

Himalmartensus, a new genus of the spider family Amaurobiidae from Nepal (Araneae)

Xin-Ping Wang and Ming-Sheng Zhu: College of Life Sciences, Hebei University, Baoding 071002, China. E-mail: wang@amaurobiidae.com; xinping@ufl.edu

Abstract. A new genus of Amaurobiidae, *Himalmartensus*, is described from Nepal, and includes three species: the type species *H. martensi* new species, *H. ausobskyi* new species, and *H. nepalensis* new species. Members of this new genus can be separated from other amaurobiid genera by the combination of the following characters: the presence of a colulus, a single chilum, smooth trichobothrial bases, and simple tracheal tubes. Both promargin and retromargin of *Himalmartensus* chelicerae have 5–8 teeth and the female epigynum is modified with long and looping copulatory ducts. The spinnerets of all three new species are described and tracheal tubes of *H. martensi* are examined. Spinnerets, colulus, chilum and tracheal tubes of *Himalmartensus* are compared to similar genera, including amaurobiids, agelenids, and cybaeids. *Himalmartensus* is defined as a member of the family Amaurobiidae because of its similarity to the amaurobiids *Rubrius* and *Macrobunus*.

Keywords: Taxonomy, new species, Himalayas

The definition of the family Amaurobiidae Thorell 1870 is fraught with problems (Griswold 1990). Lehtinen (1967) attempted to define the Amaurobiidae, Agelenidae, and other families of his superfamily Amaurobioidea but his treatment suffered from a vagueness of character definition (Griswold 1990). Griswold also indicates that the problem of defining Amaurobiidae becomes one of discovering synapomorphies and any taxon assigned to the Amaurobiidae should be demonstrably related to the type genus of the family, *Amaurobius* C.L. Koch 1837. Griswold (1990), the author who most recently tried to define Amaurobiidae, defines the family as having a divided cribellum, the simple, sclerotized retrolateral and dorsal tibial processes on the male palp, and two rows of metatarsal and a single row of tarsal trichobothria (sensu Lehtinen 1967). Since then, the subfamily Phyxelidinae Lehtinen 1967 from Africa has been elevated to family Phyxelididae and placed as sister group of Titanoecidae by Griswold et al. (1999). The currently included members of the family Amaurobiidae are still globally distributed (Platnick 2008), including at least the Holarctic genera of the subfamily Coelotinae F.O. Pickard-Cambridge 1893, the Holarctic *Amaurobius* C.L. Koch 1837 and related genera, the Holarctic genus *Arctobius* Lehtinen 1967, the Neotropical *Macrobunus* Tullgren 1901, *Rubrius* Simon 1887 and related genera, and a few other genera from Africa. The relationship of Amaurobiidae to other families has for a long time been, and remains, one of the major cladistic problems in spider taxonomy (Coddington & Levi 1991). The intrafamilial relationships and monophyly of Amaurobiidae have only recently begun to be addressed using morphological (Griswold et al. 2005) and molecular data (Wu et al. 2002; Bi et al. 2005; Spagna & Gillespie 2008). However, these works use only a limited number of representative amaurobiid taxa and, clearly, further phylogenetic work is urgently needed.

Griswold (1990) addressed the higher level taxonomic question of the familial relationships of Phyxelidinae by emphasizing four character systems: the nature of the cribellum; the presence, form, number, and position of processes on the male palpal tibia; the pattern of tarsal and metatarsal trichobothria; and the form of the tracheal system. In examining those structures, we found that the striated

texture of the small trichobothrial hood, plus the presence of PMS paracribellar spigots and PLS modified spigot (amaurobiid PLS spigot of Wang 2000), are unique and define *Amaurobius* (the type genus of the family) and related genera including, at least, *Callobius* Chamberlin 1947, *Pimus* Chamberlin 1947 and *Taira* Lehtinen 1967. This “true Amaurobiidae” group has been tested phylogenetically by Griswold et al. (2005). As a result, the family Amaurobiidae includes at least the above genera, and more are likely to be included with more detailed analysis that is beyond the scope of this study.

Wu et al. (2002) analyzed 12S rRNA gene sequences using 2 amaurobiid species, *Coelotes plancyi* Simon 1880 and *Tamgrinia tibetana* (Hu & Li 1987) and 2 agelenid species of the genus *Agelena* and concluded that *Coelotes* is more closely related to *Tamgrinia* than to *Agelena*. However, in another study (Bi et al. 2005) that used 18S and 28S rRNA in an attempt to resolve the phylogenetic position of Coelotinae, four taxa from two amaurobiid and two agelenid genera (e.g., *Draconarius*, *Coelotes*, *Agelena*, and *Alloagelena*) were used and results indicated that *Coelotes* + *Draconarius* are more closely related to *Agelena* + *Alloagelena* than to *Tamgrinia*, suggesting (*Tamgrinia*((*Coelotes*, *Draconarius*)(*Agelena*, *Alloagelena*))), which is in conflict with the findings of Wu et al. (2002). More recently, the analyses by Spagna & Gillespie (2008) using molecular data of non-orb-weaving spiders suggested a sister group relationship between Coelotinae and Ageleninae, which is consistent with the conclusion of Bi et al. (2005). Spagna & Gillespie (2008) found that Agelenidae (including Ageleninae and Coelotinae) could be the sister to Hahniidae + Cybaeidae related taxa. In addition to agelenids and coelotines, Spagna & Gillespie also selected four taxa for analyses from three “true amaurobiids” genera (e.g., *Amaurobius*, *Callobius*, and *Pimus*) and found none of them was closely related to Coelotinae. Unfortunately, other lineages of current Amaurobiidae species were not sampled by Spagna & Gillespie (2008) (e.g., *Rubrius* and *Macrobunus* related species from South America, the Holarctic *Arctobius*, and *Tamgrinia* from the Himalayan region) and their phylogenetic placements, either related to Agelenidae or to Amaurobiidae, still need further investigation. The synapomorphies of current Agelenidae (including Coelotinae) are still unknown, but some

may be found in their spinneret structures. Both Ageleninae and Coelotinae are cribellate spiders and build similar funnel-shaped webs (and also the cribellate amaurobiid genus *Tamgrinia*) (Wang 2002, 2003), although the webs of Coelotinae appear to be much smaller. It seems likely that species of the cribellate *Tamgrinia* are also related to agelenids and coelotines.

When we first examined the three amaurobiid species collected from Nepal and included in this paper, their generic placement was puzzling. After eight years of a failed search for male specimens in hopes of obtaining additional characters to support their generic status, we decided to publish the material on hand as a new genus, *Himalmartensus*, based only on females. Hopefully males will be found in the future based on our published female information. Even without male palpal characters, the differences between *Himalmartensus* new genus and other current amaurobiid and agelenid members are obvious. We defined this new genus as a member of the family Amaurobiidae because of its similarity to amaurobiid *Rubrius* and *Macrobunus*, despite the large geographic distance between them. Of course, the phylogenetic placement of *Rubrius* and *Macrobunus* related amaurobiids needs to be evaluated further. Of the similar genera (Table 1), the new genus *Himalmartensus* is similar to *Rubrius* and some *Macrobunus* species by having a single hairy colulus (Figs. 9, 27, 29), rather than a cribellum found in "true amaurobiids," *Tamgrinia*, *Arctobius*, and some *Macrobunus*, or two patches of setae as in the subfamily Coelotinae, Ageleninae, and the family Cybaeidae. Another similarity between *Himalmartensus* new genus and *Rubrius* is the smooth large hood of the trichobothrial base (Figs. 12, 26, 51), being either longitudinally or transversely striated in other studied taxa. But the four simple tracheal tubes in *Himalmartensus* new genus (Fig. 36) differ from the strongly branched tracheal tubes in *Rubrius*. While in *Cybaeus jilinensis* (Song et al. 1993), there are only two tracheal tubes, which are strongly branched (Fig. 61). In addition, the female epigynum of *Himalmartensus* new genus is modified with long and looping copulatory ducts. Similar coiled copulatory ducts are observed in coelotine *lutulentus*-group species and also in some Cybaeidae species, for example, *Cybaeina minuta* (Banks 1906), but the species of *Himalmartensus* new genus show no evidence of complex spermathecal pore structures as in Cybaeidae. According to Bennett (1992), the complex spermathecal pore structures are also absent in Coelotinae and other amaurobiids.

