2015. Journal of Arachnology 43:231–292

# A phylogenetic classification of jumping spiders (Araneae: Salticidae)

**Wayne P. Maddison**: Beaty Biodiversity Museum, and Departments of Zoology and Botany, University of British Columbia, Vancouver, British Columbia, V6T 1Z4 Canada. E-mail: wayne.maddison@ubc.ca

**Abstract.** The classification of jumping spiders (Salticidae) is revised to bring it into accord with recent phylogenetic work. Of the 610 recognized extant and fossil genera, 588 are placed at least to subfamily, most to tribe, based on both molecular and morphological information. The new subfamilies Onomastinae, Asemoneinae, and Eupoinae, and the new tribes Lapsiini, Tisanibini, Neonini, Mopsini, and Nannenini, are described. A new unranked clade, the Simonida, is recognized. Most other family-group taxa formerly ranked as subfamilies are given new status as tribes or subtribes. The large long-recognized clade recently called the Salticoida is ranked as a subfamily, the Salticinae, with the name Salticoida reassigned to its major subgroup (the sister group to the Amycoida). Heliophaninae Petrunkevitch and Pelleninae Petrunkevitch are considered junior synonyms of Chrysillini Simon and Harmochirina Simon respectively. Spartaeinae Wanless and Euophryini Simon are preserved despite older synonyms. The genus *Meata* Żabka is synonymized with *Gedea* Simon, and *Diagondas* Simon with *Carrhotus* Thorell. The proposed relationships indicate that a strongly ant-like body has evolved at least 12 times in salticids, and a strongly beetle-like body at least 8 times. Photographs of living specimens of all 7 subfamilies, 30 tribes, and 13 subtribes are presented.

**Keywords:** Phylogeny, taxonomy, systematics, biogeography

Jumping spiders, with more than 5800 species described (World Spider Catalog 2015), are familiar in all non-polar terrestrial ecosystems, and yet there has not been a new comprehensive classification of the family in more than a century. Eugène Simon's 1901–1903 landmark classification of salticids was remarkable for its breadth, covering the family's worldwide diversity. He separated the Salticidae by cheliceral dentition into three large sections (Pluridentati, Fissidentati, Unidentati), an arrangement that Simon suggested, correctly, to be somewhat artificial. His further division of the family into 69 groups is also rather artificial, because heavy reliance on basic body shape led him to group superficially similar species that we now recognize as unrelated. Petrunkevitch (1928) and Roewer (1954) substantially maintained Simon's arrangement. The next major advance was from Prószyński (1976), who used genitalic characteristics, radically reorienting salticid classification to be considerably more natural than Simon's. However, it included only a small fraction of the family's genera, and subsequent work (e.g., Maddison & Hedin 2003a; Bodner & Maddison 2012) has shown the basic form of male genitalia — the general shape of the tegulum and embolus — to be frequently convergent, holding insufficient information to resolve the family reliably. Wanless (1980c, 1981a, et seq.) brought cladistic reasoning to salticids, clarifying relationships among non-salticine salticids. Despite these advances, the relationships of most salticid genera remained unclear.

Five developments now enable a comprehensive new phylogenetic classification of the family. First, an increase in taxonomic effort during the last several decades by Prószyński, Wesołowska, Żabka, Logunov, Galiano, Wanless, Zhang, Maddison, Peng, Ruiz, Marusik, and others has made many species better known. Second, these authors, along with Edwards, Szűts, and others, have improved our phylogenetic interpretations of morphological variation. Third, the compilation of online libraries of illustrations (Prószyński 1995, 2015; Metzner 2015) has greatly facilitated inspection and comparison of morphological variation across the family, giving clues to the placement of many genera. Fourth, electronic catalogs (Platnick 2014; World Spider Catalog 2015) have assisted many aspects of this work, providing a complete list of target genera to be placed. Molecular phylogenetic studies are the fifth major development. They have approached a sufficient breadth of coverage so as to represent most of the distinctive groups of genera (Hedin & Maddison 2001; Maddison & Hedin 2003a, b; Andriamalala 2007; Su et al. 2007; Maddison et al. 2008, 2014; Bodner & Maddison 2012; Zhang & Maddison 2013, 2014; Ruiz & Maddison in press). They also have enough support that we can be confident of the basic structure of the family (Bodner & Maddison 2012; Maddison et al. 2014).

In order to generate the classification, we would ideally perform a phylogenetic analysis for all genera of salticids based on scored character data, both molecular and morphological. Such formal data are not available for most of the genera, and waiting for them would leave us without a good classification for years. However, we have a strong scaffold from the molecular phylogeny, and we can identify where most salticid genera would attach to it, based on similarities in genitalic and somatic features, even if we lack clear synapomorphies. The classification proposed here (Tables 1 and 2) is therefore based on both molecular and morphological information. It is, of course, tentative, but by placing most salticid genera into groups, it increases the chances that each will be considered further, no doubt leading to revisions in the arrangement.

## METHODS

The list of genera to be placed in groups was compiled from Platnick's (2014) catalog version 15 by special modules in Mesquite 3.01 (Maddison & Maddison 2014), which allowed easy tabulation of species and geographic distribution. To this were added new genera and synonymies from some more recent papers (Wesołowska et al. 2014; Żabka 2014; Caleb et al. 2015; Dunlop et al. 2015; Patoleta & Żabka 2015; Richman 2015; Zhang & Maddison 2015; Edwards in press; Ruiz & Maddison in press). Although an attempt was made to include all described genera, a few species described after the date of Platnick (July 2014) are missing from the counts.

Counts of species currently in subtribes and tribes are given, but I did not attempt to decide for every species whether it belonged in the tribe or subtribe. Rather, the counts for a taxon are derived from the counts of species currently assigned to its contained genera. Given the state of salticid taxonomy, there are some genera that contain species properly belonging to different tribes, and so some will be misassigned in the counts given. These species counts should therefore not be relied upon for quantitative analyses; they are intended merely to convey a sense of diversity.

Authors of family-group taxon names are given in Table 1, and of generic names in Table 2, rather than listed in the text on first use. Synonymies under each taxon include any synonyms and changes of rank, as well as the names used by Simon (1901, 1903), Petrunkevitch (1928), Roewer (1954) and Prószyński (1976).

**Family-group taxa and ranking.**—My goal is not to question generic limits, but to place existing genera within suprageneric taxa (subfamilies, tribes and subtribes). A few family-group taxon names for salticids were proposed in the 19th century: Attidae by Sundevall (1833), Salticidae by Blackwall (1841), Lyssomanidae by Blackwall (1877), Dendryphantidae by Menge (1879), Athamii and Simonellii by Peckham et al. (1889), and Synemosinae, Ballinae, Marptusi and Phidippi by Banks (1892). F.O. Pickard-Cambridge's Biologia Centrali Americana (section containing salticid classification published 1900) added Synageleae, Amyceae, and Homalotteae. However, one major work provided most of the names needed for our current family-group taxa: Simon's second edition of Histoire Naturelle des Araignées (1901, 1903). Simon gave the first comprehensive and detailed classification of the family, adding dozens of names for taxa through his many "groups".

Salticid classification moved from Simon's groups toward a system of taxa ranked as subfamilies beginning with Petrunkevitch (1928), who dispensed with the rank of "group", instead consolidating Simon's 69 groups to form 23 subfamilies, a few of which were new. Roewer (1954) maintained Petrunkevitch's subfamilies, but layered them over top of Simon's groups and a few new groups of his own. Prószyński (1976) and most of the subsequent literature has focused on subfamily as the primary rank for suprageneric taxa within Salticidae. Since Prószyński (1976), one subfamily has been added by each of Wanless (1984a), Bodner & Maddison (2012), Edwards (in press), and Ruiz & Maddison (in press).

In recent years, unranked taxa such as the Amycoida (Maddison & Hedin 2003a) have been established for salticid groups. This has been convenient, especially while our understanding of salticid relationships was changing rapidly. However, these unranked groups, along with the failure to place many genera into higher taxa, has left the classification in disarray, with subfamilies (such as Heliophaninae) existing alongside Simon's groups (such as Hasarieae) of unclear rank, and with many genera unplaced. Although ranks carry no biological meaning, a system of ranked taxa can be useful to provide a predefined low-resolution subset of highlighted clades for non-experts and alphabetizers. I therefore attempt to regularize salticid taxa into standard ranks.

