

## Revision and cladistic analysis of the genus *Hemirrhagus* Simon, 1903 (Araneae, Theraphosidae, Theraphosinae)

Fernando Pérez-Miles

Sección Entomología, Facultad de Ciencias,  
Iguá 4225, 11400 Montevideo, Uruguay

and

Arturo Loch

Laboratorio de Acarología, Facultad de Ciencias,  
Universidad Nacional Autónoma de México,  
Coyoacán 04510, D.F., México

### Summary

The genus *Hemirrhagus* Simon, 1903 is reviewed on the basis of the study of types and new collections from Mexico. Six new species are described and illustrated. *Hemirrhagus peruvianus* Chamberlin, 1916 and *Hemirrhagus major* Chamberlin, 1916, both from Peru, are here removed from *Hemirrhagus* because they lack the diagnostic characters of the genus; they are transferred to *Homoeomma* Ausserer, 1871 and *Hapalotremus* Simon, 1903 respectively (new combinations). As a result of the study of types of all species of *Spelopelma* Gertsch, 1982, found mostly in caves, this genus is considered a junior synonym of *Hemirrhagus* because they share characters of generic significance. Thus, the subfamily Spelopelminae Smith, 1995 is here regarded as a synonym of the subfamily Theraphosinae Thorell, 1870. Also *Cyrtopholis pernix* (Ausserer, 1875) is transferred to *Hemirrhagus*. A total of 15 species included in this genus are diagnosed and keyed. A phylogenetic analysis of the species was performed and one fittest tree (fit=164.4; 47 steps; CI 0.55; RI 0.70) was found.

### Introduction

The genus *Hemirrhagus* Simon, 1903 was known from the female holotype of the type species, *H. cervinus* (Simon, 1891), and from *H. peruvianus* Chamberlin, 1916 and *H. major* Chamberlin, 1916. The last two species are here removed from *Hemirrhagus* because they lack the diagnostic characters of the genus. Pérez-Miles (1998) transferred *Hemirrhagus* from Ischnocolinae *incertae sedis*, where it was placed by Raven (1985), to Theraphosinae, on the basis of the presence of a new type of urticating hairs found in the holotype of *H. cervinus*. The study of types and additional material attributed to *Spelopelma* Gertsch, 1982 led us to observe that several species of this genus, as well as *Cyrtopholis pernix* (Ausserer, 1875) and other undescribed species of *Hemirrhagus* also have this type VI of urticating hairs. Also the palpal organ morphology, the spermathecal structure and the presence of retrolateral-ventral coxal heels are shared by all the above-mentioned taxa, which lead us to establish the synonymy of *Spelopelma* and *C. pernix* with *Hemirrhagus*. *Spelopelma* was considered as Theraphosidae *incertae sedis* by Raven (1985: 116). Smith (1995) proposed the new subfamily Spelopelminae for *Spelopelma* because of the weakly-developed eye tubercle and eyes which may be completely absent in some cave-dwelling species. Schmidt (1997) agreed with this author but misinterpreted the urticating hairs as

being type II, as had also been done by Gertsch (1982: 91) for *Spelopelma elliotti* (Gertsch, 1973). Schmidt (1997) also disregarded the presence of a clear keel on the male palpal organ to support this conclusion. As a consequence of our study the genus *Hemirrhagus* (including its junior subjective synonym *Spelopelma*) is here placed in the Theraphosinae, mainly because of the presence of type VI urticating hairs (of Pérez-Miles, 1998) and the presence of a palpal organ with an extended subtegulum and a developed keel. The absence of urticating hairs in some species could be interpreted as reversions related to troglobitic habits, like the loss of eyes. Thus the subfamily Spelopelminae, based solely on the reduction or lack of eyes, cannot be supported, and is here considered as a junior synonym of Theraphosinae. Six new species of *Hemirrhagus* are here described from Mexico. A phylogenetic analysis of the species resulted in one fittest tree of 47 steps, CI 0.55, RI 0.70, fit 164.4.

### Methods

**Abbreviations:** AME=anterior median eyes, ALE=anterior lateral eyes, PME=posterior median eyes, PLE=posterior lateral eyes, OQ=ocular quadrangle (including lateral eyes); d=dorsal, p=prolateral, r=retrolateral, v=ventral; AMNH=American Museum of Natural History, New York; BMNH=Natural History Museum, London; LAAH=Laboratorio de Acarología “Anita Hoffmann”, Facultad de Ciencias, Universidad Autónoma de México; LAE=Laboratorio de Acarología, Instituto de Ecología, Universidad Autónoma de México; MCZ=Museum of Comparative Zoology, Harvard, USA; MNHNP=Museum National d’Histoire Naturelle, Paris, France; UNAM=Universidad Autónoma de México; USP=Universidad de São Paulo, Brazil. All measurements are in mm.

**Taxa:** Fifteen species of *Hemirrhagus* considered in the present review are included as terminal taxa for the analysis. In a first run the genera *Euathlus* Ausserer, *Grammostola* Simon, *Plesiopelma* Pocock and *Homoeomma* Ausserer were used as outgroups to test the monophyly of *Hemirrhagus*, considering their basal position in the cladograms proposed by Pérez-Miles *et al.* (1996) and Pérez-Miles (2000) for Theraphosinae.

**Characters:** Character distribution is shown in Table 10. (0) Eyes: eight eyes present=0, PME absent=1, all eyes absent=2. (1) Ocular tubercle: normally developed (as in general in theraphosids)=0, reduced=1, very reduced (without elevation)=2. (2) Periocular pigmentation: absent=0, divided (involving some areas around eyes)=1, entire (one area involving all eyes)=2. (3) Labial cuspules: numerous (more than 25)=0, reduced (5–15)=1, very reduced (1 or 2)=2. (4) Scopulae on tarsi IV: divided by longitudinal band of longer and thicker spiniform setae=0, entire=1. (5) Female tibia I: with 0–8 spines=0, with 10 or more spines=1. (6) Female tibia II spination (coded as 5). (7) Female tibia III spination (coded as 5). (8) Female tibia IV spination (coded as 5). (9) Female metatarsus I spination (coded as 5). (10) Female metatarsus II spination (coded as 5).

(11) Female metatarsus III spination (coded as 5). (12) Female metatarsus IV spination (coded as 5). (13) Type VI urticating hairs: absent=0, present=1. (14) Patch of urticating hairs: diffuse, extended or oval=0, in a heart-like patch=1, in a butterfly-like patch=2 (absence or two patches coded as ?). (15) Disposition of urticating hairs: one patch or diffuse=0, two round patches clearly delimited=1 (absence coded as ?). (16) Area of urticating hairs: not extended=0, extended laterally, in anterior–posterior direction=1. (17) Spermathecal receptacles: separated or slightly fused (less than half spermathecal length)=0, widely fused (fusion zone more than half spermathecal length)=1. (18) Spermathecal receptacles: not close together at base (most species)=0, close together at base (*H. puebla*)=1. (19) Spermathecal receptacles: without clear inflexion in neck=0, with clear inflexion in neck=1. (20) Subtegulum: not notched at base of keel=0, notched at base of keel=1. (21) Specialised plumose setae on prolateral face of trochanter I: absent=0, present=1. (22) Retrolateral–ventral coxal heels: absent=0, present=1. Multistate character 2 was coded as non-additive.

*Computer assisted methods:* A data matrix of 19 taxa (including the outgroups) and 23 characters (Table 10) was analysed. To test the monophyly of *Hemirrhagus* a first run was carried out using an Ms-Dos computer program, Hennig 86, developed by Farris (1988), considering *Euathlus*, *Grammostola*, *Plesiopelma* and *Homoeomma* as outgroups. Then, a cladistic analysis was performed using an Ms-Dos program, Pee-Wee, developed by Goloboff (1993a, b). To find the fittest trees we used heuristic search with 15 additive sequences and tree bisection reconnection; the concavity index was 6, following Ramírez (1998).

### Genus *Hemirrhagus* Simon, 1903

*Hemirrhagus* Simon, 1903: 926; Strand, 1907: 16; 1912: 175; Petrunkevitch, 1911: 71; 1928: 78; Roewer, 1942: 231; Raven, 1985: 116; Smith, 1995: 185; Pérez-Miles, 1998: 121.

*Spelopelma* Gertsch, 1982: 87; Smith, 1995: 32. **New synonymy.**

*Type species:* *Hemirrhagus cervinus* (Simon, 1891).

