2005. The Journal of Arachnology 33:785–796

REVISION OF THE SPIDER GENUS *HESYDRUS* (ARANEAE, LYCOSOIDEA, TRECHALEIDAE)

James E. Carico: School of Sciences, Lynchburg College, 1501 Lakeside Drive, Lynchburg, Virginia 24501 USA. E-mail: carico@lynchburg.edu

ABSTRACT. *Hesydrus palustris* Simon and *H. habilis* (O.P.-Cambridge) are redescribed. Four new species are described: *H. caripito*, *H. yacuiba* and *H. chanchamayo* are described only from females, and *H. canar* from both male and female specimens. *Hesydrus monticola* Chamberlin is a junior synonym of *H. palustris*. *Hesydrus bucculentus* Simon is a senior synonym of *Trechalea cezariana* Mello-Leitão. *Hesydrus estebanensis* Simon is transferred to the genus *Enna* O.P.-Cambridge. *Hesydrus ornatus* Mello-Leitão and *H. bivittatus* Mello-Leitão, known only from unidentifiable spiderling holotypes, are regarded as nomina dubia. Coincidence of geographic distributions of *Hesydrus* and *Trechalea* are noted.

Keywords: New species, taxonomy, South America, Central America

This revision of the genus *Hesydrus* Simon 1898 is included in a series of studies of trechaleid genera initiated by the recognition of the validity of the family (Carico 1986) and subsequently followed by a redefinition of the family and revision of its type genus, *Trechalea* Thorell 1869 (Carico 1993). Other genera under study include *Syntrechalea* F.P.-Cambridge 1902, *Dossenus* Simon 1898, *Dyrines* Simon 1903, *Enna* O.P.-Cambridge 1897 and *Paradossenus* F.P.-Cambridge 1903, along with new genera (Carico 2005).

Members of the genus *Hesydrus* share the trechaleid habitat, which place them among rocks and around stream margins. The egg sac is a typical, flattened, bivalve disc (Carico 1993, fig. 6) which is carried on the spinnerets and provides a transportation platform for spiderlings after their emergence. Like members of the genus *Trechalea*, the egg sac is attached permanently to the spinnerets at a single location, but unlike the former, in which the attachment is in the center of the upper valve, *Hesydrus* always makes the attachment distinctly off-center.

A comparison of the distributions of species within this genus and with species of *Trechalea* reveals notable similarities throughout Central and South America. In particular, there is an apparent sympatry of particular species from each genus into comparable and identifiable geographic subregions. Therefore, the same geographic isolating mechanisms may be affecting the radiation of both genera. This is not surprising in that the habitat preferences are apparently very similar. An example is the observation that both *H. canar* new species and *T. longitarsis* (C.L. Koch 1848) are limited to the coastal river drainages of Peru, Ecuador and Colombia, while *H. palustris* Simon 1898 along with both *T. mcconnelli* Pocock 1900 and *T. paucispina* Caporiacco 1947 are found in the tributaries of the Amazon River. The common feature that separates the species cluster in the West from those in the East is the barrier afforded by the Andean continental divide. An interesting exception, however, is the occurrence of a single collection of *H. palustris* in the Canal Zone of Panama. The latter, if not due to collection mislabeling or introduction, suggests that this species has extended its range from the Pacific coastal drainages of South America into Panama. Another geographic coincidence is the occurrence of both *H. habilis* O.P.-Cambridge 1896 and *T. extensa* F.P.-Cambridge 1902 in Central America between the isthmuses of Tehuantepec and Panama which clearly suggests that the Panamanian lowlands is a barrier separating them from species in South America while Tehuantepec limits range extensions northward. The nomenclature of the genitalia and other anatomical features follow Carico (1993 [after Sierwald 1989, 1990]). The structure of both the male palpus and female genitalia in *Hesydrus* have the same basic configurations as that of *Trechalea* (Carico 1993, figs. 7–10). Because of its rigidity and resis-

tance to distortion, carapace length is emphasized as an index of body size, particularly in the discussions of variation. Measurements and figure scales are in millimeters.

Specimens examined during this study are lodged in the following museums: American Museum of Natural History, New York (AMNH); California Academy of Sciences, San Francisco (CAS); Field Museum of Natural History, Chicago (FMNH); J.E. Carico collection (JEC); Museo Argentino de Ciencias Naturales, Buenos Aires (MACN); Museum of Comparative Zoology, Harvard (MCZ); via Museu Equitoriano de Ciencias Naturales, Quito, Ecuador (MECN); Museo de la Universidad Nacional de La Plata (MLP); Museu Nacional, Universidade Federal do Rio de Janeiro (MNRJ); Muséum National d'Histoire Naturelle, Paris (MNHN); University of Costa Rica, San José (UCR); and Yale Peabody Museum, New Haven (YPM).

Since the general anatomy and color pattern within species in *Hesydrus* are quite similar, the best characters used to distinguish species are details of the genitalia. Because of the lack of representative series, it is difficult to ascertain in many cases whether some of the genitalic characters represent a range of variation within a species or indicate species-level divergence. Of particular concern is a number of singleton females representing widely divergent locations within the Amazon River basin. Although there are small, but notable, differences in the genitalic characters, I have elected to be conservative in the nomenclature for the present in light of the possibility that future collecting in the area will provide a basis for decisions. If, however, there are well-known geographic features serving as barriers between species that coincide with characters, then the latter are assumed to be of value in distinguishing species.

Transfer of *Hesydrus* species to other genera.—The apparent holotype of *Hesydrus bucculentus* Simon 1898 is a large antepenultimate male (carapace length, 7.3) of *Trechalea cezariana* Mello-Leitão 1931. *Trechalea bucculenta* (Simon 1898) is therefore a senior synonym (NEW SYNONYMY, NEW COMBINATION). This conclusion is based upon a careful anatomical examination and the consideration that the three possible Brazilian locations for the locality on the specimen label, ''Thelezopolis [Theresópolis?]'' are at 22°25′S/42°58′W, 27°05′S/51°12′W or 30°05′S/42°58′W, all of which are within the geographical range for Simon's species. In his short description, Simon indicates the type is a female from ''Brasilia'' (Brazil) and the specimen examined, # 8537, has the label probably written by him.

