

A REVISION OF THE NEOTROPICAL ORB-WEAVING
SPIDER GENUS *SCOLODERUS* (ARANEAE: ARANEIDAE)

BY M. BRIAN TRAW

Museum of Comparative Zoology
Harvard University
Cambridge, Massachusetts 02138*

ABSTRACT

More than one-fourth of the spiders examined for this revision were collected since the neotropical genus *Scoloderus* was revised in 1976. Thirteen names have been proposed for what appear to be five valid species (*Scoloderus cordatus*, *S. gibber*, *S. nigriceps*, *S. tuberculifer*, and *S. ackerlyi*). These species are distinguished by the presence or absence of abdominal humps on the female, the shape of the median apophysis of the male palpus, and the shape of the scape of the female epigynum. Abdominal coloration and pattern are highly variable and unreliable for identification. One new species, *Scoloderus ackerlyi*, is described on the basis of a single, unique female from Belize.

INTRODUCTION

The orb-weaving genus *Scoloderus* (Simon, 1887) consists of five species, one of which is new. The genus is primarily neotropical in distribution, although individuals have been recorded as far north as Georgia, United States and as far south as Rio Negro, Argentina.

Scoloderus spiders, as adults, spin very tall, rectangular webs. The most detailed information about *Scoloderus* web structure is known from observations of *S. tuberculifer* in Colombia (Eberhard, 1975). At the base is an orb-web. Radii on the upper half of the orb-web extend vertically up to 1.0 m forming a long rectangle.

*Correspondence: Section of Ecology and Systematics, Corson Hall, Cornell University, Ithaca, NY 14853. Email: mbt @ cornell.edu.

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Spiders spin their webs in the late evening and tear them down each morning. These webs have been hypothesized to facilitate the capture of moths. When moths strike the upper part of the web, they tumble down, losing scales along the way. By the time they reach the bottom the moths have lost so many scales that they stick to the web (Eberhard, 1975; Stowe, 1978).

The first *Scoloderus* species described were placed in *Hypophthalma* (Taczanowski, 1879), having the type species *H. deplanata* Taczanowski. Simon (1887) found the name *Hypophthalma* preoccupied and determined that the species placed by Taczanowski in *Hypophthalma* actually belonged in two genera. The species considered in this paper were ones that were placed in a new genus *Scoloderus* (Simon, 1887), having the type species *H. cordata*. The other species were placed in the genus *Hypognatha* Guérin-Méneville, having the type species *H. feisthameli* (= *H. scutata*) (Simon, 1895). Early descriptions of *Scoloderus* species (including *S. cordatus*, *S. tuberculifer*, *S. nigriceps*, *S. normalis*, *S. hybus*, *S. birabeni*, *S. intermedius*, and *S. nigrocellatus*) were based solely upon female specimens. One species, *S. eresimorpha*, was described on the basis of a single immature male (Taczanowski, 1879). Only *S. americana* and *S. gibber* were described with information on males. Unfortunately, the male holotype of *S. gibber* has since been lost and was not available for this revision. Abdominal pattern and coloration were important criteria for these early descriptions.

Upon discovering that abdominal coloration and pattern were highly variable in *Scoloderus*, Levi (1976) synonymized all *Scoloderus* names under either *S. cordatus* or *S. tuberculifer*. Levi's classification was based on differences in the structure of the scape of the female epigynum and the median apophysis of the male palpus. The difficulty of placing the many recently collected specimens of *Scoloderus* has prompted this revision. *Scoloderus gibber* (O.P.-Cambridge) and *S. nigriceps* (O.P.-Cambridge) are resurrected from Levi's (1976) synonymization. *Scoloderus gibber* and *S. nigriceps* are distinguished by the genitalia, as well as by the presence or absence of abdominal humps.

Additionally, this study includes information on the structure of the male palpus of *Scoloderus* based upon examination under a scanning electron microscope. The palpal structure of *Scoloderus*

has previously eluded accurate description due to the small size and transparency of some parts.

METHODS AND MATERIALS

Specimens were examined primarily under a dissection microscope for this revision. Eye sizes, distances between eyes, and clypeus height were all recorded in units of anterior median eye diameter (AME). The techniques for measuring and drawing spider body parts followed a standard method for spider genus revisions (Levi, 1993). The male palpi of four species were examined through both a dissecting microscope and a scanning electron microscope. The SEM photographs were of right palpi. In this paper, SEM photographs are printed in reverse to render them comparable to illustrations of left palpi.

Specimens for this revision were generously loaned from the following collections:

AD	A. Dean Collection, Texas A and M University, College Station, Texas, United States
AMNH	American Museum of Natural History, New York, United States; N. Platnick, L. Sorkin
BMNH	British Museum (Natural History), London, Great Britain; P. Hillyard
CAS	California Academy of Sciences, San Francisco, United States; C. Griswold, W. J. Pulawski, D. Ubick
FSCA	Florida State Collection of Arthropods, Gainesville, Florida, United States; G. B. Edwards
IRSNB	Institut Royal des Sciences Naturelles de Belgique, Brussels, Belgium; L. Baert
MACN	Museo Argentino de Ciencias Naturales, Buenos Aires, Argentina; E. A. Maury, C. L. Scioscia
MCN	Museu de Ciências Naturais, Porto Alegre, Rio Grande do Sul, Brazil; E. H. Buckup
MCZ	Museum of Comparative Zoology, Cambridge, Massachusetts, United States; H. W. Levi
MEG	M. E. Galiano; Buenos Aires, Argentina
MUSM	Museo de Historia Natural, Universidad Nacional Mayor de San Marcos, Lima, Peru; D. Silva

- MZSP Museu de Zoologia da Universidade de São Paulo,
 São Paulo, Brazil; P. Vanzolini, L. Neme, J. L. M.
 Leme
- PAN Polska Akademia Nauk, Warszawa, Poland; A. Slo-
 jewska, E. Kierych

I thank H. W. Levi for suggesting this project, providing helpful comments, and offering encouragement throughout. L. Leibensperger's logistical support and advice were greatly appreciated. L. Leibensperger, H. W. Levi, W. Piel, N. E. Gift, and two anonymous reviewers offered suggestions that improved the manuscript. This revision benefited greatly from illustrations drawn by H. W. Levi (Figs. 1–7, 11–14, 19, 20, 22, 23, 29–33) and his descriptions of previously examined types. Scanning electron microscopy was conducted at Harvard's Museum of Comparative Zoology with the help of R. L. Pinto.

Scoloderus Simon

Scoloderus Simon, 1887: 187. Type species by original designation *Hypophthalma cordata* Taczanowski. The generic name is masculine.

Diagnosis. *Scoloderus* is close to *Wixia* (Levi, 1993) but has a bulging, helmet-shaped carapace (Fig. 2). The genus *Carepalxis* (Levi, 1992a) is also closely allied and has a bulging carapace, but one that is distinguished by two prominent knobs. *Scoloderus* species lack these knobs, although *S. cordatus* has two slight, angular projections on top of the bulge (Fig. 1). The pedicel of *Scoloderus* is generally attached to the posterior third of the abdomen (Fig. 10), unlike *Carepalxis* and *Parawixia* (Levi, 1993). However, pedicle attachment can be located more closely to the middle of the abdomen, as in *S. cordatus* (Fig. 2). The lip of the median apophysis of the male palpus (L in Fig. 7) is not exaggerated in size as in *Wixia* (Levi, 1976) and *Ocrepeira* (Levi, 1993). Palpus of *Scoloderus* lacks the paramedian apophysis and general complexity of palpi in related genera *Parawixia* (Levi, 1992b) and *Wixia* (Levi, 1993). *Scoloderus* spiders are small (maximum total length, 4.5 mm) in comparison to species in the genus *Carepalxis* (maximum total length, 15.5 mm). The height of the *Scoloderus*

carapace is an apomorphy. Other apomorphies include the attachment of the pedicel at the posterior third of the abdominal ventral region (Fig. 10), and a clypeus height of approximately two diameters of the anterior median eyes (Fig. 9).