METHODS

All measurements are in millimeters. Unless indicated otherwise, all scale bars are 0.2 mm length. Legs are not measured. Spinnerets, trichobothria, and tarsal organs are examined using SEM. Other photos are taken from the Olympus Stereo Scope eyepiece using a Nikon Coolpix 4500 camera. Prior to SEM examination, the specimens were either air-dried or critical point dried and coated. Tracheal tubes were examined using Griswold's (1990) method. The spigot names used in the text and figures follow Coddington (1989) and Griswold (1990). The distribution map was generated using GIS ArcView software and the .dbf files of the studied species are downloadable from <http://www.amaurobiidae.com>, which is published and maintained by Xin-Ping Wang.

More photos of the type specimens included in this paper can be viewed from the website <http://www.ChineseSpecies.com> which was created and maintained by Shu-Qiang Li and Xin-Ping Wang.

The types are deposited in the Senckenberg Museum, Frankfurt, Germany (SMF). Abbreviations: AC = aciniform spigots; ALE = anterior lateral eyes; ALS = anterior lateral spinneret; AME = anterior median eyes; CY = cylindrical spigots; mAP = minor ampullate spigots; MAP = major ampullate spigots; PI = piriform spigots; PLE = posterior lateral eyes; PLS = posterior lateral spinneret; PME = posterior median eyes; PMS = posterior median spinneret.

SYSTEMATICS

Family Amaurobiidae Thorell 1870

Himalmartensus Wang & Zhu new genus

Type species.—*Himalmartensus martensi* Wang & Zhu new species.

Other species.—*Himalmartensus ausobskyi* Wang & Zhu new species and *H. nepalensis* Wang & Zhu new species.

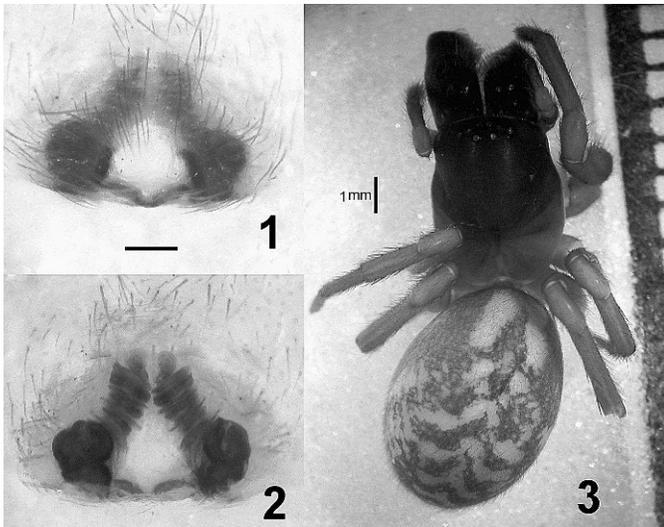
Etymology.—The genus is named in honor of Jochen Martens (Mainz, Germany) for his contribution of amaurobiid specimens that were collected from his Himalayan expeditions. These specimens included a new coelotine genus (*Himalcoelotes* Wang 2002) and 10 species of this genus (Wang 2002). Another 38 coelotines, including 36 new species, have been recognized from Martens material and will be published soon. The gender is masculine.

Diagnosis.—*Himalmartensus* new genus can be diagnosed from other amaurobiids, agelenids, and genera of other related families by at least: (1) AMS represented by colulus as in *Rubrius* and some *Macrobunus* species; (2) single chilum, as in *Rubrius*, and *Amaurobius*-related genera; (3) smooth trichobothrial base, as in *Rubrius* and agelenids, all others being either longitudinally or transversely striated, and (4) four simple tracheal tubes, but branched tubes in *Cybaeus*, *Rubrius* and *Macrobunus*. In addition, both the promargin and retromargin of *Himalmartensus* new genus have 5–8 teeth and the epigynum is modified with long and looping copulatory ducts.

Description.—Females: Medium size cribellate spiders, with total length 8–10 mm. Carapace elongate, reddish brown, slightly narrowed in ocular area, sparsely covered with short, long black setae; few strong setae on clypeus, ocular area, and middle carapace; longitudinal fovea moderately depressed. Legs moderately long. Abdomen dark brown, with dark maculation, heavily covered with short setae (Figs. 3, 14, 15, 23, 33, 37, 45). Spinnerets short. From dorsal view, anterior eye row slightly procurved, posterior row procurved; eye sizes and arrangements: AME smallest, ALE and PLE largest and subequal, PME larger than AME, AME–AME separated by approximately AME diameter, AME–ALE widely separated by approximately 1–1.5 AME diameter, ALE–PLE separated by approximately their radius, PME–PLE and PME–PME distinctly separated by approximately 1.5–2 times PME diameter, AME–PME widely separated by at least 2 times AME diameter (Figs. 6, 16, 42). Clypeus height 1.5–2 times AME diameter, covered with long, strong setae; chilum undivided, hairless (Figs. 6, 16). Chelicerae with 6–7 promarginal teeth, the basal ones largest, and 5–8 retromarginal teeth,

Table 1.—Comparison of eight selected characters of twelve representative species from ten Amaurobiidae genera: *Amaurobius*, *Callobius*, *Taira*, *Tamgrinia*, *Arctobius*, *Pimus*, *Macrobumus*, *Rubrius*, *Himalmartensus*, and *Coelotes*, Agelenidae genus *Agelena*, and Cybaeidae genus *Cybaeus*.

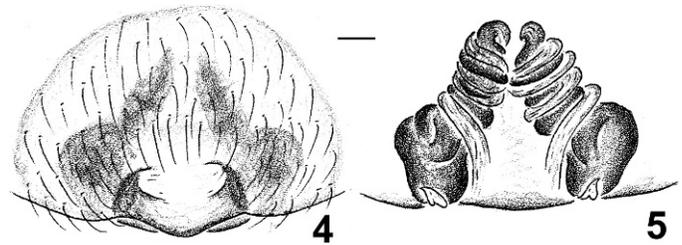
Characters	Coelotes											
	<i>Amaurobius fenestralis</i>	<i>Callobius bennetti</i>	<i>Taira sp.</i>	<i>Tamgrinia laticeps</i>	<i>Arctobius agelenoides</i>	<i>Pimus pitus</i>	<i>Macrobumus multidentatus</i>	<i>Rubrius antarcticus</i>	<i>Himalmartensus martensi</i>	<i>atropos</i> (Wang 2002)	<i>Cybaeus spp.</i> (Figs. 60, 61)	<i>Agelena labyrinthica</i> (Fig. 58)
AMS	cribellum	cribellum	cribellum	cribellum	cribellum	cribellum (Griswold et al. 2005)	colulus	colulus	colulus	setae	setae (Bennett 1988)	setae (Roth & Brame 1972)
Cribrillum	divided	divided	divided	divided	divided	—	—	—	—	—	—	—
PMS paracribellar spigots	present	present	present	absent	absent	present	absent	absent	absent	absent	absent	absent
PLS modified spigot (amaurobiid)	present	present	present	absent	absent	present	absent	absent	absent	absent	absent	absent
PLS spigot of Wang 2000)	present	present	present	absent	absent	present	absent	absent	absent	absent	absent	absent
Chilum	single	single	single	paired	paired	?	absent	single	single	paired	paired (Ihara & Nojima 2004)	smooth
Trichobothria base, large hood striations	transverse	transverse	transverse	transverse	transverse	transverse	longitudinal	smooth or finely striated	smooth	transverse	smooth or finely striated	smooth
Trichobothria base, small hood striations	striated	striated	striated	smooth	smooth	striated	smooth	smooth	smooth	smooth	smooth	smooth
Tracheal middle tubes	four simple tubes	four simple tubes (Griswold et al. 2005)	four simple tubes	four simple tubes	?	four simple tubes (Griswold et al. 2005; <i>Pimus</i> sp.)	four tubes, with median tubes slightly branched (Griswold et al. 2005)	four tubes, with median tubes strongly branched	four simple tubes	four simple tubes	two strongly branched tubes	four simple tubes



