

New lapsiine jumping spiders from Ecuador (Araneae: Salticidae)

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Abstract

Two new genera and three new species of salticid spider from eastern Ecuador are described, belonging to a group informally called "lapsiines". The new genus *Galianora* is based on *Galianora sacha*, new species, and also contains *Galianora bryicola*, new species. The new genus *Thrandina* includes the single new species *Thrandina parocula*. These genera share the ancestral salticid traits, rare among neotropical salticids, of a tarsal claw on the female palpus and a median apophysis on the male palp. *Galianora* is distinguished from other lapsiines by the round tegulum with peripheral embolus. The strikingly large posterior median eyes of *Thrandina* are unique among New World salticids.

Key words: Araneae, Salticidae, *Thrandina*, *Galianora*, *Lapsias*, lapsiines, jumping spider, new species, Ecuador

Introduction

Phylogenetic studies of salticid spiders have revealed that most species fall in a single large clade, the Salticoidea (Maddison & Hedin, 2003). The relatively few salticids outside of this clade therefore occupy a basal position in the family, and have been of considerable interest for studies of the early evolution of the family (Jackson & Pollard, 1996). While the Old World has about 25 genera of basal salticids of diverse body forms (Wanless, 1980, 1982, 1984; Žabka & Kovac, 1996; Logunov, 2004), in the New World only *Lyssomanes* Hentz and *Chinoscopus* Simon have been recognized as basal (i.e., outside the Salticoidea). However, Maddison and Hedin (2003) have suggested that *Lapsias* Simon may also be a basal salticid based on several morphological characters. Recent field work in Ecuador has revealed that the neotropics contain a previously unknown diversity of basal salticids apparently related to *Lapsias*. In this paper I describe three new species in

this group, and place them in two new genera. In a companion paper (Maddison & Needham, 2006) we present molecular evidence that these two genera are among the basal groups of salticids.

Methods

Specimens were preserved in either 80% or 100% ethanol, and examined under both dissecting microscopes and a compound microscope with reflected light. Drawings were made with a drawing tube on a Nikon ME600L compound microscope.

Terminology is standard for Araneae. All measurements are given in millimeters. Spination is described in the format: "D a-b-c P a-b-c V a-b-c R a-b-c" where D = dorsal, P = prolateral, V = Ventral, R = retrolateral and a, b, c refer to the numbers of spines in the proximal, middle and distal third of the segment.

Abbreviations for collections: MNHN—Muséum national d'Histoire naturelle, Paris (C. Rollard); UBC-SEM—Spencer Entomological Museum of the University of British Columbia (K. Needham).

Descriptions

The lapsiines

Few New World salticids have the ancestral salticid trait of a tarsal claw on the female palp: the lyssomanines *Lyssomanes* and *Chinoscopus*, and the three genera here considered lapsiines, *Lapsias*, *Galianora* new genus, and *Thrandina* new genus. Lapsiines also share with *Lyssomanes* an additional ancestral trait otherwise unknown in neotropical salticids, a median apophysis on the male palp. Lapsiines differ from lyssomanines in having the box-shaped carapace and eye arrangement typical of most salticids. Because the group is easy to recognize within the New World, the label "lapsiines" is useful, but no formal taxon is described here because evidence for its monophyly is weak or lacking. The unifying traits described above are plesiomorphic. Maddison & Needham (2006) provide molecular data for the monophyly of *Galianora* with *Thrandina*, but molecular data are lacking for *Lapsias*. Formal establishment of a taxon including these genera should therefore wait until better evidence for its monophyly is found. Given that *Lapsias* retains the median apophysis, has a reduced (or absent) palp conductor, and reduced posterior median eyes, there would appear to be only two parsimonious placements for *Lapsias* within the phylogeny of Maddison & Needham (2006): as sister to the Salticoida or as sister to *Galianora*.

The distinct apophysis arising from the tegulum in lapsiines is referred to as a median apophysis following Wanless's use for a presumably homologous sclerite in the *Cocalodes*

group (Wanless, 1982, 1985). The median apophysis in lapsiines is a discrete sclerite retrolateral to the base of the embolus, and is (typically at least) approached by a loop of the sperm duct before the latter enters the embolus. Some lapsiines have in addition a small extension of the cuticle near the base of the embolus (Figures 1 and 2, between base of embolus and median apophysis) that may be a conductor. This arrangement is very similar to that of *Allococalodes* Wanless (Wanless, 1982).