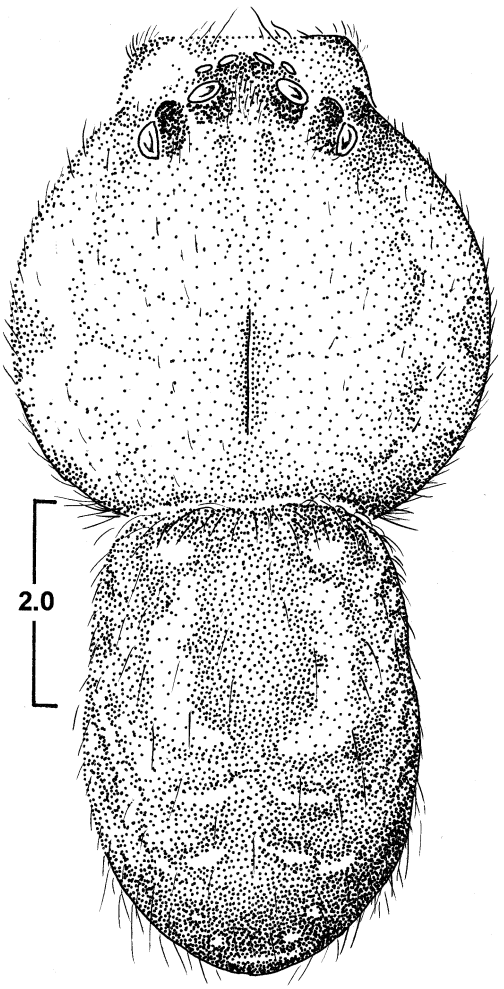


Figure 1.—Dorsal pattern of *Hesydrus palustris* male.

The holotype of *H. estebanensis* Simon 1898 is actually a species of *Enna* and this species is therefore transferred to that genus [*Enna estebanensis* (Simon 1898) NEW COMBINATION]. Its taxonomic placement within the latter genus, however, is not yet determined.

Genus *Hesydrus* Simon 1898

Hesydrus Simon 1898b:305. 1898b:315 (Pisauridae); Roewer 1954:137 (Pisauridae); Bonnet

1957:2182 (Pisauridae); Lehtinen 1967:372 (transferred to Dolomedidae); Brignoli 1983:461, 465 (Dolomedidae); Carico 1986:305 (transferred to Trechaleidae); Sierwald 1990:8 (''*Trechalea* genus-group''); Carico 1993:226 (Trechaleidae); Sierwald 1993:63 (Trechaleidae); Platnick 2004 (Trechaleidae).

Type species.—*Hesydrus palustris* Simon 1898a by original designation.

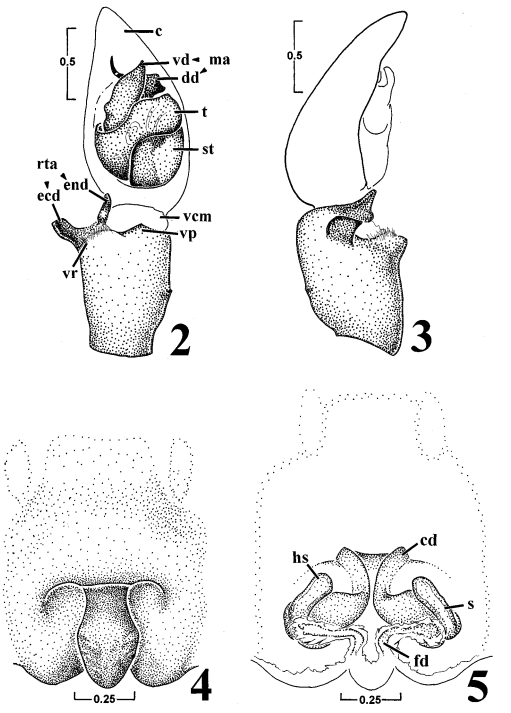
Diagnosis.—Leg I is always shorter than II and IV and approximately equal to the length of III. Both the tarsi and the distal half of the metatarsi are flexible. Chelicerae of adult males are enlarged frontally, glabrous and without distinct lateral carinae. Pairs of ventral macrosetae on the venter in all known species is: I-4, II-4, III-3 and IV-3.

Description.—Carapace moderately low, cephalic area not distinct, AE row straight or slightly recurved. Each basal segment of male chelicera swollen anteriorly and without a distinct carina: promarginal teeth three with center one largest, three retromarginal teeth sometimes with a small gap between the proximal two. Leg formula generally (IV-II)-(I-III), tarsus and distal half of metatarsi flexible, all claws dentate, paired marcosetae I-4, II-4, III-3, IV-3.

Male palpal bulb (Fig. 2) with median apophysis (ma) with distal, sickle-shaped dorsal division (dd) narrow, tapered, with tip conspicuous, and directed variably distad or laterad, the ventral division (vd) acute distally; retrolateral tibial apophysis (rta) arising distally and laterally from near the ventro-distal rim (vr) with ectal division (ecd) spatulate, and ental division (end) partly surrounded by ventral cymbio-tibial membrane (vcm); tibial (vr) of ventral protuberance (vp) folded over to create a depression in the vcm. The epigynum externally a slightly convex plate, with an elongated medial scape; internally (Fig. 5) on either side, partially attached stalked spermathecum with head (hs) slightly larger than stalk and free from other components; a single diverticulum arising from a large common chamber (probably enlarged portion of copulatory duct), both copulatory duct (cd) and fertilization duct (fd) arising from this common chamber.

Distribution.—Widespread from Guatemala southward to northern Argentina (Figs. 6, 11).

Nomina dubia.—The following two species described in *Hesydrus* are considered unidentifiable with any adult of any recognizable species:



Figures 2–5.—Genitalia of *Hesydrus palustris*. 2, 3. right palpus; 2. ventral view, 3. retrolateral view; 4, 5. female genitalia; 4. ventral view, 5. dorsal view. Apparent difference in scale in 4 & 5 is due to viewing at different tilt angles of this thick structure. (c = cymbium, cd = copulatory duct, dd = dorsal division, ecd = ectal division, end = ental division, fd = fertilization duct, hs = head of spermathecum, ma = median apophysis, rta = retrolateral tibial apophysis, s = spermathecum, t = tegulum, st = subtegulum, vcm = ventral cymbio-tibial membrane, vd = ventral division, vp = ventral protuberance, vr = ventro-distal rim.)

Hesydrus ornatus Mello-Leitão 1941. Holotype juvenile no. 14667, Yala, Jujuy, Argentina, M. Birabén, MLP, examined. The specimen is a small spiderling with a carapace length of 1.7 mm and no legs attached. There are only a few loose leg fragments but no tarsi present.