Figures 1-3.—*Himalmartensus ausobskyi* new species, female holotype (# 44) from Jiri valley, Dholakha District, Nepal, photos. 1. Epigynum, ventral view; 2. Epigynum, dorsal view; 3. Habitus, dorsal view.

with basal large and distal small; condyle large; dorsal chelicerae covered with long setae, with strongly elevated base; chelicerae ventrally flat, with proximal short setae and inner long, fine setae; fangs moderately long; anterior face of chelicerae covered with dense, long, strong setae (Figs. 22, 44). Endites elongated, with anterior scopula and linear serrula. Labium longer than wide, slightly notched distally. Sternum shield-shaped, sparsely covered with long dark setae, heavily sclerotized (Figs. 7, 17, 43). Legs medium length, I, IV longest, almost subequal, leg III shortest; trochanters not notched; tibiae with about four rows of trichobothria; metatarsi and tarsi with one row of trichobothria; trichobothria with both large and small hoods smooth, not striated (Figs. 12, 26, 51). Tarsal organ with simple opening (Figs. 13, 28, 52). Tarsi with three claws, superior claws with 8-10 teeth; scopulae absent; leg spination often varies among individuals, typical leg spination pattern: femur: I p0-0-2, d1-1-0; II p0-0-1, d1-1-0; III p0-0-1, d1-1-0; IV d1-1-0; tibia: I p0-0-1, v2-2-2; II p0-0-1, v2-2-2; III p0-0-1, v1-2-2; IV d1-0-0; r1-1-0, v1-1-2; metatarsus: I v2-2-2; II v2-2-2; III p0-1-1, r0-1-1, v2-2-2; IV d0-0-1, v1-1-2. Tracheal tubes simple, limited to abdomen; spiracle situated close to spinnerets and connected to relatively narrow atrium from which two lateral and two median tubes arise (Fig. 36). Colulus present, covered with hairs (Figs. 9, 27); ALS short, apex with 2 major ampullate gland spigots (MAP) and 41-55 piriform gland spigots (PI); PMS small, with 2 minor ampullate gland spigots (mAP), 2 aciniform gland spigots (AC), and 1-3 cylindrical gland spigots (CY); PLS second segment short, with approximately 6-17 aciniform gland spigots, and 2 cylindrical gland spigots (Figs. 8-11, 29-32, 47-50). Epigynum simple, atrium small, situated close to epigastric furrow; copulatory ducts long, with 3-7 loops around spermathecae; spermathecae with bases relatively large, widely separated, anteriorly converging with spermathecal heads almost touching each other (Figs. 1, 2, 4, 5, 18-21, 24, 34, 35, 38-41, 46).

Males: unknown.



Figures 4, 5.—*Himalmartensus ausobskyi* new species, female holotype (# 44) from Jiri valley, Dholakha District, Nepal, drawings. 4. Epigynum, ventral view; 5. Epigynum, dorsal view.

Distribution.—Nepal (Fig. 53).

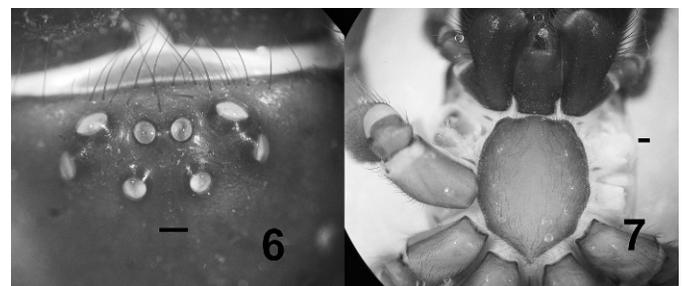
Himalmartensus ausobskyi Wang & Zhu new species
Figs. 1-13, 53

Type specimens.—NEPAL: holotype female, *Dholakha District*, Jiri valley, elev. 2600-3000 m, oak forest, 86°14'E, 27°37'N, 16 January 1970, J. Martens (SMF, #44); 1 female paratype, *Lalitpur District*, Phulchoki Mt., foot-hills near Godavari, elev. 1770 m, 85°23'E, 27°36'N, 19 March 1980. J. Martens & A. Ausobsky (SMF, #105).

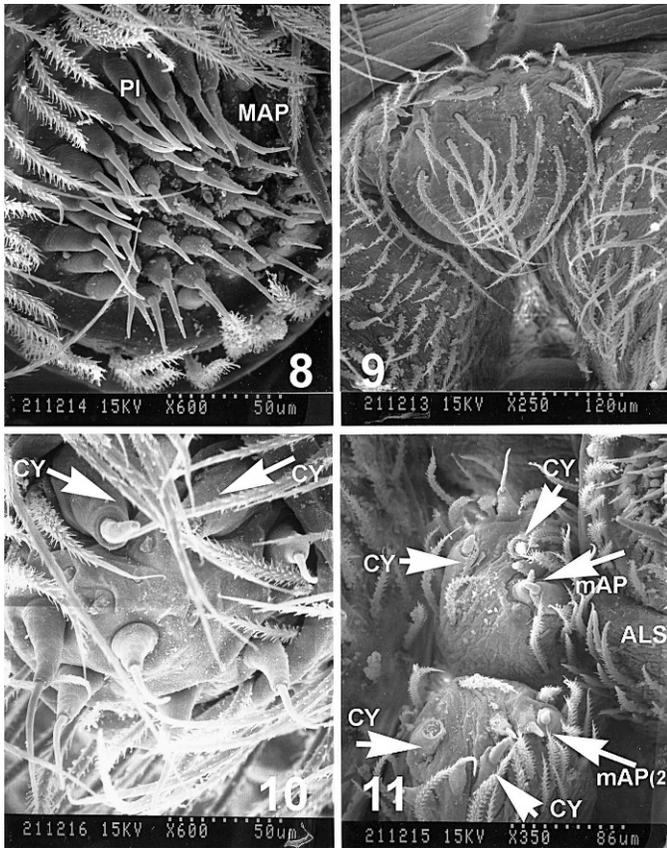
Etymology.—The specific name is after Albert Ausobsky, one of the collectors of the type specimens.

Diagnosis.—*H. ausobskyi* resembles *H. nepalensis* in having long spermathecal stalks (short in *H. martensi*), with long copulatory ducts that loop around spermathecal stalks at least four times, and the narrow, less sclerotized posterior plate of atrium. The spermathecal stalks of this species converge gradually while extending anteriorly (Figs. 2, 5), rather than converging immediately as in *H. nepalensis*.