Description. Ocular quadrangle wider behind than in front (Fig. 1). Width of carapace behind posterior lateral eyes about 74 to 87% of width of thorax in females, 68 to 78% in males. Anterior and posterior margin of chelicerae with four and three teeth respectively. Epigynum of *Scoloderus* a lightly sclerotized, smooth plate with a lobe (Fig. 4). Lobe of epigynum shorter than half the width of basal plate. Coxa I of males with a hook protruding from its distal margin. Tibia II of males thicker than tibia I with 5 to 10 macrosetae. Webs much longer than wide with orb at the base. R radii on the upper half of the orb-web extend vertically to form a rectangular ladder (Eberhard, 1975).

Note. The following parts of the median apophysis are used in identification: inner margin (IM in Fig. 7), lip (L in Fig. 7), spine (S in Fig. 16), and distal rim (DR in Fig. 7). The lip of the median apophysis is the area between the inner margin and the distal rim.

Species differences. The species of *Scoloderus* are quite variable and often difficult to separate. Females are distinguished by the presence (Figs. 19, 28) or absence (Figs. 2, 10) of abdominal humps. The posterior scape of the epigynum can be reduced to a crescent (Figs. 4, 12), semicircular (Fig. 21), or narrow and protruding (Figs. 30, 39). Females have either a notched (Fig. 1) or flat (Fig. 9) surface at the top of the carapace hump. Males are separated based on the shape of the lip of the median apophysis (L in Fig. 7). The lip of the median apophysis can either be broadly semicircular (Fig. 7), narrow (Fig. 25), or broadly rectangular (Fig. 33). The median apophysis can have a pointed distal tip (S in Fig. 16) or one that is rounded (Figs. 7, 25, 33).

Distribution. All species come from tropical and subtropical America.

Key to females of *Scoloderus* species

1. Scape of epigynum narrow with parallel sides (Figs. 30, 39) 2
- Scape of epigynum semicircular (Figs. 12, 21) or reduced to a crescent (Fig. 4) 3

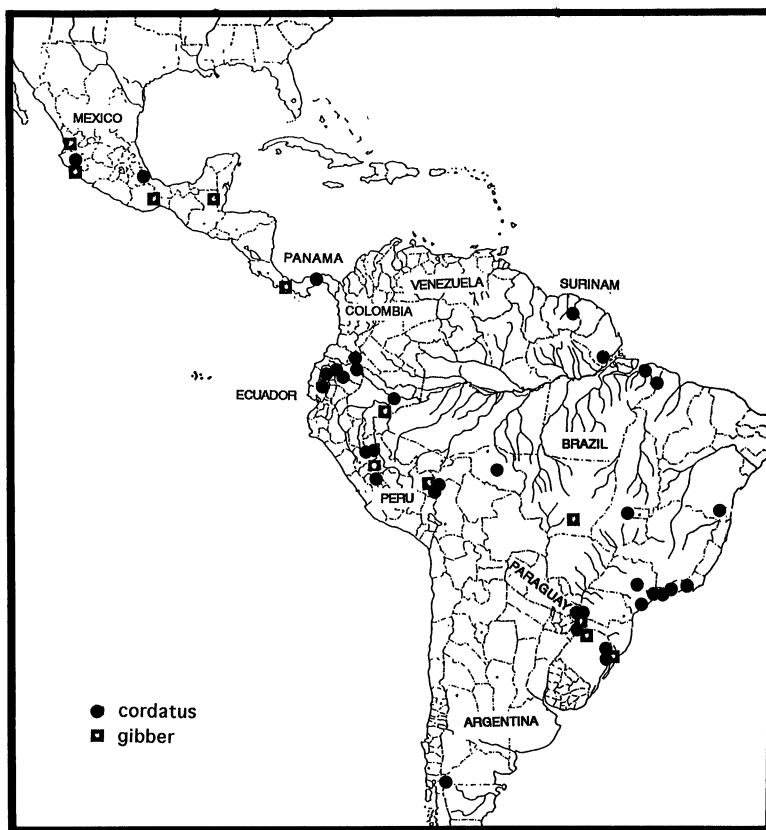
- 2(1). Width of epigynal scape at base roughly one-third of width of basal plate at attachment (Fig. 30); Mexico, Central and South America. (Map. 2) *tuberculifer*
- Width of epigynal scape less than one-fifth of width of basal plate at attachment (Fig. 39); Belize (Map. 2) *ackerlyi*
- 3(1) Abdomen with paired humps (Figs. 19, 20) and shaped like a shield; United States, Mexico, Caribbean Islands (Map. 2) *nigriceps*
- Abdomen never with dorsal humps (Fig. 2); abdomen round and dark; legs often ringed; Mexico, Central and South America (Map. 1) 4
- 4(3) Scape of epigynum broadly rounded (Fig. 4); carapace bulge often notched (Fig. 1) *cordatus*
- Scape of epigynum semicircular and protruding (Fig. 12); carapace bulge without notch (Fig. 9) *gibber*

Key to males of *Scoloderus* species

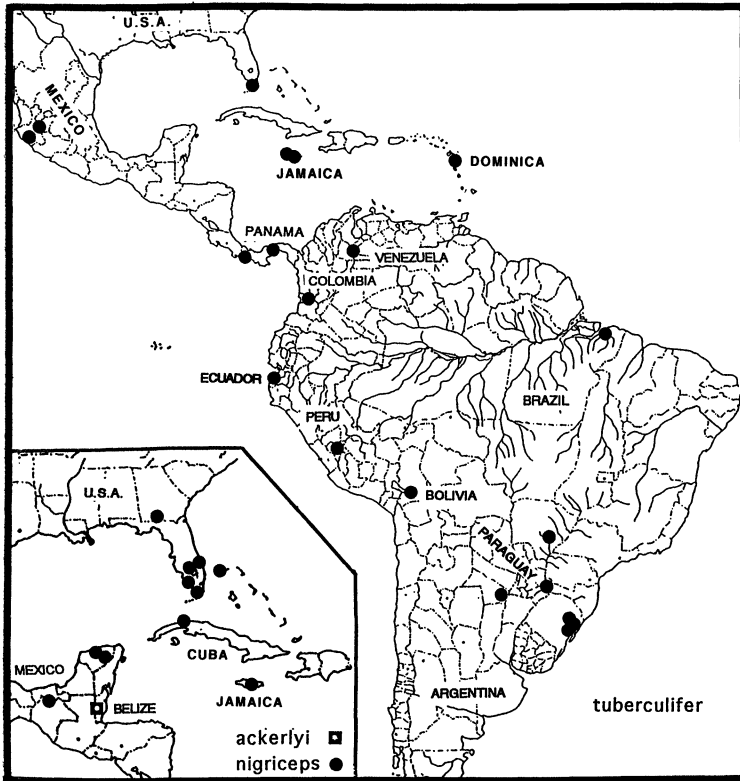
The male of *S. ackerlyi* is not known

1. Palpus with median apophysis lip wide, semicircular in shape (L in Figs. 7, 16); abdomen dark gray to green; clypeus height greater than two diameters of anterior median eyes; Mexico, Central and South America 2
- Palpus with median apophysis lip narrow, rectangular in shape (Figs. 25, 33); abdomen white; clypeus height less than two diameters of anterior median eyes 3
- 2(1). Distal rim of median apophysis of palpus with a spine (S in Fig. 16) *gibber*
- Distal rim of median apophysis of palpus without spine (DR in Fig. 7) *cordatus*
- 3(1). Lip of median apophysis of palpus at least two times longer than wide (Fig. 25); abdomen often with dorsal black stripe; United States, Mexico, and Caribbean islands (Map. 2) *nigriceps*

- Lip of median apophysis of palpus less than two times as long as wide (Fig. 33); abdomen with dark pigmented region on dorsum; Mexico, Central and South America (Map. 2) *tuberculifer*



Map 1. The distribution of *Scoloderus cordatus* and *Scoloderus gibber*.