Hesydrus bivittatus Mello-Leitão 1941. Holotype juvenile no. 14666, Salta, Salta, Argentina, M. Birabén, MLP, examined. The specimen is a small spiderling with a carapace length of 1.16 mm but with all legs attached except for one.

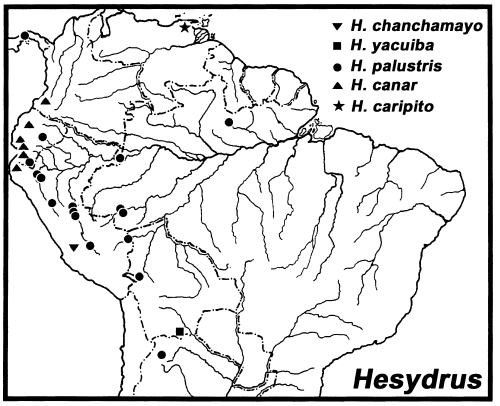


Figure 6.—Distribution of species of *Hesydrus* in South America.

Both these similar specimens are very small juveniles and are in poor condition. The legs show generalized features of lycosoids but have no specific features of *Hesydrus*. The only features that are clear enough for practical analysis are the eye pattern and what can be discerned from remnants of the dorsal pattern. The eye pattern is general for trechaleids and pisaurids, but also for the rather atypical lycosid genus, *Aglaoctenus*. In some pisaurids I have found that there may be a significant shift of the relative positions of eyes and proportions of some body parts during the transition of spiderling to adult, a significant factor to consider when identifying spiderlings in these lycosoid families. The median dorsal bands of the abdomen of both specimens are unknown in any recognized species, but then it is not unusual for spiderling coloration to be different from that of later juveniles and adults. Therefore, until a detailed comparative study can be made on juveniles of known species of these wide-ranging families, it is not possible to determine the status of these specimens. Since it is not useful to base a taxonomy on such uncertainty, I have not considered these two species further in the nomenclature of species in *Hesydrus*.

Hesydrus palustris Simon 1898
Figs. 1–6

Hesydrus palustris Simon 1898a:20; Simon 1898b: 305; F.O.P.-Cambridge 1903:165, plate 15, figs. 22–25; Roewer 1954:137; Bonnet 1957:2182; Platnick 2004.

Trechalea monticola Chamberlin 1916:276, 277, plate 23, fig. 1; Roewer 1954:143; Bonnet 1959: 4679. NEW SYNONYMY.

Hesydrus monticola (Chamberlin): Carico 1993: 237; Platnick 2004.

Type material.—*Hesydrus palustris*: lectotype male (present designation), 1 paralectotype female, Loja, Zamora, Ecuador, 4°00′S, 79°12′W, Gaujon (MNHN, examined) (Simon did not designate a holotype from the syntype series; a male lectotype is selected here to provide taxonomic stability).

Trechalea monticola: holotype, juvenile female, Santa Ana, Peru, August 1911, Yale Peruvian Expedition (MCZ, examined).

Other material examined.—ARGENTINA: *Jujuy*: ''S. S.'' [?San Salvador de Jujuy], 24°11′S, 65°18′W, February 1966, Maury, 1 ♀ (MACN). BOLIVIA: *La Paz*: Guanay near La Paz, 16°30′S, 68°09′W, August 1989, L.E. Peña, 1 ♂, 1 ♀, 4 juveniles (AMNH). BRAZIL: *Acre*: Rio Purus NW. of Sena Madureira Seringal Santo Antônio, 9°04′S, 68°40′W, 13–18 September 1973, B. Patterson, 2 ♀ (MCZ). COLOMBIA: *Amazonas*: 35 km above Leticia, 10°22′N, 74°28′W, 15 September 1973, Mary Corn, 1 ♀ (MCZ). ECUADOR: *Pastaza*: Cusuimi, on Cusuimi River 150 km SE. Puyo, 2°43′S, 77°40′W, 15–31 May 1971, B. Malkin, 1 ♀ (FMNH). PANAMA: *Canal Zone*: Barro Colorado Island, 9°09′S, 79°50′W, 16 June–15 July 1934, A.M. Chickering, 1 ♂ (MCZ). PERU: *San Martin*: Ekin, E. of Tarapoto, 6°30′S, 76°21′W, 9–21 March 1947, F. Woytkowski, 2 ♂, 12 ♀ (AMNH); Mishqui-Yacu, 20 km NE. Moyobamba, 6°03′S, 76°58′W, 16–24 August 1947, F.Woytkowski, 2 ♀, 3 juveniles (AMNH); Hara, 20 miles SE. of Moyabamba, 6°03′S, 76°58′W, 1–30 June 1947, F. Woytkowski, 1 ♂ (AMNH); *Huanuco*: Divisoria, 9°40′S, 76°05′W, 23 September–3 October 1946, F. Woytkowski, 2 ♂, 10 ♀ (AMNH); *Loreto*: Aquaitia, 4°00′S, 75°10′W, 1–2 September 1946, F. Woytkowski, 5 ♂, 25 ♀ (AMNH); San Alejandro, 4°00′S, 75°10′W, June 1947, W. Weyrauch, 5 ♂, 2 ♀ (AMNH); *Pasco*: Upper Pachitea River, 8°46′S, 74°31′W, collector & date unknown, 1 ♀ (AMNH); *Madre de Dios*: 15 km E. of Puerto Moldonado on Rio Madre de Dios, 12°17′S, 70°52′W, 4 June 1983, G.C. Hunter, 1 ♀ (CAS); same location & collector, 27 June 1983, 1 ♀ (CAS).

Diagnosis.—This species is distinguished

Table 1.—Eye measurements for species of *Hesydrus* in mm. Measurements are dimensions within outer margins of entities included. AE row = width of anterior eye row, PE row = width of posterior eye row, OQA = width of ocular quadrangle anteriorly (width of anterior median eyes), OQP = width of ocular quadrangle posteriorly (width of posterior median eyes), OQH = height of ocular quadrangle (height of anterior median eye and posterior median eye), PLE = diameter of posterior lateral eye, PME = diameter of posterior median eye, ALE = diameter of anterior lateral eye, AME = diameter of anterior median eye, PLE-PME = interdistance between posterior lateral eye and posterior median eye, PME-PME = interdistance between posterior median eyes, ALE-AME = interdistance between anterior lateral eye and anterior median eye, AME-AME = interdistance between anterior median eyes.