*Diagnosis:* Differs from other theraphosine genera by the retrolateral projections ventrally on coxae of all legs. Also differs by the presence of type VI urticating hairs (Pérez-Miles, 1998) in most species, with the exception of *H. grieta*, *H. mitchelli*, *H. puebla*, *H. reddelli* and *H. stygius*. Additionally differs from most theraphosine genera in the palpal organ morphology, with only one retrolateral spiral keel (Figs. 5, 6, 14, 15, 24, 25). The only other theraphosine genus which includes some species having only one retrolateral keel on the palpal organ is *Aphonopelma* Pocock, 1901, but in this genus the keel is less developed and placed more distally and prolaterally.

*Composition:* Fifteen species: *Hemirrhagus cervinus* (Simon, 1891), *H. chilango* sp. n., *H. coztic* sp. n., *H. eros* sp. n., *H. gertschi* sp. n., *H. ocellatus* sp. n., *H. papalotl* sp. n., *H. elliotti* (Gertsch, 1973) comb. n., *H. grieta* (Gertsch, 1982) comb. n., *H. mitchelli* (Gertsch, 1982) comb. n., *H. nahuanus* (Gertsch, 1982)

comb. n., *H. puebla* (Gertsch, 1982) comb. n., *H. reddelli* (Gertsch, 1973) comb. n., *H. stygius* (Gertsch, 1971) comb. n., *H. pernix* (Ausserer, 1875) comb. n.

*Misplaced species:* Examination of type specimens of *Hemirrhagus major* Chamberlin, 1916 and *H. peruvianus* Chamberlin, 1916 (all deposited in MCZ, examined) confirms that neither of these species belongs to *Hemirrhagus*. *Hemirrhagus major* is formally transferred to *Hapalotremus* Simon, 1903 comb. n., and *H. peruvianus* is transferred to *Homoeomma* Ausserer, 1871 comb. n.

*Comments:* *Spelopelma* was placed in the Theraphosidae *incertae sedis* by Raven (1985); Smith (1995) created the subfamily Spelopelminae for this genus, based only on the reduction or absence of eyes, which is usually found in troglobitic fauna. This was followed by Schmidt (1997), who misinterpreted the urticating hairs as being type II, as also did Gertsch (1982), and disregarded the presence of a developed keel on the palpal bulb. *Spelopelma* and *Hemirrhagus* share the retrolateral–ventral heel on all coxae, the similar morphology of the palpal organ, and the presence of type VI urticating hairs in some species of both genera. The absence of these urticating hairs in some species seems to be a secondary loss related to the adaptation to troglobitic habits, as is the loss or reduction of the eyes and ocular tubercle. Thus, the synonymy between *Spelopelma* Gertsch, 1982 and *Hemirrhagus* Simon, 1891, and that between Spelopelminae Smith, 1995 and Theraphosinae Thorell, 1870, is here established. *Cyrtopholis pernix* (Ausserer, 1875) is here transferred to *Hemirrhagus* because of sharing the presence of type VI urticating hairs, palpal organ morphology and retrolateral–ventral coxal heels. *Hemirrhagus major* is placed in *Hapalotremus* because of the characteristic palpal organ morphology and other characters of generic significance. *Hemirrhagus peruvianus* is placed in *Homoeomma* because of sharing the palpal organ morphology, with a digitiform apophysis, and other characters of generic significance.

### Key to species

1. Urticating hairs present ..... 2  
— Urticating hairs absent ..... 11
2. Urticating hairs arranged in two lateral round patches ..... 3  
— Urticating hairs arranged otherwise ..... 4
3. Reduced number of labial cuspules (fewer than 15) .....  
..... *H. ocellatus*  
— Numerous labial cuspules (more than 25) ..... *H. chilango*
4. Periocular pigmentation divided (Fig. 22) in combination with spinose metatarsi III and IV (more than 15 spines) and divided scopula. Males with spinose tibia IV (10 spines or more) ..... *H. gertschi*  
— Not as above ..... 5
5. Numerous labial cuspules (more than 25) ..... 6  
— Reduced number of labial cuspules (fewer than 15) ..... 9
6. Reduced spination on tibia IV (fewer than 5 spines), scopula entire, heart-like urticating hair patch ..... *H. eros*  
— Normal spination on tibia IV (more than 15 spines) ..... 7

- 7. Ocular tubercle reduced ..... *H. nahuanus*  
— Ocular tubercle normally developed ..... 8
- 8. Plumose setae present on trochanter I (retrolateral face).....  
..... *H. pernix*  
— Plumose setae absent ..... *H. cervinus*
- 9. Tarsal scopula entire, butterfly-like urticating hair patch.....  
..... *H. papalotl*  
— Tarsal scopula divided, urticating hair patch otherwise ..... 10
- 10. Periocular pigmentation entire (surrounding all eyes, Fig. 8).....  
..... *H. coztic*  
— Periocular pigmented area divided ..... *H. elliotti*
- 11. Eight eyes present ..... 12  
— PME absent or all eyes absent ..... 14
- 12. Ocular tubercle well developed ..... *H. stygius*  
— Ocular tubercle reduced ..... 13
- 13. Spermathecal receptacles widely fused, with narrow base  
(Gertsch, 1982; fig. 16) ..... *H. puebla*  
— Spermathecal receptacles separated ..... *H. reddelli*
- 14. Eyes completely absent ..... *H. grieta*  
— Only PME absent ..... *H. mitchelli*

***Hemirrhagus cervinus* (Simon, 1891) (Table 1)**

*Cratorrhagus cervinus* Simon, 1891: 330 (D♀); F. O. P.-Cambridge, 1899: 41, pl. 2, fig. 1.

*Hemirrhagus cervinus*: Simon, 1903: 926, fig. 1077; Strand, 1907: 16; 1912: 175; Petrunkevitch, 1911: 71; 1928: 78; Roewer, 1942: 231; Raven, 1985: 116; Smith, 1995: 185, figs. 1032–1033; Pérez-Miles, 1998: 121, figs. 1–6.

**Type:** Holotype ♀ from Mexico, without locality data, deposited in MNHNP, # 756, examined.

**Diagnosis:** Differs from most species of *Hemirrhagus* by the presence of a normally developed ocular tubercle, from *H. pernix* by the absence of plumose setae on trochanter I, from *H. eros* by the divided tarsal scopulae and from *H. stygius* by the presence of urticating hairs.

**Female:** Total length, not including chelicerae or spinnerets, 32. Prosoma length 10.5, width 10. Anterior eye row straight, posterior row recurved. Eye sizes and interdistances: AME 0.76, ALE 0.40, PME 0.40, PLE 0.24; AME-AME 0.24, AME-ALE 0.10, PME-PME 0.76, PME-PLA 0.06, ALE-PLA 0.12; OQ length 1.00, width 1.95, clypeus height 0.30. Ocular tubercle normally developed, periocular pigmentation absent. Fovea transverse, straight, width 2.2. Labium length 1.2, width 1.7, with 35 cuspules. Maxillae with 126 cuspules. Sternum length 4.7, posterior sternal sigilla large, oval, submarginal. Chelicera with 20 teeth on promargin (8 small, 2 medium, 10 large). Tarsi I–IV scopulate, scopula divided. Metatarsi I–III scopulate, IV scopulate on distal end. Length of legs and palpal segments as in Table 1. Spination: femora II 1d; III 3d; IV 1d, 1p;

	I	II	III	IV
<b>Femur</b>	9.2	8.2	8.0	10.5
<b>Patella</b>	5.6	5.1	4.5	4.7
<b>Tibia</b>	7.0	6.3	6.0	8.3
<b>Metatarsus</b>	6.4	6.2	7.7	11.0
<b>Tarsus</b>	5.2	5.2	5.4	6.4

Table 1: *Hemirrhagus cervinus* (Simon). Female holotype, length of leg segments (the holotype lacks palps).

patellae I–IV 0; tibiae I 6v, 2p; II 6v, 1p; III 7v, 3p, 3r; IV 2v, 7p, 5r; metatarsi I 3v; II 5v, 2p; III 3d, 6v, 4p, 4r; IV 5d, 3v, 7p, 4r; tarsi I–IV 0. Prosoma and legs orange-brown, opisthosoma yellow-brown with round posterior grey-brown patch. Type VI urticating hairs present in one patch. Spermathecae, see Pérez-Miles (1998: fig. 6).