There are two primary consequences of the review of ranking. First, most subfamilies are demoted to tribes, as per status changes indicated in Table 1. The traditional use of "subfamily" in salticids is too fine-grained, with dozens of subfamilies and little chance for a formal higher order structure. Salticid systematists may have been inclined to use such small subfamilies because of the difficulty of finding broader relationships before molecular data were available. The new classification has 7 subfamilies and 30 tribes (Table 1).

Second, the name "Salticoida", previously applied to the enormous clade of familiar salticids, will change its meaning to a stricter sense (to exclude the Amycoida) so as to permit the larger clade to be renamed as a formal subfamily, the Salticinae. Several other unranked taxa that serve to group tribes together remain within the Salticinae, including the Amycoida, Astioida, Marpissoida and Saltafresia.

The use of tribes and subtribes leads to ambiguity in the meaning of the adjectival forms "salticine", "spartaeine", "dendryphantine", "plexippine", and "aelurilline". If not otherwise specified, by default I use "salticine" to refer to the subfamily, "spartaeine" to the tribe, and the last three to the respective subtribes. For the last three, this convention most closely maintains previous use of the terms.

**Phylogenetic decisions.**—The broader structure of this classification is based primarily on recent molecular phylogenetic results (Fig. 1; Hedin & Maddison 2001; Maddison & Hedin 2003a; Su et al. 2007; Maddison et al. 2008, 2014; Bodner & Maddison 2012; Zhang & Maddison 2013; Ruiz & Maddison in press), as well as a few unpublished molecular results. I would not have relied so much on the molecular results were they nonsensical to the morphological patterns, but they are not. The groups discovered by molecular data have coherence in general body form, in genitalia, and in geographical distribution. However, we lack precise morphological synapomorphies to corroborate many of our groups. While such synapomorphies no doubt exist, to date we have examined too few character systems in too little detail to have found them. I have given preference to molecular data primarily because we have hundreds of molecular characters, but only a few well gathered and consistently described morphological characters.

The molecular phylogeny is merely a skeleton, as molecular data have been gathered for only about half of the genera (Table 2 marks genera for which molecular data are available). Thus, I have added flesh to the bones by attaching other genera by morphological data, with varying degrees of certainty. In some cases, clear synapomorphies link a genus to a group well placed by molecules (e.g., *Kima* and others sharing the loss of retromarginal cheliceral teeth and ant-like body with the well-placed *Leptorchestes*). In other cases, there are no documented linking traits well demonstrated to be derived, but an overwhelming resemblance in many traits establishes a placement firmly (e.g., *Simaethula* as a simaethine). Under each tribe or subtribe, if there are no molecular data or previous literature justifying the inclusion of a genus, I give some indication as to why it is placed there. In making such choices, I am reassured by our experience in gathering molecular data: in many cases we have guessed by morphology that a genus would be in a particular group even though we lacked clear synapomorphies, and the molecular data have almost always corroborated our guess.

Molecular synapomorphies are indicated for some of the new tribes and subfamilies. Insofar as these are single nucleotide site changes, they do not supply strong evidence for monophyly, but are given for the sake of the formal diagnosis of the new taxa. No attempt was made to list such molecular synapomorphies for other taxa.

In order to assess morphological similarities and synapomorphies, besides consulting the literature, I made heavy use of Prószyński's (2015) compilation of drawings, and to a lesser extent Metzner's (2015). Not only does Prószyński's compilation bring together in one place most of the illustrations in the literature, but it also includes many illustrations of Prószyński's that are not otherwise published, including of type specimens. This resource had an important influence at every stage of this project, for every tribe and subtribe, even where not directly cited below. Without it, the current classification would have taken far longer to achieve.

**Palps.**—Since Prószyński's (1976) work, the male palp has been an important focus of salticid systematics. It provides convincing or potential synapomorphies for many groups: Onomastinae, Lyssomaninae, Spartaeina, Holcolaetina, Marpissoida, Ballini, Dendryphantina, Neonini, Mopsini, Chrysillini, Euophryini, Aelurillina, and Plexippini. Several axes of variation are evident: whether the embolus is movable, whether the bulb is circular, and whether the functional tegulum appears divided by a cleft. A thorough review is beyond the scope of this paper, but some distinctions used in the discussion of taxa are explained here.

"Fixed embolus" is used to refer to an embolus that is more or less immovable relative to the tegulum, being fused thereto. "Freely movable embolus", in contrast, refers to an embolus (often spiral in form) that has substantial freedom of movement relative to the tegulum, with an extensive embolic hematodocha. There is not always a clear distinction between fixed and free, as some species have a small embolic hematodocha that permits a slight bend of the embolus away from the tegulum. Several clades have both fixed- and movable-embolus palps (e.g., Amycoida, Astioida, Marpissoida, Euophryini, Aelurillini).

For fixed-embolus palps, there are two basic forms, a narrower oval form (e.g., *Hypaeus*, *Menemerus*, *Freya*, *Clynotis, Anarrhotus*, *Pellenes*, *Sitticus distinguendus* (Simon, 1868)) and a circular form (e.g., *Amycus*, *Afraflacilla*, *Chira*, *Myrmarachne*, *Epeus*, *Habronattus*, *Sitticus fasciger* (Simon, 1880)). The former typically have the embolus originating at about 9:00 to 10:00 (as on a clock face, left palp, ventral view), while the latter have the embolus arising at 8:00, or 5:00, or 2:00, or even further counterclockwise. These variants appear to be simply points along a continuum of rotation of the bulb, with the embolus getting longer and the bulb more circular as the origin of the embolus is rotated further counterclockwise. Many clades, well supported by molecular and other morphological data, separately show a diversity of rotations. Indeed, the exemplary genera noted above are respectively paired phylogenetically, with *Hypaeus* and *Amycus* both amycines, *Menemerus* and *Afraflacilla* both chrysillines, and so on. This strongly indicates considerable homoplasy in bulb rotation, and is the reason I mostly ignore the degree of rotation (embolus length), unlike Prószyński (2015), whose classification (unpublished by the rules of the ICZN 2012) appears to be heavily influenced by degree of rotation. Similar homoplasy is seen in the rotation of the spiral embolus in movable-embolus palps, where the embolus can vary from a simple curve to more than 720 degrees of spiralling (repeated in the marpissoids and many euophryine subclades).

Those fixed-embolus palps with a short embolus (i.e., bulb narrow, oval, less rotated) often have a cleft cutting diagonally from the base of the embolus across the functional tegulum, as in freyines (Galiano 1982, fig. 2) and hasariines (Logunov 1999a, fig. 24). This cleft is also seen in palps that have a movable embolus, as in dendryphantines, where the cleft forms the "tegular ledge" of Maddison (1996, fig. 3). The two regions on either side of the cleft have been named variously by authors: the more basal region (toward the subtegulum) is called the "shoulder" of the tegulum by Maddison (1996), the tegulum proper by Logunov & Cutler (1999), and the basal division of the tegulum by Edwards (in press). The region distal to the cleft (toward the embolus) is called the radix by Logunov and Cutler (1999), and the distal division of the tegulum by Edwards (in press). In more circular, rotated bulbs, this cleft is less distinct and may be absent.

## CLASSIFICATION

A summary of the classification is given in Table 1, and is presented in relation to recent phylogenetic results in Fig. 1. The placement of salticid genera into subfamilies, tribes, subtribes, and unranked clades is given in Table 2, and repeated in machine-readable form in supplemental materials, online at http://dx.doi.org/10.1636/R15-55.s1. Photographs of living representatives of each of these groups are shown in Figs. 2–136.

There are four categories of genera that I leave as "*incertae sedis*". Among the extant species, some are poorly enough known that we cannot even decide whether they are salticines or not ("Salticidae *incertae sedis*", 9 genera). Others are well enough described that we know they belong to the Salticinae, but their placement is unclear, usually because we lack clear synapomorphies to place them ("Salticinae *incertae sedis*", 48 genera). The fossil genera (Dunlop et al. 2015) include some that are clearly non-salticines ("Fossil Salticidae *incertae sedis*, not in the Salticinae", 7 genera) and others poorly enough known that we cannot place them in, or exclude them from, any subfamily ("Fossil Salticidae *incertae sedis*", 6 genera). All remaining genera of salticids, 540 in total, have been placed to tribe, major clade, or subfamily.

### **Family Salticidae** Blackwall, 1841

Sundevall, 1833: Attidae
Blackwall, 1841: Salticidae
F.O. Pickard-Cambridge, 1900: Salticidae
Simon, 1901: Salticidae
Peckham & Peckham, 1909: Attidae
Petrunkevitch, 1928: Salticidae
Roewer, 1954: Salticidae

**Remarks.**—See Edwards (2011) regarding the synonymy of *Attus* with *Salticus*, and thus the preference for Salticidae over Attidae.

