

The *Zantheres* group of Zoicinae (Araneae, Lycosidae) and a relimitation of the subfamily

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The newly raised lycosid subfamily Zoicinae is redefined and relimited on the basis of new material from India. The subfamily consists of two externally dissimilar types of wolf spider: minute (1.5-2.0 mm) unicolorous with wide carapace and sloping eye region (*Zoica*) and small (2.2-4.0 mm), narrow, patterned with high eye region. The latter type includes two monophyletic groups which are not closely related to each other, but *Lysania* is a sister group of *Zoica* and the *Zantheres* group seems to be a sister group of *Lysania* and *Zoica* together.

The *Zantheres* group is restricted to mountain regions of northeastern India and Burma. Only three species are known, but wide morphological and topographical differences in genital organs in both sexes suggest that they be placed into three different genera. This group is easily distinguished from all Oriental lycosids by the presence of a basal tibial spur in the male palp. Long legs, presence of glistening hairs in both sexes and long, narrow abdomen are also characteristic of all of them.

Margonia (type-species *Venonia himalayensis* Gravely, 1925) and *Shapna* (type-species *S. pluvialis* sp. n.) are described as new genera. *Zantheres* Thorell, 1887 is transferred from Venoniinae to Zoicinae.

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1. Introduction

Small and minute Oriental lycosids were recently revised by us (Lehtinen & Hippa 1979). Since then, new material of these groups, including several new species, has been collected from different parts of the Oriental region. Checking of the type material of *Venonia himalayensis* Gravely, 1925 has also revealed new, important information. This paper mainly concentrates on the taxonomy of a certainly monophyletic group of patterned Zoicinae in the mountains of northeastern India and Burma.

Our revision listed *Zantheres gracillimus* Thorell, 1887 as a member of Venoniinae, although the marked differences in topography and also morphology of the palpal structures between *Zantheres* and *Venonia* was mentioned (Lehtinen & Hippa 1979:11). "*Venonia*" *himalayensis* could not be exactly placed according to information available at the time.

On the basis of this new material it is evident that both *Zantheres* and "*V.*" *himalayensis* must be included in Zoicinae and not in Venoniinae, at least as long as these groups are regarded worthy of subfamilial status. They are more closely related to each other than to *Lysania* or *Zoica*. An additional, externally similar, very long-legged

new species from the Khasi Hills also belongs to this group.

Creation of generic standards within Zoicinae poses some practical problems. In comparison with the traditional and well-known Holarctic groups of Lycosidae, especially the large Lycosinae (Lycosini, Pardosini, etc.), the range of structural variation of both male and female genital organs within most of the poorly known Oriental subfamilies is very large. This variation in genital structures is sometimes correlated with parallel variation of striking non-genital characters, but not always. In the case of the above-mentioned *Zantheres* group, the range of variation is exceptionally wide in genital structures, but less striking on other characters. Despite this, we could not choose any other solution than to treat them as three monotypic genera, if any general standards for spider genera are to be followed. As the mountain areas of the Oriental region still belong to the most poorly known parts of the Old World, nothing can be anticipated about the actual size of these genera.

The homology of male and female genital structures in Lycosidae were preliminarily discussed by us in our previous paper. Although new information has arisen, the present paper contains no detailed discussions of these matters,

except for the purposes of infragroup comparison within Zoicinae. Thus, topographic and descriptive terms only have been used.

2. Zoicinae Lehtinen & Hippa, 1979

Our original diagnosis (Lehtinen & Hippa 1979: 12) must be slightly modified, as the *Zantheres* group is included in Zoicinae. The size range of known species is 1.5–4.0 mm, and the carapace may have an obscure lighter pattern. The cephalic area is normal in all genera except *Zoica*. The abdominal pattern is quite variable or lacking, and may include several types of specialized hairs (glistening hairs, branched white hairs, erect, distally curved hairs, etc.). The presence of abdominal scuta is shared by *Zoica* and *Lysania* only, while traces of abdominal sclerotization within the *Zantheres* group are known only in *Shapna*.

