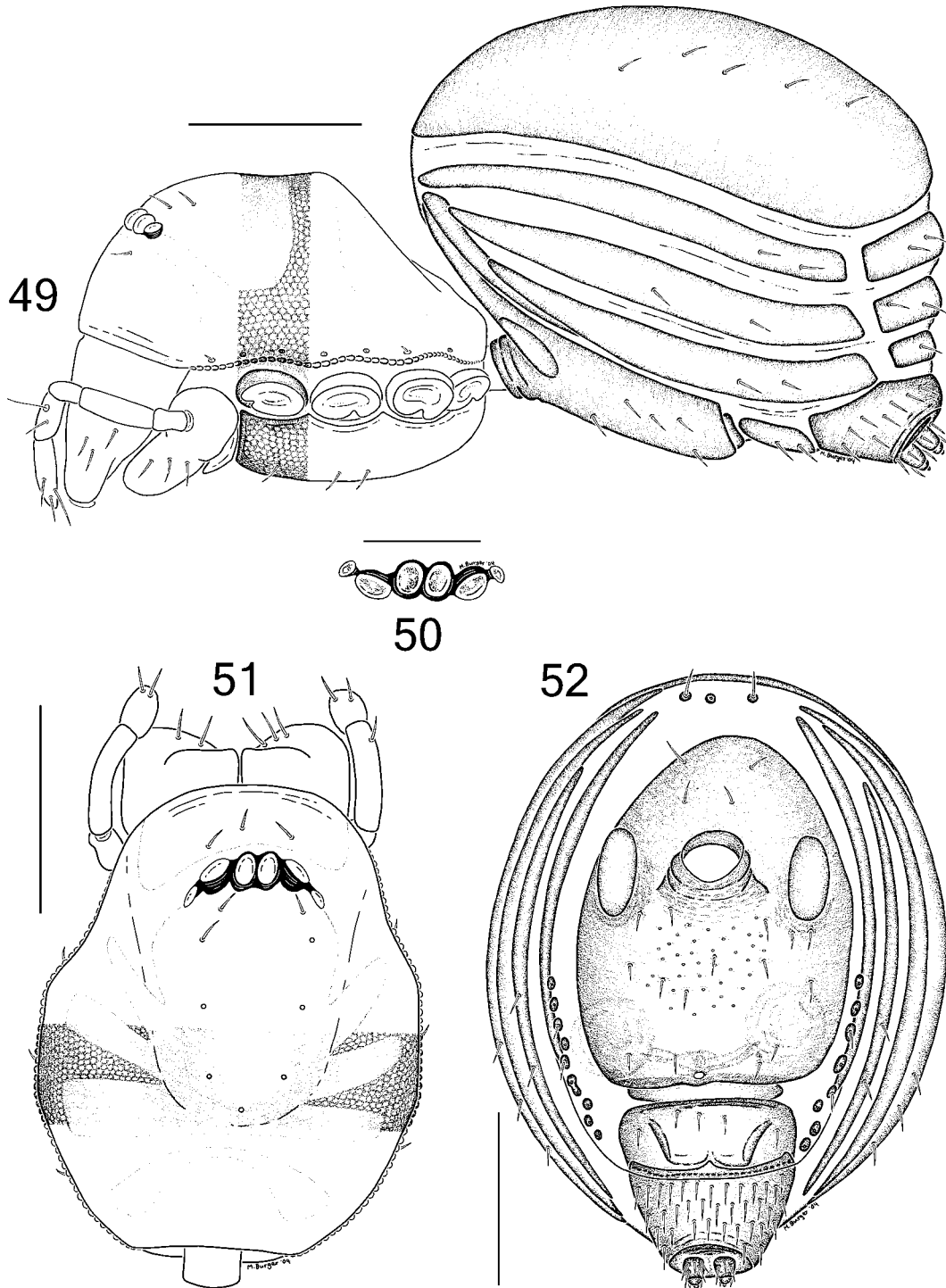


Figs. 43–48: *Indicoblemma sheari*, male. **43** Lateral view, hairs and mosaic-like stripe pattern only partly shown; **44** Prosoma, dorsal view, mosaic-like stripe pattern only partly shown; **45** Eyes, anterior view; **46** Opisthosoma, ventral view; **47** Chelicerae, anterior view; **48** Chelicerae, posterior view. Arrow=apophysis on chelicera. Scale lines=0.2 mm (43, 44, 46), 0.1 mm (45, 47, 48).

