

THE GENUS *TACZANOWSKIA* OF THE ORB-WEAVER SPIDER FAMILY ARANEIDAE (ARANEAE)

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RESUMEN

Se conocen solamente cuatro especies de *Taczanowskia* de América tropical y sólo se ha encontrado un macho. Las extrañas uñas de las primeras patas, una larga y una corta, indican que estas arañas atrapan a las presas alanceándolas, en vez de enredarlas en una telaraña. Estas modificaciones relacionan el género *Taczanowskia* con el género australiano *Celaenia*.

Palabras clave: *Taczanowskia*, Araneidae, taxonomía.

ABSTRACT

Only four species of *Taczanowskia* are known and only one male has been found. All are tropical American. The unusual leg claws, a long claw and a short one on the first two legs, suggest that these spiders catch their prey by spearing them rather than snaring them in a web. These modifications relate the genus to the Australian *Celaenia*.

Key words: *Taczanowskia*, Araneidae, taxonomy.

INTRODUCTION

This paper is dedicated to Anita Hoffmann.

In the course of revising South American Araneidae (listed in Levi, 1993 and Levi, in press) I found that in most genera about 30% of the species are previously

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known, 70% are new. All four *Taczanowskia* species were named in the last century and only a few specimens have been found since.

Gillespie (1991) described the impaling of insect prey by *Doryonychus raptor* Simon, a tetragnathid orb weaver from Hawaii. Similar tarsal equipment, long and short claws, have arisen independently in several groups, including the primitive gradungulid *Progradungula* of Australia, and the araneid *Celaenia* of Australia, as well as the American araneid genus *Taczanowskia*.

Doryonychus hangs upside-down from silk threads, using the third and fourth legs, the first and second legs are free. Flies are captured with a rapid movement of the first legs. In the laboratory, the spider was observed to use the long claw to impale the insect and pull it toward the chelicerae. Once the prey is held by the mouth parts, the spider withdraws its claws. Insects are consumed without wrapping (Gillespie, 1991).

Of the four known species, only the *Taczanowskia sextuberculata* female has been observed in the field (Eberhard, 1981).

METHODS

The methodology for this revision is the same as in Levi (1993). The specimens examined came from the following collections: American Museum of Natural History, New York, USA (AMNH), Natural History Museum, London, England, (BMNH), Museo Argentino de Ciencias Naturales, Buenos Aires, Argentina (MACN), Museu de Ciências Naturais, Fundação Zoobotânica do Rio Grande do Sul, Porto Alegre, RS, Brazil (MCN), Museu de Ciências, Pontifícia Universidade Católica do Rio Grande do Sul, Porto Alegre, RS, Brazil (MCP), Museum of Comparative Zoology, Cambridge, Mass., USA (MCZ), Muséum National d'Histoire Naturelle, Paris, France (MNHN), Museu de Zoologia, Universidade de São Paulo, SP, Brazil (MZSP), and Polska Akademia Nauk, Warszawa, Poland (PAN).

Taczanowskia Keyserling

Taczanowskia Keyserling, 1880: 297. Type species *Taczanowskia striata* Keyserling, 1880, by monotypy. Neave, 1940: 386. The generic name is feminine (Bonnet, 1959: 4232).

Diagnosis. *Taczanowskia* species differ from all other araneids by having the carapace almost as wide as long, with the cephalic area narrower than half the carapace's widest diameter (Figs. 2, 8, 12, 16), and also by having the abdomen wider than long (Figs. 8, 12, 16, 18). Having the first two legs with a pair of claws, of which one is much longer than the others (Plate 1, Fig. 22), is unique among American araneid orb-weavers, but is shared with the Australian *Celaenia*. Another

character shared by *Taczanowskia* and *Celaenia* is that the first two femora are thick and armed with rows of teeth (Plate 1, Figs. 16, 21).

Taczanowskia (Figs. 1-22) differs from *Celaenia* (Figs. 24-32) by being small in size and having the epigyna and palpi lightly sclerotized (Figs. 6, 7, 19). The male differs in having a median apophysis with lateral teeth (Fig. 19).

The genus, especially the species *T. trilobata*, is similar to *Stephanopsis* (Thomisidae) and may be confused with *Stephanopsis* in collections. *Taczanowskia* has long claws, absent in *Stephanopsis*; also in frontal view the eye arrangement differs.