*Monophyly:* Jumping spiders are united by the large anterior median eyes in the form of a long cone (Scheuring 1914; Ramírez 2014) whose retinas are vertical strips (Land 1969a; Blest et al. 1990) and by the eye arrangement: medium-sized anterior lateral eyes (ALE) just beside or behind the anterior

Table 1.—Summary of classification.

- **Family Salticidae** Blackwall, 1841
- **Subfamily Onomastinae** Maddison, *subfam. nov.*
- **Subfamily Asemoneinae** Maddison, *subfam. nov.*
- **Subfamily Lyssomaninae** Blackwall, 1877
- **Subfamily Spartaeinae** Wanless, 1984
  - **Tribe Spartaeini** Wanless, 1984, *stat. nov.*
    - **Subtribe Spartaeina** Wanless, 1984, *stat. nov.*
    - **Subtribe Holcolaetina** Simon, 1901, *stat. nov.*
  - **Tribe Cocalodini** Simon, 1901, *stat. nov.*
  - **Tribe Lapsiini** Maddison, *trib. nov.*
- **Subfamily Eupoinae** Maddison, *subfam. nov.*
- **Subfamily Hisponinae** Simon, 1901
- **Subfamily Salticinae** Blackwall, 1841
  - **Clade Amycoida** Maddison & Hedin, 2003
    - **Tribe Gophonini** Simon, 1901, *stat. nov.*
    - **Tribe Sitticini** Simon, 1901, *stat. nov.*
    - **Tribe Bredini** Ruiz & Maddison, 2015, *stat. nov.*
    - **Tribe Scopocirini** Simon, 1901, *stat. nov.*
    - **Tribe Thiodinini** Simon, 1901, *stat. nov.*
    - **Tribe Sarindini** Simon, 1901, *stat. nov.*
    - **Tribe Simonellini** Peckham, Peckham & Wheeler, 1889, *stat. nov.*
    - **Tribe Huriini** Simon, 1901, *stat. nov.*
    - **Tribe Amycini** F.O. Pickard-Cambridge, 1900, *stat. nov.*
  - **Clade Salticoida** Maddison & Hedin, 2003, new delimitation
    - **Tribe Agoriini** Simon, 1901, *stat. nov.*
    - **Tribe Baviini** Simon, 1901, *stat. nov.*
    - **Clade Astioida** Maddison, Bodner & Needham, 2008
      - **Tribe Myrmarachnini** Simon, 1901, *stat. nov.*
      - **Tribe Neonini** Maddison, *trib. nov.*
      - **Tribe Astiini** Simon, 1901, *stat. nov.*
      - **Tribe Mopsini** Maddison, *trib. nov.*
      - **Tribe Viciriini** Simon, 1901, *stat. nov.*
        - **Subtribe Viciriina** Simon, 1901, *stat. nov.*
        - **Subtribe Simaethina** Simon, 1903, *stat. nov.*
    - **Clade Marpissoida** Maddison & Hedin, 2003
      - **Tribe Ballini** Banks, 1892, *stat. nov.*
      - **Tribe Tisanibini** Maddison, *trib. nov.*
      - **Tribe Dendryphantini** Menge, 1879, *stat. nov.*
        - **Subtribe Synagelina** F.O. Pickard-Cambridge, 1900, *stat. nov.*
        - **Subtribe Itatina** Simon, 1901, *stat. nov.*
        - **Subtribe Marpissina** Simon, 1901, *stat. nov.*
        - **Subtribe Dendryphantina** Menge, 1879, *stat. nov.*
    - **Clade Saltafresia** Bodner & Maddison, 2012
      - **Tribe Nannenini** Maddison, *trib. nov.*
      - **Tribe Hasariini** Simon, 1903, *stat. nov.*
      - **Tribe Chrysillini** Simon, 1901, *stat. nov.*
      - **Clade Simonida** Maddison, *nov.*
        - **Tribe Leptorchestini** Simon, 1901, *stat. nov.*
        - **Tribe Euophryini** Simon, 1901, *stat. nov.*
        - **Tribe Salticini** Blackwall, 1841, *stat. nov.*
        - **Tribe Aelurillini** Simon, 1901, *stat. nov.*
          - **Subtribe Aelurillina** Simon, 1901, *stat. nov.*
          - **Subtribe Freyina** Edwards, 2015, *stat. nov.*
          - **Subtribe Thiratoscirtina** Bodner & Maddison, 2012, *stat. nov.*
        - **Tribe Plexippini** Simon, 1901, *stat. nov*
          - **Subtribe Plexippina** Simon, 1901, *stat. nov*
          - **Subtribe Harmochirina** Simon, 1903, *stat. nov*

median eyes (AME), behind which are the smallest eyes, behind which are the medium-sized posterior eyes. The smallest eyes, which are sometimes almost as large as the others, are here and traditionally referred to as the posterior medians (PME), although Homann (1971) argues that they are homologous to the posterior laterals of other spiders. This placement of the PMEs and posterior lateral eyes (PLE) results from a strong curvature of the posterior eye row, which can be considered another synapomorphy (Ramírez 2014). The jumping behaviour (Parry & Brown 1959; Hill 2010b), more precise than in other spiders, likely implies synapomorphies in cuticle, muscle or nervous systems, but they have not been described. Ramírez (2014) indicates several other possible synapomorphies for the family: loss of cylindrical gland spigots, gain of a median apophysis, and reversal to prograde leg orientation. Molecular data concur that the family is monophyletic (Maddison et al. 2014).

*Subdivision:* The basic division of the family established here, into 7 subfamilies, is based on both morphological (Wanless 1980c, 1985; Maddison 1988, 1996; Ramírez 2014) and molecular (Maddison et al. 2014) data. Table 1 presents the classification of salticids to the level of subtribe. Each of the 7 subfamilies, 30 tribes, and 13 subtribes will be considered in turn. The genera assigned to each are listed in Table 2.

With the recognition of the familiar and well-established clade as the subfamily Salticinae, the phylogeny (Fig. 1; Maddison et al. 2014) dictates that we recognize the Hisponinae and Spartaeinae as distinct subfamilies. The Eupoinae are distinctive and of unclear affiliation, and therefore provisionally separated. Most tentative is the separation of the former Lyssomaninae (Wanless 1980c) into three subfamilies, the Onomastinae, Asemoneinae, and Lyssomaninae. These three collectively have been treated as a separate family (Banks 1892; Roewer 1954) or subfamily (Galiano 1976b). They are superficially similar, sharing translucent green or yellow bodies, long legs, complex palps and the ALE placed behind and above the AME to form a second separate eye row. Their complex palps could represent a symplesiomorphy, and so do not provide evidence for their joint monophyly. Both the translucent greenish foliage-dwelling body form and displaced ALEs could be synapomorphies uniting the three groups, but alternatively they could be ancestral for the family or convergent, as other salticids show independent origins of both long-legged green body forms (e.g., *Epeus*, *Orthrus*, *Sidusa*) and displaced ALEs (e.g., *Athamas*, *Mantisatta* – see Wanless 1980c). Benjamin (2010) suggested that his morphological data support the monophyly of the former Lyssomaninae *sensu lato*, but this conclusion does not follow from his analysis, as only a single non-lyssomanine taxon was included. Wanless (1980c) suggested the Lyssomaninae *sensu lato* may be polyphletic, dividing it into three groups that correspond to the three subfamilies recognized here. Molecular analyses suggest that the Onomastinae, Asemoneinae, and Lyssomaninae may not form a clade (Maddison & Needham 2006; Su et al. 2007; Maddison et al. 2008; Bodner & Maddison 2012; Maddison et al. 2014). They are treated as separate subfamilies here, despite ambiguity in the molecular results. Even if they were to fall into a single monophyletic group, their molecular divergences are as deep as those separating other subfamilies (Maddison et al. 2014).