The male palp cannot be directly compared with the Holarctic types of Lycosidae, and its sclerites cannot be described in terms usually applied to species of the latter groups, although we tried to do so in our revision. The bulbal sclerites visible in the ventral view of an unexpanded palp include a fairly large, well-sclerotized structure usually attached to the apico-lateral corner of the tegulum, but exceptionally more central in *Shapna pluvialis*. This sclerite is certainly homologous in all Zoicinae, and here it is simply called the lateral apophysis. A separate median apophysis homologous with that of Lycosinae is certainly absent, but the distal regular margin may bear a membranous lobe that was called median apophysis by us and is referred to by the same term here, too. The relative size of the sclerite or sclerites between the superficial structures and the alveolus is fairly variable within Zoicinae, and they may further be referred to as "truncus" without expressing any opinion about possible homologies. The mesal half of the tegulum bears an apophysis or sometimes (*Margonina*) two apophyses that are simply referred to as tegular apophyses. The embolus of most species of Zoicinae is totally concealed behind more superficial sclerites, and it may be a simple spine or distally modified. The embolus of *Lysania* is well visible because of weak development of the sclerites and membranes on the outer surface of the tegulum.

Zoicinae includes two main types of general appearance, the minute, unicolours, vagrant *Zoica* (s. lat.) and the medium-sized, more or less patterned, apparently web-spinning species of other genera. When the structures of the male and female genital organs are compared, this bifurcate

grouping is no longer valid, and a part of the latter type is most probably more closely related to *Zoica* than to the other species with a similar appearance. These two groups are simply called the *Lysania* group and the *Zantheres* group here. The latter group is here revised in detail, and a few notes are presented for the former.

A proposed cladogram for the genera of Zoicinae is presented in Fig. 1.

Zantheres group

Zantheres Thorell, 1887, *Margonina* gen. n. and *Shapna* gen. n. all live in mountains of the central part of the Oriental region, and share several non-genital characters in addition to similar size and

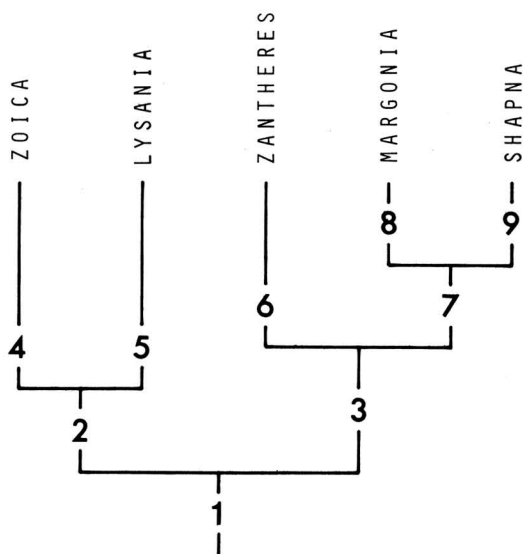


Fig. 1. A cladogram showing the supposed inter-relationships of the genera of Zoicinae. The apomorphic character states (plesiomorphic character states in parenthesis) of the clades are:

1. Strong lateral apophysis in the male palp (a horseshoe shaped small sclerite at the base of the median apophysis).
2. No glistening hairs (glistening hairs present).
3. Male palpal tibia spurred (male palpal tibia simple), male palpal tarsus narrowed (male palpal tarsus normal).
4. Minute size (small size), male palpal tarsus widened (normal palpal tarsus), unusual eye pattern (normal eyes).
5. Reduction of median apophysis (median apophysis present as a membranous lobe), female spermatheca far in front, connected to the posterior parts of vulva by long ducts (spermatheca close to posterior structures of vulva, no ducts).
6. Carapace narrow (carapace normal), lateral apophysis in male palp greatly modified, transverse (lateral apophysis unmodified, longitudinal), wrinkled epigynal scape with an apical pit (epigyne with an unmodified median plate).
7. Sclerotized tegular apophyses present (membranous tegular apophysis).
8. Modified embolus (unmodified embolus).
9. Lateral apophysis in median position (in lateral position).

general appearance. Their genital organs can easily be homologized, although both male palpi and epigyna show striking autapomorphies in each genus.