	Hesydrus palustris ♂	*Hesydrus palustris* ♀	*Hesydrus habilis* ♂	*Hesydrus habilis* ♀	*Hesydrus canar* ♂	*Hesydrus canar* ♀	*Hesydrus caripito* ♀	*Hesydrus yacuiba* ♀	*Hesydrus chanchamayo* ♀
AE row	1.12	1.32	1.17	1.20	1.29	1.28	1.18	1.17	1.47
PE row	2.13	2.55	2.20	2.36	2.53	2.50	2.38	2.37	2.94
OQA	0.73	0.81	0.73	0.73	0.83	0.81	0.74	0.72	0.90
OQP	1.20	1.35	1.08	1.13	1.26	1.21	1.20	1.23	1.44
OQH	0.90	0.95	0.90	0.96	1.03	1.04	0.95	0.85	1.10
PLE	0.46	0.49	0.52	0.50	0.54	0.52	0.50	0.45	0.60
PME	0.44	0.44	0.44	0.45	0.47	0.48	0.45	0.41	0.54
ALE	0.18	0.20	0.17	0.20	0.18	0.21	0.20	0.17	0.21
AME	0.31	0.33	0.33	0.45	0.35	0.38	0.32	0.30	0.33
PLE-PME	0.40	0.55	0.37	0.47	0.50	0.51	0.44	0.45	0.55
PME-PME	0.46	0.49	0.35	0.35	0.41	0.37	0.40	0.48	0.48
ALE-AME	0.02	0.05	0.06	0.06	0.07	0.06	0.05	0.06	0.10
AME-AME	0.08	0.20	0.15	0.15	0.19	0.20	0.16	0.19	0.23

by characteristics of the prominent retrolateral tibial apophysis which is about as wide as long and diverges distinctly from the axis of the tibia; its apex is rounded on one corner and acute on the other. Additionally, the guide of the median apophysis is acute and directed distad. The distinctive scape of the epigynum emerges dorsally from beneath a distinct rim, is widest at about the middle of its length, and is rugose on the posterior half. Internally, about one-third of the spermathecum is free from attachment to other structures.

Description.—*Male (lectotype):* Carapace (Fig. 1) medium brown with irregular submarginal light bands, narrow dark marginal bands, black in eye region, length 5.0, width 4.5. Sternum light, unmarked, length 2.30, width 2.15; labium generally light, lighter at distal margin, length 0.45, width 0.42. Clypeus height 0.35, width 2.18. Anterior eye row straight or slightly recurved, eye measurements in Table 1. Cheliceral faces light and shaped as for genus, three retromarginal teeth, subequal in size and with a gap between proximal two. Legs II-IV-I-III, measurements in Table 2. Color of legs medium brown, marked only with very faint maculae on dorsum of femora. Abdomen with distinct, diffuse dorsal pattern (Fig. 1), length 4.7. Palpus (Figs. 2, 3) tibia length approximately equal to length of cymbium, bulb t and st prominent, vd of ma acute distally, g of dd acute, curved distally towards apex of c, ecd of rta prominent, projected somewhat laterally, rounded on outer edge except at ventral corner.

Table 2.—Leg measurements of *Hesydrus palustris* male in mm.

Leg segment	I	II	III	IV
Femur	5.8	7.3	5.8	6.7
Tibia-patella	7.7	9.4	6.9	8.3
Metatarsus	6.2	7.5	5.5	8.5
Tarsus	3.5	4.0	3.6	4.5
Total	23.2	28.2	21.8	28.0

Female (paralectotype): Carapace with irregular light submarginal bands, length 5.6, width 5.5. Sternum unmarked, length 3.1, width 2.8; labium length 1.0, width 0.95. Clypeus unmarked, height 0.50, width 2.5. Anterior eye row slightly recurved, eye measurements in Table 1. Chelicerae medium

Table 3.—Leg measurements of *Hesydrus palustris* female in mm.

Leg segment	I	II	III	IV
Femur	6.9	8.1	7.0	8.0
Tibia-patella	9.0	10.3	8.4	9.9
Metatarsus	6.6	7.4	6.4	9.5
Tarsus	3.6	3.3	4.0	4.5
Total	26.1	29.1	25.8	31.9

brown, three promarginal teeth, three retromarginal teeth with gap between proximal two. Legs unmarked, IV-II-I-III, measurements in Table 3. Abdomen with distinct, diffuse dorsal pattern similar to male, venter light, unmarked, length 7.0. Median scape of epigynum (Figs. 4, 5) emerges from under a rim, widest in middle of its length, rugose at the posterior half, spermatheca free from attachment for one-third of their length.

Variation.—Carapace length of males average 4.74 (4.0–5.3, $n = 11$) and of females 4.91(3.9–6.2, $n = 50$). Dorsal pattern similar in both sexes with little variation noted.

Natural history.—Average diameter of 22 egg sacs equals 8.54 (6.1–10.5). Occurrence of egg sacs in the months of February, March, June, September and October suggests that reproduction may occur year round.

Distribution.—Known from the high elevation tributaries of the Amazon River on the Eastern slopes of the Andes in Peru, Equador and Bolivia. A single male specimen from the Canal Zone seems disjunct from the of the main population. A thorough collecting effort at this location at Barro Colorado Island by the author in 1983 failed to find any specimens of *Hesydrus* although other trechaleids were found there suggesting that the Chickering specimen location may be in error. A single female in northern Argentina seems also be disjunct, but further collections are needed to determine if it is part of a continuous distribution (Fig. 6).

Hesydrus habilis (O. P.-Cambridge 1896)
Figs. 7–11

Triclaria habilis O.P.-Cambridge 1896:173, plate 22, fig. 9.

Trechalea habilis (O.P.-Cambridge): F.O.P.-Cambridge 1902:313, plate 30, fig. 15.

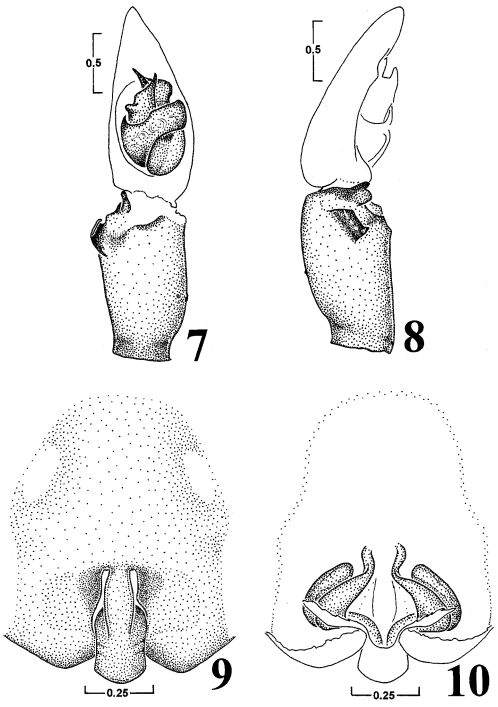
Hesydrus habilis (O.P.-Cambridge): F.O.P.-Cambridge 1903:165, plate 15, fig. 21; Roewer 1954: 137; Bonnet 1957:2182; Platnick 2004.