**Distribution:** Mexico, known only from the holotype.

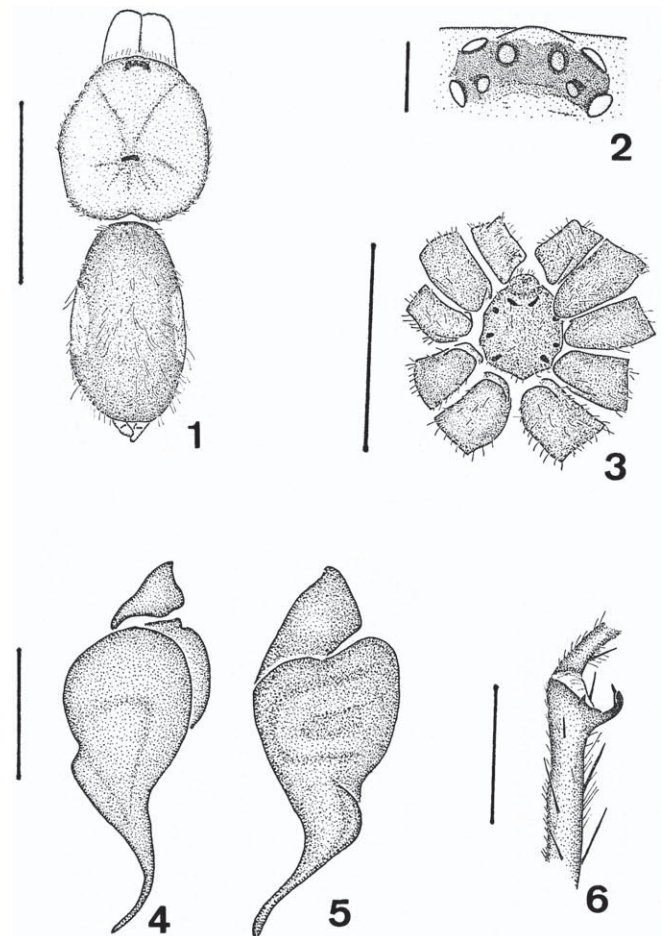
***Hemirrhagus chilango*, new species (Figs. 1–6, Table 2)**

**Type:** Holotype ♂ from Pedregal de San Ángel, Mexico, D.F. (19° 18' N, 99° 11' W), 15 November 1977, A. Zaldivar, deposited in LAAH.

**Etymology:** Noun in apposition, masculine singular. Chilango is a popular name given to the people living in Mexico City; it refers to the type locality.

**Diagnosis:** Differs from other *Hemirrhagus* species by the two oval patches of urticating hairs, situated laterally and widely separated on the opisthosoma, and from *H. ocellatus* by the more developed ocular tubercle and larger number of labial cuspules (more than 25).

**Male (Figs. 1–6):** Total length, not including chelicerae or spinnerets, 21.3. Prosoma length 9.1, width 8.3.



Figs. 1–6: *Hemirrhagus chilango* sp. n., male holotype. **1** Body, dorsal view; **2** Ocular region, dorsal view; **3** Prosoma, ventral view; **4** Left palpal organ, ventral view; **5** Ditto, retrolateral view; **6** Tibial apophysis of left leg I, prolateral view. Scale lines = 10 mm (1, 3), 5 mm (6), 1 mm (2, 4, 5).

	I	II	III	IV	Palp
Femur	8.3	7.9	7.5	9.5	6.1
Patella	4.6	4.2	3.8	4.1	3.5
Tibia	6.7	6.2	6.3	7.8	5.1
Metatarsus	7.3	6.9	7.1	11.5	—
Tarsus	5.9	5.4	5.5	6.6	2.5

Table 2: *Hemirrhagus chilango* sp. n. Male holotype, length of leg and palpal segments.

Anterior eye row slightly procurved, posterior row recurved. Eye sizes and interdistances: AME 0.20, ALE 0.28, PME 0.14, PLE 0.30; AME-AME 0.20, AME-ALE 0.16, PME-PME 0.76, PME-PLE 0.08, ALE-PLE 0.20; OQ length 0.64, width 1.54; clypeus height 0.16. Ocular tubercle slightly reduced, periocular pigmentation entire (Fig. 2). Fovea transverse, procurved, width 1.60. Labium length 1.10, width 1.30, with 28 cuspules. Maxilla with 114 cuspules. Sternum length 3.6, posterior sternal sigilla oval, submarginal (Fig. 3). Chelicera with 15 teeth on promargin (5 small, 10 large). Tarsi I–IV scopulate, scopula I entire, II–IV divided. Metatarsi I scopulate, II–IV scopulate on distal end. Tibia of leg I with prolateral double apophysis (Fig. 6). Palpal organ with one wide keel (Figs. 4–5). Length of legs and palpal segments as in Table 2. Spination: femora II 4p; III 1d, 2r; patellae II 3p; IV 1d; tibiae I 6v, 3p, 5r; II 7v, 5p, 4r; III 4v, 4p, 1r; IV 3v, 9p; palp 3v, 1p; metatarsi I 3v, 1p; II 2d, 3v, 2p, 1r; III 5v, 2p, 4r; IV 3d, 6v, 7p, 5r; tarsi I–IV 0. Prosoma and legs orange-brown, opisthosoma yellow-brown with two golden lateral patches. Type VI urticating hairs present, arranged in two lateral patches (Fig. 1).

*Female*: Unknown.

*Other material examined*: Pedregal de San Ángel, Mexico, D.F., 13 September 1985, 1 juv., no collector's name, deposited in LAE.

*Distribution*: Known only from Pedregal de San Ángel, Mexico, D.F.

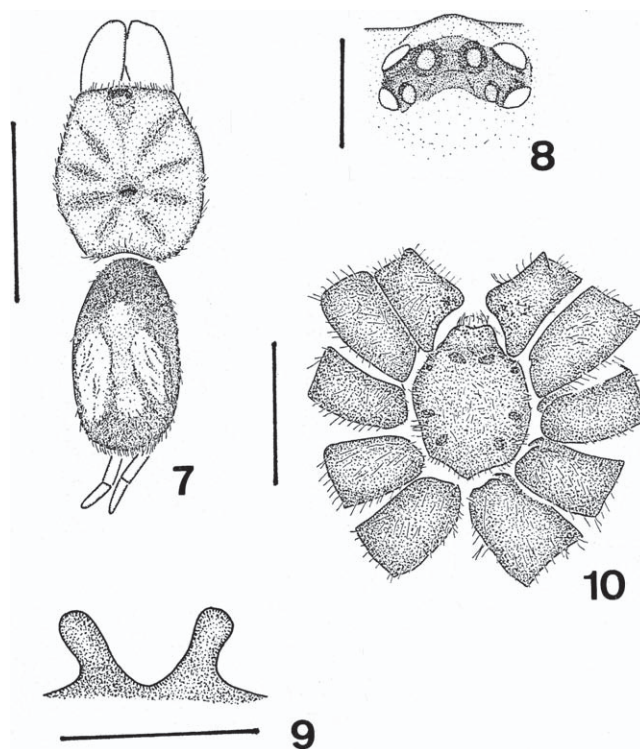
#### *Hemirrhagus coztic*, new species (Figs. 7–10, Table 3)

*Type*: Holotype ♀ from Cueva del Diablo (19°01' N, 99°04' W), Tepoztlán, Morelos, Mexico, 26 November 1978, E. López, deposited in LAAH.

*Etymology*: Coztic is a noun in apposition taken from the Nahuatl language and means yellow, referring to the colour of this species.

*Diagnosis*: Differs from most *Hemirrhagus* species by the periocular pigmented area involving all eyes, from *H. ocellatus* and *H. chilango* by the presence of one area of urticating hairs extended laterally, and from *H. pernix* by the smaller number of labial cuspules.