The description of the whole group is mostly based on fresh material of *Margonia himalayensis* and *Shapna pluvialis*, although characters of *Zantheres* are not in conflict with them as far as they could be used. The type material of *Zantheres gracillimus* was studied by us before (Lehtinen & Hippa 1979), but the colour were strongly faded and the leg spinulation and hair pattern of body and legs were worn. Most probably most of the detailed description below also fits *Z. gracillimus*, and even if some details do not fit, they cannot alter the conclusions about the monophyly of this group of three genera.

Description. Small or medium-sized (3–4 mm), web-spinning lycosid spiders with bright white egg cocoon. Legs long and slender, also in females relatively longer than in most Lycosiinae, at least. Narrow glistening hairs present, more abundant in males. Carapace with ill-defined pattern (lighter central area and some minor details lighter), abdomen with simple pattern of transverse light bars on dark ground. Pair of light spots dorsally close to spinnerets shared with *Lysania* group. Abdominal scuta absent or quite weakly developed in males, no traces of scuta in females. Ventral side of abdomen with short hair covering and two longitudinal rows of a few (2–4), very long, dark hairs. This is in strict contrast to *Lysania*, in which the ventral abdominal hairs are long. Posterior spinnerets with long and slender basal segment, distal segment conical, its spigots mainly concentrated on the median surface.

Cephalic area high and narrow as in *Lysania* group and all Venoniinae, but in strict contrast to the short and wide, sloping cephalic area of *Zoica*. Anterior eyes subequal in size, in strongly procurved row.

Chelicerae relatively long and thin, anterior cheliceral margin usually with one big tooth flanked on both sides with a minute denticle, posterior cheliceral margin with two equal teeth distinctly separated from each other, and an additional, sometimes bifurcate basal denticle.

Complex patterns of trichobothria on metatarsi and tibiae (Fig. 10). Basal tibial trichobothria in oblique row posterior to the basal dorsal spine. Spine pattern on legs unstable in tibiae and metatarsi, but usually without distinctly paired ventral spines. Legs II–IV with 2–3 unpaired ventral and/or dorsal or lateral spines, leg I with reduced number of dorsal spines in males. Patellae with a single long dorso-apical spine (in *Lysania* 2 patellar spines). Femora with 2–3 dorsal spines.

Female palpal tarsi distinctly tapering, armed with 3 long basal spines and one subapical ventral spine (2 ventral spines in *Lysania*).

Male palpal tibia with a basal or submedian spur, lacking in all other known lycosid species of the Oriental region. Tegulum with characteristic narrow ventral loop of ductus ejaculatorius. Lateral apophysis (conductor of *Zantheres* in Lehtinen & Hippa 1979) variable in size, position and shape. Median apophysis represented by a fixed membranous process of the anterior tegular margin (absent in *Lysania*). Terminal parts of bulbous variably modified in different genera. Embolus totally concealed in unexpanded palp, spine-like or partly lamellar.

Epigyne with variable types of posterior plate, obviously corresponding to different modifications of the male bulbous. Epigynal scape in *Zantheres*, copulatory orifice in posterior margin in *Zantheres* and *Margonia*, but more anterior in *Shapna*.

Zantheres Thorell, 1887

Zantheres Thorell, 1887. Ann. Mus. Civ. Stor. Nat. Genova (2 a) 5: 317.

Zantheres, Lehtinen & Hippa, 1979. Ann. Zool. Fenn. 16: 11, figs. 32–37 & 66.

Type-species *Z. gracillimus* Thorell, 1887 from Burma, by original designation and monotypy.