Map 2. The distribution of *Scoloderus nigriceps*, *Scoloderus tuberculifer*, and *Scoloderus ackerlyi*.

Scoloderus cordatus (Taczanowski)

Figures 1-8; Map 1

Hypophthalma ? *cordata* Taczanowski, 1879: 129, pl. 2, fig. 41, ♀.

Female holotype from Amable María [Tarma Prov., Depto. Junín], Peru, in PAN, examined and illustrated by H. W. Levi (unpublished).

Hypophthalma ? *eresimorpha* Taczanowski, 1879: 130, pl. 4, fig. 8,

♂. Juvenile male holotype from Amable María [Tarma Prov., Depto. Junín], Peru, in PAN, examined and illustrated by H. W. Levi (unpublished).

Scoloderus cordatus: -Simon, 1887: 187. First placement of *cordatus* in *Scoloderus*.

Carepalxis normalis Keyserling, 1892: 53, pl. 2, fig. 42, ♀.

Female holotype from Taquara, Rio Grande do Sul, Brazil, in BMNH, examined and illustrated by H. W. Levi (unpublished).

Note: The question marks before the specific names are those of Taczanowski and probably refer to the doubtful placement in *Hypophthalma*.

Description. Female from Cuyabeno, Ecuador. Carapace dark brown. Chelicerae dark brown, darker distally. Sternum dark brown. Legs light brown. Abdomen round with white spot inside a blue-gray pigmented region on dorsum, giving the spider the appearance of a bird dropping. Sides of abdomen green-brown. Venter of abdomen, blue-gray. Posterior median eyes 1.3 anterior median eye diameters (AME), laterals 0.6. Anterior median eyes 1.0 AME apart, posterior median eyes 2.0 AME apart. Anterior and posterior median eyes 5.0 AME from laterals. Clypeus height 2.5 AME. Carapace hump notched (Fig. 1). Carapace very hairy (Fig. 2). Dorsum of abdomen without humps (Figs. 2, 3). Total length 3.6 mm. Carapace 1.6 mm long, 1.4 wide, 1.2 high. Sternum length 0.7, width 0.8. First femur 1.3 mm, patella and tibia 1.3, metatarsus 0.8, tarsus 0.4. Second patella and tibia 1.2, third 0.8, fourth 1.2.

Male from Cuyabeno, Ecuador. Coloration as in female. Posterior median eyes 1.3 diameters of anterior medians, laterals 0.7. Anterior median eyes 1.0 AME apart, posterior medians 2.0 AME apart. Anterior and posterior median eyes 6.5 diameters from laterals. Clypeus height 4.0 AME. Abdomen round. Carapace with dense hair, without notch. Total length 2.3 mm. Carapace 1.3 mm long, 1.0 mm wide, and 0.9 mm in height. Sternum length, 0.5; width, 0.5. Median apophysis 0.1 mm long. First femur 1.0 mm, patella and tibia 1.2 mm, metatarsus 0.7, tarsus 0.4. Second patella and tibia 0.9 mm, third 0.5, fourth 0.8.

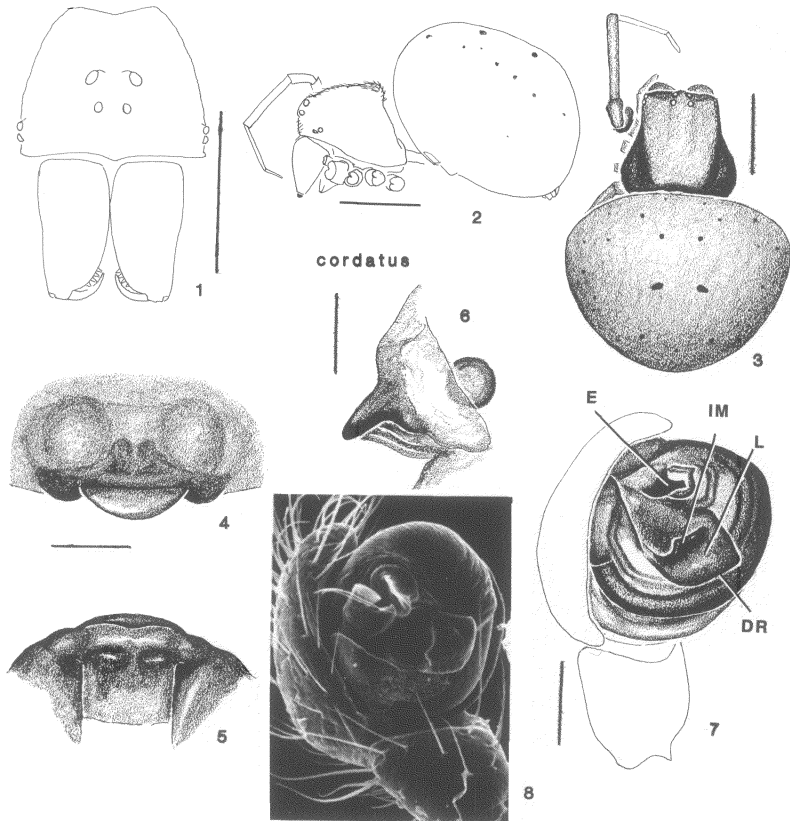
Variation. Adult female total length 2.9 to 3.6 mm; width of carapace 1.2 to 1.7. Male total length 1.5 to 2.9 mm; width of carapace 1.0 to 1.4 mm. Legs sometimes ringed darker brown. Dorsum and sides of abdomen with variable patterns and coloration in both sexes.

Diagnosis. Lip of median apophysis of male semicircular (L in Fig. 7), distal rim lacks spine of *S. gibber* (Fig. 16). Female is very difficult to distinguish from *S. gibber* female. The scape of *S. cordatus* is shorter in length and more broadly rounded (Fig. 4) than that of *S. gibber* (Fig. 12). See diagnosis section of *S. gibber* description for a further comparison. Reliable identification of female *S. gibber* specimens requires the presence of males.

Natural History. Specimens collected in night sweeps of vegetation (B. Malkin, AMNH). Found in grass and scrub (G. B. Edwards, FSCA). A silken pouch containing 18 eggs was found in Loreto Province, Peru (G. B. Edwards, FSCA).