Description. Female: body yellowish white with black pigment. Sternum truncate to rounded between fourth legs (Fig. 4). First and second legs modified, having thick femora with teeth facing tibia, and thin distal articles (Figs. 16, 21). Femora long, as long as patella and tibia of same leg. Tarsi short, less than half length of metatarsi. Eyes subequal, with anterior median eyes slightly larger than others, the lateral eyes slightly smaller. Distance between anterior, median eyes equals that between medians and laterals. Distance between posterior median eyes one to 2.5 times their diameter, 1.5 to 3 from laterals. The eyes of *T. mirabilis*, the largest species, are farthest apart; those of *T. sextuberculata* closest. Eye quadrangle, measured outside the edge of the eyes, slightly wider than long, slightly wider in front than behind. Height of clypeus 0.3 to 1.0 diameter of anterior median eye; *T. trilobata*, 2.0 diameters. Abdomen wider than long, pointed on each side and behind, with anterior margin concave (Figs. 8, 12, 16, 18, 20).

Total length of male (Fig. 17) half that of female (Fig. 16), colorless in alcohol (Fig. 18) except for pigment around median eyes and pigment spot on fourth tibia. Posterior median eyes 0.7 diameter of anterior eyes, laterals 0.5 diameter. Distance between anterior median eyes 1.6 diameters of eye, 0.5 to lateral eyes. Posterior median eyes 1.5 diameters apart, their diameter from laterals. Shape of eye quadrangle as in female. Height of clypeus equals 0.7 diameter of anterior median eye. Endite without tooth, first coxa without hook. Palpal patella with one large seta (Fig. 19). Claws of unequal size, as in female. Abdomen wider than long, as in female, but without dorsal tubercles (Fig. 18). Femora shorter than patella and tibia.

Palpus with conductor, median apophysis, radix and terminal apophysis (Figs. 18) quite similar to those of the Australian *Celaenia excavata* (Figs. 29-32).

Note. Besides the long claws and armed femora, there is another unusual structure: feather-shaped setae. These flat setae, widest in the middle (Fig. 16), are found on the sides of the back of abdomen of *T. striata*. Similar setae have been found in the theridiid *Chryso pulcherrima* (Mello-Leitão) [= *Chryso (Meotipa) clementinae* (Petrunkevitch)] (Levi, 1962: fig. 71).

Relationship. The short scape with a distal pocket (Figs. 6, 10, 14), and the nonsclerotized area ventral to the median plate in posterior view of the epigynum (Figs. 7, 11, 15) is synapomorphous with *Celaenia* (Figs. 25, 26). The scape suggests that *Taczanowskia* might be close to *Araneus*, a suggestion reinforced by evidence from the male (Fig. 19), which has the conductor on the margin of the tegulum

(at 3 hr in Fig.19) as in *Araneus* species. The distal pocket of the epigynal scape correlates with the large hook on the median apophysis of the male palpus (Fig. 19). The hook is also present in the male of *Celaenia* (M in Fig. 29). While the *Araneus* group of genera has a large distal terminal apophysis and distal hematochocha, these are absent from the palpi of both *Celaenia* and *Taczanowskia*. The teeth on the side of the median apophysis and weak sclerotization are also found in *Kaira* species.

Distribution. All four species are tropical American (Map 1).