Both sexes described in detail by Lehtinen & Hippa (1979). Differentiated from *Margonia* and *Shapna* by extreme narrowness of carapace and abdomen of both sexes, as well as by simple, basally directed apex of lateral apophysis in male and by presence of epigynal scape in female.

Listed in Venoniinae by Lehtinen & Hippa (1979: 11), although the presence of several features not shared by *Venonia* and *Anomalosa* were mentioned then. A comparison of genital organs with those of *Margonia* and *Shapna* undoubtedly proves the phylogenetic relationships of these three genera.

Margonia gen. n.

Venonia, Gravely, 1925. Rec. Indian Mus. 26: 608, nec Thorell, 1894.

Venonia, Tikader & Malhotra, in press. Fauna of India, Spid., Aran. 11.

"*Venonia*", Lehtinen & Hippa, 1979. Ann. Zool. Fenn. 16: 12.

Type-species *Venonia himalayensis* Gravely, 1925 from Darjeeling area, India.

Small web-spinning lycosids with both carapace and abdominal pattern. Legs relatively shorter than in *Zantheres* and *Shapna*.

Male palpal tibia with short and wide basal spur, median apophysis flat, membranous, lateral apophysis simple, falciform. Embolus short, distally modified, blunt truncal apophysis close to embolic apex, probably acting as functional conductor. Tegular apophysis with double sclerotized apex.

Epigyne with wide median plate posteriorly. This plate is centrally invaginated, but without true pit or scape. Seminal receptacula simple, globular.

Margonia is separated from *Shapna* by widely different shape of conductor and tegular apophysis as well as by short, modified embolus in male and by type of epigyne in female. For comparison with *Zantheres*, see above. It is further differentiated from *Lysania* (that has falciform lateral apophysis and short legs in female) by entirely different trichobothrial and spine pattern of legs as well as by presence of sclerotized tegular apophysis and type of tegular margin in male.

Margonia himalayensis (Gravely, 1925) comb. n.

Figs. 2, 4, 5, 7, 9–12, 15, 17, 19, 20.