Specimens Examined. MEXICO *Jalisco*: 6.7 km N Autlan, Mine Rd, 7 July, 1984, ♀ (J. B. Woolley, AD); 24 km SW of Autlan, 15 July, 1983, ♀ (P. K. Kovarik, T. L. Harrison and J. C. Schaffner, AD). *Veracruz*: Jalapa, 6 July, 1963, ♀ (D. Bixler, MCZ). PANAMA *Panamá*: Pipeline Road, 8 km NW Gamboa, 7 August, 1983, ♀ (H. W. Levi, MCZ). COLOMBIA *Putumayo*: Buena Vista, 23–29 July, 1972, ♂, ♀ (W. Eberhard, MCZ). SURINAM *Marowijne*: Anapaike Village at Lawa River, 8–29 November, 1963, ♀; Benzdorp at Lawa River, 6 November, 1963, ♂, ♀ (both B. Malkin, AMNH). ECUADOR *Napo*: Río Puyo 900 m, 1 April, 1941, ♂ (W. Clarke, AMNH); 18 April, 1958, ♀ (R. W. Hodges, MCZ). *Sucumbíos*: Tarapoa, 23 June – 1 July, 1988, ♀; Cuyabeno, Napo bridge between Tarapoa and Tipishca, 30 July, 1988, ♂, ♀ (both W. Maddison, MCZ). *Pichincha*: 4 km NE of Pedro Vicente Maldonado, 9–12 July, 1988, ♀ (W. Maddison, MCZ); W Cayambe 2300 m, 7 June, 1965, ♀ (L. E. Peña, MCZ). *Los Ríos*: Río Palenque, 15 February, 1979, ♀ (L. Burnham, MCZ); 14 March, 1982, ♂ (Y. Lubin, MCZ). PERU *Loreto*: Río Manatee, 18 July, 1989, ♂; Explorama Lodge 80 km NE Iquitos, 16–20 July, 1989, ♂ (both G. B. Edwards, FSCA). *Huánuco*: Tingo María, 21, 29 October, 1946, ♀; 26 December, 1946, ♂ (all J. C. Pallister, AMNH); 23 September, 1954, ♂, ♀; 26 October, 1954, ♀ (both E. S. Ross, CAS); 10, 29 November, 1954, ♀ (both E. S. Ross, E. I. Schlinger, CAS); 43 mi E of Tingo María, 5 October, 1954, ♀ (E. S. Ross, E. I. Schlinger, CAS). *Ucayali*: Ivita, Río Neshuya, 2 July, 1986, ♂, ♀; 14 July, 1986, ♀; 26 July, 1986, ♂ (all D. Silva, MUSM); *Madre de Dios*, Zona Reservada Tambopata, trocha, 30 July, 1987, ♀ (D. Silva, MUSM), Puerto Maldonado, 16–23 April, 1947. ♀ (J. C. Pallister, AMNH). BRAZIL

Amapá: Serra do Navio, June, 1966, ♀ (M. E. Galiano, MEG).
Pará: Belém, Fazenda Velha, July, 1970, ♂, ♀; Belém, August 1971, ♂ (M. E. Galiano, MEG); 8 August, 1962, ♀ (K. Lenko, MZSP); Rio Gurupi, Uma, 2–30 May, 1963, ♀ (B. Malkin, AMNH). *Rondônia*: Fazenda Rancho Grande NE Cacaulandia,



Figures 1–8. *Scoloderus cordatus* (Taczanowski). 1–6, female. 1, eye region and chelicerae. 2, lateral. 3, dorsal. 4–6, epigynum. 4, ventral. 5, posterior. 6, lateral. 7, 8, left male palpus.

Scale lines, 1 mm; genitalia 0.1 mm.

Abbreviations, DR, distal rim. E, embolus. IM, inner margin. L, lip.

2–15 December, 1990, ♂, ♀ (G. B. Edwards, FSCA). *Bahia*: Fazenda Matiapa Camacan, 16 October, 1978, ♀ (J. Santos, MCN). *Goiás*: Pirapitinga Pirenópolis Goiás, 23 June, 1942, ♀ (F. Lane, MZSP). *Rio de Janeiro*: Nova Iguaçu, 7 September, 1961, ♀; Represa Rio Grande, February, 1976, ♂, ♀; Mangaratiba, February, 1976, ♂, ♀; Silva Jardim, August, 1975, ♂ (all M. Alvarenga, AMNH). *São Paulo*: Caraguatatuba, 16 November, 1942, ♀ (B. Soares, MZSP); Juquia, Poco Grande, 23 March, 1951, ♂; 21–26 July, 1949, ♂ (both F. Lane, MZSP); Marsilae, 12 March, 1967, ♀ (P. Biasi and F. Lane, MZSP); Osasco, 26 October, 1941, ♀; 28 November, 1943, ♀; Municipio de Itu, Fazenda Paud Alho, 2 February, 1959, ♀ (both F. Lane, MZSP); Boraceia, 9–15 February, 1949, ♀ (D. Silva, MZSP). *Rio Grande do Sul*: Aqua Belas Viamão, 13 September, 1984, ♀; Cauela, 31 December, 1973, ♂; Garruchos São Borja, 7 December, 1975, ♂; Irai, 20 November, 1975, ♂, ♀; Montenegro, 20 December, 1977, ♀; Passo do Bugio Butia, 13 May, 1982, ♀; Passo Fundo, 12 October, 1985, ♀; Salto do Yucuma, 16 January, 1985, ♂, ♀ (all A. A. Lise, MCN); Fazenda Recanto de Figueira Arroio dos ratos, 1 August, 1986, ♂; Montenegro, 7 July, 1977, ♂; Vila Oliva, 5 January, 1976, ♀ (all E. Buckup, MCN); Vila Oliva, 15 January, 1974, ♀ (F. Meyer, MCN); Guaíba, 25 December, 1988, ♂ (A. Bonaldo, MCN); Tgrejinka, Jaquera, 19 October, 1967, ♂, ♀ (P. Biasi, MZSP). PARAGUAY *Alto Paraná*: SE of Nararyal, 18 August, 1988, ♀ (L. E. Peña, AMNH); Tatiyupi Reserve, 1984, ♀; Itabo Reserve, 5 June, 1984, ♂, ♀ (both L. Baert, IRSNB). ARGENTINA *Misiones*: Monte Carlo, 130m, 5 December, 1965, ♀ (Giaschi, AMNH); January, 1966, ♂, ♀ (M. E. Galiano, MEG); Eldorado, 11 September–15 November, 1964, ♀ (A. Kovacs, AMNH); November, 1970, ♀ (M. E. Galiano, MEG); Parque Nacional Iguazu, Arroyo Yacui, January, 1966, ♀; December, 1972, ♂, ♀ (both M. E. Galiano, MEG); N Wanda, 12 July, 1988, ♀ (L. E. Peña, AMNH). *Rio Negro*: El Bolson area, 1965–1966, ♂, ♀ (A. Kovacs, AMNH).

Scoloderus gibber O. P.-Cambridge

Figures 9-17; Map 1

Scoloderus gibber O. P.-Cambridge, 1898: 282, pl. 36, fig. 4, ♂, ♀.

Female syntype from Bugaba, Panama, in BMNH, examined and illustrated by H. W. Levi (unpublished). F. P.-Cambridge, 1904: 521, pl. 51, fig. 8, ♀. Petrunkevitch, 1911: 386. Roewer, 1942: 872. Bonnet, 1958: 3955.

Scoloderus birabeni Mello-Leitão, 1945: 242. Female holotype from Puerto Victoria, Misiones Province, Argentina, in Museum of La Plata, examined and illustrated by H. W. Levi (unpublished). NEW SYNONYMY.