Description.—Holotype female: Total length 11.3. Carapace 4.80 long, 3.60 wide. Abdomen 6.50 long, 4.90 wide (Fig. 3). Eye sizes and interdistances: AME and PME approximately same size, ALE largest, PLE slightly smaller than ALE (AME 0.16, ALE 0.26, PME 0.17, PLE 0.20); AME separated from each other by 2/3 of its diameter, from ALE by slightly more than AME diameter; PME and PLE widely separated (AME-AME 0.10, AME-ALE 0.21, AME-PME 0.25, PME-PME 0.31, PME-PLE 0.34) (Fig. 6). Chelicerae with 6 promarginal, and 8 retromarginal teeth. Apex of ALS with 2 major ampullate gland spigots (MAP) and approximately 44 piriform gland spigots (PI); PMS with 2 minor ampullate gland spigots (mAP), 2 aciniform gland spigots (AC), 2 cylindrical gland

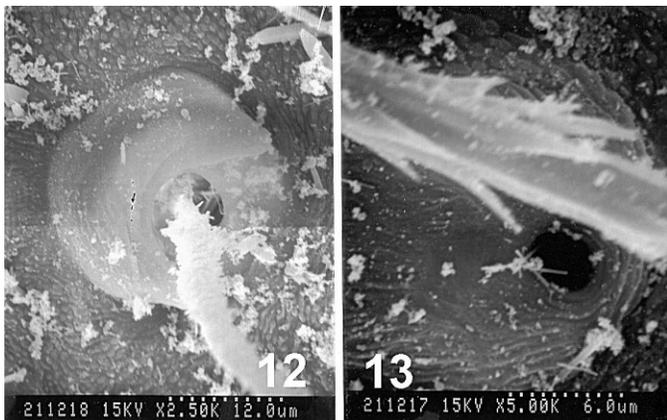


Figures 6, 7.—*Himalmartensus ausobskyi* new species, female holotype (# 44) from Jiri valley, Dholakha District, Nepal, photos. 6. Eyes and chilum, dorsal view; 7. Sternum area, ventral view.

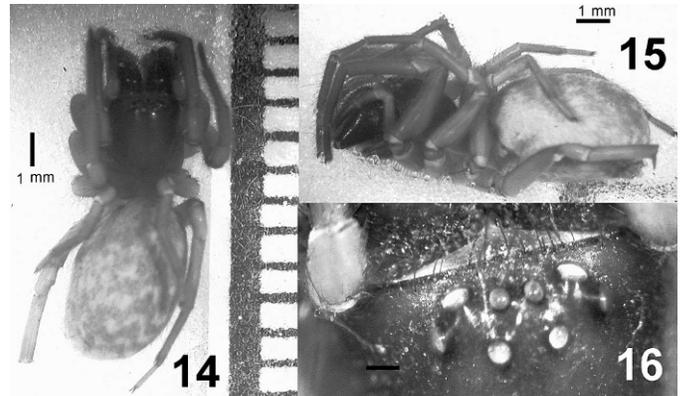


Figures 8–11.—*Himalmartensus ausobskyi* new species, female holotype (# 44) from Jiri valley, Dholakha District, Nepal, SEM, spinnerets in ventral view. 8. ALS (left); 9. Colulus; 10. PLS (left); 11. PMS.

spigots (CY); PLS with approximately 6 aciniform gland spigots, and 2 cylindrical gland spigots (Figs. 8–11). Epigynum with small atrium; atrium with narrow, less sclerotized posterior plate; copulatory ducts originate posteriorly between the spermathecal bases, extending anteriorly, each looping around the long and converging spermathecal stalks at least four times; spermathecae with large bases separated by



Figures 12, 13.—*Himalmartensus ausobskyi* new species, female holotype (# 44) from Jiri valley, Dholakha District, Nepal, SEM. 12. Trichobothrium; 13. Tarsal organ.



Figures 14–16.—*Himalmartensus martensi* new species, female holotype (# 36) from Kathmandu District, Kathmandu valley, Balaju Park, Nepal, photos. 14. Habitus, dorsal view; 15. Habitus, lateral view; 16. Eyes and chilum, dorsal view.

approximately their width; spermathecal stalks extend anteriorly, converging gradually, with distal ends close together (Figs 1, 2, 4, 5).

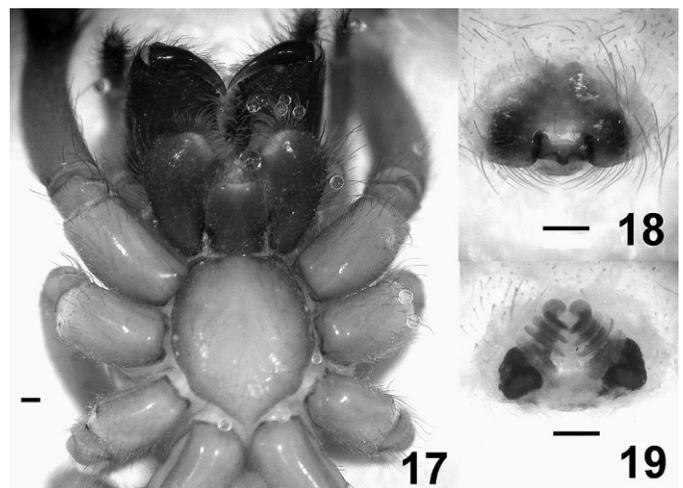
Males unknown.

Distribution.—Nepal (Dholakha, Lalitpur) (Fig. 53).

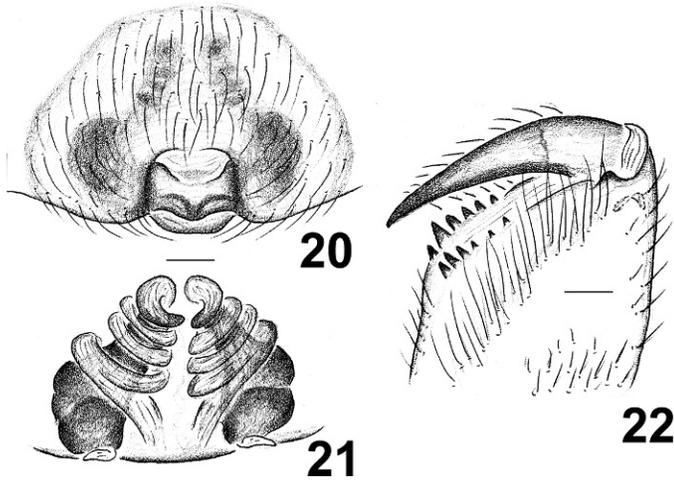
Himalmartensus martensi Wang & Zhu new species

Figs. 14–36, 53

Type specimens.—NEPAL: holotype female, *Kathmandu District*, Kathmandu valley, Balaju Park, elev. 1400 m, 85°17'E, 27°44'N, 1 May 1973, J. Martens (SMF, #36); 1 female paratype, *Lamjung District*, Marsyandi valley, between Tal and Dharapani, forest remnants in gorge, elev. 1580–1850 m, 84°21'E, 28°17'N, 12 April 1980. J. Martens & A. Ausobsky (SMF, #136); 1 female paratype, *Ilan District*, Mai Pokhari, elev. 2100–2200 m, Castganopsis forest remnants, 87°55'E, 26°58'N, 9–10 April 1988, J. Martens & W. Schawaller (SMF, #319, tracheal tubes examined); 1 female paratype, *Myagdi District*, southern Dhaulagiri range, Bobang



Figures 17–19.—*Himalmartensus martensi* new species, female holotype (# 36) from Kathmandu District, Kathmandu valley, Balaju Park, Nepal, photos. 17. Sternum area, ventral view; 18. Epigynum, ventral view; 19. Epigynum, dorsal view.



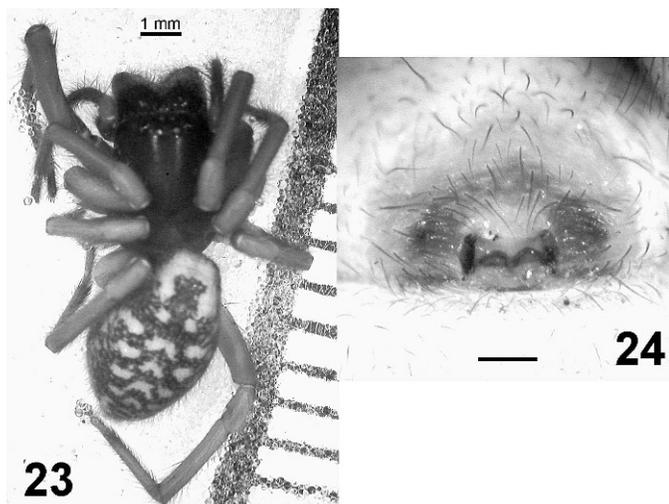
Figures 20–22.—*Himalmartensius martensi* new species, female holotype (# 36) from Kathmandu District, Kathmandu valley, Balaju Park, Nepal, drawings. 20. Epigynum, ventral view; 21. Epigynum, dorsal view; 22. Chelicera, ventral view.