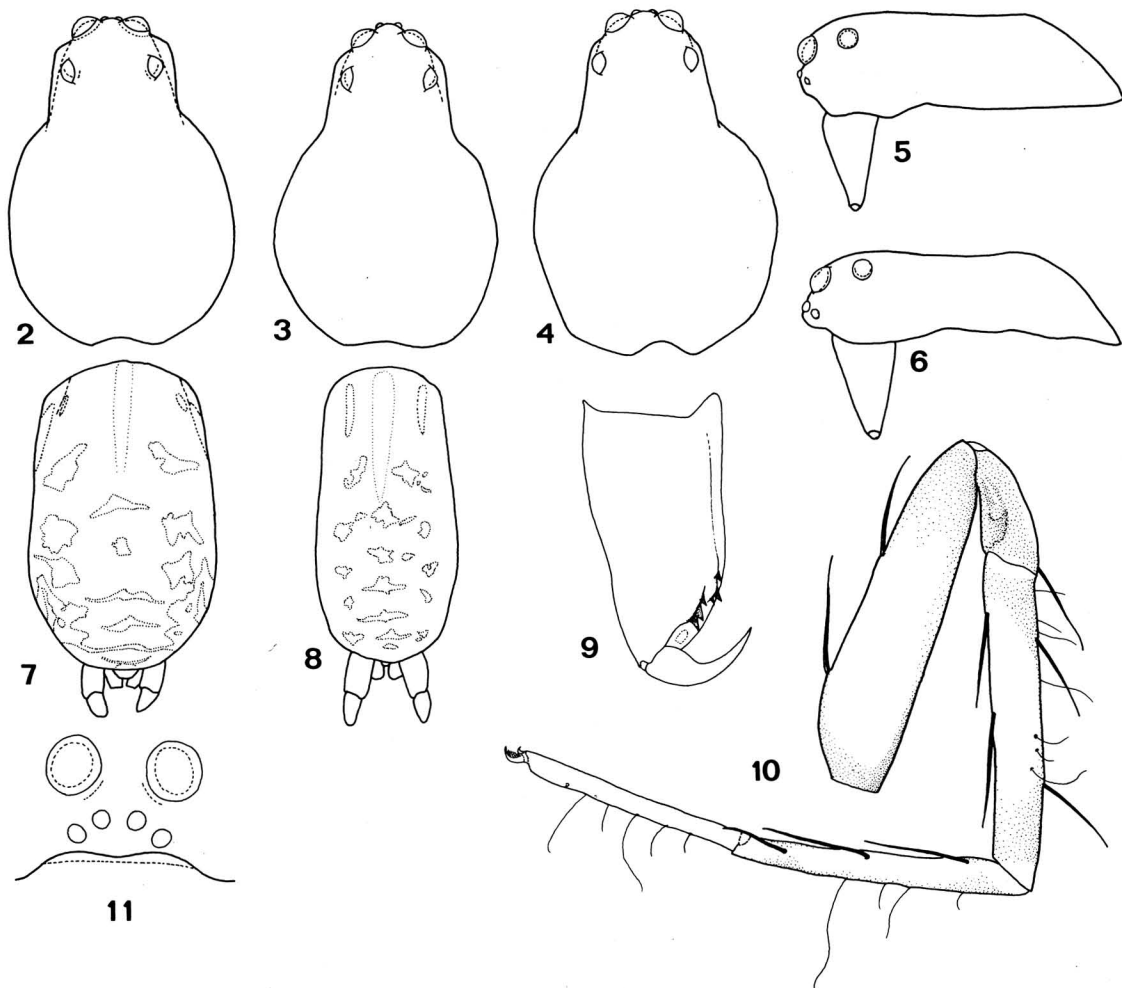
Venonia himalayensis Gravely, 1925. Rec. Ind. Mus. 26: 608, fig. 4 L.

V. himalayensis, Tikader & Malhotra, in press. Fauna of India, Spid., Aran. 11.

"*V.*" *himalayensis*, Lehtinen & Hippa, 1979. Ann. Zool. Fenn. 16: 12.

Holotype male from Rungneet Tea Estate, 1500–1600 m, Darjeeling District, West Bengal, India, in Zoological Survey of India, Calcutta, examined. Male and female paratypes with same data, also examined.

New material from India, West Bengal, Darjeeling District: Darjeeling, moist grassy roadside cutting (2070 m), on dense sheet webs at the bottom of small crevices or pits in soil, 2. V. 1979, P. T. Lehtinen, 5♂ 16♀ 10 juv. — Bhanjan Road, 4 km W of Ghoom, 2300m, in litter in cloud forest, 1. V. 1979, P. T. Lehtinen, 1 juv. — Manibhanjan, grassy bush, 2200 m, 1. V. 1979, 1 juv.



Figs. 2-21. *Margonia himalayensis* (Gravely), Darjeeling (Figs. 2, 4, 5, 7, 9-12, 15, 17, 19, 20). *Shapna pluvialis* sp. n., holotype male, paratype female (Figs. 3, 6, 8, 13, 14, 16, 18, 21). — 2 and 3: male carapace in dorsal view. — 4: female carapace in dorsal view. — 5 and 6: male carapace and chelicer in lateral view. — 7 and 8: male abdomen in dorsal view. — 9: female chelicer in posterior view. — 10: female I leg in retrolateral view. — 11: female anterior and median eyes in frontal view. — 12 and 13: male palpal tarsus in ventral view. — 14: male palpal tarsus in lateral view. — 14 and 16: male palp in lateral view. — 17 and 18: embolic division in ventral view. — 19 and 21: epigyne. — 20: vulva in ventral view.

Male 3.1-3.2. mm, carapace 1.67-1.68 x 1.14-1.15 mm, index 1.45; abdomen 1.6 mm, leg 1: 1.49+0.52+1.37+1.32+0.93 mm, tibial index 0.82.

