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Revision of the jumping spider genus *Sassacus* (Araneae, Salticidae, Dendryphantinae) in North America

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Abstract. The nine species of *Sassacus* Peckham & Peckham 1895 known from Canada, the United States, and Mexico are described. The genus as defined here includes: *Sassacus papenhoei* Peckham & Peckham 1895, *Sassacus paiutus* (Gertsch 1934), *Sassacus samalayucae* Richman (new species), *Sassacus cyaneus* (Hentz 1846), *Sassacus alboguttatus* (F.O. Pickard–Cambridge 1901), *Sassacus vitis* (Cockerell 1894), *Sassacus aztecus* Richman (new species), *Sassacus barbipes* Peckham & Peckham 1888, and *Sassacus lirios* Richman (new species). *Agassa* Simon 1901 is synonymized with *Sassacus*. "Typical" (beetle-like) and more "normal" (spider-like) *Sassacus* range from Southern British Columbia south into Central America. The *Sassacus arcuatus* group, which is much more extensive in South America, possibly belongs to its own genus and is not treated beyond one species described here from Mexico.

Keywords: Taxonomy, new species, *Agassa. Metaphidippus*

The salticid genus *Sassacus* Peckham & Peckham 1895, along with the spiders placed in the monotypic genus *Agassa* Simon 1901 (here made a junior synonym of *Sassacus*) and *Metaphidippus vitis* (Cockerell 1894) (described as a species of *Dendryphantes* and placed in *Sassacus* by Hill 1979) represent an evolutionarily interesting group. Members of *Sassacus* s.s., including the *Agassa* subgroup, appear to be beetle mimics, while the others are not beetle-like. The "*Agassa*" species appear to be mimics of chrysomelid beetles (Coleoptera, Chrysomelidae). Apparent beetle mimicry is also exhibited by at least two other salticid genera (Richman & Jackson 1992). The presence of such resemblances in some members of the highly diversified spider family Salticidae poses a number of important evolutionary questions.

The current paper centers on the revision and description of the species of *Sassacus* (including *Agassa* and the "*Metaphidippus*" *vitis* group) from Canada, the United States and Mexico to the Guatemalan border. The Neotropical species south of Mexico, mostly if not all in the *Sassacus arcuatus* group, are outside the scope of this paper. An unrelated salticid, *Sassacus aemulus* Gertsch 1934, was transferred first to *Bianor aemulus* (Gertsch): by Maddison (1978) and then to *Sibianor aemulus* (Gertsch): by Logunov (2001). It is not treated in the current paper.

METHODS

More than 1850 specimens were examined for this study. The specimens were loaned or data were provided by the following institutions and individuals (names followed by acronym used in the species descriptions): American Museum of Natural History, New York City (AMNH); British Museum of Natural History, London (BMNH* record of type from photographs- specimen not examined directly); Bruce Cutler Collection, Lawrence, Kansas (BCC); California Academy of Science, San Francisco (CAS); Canadian National Collection, Ottawa (CNC); Florida State Collection of Arthropods, Gainesville (FSCA); Illinois Natural History Survey, Chicago (INHS*- records from database- specimens not examined); Milwaukee Public Museum, Milwaukee, Wisconsin (MPM); Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts (MCZ); New Mexico State University Arthropod Museum, Las Cruces (NMSUAM): Texas A&M University, College Station (TAM); United States National Museum of Natural History, Washington DC (USNMNH); University of California, Riverside (UCR); West Texas A&M University, Canyon (WTAM)

All measurements, given in mm, were made using an Olympus binocular dissecting microscope with an eyepiece scale calibrated with a slide micrometer. Total length was based on the standard anterior center edge of carapace to the tip of the abdomen, although on occasion it was difficult to discern exactly where the tip of the abdomen was located. Carapace length down the center and width at the widest points were also measured. Drawings were made using a grid in one ocular and a corresponding grid under tracing paper. Final drawings were made on coquille board using a black Prismacolor pencil (habitus drawings) and pen and ink on velum.

Latitude and longitude have been added to records from maps, internet web sites (e.g., United States Geological Survey site at http://geonames.usgs.gov/redirect.html) and gazetteers when practical. Some locations were not found on maps, websites, or in gazetteers, or there were two or more possibilities for the actual locations. For these no latitude or longitude is given. It should be noted that as almost none of the localities for the specimens were ever GPS recorded, these figures are only approximate. With *Sassacus papenhoei*, *S. cyaneus*, and *S. vitis* only county records are given for USA locations and latitude and longitude were not determinable. One North American species (*S. paiutus* Gertsch) is so little known that I have included exact locality records.

Specimens were compared to type specimens borrowed from the collections noted in the descriptions, photographs provided by the British Museum of Natural History and drawings in the literature cited and/or on the internet website of Prószyński (2003).

TAXONOMY

Family Salticidae Blackwall 1841
Sassacus Peckham & Peckham 1895

Sassacus Peckham & Peckham 1895:176; Peckham & Peckham 1909:591.
Agassa Simon 1901:643. **New synonymy.**
Metaphidippus F.O. Pickard-Cambridge 1901:258 (in part).
Homalattoides F.O. Pickard-Cambridge 1901:293 (in part – genus no longer recognized).
Ramboia Mello-Leitão 1943:229. (This synonomy is uncertain and may be altered in the future.)

Type species.—*Sassacus papenhoei* Peckham & Peckham 1895, by monotypy.

Agassa: *Attus cyaneus* Hentz 1846, by monotypy.

Metaphidippus: *Metaphidippus mandibulatus* F.O. Pickard-Cambridge 1901, by original designation.

Ramboia: *Ramboia helenica* Mello-Leitão 1943, by monotypy.

Etymology.—Apparently named for the Pequot chief Sassacus (born 1560), whose sub-chief, Uncas, rebelled founding the Mohegans. The name was also applied to the U.S.S. Sassacus, a Union gunboat, which earned some fame by ramming the Confederate ironclad C.S.S. Albemarle near the Outer Banks of North Carolina in 1864. As far as I know this is the only case of a genus of jumping spiders sharing the name of a warship!

Diagnosis.—Beetle-like to normal appearing dendryphantine jumping spiders with a short, curved or crooked terminal embolus and robust, usually unidentate, chelicerae in the males. Most species have metallic scales covering the body. The genus *Sassacus* is apparently restricted to North and Central America (if the *arcuatus* group is not this genus) and consists of only 8 species. A ninth species, *S. lirios*, from southern Mexico and Central America, is described here and placed in *Sassacus* until a new genus can be erected for the *arcuatus* group, if it so belongs. The type species is *Sassacus papenhoei,* which was described by Peckham & Peckham (1895, 1909). The genus *sensu stricto* is primarily beetle-like, as discussed earlier. *Sassacus sensu lato* as defined here, includes the genera *Sassacus s.s.* (including *Agassa*), *Sassacus barbipes* and the "*Metaphidippus*" *vitis* groups. The definition of *Agassa*, with the reduced spination on the ventral first tibia and more box-like cephalothorax is not distinctive enough to separate it from *Sassacus*. The spination on the ventral tibiae of the first legs is usually reduced to 3 in *Sassacus papenhoei*. "Normal" Dendryphantinae have 6 and this is the number found also in *S. samalayucae, S. vitis, S. aztecus*, and *S. lirios*. Since *S. papenhoei* itself can have anywhere from 1 to 4 ventral macrosetae, the spination of the first tibia cannot be depended on as a taxonomic character at the generic level for these spiders. This leaves *Agassa* with only a somewhat more extreme carapace shape and obviously different, but yet similar, genitalic characteristics, which in my view are only enough to make it a separate species group within *Sassacus*. The "*Metaphidippus*" *vitis* group was a little more difficult to place in relation to the *S. papenhoei* group until the discovery of *S. aztecus,* which resembles *S. vitis* with a more *S. papenhoei*-like embolus. Without this connection, while obviously a dendryphantine, *M. vitis* is not obviously a *Sassacus*, as defined by the type species, *S. papenhoei*. Hill (1979) placed *M. vitis* in *Sassacus*, based on body scale structure, and Hedin & Maddison (2001) agreed with this placement, based on molecular data. The genitalia of *S. vitis* are however somewhat different from those of *Sassacus s. s.*

The "*Sassacus arcuatus* group" (= *Ramboia*?) is mostly South American, with possibly only two species (one not described here) falling into the distribution range of the current work. These appear to belong to a separate genus. *Sassacus barbipes* is apparently (and surprisingly) a true *Sassacus.* (A second species presently placed in *Ashtabula*, *A. glauca* Simon, from Mexico, apparently is a junior synonym of *S. barbipes*.)

Behavior.—The genus *Sassacus* has been little studied in regard to behavior. Only two of the North American species, *S. paiutus* (misidentified as *S. papenhoei*) and *S. vitis* have had their courtship recorded (Richman 1982a, 1982b). Crane (1949a, 1949b) examined the courtship of two species of the *S. arcuatus* group that she described from Venezuela. As noted above *Sassacus paiutus* and *S. vitis* have some very similar elements in their courtships (Richman 1982a, 1982b), which led me to believe that they might be congeneric. Table 1 contains a summary checklist of the species known from North America, including Mexico.

KEY TO THE NORTH AMERICAN SPECIES OF *SASSACUS*

1. Front patellae-tibiae flattened in both sexes and with fringe of spatulate hairs on ventral edges (Fig. 43) . . . . . *Sassacus barbipes*
   With front legs normal and without fringes 2
2. Abdomen with inverted stylized lily-like marking (sometimes broken in middle) (Fig. 49); male with scythe-like embolus (Fig. 51); female epigynum generally smaller than in other species (Figs. 53, 54) . . . . . *Sassacus lirios*
   Abdomen usually without inverted stylized lily-like marking (exception some females of *S. aztecus* from southern Sonora); male embolus not scythe-like; body usually covered with metallic scales 3
3. Body elongated and covered with golden scales 4
   Body beetle-like (compact—not elongated) (Figs. 1–3, 9, 17, 23) and covered with metallic scales of various colors; male with kinked or curved embolus (Figs. 5, 11, 19, 25), but not buttonhook-like, or only female known 5
4. Male with buttonhook-like embolus (Figs. 31, 32 . . . . . *Sassacus vitis*
   Male with curved embolus (Fig. 38) . . . . . *Sassacus aztecus*
5. Body covered with metallic gold-silver scales (Fig. 9) 6
   Body covered with coppery, pink and green, brassy or blue scales (Figs. 1–3) 7
6. Three first ventral tibial macrosetae (as in *S. papenhoei*) . . . . . *Sassacus paiutus*
   Six first ventral tibial macrosetae; epigynum (Fig. 15) distinctive, quite unlike those of either *S. papenhoei* or *S. paiutus* . . . . . *Sassacus samalayucae*

7. Carapace more elongate (Fig. 3); males with broader slightly crooked embolus (Fig. 5); females with openings curved but not sinuate (Fig. 7) . . . . . *Sassacus papenhoei*
   Carapace nearly square (Figs. 17, 23) 8
8. Males with 0–2 promarginal teeth and single large curved retromarginal tooth (Fig. 18), and with narrow, slightly curved embolus (Fig. 19); females with epigynal plate wider than long and with sinuate epigynal openings (Figs. 21, 22) . . . . . *Sassacus cyaneus*
   Males with single large promarginal tooth and single large retromarginal tooth (Fig. 24), embolus curved toward tip (Fig. 25); females with epigynal plate longer (or at least as long as) than broad; epigynal openings not sinuate (Figs. 27, 28) . . . . . *Sassacus alboguttatus*

***Sassacus papenhoei* species-group**

Sassacus papenhoei Peckham & Peckham 1895
Figs. 1–8, 55

Sassacus papenhoei Peckham & Peckham 1895:177, plate 16, fig. 11.
Sassacus smaragdinus Barrows 1919:359, plate 15, fig. 9.
Sassacus vanduzeei Chamberlin 1924:687, fig. 133; Roewer 1954:1228.
Sassacus uteanus Chamberlin & Gertsch 1929:111, plate 5, figs. 54, 56.

Material examined.—*Sassacus papenhoei:* male lectotype and 7 female paralectotypes, USA: *Kansas*: Wallace, Wallace County [38°54′41″N, 101°35′28″W], 1895 (MCZ, examined). Note: the type vial contained 1 male and 7 females from the same locality. As it is uncertain just which specimen the Peckhams intended to be the holotype, I designate the male as the lectotype and the females as the paralectotypic series.

Sassacus vanduzeei: holotype female, MEXICO: *Sonora*: San Pedro Martir Island, 28°20′N, 112°12′W, 18 April 1921 (CAS, examined).

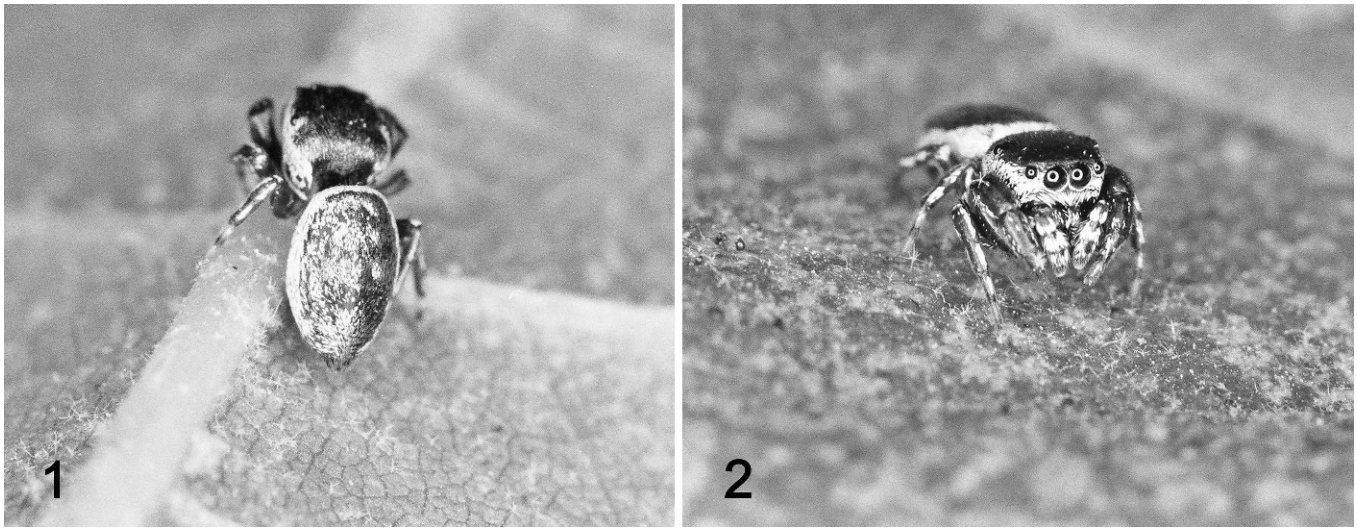
Sassacus uteanus: 1 paratype male (with female *S. vitis*), USA: *Wyoming*: Afton, Lincoln County [42°43′29″N, 110°55′54″W], 20 June 1927, W. J. Gertsch (AMNH, examined).

Other material: CANADA: *British Columbia:* 3.2 km E. of Lytton latter 50°14′N, 121°34′W (CNC); Osoyoos, 49°02′N, 119°28′W (CNC), Summerland 49°39′N, 119.33°W (CNC); Vernon 50°16′N, 119°16′W (AMNH), Victoria 48°26′N, 123°21′W (MCZ).