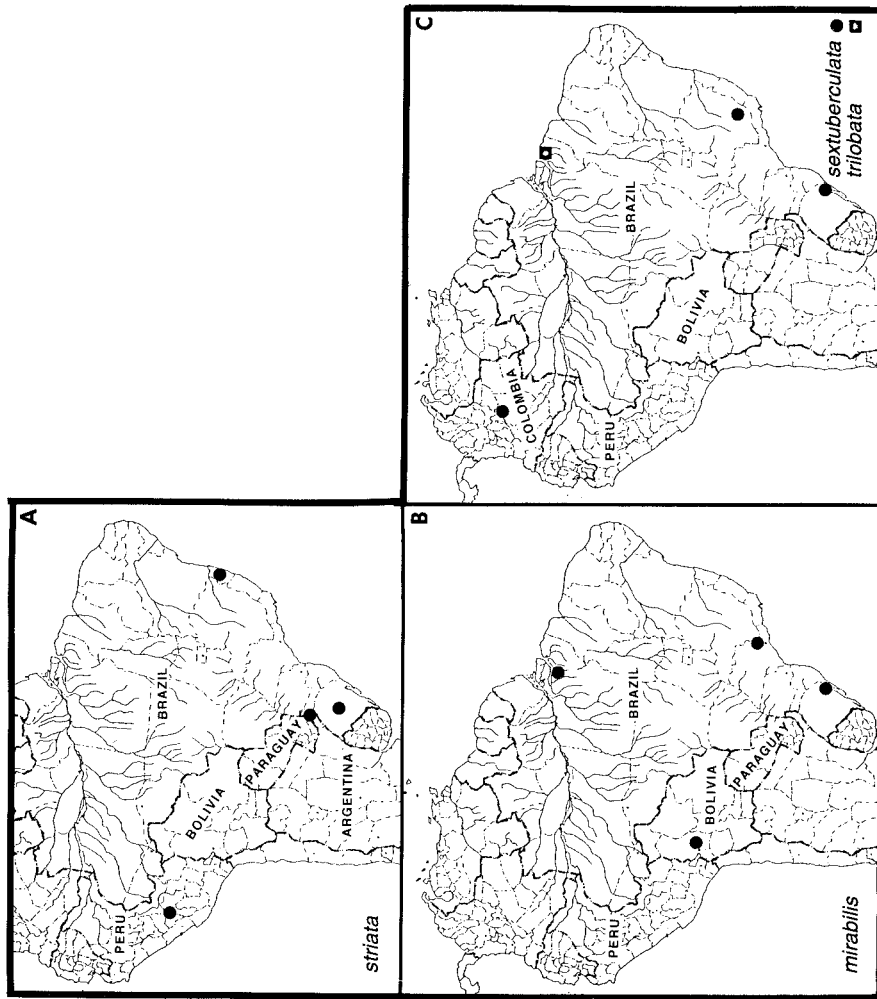
Natural history. Only Eberhard (1981) gives information on *Taczanowskia*. The voucher specimen for these observation was identified as *T. sextuberculata*. It was found in a small pasture in dry tropical forest in Depto. Meta, Colombia, 1 meter above ground, in leaves of a small guava tree (*Psidium* sp.). It had three stalked, spherical egg-sacs, with a stiff papery covering (Fig. 23). One egg-sac was opened. It contained young, but none of the young had swollen palpi, suggesting that the males are immature upon hatching then undergo several molts before maturing. (Young out of the egg sac of *Celaenia* also do not have swollen palps, Forster and Forster, 1973.) She had no web, but hung on a horizontal line head down, with legs one and two partly spread. She extended her front legs when mosquitoes flew near by or when the observer made humming sounds. A passing insect was seized with a sudden grab, embraced, then wrapped. The spider's prey were pyralid moths, which seemed to fly toward the spider, suggesting that *Taczanowskia*, like *Mastophora*, uses an attractant.

The female sat with the legs drawn in, on the underside of a leaf. Early in the evening the animal became active, hung from a horizontal line and caught pyralid moths apparently attracted by the spider. The spider seized insects with a sudden grab, embraced the prey and then wrapped it in silk (Eberhard, 1981).

Separating species. American females can be separated to species by the appearance and number of tubercles on the abdomen. The epigyna are lightly sclerotized (Figs. 6, 7, 10, 11) and seem quite variable. The male of only one species, *T. striata*, is known.

KEY TO FEMALES

1. Sides of abdomen with two lobes (Fig. 20) *trilobata*
 Abdomen without such lobes (Figs. 8, 12, 16)2
- 2(1) Dorsum of abdomen with three pairs of nipples (Fig.12)*sextuberculata*
 Abdomen with one pair of dorsal tubercles (Figs. 8, 16)3
- 3(2) Abdomen with colored patches, brushes of white setae and black feather-like
 setae on each side (Fig. 16); total length less than 5.5 mm*striata*
 Abdomen evenly colored (Fig. 8); total length usually more than 6.0 mm
 *mirabilis*



Map. 1. Distribution of the *Taczanowskia* species.

***Taczanowskia mirabilis* Simon**
(Figs. 1-8; map 1)

Taczanowskia mirabilis Simon, 1895: 897; 1897: 481. Female holotype from Cameta, Tocantins [Cametá, Rio Tocantins, Est. Pará, Brazil], in MNHN, no. 4966, examined. Roewer, 1942: 908. Bonnet, 1959: 4232.

Taczanowskia pulchra Soares, 1944: 154, fig. 1, ♀. Female holotype from Fazenda Santa Maria, Amparo, São Paulo, Est. São Paulo, Brazil, in MZSP, examined. Brignoli, 1983: 280. NEW SYNONYMY.

Note. The Soares specimen is yellowish white with black striations on the carapace and black speckles on the abdomen; it is only 5.2 mm in total length, much smaller than the other specimens.