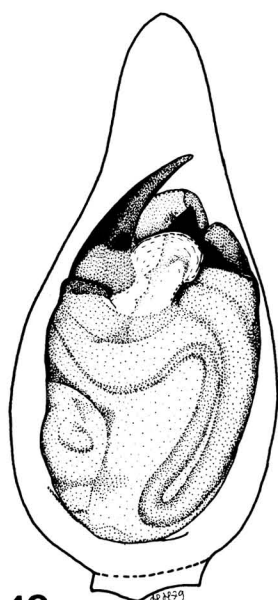
Carapace and eyes, see Figs. 2 and 5, cheliceral armature, Fig. 9. Coloration: carapace dark greyish brown, centrally light greyish, but no distinctly delimited, parallel-sided bands present. Cephalic area with posteriorly tapering triangular light area followed by two dilatations in the thoracic area.

Abdomen dark brown, anteriorly with lighter brown median stripe, posterior half with transverse light bands. These bands are usually broken into three separate rows of light spots. Lateral side of abdomen posteriorly with three wide oblique light bands. Ventral side light yellowish grey, area anterior to epigastric furrow dark brownish grey. Glistening hairs all over the body, but most abundant on posterior half of abdominal dorsum.

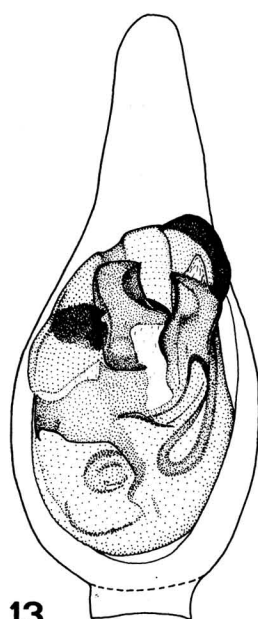
Chelicerae, labium, gnathocoxae, and sternum dark brown, base of spinnerets and their apical segment yellowish, basal segment of spinnerets dark brown.

All coxae and trochanterae yellowish, dorsally densely covered with glistening hairs. Palpi and femora I-II unicolorous dark brown, femora II-IV ventrally yellowish at least in basal half. The more distal segments of all legs reddish brown, tibiae and femora III-IV dorsally with dark brown annulations.

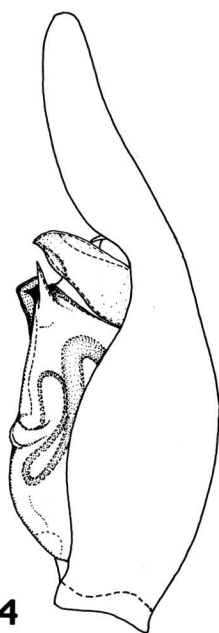
Femur I with 2 long dorsal and one short dorsal apical spine, patella with one dorso-apical bristle. Tibia I with 2 dorsal, 2 pairs of ventral or ventrolateral and one short prolateral subapical spine, metatarsi I with 2 pairs of long ventral or ventrolateral spines and one short subapical pair. Tarsi spineless, tarsi and metatarsi I with numerous erect ventral and lateral hairs. An additional pair of subapical