S of Dhorpatan, elev. 2500 m, 26 April–1 May 1970, J. Martens (SMF, #3); 1 female paratype, *Makawanpur District*, Mahabarat Mts., Daman, elev. 2500–2900 m, 22–25 February 1970, J. Martens (SMF, #33).

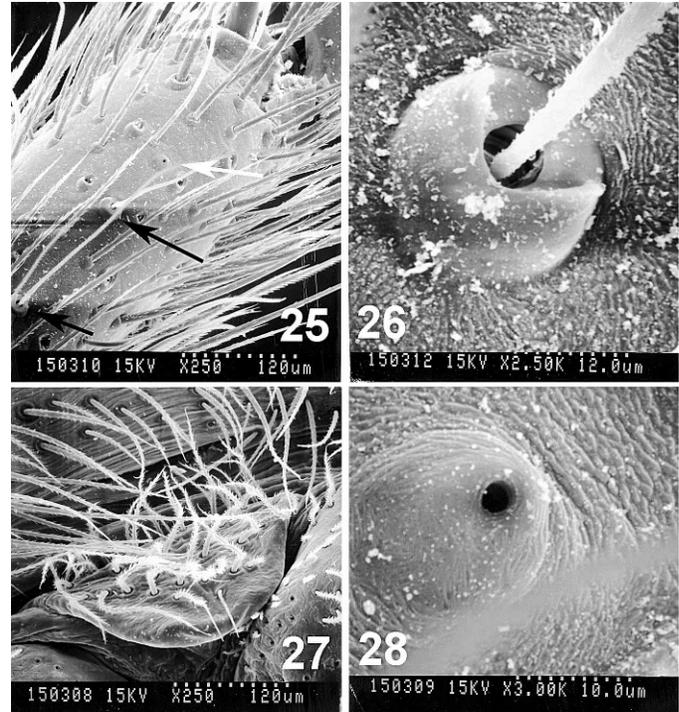
Etymology.—This new species is named in honor of Jochen Martens who collected the specimens used in this and other studies.

Diagnosis.—Compared to the more than four copulatory duct loops in *H. ausobskyi* and *H. nepalensis*, this new species has only 3 loops around the relatively short spermathecal stalk (Figs. 19, 21, 35). In addition, the atrium of this new species has a broad, highly sclerotized plate (Figs. 18, 20, 24, 34).

Description.—Holotype female: Total length 11.3. Carapace 3.10 long, 2.30 wide. Abdomen 5.20 long, 3.40 wide (Figs. 14, 15). Eye sizes and interdistances: AME and PME subequal, ALE largest, PLE slightly smaller than ALE (AME 0.13, PME 0.14, ALE 0.18, PLE 0.16); AME separated from each other



Figures 23, 24.—*Himalmartensius martensi* new species, female paratype (# 319) from Ilan District, Mai Pokhari, Nepal, photos. 23. Habitus, dorsal view; 24. Epigynum, ventral view.



Figures 25–28.—*Himalmartensius martensi* new species, female paratype (# 3) from Bobang Sudl. Dhorpatan, Nepal, SEM. 25. Tarsus, showing position of tarsal organ (white arrow) and two distal-most trichobothria (black arrows); 26. Trichobothrium; 27. Colulus; 28. Tarsal organ.

by 2/3 of its diameter, from ALE by about AME diameter, from PME by approximately 1.5 times AME diameter; posterior eyes widely separated (AME–AME 0.08, AME–ALE 0.13, AME–PME 0.19, PME–PME 0.23, PME–PLE 0.22) (Fig. 16). Chelicerae with 6 promarginal, and 6 retro-marginal teeth (Fig. 22). Apex of ALS with 2 major ampullate gland spigots (MAP) and approximately 55 piriform gland spigots (PI); PMS with 2 minor ampullate gland spigots (mAP), 2 aciniform gland spigots (AC), and 2 cylindrical gland spigots (CY); PLS with approximately 10 aciniform gland spigots, and 2 cylindrical gland spigots (Figs. 29–32). Epigynum with small atrium; atrium with broad, highly sclerotized posterior plate; copulatory ducts originate posteriorly between the spermathecal bases, extend anteriorly and loop around the converging spermathecal stalks 3 times; spermathecae with large bases that are separated by approximately their width; spermathecal stalks extend anteriorly and converge gradually, with distal ends close together (Figs. 18–21).

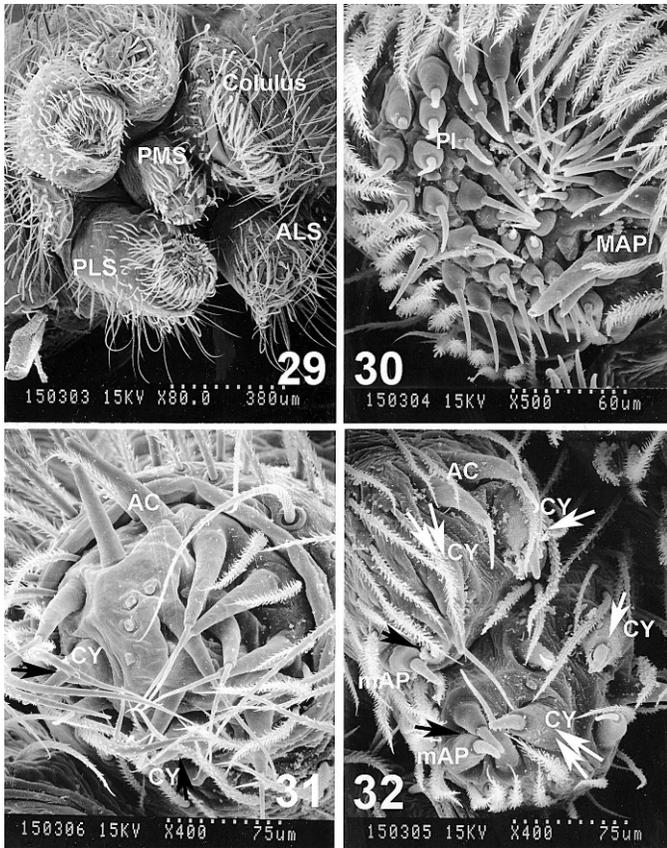
Males unknown.

Distribution.—Nepal (Kathmandu, Lamjung, Ilan) (Fig. 53).

Himalmartensius nepalensis Wang & Zhu new species

Figs. 37–53

Type specimens.—NEPAL: holotype female, *Rasuwa District*, Trisuli Valley, Gosainkund, mixed forest, elev. 2400–2600 m, 85°23'E, 28°8'N, 23 April 1973 (SMF, #38); 1 female paratype, *Rasuwa District*, Trisuli Valley, Gosainkund, moist forest in gorge, elev. 1000–2000 m, 85°19'E, 28°8'N, 23 June?



Figures 29–32.—*Himalmartensus martensi* new species, female paratype (# 3) from southern Dhaulagiri range, Bobang S of Dhorpatan, Myagdi District, Nepal, SEM, spinnerets in ventral view. 29. Spinnerets, whole; 30. ALS (left); 31. PLS (right); 32. PMS.