Description. Female holotype. Carapace black posteriorly with yellow-white (Fig. 8). Chelicerae black, distal end whitish; labium, endites black. Anterior third of sternum black, posterior two-thirds yellow-white. Coxae yellow-white with distal ends dusky, proximal half of femora black, leg articles yellow-white with some black rings and some black on distal articles. Abdomen black with white on each lateral tip (Fig. 8), posterior and sides white, venter yellowish-white with some white pigment between epigynum and spinnerets. Total length 8.0 mm. Carapace 3.2 mm long, 3.3 wide in thoracic region, 1.4 wide in cephalic region. First femur 5.5 mm, patella and tibia 5.6, metatarsus 1.9, tarsus 0.8. Second patella and tibia 5.3 mm, third 2.2. Fourth femur 3.6 mm, patella and tibia 2.8, metatarsus 1.2, tarsus 0.6.

Variation. Total length of females 5.2 to 8.0 mm. The specimen from Viamão had a black sternum and spotted abdomen. The female from Sud Yungas had a median black band on the dorsum of the abdomen and a lateral black tip on each lobe. The width and shape of the sternum is variable. All illustrations were made from female holotype of *T. mirabilis*.

Diagnosis. This species differs from others by having only two dorsal, elongate tubercles, lacking the bundles of setae on the abdomen, and having the abdomen relatively wide, about 1.8 times its length (Fig. 8).

Specimens examined. BRAZIL RIO GRANDE DO SUL: Viamão, 23 Sept. 1994, 1♀ (A. A. Lise, MCP 5320). BOLIVIA LA PAZ: Sud Yungas, Lavi Grande, nr. Irupana, 16°30'S, 67°20'W, 19 Dec. 1991, 1♀ (H. Höfer, MCN); Yungas, Coroico to Coripata, 800-2200 m, 29 Nov. - 3 Dec. 1984, 1♀ (L. E. Peña, AMNH).

***Taczanowskia sextuberculata* Keyserling**
(Figs. 9-12, 21-23; map 1)

Taczanowskia sextuberculata Keyserling, 1892: 60, pl. 3, fig. 47, ♀. Female holotype from Taquara, Rio Grande do Sul, Brazil, lost (not in BMNH, MNHN, PAN, NMW). Roewer, 1942: 908. Bonnet, 1959: 4232.

Taczanowskia sp., Eberhard, 1981: 175-176.

Description. Female from Colombia. Carapace yellowish white with a median black patch. (Fig. 12). Chelicerae, labium, endites, sternum, legs yellowish white with a dusky ring near distal end of each femur. Abdomen yellowish white, with a median dusky patch, and a black spot on sides near spinnerets. Abdomen with long white hairs (Fig. 12). Total length 5.7 mm. Carapace 2.3 mm long, 2.1 wide in thoracic region, 0.8 wide in cephalic region. First femur 3.4 mm, patella and tibia 3.4, metatarsus 1.5, tarsus 0.6. Second patella and tibia 3.3, third 1.6. Fourth femur 2.3, patella and tibia 2.2, metatarsus 1.1, tarsus 0.4.

Variation. Total length of females 5.7 to 6.8 mm. The illustrations were made from the Colombian female.

Diagnosis. The three pairs of tubercles on the abdomen (Fig. 12) separate this from the other species.

Natural history. See above.

Specimens examined. COLOMBIA META: Hacienda Mozambique, 200 m, 12 km SW Puerto Lopez, 1978, 1♀ (W. Eberhard, MCZ). BRAZIL MINAS GERAIS: Viçosa, 1930, 1♀ (Hambleton, AMNH).