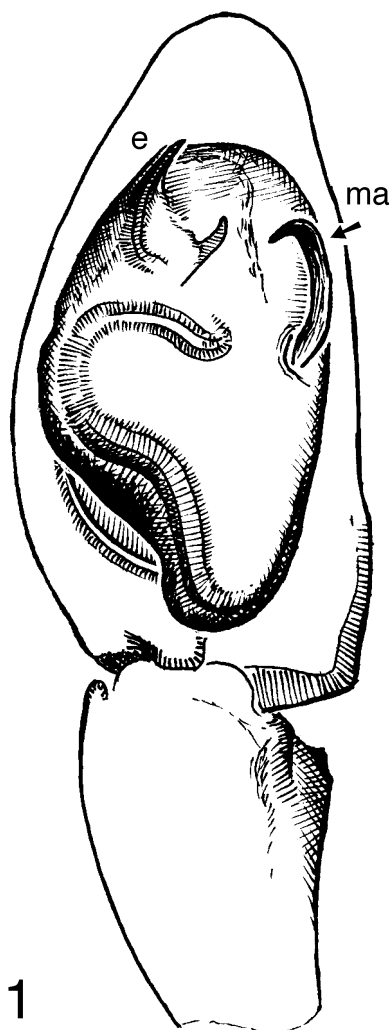


FIGURE 1. *Lapsias estebanensis* Simon, left palpus of male holotype. **e** = embolus, **ma** = median apophysis.

Lapsias Simon, 1900

Currently 6 described species are assigned to the genus (Platnick, 2005). The palpus of the type species (*L. estebanensis* Simon) is shown in Fig. 1 (type specimen, MNHN). The

palpi are similar in Simon's four species (type specimens in MNHN examined; Galiano, 1963), with a small curved fingerlike median apophysis and a fairly short embolus. As in other lapsiines, the females of *Lapsias* (*L. ciliatus* Simon and *L. cyrboides* Simon examined) have a claw on the tarsus of the palpus.

***Thrandina* Maddison, new genus**

Type species: *Thrandina parocula*, new species

Etymology. The name is a fusion of *andina*, referring to the Andean habitat, and *Thranduil*, king of J. R. R. Tolkien's Mirkwood elves, who, as *Thrandina*, inhabit shaded forests.

Diagnosis. The large posterior median eyes distinguish *Thrandina* from all other New World salticids. The median apophysis is much larger than in *Lapsias* and *Galianora*.

***Thrandina parocula* Maddison, new species**

Figs. 2–8

Type material. Holotype male in UBC-SEM with label: "ECUADOR: MORONA SANTIAGO: 6.6 km N of Limón on highway to Méndez. S 2.9227 W 78.4079; 1000 m el. Forest 14 July 2004 Maddison, Agnarsson, Iturralde, Salazar. WPM#04-041"; "UBC-SEM AR00001"

Paratypes: a second male, a female, and a subadult male, same data as the holotype (UBC-SEM). Molecular data gathered for this species by Maddison & Needham (2006) were obtained from legs of the paratype male (DNA voucher d123).

Etymology. The name refers to the relatively equal sizes of the lateral and posterior eyes.

Diagnosis. The large posterior median eyes (Figs. 5–8) distinguish this from other neotropical salticids, including the described species of *Lapsias* (Galiano, 1963; types in MNHN examined). The large angled median apophysis of the male palp (Figs. 2–3), and the deep opening of the epigynum (Fig. 4) are also distinctive.