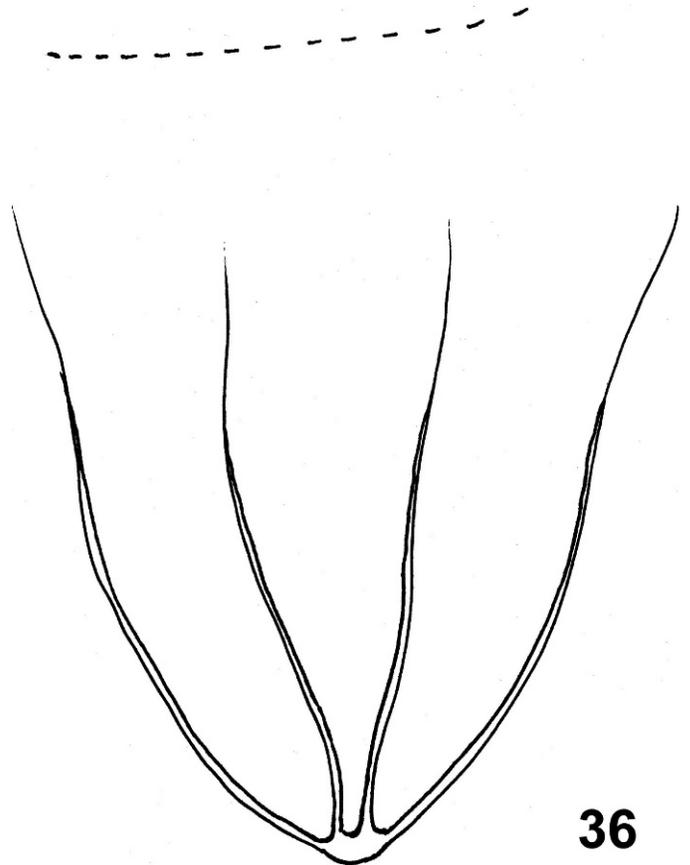
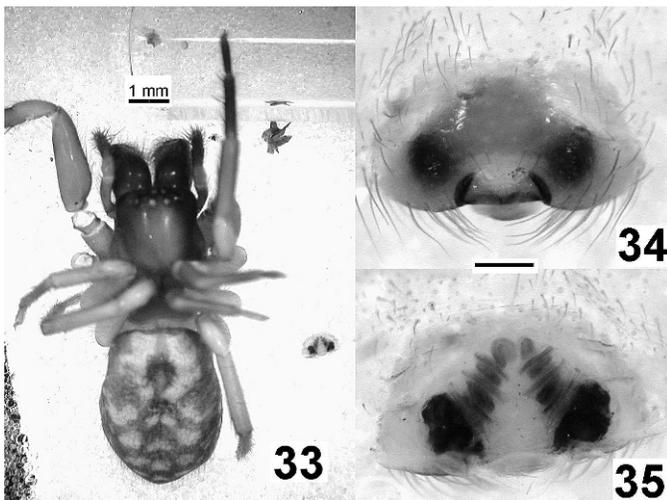
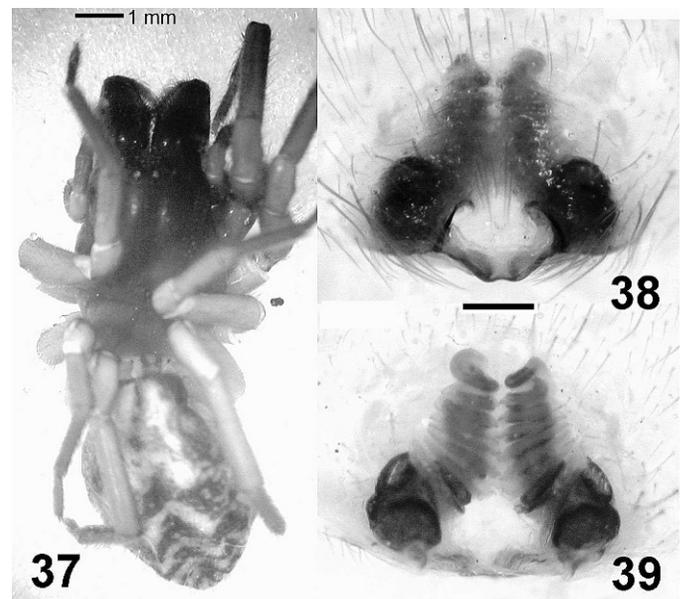


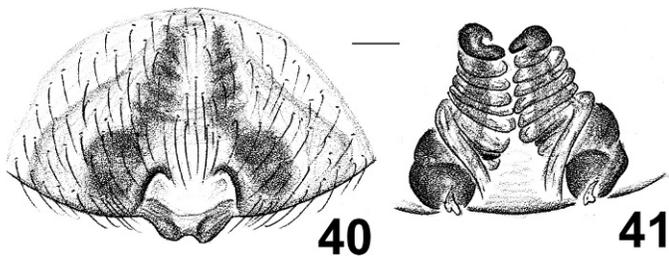
Figure 36.—*Himalmartensus martensi* new species, female paratype (# 319) from Ilan District, Mai Pokhari, Nepal, drawing, tracheal tubes.



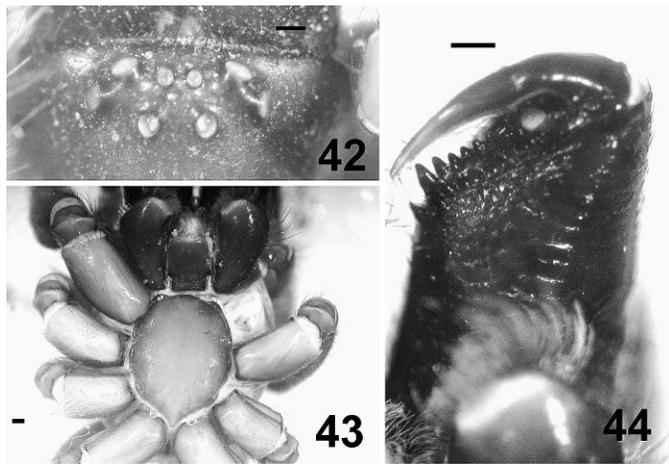
Figures 33–35.—*Himalmartensus martensi* new species, female paratype (# 33) from Mahabarat Mts., Daman, Makawanpur District, Nepal, photo. 33. Habitus, dorsal view; 34. Epigynum, ventral view; 35. Epigynum, dorsal view.



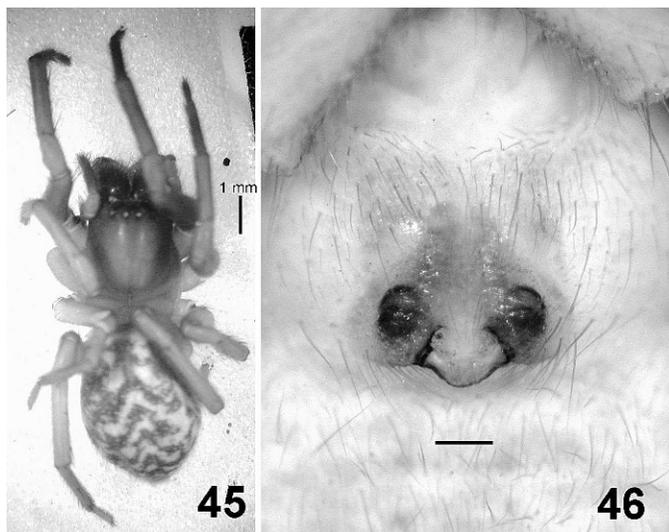
Figures 37–39.—*Himalmartensus nepalensis* new species, female holotype (# 38) from Trisuli valley, Gosainkund, Rasuwa District, Nepal, photos. 37. Habitus, dorsal view; 38. Epigynum, ventral view; 39. Epigynum, dorsal view.