Scoloderus intermedius Gerschman de Pikelin and Schiapelli, 1948: 13, figs. 14-17, ♀. Female holotype from Santa María, Misiones Province, Argentina, in MACN, examined by M. B. Traw. NEW SYNONYMY.

Synonymy. *Scoloderus birabeni* and *S. intermedius* are both included in *S. gibber* because both lack tubercules on the abdomen (Fig. 11) and have an epigynum with a protruding scape (Fig. 12).

Description. Female from Depto. Madre de Díos, Peru. Carapace, chelicerae dark brown. Sternum, coxae light brown. Legs light brown, ringed dark brown. Dorsum of abdomen mottled gray-green; sides white. Venter of abdomen blue-gray. Posterior median eyes 1.0 diameters of anterior median eyes (AME), laterals 0.7. Anterior median eyes 1.0 AME apart, posterior median eyes 1.6 AME apart. Anterior and posterior median eyes 4.5 AME from lateral eyes. Clypeus height 2.3 AME. Carapace very hairy, hump without notch (Fig. 9). Dorsum of abdomen without humps (Fig. 10). Total length 3.3 mm. Carapace 1.6 mm long, 1.4 wide, and 1.1 high. Sternum length 0.9 mm, width 1.3. First femur 1.6 mm, patella and tibia 1.7, metatarsus 0.8, tarsus 0.5. Second patella and tibia 1.4 mm, third 0.8, fourth 1.1.

Male from Depto. Madre de Díos, Peru. Coloration as in female. Posterior median eyes 1.0 AME, laterals 0.6. Anterior median eyes 1.1 AME apart, posterior median eyes 1.7 AME apart. Anterior and posterior median eyes 4.0 AME from laterals. Clypeus height 2.5 AME. Carapace very hairy, without notch. Median apophysis of palpus with sharply pointed distal tip (S in Fig. 16). Total length 2.5 mm. Carapace 1.4 mm long, 1.2 wide, 0.8 high. Sternum

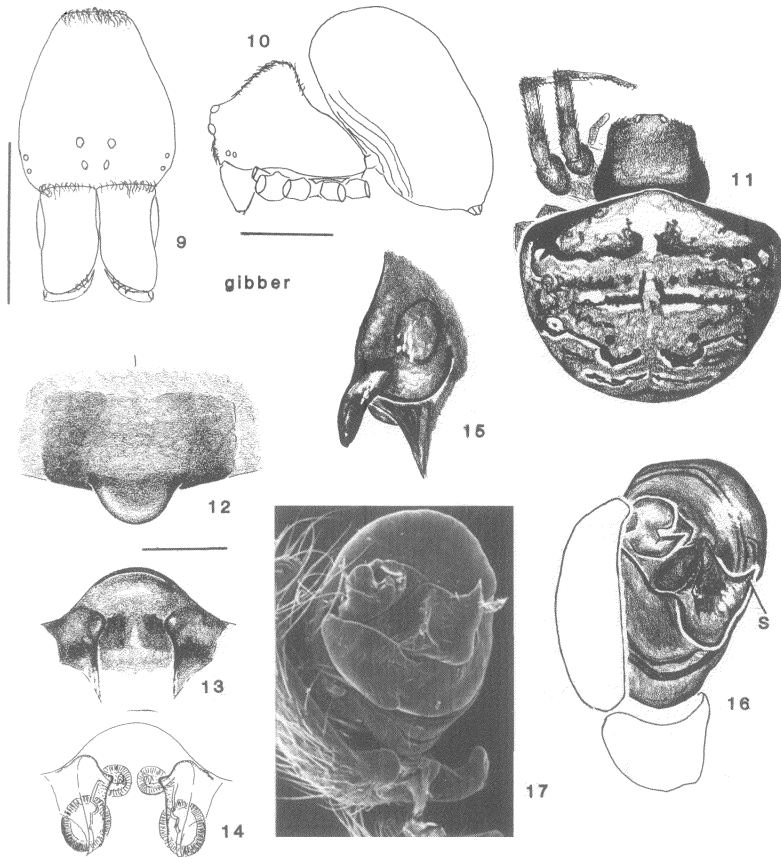
length 0.6, width 0.6. Median apophysis 0.1 mm long. First femur 1.4 mm, patella and tibia 1.6, metatarsus 0.7, tarsus 0.4. Second patella and tibia 1.2 mm, third, 0.7, fourth 0.9.

Variation. Adult female total length 2.9 to 3.6 mm, width of carapace 1.4 to 1.6. Male total length 1.8 to 2.9 mm, width of carapace 1.0 to 1.3.

Diagnosis. Males of *S. gibber* are easily distinguished from males of other species by the spine on the distal rim of the median apophysis of the palpus (S in Fig. 16). Females of *S. gibber* and *S. cordatus* are extremely difficult to tell apart. Both species occupy similar geographical ranges (Map 1) and have very similar abdominal shapes (Figs. 2, 10). However there appear to be three basic differences between *S. cordatus* and *S. gibber* females. The scape of *S. gibber* females (at 6 hr in Fig. 12) is a larger portion of a circle than that of *S. cordatus* females (at 6 hr in Fig. 4). *S. gibber* females have a level top to the carapace bulge (Fig. 9) unlike *S. cordatus* females which have a notch (Fig. 1). This character is less reliable because some *S. cordatus* females do not have a notched carapace. Females of *S. gibber* also have considerably more hair on the carapace (Fig. 10) and legs (Fig. 11) than do females of *S. cordatus* (Figs. 2, 3). Specimens of *S. cordatus* were much more numerous (roughly 50 localities) in the collections examined than were those of *S. gibber* (roughly 10 localities). Therefore it was difficult to ascertain the variability of *S. gibber* morphological characteristics. However, it appears that the abdominal coloration and design of both *S. gibber* and *S. cordatus* are highly variable and should not be used for identification. The abdominal pattern shown for *S. gibber* (Fig. 11) was also found on many specimens that were clearly *S. cordatus*.

Specimens Examined. MEXICO *Nayarit*: Tepic, 2 August, 1947, ♀ (C. J. Goodnight, AMNH). *Colima*: 10 mi NE Comala, 17–19 July, 1983, ♂, ♀ (P. K. Kovarik, T. L. Harrison, and J. C. Schaffner, AD). *Oaxaca*: 23 km SW Valle Nacional on HWY 175, 25 June, 1983, ♂ (W. Maddison, MCZ). GUATEMALA *Tikal*, 7 July, 1975, ♂ (W. C. Sedgewick, MCZ). PERU *Loreto*: Genaro Herrera, 25 August, 1988, ♀ (D. Silva, MUSM). *Pasco*: Huanca-bamba, 11 September, 1987, ♂, ♀ (D. Silva, MUSM). *Depto. Madre de Días*: Albergue Cusco Amazonico, Río Madre de Días, 6–10 March, 1990, 7–18 July, 1989, ♂, ♀ (both D. Silva,

MUSM). BRAZIL *Mato Grosso*: Chapada dos Guimarães, 18 November, 1983, ♂ (M. Hoffman, MCN). *Rio Grande do Sul*: Tenente Portela, 11 September, 1976, ♂ (S. Scherer, MCN); Sino dal, São Leopoldo, 21 October, 1967, ♂ (P. Biasi, MZSP).



Figures 9–17. *Scoloderus gibber* O.P. -Cambridge. 9–14, female. 9, eye region and chelicerae. 10, lateral. 11, dorsal. 12–15, epigynum. 12, ventral. 13, posterior. 14, cleared. 15, lateral. 16, 17, left male palpus.