USA (counties only): *Alabama:* Cleburne (AMNH); Coosa (MCZ, AMNH); Madison (AMNH); Tallapoosa (MCZ); *Arizona*: Apache (AMNH, FSCA); Cochise (TAM, MCZ, CAS, UCR, AMNH, FSCA); Gila (AMNH); Pima (TAM, MCZ, AMNH, FSCA); Santa Cruz (MCZ, NMSUAM); Yavapai (MCZ, CAS); *Arkansas*: Benton (INHS*); Carroll (MCZ); Washington (MCZ, INHS*); *California*: Contra Costa (CAS, AMNH); Fresno (CAS); Inyo (AMNH); Lake (AMNH); Los Angeles (MCZ, AMNH); Marin (CAS); Mendocino (CAS); Monterey (MCZ, CAS, UCR, ANMH); Napa (CAS); Nevada (CAS); Riverside (CAS, UCR, AMNH); San Bernardino (UCR); San Diego (MCZ, AMNH, FSCA); San Joaquin (CAS); Santa Clara (CAS); Trinity (AMNH); Ventura (MCZ); *Colorado*: Boulder (CNC); Larimer (MCZ); Prowers (AMNH); *District of Columbia:* Washington (USNMNH); *Idaho*: Bannock (USNMNH); Boise (AMNH); Franklin (AMNH); Gem (AMNH); Minidoka (AMNH); Oneida (MCZ); Twin Falls (AMNH); *Illinois*: Bond (AMNH); Macoupin (AMNH); Mason (INHS*); *Iowa:* Woodbury (FSCA*); Kansas*: Barber (BCC); Cheyenne (BCC); Douglas (BCC); Geary (BCC); Gove (BCC); Riley (BCC, MCZ); Stafford (USNMNH); Wabaunsee (BCC); *Louisiana*: Caddo (MCZ); *Maryland*: Prince Georges (USNMNH); *Michigan*: Livingston (FSCA); *Minnesota*: Wabasha (BCC); Winona (BCC, CAS); *Mississippi*: Claiborne (MCZ); *Missouri*: Johnson (BCC, FSCA); Phelps (AMNH); St. Louis (MCZ); *Montana:* Sanders (AMNH); *Nebraska:* Keith (NMSUAM); *Nevada*: Washoe (MCZ); *New Mexico*: Bernalillo (TAM); Chaves (NMSUAM); Doña Ana (USNMNH, NMSU, MPM, NMSUAM, FSCA); Eddy (AMNH); Hidalgo (NMSUAM, FSCA); Luna (NMSU); Otero (FSCA); Roosevelt (AMNH); Sandoval (AMNH); *North Carolina*:(MCZ); Durham (MCZ); Macon (USNMNH, MCZ); Watauga (MCZ); *Oklahoma*: Delaware (AMNH); Dewey (NMSUAM); Marshall (FSCA); *Oregon*: Baker (AMNH); Benton (AMNH); Deschutes (AMNH); Grant (MCZ, AMNH); Harney (BCC, AMNH); Jackson (AMNH); Jefferson (AMNH); Josephine (AMNH); Klamath (AMNH); Lake (AMNH); Mulheur (AMNH); Wheeler (MCZ, AMNH); *South Carolina*: Darlington (FSCA); State record only (USNMNH); *Tennessee*: Hamilton (MCZ); Robertson (AMNH); *Texas*: Brazos (AMNH);

Table 1.—Check list of species of *Sassacus* from North America.

Species	Distribution
♂♀ *alboguttatus* (F.O. Pickard-Cambridge)	Mexico: Chiapas, Distrito Federal, Guerrero, Moreles, Nayarit, Sonora
♂♀ *aztecus* new species	Mexico: Nayarit, Sonora
♂♀ *barbipes* Peckham & Peckham	Mexico: Sonora south into Central America
♂♀ *cyaneus* (Hentz)	Eastern USA
♂♀ *lirios* new species	South-eastern Mexico, south to Costa Rica
♂♀ *paiutus* (Gertsch)	Mexico: Baja California Norte; USA: south-western Arizona, eastern California, southern Utah
♂♀ *papenhoei* Peckham & Peckham	South-western Canada; USA; Mexico
♀ *samalayucae* new species	Mexico: Chihuahua
♂♀ *vitis* (Cockerell)	South-western Canada; USA; Mexico south to Panama



Figures 1, 2.—*Sassacus papenhoei.* Female from New México, USA.

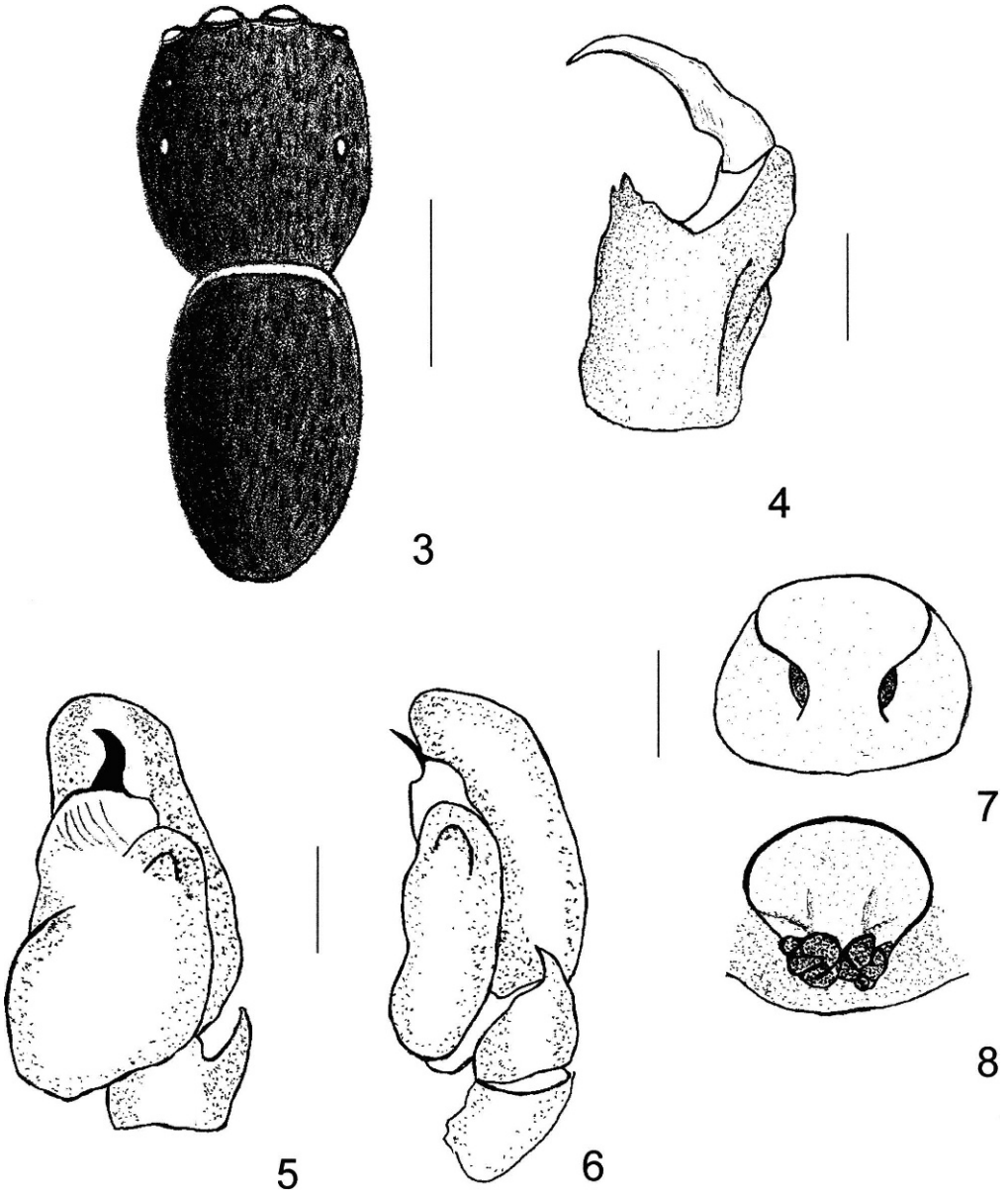
Brewster (BCC, CAS); Brown (FSCA); Burnet (FSCA); Calhoun (AMNH); Cameron (AMNH); Carson (WTAM); Collin (TAM); Comanche (TAM); Dallas (MCZ, AMNH); Denton (MCZ); Dickens (TAM); El Paso (AMNH); Erath (TAM); Floyd (TAM); Gaines (FSCA); Grayson (AMNH); Hale (TAM); Howard (TAM, NMSUAM); Jones (FSCA); Martin (TAM); Montague (AMNH); Nolen (FSCA); Randall (AMNH); Somervill (MCZ); Taylor (AMNH); Tom Greene (TAM); Travis (TAM, MCZ); Val Verde (TAM); Webb (TAM); Wichita (AMNH); Wilbarger (AMNH); Winkler (FSCA); Wise (AMNH); Yoakum (FSCA); *Utah*: Box Elder (MCZ, AMNH); Cache (MCZ, NMSUAM); Davis (USNMNH, AMNH); Duchesne (AMNH); Millard (MCZ); Morgan (AMNH); Salt Lake (AMNH); San Juan (MCZ); Summit (AMNH); Utah (AMNH); Wasatch (AMNH),Washington (MCZ); Weber (AMNH); *Virginia*: (USNMNH); Fairfax (MCZ); *Washington*: Benton (MCZ); Chelan (CNC); Franklin (MCZ); Grant (MCZ, AMNH); Okanagon (AMNH); Thurston (MCZ); Whitman (MCZ); Yakima (MCZ); *Wisconsin*: Walworth (MCZ) ; *Wyoming*: Goshen (MCZ); Lincoln (AMNH); Platte (MCZ).

MEXICO: *Baja California (Norte):* El Rosario, 28.38°N, 106.03°W (AMNH); San Jose (Meling Ranch) (coordinates not determined) (AMNH); Santo Tomas, 31.33°N, 116.24°W (AMNH); *Chihuahua:* 21 km N. Ciudad Camargo (MCZ); 40.2 km SW Carmargo (AMNH) 40 km W Carmargo (AMNH); Note: Carmargo is at 27.41°N, 105.10°, W Catarinas, 29.83°N, 107.7°W (AMNH); Cuevas Matamoros District 26°48′N, 105°35′W (AMNH); Huejotitlan 27°04′N, 106°12′W (AMNH); Las Delicias 28°12′N, 105°30′W (AMNH); La Cruz, 23.55°N, 106. 54°W (AMNH); Primavera (coordinates not determined) (AMNH); Santa Barbara, 26.48°N, 105.50°W (AMNH); 1.6 km E. La Sauceda (coordinates not determined) (AMNH); *Coahuila:* Gloria 25.50°N, 101.06°W (AMNH); Guadalupe, 32.05°N, 116.32°W (AMNH); 24 km N. Saltillo, 25.25°N, 101.0 W (AMNH); *Distrito Federal:* Tlalpan, 19°17′N, 99°09′W (AMNH); *Durango:* Encino 26.09°N, 105.20°W (AMNH); La Loma near 25.32°N, 103.32°W (AMNH); Palos Colorados (coordinates not determined) (ANMH) Nombre de Dios (coordinates not determined) (AMNH); Rodeo, 25.1°N, 104.39°W (AMNH); *Guanajuato:* San Miguel Allende 21°54′08″N, 101°06′06″W (AMNH); *Jalisco:* El Nolina (coordinates not determined) (MCZ); Ojuelos, 21°52′N, 101°40′W (AMNH); 3.2 km S. of Tlaquepaque near 20°39′N, 103°15′W (AMNH); Zapotlanejo 20°38′N, 103°04′W (AMNH); *Morelos*: N. of Cuernevaca, 18.55°N, 99.15°W (MCZ); *Nuevo Leon:* Villa de Santiago 25°26′N, 100°08′W (MCZ); *Oaxaca:* 5.6 km E. of Mitla near 16°55′N, 96°24′W (MCZ); Tlacolula 16°57′N, 96°28′W (AMNH); *Puebla:* Puebla, 6500′, 19.05°, 98.22°W (AMNH); *Sonora:* Isla San Pedro Martir 28°23′N, 112°20′W (CAS); Minas Nuevas 27°03′N, 109°00′W (AMNH); 13.8 km W. Tepoca near 30°16′N, 112°51′W (CAS); *Tlaxcala:* Huamantla 19°18′N, 97°55′W (AMNH); *Zacatecas*: Tropic of Cancer on Hwy. 23°27′N, 102°10′W (TAM).

Diagnosis.—This species differs from almost all other *Sassacus* (exception *S. paiutus*) in usually having only three ventral macrosetae on the first tibiae and in being covered with pink or coppery and green, blue or brassy metallic scales in life. These may all appear to be brassy or greenish under alcohol. The male palpi differ from all the other members of the genus (except for *S. paiutus*) in the characteristic kinked shape of the embolus (Fig. 5). Similarly the epigynum of the female differs from all but *S. paiutus* in the placement of openings and general structure (Figs. 7, 8). The species is easily separable from *S. paiutus* in that the body of the latter is covered with golden metallic scales. *Sassacus paiutus* is also confined almost totally to the lower Colorado River of Nevada, California, and Arizona, while *S. papenhoei* is widespread from British Columbia and Maryland south into southern Mexico.

Description.—Generally both sexes covered with metallic green and pink or coppery scales in life (Figs. 1–3). Usually the scales on the carapace are pink or coppery and on the abdomen are green or blue.

Male lectotype from Wallace County, Kansas: Total length 3.6, carapace length 1.7, carapace width 1.4. Ventral spines on first tibiae 1-2-0 (or 1-0, 1-1, 0-0) (typical spination). Leg



Figures 3–8.—*Sassacus papenhoei*. 3. Male from New Mexico, dorsal view. 4–6. Male from Utah: 4. Chelicera, ventral view; 5. Left palpus, ventral view; 6. Left palpus, retrolateral view. 7, 8. Female from Utah: 7. Epigynum, ventral view; 8. Vulva, dorsal view. Scale line 1 mm (Fig. 3), 0.25 mm (Fig. 4), 0.1 mm (Figs. 5–8).

formula 1423. Chelicerae excavate with 2 promarginal teeth and one large retromarginal tooth (Fig. 4), which may in some examples have a basal projection. Body covered with metallic scales, which appear greenish under alcohol, otherwise base color appears brown, darker around eyes. Palpi light brownish, chelicerae and clypeus orange brown. Sternum, endites, and labium brown; endites lighter on anterior 1/3. Legs brownish with metatarsi 2, 3, and 4 having proximal 1/3 yellow. Patellae slightly lighter ventrally. Ten males from Kansas (BCC) total body length 2.9–3.7, carapace length 1.4–1.8, carapace width 1.25–1.6.

Female paralectotype from Wallace County, Kansas: Total length 4.6, carapace length 1.8, carapace width 1.6. Leg formula 1423. Appearance as in male, but with metatarsi only dark at distal ends and legs 2, 3, and 4 lighter- nearly orange- and chelicerae not excavate. Ten females from Winona County, MN (BCC) total length 3.75–5.25, carapace length 1.75–2.0, carapace width 1.5–1.7.

Variation.—While *Sassacus papenhoei* is fairly stable in appearance throughout its distribution, it does vary somewhat in the number of ventral macrosetae on the first tibiae, as noted earlier. These are usually arranged as 1-0, 1-1, 0-0, but may be 1-0, 0-1, 0-0 or 1-0, 1-1, 0-1. One male from Gem County, Idaho, had 0-0, 0-1, 0-0 and a female from Utah County, Utah had 1-0,0-0,0-0 just the same as *S. cyaneus*! In both cases both front legs were examined closely for sockets, but none were found. Since loss of ventral macrosetae is fairly common in this species it is easy to see why "*Agassa*" has lost macrosetae to the point of only having one. The *arcuatus* and *vitis* groups of *Sassacus,* as well as the more typical *Sassacus*

samalayucae, have a more usual dendryphantine formula of 1-1, 1-1, 1-1, with the macrosetae occupying the distal 1/2 to 2/3 of the ventral tibia. This can be considered the "primitive" dendryphantine condition.