Description. Male holotype: Carapace length 2.3; abdomen length 2.1. Approximate leg lengths 4 = 1 > 2 = 3. Macrosetae on tibia I P 1-0-1 V 2-2-2, metatarsus I P 0-0-1 V 2-1-2 R 0-1-0 (left leg) P 0-1-1 V 2-1-2 R 0-0-1 (right leg). Second leg anterior tarsal claw with 5 teeth, posterior with 4–5. Chelicerae: 3 promarginal and 2 retromarginal teeth. Palpus (Figs. 2–3): with a large, distinct median apophysis arising from the membranous area

retrolateral of the embolus. The median apophysis expands as it proceeds distally, then angles and sends a spike toward the prolateral, passing behind a short triangular extension of the membrane that may represent the conductor. Colour: carapace dark brown to black except for central pale longitudinal stripe on thorax. Legs pale to medium brown except femur I which is dark brown. Abdomen medium brown above with lighter chevrons; paler below with dark speckles.

Female paratype: Carapace length 1.9; abdomen length 1.7. Macrosetae on tibia I P 1-0-0 V 2-1-2 (left leg), P 1-0-0 V 2-2-2 (right leg), metatarsus I P 0-0-1 V 2-1-2. Second leg anterior tarsal claw with 6 teeth, posterior with 5. Chelicerae: 3 promarginal and 2 retromarginal teeth. Palpus: with tarsal claw. Epigynum (Fig. 4): a large mound, with a central opening that descends into a deep cavern. Colour: as in male except that legs are more annulate.

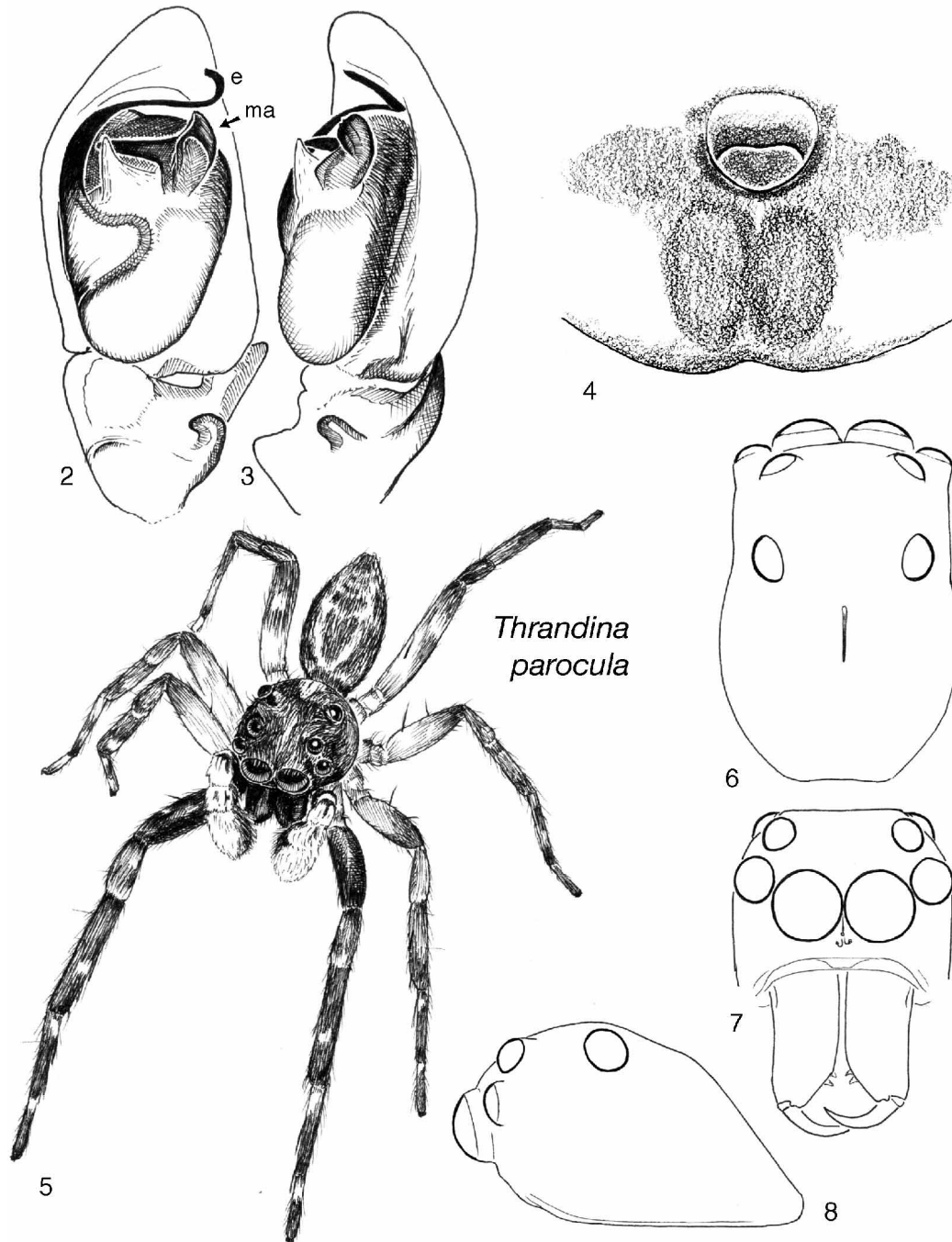
Specimens examined. Subadult males with similar eye arrangement and colouration, and thus presumed to be of this or a closely related species, were found at two other locations: (1) ECUADOR: MORONA SANTIAGO: km 20 from Limón towards Gualaceo. S 3.0044 W 78.5142; 2270 m el. Cloud forest. 11 July 2004 Maddison, Agnarsson, Iturralde, Salazar. WPM#04-029 (UBC-SEM). and (2) ECUADOR: NAPO: Caucheras, Estación Yanayacu. S 0.6049 W 77.8886; 2150 m el. 20 July 2004 Maddison, Agnarsson, Iturralde, Salazar, Avilés. WPM#04-052 (UBC-SEM).