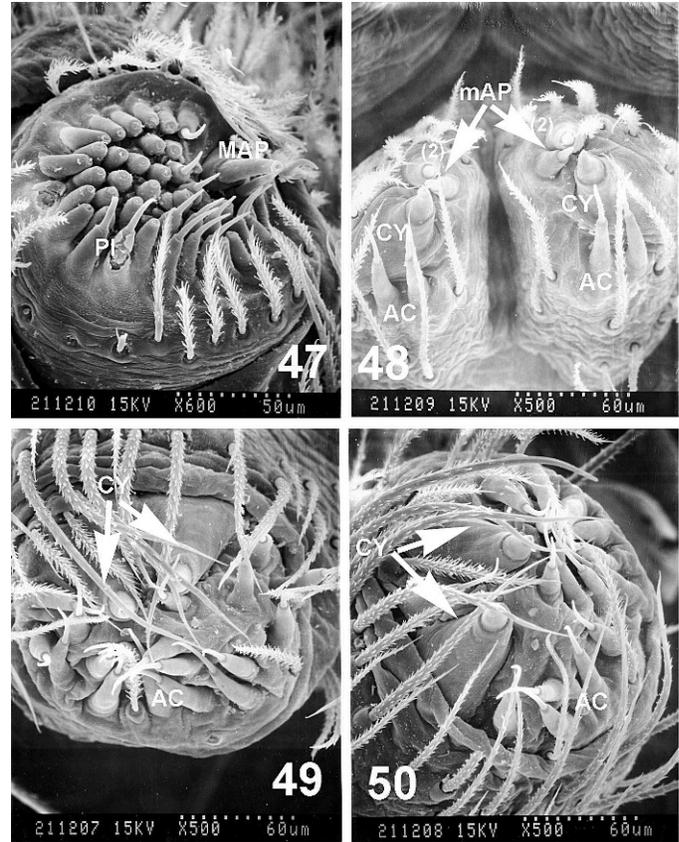
Figures 40, 41.—*Himalmartensus nepalensis* new species, female holotype (# 38) from Trisuli valley, Gosainkund, Rasuwa District, Nepal, drawings. 40. Epigynum, ventral view; 41. Epigynum, dorsal view.



Figures 42–44.—*Himalmartensus nepalensis* new species, female holotype (# 38) from Trisuli valley, Gosainkund, Rasuwa District, Nepal, photos. 42. Eyes, dorsal view; 43. Sternum area, ventral view; 44. Chelicera, ventral view.



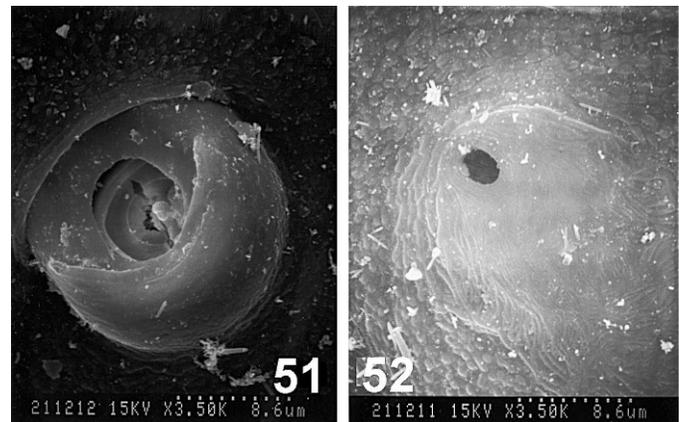
Figures 45, 46.—*Himalmartensus nepalensis* new species, female paratype (# 38A) from Trisuli valley, Gosainkund, moist forest in gorge, Rasuwa District, Nepal, photos. 45. Habitus, dorsal view; 46. Epigynum, ventral view.



Figures 47–50.—*Himalmartensus nepalensis* new species, female paratype (# 37) from Trisuli valley, between Ramche and Dhunche, Rasuwa District, Nepal, SEM, spinnerets in ventral view. 47. ALS (left); 48. PMS; 49. PLS(left); 50. PLS (right).

1973, J. Martens (SMF, #38A); 1 female paratype, *Rasuwa District*, Trisuli Valley, between Ramche and Dhunche, elev. 1800–2000 m, 85°14'E, 28°5'N, 22 April 1973, J. Martens (SMF, #37).

Etymology.—The specific name refers to the type locality of the species, Nepal.



Figures 51, 52.—*Himalmartensus nepalensis* new species, female paratype (# 37) from Trisuli valley, between Ramche and Dhunche, Rasuwa District, Nepal, SEM. 51. Trichobothrium; 52. Tarsal organ.

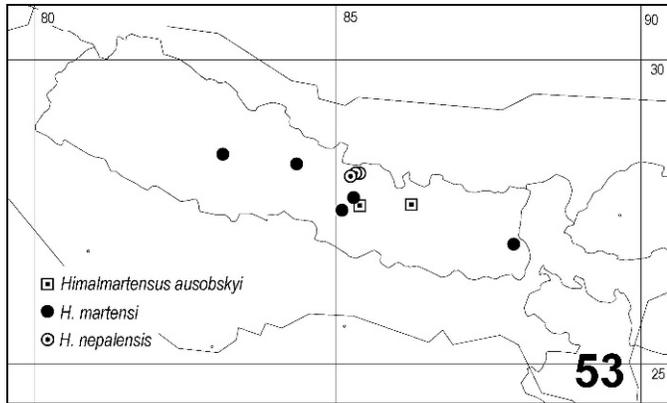
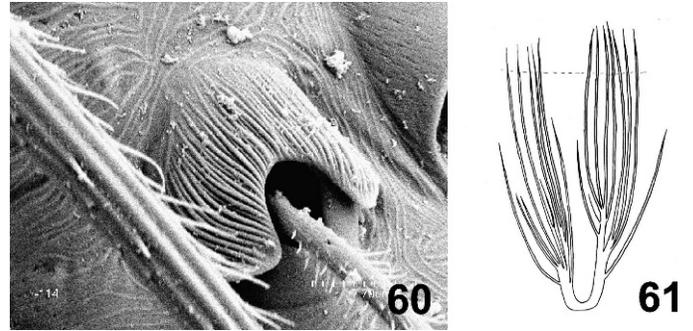


Figure 53.—Records of *Himalmartensus* new genus

Diagnosis.—*H. nepalensis* is similar to *H. ausobskyi* in having long spermathecal stalks and copulatory ducts which loop at least 5 times, and the narrow, less sclerotized posterior plate of atrium. The spermathecal stalks of this new species converge immediately and then extend anteriorly (Figs. 39, 41), rather than converge gradually as in *H. ausobskyi*.

Description.—Holotype female: Total length 11.3. Carapace 4.20 long, 3.40 wide. Abdomen 4.60 long, 3.20 wide (Fig. 37). Eye sizes and interdistances: AME smallest, PME slightly larger than AME, ALE and PLE about the same size (AME 0.11, ALE 0.20, PME 0.15, PLE 0.18); AME separated from each other by less than its diameter, from ALE and PME by about 1.5 times AME diameter; posterior eyes are widely separated (AME–AME 0.08, AME–ALE 0.17, AME–PME 0.17, PME–PME 0.23, PME–PLE 0.26) (Fig. 42). Chelicerae with 7 promarginal and 5 retromarginal teeth (Fig. 44). ALS with 2 major ampullate gland spigots (MAP) and approximately 41 piriform gland spigots (PI); PMS with 2 minor



Figures 60, 61.—Trichobothrium of *Cybaeus tetricus* (C.L. Koch 1839), with specimen from Europe; 61. Tracheal tubes of *Cybaeus jilinensis* (Song, Kim & Zhu 1993), with specimen from Jilin, China.