Type material.—Holotype male, Costa Rica, 1907, by Sarg (BMNH, examined).

Other material examined.—COSTA RICA: unnamed river near Siquirres, 10°06′N, 83°31′W, 16 August 1983, J. Carico & F. Coyle, 7 ♂, 9 ♀ (JEC); Rio Chirripo de Alantica near Limon, 9°46′N, 83°10′W, 16 August 1983, J. Carico & F. Coyle, 4 ♂, 6 ♀ (JEC); 7 miles W. Turrialba, 9°54′N, 83°41′W, 7 August 1927, W.J. Hamilton, Jr., 1 ♂, 4 ♀, 4 juveniles (AMNH); Rio Corobici, 1 km de Carretera Interamer., 10°26′N, 85°10′W, December 1965, C.E. Valerio, 2 ♂, 1 ♀ (UCR). HONDURAS: Lancetilla, 14°54′N, 89°07′W, 19 July 1929, A.M. Chickering, 1 ♀ (MCZ); July 1929, A.M. Chickering, 1 ♂ (MCZ), 11 July 1929, A.M. Chickering, 1 ♀ (MCZ), Lancetilla, Mt. Side near reservoir, 25 July 1929, A.M. Chickering, 1 ♀ (MCZ). PANAMA: Rio Changuinol near Quebrada el Guabo, 8°46′N, 79°56′W, April 1980, C.W. Myers, 1 ♀ (AMNH); Remedios, 8°14′N, 81°51′W, 27 February 1924, A. & W. Petrunkevitch, 1 ♂ (YPM), river 10 km W. David, 8°26′N, 82°26′W, 8 August 1983, J. Carico, F. Coyle, J. Coddington, W. Eberhard, 1 ♂ (JEC).

Diagnosis.—The distinctive small retrolateral tibial apophysis in the male palpus is wider than long, truncated distally, and follows the contour of the tibia. The guide of the median apophysis is directed slightly laterally. The distinctive scape of the female epigynum is continuous with the epigynal plate, not separated by a ridge, and is narrowed in its anterior half.

Description.—*Male (Siquirres, near Rio Pacuare, Costa Rica):* Carapace medium brown with irregular submarginal light bands, narrow dark marginal bands, black in eye region, length 4.8, width 4.8. Sternum light, unmarked, length 2.9, width 2.5; labium generally light, lighter at distal margin, length 0.92, width 0.85. Clypeus height 0.34, width 1.50. Anterior eye row slightly recurved, eye measurements in Table 1. Cheliceral faces light and shaped as for genus, three retromarginal teeth, subequal in size and with a gap between proximal two. Legs II-IV-I-III measurements in Table 4. Color of legs medium brown, marked only with very faint maculae on dorsum of femora. Abdomen with distinct, diffuse dorsal pattern but three pairs of light spots evident, length 4.6. Palpus (Figs. 7, 8) tibia length approximately equal length of



Figures 7–10.—Genitalia of *Hesydrus habilis*. 7, 8. right palpus; 7. ventral view, 8. retrolateral view; 9, 10. female genitalia; 9. ventral view, 10. dorsal view.

cymbium, bulb t and st prominent, vd of ma acute distally, g of dd acute, directed anteriolaterally, ecd of rta prominent, cupped, wider than long, truncated distally following the contour of the tibia, smooth on outer edge.

Female (Siquirres, near Rio Pacuare, Costa Rica): Carapace with irregular light submarginal bands, narrow dark marginal bands, length 5.0, width 5.0. Sternum unmarked, length 2.9, width 2.7; labium length 1.00, width 0.92, lighter distally. Clypeus unmarked, height 0.39, width 2.45. Anterior eye row slightly recurved, eye measurements in Table 1. Chelicerae medium brown, unmarked, three promarginal teeth, three retromarginal teeth equidistant, equal size. Legs IV-II-I-III, measurements in Table 5. Abdomen with distinct, diffuse dorsal pattern similar to male, venter light, unmarked, length 5.1. Median scape of epigynum (Figs. 9, 10) narrow, continuous with the epignal plate, not separated by a ridge, narrower in the anterior half, internal structures as for genus. The scape is continuous with the epigynal plate, not separated by a ridge, and narrowed in its anterior half.

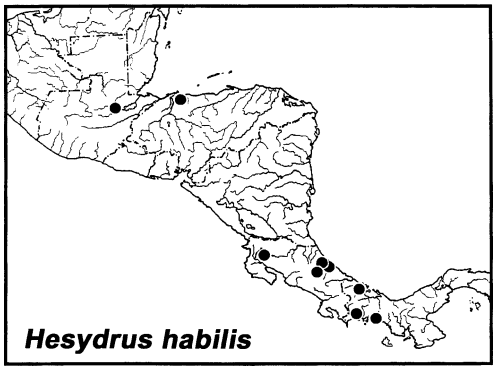


Figure 11.—Distribution of *Hesydrus habilis* in Central America.

Variation.—Carapace length of males average 4.79 (4.2–5.2, $n = 14$) and of females 4.68 (4.0–5.4, $n = 23$). Dorsal pattern similar in both sexes with little variation noted.

Natural history.—Twelve egg sacs collected during the months of April, July, August, and December have an average diameter of 8.37 (7.1–10.2).

Distribution.—Central Guatemala, Costa Rica and western Panama (Fig. 11).