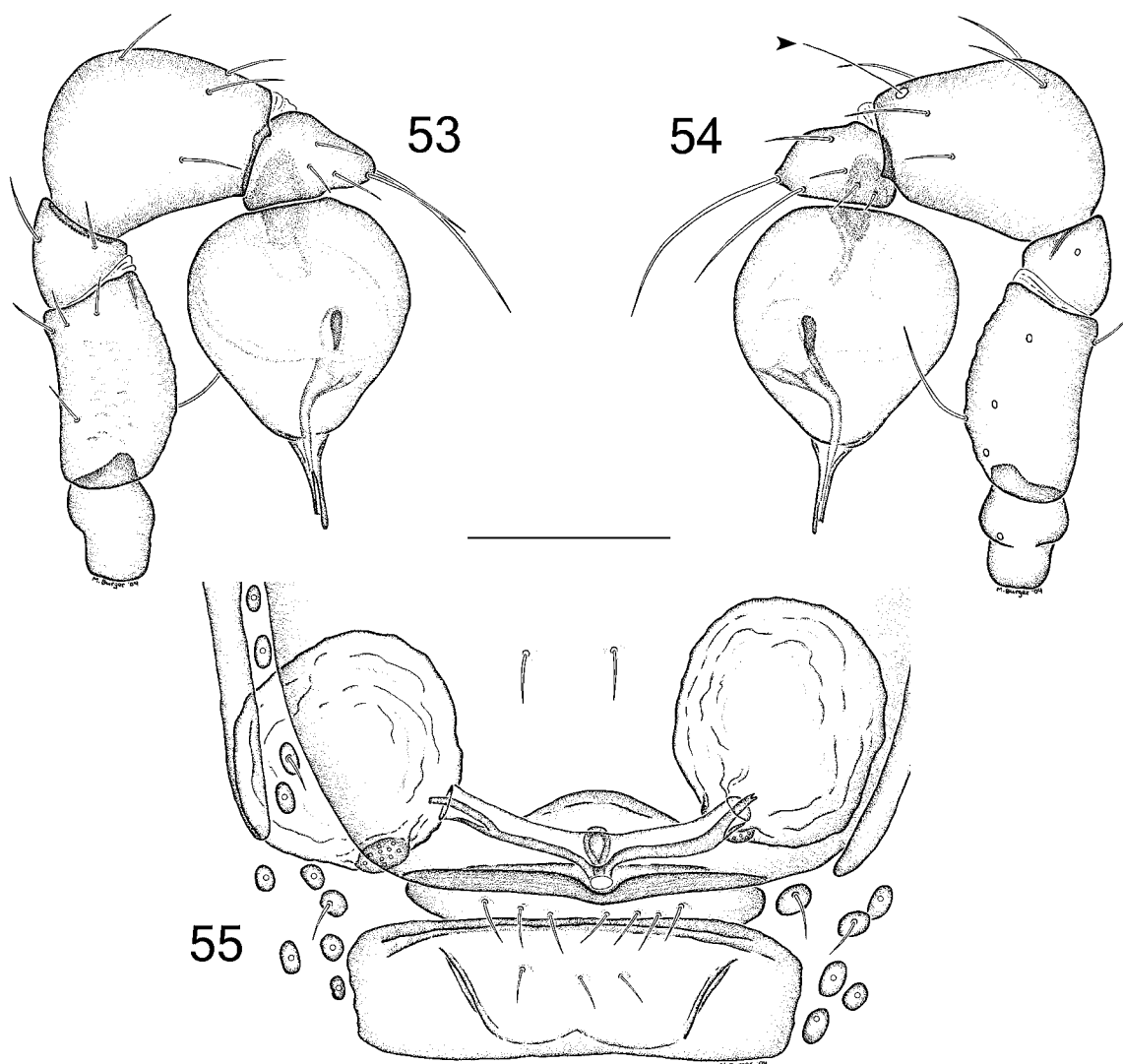
(Figs. 53, 54) looks like an intermediate between the globular bulb of *I. lannaianum* sp. n. (Figs. 12, 13) and the longer pyriform bulb of *I. monticola* (Figs. 34, 35). The species in Thailand live syntopically and it seems sensible to assume that they evolved from a common ancestor with *I. sheari*, with *I. lannaianum* sp. n. as a common and widespread species in the north and *I. monticola* as a specialised form only found in the higher cloud forests of Doi Inthanon (Fig. 5b).