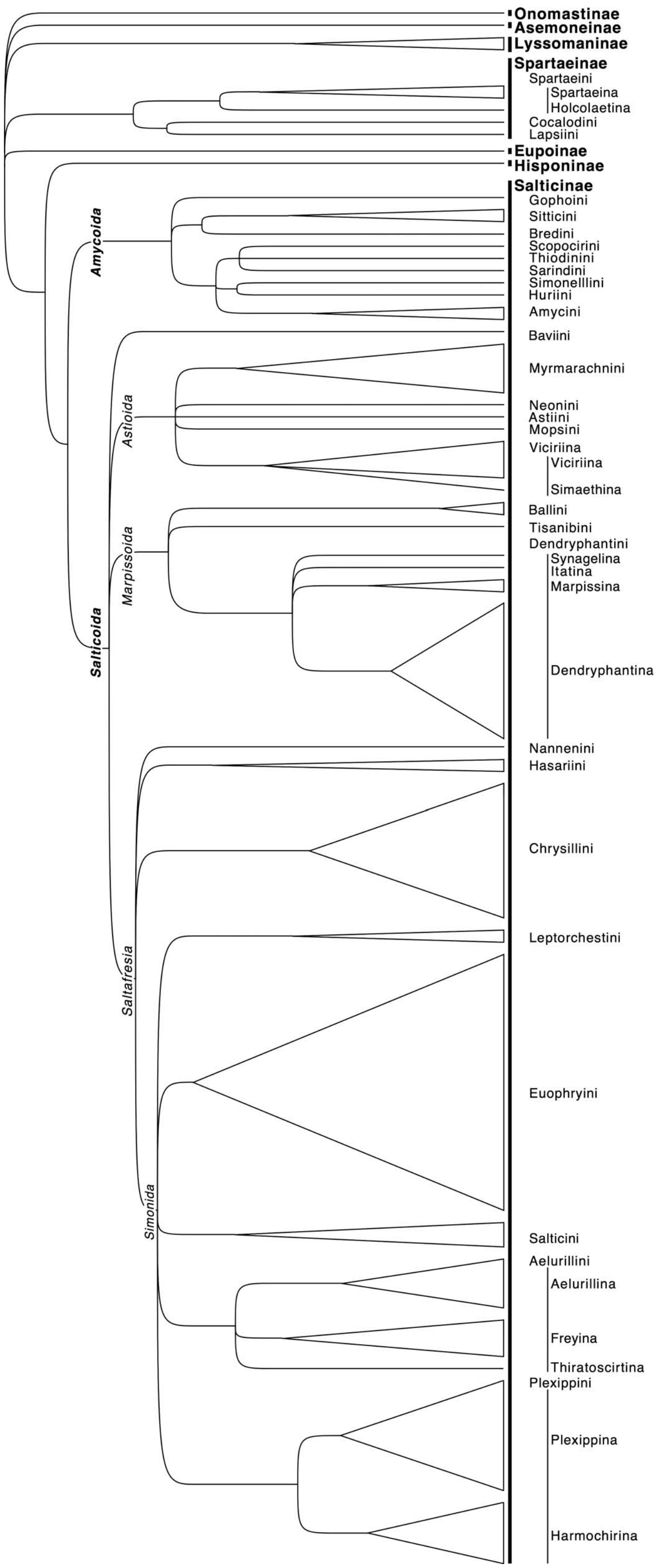


Figure 1.—Summary phylogeny of Salticidae showing higher taxa, based primarily on molecular results of Maddison et al. (2014) and others (see text). The Agoriini, somewhere within the Salticoida, is not shown. The span of each terminal clade is drawn approximately proportional to its number of described species. Divergence depths are shown approximately proportional to their inferred ages from Bodner & Maddison (2012) and Zhang & Maddison (2013), with ages not included therein interpolated subjectively using branch lengths from Maddison et al. (2014).

Putative ancestral states for salticids in various characters can be inferred from the discussions of synapomorphies under particular clades. Three worth mentioning here are the presence of a median apophysis (Maddison 2009), the presence of large posterior median eyes (Wanless 1984a), and the presence of a claw on the female palp (Maddison 1996). Relatively few salticids show these features, and those that have any one of these are instantly marked as falling outside the Salticinae.

Some Baltic Amber salticids have a characteristic constriction behind the PMEs, and hence are here considered to be hisponines. The remainder (e.g., *Eolinus*) are clearly non-salticines that cannot yet be placed to any subfamily. Although Wunderlich (2004) considered them "Cocalodinae", his concept of the subfamily was paraphyletic, without synapomorphies. I therefore consider the non-hisponine Baltic salticids to be non-salticine Salticidae *incertae sedis*. While the Baltic Amber is striking for its lack of Salticinae, the younger Dominican Amber appears remarkably modern, including extant genera in such salticine groups as the euophryines and gophoines (Wunderlich 1982; Wunderlich 1988; Wolff 1990; Penney 2008).

### **Subfamily Onomastinae** Maddison, **subfam. nov.**

http://zoobank.org/?lsid=urn:lsid:zoobank.org:act:74993737-8A80-48B6-8660-6EF149DD7A6E
(1 genus; Fig. 2)

**Type genus.—***Onomastus* Simon, 1900

**Remarks.—**Delicate, translucent and long-legged, with highly complex palps, from the Asian tropics. As in lyssomanines and asemoneines, the ALE are above the AME, forming two separate rows. Benjamin (2010) divides *Onomastus* into two groups, a Southeast Asia clade with a broad conductor and epigynal folds, and a South Asia clade with a medial branch on the median apophysis and a TA3 tegular apophysis.

*Monophyly and Diagnosis:* Wanless (1980b) proposes the distinctive tegular apophysis as a synapomorphy for onomastines (Wanless 1980b, fig. 3E). Benjamin (2010) indicates two additional synapomorphies for *Onomastus* species, the absence of the retrolateral tibial apophysis (Benjamin 2010, fig. 4A) and the dorsal origin of the embolus (Benjamin 2010, figs. 9A, 15A).

### **Subfamily Asemoneinae** Maddison, **subfam. nov.**

http://zoobank.org/?lsid=urn:lsid:zoobank.org:act:018DD4F2-4695-4E50-A287-DD8ADFC151E2
(5 genera; Figs. 3, 4)

**Type genus.—***Asemonea* O. Pickard-Cambridge, 1869

**Remarks.—**The African and Asian asemoneines are translucent and long-legged (Wanless 1980a, c), resembling onomastines and lyssomanines. They correspond to Wanless's (1980c) "Group III" among the lyssomanines *sensu lato*. *Asemonea* is widely distributed in the African and Asian tropics. Most of the rest of the group's diversity is in Africa, with four genera occurring in Madagascar.

*Monophyly and Diagnosis:* This group is distinguished by the unusually medial position of the PME, distinctly closer to the midline than is the inner edge of the ALE, an apparent synapomorphy (Wanless 1980c, figs. 2D, E, F). Molecular data (Maddison et al. 2014) unite the three sampled asemoneines, *Asemonea*, *Goleba* and *Pandisus*. Logunov (2004) suggests *Hindumanes* is near *Pandisus*, sharing their minute PLE.

### **Subfamily Lyssomaninae** Blackwall, 1877
(2 genera; Figs. 5–7)

Blackwall, 1877: Lyssomanidae
Peckham & Peckham, 1886: Lyssomaneae
Peckham, Peckham & Wheeler, 1889: Lyssomaneae, Lyssomanii
Thorell, 1895: Lyssomaninae
F.O. Pickard-Cambridge, 1900: Lyssomaneae
Simon, 1901: Lyssomaneae
Petrunkevitch, 1928: Lyssomaninae
Roewer, 1954: Lyssomanidae
Galiano, 1976b: Lyssomaninae

**Remarks.**—Lyssomanines are translucent and long-legged, usually green or yellow, from the American tropics (Galiano 1980, 1998; Logunov & Marusik 2003b; Logunov 2014). They dwell on foliage, especially large leaves. As in asemoneines and onomastines, the ALE are above the AME, forming a second separate row. Two genera are described, although Maddison et al.'s (2014) results suggest that *Lyssomanes* may be paraphyletic with respect to *Chinoscopus*.

*Monophyly:* Wanless (1980c) suggests the membranous secondary conductor as a possible synapomorphy of lyssomanines (Wanless 1980c, figs. 2G, H). Molecular data (Maddison et al. 2014) strongly support the monophyly of the group.

### **Subfamily Spartaeinae** Wanless, 1984
(29 genera; Figs. 8–20)

Simon, 1901: Boetheae, Cocaleae, Cocalodeae, Codeteae, Cyrbeae, Holcolaeteae, Lineae
Petrunkevitch, 1928: Boethinae
Roewer, 1954: Boethinae, Boetheae, Cocaleae, Cocalodeae, Codeteae, Holcolaeteae, Lineae
Wanless, 1984a: Spartaeinae
Wunderlich, 2004: Cocalodinae

**Remarks.**—Wanless's Spartaeinae and his "*Cocalodes* group", along with the lapsiines, are united here in the subfamily Spartaeinae. The names used for the subfamily and its contained groups are discussed below under "Problematic names".