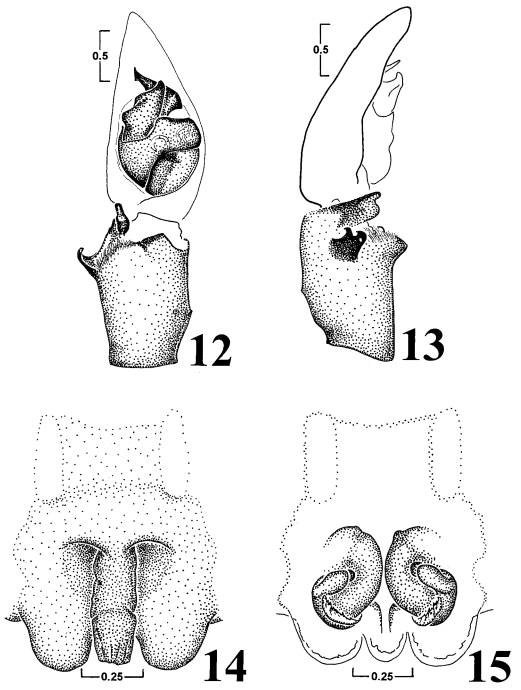
Hesydrus canar new species
Figs. 6, 12–15

Type material.—Holotype male, Rio Yanayacu, Cañar, Ecuador, 2°27′S, 79°17′W, 22 September 1984, F. Man Ging (MECN). Paratypes: 3 males, 2 females, same collection data as holotype (MECN).

Other material examined.—COLOMBIA: *Cauca*: Questrada Huanqui, Rio Saija area, 2°56′N, 77°38′W, 18 October–3 November 1971, 4 ♀ (FMNH). ECUADOR: *Guyas*: Hac, San Juaquin, 4 km SW. Bucay, 2°41′S, 79°40′W, 1–4 May 1986, S.H. Kamey, 3 ♀ (MECN); *El Oro*: Rio Colorado, 0°41′N,

Table 4.—Leg measurements of *Hesydrus habilis* male in mm.

Leg segment	I	II	III	IV
Femur	6.2	7.7	6.2	7.0
Tibia-patella	8.3	10.1	7.4	9.0
Metatarsus	6.4	8.0	6.0	9.0
Tarsus	3.0	3.7	3.3	4.4
Total	23.9	29.5	22.9	29.4



Figures 12–15.—Genitalia of *Hesydrus canar*. 12, 13. right palpus; 12. ventral view, 13. retrolateral view; 14, 15. female genitalia; 14. ventral view, 15. dorsal view.

77°58′W, 3 November 1942, R. Walls, 1 ♀ (CAS); *Pichincha*: Macachi, 0°10′S, 78°40′W, March 1943, H. Frizzell, 1 ♀ (CAS). PERU: *Piura*: Higueron Las Lomas, 4°39′S, 80°14′W, 29 July 1941, H. & F. Frizzell, 2 ♂, 2 ♀ (CAS); Quiroz River, 4°26′S, 80°18′W, 26 December 1940, H. & F. Frizzell, 1 ♀ (CAS).

Etymology.—The name is a noun in apposition suggested by the name of the province from which the specimen was collected.

Diagnosis.—The distinctive retrolateral apophysis of the male palpus is about as long as wide and distinctly bifurcated distally. Also, the guide of the median apophysis has a distinctive spur near the tip. The scape of the epigynum is rather uniform in width and is continuous with the epigynal plate while not separated from it by a rim, slightly narrowed medially.

Description.—*Male (holotype):* Carapace medium brown with distinct zig-zag submarginal light bands, dark marginal bands with undulations into the submarginal band, black in eye region, length 5.7, width 5.4. Sternum light, unmarked, length 3.1, width 2.8; labium median brown, lighter at distal margin, length 1.15, width 0.93. Clypeus height 0.40, width 2.75. Anterior eye row slightly recurved, eye measurements in Table 1. Cheliceral faces light and shaped as for genus, three retromarginal teeth, subequal in size and with a gap between proximal two. Legs II-IV-I-III, measurements in Table 6. Color of legs medium brown, marked only with distinct maculae on dorsum of femora. Abdomen mostly dark above with distinct, diffuse light areas in pattern, length 5.1. Palpus (Figs. 12, 13) tibia length approximately equal length of cymbium, bulb t and st prominent, vd of ma acute distally, g of dd with ante-apical spur, directed anterio-laterally, ecd of rta prominent, bifurcated with each division acute and curved dorsally.

Table 5.—Leg measurements of *Hesydrus habilis* female in mm.

Leg segment	I	II	III	IV
Femur	6.5	8.0	6.4	7.3
Tibia-patella	8.4	10.3	7.7	9.2
Metatarsus	6.3	8.0	6.4	9.2
Tarsus	3.2	3.8	3.6	4.9
Total	24.4	30.1	24.1	30.6

Female (paratype): Carapace medium brown with narrow, distinct zig-zag submarginal light bands, dark marginal bands with undulations into the submarginal band, black in eye region, length 5.4, width 5.4. Sternum light, unmarked, length 3.1, width 2.8; labium length 1.08, width 1.00, lighter distally. Clypeus unmarked, height 0.41, width 2.60. Anterior eye row slightly recurved, eye measurements in Table 1. Chelicerae dark brown, unmarked, three promarginal teeth, on the left side three retromarginal teeth, subequal in size and with a gap between proximal two, two submarginal teeth on the right side. Legs IV-II-I-III, measurements in Table 7. Color of legs medium brown, marked only with distinct maculae on dorsum of femora. Abdomen dorsal pattern similar to male, venter light, unmarked, length 8.1. Median scape of epigynum (Figs. 14, 15) rather uniformly narrow, continuous with the epigynal plate and not separated by a rim, internal structures as for genus.

Variation.—Carapace length of males average 5.54 (5.0–6.0, $n = 5$) and of females

Table 6.—Leg measurements of *Hesydrus canar* male in mm.

Leg segment	I	II	III	IV
Femur	7.0	8.6	6.9	8.0
Tibia-patella	9.5	11.5	8.4	10.0
Metatarsus	7.5	9.5	7.0	10.5
Tarsus	3.8	4.5	4.0	5.4
Total	27.8	34.1	26.3	33.9

5.08 (4.2–5.5, $n = 13$). Dorsal pattern similar in both sexes with little variation noted.

Natural history.—Average diameter of 4 egg sacs equals 7.9 (6.9–8.5). Egg sacs occurred in the months of May, September and October.

Distribution.—Known from the high altitude tributaries of coastal rivers on the Western slopes of the Andes in Columbia, Ecuador and Peru (Fig. 6).