Natural history and behaviour. At the type locality, collected by beating moss-covered branches and tree trunks in the understory of a moist forest near a stream in a narrow canyon at 1000 m elevation. The subadult males from the other two localities were found in similar cloud forest habitats but at higher elevations (2150 m, 2270 m). Walking behaviour of an adult male and subadult male were observed in laboratory conditions for a few minutes. These specimens had a fluid but hesitant walk. Frequently, while pausing in forward motion, they raised and lowered the first and second pairs of legs in synchrony. Their unusual gait is strongly reminiscent of that of spartaeines (W. Maddison, pers. observations; Robert Jackson, pers. comm.).

***Galianora* Maddison, new genus**

Type species: *Galianora sacha*, new species

Etymology. This phylogenetically remarkable genus is named in honour of the late María Elena Galiano, the deserving heir to Eugène Simon as the leader of neotropical salticid taxonomy. Her work is the foundation for our knowledge of one of the world's richest salticid faunas.



FIGURES 2–8. *Thrandina parocula*, new species. 2, left palp of male holotype, ventral; 3, left palp of holotype, retrolateral; 4, female epigynum, ventral; 5, living male, traced from photograph; 6, male carapace, 7, male face; dorsal; 8, male carapace, lateral. **e** = embolus, **ma** = median apophysis.

Diagnosis. Among neotropical salticids with a median apophysis and female palp claw, the round tegulum with peripheral embolus is distinctive (Figs. 9, 19).

Notes. With hesitation I include in this genus two species so different in body form. In the field, I did not realize they belonged to the same subfamily — *G. sacha* is elongate and pale with raptorial front legs; *G. bryicola* is compact and brown. However, the morphological synapomorphies and molecular data (Maddison and Needham, 2006) clearly suggest a close relationship between *G. sacha* and *G. bryicola*. An as-yet undescribed species from Venezuela is intermediate in body form and palpus. To avoid describing two monotypic sister genera, I have chosen to place *G. bryicola* in *Galianora* until lapsiine diversity and phylogeny are better understood.

***Galianora sacha* Maddison, new species**

Figs. 9–16

Type material. Holotype female in UBC-SEM from Jatun Sacha, Ecuador with label: "ECUADOR: NAPO: Estación Biológica Jatun Sacha. S 1.067 W 77.617; 400 m el. Forest and nearby disturbed areas. 21–24 July 2004 Maddison, Agnarsson, Iturralde, Salazar. WPM#04–055"; "UBC-SEM AR00002"