*Monophyly:* Among non-salticine salticids, the Spartaeinae lack the distinctive green or yellow translucence of the lyssomanines, onomastines and asemoneines, lack the ocular constriction on the carapace of hisponines, and lack the small shiny bodies of eupoines. In this regard, the Spartaeinae appear generalized, united only by possibly ancestral character states. Together they have no known morphological synapomorphies. It was not necessarily expected therefore that they would be monophyletic. Rodrigo & Jackson (1992) concluded that their morphological data supported the monophyly of the group (ignoring the lapsiines, of which they were unaware), but this conclusion does not follow from their analyses, because the latter included only a single taxon outside the group (*Asemonea*). Nonetheless, the molecular data (Maddison et al. 2014) clearly show that spartaeines, cocalodines and lapsiines form a clade. Similarly generalized salticids such as *Eolinus* and *Cenattus* are known from Paleogene Baltic amber, but there is no evidence to date that they are also part of this clade.

Appearing frequently in the Spartaeinae are PMEs notably larger than in the Salticinae. However, large PMEs are also seen in some asemoneines, and some Spartaeinae have small PMEs. While PME size is therefore problematical as evidence for monophyly, it can serve as an informal identification aid: all known living salticids with large PMEs that are not *Lyssomanes*-like (i.e., are not translucent and long-legged) belong to the Spartaeinae.

The subgroups of Spartaeinae are clearly defined by geographical range, if not by morphology. The Spartaeini has known synapomorphies, but the Cocalodini and Lapsiini are not distinguished by any documented morphological synapomorphies, appearing simply to be generalized salticids. In practice, they are best distinguished by molecular data or location (Lapsiini are American; Cocalodini are Australasian except for the distinctive *Depreissia*; Spartaeini are Afro-Eurasian, except for a few Australasian species).

### **Tribe Spartaeini** Wanless, 1984

Synonymy given under subtribe Spartaeina

**Remarks.**—This group was first recognized by Wanless (1985) when he proposed that *Holcolaetis* and *Sonoita* — the present Holcolaetina — are closely related to what is here called the Spartaeina. Su et al. (2007)'s concept of Spartaeinae matches the tribe Spartaeini here.

Many of the Spartaeini are known to eat other spiders, to build webs, and to invade webs of other spiders (Su et al. 2007). The Spartaeini are primarily African and Asian, with a few representatives in Europe and Australasia.

*Monophyly:* Wanless (1985) proposes abdominal secretory organs as a synapomorphy uniting the members of this group (Wanless 1984b, figs. 16–21; Wanless 1985, fig. 12B). The molecular data (Maddison et al. 2014) strongly support their monophyly.

### **Subtribe Spartaeina** Wanless, 1984
(16 genera; Figs. 8–13)

Simon, 1901: Boetheae, Cocaleae, Codeteae, Cyrbeae, Lineae
Petrunkevitch, 1928: Boethinae
Roewer, 1954: Boetheae, Cocaleae, Codeteae, Lineae
Wanless, 1984a: Spartaeinae

**Remarks.**—This is the Spartaeinae of Wanless (1984a), delimited by the presence of a tegular furrow. It is restricted to the tropics and subtropics of the Old World (Wanless 1978b, 1979, 1981b, c, 1984a, b, 1987). The best-known member is the araneophagous *Portia* (Jackson & Blest 1982; Jackson & Hallas 1986a, 1990; Jackson & Wilcox 1990, 1993;

Jackson 1992a, b, 1995; Clark & Jackson 2000; Jackson et al. 2001, 2008b; Jackson & Nelson 2011; Cross & Jackson 2014). The habitats of Spartaeina range from tree trunks (*Phaeacius*, *Mintonia*) to foliage (*Brettus*, some *Neobrettus*) and suspended litter near the ground (*Taraxella*).

*Monophyly:* A furrow in the tegulum just retrolateral from the base of the embolus, running parallel to the periphery of the tegulum, delimits this group ("tegular furrow", Wanless 1984a, figs. 35A, C, E). It does not appear to be homologous with the tegular furrow of Ramírez (2014, fig. 157) or the cleft behind the tegular ledge of Maddison (1996). Loss of the median apophysis (Wanless 1984a) is a synapomorphy, but convergent with losses in salticines, hisponines and lyssomanines. In addition, the conductor is lost or extremely reduced in most, though not all (Wijesinghe 1992). The group is strongly supported by molecular data (Su et al. 2007; Maddison et al. 2014).

### **Subtribe Holcolaetina** Simon, 1901
(2 genera; Fig. 14)

Simon, 1901: Holcolaeteae
Roewer, 1954: Holcolaeteae

**Remarks.—**A strictly African group notable for the prominent conductor on the palp (Wanless 1985). Unlike the Spartaeina, holcolaetines retain a distinct median apophysis. *Holcolaetis* is a large, flat bark dweller reminiscent of *Marpissa* or *Balmaceda*, but instantly recognizable as a non-salticine by its large PMEs.

*Monophyly:* Wanless (1985) suggests the two genera of holcolaetines share as synapomorphies "the characteristic form of the tegulum, median apophysis and distal haematodocha in males and epigynal flanges in females". The first three of these have not been well explained as synapomorphies, but the epigynal flanges are distinctive (Wanless 1985, fig. 11J). Molecular data support their joint monophyly (Maddison et al. 2014).

### **Tribe Cocalodini** Simon, 1901
(6 genera; Figs. 18–20)

Simon, 1901: Cocalodeae
Roewer, 1954: Cocalodeae
Wunderlich, 2004: Cocalodini, Cocalodinae
Maddison, 2009: Cocalodinae

**Remarks.—**Cocalodines are non-salticine salticids with large PMEs (except in *Cucudeta* and *Depreissia*), restricted (except for *Depreissia*) to Australasia east of Wallace's Line (Wanless 1982; Maddison 2009). They are common components of the fauna of New Guinea, with varied body forms (Maddison 2009). Habitats vary, from foliage (*Cocalodes*, some *Tabuina*) to tree trunks (*Allococalodes*, *Yamangalea*, some *Tabuina*) and leaf litter (*Cucudeta*).

*Monophyly:* With the possible exception of the large size of the median apophysis (Maddison et al. in press), there are no known morphological synapomorphies of the group. However they are the only salticids east of Wallace's Line with a median apophysis on the palp. The molecular data (Maddison et al. 2014) clearly place the five Australasian genera together. The sixth genus, *Depreissia*, is placed only tentatively with the cocalodines. Known from central Africa and Borneo (Wesołowska 1997; Deeleman-Reinhold & Floren 2003; Szűts & Wesołowska 2003), *Depreissia* resembles an ant or wasp (Christa Deeleman-Reinhold, pers. comm.). Its placement outside the Salticinae is strongly supported by its median apophysis (Maddison et al. in press), absence of a cymbial apical groove cradling the embolus (Maddison et al. in press), and by molecular data (Maddison et al. in press). Molecular data suggest it is the sister group to the remaining cocalodines (Maddison et al. in press).

### **Tribe Lapsiini** Maddison, **trib. nov.**
http://zoobank.org/?lsid=urn:lsid:zoobank.org:act:173197EF-71CA-4615-8786-4D33210B3BAC
(5 genera; Figs. 15–17)

**Type genus.—***Lapsias* Simon, 1900

**Remarks.—**The Neotropical lapsiines are the only non-salticines other than lyssomanines in the New World. Following Simon's early description of four *Lapsias* species from Venezuela, no other species were correctly added to this group for more than a century. Recently, several species and four new genera were added (Maddison 2006, 2012; Makhan 2007; Ruiz & Maddison 2012; Ruiz 2013a). Some live on leaf litter (*Soesiladeepakius*, some *Lapsias*), others on foliage (*Galianora sacha* Maddison, 2006), others on mossy tree trunks (*Thrandina*, *Galianora bryicola* Maddison, 2006, other *Lapsias*). The only lapsiine with substantially large PMEs is *Thrandina*.