Sex-linked characters in *I. lannaianum* sp. n. and *I. sheari* are the apophyses on the male chelicerae (Figs. 7,

9, 10, 43, 47) and the lateral grooves on the preanal plates of females (Figs. 23, 25, 26, 52, 55). They seem to function as a locking mechanism during copulation, since the apophyses fit perfectly into the grooves (Lehtinen, 1981). My personal observations of the copulation of *I. lannaianum* sp. n. confirm this assumption. Interestingly, females of *I. monticola* lack such grooves on the preanal plate (Figs. 39, 42). Lehtinen (1981) argued that preanal grooves were absent in females of *Chavia* (*sensu* Lehtinen) and the closely related *Singaporemma* Shear, 1978 because of the simple structure of



Figs. 49–52: *Indicoblemma sheari*, female. **49** Lateral view, hairs and mosaic-like stripe pattern only partly shown; **50** Eyes, anterior view; **51** Prosoma, dorsal view, mosaic-like stripe pattern only partly shown; **52** Opisthosoma, ventral view. Scale lines=0.2 mm (49, 51, 52), 0.1 mm (50).



Figs. 53–55: *Indicoblemma sheari*. **53** Left male palp, prolateral view; **54** Left male palp, retrolateral view; **55** Vulva, ventral view. Arrowhead=trichobothrium. Scale line=0.1 mm.

the male chelicerae. However, only males of *Singaporemma* which in fact have simple chelicerae, were known at that time. The clearly different male of *I. monticola* is described for the first time in this paper. It shows huge apophyses with a hook-like apical part (Figs. 27, 28, 30, 32). The copulatory position in *I. monticola* is most probably the same as in *I. lannaianum* sp. n. (Helvesen, 1976). The large cheliceral apophyses could possibly be explained by the ability of the male to grasp the female more easily during copulation, when there are no grooves present on the female's preanal plate. However, as the genital morphology (including male cheliceral apophyses) in *Singaporemma* contradict this proposition, detailed studies are clearly needed on tetrablemmid copulatory behaviour, which has not been investigated so far.

Acknowledgements

I am most grateful to Dr C. Kropf for his support and to A. Jacob, mainly for his invaluable help in collecting the spiders. My special thanks go to Dr P. Schwendinger (Geneva Natural History Museum), who discovered the

new species and provided important information about the type locality in Thailand. He also kindly provided his material for examination. I thank Dr M. I. Saaristo (Zoological Museum, Centre for Biodiversity, University of Turku) for kindly providing the holotype of *I. monticola* for examination. The trip to Thailand was financed by a travel grant from the Swiss Academy of Sciences (SAS) which is greatly acknowledged. Furthermore I sincerely thank Dr K. Fischer, without whose financial support this work could probably not have been done.

References

- BOURNE, J. D. 1980: New armored spiders of the family Tetrablemmidae from New Ireland and Northern India (Araneae). *Revue suisse Zool.* **87**: 301–317.
- BRIGNOLI, P. M. 1974: Tetrablemmidae (Araneae) dell'Angola e dello Zaire. *Publicões cult. Co. Diam. Angola* **88**: 177–196.
- DEELEMEN-REINHOLD, C. L. 1980: Contribution to the knowledge of the Southeast Asian spiders of the families Pacullidae and Tetrablemmidae. *Zool. Meded. Leiden* **56**: 65–82.
- DEELEMEN-REINHOLD, C. L. 1993: A remarkable troglobitic tetrablemmid spider from a cave in Thailand (Arachnida: Araneae: Tetrablemmidae). *Nat. Hist. Bull. Siam Soc.* **41**: 99–103.

- HELVERSEN, O. von 1976: Gedanken zur Evolution der Paarungsstellung bei den Spinnen (Arachnida: Araneae). *Entomologica germ.* **3**: 13–28.
- LEHTINEN, P. T. 1981: Spiders of the Oriental-Australian region. III. Tetrablemmidae, with a world revision. *Acta zool. fenn.* **162**: 1–151.
- SCHWENDINGER, P. J. 1989: On three new armoured spiders (Araneae: Tetrablemmidae, Pacullinae) from Indonesia and Thailand. *Revue suisse Zool.* **96**: 571–582.

- SCHWENDINGER, P. J. 1994: Four new *Perania* (Araneae: Tetrablemmidae, Pacullinae) from Thailand and Malaysia. *Revue suisse Zool.* **101**: 447–464.
- SHEAR, W. A. 1978: Taxonomic notes on the armored spiders of the families Tetrablemmidae and Pacullidae. *Am. Mus. Novit.* **2650**: 1–46.
- SHEAR, W. A. 1988: *Brignoliella ratnapura* n. sp., and an enigmatic new structure in spiders (Araneae, Tetrablemmidae). *Bull. Br. arachnol. Soc.* **7**: 201–203.