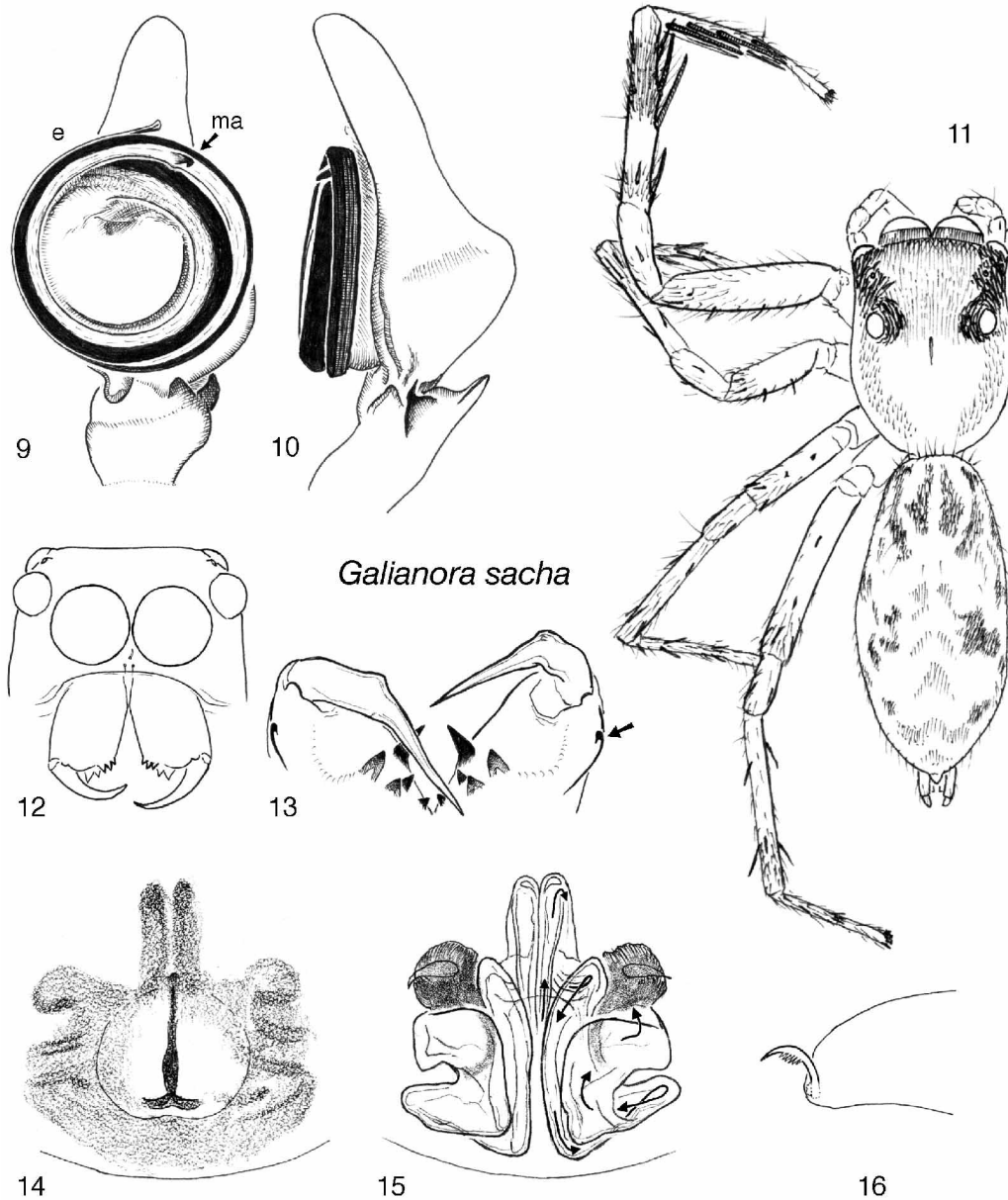
Paratypes: Two additional females, a male, and two juveniles, same data as the holotype (UBC-SEM). A female was chosen as holotype because the carapace of the single male was crushed when the specimen was alive. Molecular data gathered for this species by Maddison & Needham (2006) were obtained from one of the juveniles (DNA voucher d116).

Etymology. The name is from the Quechua “sacha”, referring both to its habitat (“tree” or “forest”) and to the type locality.