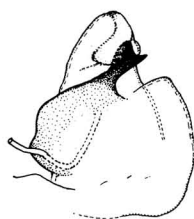
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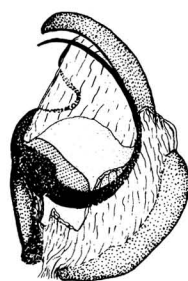
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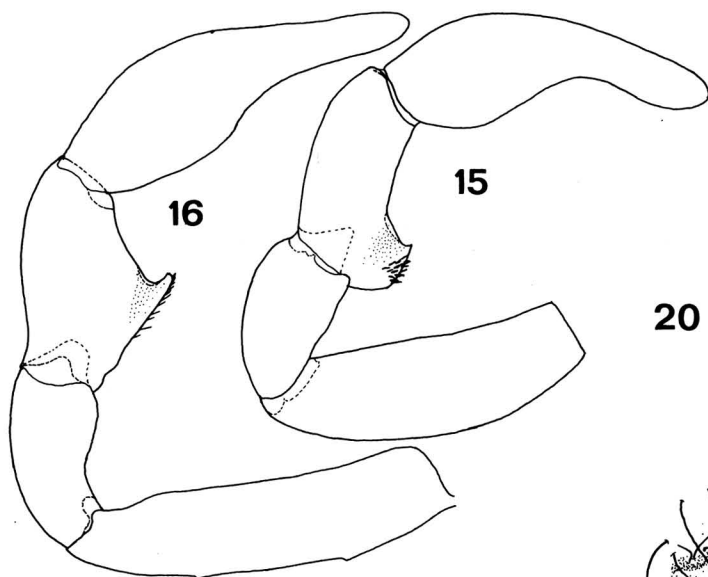
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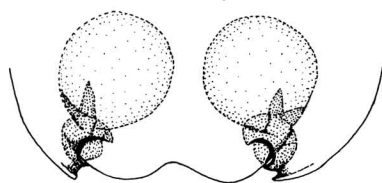


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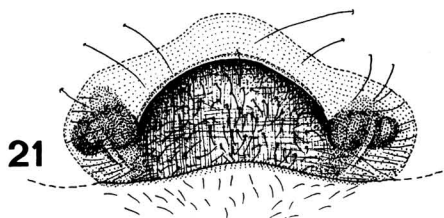


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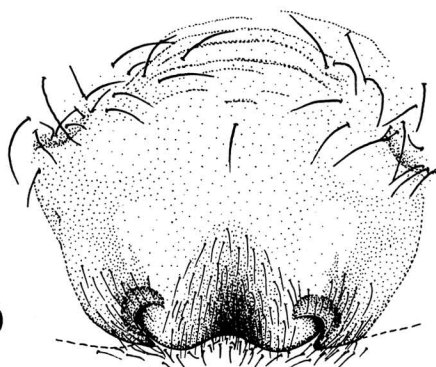
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dorsal or dorsolateral short spines present on metatarsi of leg II and 4-5 odd spines on metatarsi III-IV. Legs II-IV without special hairs.

Male palp, see Figs. 12, 15 and 17. Lateral apophysis falciform, median apophysis fairly large, subcircular membrane. Embolus totally concealed in unexpanded palp, short, distally with a partly membranous lobe.

Female 3.05-4.0 mm, carapace 1.53-1.60 \times 1.01-1.14 mm, index 1.40-1.52; abdomen 1.5-2.5 mm, leg I: 1.14-1.20 + 0.45-0.48 + 1.07-1.08 + 1.03-1.10 + 0.74-0.76 mm, tibial index 0.67-0.70.

Carapace (Fig. 4) slightly wider than in male, but generally similar to male in shape. Coloration much as in male, but ground colour often less dark, abdominal pattern more distinct, and glistening hairs scanty.

Leg spinulation as in male, but erect hairs on tarsi and metatarsi of leg I absent. Annulation of legs more distinct than in male, extending also to metatarsi. Femora and tibiae always with distinct sub-basal and subapical dark annuli.

Epigyne (Fig. 19) consists only of a centrally concave median plate, laterally bordered by semicircular orifices of the copulatory channel. Seminal receptacula globular (Fig. 20), basally with two more strongly sclerotized, distally tapering strips.

M. himalayensis has shorter legs than other known species of this group. On closer examination it is easily differentiated from all medium-sized lycosids by the male and female genital organs, as the genital structures of different genera in Zoicinae differ more than, e.g., the genital structures of different genera of the well-known Lycosinae.

Shapna gen. n.

Type-species *S. pluvialis* sp. n. from Meghalaya, India.