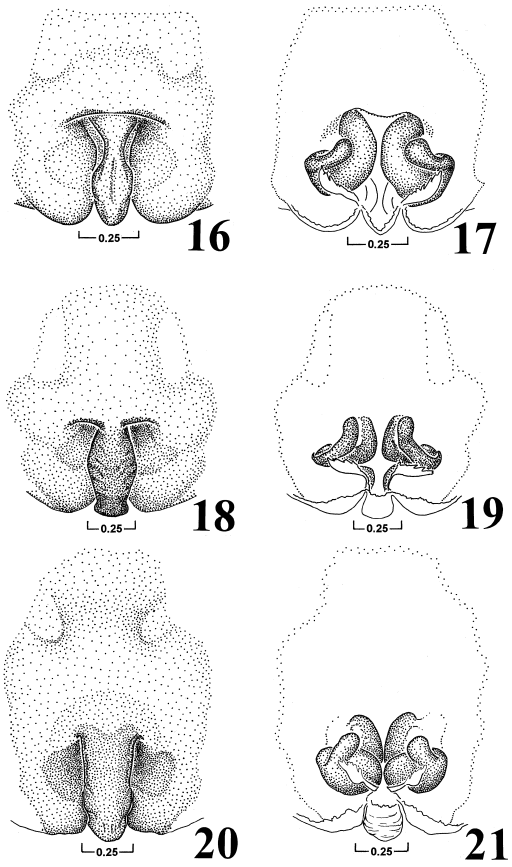
Hesydrus caripito new species
Figs. 6, 16–17

Type.—Holotype female, Caripito, Monagas, Venezuela, 10°07′N, 63°06′W, 17 March 1942, New York Zoological Society 1942 Venezuela Expedition (AMNH).

Etymology.—The name is a noun in apposition suggested by the name of the type locality.

Diagnosis.—Distinctive characters of the median scape of the female epigynum include being very narrowed near the base, emerging from beneath the transverse rim, and its length being greater than half the length of the entire sclerotized epigynal plate.

Description.—*Female (holotype):* Carapace medium brown with indistinct submarginal light bands, indistinct medium submarginal band, black in eye region, length 4.9, width 5.0. Sternum light, unmarked, length 2.9, width 2.6; labium lighter distally, length 1.00, width 0.90. Clypeus unmarked, height 0.36, width 2.40. Anterior eye row slightly recurved, eye measurements in Table 1. Chelicerae dark brown, unmarked, three promarginal teeth, three equidistant retromarginal teeth, subequal in size. Legs IV-II-I-III, measurements in Table 8. Color of legs medium brown, marked only with distinct maculae on dorsum of femora. Abdomen dorsal pattern diffuse and distinct, venter light, unmarked, length 5.5. Median scape of epigynum (Figs. 16, 17) narrowed basally, epigynal plate relatively short, internal structures as for genus.



Figures 16–21.—Female genitalia of *Hesydrus* species. 16, 17. *H. caripito*; 16. ventral view, 17. dorsal view; 18, 19. *H. yacuiba*; 18. ventral view, 19. dorsal view; 20, 21. *H. chanchamayo*; 20. ventral view, 21. dorsal view.

Natural history.—A note with the collection states: ''Under and around smooth stones in ford across Caripe R. at water pump station.''

Material examined and distribution.—Known only from the type specimen from Venezuela (Fig. 6).

Hesydrus yacuiba new species
Figs. 6, 18, 19

Type material.—Holotype female, Yacuiba, Tarija, Bolivia, 22°02′S, 63°41′W, 18 November 1961, Bachmann (MACN).

Etymology.—The name is a noun in apposition suggested by the name of the type locality.

Table 7.—Leg measurements of *Hesydrus canar* female in mm.

Leg segment	I	II	III	IV
Femur	6.8	8.3	6.8	7.8
Tibia-patella	8.9	10.7	8.0	9.5
Metatarsus	6.8	8.4	6.5	9.3
Tarsus	3.6	4.1	3.9	5.1
Total	26.1	32.5	25.2	31.7

Table 8.—Leg measurements of *Hesydrus caripito* female in mm.

Leg segment	I	II	III	IV
Femur	5.8	7.2	6.0	6.8
Tibia-patella	7.8	9.3	7.2	8.3
Metatarsus	5.9	7.5	5.7	8.5
Tarsus	2.8	3.5	3.3	4.2
Total	22.3	27.5	22.2	27.8

Diagnosis.—The scape of the female epigynum is continuous with the epigynal plate, widest midway along its length and expanded slightly at the posterior end. The entire ventral surface is rugose.

Description.—*Female (holotype):* Carapace medium brown with indistinct submarginal light bands, white hairs on clypeus, eye region and submarginal band, black in eye region, length 4.7, width 5.1. Sternum light, unmarked, length 2.8, width 2.8; labium, lighter distally, length 1.00, width 0.90. Clypeus unmarked but with white hairs, height 0.44, width 2.42. Anterior eye row slightly recurved, eye measurements in Table 1. Chelicerae medium, unmarked, covered in dense light and dark hairs, three promarginal teeth, three equidistant retromarginal teeth, subequal in size. Legs II-IV-I-III, measurements in Table 9. Color of legs medium brown, marked only with distinct maculae on dorsum of femora. Abdomen dorsal pattern diffuse and distinct, covered in dense shiny hairs, venter light, unmarked, length 5.1. Median scape of epigynum (Figs. 18, 19) rough-surfaced, narrowed proximally and distally, internal structures as for genus.

Natural history.—Unknown.

Material examined and distribution.—Known only from the type specimen from Bolivia (Fig. 6).

Hesydrus chanchamayo new species
Figs. 6, 20, 21

Type material.—Holotype female, Chanchamayo, Ica, Peru, 13°42′S, 75°48′W, 7 February 1953, Weyrauch (CAS).

Etymology.—The name is a noun in apposition suggested by the name of the type locality.

Diagnosis.—The rather smooth median scape of the female epigynum has its continuous connection with the epigynal plate broader than the width of the scape and not separated by a rim. The internal structures, including the short spermathecum, are heavily sclerotized and robust. This specimen is larger (carapace length 6.5) than any other female in the genus thus far studied.

Description.—*Female (Holotype):* Carapace medium brown with indistinct submarginal light bands, indistinct medium band, black in eye region, length 6.5, width 6.7. Sternum light, unmarked, length 1.90, width 1.70; labium length 1.24, width 1.70, lighter distally. Clypeus unmarked, height 0.60, width 3.0. Anterior eye row slightly recurved, eye measurements in Table 1. Chelicerae dark brown, unmarked, three promarginal teeth, three equidistant retromarginal teeth, subequal in size. Legs II-III-I (IV missing), measurements in Table 10. Color of legs medium brown, marked only with indistinct maculae on dorsum of femora. Abdomen dorsal pattern diffuse and distinct, venter light, unmarked, length 9.2. Median scape of epigynum (Figs. 20, 21) of relatively uniform width and not separated from epigynal plane by a sclerotic rim, internal structures as for genus but heavily sclerotized and robust.

Natural history.—Unknown.