Diagnosis. Pale, elongate, long-legged and somewhat flattened (Fig. 11), superficially resembling *Itata* Peckham & Peckham (but not so narrow) or *Helpis* Simon. The first legs are elongate and appear raptorial. This species is distinguished from all other known neotropical salticids by the body form combined with the distinctive male palp having a small apophysis accompanying the embolus (Fig. 9, ma), a claw on the female palp (Fig. 16), and four pairs of ventral macrosetae on the first metatarsus.

Description. Both females and male have the body and legs pale and yellowish, except for pigmented areas around the eyes, dark speckles on the abdomen, and some darker areas of the legs, especially the distal half of the first tibia. First legs large and well-spined in both male and female. Body and legs thinly but more or less completely covered by small, fine hairs. On the legs these hairs are mostly upright and black; on the body are they are largely

orange or white and recumbent. These orange setae are densest covering the pigmented integument around eyes. None of the setae are flattened and widened to the extent of the "scales" of many salticids. The integument of the legs has a subtle blue-purple iridescence, at least under alcohol.



FIGURES 9–16. *Galianora sacha*, new species. 9, left palpus of male paratype, ventral; 10, left palpus, retrolateral; 11, habitus of holotype female; 12, female face; 13, male chelicerae from below; 14, epigynum of holotype female, ventral; 15, epigynum of paratype female, dorsal (cleared with clove oil); 16, tip of female palpus, showing tarsal claw. **e** = embolus, **ma** = median apophysis.

Male paratype: Carapace length 2.3; abdomen length 2.7. Leg lengths $1 > 4 > 2 = 3$. Macrosetae on tibia I D 0-1-1 P 1-0-1 V 2-2-2 R 1-0-1. First metatarsus with four pairs of ventral macrosetae, although the terminal pair might be considered lateral. Second leg anterior tarsal claw with ca. 14 teeth, posterior with 12. Chelicerae (Fig. 13): three promarginal teeth, the distalmost long and projecting forward slightly; two distinct retromarginal teeth. On the retrolateral corner of the basal segment, near the fang articulation, is a small apophysis (arrow in Fig. 13). Fang with swelling near base. Palpus (Figs. 9, 10): embolus long, wrapping two times around periphery of round tegulum. Embedded within a membrane accompanying the embolus is a sclerotized projection (Fig. 9, ma), which I interpret as the median apophysis. (This interpretation would suggest that what appears to be the basal portion of the embolus is actually an extension of the tegulum.) A sharp retrolateral tibial apophysis is accompanied by two lobes, one dorsal and one ventrolateral.

Female holotype: Carapace length 2.3, width 1.6, height 1.2; abdomen length 3.2. Leg lengths $4 > 1 > 2 = 3$. Macrosetae on tibia I D 0-1-1 P 1-0-1 V 2-2-2 R 1-0-1. First metatarsus with four pairs of ventral macrosetae, although the terminal pair might be considered lateral. Second leg anterior tarsal claw with approximately 12 teeth, posterior with approximately 11. Chelicerae: two retromarginal and two retromarginal teeth. Palpus: with tarsal claw (Fig. 16), curved and with teeth. Epigynum (Fig. 14, 15): a central shallow crater containing a dark longitudinal structure. The openings appear to be longitudinal slits within this dark structure. From the openings, ducts proceed anteriorly near the midline, then posteriorly to the back of the epigynum, then loop laterally and anteriorly to the fertilization ducts (arrows in Fig. 15).