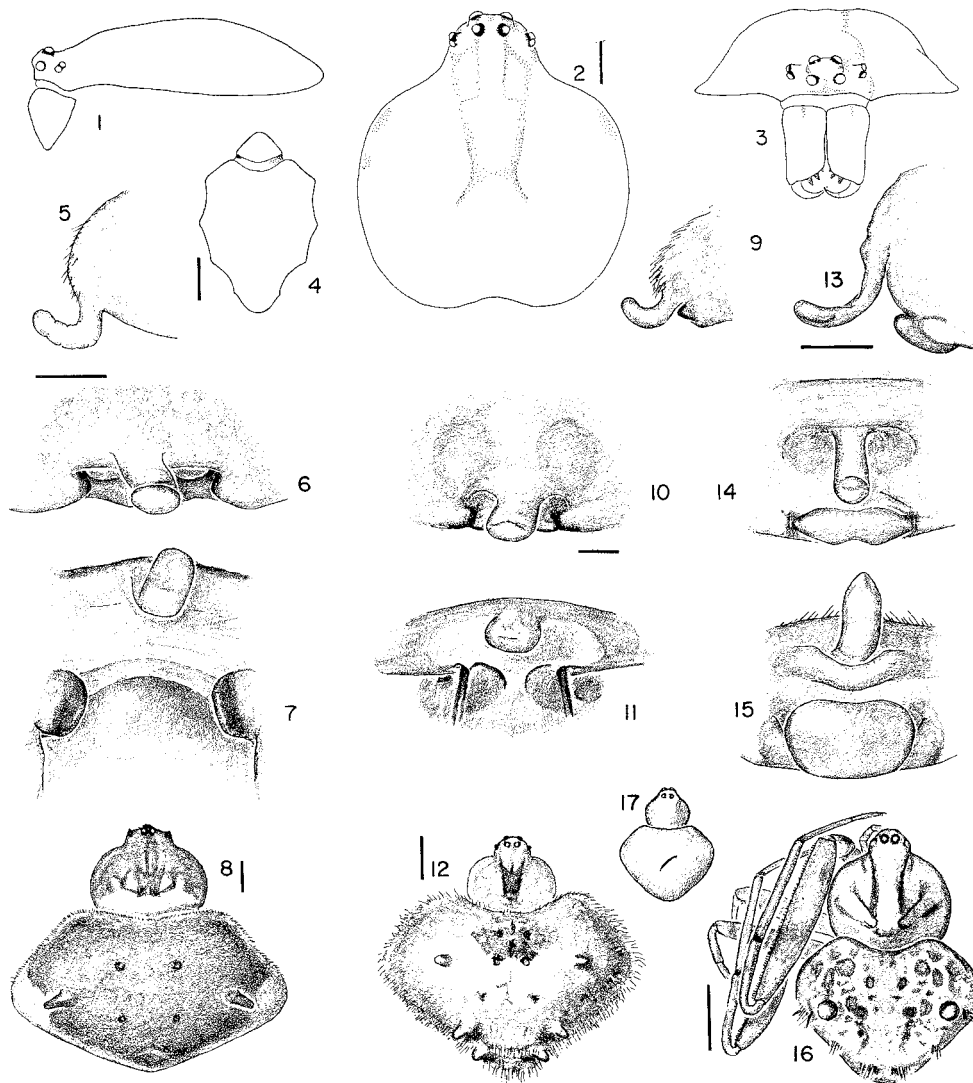
Taczanowskia striata Keyserling
(Figs. 13-19; map 1)

Taczanowskia striata Keyserling, 1880: 298, pl. 4, fig. 3, ♀. Female holotype from Amable María [Depto. Junín], Peru, PAN, lost. Not in BMNH, MNHN, NMW. Keyserling, 1892: 59, pl. 3, fig. 46, ♀. Roewer, 1942: 908. Bonnet, 1959: 4232.

Taczanowskia penicillata Simon, 1895: 897; Simon, 1897: 482. Female holotype from Mato Grosso [Brazil] in MNHN no. 10554, examined. Roewer, 1942: 908. Bonnet, 1959: 4232. NEW SYNONYMY.

Note. According to his description, Keyserling's specimen appears slightly larger (5.6 mm, carapace 2.2 long, 2.4 wide) than the specimens examined. Despite the lack of the type specimen, it is referred to this species because of the radiating lines on the carapace, illustrated and described by Keyserling, the pair of knobs and the shape of the abdomen, and the scattered dorsal markings. Also the proportions of the illustrated epigynum come closest to this species.

Description. Female holotype of *T. penicillata*. Carapace light orange with radiating black lines (Fig. 16), chelicerae, labium light orange. Endites with dusky patch. Sternum black. Legs yellow-white, coxae with dusky patches, femora proximally gray, distal articles with some black rings, dark areas less distinct on venter of leg articles. Abdomen light with black patches and spots (Fig. 16), venter with transverse black bar close to spinnerets. Carapace high in middle of thorax. Abdomen with two wide, short tubercles, paired tufts of setae, and several feather-shaped setae (Fig. 16). Total length 3.8 mm. Carapace 2.0 mm long, 1.9 wide in thoracic region, 1.2 wide in cephalic region. First femur 3.3 mm, patella and tibia



Figs. 1-17. 1-8, *Taczanowskia mirabilis* Simon, female. 1, carapace and chelicera. 2, carapace. 3, eye region and chelicerae. 4, sternum. 5-7, epigynum. 5, lateral. 6, ventral. 7, posterior. 8, dorsal. 9-12, *T. sextuberculata* Keyserling, female. 9-11, epigynum. 9, lateral. 10, ventral. 11, posterior. 12, dorsal. 13-17, *T. striata* Keyserling. 13-16, female. 13-15, epigynum. 13, lateral. 14, ventral. 15, posterior. 16, dorsal. 17, male, dorsal (same magnification as female). Scale bars, 1.0 mm; except Figs. 1-4, 0.5 mm; genitalia 0.1 mm.