*Monophyly and Diagnosis:* There is no known morphological synapomorphy for this group. The molecular data strongly support its monophyly, although the unusual *Thrandina* branches deep (Maddison et al. 2014). Diagnostic characters can be found in the molecular data: in the alignments submitted by Maddison et al. (2014) to the Dryad data repository (http://dx.doi.org/10.5061/dryad.v53h1), site 110 in CO1 has G in *Thrandina parocula* Maddison, 2006 and the two species of *Galianora* (the only three lapsiines sampled for that gene) *versus* C in all other salticids sampled. Similarly, in 18S rRNA, sites 522 (A *vs.* G) and 543 (T *vs.* C) supply apparent synapomorphies for lapsiines.

### **Subfamily Eupoinae** Maddison, **subfam. nov.**
http://zoobank.org/?lsid=urn:lsid:zoobank.org:act:BE3B9C99-A02F-40C4-8FF4-A20117EE2771
(3 genera; Figs. 21, 22)

**Type genus.—***Eupoa* Żabka, 1985

**Remarks.—**Known from subtropical Southeast Asia (southern China, Vietnam, Thailand), these are the only known minute litter-dwelling non-salticines, resembling *Neon* or *Neonella*. Other litter-dwelling non-salticines (e.g., *Cucudeta*, *Soesiladeepakius*, some *Lapsias*) are larger-bodied. There are three genera described (Żabka 1985; Zhou & Li 2013a, b; Logunov & Marusik 2014). Their phylogenetic placement is uncertain, but both the molecular data and morphological features indicate they are non-salticines (Maddison et al. 2007, 2014). Zhou & Li (2013a, figs. 90, 91) illustrate the insertion of the highly complex palps into the epigynum.

*Monophyly and Diagnosis:* Eupoines can be recognized by the complex palps (Żabka 1985; Zhou & Li 2013a; Logunov & Marusik 2014), small size, the dorsal abdominal scutum in the male, anterior eye row wider than posterior (Logunov & Marusik 2014), and the paired pale spots on the abdomen. The last two features could be synapomorphies, though they are weak. The complex palps will likely supply some morphological synapomorphies, but none has been clearly articulated. Molecular data (Maddison et al. 2007, 2014) indicate that eupoines are distinctive from all of the other subfamilies, but these data do not give evidence for the monophyly of the group, as they are available for only one species (*Eupoa nezha* Maddison & Zhang, 2007). Logunov & Marusik (2014) suggest that the three genera are so close that they might best be considered a single genus. On the other hand, the apparent diversity in palp form is great.

### **Subfamily Hisponinae** Simon, 1901

(9 genera; Figs. 23–27)

Simon, 1901: Hisponeae, Tomocyrbeae
Petrunkevitch, 1942: Gorgopsininae
Roewer, 1954: Hisponeae, Tomocyrbeae

**Remarks.—**The only extant subfamily of salticids recognizable in Baltic Amber, this group is diverse in Madagascar but nowhere else. Outside of Madagascar, the Seychelles and Africa, they are known from only a few specimens from Asia (Wanless 1981a; Maddison & Piascik 2014). The constriction behind the small eyes is distinctive. This group has received attention in recent years (Wanless 1981a; Prószyński & Żabka 1983; Wesołowska 1993; Wesołowska & Haddad 2009, 2013, 2014; Szűts & Scharff 2009; Maddison & Piascik 2014), but many species remain to be described.

*Monophyly:* The transverse furrow or constriction in the carapace just behind the small eyes (Fig. 23) can be considered a synapomorphy of hisponines, as can the dual copulatory ducts in females (Maddison & Piascik 2014, figs. 21–23). Molecular data support the monophyly of the group (Maddison et al. 2014).

*Relationships:* Molecular and morphological evidence places the Hisponinae as the sister group to the Salticinae (Bodner & Maddison 2012; Maddison et al. 2014; Ramírez 2014). Morphological synapomorphies potentially uniting the two subfamilies are:

(1) Reduction of PMEs (Wanless 1984; homoplasious: also reduced in *Cyrba*, *Cucudeta*, *Lyssomanes*, *Onomastus*, *Pandisus*).
(2) Medial displacement of gnathocoxal glands (see Maddison 1996). In hisponines, the medial displacement can be seen in images of *Hispo* sp. (Bemaraha) (http://www.morphbank.net/bischen/?id=497568) in the SpiderATOL collection in MorphBank (M. Ramírez, http://www.morphbank.net/myCollection/?id=799626).
(3) Asymmetrical tarsal claws (Simon 1901: 385; Maddison 1996; Ramírez 2014).
(4) Female palp tarsal claw reduced (Ramírez 2014). In hisponines it is reduced to a nubbin (Ramírez 2014), in salticines lost entirely.
(5) Loss of conductor of palp (Ramírez 2014).
(6) Presence of a cymbial apical groove that cradles the tip of the embolus (Maddison et al. in press).

The first three of these had been considered synapomorphies of salticines by Maddison (1988, 1996), but at the time hisponines were unstudied (and indeed, implicitly considered as salticines).

### **Subfamily Salticinae** Blackwall, 1841

Blackwall, 1841: Salticidae
Maddison, 1996: Salticine Division
Maddison & Hedin, 2003a: Salticoida

**Remarks.—**This large clade, known in the past as the "advanced salticids" (e.g., Wanless 1984a), the "Salticine Division" (Maddison 1996), or the Salticoida (Maddison & Hedin 2003a), includes about 93% of the known species of salticids. Its former name Salticoida is reapplied in this classification to a narrower group excluding the Amycoida, so as to permit this major long-recognized clade to receive the formal rank of subfamily. Thus, the Salticinae is divided into two major clades, the Amycoida and the Salticoida. Salticines are known throughout the world, including temperate and arctic regions.

*Monophyly:* The monophyly of the Salticinae has been well demonstrated by both morphological (Maddison 1988, 1996; Ramírez 2014) and molecular data (Bodner & Maddison 2012; Maddison et al. 2014). The following can be considered synapomorphies for the Salticinae:

(1) Tarsal claw absent on female palp (Maddison 1988, 1996; Ramírez 2014).
(2) Median apophysis absent on male palp (see Maddison 2009). It is also absent in some spartaeines, hisponines and lyssomanines. Some authors have interpreted structures in salticines as median apophyses (Logunov & Hereward 2006; Szűts & Rollard 2007; Logunov & Azarkina 2008b), but none appears homologous to that of basal salticids. The median apophysis of basal salticids is distinctive: a sclerite arising from the ventral face of the tegulum, surrounded by the tegulum but separated from it by a membrane, and with a special relationship to the spermophore (usually, a loop of the narrowing spermophore approaches the median apophysis before bending back and entering the embolus).
(3) Medial mound of slit sense organs on the chelicerae (Maddison 1988, 1996; Ramírez 2014).
(4) Inter-cheliceral sclerite reduced (Maddison 1988, 1996; Ramírez 2014).
(5) More complex tracheal system (Galiano 1976b; Wanless 1980c, 1981a; Ramírez 2014).
(6) An abrupt gait. Salticine locomotion is different from that of all or most non-salticines, involving motions that seem more abrupt. This could relate to the difference in tracheation. The gait difference has not been well

characterized, and so any synapomorphy cannot be described clearly, but an experienced collector can quickly recognize most non-salticines by their soft-edged, almost serene motions. Such a gait has been noted for the Spartaeinae (Maddison 2006, 2009) and Hisponinae (https://www.youtube.com/watch?v=HXDkUkLnK5g).

(7) Cymbium constricted at tibial joint, usually with distinct prolateral notch (Edwards in press).

The following may be synapomorphies of salticines, but have not been studied in enough members (e.g., in amycoids) to know where on the phylogeny they evolved:

(8) Loss of tarsal scopula of tenant setae (Ramírez 2014, character 161).
(9) Loss of trichobothrial distal plate transverse ridge (Ramírez 2014, character 182).
(10) Reduction of male PMS minor ampulates to one (Ramírez 2014, character 274).
(11) Loss of cymbium dorsal chemosensory patch (Ramírez 2014, character 324).

The following are derived features present in Salticinae but absent in most or all non-salticines. They have not been examined in hisponines, and therefore could be synapomorphies either for Salticinae, or for the clade uniting Salticinae and Hisponinae.

(12) Retinal strip of AME boomerang-shaped (as opposed to straight) (Blest et al. 1990).
(13) AME rhabdomeres rotated to eliminate suture lines (Blest et al. 1990).

A shorter and more anteriorly placed dorsal apodeme (fovea) of the carapace may also provide a synapomorphy (Wanless 1984). As well, salticines have, in general, greater heterogeneity of setae on legs than non-salticines. Salticine legs show a seemingly chaotic variety of setal lengths in addition to macrosetae, scales, and trichobothria. In contrast, the leg setae of many or all non-salticines appear as a uniform pelt. As with gait, differences in setae are not thoroughly studied.