*Female* (Figs. 7–10): Total length, not including chelicerae or spinnerets, 20.4. Prosoma length 9.3, width 7.6. Anterior eye row procurved, posterior row recurved. Eye sizes and interdistances: AME 0.20, ALE 0.36, PME 0.04, PLE 0.30; AME-AME 0.16, AME-ALE 0.02, PME-PME 0.58, PME-PLE 0.04, ALE-PLE 0.08; OQ length 0.60, width 1.32; clypeus height 0.22. Ocular tubercle slightly reduced, periocular pigmentation



Figs. 7–10: *Hemirrhagus coztic* sp. n., female holotype. 7 Body, dorsal view; 8 Ocular region, dorsal view; 9 Spermathecae, dorsal view; 10 Prosoma, ventral view. Scale lines = 10 mm (7), 5 mm (10), 1 mm (8, 9).

entire (Fig. 8). Fovea transverse, procurved, width 1.00. Labium length 1.5, width 1.1, with 12 cuspules. Maxilla with 135 cuspules. Sternum length 4.0, posterior sternal sigilla circular, submarginal (Fig. 10). Chelicera with 12 teeth on promargin (4 small, 8 large). Tarsi I–IV scopulate, scopula I–II entire, III–IV divided. Metatarsi I–II scopulate, III–IV scopulate on distal half. Length of legs and palpal segments as in Table 3. Spination: femora I 1d; II 3d; III 3d; IV 2d; patellae I–IV 0; tibiae I 6v, 1p; II 6v, 2p; III 7v, 2p, 3r; IV 3v, 4p, 4r; metatarsi I 2v; II 2v, 1p; III 8v, 3p, 3r; IV 8v, 10p, 3r; tarsi I–IV 0. Prosoma and legs yellow-brown, opisthosoma grey-brown with two golden lateral bands. Type VI urticating hairs present, arranged in one patch extended laterally (Fig. 7). Spermathecae as in Fig. 9.

*Male*: Unknown.

*Other material examined*: Cueva de San Juan, Tepoztlán, Morelos, Mexico (19°00' 12" N, 99°05' 12" W), 16 November 1978, 1♀ 1 juv., R. Castellanos, deposited in LAE.

	I	II	III	IV	Palp
Femur	8.7	8.4	6.9	9.0	6.1
Patella	4.6	4.4	4.0	4.5	3.5
Tibia	7.8	7.0	6.8	8.7	5.0
Metatarsus	7.0	6.5	7.5	11.4	—
Tarsus	5.3	5.5	5.3	6.0	5.0

Table 3: *Hemirrhagus coztic* sp. n. Female holotype, length of leg and palpal segments.

*Distribution:* Known only from Tepoztlán, Morelos, Mexico.

***Hemirrhagus eros*, new species** (Figs. 11–20, Tables 4–5)

*Types:* Holotype ♂ and paratype ♀ from El Punto, Oaxaca, Mexico (16°19'N, 96°28'W), 28 June 1967 and 5 September 1962 respectively, both collected by M. R. Bogert, deposited in AMNH.

*Etymology:* Named after the Greek god Eros, referring to the heart-like patch of urticating hairs with the urticating hairs representing arrows, symbols of that god.

*Diagnosis:* Differs from most *Hemirrhagus* species by the entire tarsal scopulae, and from *H. papalotl* by the urticating hairs arranged in a heart-shaped patch. Also differs from other species by the very sparse spination on tibiae and metatarsi III–IV.

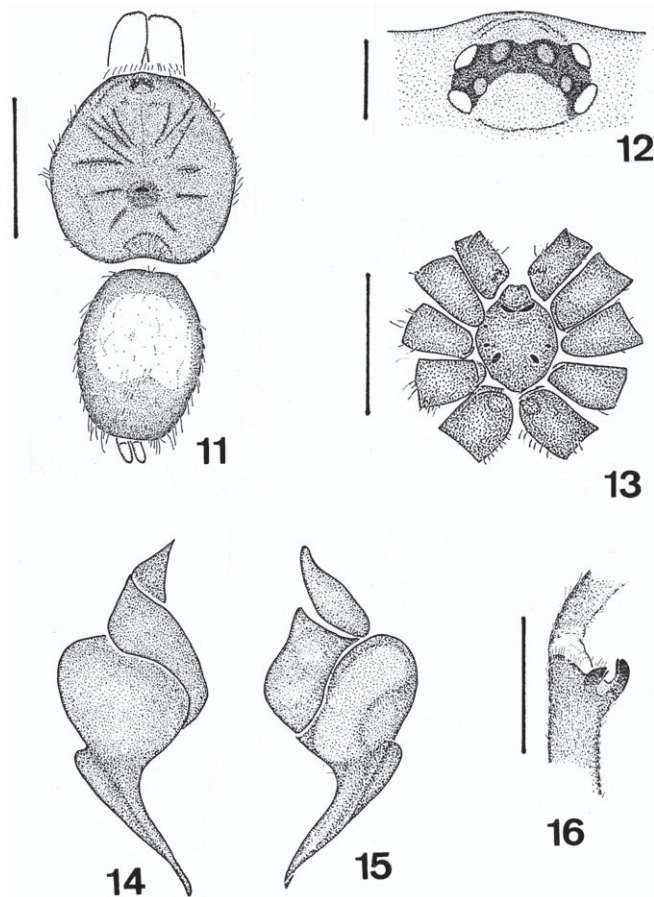
*Male* (Figs. 11–16): Total length, not including chelicerae or spinnerets, 26.0. Prosoma length 13.7, width 12.5. Anterior eye row slightly recurved, posterior row recurved. Eye sizes and interdistances: AME 0.28, ALE 0.36, PME 0.26, PLE 0.38; AME-AME 0.30, AME-ALE 0.14, PME-PME 1.14, PME-PLE 0.06, ALE-PLE 0.14; OQ length 0.84, width 1.56; clypeus height 0.34. Ocular tubercle normally developed, periocular pigmen-

	I	II	III	IV	Palp
<b>Femur</b>	11.6	11.4	10.0	11.8	8.0
<b>Patella</b>	6.6	6.1	6.0	5.6	4.9
<b>Tibia</b>	10.5	9.1	8.3	11.2	6.8
<b>Metatarsus</b>	9.4	9.0	10.1	14.0	—
<b>Tarsus</b>	7.4	7.3	7.3	8.2	3.5

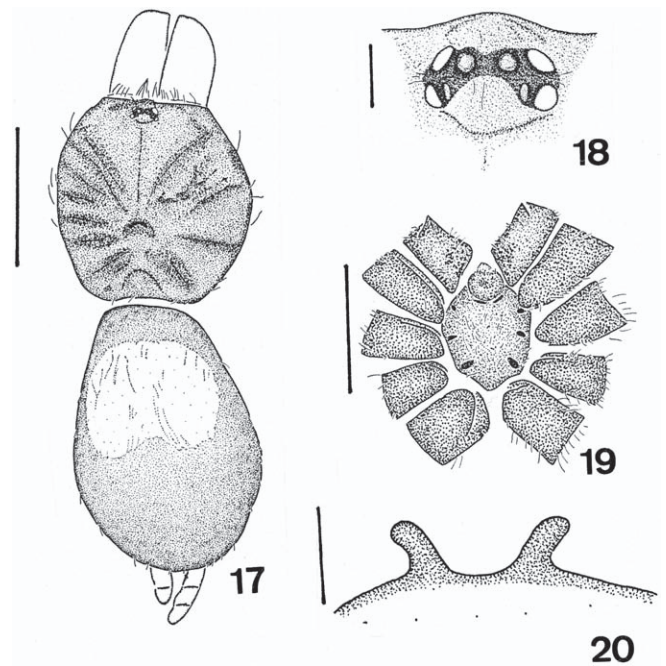
Table 4: *Hemirrhagus eros* sp. n. Male holotype, length of leg and palpal segments.

tation entire (Fig. 12). Fovea transverse, procurved, width 1.40. Labium length 1.60, width 2.0, with 12 cuspules. Maxilla with 200 cuspules. Sternum length 5.4, posterior sternal sigilla large, oval, submarginal (Fig. 13). Chelicera with 15 teeth on promargin (5 small, 10 large). Tarsi I–IV scopulate, scopula entire. Metatarsi I–II scopulate, III scopulate on distal half, IV not scopulate. Tibia of leg I with prolateral double apophysis (Fig. 16). Palpal organ as in Figs. 14–15. Length of legs and palpal segments as in Table 4. Spination: femora I–IV and palp 0; patellae I–IV and palp 0; tibiae I 2v, 1p, 1r; II 1d, 3v, 2p, 2r; III 1p, 1r, 1v; IV 1v, 1p; metatarsi II 3v; III 5v, 1p, 1r; IV 4v; tarsi I–IV 0. Prosoma and legs dark brown, with light brown hairs on carapace margin, opisthosoma dark brown with few dark reddish hairs and platinum heart-shaped patch of type VI urticating hairs in centre (Fig. 11).