3.2, metatarsus 2.2, tarsus 0.5. Second patella and tibia 3.1 mm, third 1.5. Fourth femur 2.2 mm, patella and tibia 2.1, metatarsus 0.9, tarsus 0.4.

Male. White, without pigment except around median eyes (Fig. 18), and a tiny black spot distally on underside of fourth tibiae. Total length 1.8 mm. Carapace 0.71 mm long, 0.62 wide in thoracic region, 0.45 wide in cephalic region. First femur 0.96 mm, patella and tibia 1.00, metatarsus 0.55, tarsus 0.31. Second patella and tibia 0.92 mm, third 0.61. Fourth femur 0.70 mm, patella and tibia 0.75, metatarsus 0.35, tarsus 0.23.

Note. The male was matched with the female because it was collected with an immature female of 2.5 mm total length, which had the pigment pattern, tubercles and feather-shaped setae of the female. The male also had one large feather-shaped seta on the abdomen (Fig. 18).

Variation. Total length of females 3.8 to 4.2 mm. The illustrations were made from the female holotype of *T. penicillata*.

Diagnosis. This species differs from *T. mirabilis* by the narrower abdomen (about 1.4 times its length), the smaller size and by the brushes of white hairs on the abdomen and feather-shaped black setae on the abdomen (Fig. 16).

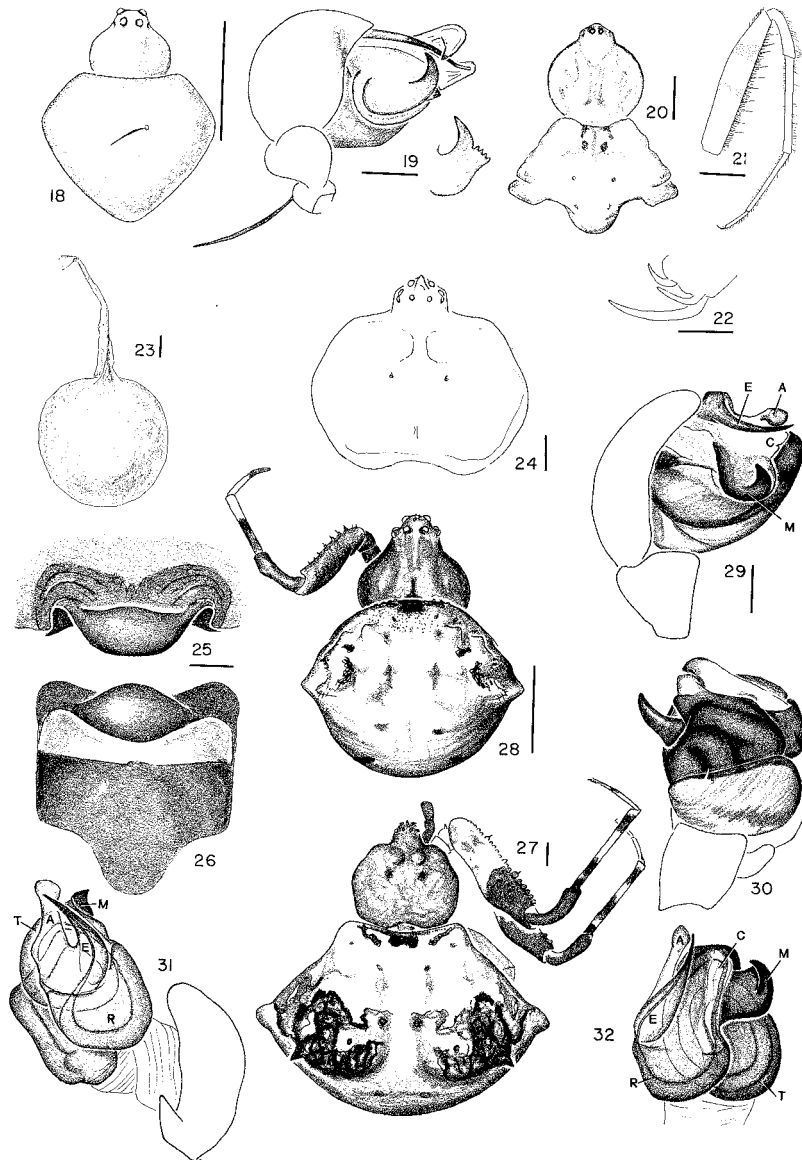
Specimens examined. BRAZIL BAHIA: Fazenda Jacarandá, Itamarajú, 9 Dec. 1977, 1♀ (J. S. Santos, MCN 10137). RIO GRANDE DO SUL: Arroio do Tigre, Itaúba, 19 Apr. 1978, imm. (H. Bischoff, MCN 8048). ARGENTINA MISIONES: Piñalito, Nov. 1954, 1♀ imm., 1♂ (R. D. Schiapelli, De Carlo, MACN).