Scale lines, 1 mm; genitalia 0.1 mm.

Abbreviation, S, spine.

Scoloderus nigriceps (O.P.-Cambridge)

Figures 18–26; Map 2

Carepalxis tuberculifera: -Keyserling, 1892: 50, pl. 2, fig. 40, ♀.
McCook, 1893: 207, pl. 13, fig. 6, ♀. Not *S. tuberculifer* (O. P.-Cambridge).

Carepalxis nigriceps: O. P.-Cambridge, 1895: 158, pl. 19, fig. 9, ♀.
Female holotype from Teapa, Tabasco State, Mexico, in BMNH, examined and illustrated by H. W. Levi (unpublished). F. P.-Cambridge, 1904: 521, pl. 51, fig. 7, ♀. Petrunkevitch, 1911: 386. Roewer, 1942: 872. Bonnet 1958: 3955.

Scoloderus nigriceps: -F. P.-Cambridge, 1904: 521, pl. 51, fig. 7, ♀. First placement of *nigriceps* in *Scoloderus*.

Scoloderus tuberculifer: -Comstock, 1912: 447, fig. 456, ♀. Comstock, 1940: 461, fig. 456, ♀. Not *S. tuberculifer* (O. P.-Cambridge).

Scoloderus cordatus: -Levi 1976: 386 (in part).

Synonymy. *S. tuberculifer* (cited by Comstock, 1912; 1940) has a scape with rounded, not parallel sides and hence is not *S. tuberculifer* (O.P.-Cambridge). Since its range is in the United States and since the female has humps on the abdomen, it is *S. nigriceps*. *Scoloderus cordatus* and *S. nigriceps* were synonymized by Levi (1976). However, *S. nigriceps* differs from *S. cordatus* and *S. gibber* in both morphology and distribution. *Scoloderus nigriceps* has a shield-shaped abdomen with paired humps at the top, while the abdomens of *S. cordatus* and *S. gibber* are round and without humps. Neither *S. cordatus* nor *S. gibber* occurs in the United States, while *S. nigriceps* is primarily found in the United States (Map 1). The illustrations of *S. cordatus* in Levi (1976) are now considered to be of *S. nigriceps*.

Description. Female from Florida. Carapace dark orange-brown. Chelicerae orange-brown. Sternum, coxae, legs light brown. Abdomen white on dorsum, sides; venter, blue-gray. Posterior median eyes 1.1 diameters of anterior median eyes (AME), laterals 0.7. Anterior median eyes 1.5 AME apart, posterior medians 2.4 AME apart. Anterior and posterior median eyes 5.5 AME from lateral eyes. Clypeus height 2.0 AME. Carapace hump without notch (Fig. 18). Dorsum of abdomen with three humps, one central anterior and two on shoulders (Figs. 19, 20). Total length 3.5 mm. Carapace 1.6 mm long, 1.4 wide, and 1.1 high. Sternum length

0.8, width 0.8. First femur 1.8 mm, patella and tibia 1.8, metatarsus 0.9, tarsus 0.5. Second patella and tibia 1.6 mm, third 1.0, fourth 1.4.

Male from Florida. Coloration as in female. Posterior median eyes 1.1 diameters of anterior medians, laterals 0.7. Anterior median eyes 1.5 AME apart, posterior median eyes 2.2 AME apart. Anterior and posterior median eyes 5.5 AME from the lateral eyes. Clypeus height 2.0 AME. Abdomen without humps. Carapace hump small, without notch. Total length 2.3 mm. Carapace 1.3 mm long, 1.1 wide, and 0.8 high. Sternum length 0.5, width 0.5. Median apophysis 0.1 mm long. First femur 1.5 mm, patella and tibia 1.5, metatarsus 0.7, tarsus 0.4. Second patella and tibia 1.2 mm, third 0.7, fourth 0.9.

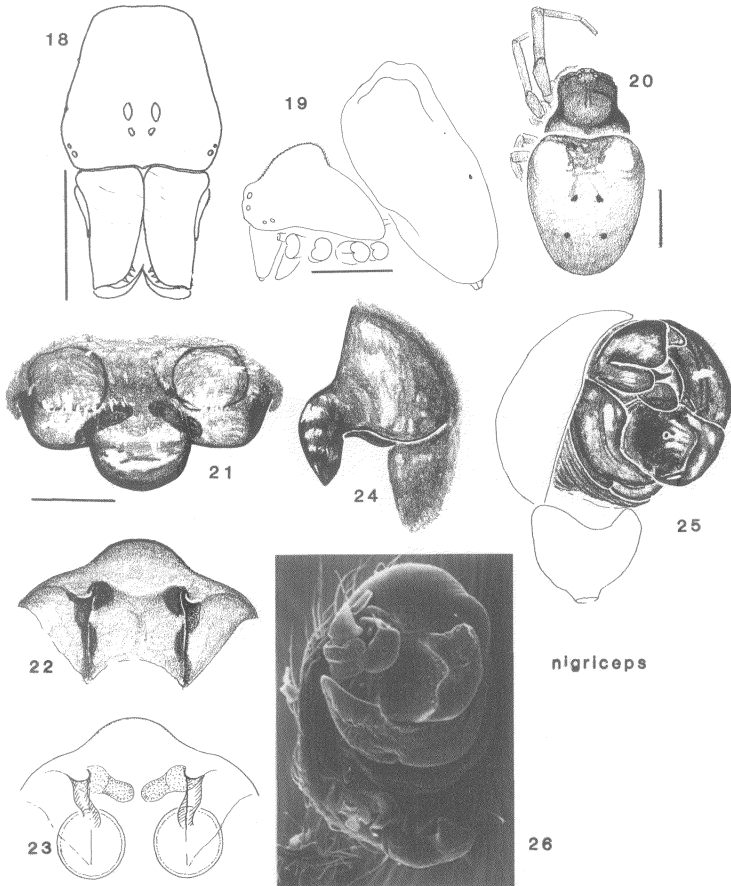
Variation. Total length of adult female 2.9 to 4.3 mm; width of carapace 1.2 to 1.7. Male total length 1.9 to 2.6 mm; width of carapace 0.9 to 1.2.

Diagnosis. Abdomen of female oblong, white, and often with humps (Figs. 19, 20), while females of *S. gibber* and *S. cordatus* never have humps (Figs. 2, 10). Epigynum lobe semicircular (Fig. 21). Lip of median apophysis of male palpus is rectangular, not more than one-half as wide as long, and heavily sclerotized (Fig. 25).

Natural History. The web, as observed at the Archbold Biological Station, Florida, is a rectangle 5 by 40 cm oriented vertically with the web center strongly offset basally (Levi, 1978). The extended vertical surface area of this web is likely an adaptation for the capture of moths that are able to escape from ordinary webs (Eberhard, 1975). When moths strike the upper region of the web, they lose scales as they tumble down its surface, finally sticking at the base of the web, having lost their protective cover.