*Female* (Figs. 17–20): Total length, not including chelicerae or spinnerets, 35.0. Prosoma length 15.8, width 14.5. Anterior eye row slightly procurved, posterior row recurved. Eye sizes and interdistances: AME 0.34, ALE 0.50, PME 0.24, PLE 0.4; AME-AME 0.32, AME-ALE 0.10, PME-PME 0.90, PME-PLE 0.04, ALE-PLE 0.16; OQ length 0.92, width 1.9; clypeus height 0.40. Ocular tubercle normally developed, periocular pigmentation entire (Fig. 18). Fovea transverse,



Figs. 11–16: *Hemirrhagus eros* sp. n., male holotype. **11** Body, dorsal view; **12** Ocular region, dorsal view; **13** Prosoma, ventral view; **14** Right palpal organ, retrolateral view; **15** Ditto, prolateral view; **16** Tibial apophysis of left leg I, prolateral view. Scale lines=10 mm (11, 13), 5 mm (16), 1 mm (12, 14, 15).



Figs. 17–20: *Hemirrhagus eros* sp. n., female paratype. **17** Body, dorsal view; **18** Ocular region, dorsal view; **19** Prosoma, ventral view; **20** Spermathecae, dorsal view. Scale lines=10 mm (17, 19), 1 mm (18, 20).

	I	II	III	IV	Palp
Femur	11.6	11.0	10.3	13.2	9.0
Patella	7.1	6.9	5.8	7.0	5.8
Tibia	8.2	7.2	7.1	9.2	6.0
Metatarsus	7.0	7.7	9.1	13.0	—
Tarsus	6.3	6.0	6.3	8.0	6.6

Table 5: *Hemirrhagus eros* sp. n. Female paratype, length of leg and palpal segments.

recurved, width 2.0. Labium length 1.8, width 2.3, with 42 cuspules. Maxilla with 145 cuspules. Sternum length 6.5, posterior sternal sigilla large, oval, submarginal (Fig. 19). Chelicera with 19 teeth on promargin (8 small, 11 large). Tarsi I–IV densely scopulate, scopula entire. Metatarsi I–II scopulate, III scopulate on distal end, IV not scopulate. Length of legs and palpal segments as in Table 5. Spination: femur I 1d; III 1d; patellae I–IV 0; tibiae II 2v, 1p; III 2v; IV 1v; metatarsi I 3v; II 3v; III 1v, 1p; IV 2d, 2p, 1r; tarsi I–IV and palp 0. Prosoma cinnamon brown with light brown hairs on carapace margin, legs and opisthosoma dark brown with few dark reddish hairs and platinum heart-shaped patch of type VI urticating hairs (Fig. 17). Spermathecae as in Fig. 20.

*Other material examined:* El Punto, Oaxaca, Mexico, 5 September 1962, 1 adult ♀, 28 June 1967, 2 small ♀, all collected by C. M. Bogert, deposited in AMNH.

*Distribution:* Known only from El Punto, Oaxaca, Mexico.

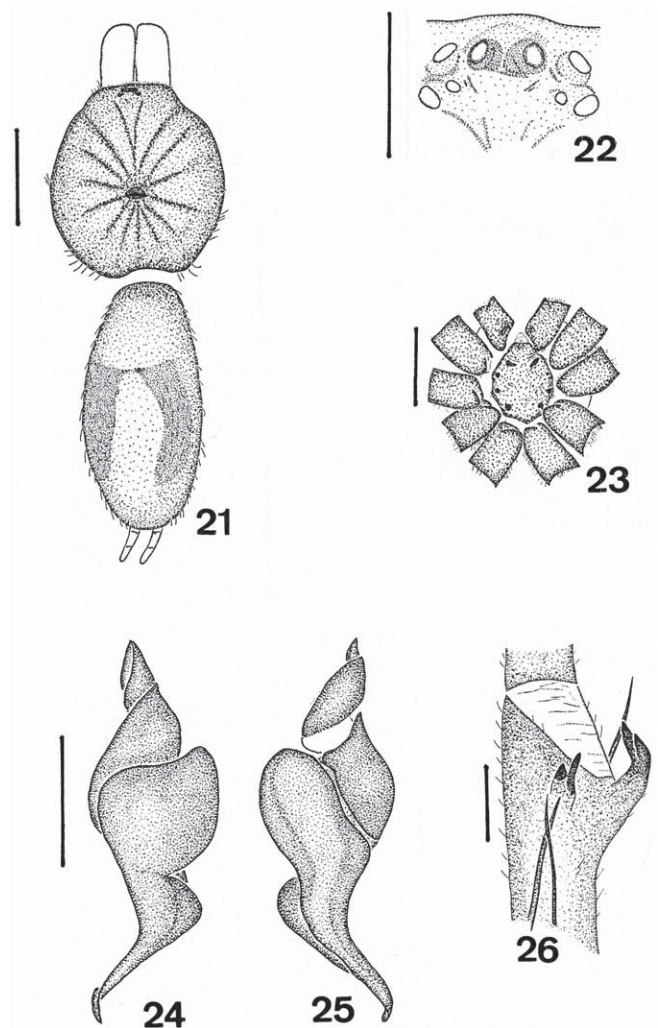
***Hemirrhagus gertschi*, new species** (Figs. 21–30, Tables 6–7)

*Types:* Holotype ♂ and paratype ♀ from Resumidero, Guerrero, Mexico (18°35'52"N, 99°42'40"W), 27 March 1976, L. Rendon, deposited in LAAH.

*Etymology:* Named after the late American arachnologist, W. J. Gertsch, who contributed much to theraphosid taxonomy, particularly to the discovery of cave theraphosids.

*Diagnosis:* Males differ from the other species by the presence of numerous (11) spines on the dorsal surface of tibia IV. Females differ from most species by the periocular pigmentation involving only the anterior eyes, from *H. papalotl* by the divided tarsal scopulae, and from *H. elliotti* by the spinose metatarsi III and IV.

*Male* (Figs. 21–26): Total length, not including chelicerae or spinnerets, 21.4. Prosoma length 9.6, width 8.8. Anterior eye row slightly recurved, posterior row recurved. Eye sizes and interdistances: AME 0.22, ALE 0.20, PME 0.12, PLE 0.20; AME-AME 0.22, AME-ALE 0.10, PME-PME 0.60, PME-PLA 0.04, ALE-PLA 0.14; OQ length 0.46, width 1.20; clypeus height 0.22. Ocular tubercle very reduced, periocular pigmentation surrounding AME only (Fig. 22). Fovea transverse, recurved, width 1.0. Labium length 1.10, width 1.3, with 9 cuspules. Maxilla with 64 cuspules. Sternum length 3.7, posterior sternal sigilla oval, submarginal (Fig. 23). Chelicera with 18 teeth on promargin. Tarsi I–IV scopulate, scopula I–II entire, III–IV divided. Metatarsi I–III



Figs. 21–26: *Hemirrhagus gertschi* sp. n., male holotype. **21** Body, dorsal view; **22** Ocular region, dorsal view; **23** Prosoma, ventral view; **24** Left palpal organ, retrolateral view; **25** Ditto, proximal view; **26** Tibial apophysis of left leg I, proximal view. Scale lines=5 mm (21), 1 mm (22–26).

scopulate, IV scopulate on distal half. Tibia of leg I with proximal double apophysis (Fig. 26). Palpal organ with posterior retrolateral keel (Figs. 24–25). Length of legs and palpal segments as in Table 6. Spination: femora I 2d; II 7d, 1p; III 4d; IV 2d, 2p; palp 4d; patellae I 1v; II 1v; palp 1v; tibiae I 4v, 2p, 4r; II 5v, 3p, 2r; III 5d, 6v, 3p, 5r; IV 11d, 6v, 3p, 5r; palp 6v, 3p; metatarsi I 4v, 1p, 1r; II 3v, 4p, 1r; III 3d, 3v, 3p, 2r; IV 1d, 5v, 6p, 4r; tarsi I–IV 0. Prosoma and legs pale orange-brown, opisthosoma yellow-brown with two golden lateral bands. Opisthosoma and legs with yellow-brown setae. Type VI urticating hairs present, arranged in two lateral bands (Fig. 21).