Taczanowskia trilobata Simon

(Fig. 20; map 1)

Taczanowskia trilobata Simon, 1895: 896, 897; 1897: 482. Immature holotype from Le Para [Belém, Pará, Brazil], in the MNHN, examined. Roewer, 1942: 908. Bonnet, 1959: 4232.

Description. Immature, female holotype. Carapace yellow-white, sides of thoracic region white, with posterior median dusky marks (Fig. 20). Chelicerae, labium, endites yellow-white. Sternum black. Legs yellow-white with indistinct gray narrow rings and wide black ring on distal end of tibiae. Abdomen white, dusky anterior in median patch (Fig. 20), venter yellow-white with a transverse white bar and adjacent posterior black bar, between genital groove and spinnerets, and a black patch on genital area and on each side. Height of clypeus equals 2.0 diameters of anterior median eye. Chelicerae with three anterior teeth, none posterior. Abdomen with a pair of lateral lobes (Fig. 20). Total length 4.3 mm. Carapace 2.0 mm long, 2.0 wide in thoracic region, 0.7 wide in cephalic region. First femur 3.1 mm, patella and tibia 3.0, metatarsus 0.8, tarsus 0.6. Second patella and tibia 2.9 mm, third 1.8. Fourth femur 2.2 mm, patella and tibia 2.0, metatarsus 0.7, tarsus 0.4.



Figs. 18-32. 18-19, *Taczanowskia striata* Keyserling, male. 18, dorsal. 19, left palp, mesal and median apophysis, ventral. 20, *T. trilobata* Simon, immature. 21, 22, anterior view of left, first leg of *T. sextuberculata*. 21, leg. 22, claws. 23, egg sac of *T. sextuberculata*. 24-32, *Celaenia excavata* (L. Koch). 24-27, female. 24, carapace. 25, epigynum, ventral. 26, epigynum, posterior. 27, dorsal. 28-32, male. 28, dorsal. 29-32, left palp. 29, mesal. 30, ventral. 31, 32, expanded. Scale bars, 1.0 mm; genitalia 0.1 mm. Abbreviations, A, terminal apophysis; C, conductor; E, embolus; M, median apophysis; R, radix; T, tegulum.