Very long-legged small lycosid spiders with faint pattern on carapace and abdomen. Cheliceral armature, sternum, and gnathocoxae similar to *Margonia*.

Male palpal tibia with median spur. Lateral apophysis blunt, originates centrally, not laterally as in *Margonia* and *Zantheres*. Median apophysis is an insignificant membrane at the base of conductor. A single tegular apophysis present. Sclerotized truncal margin very large, visible on both sides of the conductor in ventral view. Embolus long, curved spine without distal modifications.

Epigynal plate with dense hair covering. This plate is anteriorly surrounded by a chitinous arch. A large cavity is formed between them.

Shapna is differentiated from the long-legged *Zantheres* by largely different topography of all palpal parts in male and by lack of scape in epigyne.

Shapna pluvialis sp. n.

Figs. 3, 6, 8, 13, 14, 16, 18, 21.

Holotype male with one juvenile from India, Meghalaya, East Khasi Hills, Umran (1200 m), among moist litter in bamboo jungle, 4.V.1979, P. T. Lehtinen, in Zoological Museum, University of Turku. Paratype female from East

Khasi Hills, Cherrapunji, Mawmai (1200 m), among litter and ferns in wet riverside jungle, 6.V.1979, P. T. Lehtinen, in MZT; Cherrapunji road, Laitmawphlong (1400 m), in wet litter of low mountain bush, 6.V.1979, P. T. Lehtinen: 1 juv.

Male 3.2 mm, carapace 1.62 \times 1.11 mm, index 1.45; abdomen 1.5 mm, leg I: 1.75 + 0.55 + 1.83 + 1.89 + 1.16 mm, tibial index 1.13.

Carapace and eyes, see Figs. 3 and 6. Cheliceral armature identical to that of *M. himalayensis*.

Eye region black, the rest of cephalic area dark grey with faint, lighter, indistinctly limited stripes. A distinct dark V-shaped figure forms a boundary with the thoracic area, the latter brownish grey with lighter grey, indistinctly limited central band.

Abdomen (Fig. 8) long and slender, anterior margin hardly sclerotized. Colour pattern similar to that of *M. himalayensis*, but light spots smaller and more inconspicuous in tone. Glistening hairs present only in dorsum of abdomen. Other parts of body much as in *M. himalayensis*, except that gnathocoxae and sternum are light yellowish grey.

Spinulation of legs as in *M. himalayensis* except that no dorsal spines are present on leg I distal to femur, and no small apical spines on any femora. No modified hairs on leg I. All leg segments yellowish brown, with only traces of dark pigment on tibiae and metatarsi II-IV. No glistening hairs on coxae.

Male palp, see Figs. 13, 14, 16, 18, its basal segments darker than the legs. Conductor short, distally not extending to the distal margin of truncus. Tegular apophysis long, with a triangular distal membrane. Embolus totally concealed in unexpanded palp.

Female 3.6 mm, carapace 1.74 \times 1.25 mm, index 1.40; abdomen 1.8 mm, leg I: 1.41 + 0.55 + 1.41 + 1.37 + 0.99 mm, tibial index 0.81.

Cephalic area relatively wider than in male and light area more conspicuous than in male.

Abdomen less slender than in male, pattern similar, but more obscure. Pair of posterior whitish spots of branched hairs more conspicuous than other details of pattern. No glistening hairs visible in the paratype specimen, but they are easily detached in all species of the *Zantheres* group, and their presence in female, too, is thus possible. Ventral side of abdomen very light yellowish grey. Spinnerets dark greyish brown.

Spinulation of legs as in male, except that tibiae I have a submedian dorsal spine. Legs yellowish, metatarsi and tibiae with sub-basal and subapical greyish annulations, patellae and femora partly suffused with darker greyish pigment.

Epigyne, see Fig. 21, copulatory pockets very insignificant.

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Zoicinae. — Ann. Zool. Fennici 16: 1-22.

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