Some males from Utah County, Utah (AMNH) have emboli with the typical "crook" nearly or completely gone. The embolus in this case looks almost dagger-like. It is possible that this variation represents an incipient speciation event, but there do seem to be some intermediate forms. In females the spatial relationship of the epigynal openings seems to differ between being slightly slanted to being orientated parallel to the sides of the abdomen. This does not seem to be a stable difference, however, as females from several parts of the United States have the same variation.

Three males collected in Cochise County, Arizona, have a somewhat different color pattern, with white scales scattered on the abdomen forming a row of darker patches on each side (visible only when dry). The legs are less pigmented than the typical specimens. Comparison with a "typical" *S. papenhoei* from the Santa Catalina Mountains convinced me that these represent just a color variation and not a separate species. Color variations in this species are uncommon, but do exist. A few specimens from Cache County, Utah, have brassy scales but still have the darker leg segments on all legs except for the tarsi and metatarsi, which are yellow. Some individuals have lighter colored legs than usual, but these could possibly be recently molted. However, most variations are in the metallic colors rather than in having non-metallic scales replace metallic ones or in the base color.

Another interesting variation in *S. papenhoei* is found in some male specimens from Oregon, which almost resemble *S. vitis* in being apparently more elongated in body form than typical *S. papenhoei*. In at least one case specimens were consigned to a box marked "*vitis.*" Such variation, while uncommon, points out the plasticity of body shape in this genus and I think implies that all of the included species are probably closely related enough to be within a single genus.

Distribution.—This species occurs from Maryland north to southern Minnesota, south to Mississippi, and west to California and British Columbia, south into Zacatecas, Oaxaca and Guerrero, Mexico

Natural history.—Often abundant in summer, especially on creosote, *Baccharis*, mesquite, and other desert shrubs in New Mexico or on shorter perennials, such as lupine in California. This species is often also swept from alfalfa or cotton. Two males and 21 females were collected from *Chrysothamnus* and *Artemisia* in Redmond, Deschutes County, Oregon (AMNH). Males and females were collected on *Acacia* near Jacumba, San Diego County, California (AMNH), 3 females from mesquite and acacia in Pima County, Arizona (FSCA), and a female from stream edge vegetation in Burnet County, Texas (FSCA). Three males and three females were collected on perennial *Gutierrezia* in Winkler County, Texas (FSCA). A male and female were collected by sweeping upland prairie in Woodbury County, Iowa (FSCA). Females have been collected on big sagebrush or "sagebrush" in Cache County, Utah. A male was collected in montane forest in the San Gabriel Mountains, Los Angeles County, California (AMNH). Others have been collected in meadows in Missouri and from bushes along creeks in Arizona. Males collected in May-September and November; females May- November. One female collected on the Jornada Experimental Range, Doña Ana County, New Mexico on 3 August 1990, had laid 5 large (1 mm) eggs in a small sac by the time it was preserved on October 23. Another female from Johnson County, Missouri was collected with an egg sac containing 7 spiderlings and 2 unhatched eggs. One female (AMNH) from Corvallis, Oregon, was collected in July from a mud dauber's nest (Hymenoptera: Sphecidae).

Sassacus paiutus (Gertsch)
Figs. 9–14, 56

Metaphidippus paiutus Gertsch 1934:18, fig. 22.
Sassacus paiutus (Gertsch): Maddison 1996:238.
Sassacus papenhoei Peckham & Peckham: Richman 1965:133; Richman & Roth 1976:201; Hill 1979:195, 208, fig. 10L (misidentification).

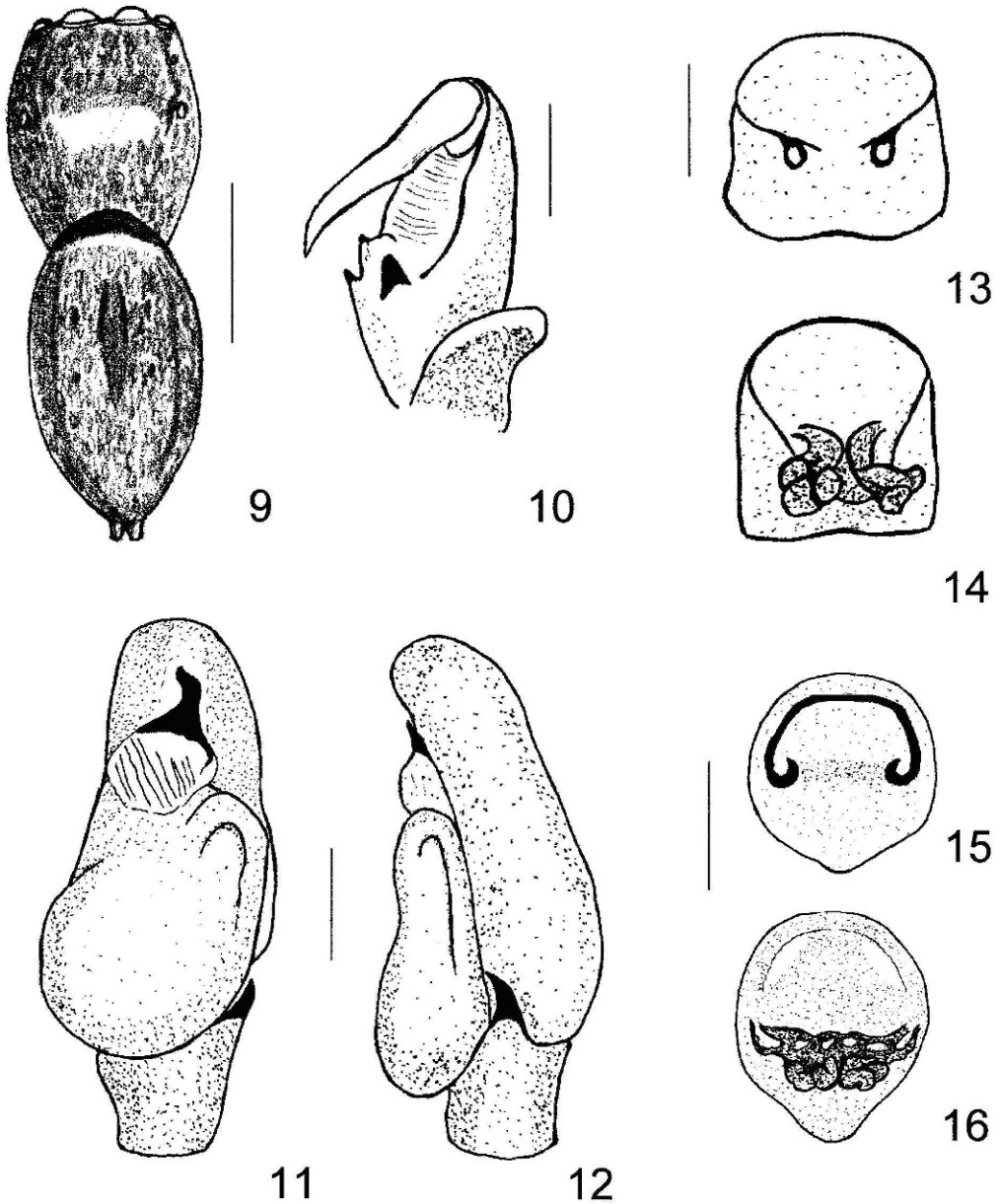
Material examined.—Male holotype, USA: *Utah*: Richfield, Sevier County, 38°46'21″N, 112°05'00″W, 4 July 1930, W.J. Gertsch (AMNH, examined).

Other material: USA: *Arizona:* Mojave County, Cottonia (coordinates not determined) (MCZ, AMNH); Yuma County, Gila Pumping Plant (coordinates not determined) (FSCA); Martinez Dam (coordinates not determined) (AMNH); McPhaul Bridge on the Gila River, 32°45'34″N, 114°25'16″W (FSCA); Mittry Lake, 32°49'07″N 114°29'18″W (CAS); Yuma, ca. 32°42'42″N 114°39'00″W (FSCA, AMNH). *California:* Imperial County, Salton City, 33°17'55″N, 115°57'22″W (AMNH); Inyo County, Laws, 37°24'02″N, 118°20'44″W (AMNH); Olancha, 36°16'54″N, 118°00'23″W (AMNH), Silver Canyon, 37°24'20″N, 118°18'58″W (AMNH); Mono County, Benton, 37°49'08″N, 118°28'35″W (AMNH); Riverside County, Blythe, ca. 33°36'37″N, 114°35'49″W (AMNH); north shore of Salton Sea, ca. 33°30'16″N, 115°54'52″W (UCR). *Utah:* Washington County, St. George, ca. 37°06'N, 113°33'W (MCZ).

MEXICO: *Baja California Norte:* San Felipe, 31.03°N, 114.52°W (FSCA).

Diagnosis.—This species is closest to *S. papenhoei* from which it differs in the curve of the embolus in males (Fig. 11) and the structure of the epigynum in females (Figs. 13, 14). This species also differs from *S. papenhoei* by the longer front legs with darkened femora. Otherwise the legs are not marked and in females are often completely yellow. When alive, *S. paiutus* differs from all other North American *Sassacus*, except for *S. samalayucae,* in having the entire dorsal surface of the body covered with golden-silver scales (Fig. 9), giving the impression of being cast from white gold. It differs from *S. samalayucae* by having only three ventral macrosetae on the first tibiae and in details of the female epigynum.

Description.—*Male holotype:* Total length 3.7, carapace length 1.8, carapace width 1.5. Leg formula 1423. Ventral tibial macrosetae on first legs appear to be 1-2-1, as reported by Gertsch, which differs from those of the paratypes and all other specimens examined, which are 1-2-0, as in average *S. papenhoei*. Badly rubbed, but showing remains of metallic electrum-colored scales on carapace (reported as white by Gertsch 1934). In life the spider is undoubtedly covered with such scales. Otherwise it appears as in original description



Figures 9–16.—*Sassacus paiutus.* 9, 10, 11, 12. Male from Arizona: 9. Dorsal view; 10. Chelicera, ventral view; 11. Left palpus, ventral view; 12. Left palpus, retrolateral view. 13, 14. Female from California: 13. Epigynum, ventral view; 14. Vulva, dorsal view. *Sassacus samalayucae*. 15, 16. Female from Chihuahua, Mexico: 15. Epigynum, ventral view; 16. Vulva, dorsal view. Scale line 1 mm (Fig. 9), 0.25 mm (Fig. 10), 0.1 mm (Figs. 11–16).

(Gertsch 1934). Chelicerae robust and excavate, with two promarginal and one large triangular retromarginal tooth (Fig. 10). Front legs distinctly longer than others.

Male from Imperial County, California: Total length 2.8, carapace length 1.3, carapace width 1.1. Leg formula 1423. Ventral first leg macrosetae 1-2-0. Chelicerae robust, excavate and appear to have only one large promarginal tooth and no retromarginal teeth. Carapace red-brown covered with white-gold scales. Palpus bulb and cymbium red brown, rest yellowish. Clypeus, chelicerae, labium and endites red-brown; endites with distal edge lighter. Clypeus with whitish hairs. Abdomen light brown above and darker below, covered with metallic white-gold scales over both surfaces. Area of book lungs anterior to epigastric furrow dark red-brown. Three other males from Yuma County, Arizona, ranged in total length from 3.2–3.5.

Female from Inyo County, California: Total length 4.7, carapace length 1.8, carapace width 1.5. Leg formula 4123, with leg 1 and leg 4 nearly equal in length, but with leg 4 having a slightly longer metatarsus-tarsus. Ventral tibial macrosetae 1-2-0. Carapace red-brown covered with white-golden metallic scales, clypeus and chelicerae red-brown, clypeus with white hairs. Sternum, labium and endites orange brown; endites with lighter anterior ¼. Palp yellow-brown. Front leg with femora, trochanters and coxae orange brown; rest of leg yellow-brown. Other legs uniform yellow-brown.

Abdomen yellowish dorsally covered with metallic white-gold scales. Venter darker with light widening center stripe and two rows of tiny light dots lateral on each side of stripe. Two other females from the same locality measured 4.7–4.8 in total length, carapace length 1.8 and carapace width 1.4 in both. Female from Salton City, Imperial County, California, in same vial with male described above, colored as females from Inyo County, but with less dark area on venter and with less dark brown on front legs; total length 4.0, carapace length 1.6, carapace width 1.2.

Distribution.—This species occurs in the Colorado River Drainage area from southwestern Utah and Mono County, California, south into Baja California and the Mexican border near Yuma, Arizona.

Natural history.—Common in summer (however Roth collected males and females in March at Mittry Lake) on *Pulchea* along watercourses. Specimens also have been collected on tamarisk and grass in similar habitats. Males collected in March and June. Females collected in March, May, June, and September. One female collected at McPhaul Bridge on 5 September 1965, laid 13 eggs on 11 September 1965. This is similar in number to the largest number (11) laid by *S. papenhoei*. The courtship (under *Sassacus papenhoei* in Richman 1982a, 1982b) is very similar to that of *Sassacus vitis*, with male crossing front pair of legs.

Remarks.—This species is very similar to *S. papenhoei* and may be derived from it. It was the species originally examined by Hill (1979) in his comparison of body scales of salticids that led him to conclude that *S. vitis* was a *Sassacus.*

Sassacus samalayucae new species
Figs. 15, 16, 57

Material examined.—Holotype female, MEXICO: *Chihuahua*: 57.9 km. S. of Juárez, ca. 31°20'N, 106°30'W, sand dunes, 13 June 1939, A.M. & L.I. Davis (AMNH).

Etymology.—This species is named for the sand dune field south of Juárez on which the type specimen was collected.

Diagnosis.—*Sassacus samalayucae* is most similar to *S. papenhoei* and *S. paiutus* from which it differs in the structure of the epigynum in females (Figs. 15, 16). The male is unknown. *Sassacus samalayucae* differs from all other North American *Sassacus*, except for *S. paiutus,* by having the entire dorsal surface of the body covered with golden-silver scales, giving the impression of being cast from electrum. It also differs from *S. paiutus* and *S. papenhoei* by having six ventral macrosetae on the first tibiae.

Description.—*Female holotype:* Total length 3.6. Carapace length 1.7, width 1.4. Leg formula 1423, cheliceral teeth two promarginal and one triangular retromarginal tooth, ventral tibial macrosetae 2-2-2. Ventral first metatarsi with four (2-2) very stout macrosetae. Carapace reddish-brown covered with metallic golden scales, as in *S. paiutus*. Chelicerae red-brown; endites lighter red-brown with pale distal portion. Sternum pale yellow. Legs and palpi pale yellow, except for ventral triangular dark marking at distal first femur at base of patella. Abdomen and venter covered with metallic golden scales.

Distribution.—Known only from the type locality in northern Chihuahua, Mexico.

Natural history.—The natural history of this species in unknown. The holotype female was collected in June.

***Sassacus cyaneus* (Hentz 1846)** new combination
Figs. 17–22, 57

? *Attus cerulea* Walckenaer 1837:448.
? *Attus quaternus* Walckenaer 1837:452.
Attus cyaneus Hentz 1846:365, plate 22, fig. 13.
Maevia chrysea C.L. Koch 1846:83, fig. 1337.
Homalattus septentrionalis Keyserling 1885:34, plate 13, fig. 19.
Homalattus cyaneus (Hentz): Peckham & Peckham 1888:86, plate 1, fig. 64, plate 6, fig. 64; Emerton 1909:232, plate 11, fig. 9.
Rhene cyaneus? (Hentz): Peckham & Peckham 1895:161, plate 15, fig. 3.
Agassa georgiana Simon 1901:643, fig. 752.
Agassa cyanea (Hentz): Peckham & Peckham 1909:590, plate 49, fig. 12, plate 51, fig. 9; Kaston 1948:471, plate 92, figs. 1721, 1722; Roewer 1954:1229.
Agassa cerulea (Walckenaer): Chamberlin & Ivie 1944:189.