	I	II	III	IV	Palp
Femur	11.1	11.0	10.0	12.2	7.4
Patella	5.5	5.3	4.5	5.2	4.4
Tibia	11.0	10.0	9.5	11.7	6.4
Metatarsus	10.6	10.3	11.5	15.6	—
Tarsus	8.2	7.6	7.6	8.9	3.3

Table 6: *Hemirrhagus gertschi* sp. n. Male holotype, length of leg and palpal segments.

	I	II	III	IV	Palp
Femur	10.5	10.6	9.2	11.4	7.1
Patella	5.9	5.0	4.3	4.8	4.5
Tibia	9.4	8.9	8.4	10.9	6.3
Metatarsus	8.2	8.5	10.4	14.3	—
Tarsus	6.4	6.4	6.1	7.7	6.0

Table 7: *Hemirrhagus gertschi* sp. n. Female paratype, length of leg and palpal segments.

**Female** (Figs. 27–30): Total length, not including chelicerae or spinnerets, 27.0. Prosoma length 10.5, width 9.2. Anterior eye row slightly recurved, posterior row recurved. Eye sizes and interdistances: AME 0.22, ALE 0.30, PME 0.14, PLE 0.18; AME-AME 0.28, AME-ALE 0.10, PME-PME 0.68, PME-PLE 0.06, ALE-PLE 0.24; OQ length 0.50, width 1.40; clypeus height 0.30. Ocular tubercle very reduced, periocular pigmentation divided, surrounding anterior eyes (Fig. 28). Fovea transverse, recurved, width 1.21. Labium length 1.20, width 1.6, with 15 cuspules. Maxilla with 121 cuspules. Sternum length 4.0, posterior sternal sigilla large, oval, submarginal (Fig. 29). Chelicera with 20 teeth on promargin. Tarsi I–IV scopulate, scopula divided. Metatarsi I–III scopulate, IV scopulate on distal end. Length of legs and palpal segments as in Table 7. Spination: femora I 2d; II 2p; III 6d; IV 5d, 2p; palp 1p; patellae I 1v; palp 1v; tibiae I 6v, 3p, 3r; II 9v, 4p, 5r; III 6v, 5p, 8r; IV 9v, 9r; palp 1v, 1r; metatarsi I 2v; II 10v, 1p; III 2d, 8v, 5p, 6r; IV 10v, 5r; tarsi II 1v. Prosoma and legs orange-brown, opisthosoma yellow-brown with two gold lateral bands. Opisthosoma and legs with brown

setae. Type VI urticating hairs present, arranged in two lateral bands (Fig. 27). Spermathecae as in Fig. 30.

**Other material examined:** Resumidero, Guerrero, Mexico, without further data, 1♂, deposited in LAAH.

**Distribution:** Known only from the cave Resumidero, Guerrero, Mexico.

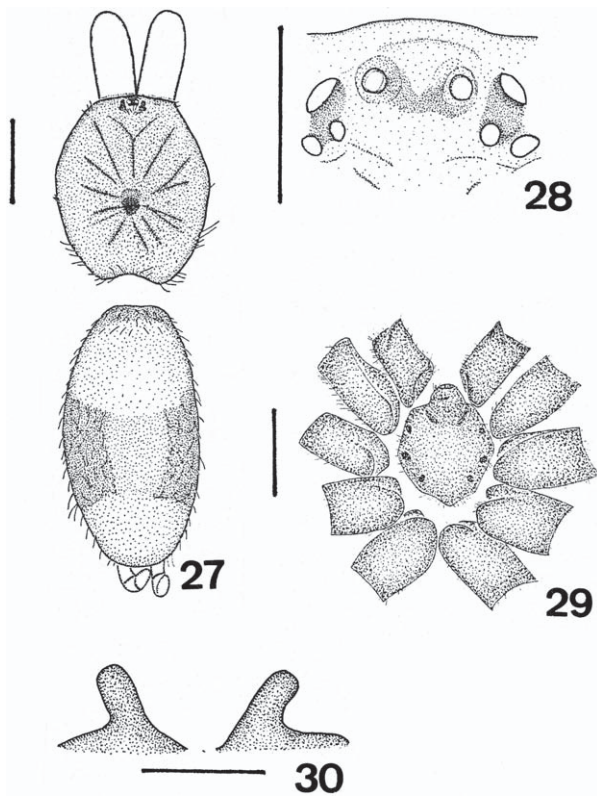
***Hemirrhagus ocellatus*, new species** (Figs. 31–34, Table 8)

**Type:** Holotype ♀ from Cueva Peña Blanca, Valle del Bravo, Estado de Mexico, Mexico (19°11'N, 100°08'W), 6 November 1976, S. Ibarra, deposited in LAAH.

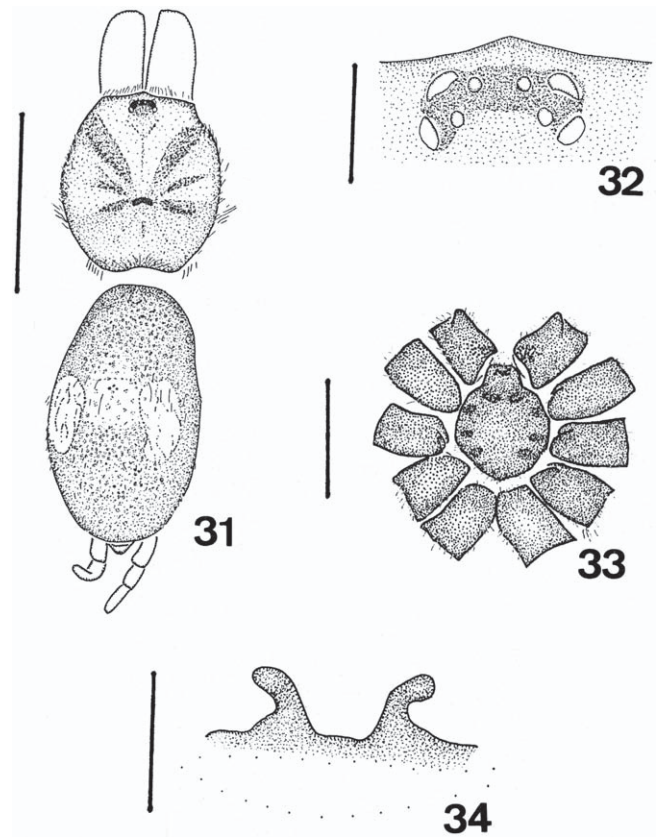
**Etymology:** The species is named from the Latin adjective *ocellatus* meaning “eyed”, referring to the two circular patches of urticating hairs on the abdomen.

**Diagnosis:** Differs from most *Hemirrhagus* species by the presence of two lateral circular patches of urticating hairs, and from *H. chilango* by having the ocular tubercle more reduced and fewer labial cuspules (fewer than 15).

**Female** (Figs. 31–34): Total length, not including chelicerae or spinnerets, 23.8. Prosoma length 10.0, width 8.6. Anterior eye row procurved, posterior row recurved. Eye sizes and interdistances: AME 0.20, ALE 0.32, PME 0.16, PLE 0.30; AME-AME 0.26, AME-ALE 0.14, PME-PME 0.62, PME-PLE 0.08, ALE-PLE 0.14; OQ length 0.64, width 1.42; clypeus height 0.26. Ocular tubercle very reduced, periocular pigmentation entire (Fig. 32). Fovea transverse, recurved, width 1.58.



Figs. 27–30: *Hemirrhagus gertschi* sp. n., female paratype. **27** Body, dorsal view; **28** Ocular region, dorsal view; **29** Prosoma, ventral view; **30** Spermathecae, dorsal view. Scale lines=5 mm (27), 1 mm (28–30).



Figs. 31–34: *Hemirrhagus ocellatus* sp. n., female holotype. **31** Body, dorsal view; **32** Ocular region, dorsal view; **33** Prosoma, ventral view; **34** Spermathecae, dorsal view. Scale lines=10 mm (31), 5 mm (33), 1 mm (32, 34).

	I	II	III	IV	Palp
Femur	7.8	7.1	8.5	8.6	5.8
Patella	4.3	4.0	3.5	3.8	3.4
Tibia	6.6	5.6	6.0	7.7	4.7
Metatarsus	5.4	5.5	6.8	10.3	—
Tarsus	4.6	4.5	4.8	5.8	3.9

Table 8 *Hemirrhagus ocellatus* sp. n. Female holotype, length of leg and palpal segments.