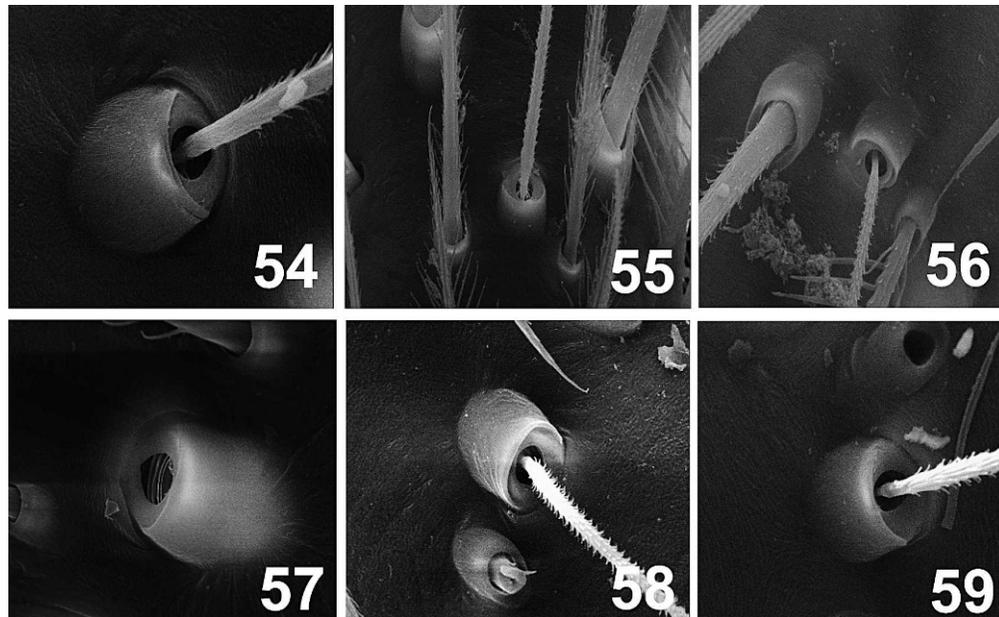
ampullate gland spigots (mAP), 2 aciniform gland spigots (AC), and 1 cylindrical gland spigot (CY); PLS with approximately 17 aciniform gland spigots and 2 cylindrical gland spigots (Figs. 47–50). Epigynum with small atrium having a narrow, weakly sclerotized posterior plate; copulatory ducts originate posteriorly between the spermathecal bases, extend anteriorly and loop around the long and converging spermathecal stalks at least 6 times; spermathecae with large bases separated by approximately their width; spermathecal stalks extend anteriorly and converge gradually, with anterior ends contiguous (Figs. 38–41).

Males unknown.

Distribution.—Nepal (Rasuwa) (Fig. 53).

ACKNOWLEDGMENTS

This research is the result of the Himalaya Expeditions of J. Martens, no. 257. For no. 256, see: Acta Arachnologica 56:15–19, 2007. J. Martens was sponsored by Deutscher Akade-



Figures 54–59.—Trichobothria of six agelenid species, with specimens collected from China (No detailed collection data linked to SEM photos). 54. *Agelena koreana* Paik 1965; 55. *Allagelena difficilis* (Fox 1936); 56. *Allagelena bistrinata* (Grube 1861); 57. *Agelena silvatica* Oligier 1893; 58. *Agelena labyrinthica* (Clerck 1757); 59. *Huangyuania tibetata* (Hu & Li 1987).

mischer Austauschdienst, Deutsche Forschungsgemeinschaft and Feldbausch Foundation, Mainz University.

We thank J. Martens (Institute of Zoology, Mainz University, Germany) for providing the specimens used in this study and for helping create the distribution map. J. Martens, C.E. Griswold (California Academy of Sciences, San Francisco), R.G. Bennett (British Columbia Ministry of Forests, Victoria, Canada) and S.Q. Li (Institute of Zoology, Chinese Academy of Sciences, Beijing) kindly read the manuscript and gave valuable comments. Z.S. Zhang (Southwest University, Chongqing, China) helped with agelenid SEM photos and the illustration of *Cybaeus* tracheal tubes. We like to thank I. Agnarsson (University of Akron, Ohio) and two anonymous reviewers for their comments. The first author thanks the American Museum of Natural History (New York, N.I. Platnick), the California Academy of Sciences (San Francisco, C.E. Griswold) and the Florida State Collection of Arthropods (Gainesville, G.B. Edwards) for the use of their facilities.

LITERATURE CITED

- Bennett, R.G. 1988. The spider genus *Cybaeota* (Araneae, Agelenidae). *Journal of Arachnology* 16:103–119.
- Bennett, R.G. 1992. The spermathecal pores of spiders with special reference to dictynoids and amaurobioids (Araneae, Araneomorphae, Araneoclada). *Proceedings of the Entomological Society of Ontario* 123:1–21.
- Bi, K.R., K.Y. Zhou & D.X. Song. 2005. Phylogenetic position of the spider subfamily Coelotinae (Araneae) inferred from nuclear rDNA gene sequences. *Acta Zoologica Sinica* 51:521–525.
- Coddington, J.A. 1989. Spinneret silk spigot morphology: evidence for the monophyly of orbweaving spiders, Crytophorinae (Araneidae), and group Theridiidae plus Nesticidae. *Journal of Arachnology* 17:71–95.
- Coddington, J.A. & H.W. Levi. 1991. Systematics and evolution of spiders (Araneae). *Annual Review of Ecology and Systematics* 22:565–592.
- Griswold, C.E. 1990. A revision and phylogenetic analysis of the spider subfamily Phyxelidinae (Araneae, Amaurobiidae). *Bulletin of the American Museum of Natural History* 196:1–206.
- Griswold, C.E., J.A. Coddington, N.I. Platnick & R.R. Forster. 1999. Towards a phylogeny of entelegyne spiders (Araneae, Araneomorphae, Entelegynae). *Journal of Arachnology* 27:53–63.
- Griswold, C.E., M.J. Ramírez, J.A. Coddington & N.I. Platnick. 2005. Atlas of phylogenetic data for entelegyne spiders (Araneae: Araneomorphae: Entelegynae) with comments on their phylogeny. *Proceedings of the California Academy of Sciences*, 4th Series, Volume 56, Supplement II. Pp. 1–324.
- Ihara, Y. & K. Nojima. 2004. Geographic distribution of the *Cybaeus kuramotoi*-group (Araneae: Cybaeidae) in Okayama, Tottori and Hyogo Prefectures, western Honshu, Japan, with descriptions of five new species. *Acta Arachnologica* 53:131–146.
- Lehtinen, P.T. 1967. Classification of the cribellate spiders and some allied families, with notes on the evolution of the suborder Araneomorpha. *Annales Zoologici Fennici* 4:199–468.
- Platnick, N.I. 2008. The World Spider Catalog, Version 8.5. American Museum of Natural History, New York. Online at <http://research.amnh.org/entomology/spiders/catalog/index.html>.
- Roth, V.D. & P.L. Brame. 1972. Nearctic genera of the spider family Agelenidae (Arachnida, Araneida). *American Museum Novitates* 2505:1–51.
- Spagna, J.C. & R.G. Gillespie. 2008. More data, fewer shifts: molecular insights into the evolution of the spinning apparatus in non-orb-weaving spiders. *Molecular Phylogenetics and Evolution* 46:347–368.
- Wang, X.P. 2000. A revision of the genus *Tamgrinia* (Araneae: Amaurobiidae), with notes on amaurobiid spinnerets, tracheae and trichobothria. *Invertebrate Taxonomy* 14:449–464.
- Wang, X.P. 2002. A generic-level revision of the spider subfamily Coelotinae (Araneae, Amaurobiidae). *Bulletin of the American Museum of Natural History* 269:1–150.
- Wang, X.P. 2003. Species revision of the coelotine spider genera *Bifidocoelotes*, *Coronilla*, *Draconarius*, *Femoracoelotes*, *Leptocoelotes*, *Longicoelotes*, *Platocoelotes*, *Spiricoelotes*, *Tegecoelotes*, and *Tonsilla* (Araneae: Amaurobiidae). *Proceedings of the California Academy of Sciences* 54:499–662.
- Wu, C., D.X. Song & M.S. Zhu. 2002. On the phylogeny of some important groups of spiders by using the third domain of 12S rRNA gene sequence analyses. *Acta Arachnologica Sinica* 11:65–73.

Manuscript received 10 December 2007, revised 16 March 2008.