Type specimens.—*Attus cerulea:* Type based on Abbot's (1792) drawing 82 of spider from "Burke County, Georgia" and resurrected by Chamberlin & Ivie (1944) now not thought to be identifiable to sex, genus, or species.

Attus quaternus: Type based on Abbot's (1792) drawing 442 of spider from "Effingham County, Georgia" and resurrected by Chamberlin & Ivie (1944) now not thought to be identifiable to sex, genus, or species.

Attus cyaneus: Listed by Hentz from North Carolina and Alabama, with no type designation. Not examined, as no Hentz specimens are known to have survived.

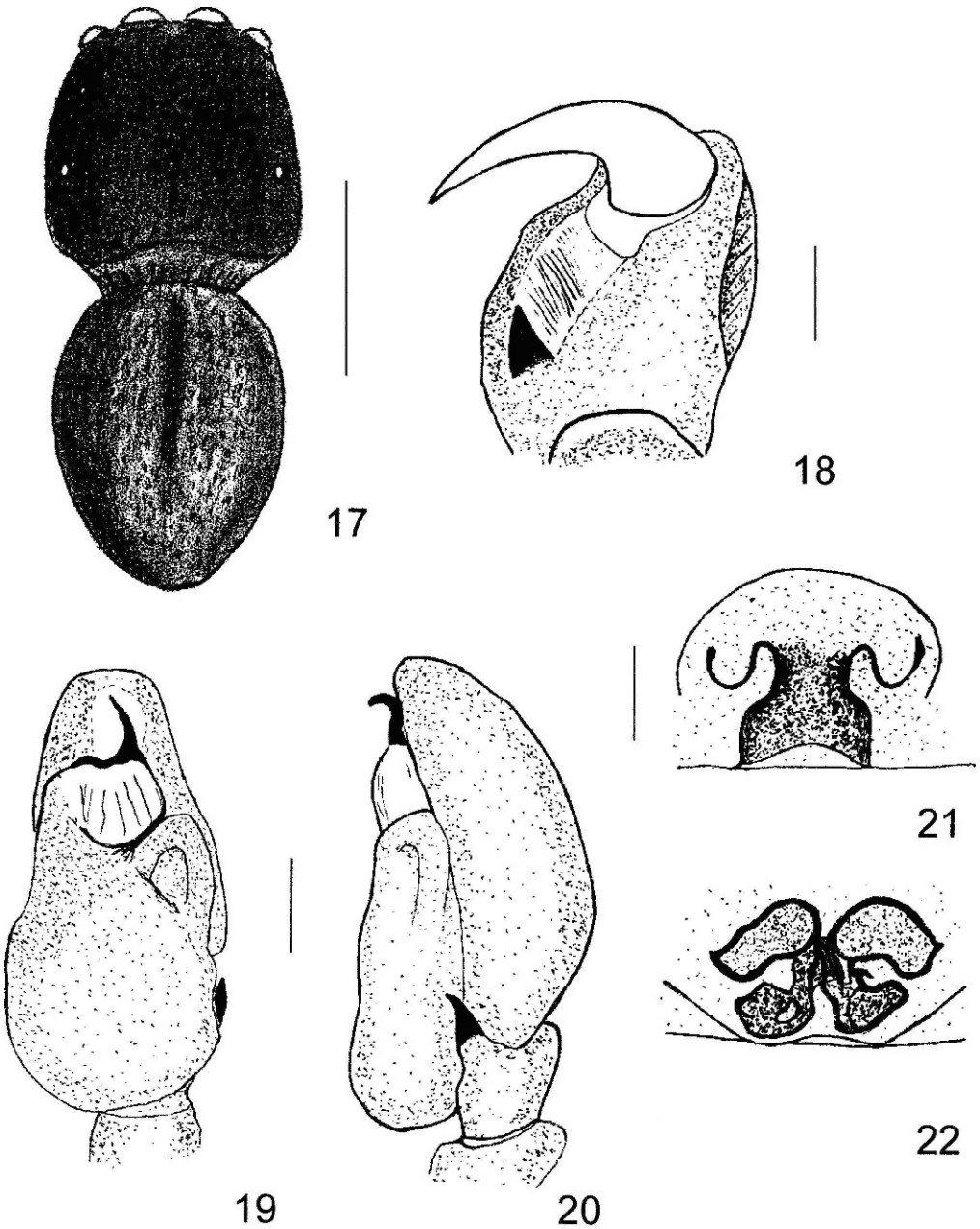
Maevia chrysea: Female holotype apparently from North America (Museum für Naturkunde, Berlin, not examined).

Homalattus septentrionalis: Female "holoype" apparently from "Nord-Amerika, Massachusetts" (MCZ, examined).

Agassa georgiana: No sex for holotype given; "type" apparently from Georgia (Museum National d'Histoire Naturelle, Paris, not examined).

Material examined.—USA (county records only): *Connecticut:* Fairfield (AMNH); Hartford (USNMNH); Litchfield (USNMNH); New Haven (MCZ, USNMNH, FSCA); Tolland (FSCA); *Florida:* Charlotte (MCZ); Gadsden (FSCA); *Georgia:* State Record Only (MCZ); Columbia (NMSUAM); *Illinois:* Effingham (INHS*); Mason (INHS*); *Massachusetts*: Barnstable (USNMNH); Middlesex (MCZ); Nantucket (MCZ); Norfolk (MCZ); Plymouth (MCZ); *Missouri:* Vernon (MCZ); *New Jersey:* Bergen (AMNH); Cape May (MCZ); Essex (FSCA); Middlesex (FSCA); Morris (FSCA); Ocean (AMNH); *New York:* Bronx (FSCA); Nassau (MCZ); Orange (MCZ); Rockland (AMNH, BCC); Tompkins (MCZ); Westchester (AMNH); *North Carolina:* Carteret (MCZ, AMNH); Durham (MCZ); New Hanover (MCZ); *Ohio:* Summit (BCC) *Pennsylvania*: Columbia (AMNH); *South Carolina:* Florence (FSCA), State record only (USNMNH); (USNMNH)*; Texas*: San Patricio (TAM); *Virginia:* Fairfax (MCZ, USNMNH); *West Virginia*: Mercer (MCZ); *Wisconsin:* State Record Only (MCZ).

Diagnosis.—Very beetle-like. Most similar to *S. alboguttatus*, from which it differs in the following ways: male lacks a



Figures 17–22.—*Sassacus cyaneus*. 17, 18, 19, 20. Male from Georgia: 17. Dorsal view; 18. Chelicera, ventral view; 19. Left palpus, ventral view; 20. Left palpus, retrolateral view. 21, 22. Female from North Carolina: 21. Epigynum, ventral view; 22. Vulva, dorsal view. Scale line 1 mm (Fig. 17), 0.1 mm (Figs. 18–22).

curve (hook) at the embolus tip (Fig. 19), the female epigynal plate is broader than long, and the details of the epigynal structure differ (Figs. 21, 22). Both *S. cyaneus* and *S. alboguttatus* have a curious row of distinct setae on the anterior edge of the dorsal abdomen (Figs. 17, 23).

Description.—*Male from Columbia County, Georgia:* Leg formula 1423. Total length 3.4, carapace length 1.7, carapace width 1.6. (nearly square, but just slightly less so than in the males of *S. alboguttatus*). Ventral first tibial macrosetae 0-1-0. Posterior median eyes much closer to anterior median eyes than posterior laterals. Cheliceral teeth: two medium-sized prolaterals and one large and curved retromarginal tooth, or just one curved retromarginal tooth (Fig. 18). Carapace nearly black with dorsal and ventral fine metallic pink and green scales. Clypeus nearly black. Palpi with cymbium and bulb dark red brown; rest red-brown. Chelicerae red-brown with scattered metallic scales. Sternum, labium and endites red-brown with scattered metallic scales. Labium and endites with distal edges lighter. Legs generally red-brown except for metatarsi and tarsi II–IV, which are yellowish with the distal 1/3 of the metatarsi and proximal 1/5 of tarsi dark brown. Abdomen nearly black with metallic pink and green scales,

both ventrally and dorsally. Three males from Connecticut, Texas, and Virginia with total length 2.4–3.35, carapace length 1.25–1.6, and carapace width 1.25–1.5.

Female from Rockland County, New York: Leg formula 4123. Total length 4.1, carapace length 1.55, carapace width 1.5. Front tibial spination reduced as in male. Ventral first tibial macrosetae 0-1-0. Posterior median eyes much closer to anterior median eyes than posterior laterals. Cheliceral teeth: two promarginals and one simple retromarginal. Basic color overall (carapace and abdomen) dark reddish-brown, nearly black. Body covered with pink (in alcohol) metallic scales. Palpi, chelicerae, clypeus, sternum and endites reddish-brown, with endites yellowish anteriorly. Eyes arranged with PME much further from PLE than ALE; PLE set far back, closer to posterior declivity than to the PME. Carapace box-like, square to nearly square, enhancing the general beetle-like appearance. Legs reddish-brown except for yellow tarsi on first legs. Long hairs on anterior dorsal abdomen. Five females from Connecticut and South Carolina (USNMNH): Total length 3.75–4.8, carapace length 1.5–1.8, carapace width 1.5–1.6.

Distribution.—This species is found from New England south to Florida and west to Texas, Missouri, and Wisconsin.

Natural history.—This species is generally found on small shrubs, small oaks and scrub pines. Hentz (1846) noted that the species was collected in "April, May, June, etc." Males collected in May. Females have been found in June, July, August, and September. One female collected in Englishtown, Middlesex County, New Jersey on 12 July 1966 (FSCA) laid 5 eggs. A female collected near the junction of highways S-65 and S-65a in Gadsden County, Florida, on 8 August 1977 (FSCA), was found on a small bush with a large number of very similar leaf beetles in the genus *Graphops* (Chrysomelidae: Eumolpinae).

Remarks.—This and the following species would be placed in *Agassa*, a separate genus, by past convention. It differs from *Sassacus papenhoei* in having only one ventral macroseta on the first tibia, by the more box-like carapace and by the PME being placed much further posterior on the carapace. However, as noted in the description of *S. papenhoei*, the ventral macrosetae are easily lost and *S. papenhoei* itself can vary from having one to five, although the usual is three. The eye placement is a result of the more pronounced beetle-like structure of the carapace. The genitalia and other aspects of the general color and structure are so close to the other true *Sassacus* that these body shape differences do not seem to really matter, other than to relate *cyaneus* and *alboguttatus* on the same sub-clade of the *papenhoei* group. I can see no justification for retaining *Agassa* as a valid genus and have thus made it a junior synonym of *Sassacus*.

Sassacus alboguttatus (F.O. Pickard-Cambridge)
Figs. 23–28, 56

Homalattoides alboguttatus F.O. Pickard-Cambridge 1901:294, plate 28.

Sassacus alboguttatus (F.O. Pickard-Cambridge): Simon 1903:838.

Material examined.—Male holotype, MEXICO: *Guerrero*: Amula, ca. 17°38′N, 99°15′W, no date (BMNH, photographs of palpus, chelicerae and whole animal provided by the British Museum examined).

Other material: MEXICO: *Chiapas:* Tuxtla Gutierrez, 16°46′N, 93°21′W (AMNH); *Distrito Federal:* Pedregal, 19°20′N, 99°10′W (AMNH); *Guerrero:* 37 km S. of Chilpancingo near 17°33′N, 99°30′W (immature) (AMNH); *Morelos:* Cuernavaca 18°57′N, 99°15′W (AMNH); *Nayarit:* Tepic, 21°35′N, 104°54′W (AMNH); *Sonora:* 11 km SE of Alamos near 27°00′N, 108°58′W (FSCA).

Diagnosis.—Very beetle-like. Most similar to *S. cyaneus,* from which it differs in having one large promarginal tooth and one large uncurved retromarginal tooth in the male (Fig. 24), three ventral macrosetae on first tibiae in both sexes, the male with a curve (hook) at the embolus tip (Fig. 25), the female with the epigynal plate longer than broad, and in the details of the epigynal structure (Figs. 27, 28). Superficially this species looks almost exactly like *S. cyaneus*, except for being slightly more beetle-like.

Description.—*Male from Chiapas, Mexico:* Leg formula 1423. Total length 3.5, carapace 1.4 long and 1.6 mm wide and almost rectangular. Front tibial spination reduced, but more similar to *S. papenhoei* than *S. cyaneus*. Ventral first tibial macrosetae 1-2-0. Basic color over all dark brown, nearly black. The abdomen has a faint cardiac mark similar to that seen on many specimens of *S. cyaneus*. The name *alboguttatus* is derived from the white hairs on the clypeus and areas lateral to the clypeus, and the small clumps of white scales on the dorsal femur, patella and tibia. Body covered with metallic scales, as in *S. cyaneus.* Eyes arranged as in *S. cyaneus*, with a box-like shape to the carapace enhancing the general beetle-like appearance. Posterior lateral eyes set far back. Long hairs on anterior dorsal abdomen.

Female from Sonora, Mexico: Leg formula 4123. Total length 4.0, carapace length 1.7, carapace width 1.7. Color and structure as in male, except 2 promarginal cheliceral teeth and one apparent ridge-like retromarginal tooth (may be broken off base). Epigynal plate (Figs. 27, 28) distinctive, being longer than wide, exactly opposite to that of *S. cyaneus.* Leg formula 4123.

Distribution.—This species occurs from Southern Sonora south into Chiapas, Mexico.

Natural history.—Males were collected in August and September; the only female in November. Ecology and behavior unknown.

Remarks.—*Sassacus alboguttatus* is obviously close in structure to *S. cyaneus*. Unfortunately very little is known about this species. While I have only seen photographs of the holotype, the structure of the chelicerae and the palpus, and the general beetle-like appearance, together with the white patches of scales on the legs described by F.O. Pickard-Cambridge (1901) (observed on the male examined from Chiapas), and the general distribution are indicative that this is the right placement of these specimens.

***Sassacus vitis* species-group**

Sassacus vitis (Cockerell 1894)
Figs. 29–35, 58

Dendryphantes vitis Cockerell 1894:207.

Icius vitis (Cockerell): Peckham & Peckham 1909:501, plate 40, fig. 11, plate 41, fig. 7.