Material examined and distribution.—Known only from the type specimen from Peru. There are at least three localities by the same name in the highlands of Eastern Peru

Table 9.—Leg measurements of *Hesydrus yacuiba* female in mm.

Leg segment	I	II	III	IV
Femur	6.0	7.6	6.2	6.9
Tibia-patella	7.9	9.5	7.3	8.5
Metatarsus	5.6	7.3	5.8	8.2
Tarsus	3.3	3.7	3.4	4.0
Total	22.8	28.1	22.7	27.6

Table 10.—Leg measurements of *Hesydrus chanchamayo* female in mm. Leg IV missing.

Leg segment	I	II	III	IV
Femur	7.9	9.7	8.2	—
Tibia-patella	10.5	12.4	9.7	—
Metatarsus	7.6	9.6	7.7	—
Tarsus	4.3	5.3	4.9	—
Total	30.0	37.0	30.5	—

and east of the Andean continental divide (Fig. 6). Location on the map is arbitrarily central to these localities and intended only to show a general geographic reference to the other species.

ACKNOWLEDGMENTS

Thanks are extended to the following persons and museums for the loan of specimens: A. Kury (MNRJ), C.F. Ituarte (MLP), N.I. Platnick (AMNH), H.W. Levi (MCZ, and via MECN), the late M.E. Galiano (MACN), C. Griswold and D. Ubick (CAS), C. Rollard (MNHN), P. Sierwald (FMNH), L.W. Buss (YPM) and C.E. Valerio (UCR). I thank also R. Balm (Rutgers Univ.) who provided valuable information on the itinerary of the Yale 1911 Peruvian Expedition, and to the editors, two anonymous reviewers, N.A. Carico and E.L. Cruz da Silva for corrections and suggested improvements.

LITERATURE CITED

Bonnet, P. 1957. Bibliographia Araneorum. Toulouse 2(3):1927–3026.

Bonnet, P. 1959. Bibliographia Araneorum. Toulouse 2(5):4231–5058.

Brignoli, P.M. 1983. A Catalogue of the Araneae Described Between 1940 and 1981. (P. Merrett, ed.).Manchester University Press, Manchester.

Cambridge, F.O.P.- 1902. Arachnida—Araneida and Opiliones. Pp. 313–424. *In* Biologia Centrali-Americana, Zoology, vol. 2 (F.D. Godman & O. Salvin, eds.). Taylor and Francis, London.

Cambridge, F.O.P.- 1903. On some new species of spiders belonging to the families Pisauridae and Senoculidae; with characters of a new genus. Proceedings of the Zoological Society of. London 1903:151–168.

Cambridge, O.P.- 1896. Arachnida. Araneida. Pp. 161–224. *In* Biologia Centrali-Americana, Zoology, vol. 1 (F.D. Godman & O. Salvin, eds.). Taylor and Francis, London.

Cambridge, O.P.-. 1897. Arachnida. Araneida. Pp. 225–232. *In* Biologia Centrali-Americana, Zoology, vol. 1 (F.D. Godman & O. Salvin, eds.). Taylor and Francis, London.

Caporiacco, L. di 1947. Diagnosi preliminari di specie nuove de arachnidi della Guiana Britannica. Monitore Zoologico Italiano 56:20–24.

Carico, J.E. 1986. Trechaleidae: A ''new'' American spider family. Pp. 305. *In* Proceedings of the Ninth International Congress of Arachnology, Panama 1983. (W.G. Eberhard, Y.D. Lubin & B.C. Robinson, eds.). Smithsonian Institution Press, Washington, D.C.

Carico, J.E. 1993. Revision of the genus *Trechalea* Thorell (Araneae, Trechaleidae) with a review of the taxonomy of the Trechaleidae and Pisauridae of the Western Hemisphere. Journal of Arachnology 21:226–257.

Carico, J.E. 2005. Descriptions of two new spider genera of Trechaleidae (Araneae, Lycosoidea) from South America. Journal of Arachnology 33: 795–810.

Chamberlin, R.V. 1916. Results of the Yale Peruvian Expedition of 1911. The Arachnida. Bulletin of the Museum of Comparative Zoology at Harvard College, Cambridge 60(6):177–299.

Koch, C.L. 1848. Die Arachniden. Füntzehnter Band. Nürnberg 210 pp.

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.

Mello-Leitão, C.F. 1931. Arachnidos do Rio Grande do Sul. Boletin Biologico Rio de Janeiro, São Paulo 17:10–14.

Mello-Leitão, C.F. 1941. Las arañas de Córdoba, La Rioja, Calamarca, Tucumán, Salta y Jujuy colectadas por los Profesores Birabén. Revista del Museo de La Plata 2:99–198.

Platnick, N. I. 2004. The World Spider Catalog, Version 4.5. American Museum of Natural History, online at http://research.amnh.org/entomology/spiders/catalog/index.html

Roewer, C.F. 1954. Katalog der Araneae, vol. 2a. Institut Royal des Sciences Naturelles de Belgique, Bruxelles.

Pocock, R.I. 1900. Myriapoda and Arachnida. In Report on a collection made by MM. F.V. McConnell and J.J. Quelch at Mount Roriama in British Guiana. Transaction of the Linnean Society of London. Zoology 2:64–71.

Sierwald, P. 1989. Morphology and ontogeny of female copulatory organs in American Pisauridae with special reference to homologous features (Arachnida: Araneae). Smithsonian Contributions to Zoology 484:1–24.

Sierwald, P. 1990. Morphology and homologous features in the male palpal organ in Pisauridae and other spider families with notes on the taxonomy of Pisauridae (Arachnida: Araneae).

Nemouria, Occasional Papers of the Delaware Museum of Natural History 35:1–59.

Sierwald, P. 1993. Revision of the spider genus *Paradossenus*, with notes on the family Trechaleidae and the subfamily Rhoicininae (Araneae: Lycosoidea). Revue Arachnologique 10(3):53–74.

Simon, E. 1898a. Descriptions d'arachnides nouveaux des familles des Agelenidae, Pisauridae, Lycosidae et Oxyopidae. Annales de la Société Entomologique de Belgique, Bruxelles 42:1–34.

Simon, E. 1898b. Histoire Naturelle des Araignées. Vol. 2(2), pp. 193–380, Encyclopédie Roret, Paris.

Simon, E. 1903. Histoire Naturelle des Araignées. Vol. 2(4), pp. 699–1080, Encyclopédie Roret, Paris.

Manuscript received 8 December 2003, revised 26 August 2004.