### **Clade Amycoida** Maddison & Hedin, 2003
(63 genera; Figs. 28–55)

Maddison & Hedin, 2003a: Amycoida

**Remarks.—**This diverse clade dominates the Amazon basin and stands as a major group in salticids — sister group to the enormous Salticoida — and yet is absent from the Old World except for *Sitticus*. Their body forms span the range of salticid diversity: long legged foliage-dwellers (the Amycini), ant-like forms (*Synemosyna*, *Sarinda*), beetle-like forms (*Cylistella*), flat bark dwellers (*Breda*), and unremarkable ground-dwellers (*Sitticus*). Most of what we know about the group is due to the efforts of Galiano (1957, 1958, 1963b, 1964a, b, c, 1965, 1966a, b, 1968b, 1971a, b, 1975, 1976a, 1977, 1985, 1987, 1988, 1989, 1991a, b), and more recently, Ruiz and colleagues (Ruiz & Brescovit 2005a, 2006a, b, 2013; Costa & Ruiz 2014; Patello & Ruiz 2014; Ruiz & Maddison in press). There are about 430 described species, but this is almost certainly only a small fraction of the total extant. For instance, there are currently 11 species of *Amycus* recognized from all of the Neotropics, but in about two months of collecting within a 10 km radius at Cuyabeno, Ecuador, I found about 20 species.

In each of the 9 contained tribes except the Gophoini and the Bredini, the palpal bulb has a fixed embolus and is usually circular, though occasionally oval.

*Definition:* A formal definition was given by Ruiz & Maddison (in press): the Amycoida is the smallest clade containing *Cotinusa*, *Amycus*, *Sitticus*, *Breda*, *Sarinda* and *Synemosyna*.

Here I follow the classification of Ruiz & Maddison (in press), except for the re-ranking of their subfamilies as tribes. As they treat the amycoids fully, the account here is abbreviated. See Ruiz & Maddison (in press) for synapomorphies and molecular support for the individual tribes.

*Monophyly:* This group was first recognized on the basis of molecular data, which strongly support its monophyly (Maddison & Hedin 2003a; Bodner & Maddison 2012; Maddison et al. 2014; Ruiz & Maddison in press). To date, there is no known morphological synapomorphy, though an unusual loop of the sperm reservoir of the palp is present near the subtegulum (Galiano 1968b, fig. 2; Prószyński 1980, fig. 5; Ruiz & Brescovit 2013, fig. 17 [left side]). It is rare to see such a loop in salticids with circular and fixed-embolus palps. Euophryines and others have a similar loop, but usually further from the subtegulum than in amycoids (Ruiz & Maddison in press).

Molecular data (Maddison, unpublished) show that *Asaracus*, once thought to be an amycoid (Ruiz & Brescovit 2008b), is a freyine near *Chira*. *Orvilleus* and *Toloella* are amycoids by their genitalia, but they are poorly studied and cannot yet be assigned to a tribe. *Albionella* and *Udalmella*, listed as Salticinae *incertae sedis*, could be amycoids.

### **Tribe Gophoini** Simon, 1901
(8 genera; Figs. 28–30)

Simon, 1901: Thiodineae [based on a misinterpretation of *Thiodina*], Gophoeae
Petrunkevitch, 1928: Thiodininae
Roewer, 1954: Thiodininae, Thiodineae
Ruiz & Maddison, 2015: Gophoinae

**Remarks.—**This group, long known as the thiodinines, cannot retain that name with the discovery that the name *Thiodina* had long been misapplied (Bustamante et al. 2015; Ruiz & Maddison in press). Thus, Thiodineae and Thiodininae are not synonyms of Gophoini, but are listed in the synonymy above because the literature's past concept of Thiodininae refers to this clade. The type genus is *Gophoa* Simon, 1901, currently considered a junior synonym of *Cotinusa* Simon, 1900 (see Ruiz & Maddison in press). The best-known genus is *Colonus* (formerly known as *Thiodina*). Gophoines are elongate, often with a carapace-leg stridulatory apparatus (Maddison 1987) and paired bulbous setae on the first legs (Hill 2012). While their motions are often deliberate and slow, they are excellent jumpers, seeming to tense strongly before popping in long jumps.

### **Tribe Sitticini** Simon, 1901
(10 genera; Figs. 32–34)

Simon, 1901: Sitticeae

Petrunkevitch, 1928: Sitticinae
Roewer, 1954: Sitticinae, Sitticeae
Prószyński, 1976: Sitticinae
Ruiz & Maddison, 2015: Sitticinae

**Remarks.—**This is the only amycoid group to have reached the Old World. The bulk of its described species are in Eurasia, studied extensively by Prószyński (1968, 1971b, 1973, 1980). However, the deeper diversity of the group is South American (Galiano 1987, 1989, 1991a, b; Ruiz & Brescovit 2005a, 2006a, b). Sitticines are distinctive in having lost the retromarginal cheliceral tooth (as in leptorchestines and some euophryines and aelurillines) and in having third legs much shorter than the fourth. They are ground dwellers, with few exceptions (e.g., *Sitticus palustris* (Peckham & Peckham, 1883) lives on marsh vegetation).

### **Tribe Bredini** Ruiz & Maddison, 2015
(2 genera; Fig. 31)

Ruiz & Maddison, 2015: Bredinae

**Remarks.—**These flat salticids dwell in suspended litter and on tree trunks. Two genera are described (Ruiz & Brescovit 2013). They were once thought to be marpissines (e.g., Edwards 2006) but molecular data have shown them to be amycoids. In retrospect, the sperm duct loop in the tegulum is typical for amycoids (Ruiz & Brescovit 2013, fig. 15).

### **Tribe Scopocirini** Simon, 1901
(2 genera; Figs. 39, 40)

Simon, 1901: Scopocireae
Roewer, 1954: Scopocireae
Ruiz & Maddison, 2015: Scopocirinae

**Remarks.—**The chelicerae and palps of males are unusual in *Scopocira* (Costa & Ruiz 2014). *Gypogyna* is only tentatively placed with *Scopocira* (Ruiz & Maddison in press).

### **Tribe Thiodinini** Simon, 1901
(9 genera; Figs. 36–38)

Simon, 1901: Thiodineae
Simon, 1903: Hyetusseae
Mello-Leitão, 1917: Arachnomureae
Roewer, 1954: Hyetusseae
Ruiz & Maddison, 2015: Thiodininae

**Remarks.—**The name “Thiodinini” now applies to what would have formerly been called the Hyetusseae (Ruiz & Maddison in press), because of the reinterpretation of *Thiodina* (Bustamante et al. 2015). The thiodinines include both elongate (e.g., *Cyllodania*, *Arachnomura*) and high-bodied (e.g., *Titanattus*) forms (Ruiz & Maddison in press).

### **Tribe Sarindini** Simon, 1901
(7 genera; Figs. 47, 48)

Simon, 1901: Sarindeae, Zuningeae [sic]
Roewer, 1954: Sarindeae, Zunigeae
Ruiz & Maddison, 2015: Sarindinae

**Remarks.—**Of the two major groups of ant-like amycoids, the sarindines are the more robust, appearing more like *Formica* or *Camponotus* ants than does *Synemosyna*.

### **Tribe Simonellini** Peckham, Peckham & Wheeler, 1889
(4 genera; Figs. 41–46)

Peckham, Peckham & Wheeler, 1889: Simonellii
Banks, 1892: Synemosinae
F.O. Pickard-Cambridge, 1900: Synemosyneae
Simon, 1901: Synemosyneae
Roewer, 1954: Synemosyneae
Prószyński, 1976: Synemosyninae
Ruiz & Maddison, 2015: Simonellinae

**Remarks.—**This group is a strange mix of small beetle-like salticids (*Cylistella*, Figs. 44, 45) and ant-like salticids (Figs. 41–43, 46), including *Synemosyna*, often an excellent mimic of the elongate ant *Pseudomyrmex*. See Ruiz & Maddison (in press) for the use of the name “Simonellini”. The type genus is *Simonella* Peckham & Peckham, 1885, a junior synonym of *Synemosyna* Hentz, 1846.

### **Tribe Huriini** Simon, 1901
(6 genera; Fig. 35)

Simon, 1901: Hurieae
Ruiz & Maddison, 2015: Huriinae

**Remarks.—**Most huriines have a typical, unremarkable salticid body form (Fig. 35). Huriines have been studied by Galiano (1985, 1988).