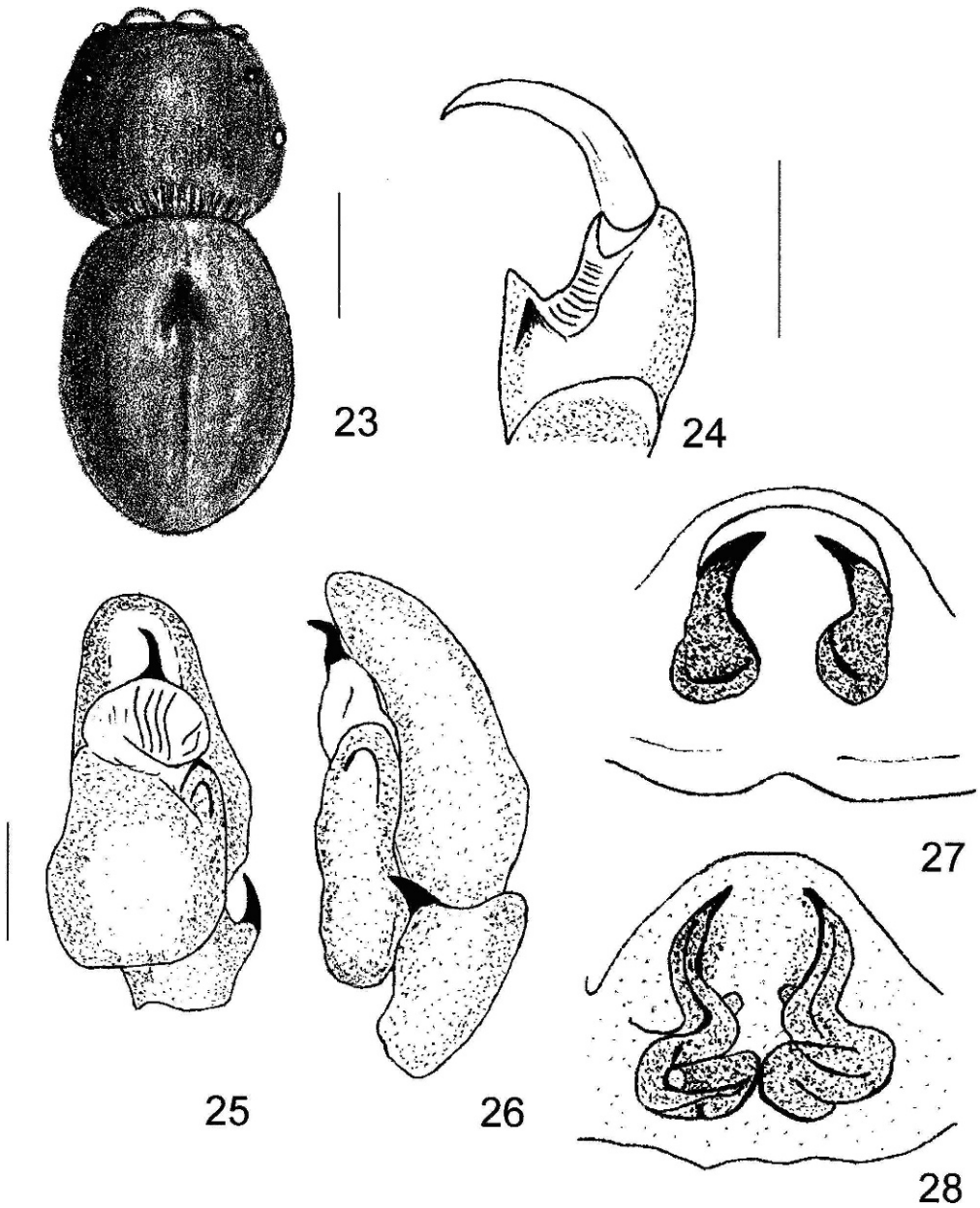


Figure 23–28.—*Sassacus alboguttatus*. 23. Female from Sonora, dorsal view. 24–26. Male from Nayarit: 24. Chelicera, ventral view; 25. Left palpus, ventral view; 26. Left palpus, retrolateral view. 27, 28. Female from Sonora: 27. Epigynum, ventral view; 28. Vulva, dorsal view. Scale line 1 mm (Fig. 23), 0.5 mm (Fig. 24), 0.1 mm (Figs. 25–28).

Dendryphantes melanomerus Chamberlin 1924:684, fig. 125–126; Jiménez-Jiménez 2007:64, figs. 1–7. **New synonymy.**

Dendryphantes apachecus Chamberlin 1925:136, figs. 55–56.

Dendryphantes mathetes Chamberlin 1925:138, figs. 59, 60. **New synonymy.**

Metaphidippus vitis (Cockerell): Gertsch 1934:19; Prószyński 1971:434.

Sassacus vitis (Cockerell): Hill 1979:215.

Metaphidippus vitis (Cockerell): Maddison 1996:237, figs. 27, 59.

Material examined.—*Dendryphantes vitis*: holotype male, USA: *New Mexico*: Las Cruces, Doña Ana County, 32°18′44″N, 106°46′40″W, no date or collector (presumably T.D.A. Cockerell) (MCZ, examined).

Dendryphantes melanomerus: holotype male, MEXICO: *Baja California del Sur*: Coyote Bay, Conception Bay (Bahia Concepcion), 26°43.24′N, 111°54.57′W, 18 June 1921, J.C. Chamberlin (CAS, examined). Paratypes: same data as holotype (MCZ, examined)

Dendryphantes apachecus: holotype male (thick embolus form), USA: *Arizona*: Thatcher, Graham County, 32°50′57″N, 109°45′33″W, 1913, R.V. Chamberlin (MCZ, examined).

Dendryphantes mathetes: Holotype male (thin embolus form), USA: *California*: Claremont, Los Angeles County, 34°05′48″N, 117°43′11″W, 1909, R.V. Chamberlin (MCZ, examined).

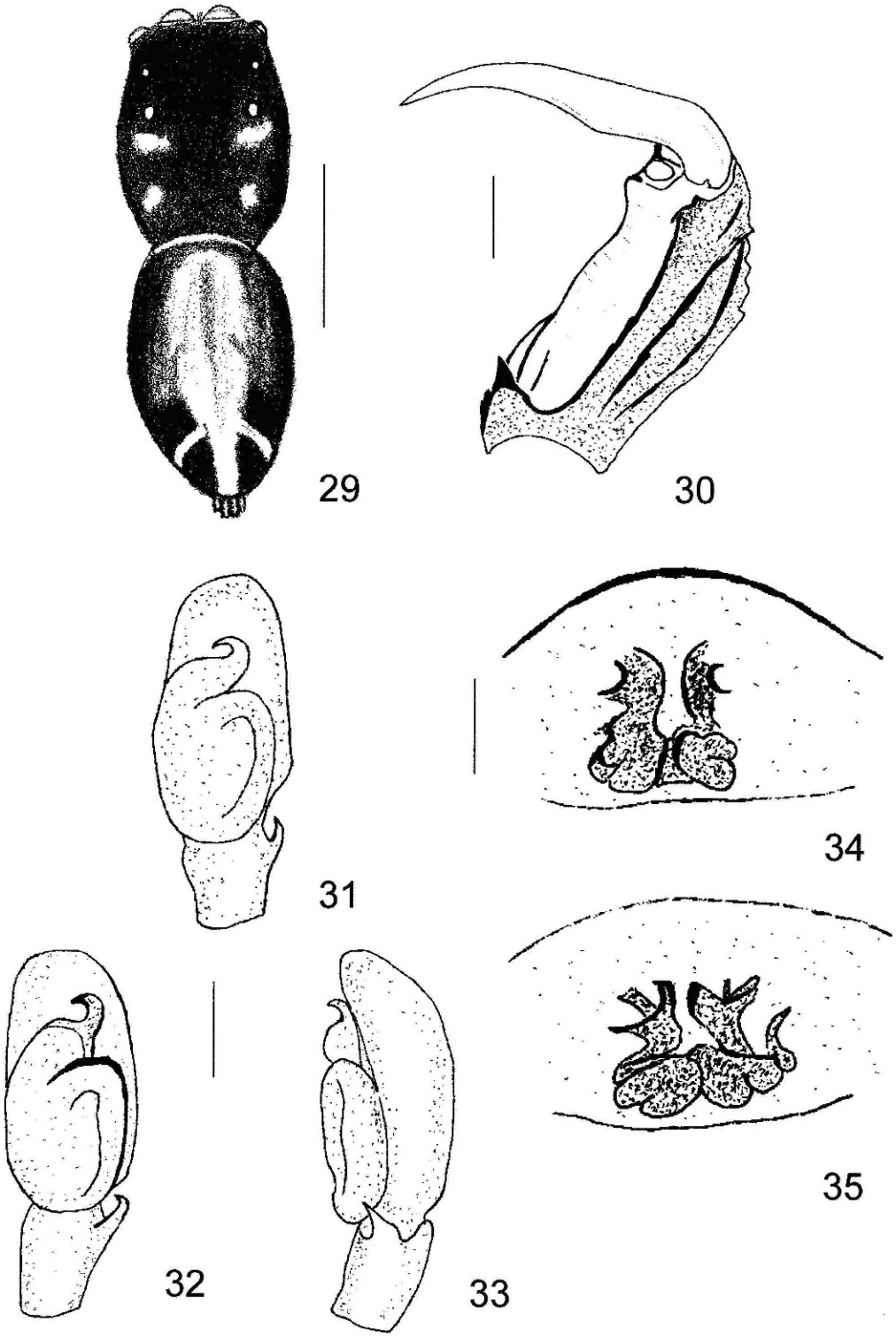


Figure 29–35.—*Sassacus vitis*. 29, 30, 31, 32, 33. Males from Arizona: 29. Dorsal view; 30. Chelicera, ventral view; 31. Left palpus, ventral view, specimen from Pima County; 32. Left palpus, ventral view, specimen from "Arizona," possibly Thatcher (holotype of *Dendryphantes apachecus* Chamberlin); 33. Left palpus, retrolateral view. 34, 35: Female from California: 34. Epigynum, ventral view; 35. Vulva, dorsal view. Scale line 1 mm (Fig. 29), 0.1 mm (Figs. 30–35).

Material examined.—CANADA: *Alberta:* Writing-on-Stone Province Park (CNC); *British Columbia:* N. end of Osayoos Lake (coordinates not determined) (CNC); Osayoos, 49°02′N, 119°28′W (CNC); Summerland, 49°39′N, 119.33°W (CNC).

USA (county records only): *Arizona:* Cochise (AMNH, FSCA); Coconino (FSCA); Graham (AMNH); Pima (MCZ, FSCA); Pinal (NMSUAM); Yuma (MCZ, FSCA, AMNH); *California:* Imperial (AMNH); Los Angeles (MCZ, AMNH, FSCA); Merced (AMNH); Monterey (AMNH); Mono (AMNH); Orange (MCZ, AMNH, NMSUAM); Riverside (USNMNH, MCZ, AMNH); San Diego (MCZ, MPM, BCC, AMNH); San Luis Obispo (AMNH); Santa Barbara (MCZ, AMNH); Santa Clara (MCZ); Tulare (USNMNH); Ventura (MCZ, AMNH, FSCA); Yolo (AMNH); *Florida:* Dade (FSCA); *Idaho:* Canyon (AMNH); Gooding (AMNH); Nez Pierce (AMNH); Payette (AMNH); *Kansas:* Decatur (MCZ); Meade (AMNH); *Montana*: Stillwater (AMNH); *New Mexico:* Doña Ana (MCZ, NMSUAM); *Oklahoma:* Tulsa (NMSUAM); *Oregon:* Grant (AMNH); Malheur (AMNH); *Tennessee:* Lake (AMNH); *Texas:* Bell (AMNH); Brewster (AMNH); Burnet (FSCA); Cameron (MCZ, AMNH); Denton (MCZ); Greyson (AMNH); Hidalgo (AMNH); Johnson (AMNH); Kerr (AMNH); Kimble (AMNH); Llano (FSCA); Presidio (MCZ); Runnals (FSCA); Travis (FSCA); *Utah:* Cache (MCZ); Salt Lake (AMNH); Utah (AMNH),Wayne (AMNH); *Washington:* Chelan (CNC); Columbia (MCZ); *Wyoming:* Lincoln (AMNH).

MEXICO: *Baja California (Norte):* El Rosario, 30°03.619′N, 115°43.567′W (AMNH); 67.6 km S. Ensenada (coordinates not determined) (AMNH); 11 km SE Mexicali (coordinates not determined) (AMNH); *Baja California del Sur:* Bahia Concepcion (no exact Lat/Long found) (MCZ); 16.4 km NW La Paz (coordinates not determined) (CAS); Mulege, 26.9°N 112.0°W (MCZ, FSCA); San Jose del Cabo near 22.9°N, 109.9°W (MCZ); *Chiapas:* Arriaga, 16.2°N, 93.9°W (AMNM); 77 km SE of Palenqueon road to Bonampak (coordinates not determined) (MCZ); Tonala, 16.1°N, 93.7°W (AMNH); *Chihuahua:* Catarinas, 29.83°N, 107.7°W (AMNH); Las Delicias, 28°12′N, 105°30′W (AMNH); *Hidalgo:* 3.2 km N. Chapulhuacan, 21°11′N, 98°57′W (AMNH); 4 km. NE Tlanchinol on highway 105 (no lat/long found) (MCZ); *Jalisco:* Guadalajara, 20°40′N, 103°20′W (MCZ, AMNH); *Morelos:* Cuernavaca, 18.55°N, 99.15°W (AMNH); *Nayarit:* SW of Acaponeta, 22°28′N, 105°24′W (AMNH); 32 km N. Tepic (No Lat/Long found) (AMNH); Tepic 21°31′N, 104°53′W (AMNH); San Blas, 21°31′N, 105°16′W (AMNH); *Nuevo Leon:* Monterrey, 25°40′N, 100°19′W (AMNH); *Oaxaca:* Rio Papaluapan at Papaluapan (coordinates not determined) (AMNH); Tehuantepec, 16°20′N, 95°14′W (AMNH); *Puebla:* Acatlan, 18°32′N, 96°36′W (AMNH); Huauchinango, 20°11′N, 98°03′W (AMNH); 2.4 km W. highway 130 bypass of Xicotepec de Juarez (coordinates not determined) (MCZ); *Quintana Roo:* Kohunlich ruins 9 km S. Francisco Villa, 18°26′N, 88°48′W (MCZ); Rancho Palmas, Carillo Puerto (coordinates not determined) (FSCA); 12.8 km west San Joaquin (21°45′N, 88°57′W) (AMNH); *San Luis Potosi:* Covadonga, south and WSW Valles 21°55′N, 98°58′W, and 21.57°N, 99.05°W (AMNH); Huichihuayan, 21°19′N, 98°50′W (AMNH),13 km E. Las Abritas on highway 80 (coordinates not determined) (MCZ); Pujal, 21°51′N, 98°55′W (AMNH); 10.4 km S. Valles, 21°55N, 98°57′W (AMNH); Valles (Taninul); 21°56 N, 98°53′W (AMNH); 16 km NE Xilitla, 21.27°N, 98.55°W (AMNH); *Sinaloa:* Burrion, 25.33°N, 08.25°W (AMNH); 24.1 km N. Mazatlan, 23°24′N, 106°27′W (AMNH); Piaxtla (River) 23°50′N,106°40′W (ANMH); *Sonora:* Hermosillo, 29°04′N, 110°58′W (AMNH); 37 km S. Hermosillo in foothills(coordinates not determined) (AMNH); Navojoa, 27°04′N, 109°25′W (AMNH); *Tabasco:* Ajijic (coordinates not determined) (AMNH); Pejelagatero 18.03°N, 93.10°W (AMNH); Villa Hermosa, 17°59′N, 92°55′W (AMNH); *Tamaulipas*: "72 km" Cd. Victoria (coordinates not determined) (FSCA); El Mante 22°45′N, 98°58′W (AMNH); Tampico, 22°18′N, 97°51′W (AMNH); *Veracruz:* Acayucan, 17°57′N, 94°55′W (MCZ); Estacion de Biologia Tropical Los Tuxtlas (coordinates not determined) (UNAM); near Lake Catemaco (coordinates not determined) (AMNH); Coatzacoalcos,18.09°N, 94.26°W (AMNH) near La Palma, 20°51′N, 97°43′W (MCZ); Martinez de la Torre, 20°04′N, 97°03W (AMNH); Plan del Rio (coordinates not determined) (AMNH); Riachuelos, 20°27′N, 96°57′W (AMNH); Tetolutla (coordinates not determined) (AMNH); Tuxpan Beach (no certain Lat/Long found) (MCZ); 12 km NW Alvarado on highway 180 (coordinates not determined) (MCZ); San Rafael (no certain Lat/Long) (AMNH).