Labium length 1.14, width 1.60, with 9 cuspules. Maxilla with 131 cuspules. Sternum length 4.4, posterior sternal sigilla oval, submarginal (Fig. 33). Chelicera with 33 teeth on promargin (21 small, 12 large). Tarsi I–IV scopulate, scopula I–II entire, III–IV divided. Metatarsi I–II scopulate, III–IV not scopulate. Length of legs and palpal segments as in Table 8. Spination: femora II 1d; III 3d; IV 2d; patellae II 1v; tibiae I 5v, 2p; II 9v, 4p; III 8v, 3p, 3r; IV 1d, 11v, 7p, 12r; metatarsi I 5v, 1p; II 7v, 2p; III 2d, 7v, 5p, 4r; IV 2d, 10v, 6p, 3r; tarsi I–IV 0. Prosoma and legs orange-brown, opisthosoma grey-brown with two circular golden patches. Type IV urticating hairs present, arranged in two circular lateral patches (Fig. 31). Spermathecae as in Fig. 34.

*Male*: Unknown.

*Distribution*: Known only from Cueva Peña Blanca, Valle del Bravo, Estado de Mexico, Mexico.

#### *Hemirrhagus papalotl*, new species (Figs. 35–38, Table 9)

*Type*: Holotype ♀ from Gruta de Aguacachil (18°35'30"N, 99°34'29"W), Taxco, Guerrero, Mexico, 29 November 1980, I. Cacaslera, deposited in LAAH.

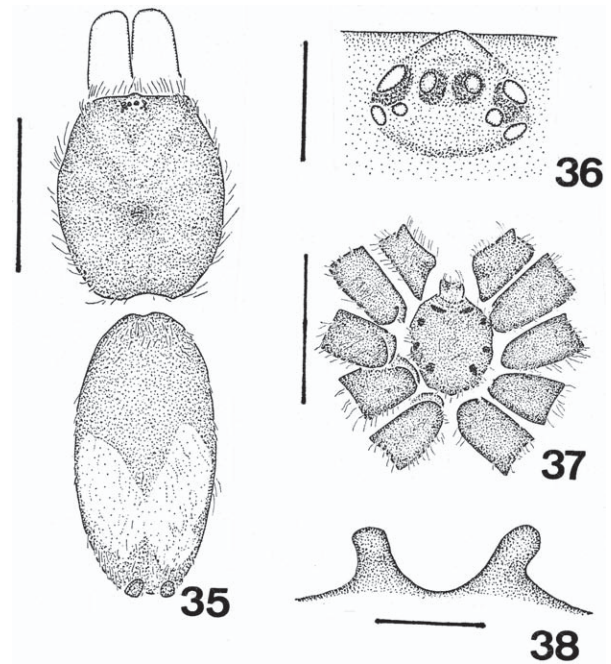
*Etymology*: The specific epithet papalotl is taken from the Nahuatl language, meaning butterfly, in reference to the butterfly-like patch of urticating hairs.

*Diagnosis*: Differs from most *Hemirrhagus* species by the entire tarsal scopulae, and from *H. eros* by the urticating hairs arranged in a butterfly-like patch, which is placed more posteriorly than in *H. eros*. Also differs from *H. eros* by the presence of very numerous spines on tibiae and metatarsi III–IV.

*Female* (Figs. 35–38): Total length, not including chelicerae or spinnerets, 32.2. Prosoma length 12.7, width 11.1. Anterior eye row straight, posterior row recurved. Eye sizes and interdistances: AME 0.22, ALE 0.32, PME 0.18, PLE 0.26; AME-AME 0.26, AME-ALE 0.16, PME-PME 0.78, PME-PLE 0.10, ALE-PLE 0.16; OQ length 0.64, width 0.64; clypeus height 0.40. Ocular tubercle slightly reduced, periocular pigmentation divided, involving only anterior eyes (Fig. 36). Fovea transverse, recurved, width 0.25. Labium length

	I	II	III	IV	Palp
Femur	12.6	11.8	11.5	13.6	8.5
Patella	6.5	6.5	5.4	5.5	5.2
Tibia	11.3	10.5	9.9	12.8	7.8
Metatarsus	11.2	11.0	10.8	17.0	—
Tarsus	8.7	8.0	7.6	8.9	7.1

Table 9: *Hemirrhagus papalotl* sp. n. Female holotype, length of leg and palpal segments.



Figs. 35–38: *Hemirrhagus papalotl* sp. n., female holotype. 35 Body, dorsal view; 36 Ocular region, dorsal view; 37 Prosoma, ventral view; 38 Spermathecae, dorsal view. Scale lines = 10 mm (35, 37), 1 mm (36, 38).

0.46, width 0.48, with 13 cuspules. Maxilla with 114 cuspules. Sternum length 5.8, posterior sternal sigilla large, circular, submarginal (Fig. 37). Chelicera with 19 teeth on promargin (8 small, 11 large). Tarsi I–IV scopulate, scopula entire. Metatarsi I–IV scopulate, scopula divided. Length of legs and palpal segments as in Table 9. Spination: femora I 2d; II 4d; III 6d; IV 1d, 1p; patellae I 2v; II 1v; tibiae I 3d, 9v; II 3p, 7v; III 8v, 4p, 4r; IV 6v, 7p, 4r; metatarsi I 4v; II 2v, 3p; III 1d, 8v, 3p, 4r; IV 1d, 12v, 5p, 4r; tarsi I–IV 0. Prosoma and legs orange-brown, opisthosoma yellow-brown with posterior golden patch of type VI urticating hairs in butterfly-like form (Fig. 35). Spermathecae as in Fig. 38.

*Male*: Unknown.

*Other material examined*: Aguacachil, Guerrero, Mexico: 3 August 1980, 1♀, J. Palacios; 29 November 1980, 2 juv., I. Cacaslera; 23 January 1982, 2 juv., D. Primero. All deposited in LAAH.

*Distribution*: All the material came from the same cave (Gruta Aguacachil) in Taxco, Guerrero, Mexico.

#### *Hemirrhagus elliotti* (Gertsch, 1973), new combination

*Schizopelma elliotti* Gertsch, 1973: 144, fig. 2c (D♀).

*Spelopelma elliotti*: Gertsch, 1982: 91, fig. 14; Schmidt, 1993: 68, fig. 130; Smith, 1995: 32, figs. 12–20.

*Type*: Holotype ♀ from Cueva de la Laguna (24°52'N, 100°13'W), San Luis Potosi, Mexico, deposited in AMNH, examined.

*Diagnosis*: Differs from most *Hemirrhagus* species by the combined presence of urticating hairs, reduced ocular tubercle, and divided periocular pigmentation, from *H. gertschi* by the reduced spination on female



metatarsi III–IV (fewer than 10 spines), and from *H. papalotl* by the divided tarsal scopulae.

***Hemirrhagus grieta* (Gertsch, 1982), new combination**

*Spelopelma grieta* Gertsch, 1982: 93, fig. 17 (D♀); Schmidt, 1993: 68, fig. 133; Smith, 1995: 33, figs. 21–29.

*Type:* Holotype ♀ from Cueva de la Grieta (17°45'N, 97°08'W), Huautla, Oaxaca, Mexico, deposited in AMNH, examined.

*Diagnosis:* Differs from other *Hemirrhagus* species by the complete absence of eyes (only subintegumental spots present).

***Hemirrhagus mitchelli* (Gertsch, 1982), new combination**

*Spelopelma mitchelli* Gertsch, 1982: 89, fig. 12 (D♀); Schmidt, 1993: 68, fig. 128; Smith, 1995: 34, figs. 30–40.

*Type:* Holotype ♀ from Entrada de Viento Alta (22°48'N, 98°22'W), Tamaulipas, Mexico, deposited in AMNH, examined.

*Diagnosis:* Differs from other *Hemirrhagus* species by the absence of PME (only subintegumental spots present).

***Hemirrhagus nahuanus* (Gertsch, 1982), new combination**

*Spelopelma nahuanum* Gertsch, 1982: 93, figs. 10–11 (D♂); Schmidt, 1993: 68, figs. 126–127; Smith, 1995: 35, figs. 41–43.