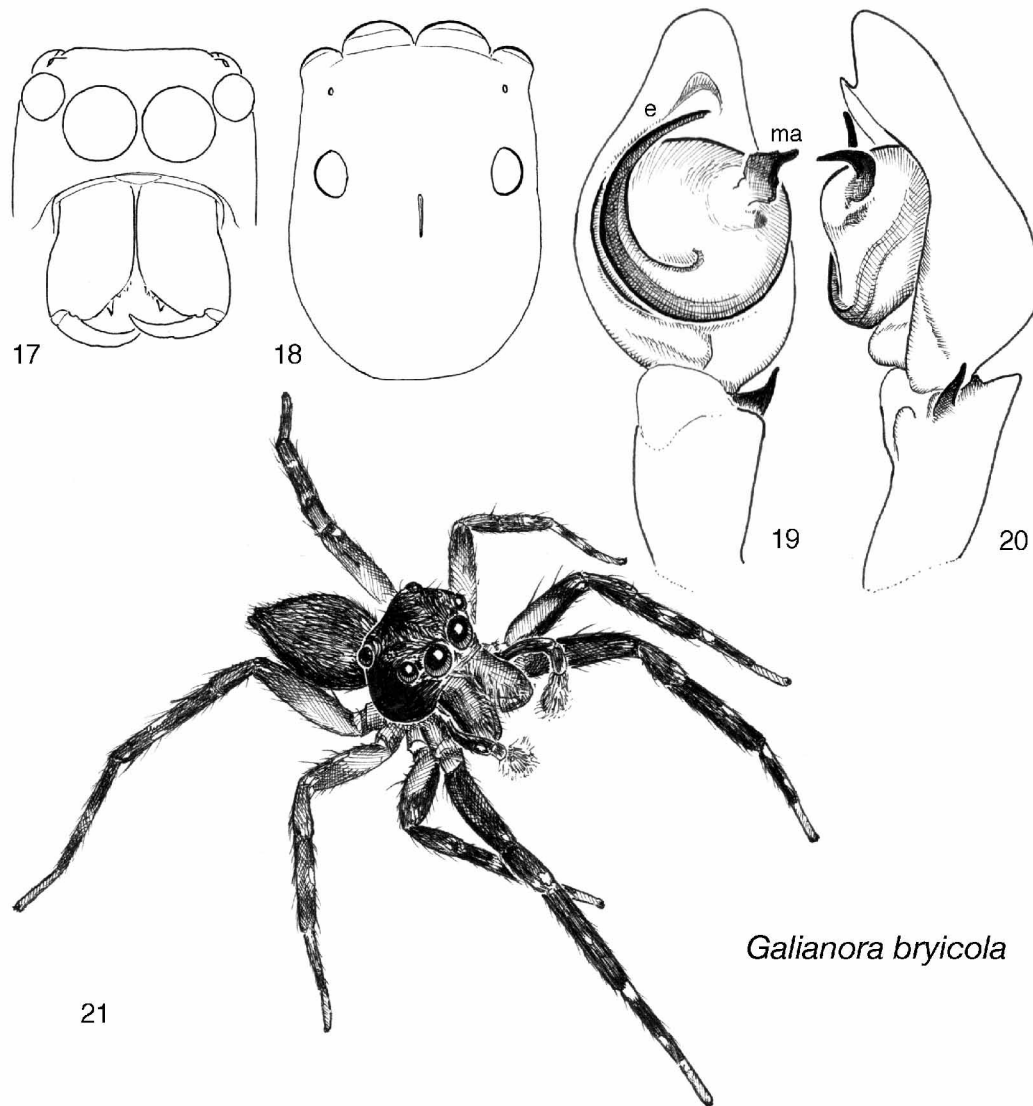
Natural history. All specimens were collected beating understory trees two to three metres tall and within one or two metres of a small stream (ca. 1 metre width) within lowland rainforest. One female was from a point on the stream within but near the edge of the forest. All other specimens were well inside the forest, where the canopy of the forest appeared somewhat more open than elsewhere but was not broken by the presence of the stream.

***Galianora bryicola* Maddison, new species**

Figs. 17–21

Type material. Holotype male in the UBC-SEM with label: "ECUADOR: NAPO: Estación Biológica Jatun Sacha. S 1.067 W 77.617; 400 m el. Forest and nearby disturbed areas. 21–24 July 2004 Maddison, Agnarsson, Iturralde, Salazar. WPM#04-055"; "UBC-SEM AR00003"

Molecular data gathered for this species by Maddison & Needham (2006) were obtained from several legs of the holotype male (DNA voucher d124).



FIGURES 17–21. Male holotype of *Galianora bryicola*, new species. 17, face; 18, carapace, dorsal; 19, left palpus, ventral; 20, left palpus, retrolateral; 21, living specimen, traced from photograph. **e** = embolus, **ma** = median apophysis.

Etymology. The name refers to the habitat of mossy tree trunks.