HONDURAS: Tela Beach, 15°43′N, 87°29′W (MCZ).

PANAMA: Chiriqui, Puerto Armuelles, 08°20′N, 82°51″W (FSCA).

Diagnosis.—This is a distinctive, relatively slender species that is not beetle-like (Fig. 29). It differs from all North American *Sassacus* and *Metaphidippus* in the buttonhook shaped embolus of the male (Figs. 31, 32) and in the structure of the female epigynum (Figs. 34, 35). Most individuals also differ from other *Sassacus*, except *S. aztecus*, in having a pair of white bars, often with black slash or block-like mark on either side, just anterior to the spinnerets on the dorsal surface (Fig. 29). It is also similar to *S. aztecus* and *S. barbipes* in having an acute angle to the tibial apophysis of the male palpus (Fig. 33). When alive this species is covered with golden scales (may appear greenish), especially on the abdomen and usually (but not always) has a patch of light-colored scales posterior to each posterior lateral eye (these are often lost in badly rubbed specimens).

Description.—*Male holotype:* Leg formula 1423. Total length 3.5. Carapace length 1.7, width 1.3. Chelicerae slightly excavate with no apparent promarginal teeth and one large basal retromarginal tooth (in specimen from Pinal County, Arizona, with one large and two small cusps) (Fig. 30). Retromargin of fang with noticeable keel (Fig. 30), which also appears to be present in *S. aztecus* (Fig. 37). First tibia with 2-2-2 ventral macrosetae. Color overall orange brown. Carapace orange brown with metallic golden scales and with a white patch of scales posterior to each PLE. Clypeus dark with metallic scales. Chelicerae dark red-brown. Legs red-brown with lighter ventral distal patellae and whole tarsi. Palpi yellow. Abdomen dorsum orange with numerous metallic golden scales (in some may appear green in life); with posterior dark patch on each side, followed by paired light (probably white in life) bars, followed by smaller dark spot. Venter

yellow. Sternum, endites and labium orange. Ten males from Grayson County, Texas, range from 3.6–4.8 in total length. Carapace length 1.7–2.2; width 1.3–1.8. In many large males the retromarginal tooth is very large and the promarginal teeth may be lacking or nearly so (Fig. 30).

Female from Orange County, California: Leg formula 4123. Total length 4.1. Carapace length 1.6, width 1.2. Description as in male but with shorter and less robust chelicerae and with two small promarginal cheliceral teeth and one larger retromarginal tooth, and lighter in color, with scattered white lateral scales on carapace and white marginal band along carapace edge. Ten females from Grayson County, Texas, range from 4.0–4.9 in total length. Carapace length 1.6–1.9; width 1.3–1.4.

Variation.—The holotype male of *Dendryphantes apachecus* from Arizona, and males from Puebla, Tamaulpas, and San Luis Potosi in Mexico, Runnals County, Texas and Utah have a broader and flatter embolus (Fig. 32), but otherwise very closely resemble other specimens of this species. There seems to be some gradation in Mexico between broad and narrow embolic forms, however. Some populations (e.g., Chihuahua) seem to lack the white bar and dark marks found in most specimens. One female from Tamaulipas State in Mexico, is nearly black and lacks any markings except for the light anterior abdominal border. Some specimens from Chiapas and from a few other sites have the whitish bars on the dorsal posterior abdomen continue as a zigzag mark on each side. Oddly, there seems to be a faint reflection of this pattern on some specimens from Chihuahua. There seems to be no variation in the ventral macrosetae number on the first tibiae.

Distribution.—This species ranges from Alberta and British Columbia south through California, east to Tennessee, and Kansas south through Texas and Mexico to Honduras and Panama, with isolated, probably introduced, populations in Florida.

Natural history.—Males and females were collected on alfalfa, grasses, herbs, oaks, shrubs, and along riverbanks. A male and female were collected on seaside vegetation in Panama. Males have been collected in March, May, June, July, August, September, October, and November. Females have been collected in March, May, June, July, August, and September. A female collected in Yuma County, Arizona on 25 June 1972, laid 15 eggs on 20–21 August 1972. These all hatched 7 September 1972. Two other females from Yuma County, Arizona, laid 11 eggs on 29 July 1965 and 13 eggs on 23 August 1972, respectively. A female collected in Pima County, Arizona, on 28 May 1972 laid 10 eggs on 11–12 June 1972. A female collected at Mexico Highway 15 and the Rio del Fuerte on 27 October 1972 laid 13 eggs by 19 November 1972.

Remarks.—This species is rarely (if ever) variable in the number of ventral macrosetae on the first tibiae, there always being 2-2-2 (or 1-1, 1-1, 1-1), with the last posteroventral spine being offset proximally from the last anteroventral spine (based on 275 individuals - 109 males, 130 females, and 46 immatures from Arizona, California, Colorado, Idaho, Oregon, Texas, Utah, Washington, and Mexico.) As noted under variation there are some differences in the width of the embolus, some males from Puebla and San Luis Potosi (and other localities) in Mexico, Runnals County, Texas, and Utah Lake, Utah, among others, having wider emboli. This may yet prove to be a specific difference, but the males were structurally similar to most northern specimens and had similar patterns. The existence of males both with wide or narrow emboli in Utah and Texas argues against such specific distinctions and so far this appears to be one species, with mostly minor variation in color pattern, except for a few specimens as noted. Most fresh individuals have a patch of whitish scales posterior to the posterior lateral eyes, including the specimens from Puebla, Mexico, and a pair of acutely angled whitish bars (occasional two pairs) on the posterior abdomen. A few Mexican specimens and females from Dade County, Florida (the species was recently introduced to this state, probably from the east coast of Mexico), have a nearly complete zig-zag or nearly straight longitudinal band on each side of the dorsal abdomen, but this can be easily derived from the bar pattern seen on most specimens. A male from Dade County, Florida is nearly black in ground color, covered with metallic scales and with yellow tarsi on the front legs and yellow metatarsi and tarsi on the last three pairs of legs. A few specimens lack any pattern at all, as in a dark female from Tamaulipas, Mexico (FSCA). At present I conclude that these differences are part of the natural variation present in such a widespread species, but it is possible that *S. vitis* actually represents a complex of several species. If the thick embolus males are eventually shown to be distinct they would take on the name *Sassacus apachecus* (Chamberlin 1925). Recently Jiménez-Jiménez (2007) described and illustrated the female from Baja California Sur, Mexico, under the name *Dendryphantes melanomerus* Chamberlin.

Sassacus aztecus new species
Figs. 36–41, 57

Material examined.—Holotype male, MEXICO: *Nayarit*: San Juan Peyotan, ca. 22°20′N, 104°30'W, 1–3 August 1955, B. Malkin (AMNH). Allotype female, collected with holotype (AMNH). Paratypes: 1 male, 1 female, collected with holotype (AMNH).

Material examined.—MEXICO: *Morelos:* Cocoyoc (AMNH); *Nayarit:* San Juan Peyotan, ca. 22°20'N, 104°30'W, 1–3 August 1955, B. Malkin (AMNH); *Sonora:* Minas Nuevas, ca. 27°00'N, 108°58'W, 8 August 1952, P. & C. Vaurie (AMNH).

Etymology.—Named for the Aztec tribe of central Mexico.

Diagnosis.—This is a relatively slender species that is not beetle-like. It differs from the apparently closely related *S. vitis* in not having a buttonhook shaped embolus (Fig. 38). Instead the embolus is more similar to those of *S. papenhoei* and *S. paiutus.* However its general appearance is like *S. vitis* (Fig. 36). Also like *S. vitis* (and unlike either *S. papenhoei* or *S. paiutus*) this species has a full count of 2-2-2 ventral tibial macrosetae and has an acute-angled tibial apophysis (Fig. 39). The female genitalic structure (Figs. 40, 41) is also close to that of *S. vitis.*

Description.—*Male holotype:* Total length 3.8. Carapace length 1.8, width 1.4. Leg formula 1423. Chelicerae with no apparent promarginal teeth and one slanted retromarginal tooth with two (holotype) or three cusps (allotype males from same site and from Morelos) (Fig. 37). First tibia with 2-2-2 ventral macrosetae. Color overall red brown. Carapace dark

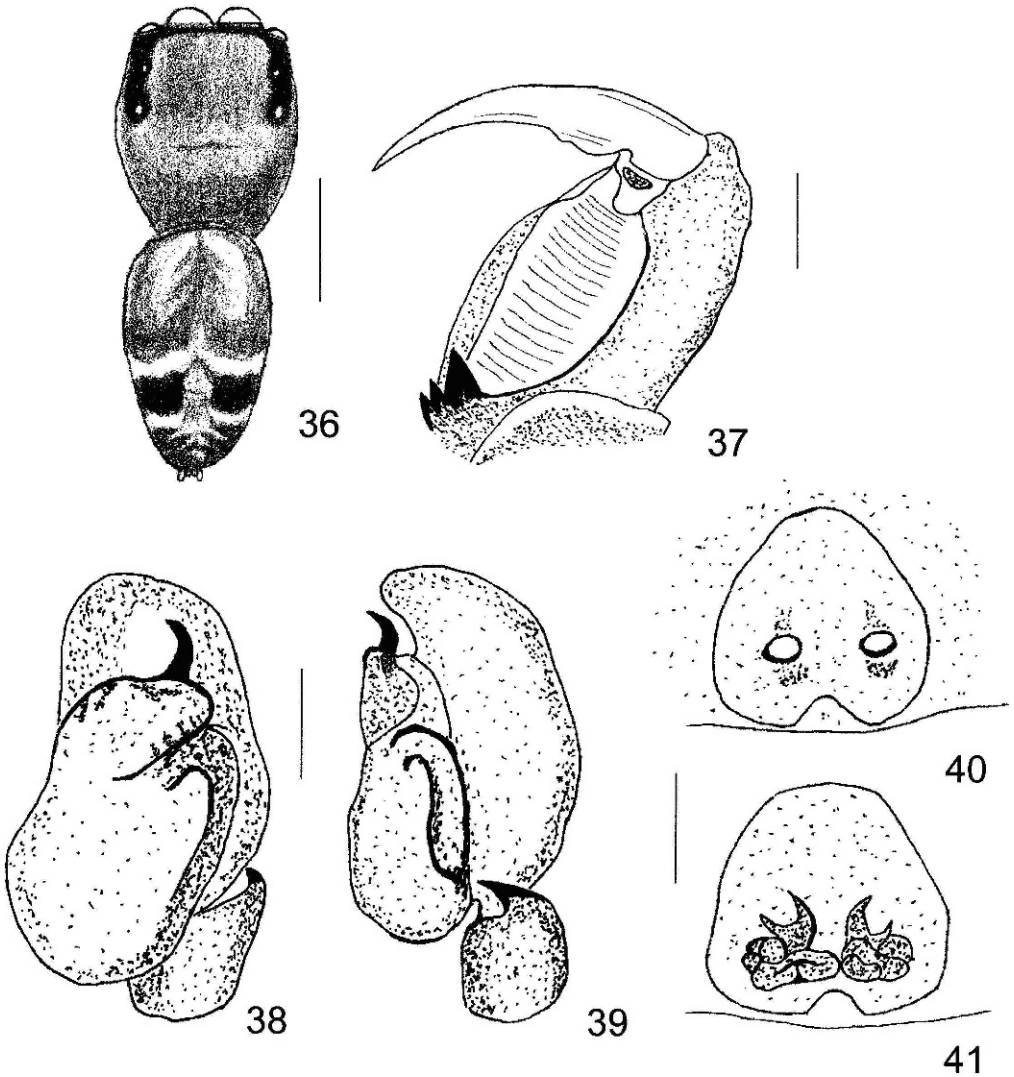


Figure 36–41.—*Sassacus aztecus*. 36, 37, 38, 39. Male from Nayarit: 36. Dorsal view; 37. Chelicera, ventral view; 38. Left palpus, ventral view; 39. Left palpus, retrolateral view. 40, 41. Female from Nayarit. 40. Epigynum, ventral view; 41. Vulva, dorsal view. Scale line 1 mm (Fig. 36), 0.1 mm (Figs. 37–41).

red brown with metallic scales, which were probably golden in life. Clypeus dark with metallic scales. Chelicerae dark red-brown. Legs red-brown with lighter ventral distal patellae and whole tarsi. Palpi reddish-brown. Abdomen dorsum red-brown with numerous metallic scales and with rim of white scales also extended as two white slashes posterior to the middle. A third slash is visible as a slight white projection on the lateral rim about one third of the way down the abdomen. Venter and sternum dark red-brown, as are endites and labium. Paratype male from same location with total length 3.6. Make dark red-brown, as are endites and labium. Paratype male from same location total length 3.6. Carapace length 1.7, width 1.3.

Female allotype: Leg formula 4123. Description as in male. Total length 5.4. Carapace length 2.1, width 1.5. Paratype female from same location: total length 4.5. Carapace length 1.6, width 1.4. One female from Sonora with complete inverted lily-like mark in center of dorsum as in *S. lirios.* In the other two females the lily-like mark is partly obscured, but traceable. The three females from Minas Nuevas (Alamos), Sonora have size ranges of 5.4–5.9 in total length, 2.0–2.1 in carapace length, and 1.5–1.7 in carapace width.

Distribution.—This species occurs in Southern Sonora to Nayarit in Mexico near border with Durango, Zacatecas and Jalisco and is probably found in all five states, south to Morelos.

Natural history.—The natural history of *S. aztecus* is unknown. The male and female type series and females from Sonora were collected in August, while a male and female from Morelos were collected in late July.

Remarks.—Very close in appearance to *Sassacus vitis*, but with very different embolus in the males (Fig. 38). Chelicerae (Fig. 37) very similar to that of *S. vitis*, although not as elongated. Also some individual females from Sonora with similar markings to *S. lirios*. The somewhat intermediate male palpal structure of this species between *S. papenhoei* and *S.*

vitis is further evidence of the closer relationship between those two species than might be supposed from the structure of the emboli and general appearances of each.

***Sassacus barbipes* species-group**

Sassacus barbipes Peckham & Peckham 1888
Figs. 42–48, 59

Eris barbipes Peckham & Peckham 1888:55, plate 4, fig. 38; F.O.P.-Cambridge 1901:300, plate 29, fig. 11

Ashtabula nigricans F.O.P.-Cambridge 1901:257, plate 23, fig. 2.

Sassacus barbipes (Peckham & Peckham): Peckham & Peckham 1909:592, plate 50, fig. 6.

Material examined.—Lectotype female, MEXICO (MCZ). Paralectotype: 1 female, collected with lectotype (MCZ).

Other material: MEXICO: *Colima:* Colima, 19°13′N, 103°42′W (AMNH); *Guanajuato:* 8 km NW Yuriria, nr. 20°12′N, 101°06′W (AMNH); *Guerrero:* Iguala (no exact Lat/Long found) (AMNH); Taxco Viejo, 18°30′N, 99°34′W (AMNH); *Jalisco:* Guadalajara, 20°40′N, 103°20′W (MCZ); West side of Lake Sayula, 20°02′N 103°32′W (AMNH); 3.2 km, 16 km, and 32.2 km N. La Quemada (coordinates not determined) (AMNH); La Venta, 20°44′N, 103°33′W (AMNH); NW Magdalena, 20.59°N, 104.02°W (AMNH); Tlaquepaque, 20°39′N, 103°19′W (AMNH); *Mexico:* Malinalco, 18°57′N, 99°30′W (AMNH); *Morelos:* Cuernavaca, 18.55°N, 99.15°W (AMNH); Oaxtepec, 18°54′N, 98°58′W (AMNH); *Nayarit:* Arroyo Canavera (coordinates not determined)(AMNH); Tepic, 21°31′N, 104°53′W (AMNH); *Nuevo Leon:* Chipinque Mesa just S. Monterrey, 25.6°N, 100.4°W (MCZ); Santa Rosa Canyon, near 24.8°N, 99.8°W (MCZ); *Oaxaca:* 2 km S. of El Tule, ca. 17°02″N, 96°40′W (MCZ); Monte Alban ruins, ca. 17°02′N, 96°47′W (MCZ); Tlacolula 16.57°N, 96.27°W (AMNH); *Sonora:* 16 km W. Alamos, nr. 27°00′N, 108°58′W (AMNH).