*Type:* Holotype ♂ from Zoquitlán (18°20'N, 97°01'W), Puebla, Mexico, deposited in AMNH, examined.

*Diagnosis:* Differs from other *Hemirrhagus* species by the very numerous labial cuspules, from *H. cervinus*, *H. pernix* and *H. eros* by the reduced ocular tubercle, and from *H. chilango* by the absence of two lateral oval urticating hair patches.

*Comments:* Gertsch (1982) indicated the presence of a patch of urticating hairs in this species, which was also pointed out by Smith (1995). In our study we did not find urticating hairs in the holotype, but we presume they have been lost as a result of preservation conditions and manipulation in previous studies. We therefore coded this character as present in *H. nahuanus*.

***Hemirrhagus puebla* (Gertsch, 1982), new combination**

*Spelopelma puebla* Gertsch, 1982: 91, fig. 16 (D♀); Schmidt, 1993: 68, fig. 132; Smith, 1995: 36, figs. 44–54.

*Type:* Holotype ♀ from Cueva de la Barranca, Cuetzalan, Puebla, Mexico (20°00'N, 97°32'W), deposited in AMNH, examined.

*Diagnosis:* Differs from most *Hemirrhagus* species by the presence of widely fused spermathecal receptacles, and from *H. elliotti* by the absence of urticating hairs.



Fig. 39: Cladogram of species of *Hemirrhagus* and outgroups (fit 164.4; 47 steps; CI 0.55; RI 0.70).

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
<i>Euathlus</i>	0	0	0	0	1	?	?	?	?	?	?	?	?	0	0	0	0	0	0	1	0	0	0
<i>Grammostola</i>	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	?	0	0	0
<i>Plesiofelma</i>	0	0	0	0	0	0	0	1	?	0	0	0	1	0	0	0	0	0	0	1	0	0	0
<i>Homoeomma</i>	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0
<i>H. cervinus</i>	0	0	0	0	0	0	0	1	1	0	0	1	1	1	0	0	?	0	0	0	?	0	1
<i>H. chilango</i>	0	1	2	0	0	?	?	?	?	?	?	?	?	1	?	1	0	?	?	?	1	0	1
<i>H. coztic</i>	0	1	2	1	0	0	0	1	1	0	0	1	1	1	0	0	1	0	0	0	?	0	1
<i>H. eros</i>	0	0	2	0	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	1
<i>H. gertschi</i>	0	2	1	1	0	1	1	1	1	0	0	1	1	1	0	0	1	0	0	0	1	0	1
<i>H. ocellatus</i>	0	2	2	1	0	0	1	1	1	0	?	1	1	1	?	1	0	0	0	0	?	0	1
<i>H. papalotl</i>	0	1	1	1	1	1	1	1	1	0	0	1	1	1	2	0	1	0	0	0	?	0	1
<i>H. ellioti</i>	0	2	1	1	0	?	?	?	1	1	?	?	0	0	1	0	0	1	1	0	0	?	0
<i>H. grieta</i>	2	2	?	2	0	?	?	1	1	?	?	1	1	0	?	?	?	0	0	0	?	0	1
<i>H. mitchelli</i>	1	2	?	0	0	?	?	1	1	?	?	1	1	0	?	?	?	0	0	0	?	0	1
<i>H. nahuanus</i>	0	2	?	0	0	?	?	?	?	?	?	?	?	1	0	0	0	?	?	?	0	0	1
<i>H. puebla</i>	0	2	?	1	0	0	0	0	0	?	?	?	1	0	?	?	?	1	1	1	?	0	1
<i>H. reddelli</i>	0	2	?	1	0	?	1	1	0	?	0	1	0	0	?	?	?	0	0	1	?	0	1
<i>H. stygius</i>	0	0	?	1	0	?	?	?	?	?	?	?	?	0	?	?	?	0	0	0	?	0	1
<i>H. pernix</i>	0	0	?	0	0	?	?	?	?	?	?	1	1	1	0	0	?	?	?	?	1	1	1

Table 10: Data matrix used in the cladistic analysis.

***Hemirrhagus reddelli* (Gertsch, 1973), new combination**

*Schizopelma reddelli* Gertsch, 1973: 143, fig. 2b (D♀).  
*Spelopelma reddelli*: Gertsch, 1982: 91, fig. 15; Schmidt, 1993: 68, fig. 131; Smith, 1995: 36, figs. 55–63.

*Type*: Holotype ♀ from Cueva del Nacimiento del Rio San Antonio, Oaxaca, Mexico (16°58'N, 95°31'W), deposited in AMNH, examined.

*Diagnosis*: Differs from most *Hemirrhagus* species by the absence of urticating hairs, and from *H. puebla*, *H. mitchelli*, *H. grieta* and *H. stygius* by the pericocular pigmentation involving only PME.

***Hemirrhagus stygius* (Gertsch, 1971), new combination**

*Aphonopelma stygia* Gertsch, 1971: 49 (D juv.).  
*Schizopelma stygia*: Gertsch, 1973: 142, figs. 1, 2a (D♀).  
*Schizopelma stygium*: Brignoli, 1983: 140.  
*Spelopelma stygium*: Gertsch, 1982: 89, fig. 13; Schmidt, 1993: 68, fig. 129; Smith, 1995: 37, figs. 64–65.

*Type*: Immature holotype from Cueva de los Potrerillos, San Luis Potosi, Mexico (21°19'N, 99°03'W), deposited in AMNH, examined.

*Diagnosis*: Differs from most *Hemirrhagus* species by the absence of urticating hairs, and from *H. puebla*, *H. mitchelli* and *H. grieta* by the well-developed ocular tubercle.

***Hemirrhagus pernix* (Ausserer, 1875), new combination**

*Crypsidromus pernix* Ausserer, 1875: 178, pl. 6, figs. 22–23 (D♂).  
*Hapalopus pernix*: F. O. P.-Cambridge, 1897: 31, pl. 2, fig. 14.

*Cyrtopholis pernix*: Pocock, 1903: 98; Simon, 1903: 931; Smith, 1995: 182, figs. 1011–1021; Platnick, 1998: 158.

*Type*: Holotype ♂ from Pico de Orizaba, Veracruz, Mexico (19°01'N, 97°16'W), deposited in BMNH, examined.

*Diagnosis*: Differs from other *Hemirrhagus* species by the presence of specialised plumose setae on the prolateral face of trochanter I.

*Comments*: This species is here removed from *Cyrtopholis* because nodes on the male palpal tibiae and type I urticating hairs are absent. The palpal organ morphology, coxal heels and the presence of type VI urticating hairs led us to include this species in *Hemirrhagus*.

**Cladistic analysis**

Using Hennig 86, two most parsimonious trees supported the monophyly of *Hemirrhagus* (188 steps, CI 0.85 and RI 0.90). Using Pee-Wee one fittest tree of 47 steps, CI 0.55, RI 0.70 and fit=164.4 was found (Fig. 39). Character fit and steps are given in Table 11. The most obvious synapomorphy of the genus was the retrolateral-ventral coxae with heels (character 22). Another probable additional synapomorphy of the genus is the presence of only one wide keel on the palpal organ, but this was not included in the analysis since only a few males are known. The ingroup was dichotomously resolved on the basis of type VI urticating hairs (character 13); this seems to be a synapomorphy of apical

Character	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Fit	10	6	8.5	5.4	7.5	10	8.5	8.5	10	—	—	8.5	7.5	8.5	8.5	10	10	8.5	10	8.5	10	—	10
Steps	2	6	3	7	3	1	2	2	1	—	—	2	3	2	3	1	1	2	1	2	1	—	1
Extra steps	0	4	1	5	2	0	1	1	0	—	—	1	2	1	1	0	0	1	0	1	0	—	0

Table 11: Character fit, steps and extra steps (the same values were found in the two trees).

*Hemirrhagus* species with a parallelism in the basal *H. eros*. As far as we know, this type of hair is unique in Theraphosinae. The reduction of the ocular tubercle (character 1), presumably related to troglobitic habits, appears in the node of *H. puebla* with the apical clade, with a reversion in the clade of *H. cervinus*+*H. pernix*. We mapped the troglobitic habits on the cladogram and involved most *Hemirrhagus* species, with ambiguities in *H. eros*, *H. nahuanus*, *H. chilango*, *H. cervinus* and *H. pernix* mainly because of missing entries in this character.

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