Specimens Examined. UNITED STATES *Georgia*: Thomas Co., Bar -M Ranch, S of Boston, 25 June, 1978, ♀ (H. W. Levi, MCZ). *Florida*: Indian River Co., Sebastian, March 1932, ♂, ♀ (G. Nelson, MCZ). Highlands Co., Archbold Biological Station, 7 March, 1976, ♂ (H. W. Levi, MCZ); Dade Co., Royal Palm State Park [Royal Palm Visitor Center, Everglades National Park], 6-24 March, 1924, ♂, ♀ (W. S. Blatchley, MCZ). Collier Co., Collier-Seminole State Park, 1 April, 1985, ♀ (W. Maddison, MCZ). BAHAMAS *Grand Bahama Island*: Freeport, Pinter's Point, 8 March, 1967, ♂; Nassau, 24 November, 1959, ♀ (both A. M.

Nadler, AMNH). CUBA Havana, 24–30 April, 1915, ♂ (F. Cervera, MCZ). MEXICO *Yucatan*: Chichen Itza, 13 July, 1952, ♂, ♀; Motul, 11 July, 1952, ♂; Dolores Otero 13 July, 1952, ♂ (all J. C. Pallister, AMNH). JAMAICA *Saint Andrew's Par.*: NE slope of Long Mountain, 26 October, 1957, ♂, ♀ (A. M. Chickering, MCZ).



Figures 18–26. *Scoloderus nigriceps* (O.P. -Cambridge). 18–24, female. 18, eye region and chelicerae. 19, lateral. 20, dorsal. 21–24, epigynum. 21, ventral. 22, posterior. 23, cleared. 24, lateral. 25, 26, left male palpus.

Scale lines, 1 mm; genitalia 0.1 mm.

Scoloderus tuberculifer (O. P.-Cambridge)

Figures 27–34; Map 2

Carepalxis tuberculifera O. P.-Cambridge, 1889: 48, pl. 4, fig. 9, ♀. Female holotype from Bugaba, Chiriquí Prov., Panama, in BMNH, examined and illustrated by H. W. Levi (unpublished). F.P.-Cambridge, 1904: 521. Petrunkevitch, 1911: 386. Roewer, 1942: 872. Bonnet, 1958: 3955.

C. americana O.P.-Cambridge, 1889: 49, pl. 4, figs. 7–8, ♂, ♀. Female syntype and holotype from Bugaba, Chiriquí Prov., Panama, in BMNH, examined and illustrated by H. W. Levi (unpublished). Keyserling, 1892: 51, pl. 2, fig. 41, ♂, ♀. F. P. - Cambridge, 1904: 521, pl. 51, fig 6, ♀. NEW SYNONYMY.

Scoloderus tuberculifer: -Simon, 1895: 828. First placement of *tuberculifer* in *Scoloderus*.

Scoloderus hybus Chamberlin, 1916: 260, pl. 19, fig. 9, ♀. Female holotype from Paltaybamba, Depto. Junín; Peru, in MCZ, examined and illustrated by H. W. Levi (unpublished). NEW SYNONYMY.

Scoloderus nigrocellatus Gerschman de Pikelin and Schiapelli, 1948:14, pl. 1, figs. 18–21, ♀. Female holotype from Santa María, Misiones Province, Argentina, in MACN, examined and illustrated by H. W. Levi (unpublished). NEW SYNONYMY.

Synonymy. *Carepalxis americana*, *Scoloderus hybus*, and *S. nigrocellatus* are all synonymized under *S. tuberculifer* due to the characteristic elongated, parallel-sided scape of the epigynum.

Description. Female from Summit, Panama. Carapace, chelicerae dark brown. Sternum brown. Legs light brown to brown. Dorsum of abdomen light gray with variable black marking. Sides of abdomen white. Venter of abdomen tan or blue-gray. Posterior median eyes 1.3 anterior median eye diameters (AME), laterals 0.8. Anterior median eyes 1.5 AME apart, posterior medians 2.0 AME apart. Anterior median eyes 5.0 AME from laterals. Posterior median eyes 6.0 AME from laterals. Clypeus height 2.5 AME. Carapace hump without notch (Fig. 27). Dorsum of abdomen with three humps, one central and two at shoulders (Figs. 28, 29). Total length 4.3 mm. Carapace 1.8 mm long, 1.7 wide, 1.3 high. Sternum length 0.9 mm, width 0.9. First femur 2.1 mm, patella and tibia 2.1, metatarsus 1.2, tarsus 0.5. Second patella and tibia 1.7 mm, third 1.0, fourth, 1.7.

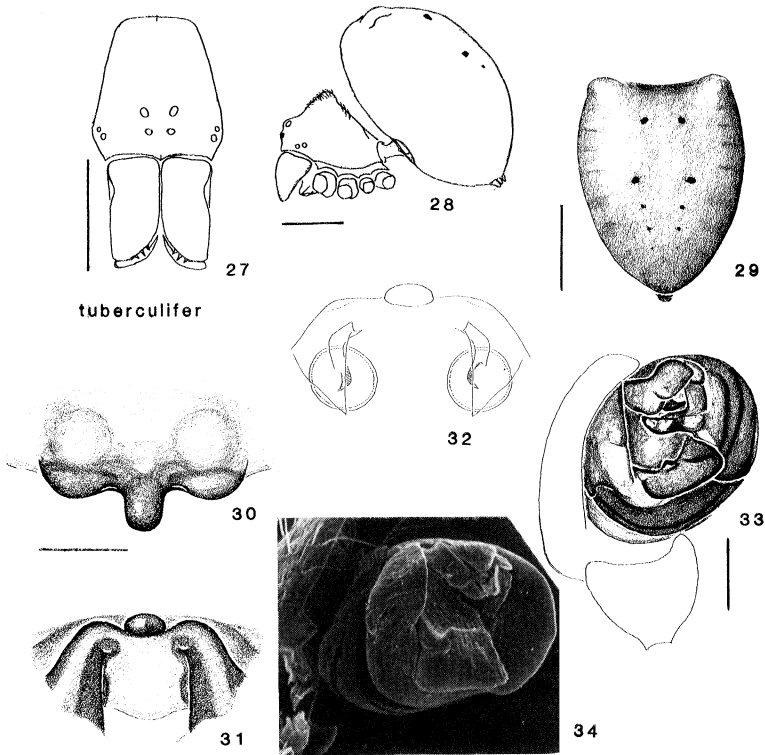
Male from Summit, Panama. Coloration as in female. Posterior median eyes 1.2 AME, laterals 0.7. Anterior median eyes 1.0 AME apart, posterior medians 1.5 AME apart. Anterior and posterior median eyes 4.0 AME from laterals. Clypeus height, 1.5 AME. Abdomen without humps. Carapace without notch. Total length 2.3 mm. Carapace 1.3 mm long, 1.1 mm wide, and 0.8 mm in height. Sternum length 0.6, width 0.6. Median apophysis 0.1 mm in length. First femur 1.6 mm, patella and tibia 1.6 mm, metatarsus 0.8, tarsus 0.4. Second patella and tibia 1.2 mm, third 0.7 mm, fourth 1.0 mm.

Variation. Adult female total length 3.6 to 4.3 mm; width of carapace 1.3 to 1.7. Male total length 2.1 to 2.6 mm; width of carapace 0.9 to 1.3. Dorsum and sides of abdomen with variable patterns and coloration in both sexes, particularly with respect to proportion of white.

Diagnosis. Abdomen of female white, shield-shaped, and with humps (Fig. 29). Scape of epigynum with parallel sides (Fig. 30). Lip of median apophysis of male rectangular, not heavily sclerotized, twice as long as wide (Fig. 33).

Natural History. This species has been found in the secondary growth of tropical dry forest in Colombia. Webs were constructed each night and torn down by morning. The specific pattern of web construction has been described in detail (Eberhard, 1975). Web shape similar to that of *S. nigriceps* (Levi, 1978). Webs of juvenile *S. tuberculifer* are simple, lacking the extended upward "ladder" (Eberhard, 1975).