Diagnosis.—This species differs from all other known North American *Sassacus* in having the front tibiae-patellae flattened and with a heavy brush of spatulate hairs in both sexes (Fig. 43). Although the palpi (Figs. 45, 46) are somewhat similar to those of *Sassacus aztecus,* especially in regard to the tibial apophysis, and the female spermathecae (Fig. 48) are also similar to this and other *Sassacus*, this larger species has been in dispute as a true *Sassacus*.

Description.—*Female lectotype from Mexico:* Leg formula 4123. Chelicerae with one or two promarginal teeth and one large retromarginal tooth (Fig. 44). First tibia with 2-2-2 ventral macrosetae. Color overall red to yellow-brown (reported as black by Peckham & Peckham 1888, 1909). Carapace dark red brown with scattered metallic scales (probably more widespread as in "syntype" (now paralectotype) from same locality (Fig. 42). Scales appear to be metallic pink under alcohol, although Peckham & Peckham (1888, 1909) reported the scales to be green. Clypeus, palpi, and chelicerae reddish brown. Sternum, endites and labium orange brown; latter two with lighter anterior 1/3. Legs yellow brown with front legs having darker brown on femora, patellae and tibiae. Tibia of front legs flattened with ventral fringe of yellowish spatulate hairs. Abdomen yellowish with scattered metallic scales (more complete in paralectotype) and with whitish basal band separating lighter dorsal from darker ventral surface (Fig. 42). Paralectotype very similar, but legs mostly missing. Lectotype with total length 7.1, carapace length 2.6, carapace width 1.9. Female from west side of Lake Sayula, Jalisco, Mexico, 3 August 1956, collected by W. Gertsch and V. Roth (AMNH) quite similar to lectotype. Total length 6.0, carapace length 2.2, carapace width 1.7. Peckham & Peckham (1909) give a total length range of 6.8–8.5 for females they measured.

Male from Jalisco, Mexico: Also quite similar to lectotype, but with smaller abdomen and with longer front legs (leg formula 1423). Total length 4.6, carapace length 2.2, carapace width 1.7. This fits well with the range of 4.5–5.5 published by Peckham & Peckham (1909).

Distribution.—This species occurs from southern Sonora to central America. F.O. Pickard-Cambridge (1901) reported it from Guatemala.

Natural history.—Males of *S. barbipes* have been collected in June and August, and females have been found from June to August.

Remarks.—Although reported from California by Peckham & Peckham (1909), I have yet to see a specimen from the USA. However, there is an apparently undescribed *Tutelina* from California (CAS) that has extensive fringes on the patella-tibia, which may have been misidentified as this species.

The type vial in MCZ contained two females from the same locality. As it is uncertain just which specimen the Peckhams intended to be the holotype, I designate one female as the lectotype.

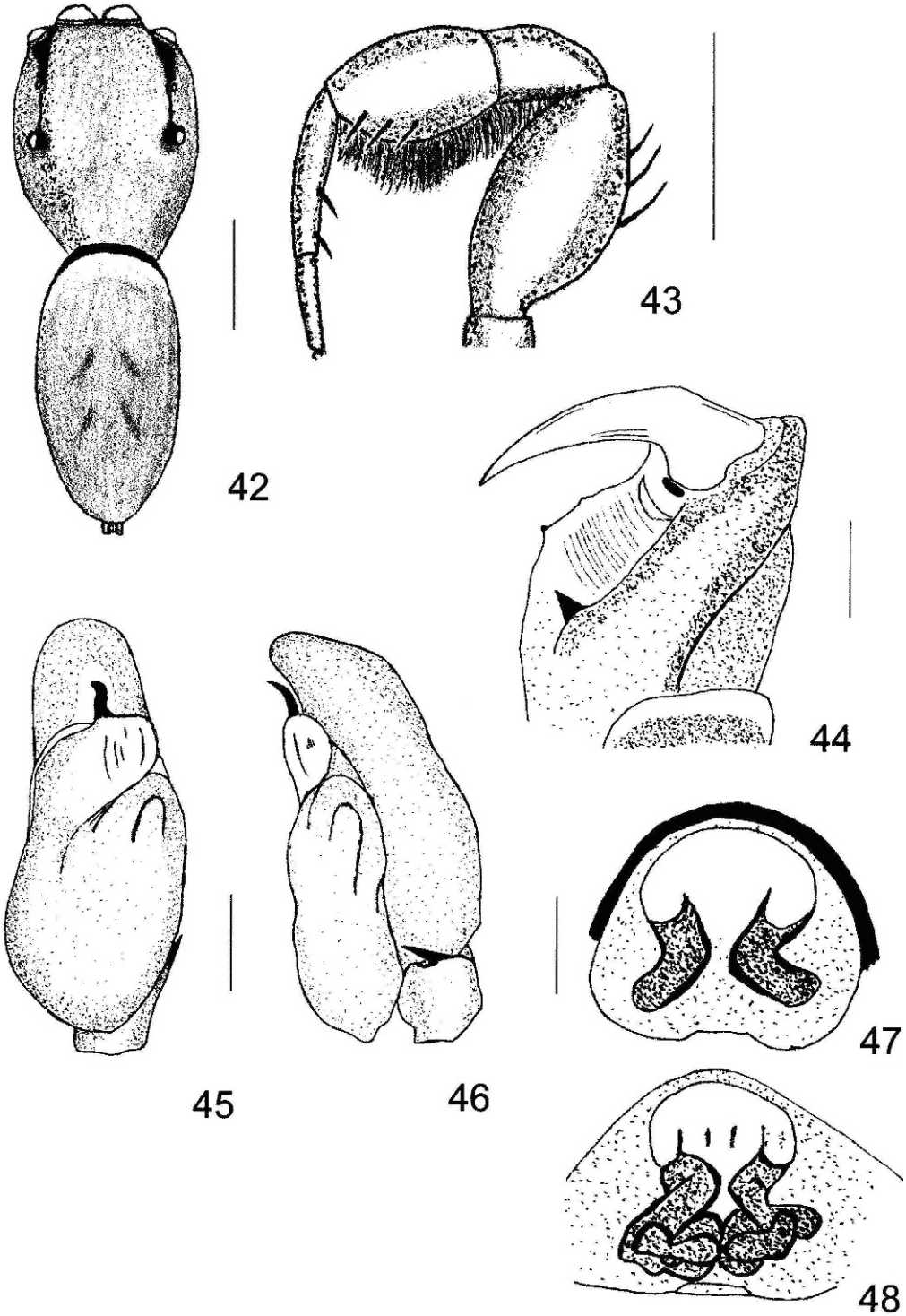
***Sassacus arcuatus* species-group**

Sassacus lirios new species
Figs. 49–54, 57

Material examined.—Holotype male, MEXICO: *Quintano Roo:* Kohunlich Ruins, 9 km S. of Francisco Villa, ca. 18°26′N, 88°48′W, Cohune palm forest and clearings, 14–17 July 1983, W. Maddison, R.S. Anderson (83–109) (MCZ). Allotype female, collected with holotype (MCZ). Paratypes: 2 males, collected with holotype (MCZ).

Other material: MEXICO: *Hidalgo:* 1 ♂, Xilitla, 21°05′N, 98°49′W, 2000 feet, 24 July 1954, R. Dreisbach (MCZ); 1 ♀, Xilitla, 21°05′N, 98°49′W, 23 July 1954, R. Dreisbach (MCZ); 1 ♀, Xilitla, Cueva de Salitre, ca. 21°23′N, 98°59′W, ca. 2000 feet, 13 June 1983, W. Maddison (MCZ); *San Luis Potosi:* 1 ♀, near Taman, ca. 16 km SW of Tamazunchale on Highway 85, ca. 1000 feet, ca. 21°11′N, 98°53′W, 11 June 1983. W. Maddison & R.S. Anderson (MCZ); *Veracruz:* 1 ♂, no further data, N. Banks collection (with *Phidippus* labeled as *Dendryphantes dubitabilis* Peckham & Peckham) (MCZ); 3 ♂, no further data, G. & E. Peckham collection (identified as 282 *Akela* new.) (MCZ); 1 ♂, Estacion de Biologia Tropical Los Tuxtlas (UNAM), nr. La Palma, N. of Catemaco, ca. 18°36 N, 95°07′W, 29 June–1 July 1983, W. Maddison & R.S. Anderson (MCZ); 1 ♂, Tlapacoyan, 18°28′N, 95°24′W, 300 m, 7–8 July 1946, H. Wagner (AMNH); COSTA RICA: *Puntarenas:* 2 ♀, and ♂ palp, 6 km S. of San Vito, 08°42′N, 83°00′W, 13–18 March 1967, OTS Zoology course (MCZ); 3 ♂, 1 ♀, Turrialba, 9°54′N, 83°41′W, 25 July–15 August 1965, A.M. Chickering (MCZ).

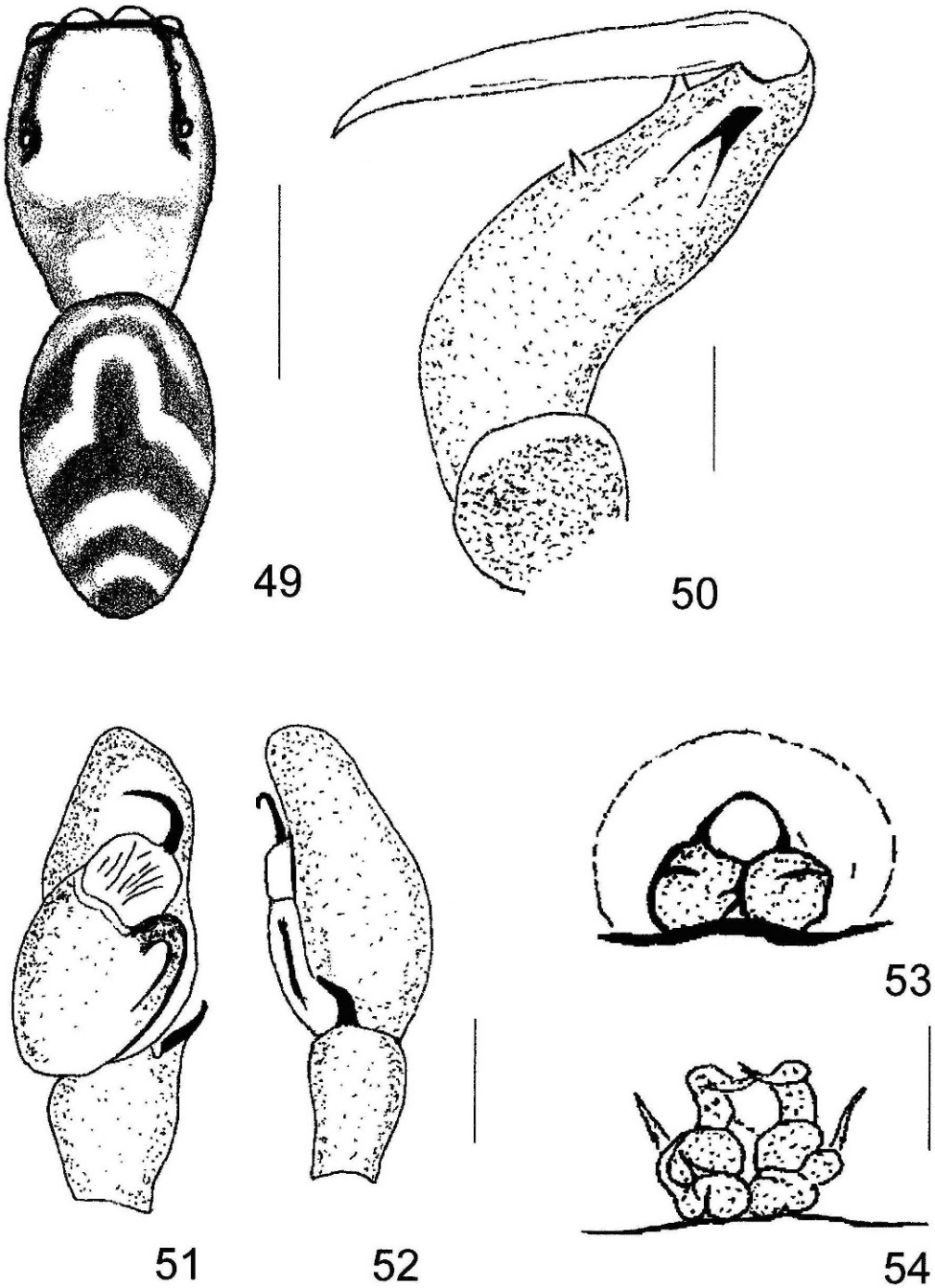
Etymology.—The specific epithet is Spanish for lilies or irises, the specific name reflects the stylized pattern on the



Figures 42–48.—*Sassacus barbipes.* 42. Male from Nayarit, dorsal view; 43. Female from Nayarit, leg I prolateral view, 44, 45, 46. Male from Nayarit: 44. Chelicera, ventral view; 45. Left palpus, ventral view; 46. Left palpus, retrolateral view. 47, 48. Female from Nayarit: 47. Epigynum, ventral view; 48. Vulva dorsal view. Scale line 1 mm (Figs. 42–43), 0.1 mm (Figs. 44–48).

abdomen and also is an allusion to a science fiction story set in Quintana Roo. To be treated as a noun in apposition.

Diagnosis.—This species differs from all other known North American *Sassacus* in having the embolus very long and curved (Fig. 51), in the structure of the male chelicerae (Fig. 50) and in the structure of the female epigynum (Fig. 53). It also differs from all other *Sassacus* except for many *S. vitis* and some females of *S. aztecus* from southern Sonora in having a contrasting pattern on the abdomen in most specimens (Fig. 49). This pattern includes an anterior band in the rough shape of a stylized lily (sometimes incomplete, but angled), similar to the Brazilian species



Figures 49–54.—*Sassacus lirios*. 49. Male from San Luis Potosi, dorsal view; 50, 51, 52. Male from Quintana Roo: 50. Chelicera, ventral view; 51. Left palpus ventral view; 52. Left palpus, retrolateral view. 53, 54. Female from San Luis Potosi: 53. Epigynum, ventral view; Vulva, dorsal view. Scale line 1 mm (Fig. 49), 0.2 mm (Fig. 50), 0.1 mm (Figs. 51–54).