Diagnosis. This brown species has a generalized salticid body form, but is distinctive among the neotropical fauna by its palpus with a round amycooid-like bulb, but having a prominent median apophysis (Figs. 19–20).

Description. Male holotype: Carapace length 2.2, width 1.7, height 1.3; abdomen length 2.2. Approximate leg lengths $4 > 1 > 3 > 2$. Macrosetae on left tibia I P 0-1-1 V 2-2-2 R 0-

1-1; right tibia 1 P 1-1-1 V 2-2-3 R 1-1-1. First metatarsus with four pairs of ventral macrosetae, although the terminal pair might be considered lateral. Second leg anterior tarsal claw with ca. 7 teeth, posterior with 6. Chelicerae: Three promarginal and two retromarginal teeth. Palpus (Figs. 19, 20): superficially resembles an amycooid palpus, with embolus fixed to a round tegulum, but projecting from the ventral-retrolateral side of the tegulum is a prominent median apophysis. As in *Galianora sacha*, the retrolateral tibial apophysis is sharp and accompanied by dorsal and ventral lobes. Carapace with posterior lateral eyes on raised mounds compared to the fovea which lies in concavity. Colour: carapace dark brown to black except for pale central longitudinal stripe on thorax. Opithosoma medium brown with indistinct speckling above; venter black. The integument of the legs and carapace has a subtle rainbow iridescence, at least under alcohol.

Female: adult female unknown. Immature female: palpus with tarsal claw.

Specimens examined. Collected with the holotype were three juveniles.

Natural history. The juveniles were collected beating moss-covered branches and tree trunks in understory of lowland rain forest. The male holotype was collected by G. Iturralde on a tree trunk within the forest.

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Literature cited

- Galiano, M.E. (1963) Las especies americanas de arañas de la familia Salticidae descritas por Eugène Simon: Redescripciones basadas en los ejemplares típicos. *Physis, Buenos Aires*, 23, 273–470.
- Jackson, R.R. & Pollard, S.D. (1996) Predatory behavior of jumping spiders. *Annual Review of Entomology*, 41, 287–308.
- Logunov D.V. (2004) On the taxonomic position of "*Lyssomanes*" *karnatakaensis* and other Indian species formerly assigned to *Lyssomanes* (Araneae, Salticidae). *Bulletin of the British Arachnological Society*, 13, 73–75.

- Maddison, W.P. & Hedin, M.C. (2003) Jumping spider phylogeny (Araneae: Salticidae). *Invertebrate Systematics*, 17, 529–549.
- Maddison, W.P. & Needham, K. (2006) Lapsiines and hisponines as phylogenetically basal salticid spiders (Araneae: Salticidae). *Zootaxa*, 1255, 37–55.
- Platnick, N.I. (2005) World spider catalog version, 6.5. Available from <http://research.amnh.org/entomology/spiders/catalog/SALTICIDAE.html>. (accessed 15 March 2006)
- Simon, E. (1900) Descriptions d'araignées nouveaux de la famille des Attidae. *Annales de la Société entomologique de Belgique*, 44, 381–407
- Wanless, F.R. (1980). A revision of the spider genera *Asemonea* and *Pandisus* (Araneae: Salticidae). *Bulletin of the British Museum of Natural History (Zoology)*, 39, 213–257.
- Wanless, F.R. (1982). A revision of the spider genus *Cocalodes* with a description of a new related genus (Araneae: Salticidae). *Bulletin of the British Museum of Natural History (Zoology)*, 42, 263–298.
- Wanless, F.R. (1984). A review of the spider subfamily Spartaeinae nom. n. (Araneae: Salticidae) with descriptions of six new genera. *Bulletin of the British Museum of Natural History (Zoology)*, 46, 135–205.
- Wanless F.R. (1985) A revision of the spider genera *Holcolaetis* and *Sonoita* (Araneae: Salticidae). *Bulletin of the British Museum of Natural History*, 48, 249–278
- Žabka M. & Kovac D. (1996) *Paracyrba wanlessi*—a new genus and species of Spartaeinae from Peninsular Malaysia, with notes on its biology (Arachnida: Araneae: Salticidae). *Senckenbergiana biologica*, 76, 154–156.