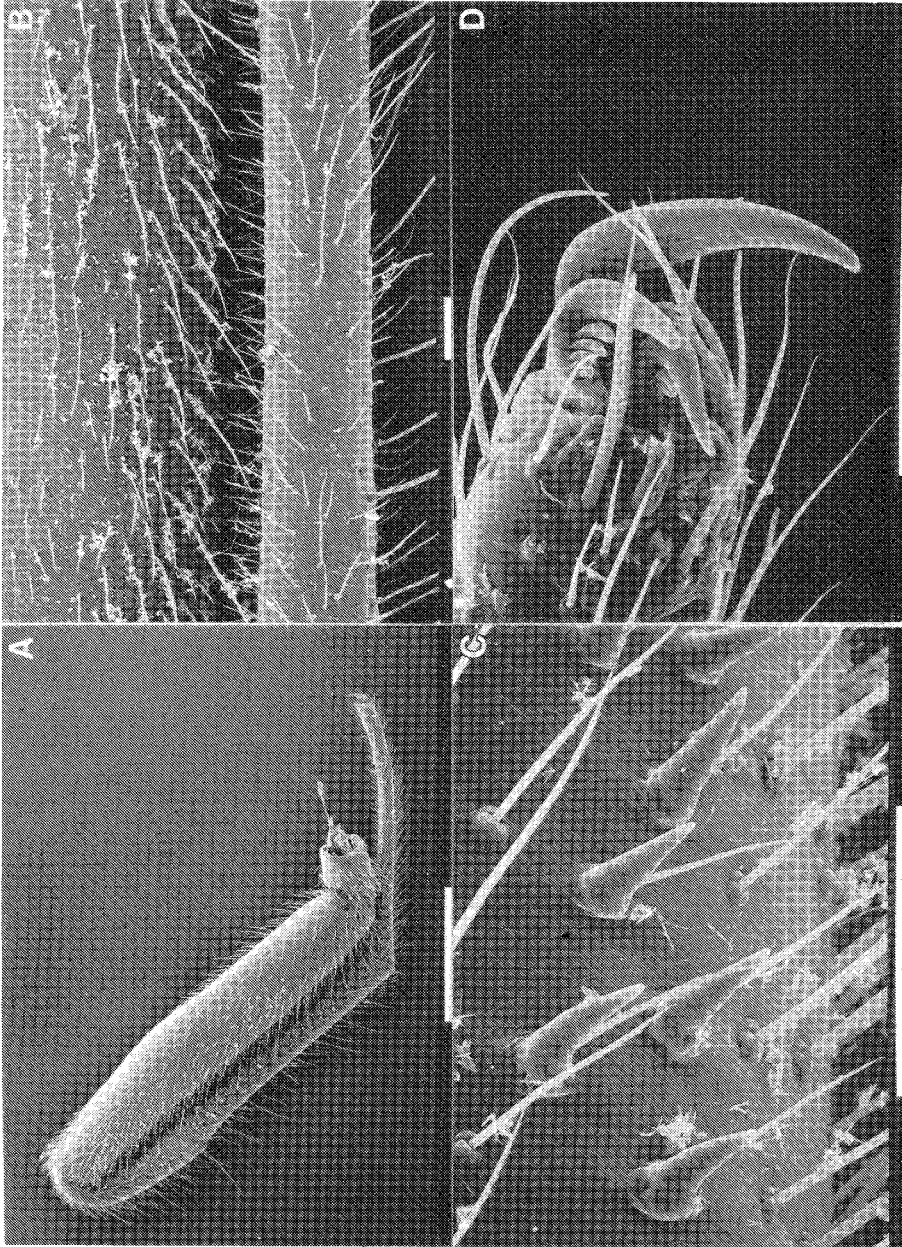


PLATE 1. Scanning electron micrographs of left, first, leg of *T. sextuberculata*. A, leg, B, section of femur and tibia. C, teeth along edge of femur. D, claws (the tips of claws are broken, due to poor handling). Scale bars, A, 1 mm; others, 0.1 mm.

Diagnosis. This species differs from the others by having the abdomen lobed on each side (Fig. 20). It resembles specimens of the crab spider *Stephanopsis* (Thomisidae), as noted by Simon, 1895, but *Stephanopsis* lacks the long claws on the first two legs, and the eye arrangement differs in frontal view.

Specimens examined. No other specimens were found.

Celaenia Thorell

Celaenia Thorell, 1868: 1. Type species *C. kinbergii* by monotypy.

Diagnosis. *Celaenia* differs from *Taczanowskia* by being large in size, and by the epigynum in females and the palpus in males being heavily sclerotized.

Note. The Australian genus is mentioned and illustrated here for comparison with *Taczanowskia*.

Celaenia excavata (L. Koch)

(Figs. 24-32)

Cyrtogaster excavata L. Koch, 1867: 175. Female from Brinsbane [sic], in BMNH, examined.

Celaenia kinbergii Thorell, 1868: 2. Female holotype from Sidney, Nova Hollandia [Australia]. Roewer, 1942: 908 (*kinbergii*). Bonnet, 1956: 979. Hickman, 1971: 75, figs. 1-5 (*kinbergii*). Davies, 1988: 316, fig. 35 .

Celaenia excavata: - L. Koch, 1872: 234, pl. 20, fig. 1. Simon, 1895: 895, figs. 959, 963. Roewer, 1942: 907. Bonnet, 1956: 979. Platnick, 1993: 424.

Note. Hickman synonymized names, but accidentally gave the younger name, *kinbergii*, priority (Platnick, 1993).

Female from Hobart, Tasmania, total length 14 mm.

Male from Hobart, Tasmania. Endite without tooth. Palpal patella with no macrosetae. First coxa without hook. Total length 3.0 mm.

Notes. The specimens were determined by V. Hickman who raised males and females from an egg-sac. Scattered white scales are on legs and some on body of male. The scales are short and constricted at both ends.

Natural history. Forster and Forster (1973: 168-172, figs. 88, 89, 106, 107) report on the habits of *Celaenia*.

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