Sassacus helenicus (Mello-Leitão 1943). It also resembles *S. helenicus* in having a similar embolus (Fig. 51) and cheliceral structure (Fig. 50), and is obviously closely related to this species. However, based on illustrations from several noted sources published on the Internet by Prószyński (2004), the proximal promarginal tooth of the chelicerae is more basal in *S. helenicus* than in *S. lirios* and the epigynal structure is quite different (Figs. 53, 54). The abdominal pattern of the closely related *Sassacus flavicinctus* Crane 1949a from Venezuela includes an incomplete and straight anterior band. *Sassacus lirios* has a distinctive embolus showing close affinities to *S. flavicinctus*, but differing from this species in that the fleshy part of the bulb at the base of the embolus is nearly as high as wide, the base of the embolus is narrower, and the tibial

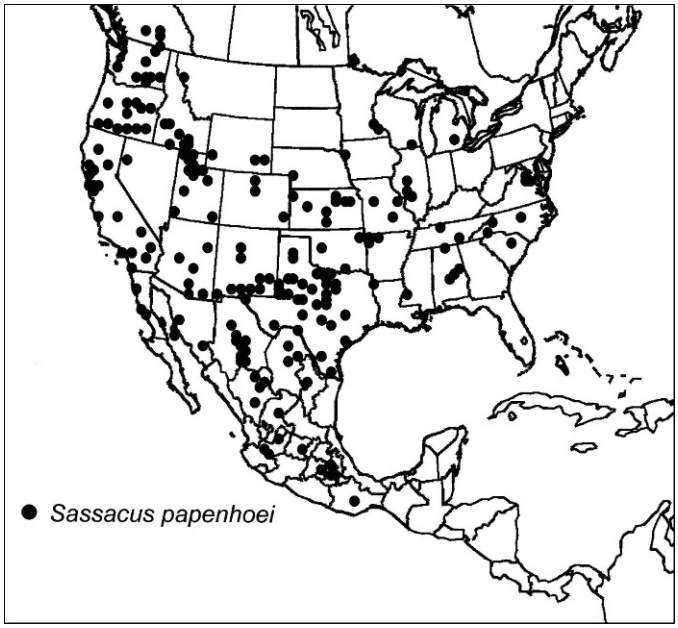


Figure 55.—Distribution of *Sassacus papenhoeii* in North America.

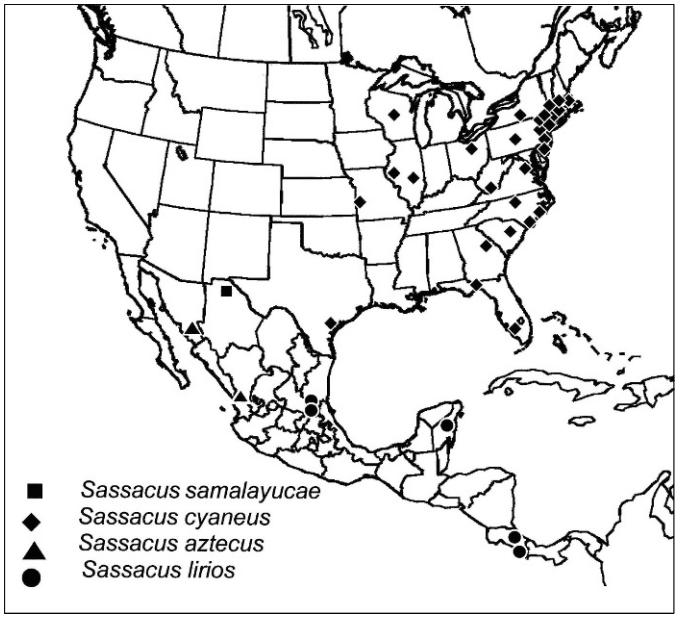


Figure 57.—Distribution of *Sassacus samalayucae*, *S. cyaneus S. aztecus* and *S. lirios* in North and Central America.

apophysis is narrower and more curved. The epigynum of *S. lirios* shows some similarities to that of S. *flavicinctus*, but differs in the shape of the spermathecae.

Description.—*Male holotype:* Leg formula 1423. Chelicerae with two promarginal and one slanted retromarginal tooth (Fig. 50). First tibia usually with 2-2-1 ventral macrosetae. Color overall red to yellow-brown. Carapace dark red brown with metallic scales in eye region and with white scales forming sinuous bands (looking somewhat like the front coil and forward facing head of a snake with mouth engulfing the spider's posterior lateral eyes) beginning at anterior lateral eyes and extending to posterior edge of carapace on each side. Clypeus covered with white hairs. Chelicerae yellow brown. Legs yellow brown with lighter yellowish patellae and tarsi. Abdomen dorsum with light yellowish-cream inverted stylized lily pattern, followed with two light bands anterior to the spinnerets. Venter and sternum yellow-brown. Other males from same locality darker brown, with yellowish patellae and tarsi. Ten males from Quintana Roo, Vera Cruz and San Luis Potosi, Mexico, and Turrialba, Costa Rica, range from 2.7–3.8 (most about 3.1) in total length. Carapace length 1.3–2.0 and width 1.05–1.5.

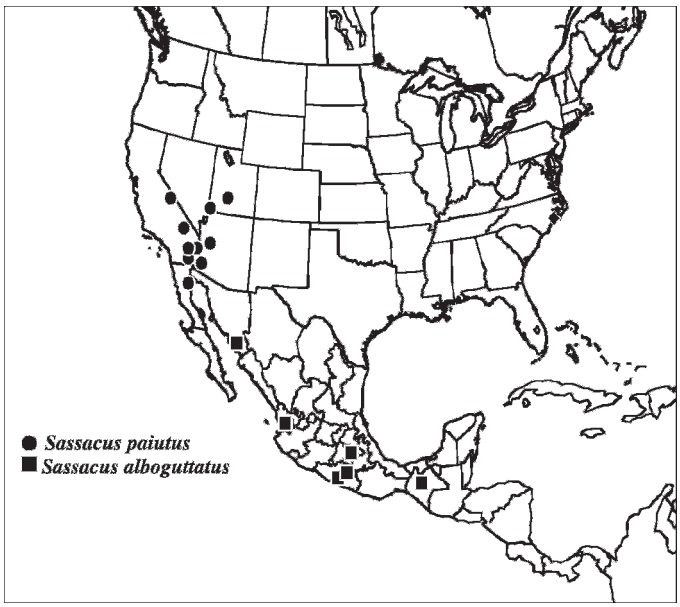


Figure 56.—Distribution of *Sassacus paiutus* and *S. alboguttatus* in North America.

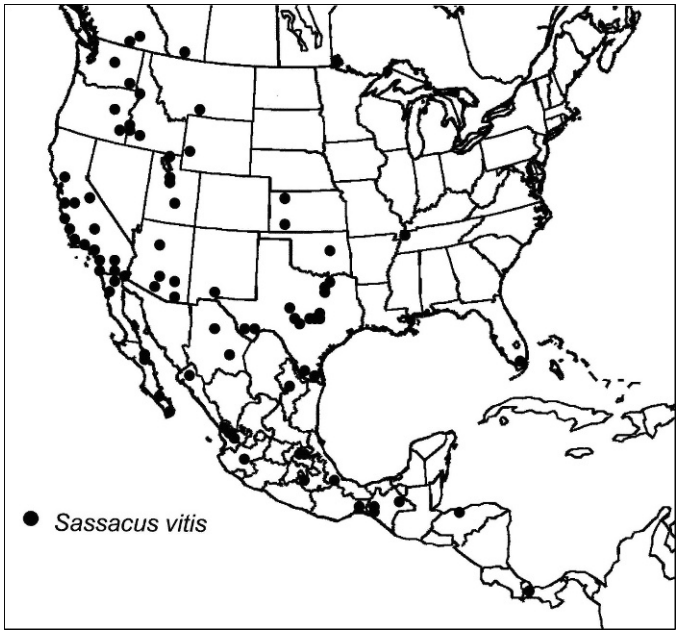


Figure 58.—Distribution of *Sassacus vitis* in North and Central America.

Figure 59.—Distribution of *Sassacus barbipes* in North America.

Female allotype: Leg formula, cheliceral teeth and ventral tibial macrosetae as in male, except cheliceral teeth much smaller and retromarginal tooth not slanted, but broad based and roughly triangular. Color pattern similar to male, but only femurs of legs dark, and dorsal carapace is some covered with light scales. Six females from Quintana Roo, San Luis Potosi and Costa Rica range from 3.0–3.7 mm in total length. Carapace length 1.4–1.6 mm, width 1.1–1.2 mm.

Distribution.—This species occurs in San Luis Potosi, Mexico, south to Quintana Roo and Costa Rica.

Natural history.—Males of this species are primarily known from July, but Costa Rican specimens may have been also collected in March and August. Females are known from March (Costa Rica) and June–July to possibly August.

Remarks.—This species appears to be a member of the mainly South American *arcuatus* species group. Whether these are actually *Sassacus* is open to debate. Their morphological structure, as exhibited in this species, is quite different, even from the most extreme members of the genus. Unfortunately the generic name *Ramboia* Mello-Leitão 1943, which might be used for this species group, is based on a species that appears to not be in the *arcuatus* group at all (Scioscia, personal correspondence). It remains for some other researcher to clear up this issue. It is my opinion that this "species group" will probably be placed into another genus, but at present it seems best to leave this species in *Sassacus* while noting the problem.

The female epigynum (Figs. 53, 54) does not match the figure provided by Peckham & Peckham (1896) for *Dendryphantes dubitabilis* (= *Metaphidippus dubitabilis*) and the dorsal pattern also does not match. It is thus thought that the identification label for Banks' specimen from Veracruz (see Material Examined) was the result of a misidentification. It does appear to be closely related to *Sassacus helenicus* (Mello-Leitão 1943), as noted in the diagnosis.

Another potential species of this species group, a female from Chiapas: Las Ruinas de Palenque, 17.31°N, 91.58°W, July 1948, C. & M. Goodnight (AMNH) was examined. The epigynum resembles that of *Sassacus aurantiacus* Simon 1901. Since placement of this specimen is uncertain (the pattern of *S. aurantiacus* is obscured in the type as noted by Galiano (1963) and I have not examined it) and only one specimen was found, it will be left for the future reviser of the whole *arcuatus* group

APPARENT CHRYSOMELID BEETLE MIMICRY IN THE SALTICIDAE

The well-known "ant mimicry" in various salticid, gnaphosid and corinnid genera is still not totally explained (Foelix 1996), although there is some solid evidence for Batesian mimicry in *Synageles* Simon 1876 (Engelhardt 1971; Cutler 1991) and *Myrmarachne* MacLeay 1839 (Nelson 1998). Indeed, most of the known ant mimics could not be aggressive mimics as they do not appear to feed on ants, although they may live with them, and Müllerian mimicry, although possible [see Nelson (1998), for a discussion of a distasteful non-mimic] so far seems unlikely. In addition to these, at least two genera of spiders (the salticids in the genus *Sarinda* Peckham & Peckham 1892 and possibly some *Castianeira* Keyserling 1879 in the family Corinnidae) may be generalist mimics of ponerine ants, while *Peckhamia* appears to mimic ants of the genus *Camponotus* or *Crematogaster,* and most *Synemosyna* Hentz 1846 seems to be obvious mimics of ants in the genus *Pseudomyrmex* [although in the north they resemble *Crematogaster* (B. Cutler, personal observation)]. Some other cases of apparent mimicry exist, including many species of *Phidippus* C.L. Koch 1846 (Edwards 2004) that apparently mimic velvet ants in the genus *Dasymutilla*, for example, *Phidippus apacheanus* Chamberlin & Gertsch 1929 (Edwards 1984), which itself has a painful bite (personal observation). This may, thus, be a case of Müllerian mimicry, as velvet ants have a painful sting.

With details lacking on documented ant and velvet ant mimicry, it is not strange that apparent beetle mimics in the genera *Sassacus*, *Coccorchestes* Thorell 1881, and possibly *Cylistella* Simon 1901, have been little studied. Are these really mimics of chrysomelid beetles or is the resemblance only incidental? The arguments for chrysomelid beetle mimicry are as follows:

1. Members of the three genera, *Sassacus*, *Cylistella* and *Coccorchestes* are so beetle-like that they can occasionally fool even a trained biologist. *Coccorchestes* from the Old World tropics is perhaps the most extreme of these and as far as is known all members of the genus are very closely beetle-like. After this genus come members of *Agassa* (*Sassacus cyaneus* and *S. albogut-tatus*). *Sassacus papenhoei* and closely related species (*S. paiutus* and *S. samalayucae*) are less beetle-like, but resemble a small flea beetle from a distance. *Cylistella* is much smaller and may be a beetle-mimic or may mimic a mite, or the resemblance may actually reflect the convergent development of an armored body to reduce water loss in a tiny animal (< 2 mm).
2. The members of these genera are generally metallic or shiny black, resembling the colors of various species of chrysomelid beetles in the Galerucinae and Eumolpinae.

3. At least one species, *Sassacus cyaneus*, has been collected on multiple occasions among groups of similarly colored chrysomelid beetles of similar size (G.B. Edwards and D.B. Richman, pers. observ.). Based on these observations, it would seem that chrysomelid beetle mimicry is a real phenomenon, although to make this concept more than a circumstantial hypothesis would require some exact experimentation.

If these are beetle mimics, what function does the resemblance serve for the mimic? It might be possible that this is indeed another example of Batesian mimicry because:

1. Some chrysomelid beetles are known to be distasteful and many produce toxins (Pasteels & Rowell-Rahier 1989; Pasteels et al. 1990; Pasteels 1993). *Galeruca tanaceti* (Chrysomelidae: Galerucinae) is known to produce anthraquinones in its hemolymph (Hilker & Schulz 1991). Furthermore, many chysomelid beetles, whether placed in the Alticinae or Galerucinae in the literature, are known to possess defense glands in the adult stage. Although some seem to lack them (Deroe & Pasteels 1982) and many leaf beetles, possibly including flea beetles and other leaf beetles that resemble flea beetles, may gain further defensive chemicals from the plants on which they feed (Blum 1981). The only chrysomelid beetle collected with *Sassacus* (*S. cyaneus*), to my knowledge, was a species of *Graphops* (Chrysomelidae: Eumolpinae) (current study - identified by Wills Flowers), not a galerucine. The defensive chemicals associated with this genus, if any, are unknown.
2. The apparent chrysomelid beetle-mimic jumping spiders are generally much less abundant than their beetle models, which would be a necessary prerequisite to effective mimicry, as otherwise the mimics would be more likely to be encountered and perhaps eaten.

From this it might also be suggested that metallic colors in small jumping spiders (that are not related to the male ornamentation) might be a general mimicry of metallic chrysomelids. This would make *Sassacus vitis, Tutelina* Simon 1901 and some *Salticus* Latreille 1804 possible general chrysomelid beetle mimics based on color. However, at least some *Tutelina* species, especially males, look and act much like ants in the field (personal observation of male *T. elegans* (Hentz 1846) on milkweed plants in Cook County, Illinois in 1998) and at least some (especially green) metallic jumping spiders (for example females of *T. elegans* (also based on observations in Cook County, Illinois, 1998) may really be "mimicking" (technically crypsis, not mimicry) water droplets (originally proposed by G.B. Edwards, pers. commun.; Edwards 2004). This might make them less visible in tropical or temperate forests or even in riparian habitats in the Southwestern United States. Thus metallic coloration alone is probably not a good criterion for general chrysomelid beetle mimicry.

What organisms are the likely targets of true beetle mimicry? Birds, other salticid spiders and possibly lizards may be the most important predators that could be fooled. This seems to be true for the ant mimics at least. Engelhardt (1971) showed that *Synageles* did fool birds into apparently perceiving them as ants. Cutler (1991) demonstrated the same for *Synageles* with immature *Phidippus* (jumping spiders) as predators. However, there are only sketchy data for beetle mimics. Preliminary experiments with the araneophage jumping spider *Portia fimbriata* (Doleschell 1859) indicated that this spider was not totally fooled by *Sassacus papenhoei*, which it usually attacked, although the attack was slower than it would have been for a normal-appearing salticid (R.R. Jackson, unpubl. data). Individuals of the jumping spider genus *Portia* Karsch 1878 may or may not encounter bad-tasting flea beetles in its normal habitat, however. Obviously, much needs to be done before we can be sure about the function of beetle mimicry, assuming it is a real phenomenon, but preliminary incidental observations seem to indicate that it may be another example of Batesian mimicry.

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