Specimens Examined. UNITED STATES *Florida*: Dade Co., Royal Palm State Park [Royal Palm Visitor Center, Everglades National Park], 7–14 March, 1930, ♀ (W. S. Blatchley, MCZ). MEXICO *Jalisco*: 27 km N. Autlan, Mine Rd, 7 July, 1984, ♀; 17 mi N of Guadalajara, 6 July, 1984, ♂ (both J. B. Woolley, AD). PANAMA *Panamá*: Madden Dam, 6 September, 1956, ♀ (W. E. Lundy, AMNH); Experimental Gardens, 14 July, 1954, ♂, ♀; Balboa, 1936, ♀; Barro Colorado Island, July, 1950, ♂, ♀; Chilibre, July, 1950, ♀; Forest Reserve, 28 July, 1954, ♀; Summit, 17 August, 1954, ♀; Fort Sherman, August, 1939, ♂, ♀; Porto Bello, August, 1936, ♂, ♀ (all A. M. Chickering, MCZ). GREATER ANTILLES, *Jamaica*: Negril, 24 March, 1955, ♂; 2 mi SW Unity valley, 18 March, 1955, ♂ (both A. M. Nadler,



Figures 27–34. *Scoloderus tuberculifer* (O.P. -Cambridge). 27–32, female. 27, eye region and chelicerae. 28, lateral. 29, abdomen, posterior. 30–32, epigynum. 30, ventral. 31, posterior. 32, cleared. 33, 34, left male palpus.

Scale lines, 1 mm; genitalia 0.1 mm.

AMNH); St. Catherine Par., Mount Diablo, 2 mi N of Ewarton, 13 August, 1958, ♀ (A. Archer, AMNH); Ewarton, 29 November, 1957, ♂ (A. M. Chickering, MCZ). Claremont, 22 July, 1960, ♀ (P. Vaurie, AMNH). St. Andrew's Par., Stony Hill, 18 October, 1957, ♂, ♀; Hermitage Reserve, 5 November, 1957, ♂; Jack's Hill Road, 6 December, 1957, ♂; Morces Gap, 22 July, 1958, ♀; NE slope of Long Mountain, 26 October, 1957, ♂, ♀; St. Andrew's Ferry, 0.9 mi W on Red Hills Road, 28 October, 1957, ♀ (all A. M. Chickering, MCZ). LESSER ANTILLES, *Dominica*:

Bataka, 30 January, 1968, ♀ (B. Malkin, AMNH). VENEZUELA *Tachira*: San Juan de Colón, 15 August, 1984, ♀ (J. Plagens, FSCA). COLOMBIA *Valle*: Cali, 1000m 1973, ♂, ♀ (W. Eberhard, MCZ). PERU *Tumbes*: Lechugal, ♀ (J. Stolzman, PAN). BRAZIL *Pará*: Belém, Fazenda Velha, July 1970, ♀ (M. E. Galiano, MEG). *Mato Grosso do Sul*: 260 km N of Xavantina, February–April 1969, ♂ (Xavantina - Cachimbo Expedition, MCZ). *Rio Grande do Sul*: Barra do Rebeiro, 13 November, 1976, (M. Tavares, MCN); Encantado, 7 March, 1984, ♀; Gravatae, 21 October, 1983, ♀; Muçum, 2 March, 1984, ♂; Porto Alegre, 17 December, 1983, ♀; Triunfo, 28 November, 1989, ♂, ♀ (all A. Brescovit, MCN); General Câmara, 19 October, 1982, ♀ (E. Buckup, MCN). BOLIVIA: *Yungas*: La Paz, 17–25 December, 1955, ♀ (L. Peña, MCZ). ARGENTINA *Chaco*: Selva de Río de Oro, 27 January, 1965, ♀ (M. E. Galiano, MEG).

Scoloderus ackerlyi new species

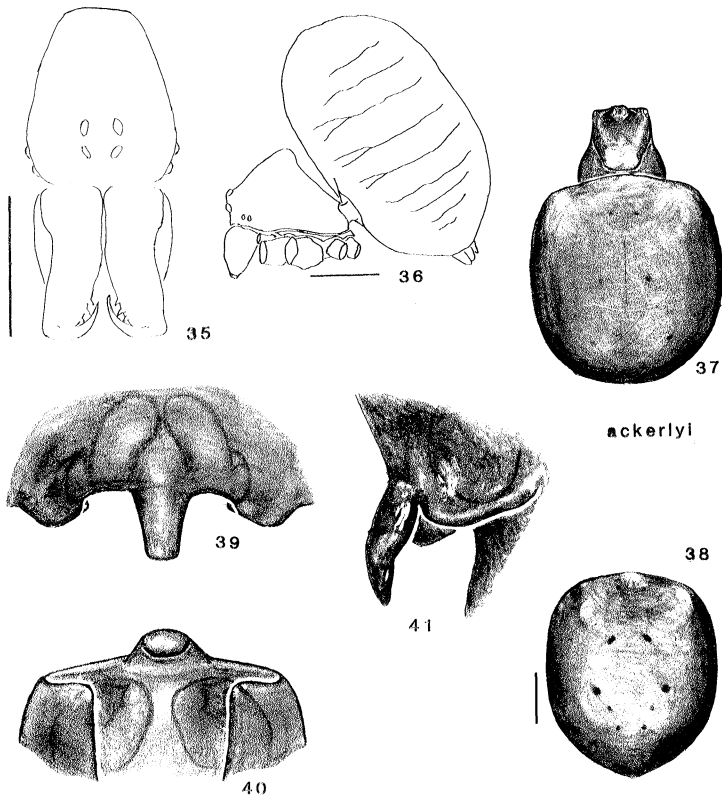
Figures 35–41; Map 2

Holotype. BELIZE Mountain Pine Ridge, [16°53'N, 88°55'W], February, 1931, ♀ (H. H. Bartlett, MCZ) deposited in MCZ. The species is named after David D. Ackerly, an ecologist whose insight into the natural world has greatly influenced the author.

Description. Female holotype. Carapace, chelicerae, and sternum brown. Coxae, legs light brown, darker on femur I, II. Dorsum, venter of abdomen white. Light gray stripes on sides of abdomen, extending away from pedicel. Posterior median eyes 1.3 anterior median eye diameters (AME), laterals 0.8. Anterior median eyes 1.5 AME apart, posterior medians 2.0 AME apart. Anterior and posterior median eyes 5.0 AME from laterals. Carapace hump without notch. Clypeus narrow, 2.0 AME. Total length 4.3 mm. Carapace 1.7 mm long, 0.6 wide, 1.2 high. Sternum length 0.9, width 0.8. First femur 2.0 mm, patella and tibia 1.8, metatarsus 1.0, tarsus 0.5. Second patella and tibia 1.6 mm, third 1.0, fourth 1.4.

Male unknown.

Diagnosis. Scape of epigynum of *S. ackerlyi* is substantially more elongated and narrowed distally (Fig. 39) than that of *S. tuberculifer* (Fig. 30).



Figures 35–41. *Scoloderus ackerlyi* new species, female. 35, eye region and chelicerae. 36, lateral. 37, dorsal. 38, abdomen, dorsal. 39–41, epigynum. 39, ventral. 40, posterior. 41, lateral.

Scale lines, 1mm; genitalia 0.1mm.

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