### **Tribe Amycini** F.O. Pickard-Cambridge, 1900
(13 genera; Figs. 49–55)

F.O. Pickard-Cambridge, 1900: Amyceae
Simon, 1901: Amycieae
Petrunkevitch, 1928: Magoninae
Roewer, 1954: Magoninae, Amycieae
Maddison & Hedin, 2003a: Amycinae
Ruiz & Maddison, 2015: Amycinae

**Remarks.—**This large and speciose group of mostly foliage-dwellers includes many with translucent legs, and males with a high clypeus. Many are excellent jumpers: I measured a 5.2 mm juvenile *Hypaeus* aff. *porcatus* (Taczanowski, 1871) from Yasuní, Ecuador jump 25 cm on a horizontal surface (more than 45 times its body length). The third leg is longer than the fourth (Ruiz & Maddison in press), as in many Simonida.

### **Clade Salticoida** Maddison & Hedin, 2003, **new delimitation**
(427 genera; Figs. 56–136)

**Remarks.—**This clade, sister group to the primarily-Neotropical Amycoida, includes the vast bulk of described species in the Salticinae, although our counts are likely skewed against the Amycoida by the relatively little attention paid to the South American fauna. The relationships among the subgroups of Salticoida are ambiguous, but some analyses (Bodner & Maddison 2012) suggest that baviines, marpissoids and astioids may form a clade, which would then be sister to the Saltafresia.

*Definition:* This clade has been recognized (e.g., node 3, Maddison et al. 2014), but not previously given a name. The name "Salticoida" is used for it here, reassigning the name from its former meaning (the current Salticinae), as explained under Salticinae. The Salticoida is now defined formally as the smallest clade containing baviines, marpissoids, astioids and the Saltafresia.

*Monophyly:* There are no known morphological synapomorphies of this group, and yet it is reconstructed with confidence by combined molecular datasets as well as by individual genes (28S rRNA, 18S rRNA, *wingless*, myosin HC; Maddison et al. 2014).

### **Tribe Agoriini** Simon, 1901
(2 genera; Figs. 56, 57)

Simon, 1901: Agorieae
Petrunkevitch, 1928: Agoriinae
Roewer, 1954: Agoriinae

**Remarks.**—This group includes only *Agorius* and *Synagelides*, unusual ant-like salticids from Asia and Australasia (Szűts 2003a; Logunov & Hereward 2006; Prószyński 2009a). *Agorius* holds the first legs curled and raised in life, like antennae (Fig. 56). The relationships of the group are unclear by both morphological and molecular data, but evidence suggests they are within the sister group to amycoids, i.e., within the Salticoida (Maddison et al. 2014). Their current placement outside of the major clades Saltafresia, Marpissoida and Astioida reflects ignorance and not evidence for exclusion. We simply do not know their relationships, and they may fall within one of those groups. The multiple-genes salticine analysis of Maddison et al. (2014: fig. 18) places them as sister to the chrysillines, but not firmly so, as the group is placed elsewhere by other analyses and individual genes. The palps of some species are unusual, but the simpler ones (Prószyński 2009a, figs. 27, 28) resemble those of chrysillines or hasariines.

*Monophyly: Synagelides* and *Agorius* have a male palp with unusually-proportioned segments, the femur being smaller than the robust patella (e.g., Logunov & Hereward 2006, fig. 4). In addition, the first leg has a tibia that is usually bent dorsally and with macrosetae closely packed in the distal half (Prószyński 2009a, figs. 16–22). In addition to these apparent synapomorphies, molecular data place *Synagelides* and *Agorius* together (Maddison et al. 2014).

### **Tribe Baviini** Simon, 1901
(3 genera; Figs. 58, 59)

Simon, 1901: Bavieae
Roewer, 1954: Bavieae

**Remarks.**—The baviines, elongate and resembling marpissines, are common on large-leaved plants and suspended litter in Southeast Asian forests. They are speciose, despite the paucity of species currently described. The palp is of typical oval form with a fixed embolus and tegular ledge (i.e., with a cleft running retrolaterally across the bulb from the base of embolus).

*Monophyly:* Although the elongate and flattened body form (Figs. 58, 59) is consistent, it may not provide a synapomorphy for the group, as the same body form may be plesiomorphic in the possibly related marpissoids. The palps are fairly consistent, with a fixed embolus (e.g., Żabka 1988, figs. 29, 37, 52), generally like viciriines or marpissines, but without any known distinctive features. Molecular data, however, show that *Stagetilus* and *Bavia* fall together (Maddison et al. 2014). *Piranthus* is placed tentatively here on the basis of the close similarity in body form and markings with many *Bavia*.

### **Clade Astioida** Maddison, Bodner & Needham, 2008
(55 genera; Figs. 78–89)

Maddison, Bodner & Needham, 2008: Astioida

*Remarks.*—The astioids form one of the two major radiations of Australasia (the other, euophryines). The group is almost restricted to Australasia, the Pacific Islands, and Southeast Asia, with only *Neon* and *Myrmarachne* having extended beyond to Europe, Africa and the Americas. Alongside the Marpissoida and Saltafresia, this is one of the three major subgroups of the Salticoida. The form of the body is varied, including the ant-like *Myrmarachne*, the robust beetle-like simaethines, the delicate astiines, and the majestic mopsines. This group has become known especially through the efforts of Żabka and colleagues (Żabka 1987a, 1990a, 1991a, b, 1992a, b, 1994, 1995, 2000, 2001, 2002, 2003, 2004, 2009, 2014; Żabka & Gray 2002, 2004; Gardzińska & Żabka 2010; Żabka & Patoleta 2014; Patoleta & Żabka 2015).

The division of the group into five tribes is based on the combined results of Maddison et al. (2008, 2014) and Bodner & Maddison (2012), which show a major subclade (here called the Viciriini) and four smaller clades outside that.

*Definition:* The group was proposed by Maddison et al. (2008). It is here defined formally as the smallest clade including *Neon*, *Myrmarachne*, *Mopsus*, *Astia*, *Viciria, Trite* and *Simaetha.*

*Monophyly:* There are no known morphological synapomorphies, but the Astioida is well supported by molecular data (Maddison et al. 2008, 2014; Bodner & Maddison 2012). The embolus is generally fixed to the tegulum, but in some there appears to be a movable embolus (*Neon*, *Mopsus*), which however is not spiralled in the same manner as euophryines or marpissoids.

Because of the diversity of genitalia in this group, it is difficult to assess which unsequenced salticid genera are in fact astioids. However, the biogeographical pattern is strong, and we can guess that any salticid with a fixed embolus occurring in Australasia that is not obviously a member of another group (e.g., not a plexippine or chrysilline) is likely to be an astioid. Thus, among the genera listed as Salticinae *incertae sedis*, I suspect that *Aruana*, *Grayenulla*, *Hinewaia*, *Maddisonia*, *Proszynellus*, *Pseudomaevia*, and *Pseudosynagelides* are all astioids. *Muziris* could also be an astioid.

### **Tribe Myrmarachnini** Simon, 1901
(7 genera; Figs. 78, 79)

F.O. Pickard-Cambridge, 1900: Toxeae, Toxeinae
Simon, 1901: Myrmarachneae, Ligonipedeae
Petrunkevitch, 1928: Myrmarachninae
Roewer, 1954: Myrmarachninae, Myrmarachneae, Ligonipeae

**Remarks.—**The mymarachnines form the most speciose clade of ant-like jumping spiders, most species of which are in the enormous genus *Myrmarachne* (Galiano 1969; Wanless 1978a; Edwards & Benjamin 2009; Edwards 2013; Benjamin 2015). There is great variability in appearance: depending on the colour, and the width and contours of the body, different species resemble different groups of ants. *Myrmarachne* has been the focus of studies of mimicry (Nelson et al. 2005; Edmunds 2006; Ceccarelli & Crozier 2007; Ceccarelli 2008; Nelson & Jackson 2009b; Huang et al. 2011), social behavior (Jackson et al. 2008a; Nelson & Jackson 2008), predatory behavior (Jackson 1986c; Jackson & Willey 1994), and sexual selection (Pollard 1994). Apart from a few Neotropical species of *Myrmarachne*, the group is entirely Old World. Edwards & Benjamin (2009) present a review of the group with a morphological phylogeny.

The name Toxeinae is not used as it was replaced, before 1961, by Myrmarachneae/Myrmarachninae because of synonymy of the type genus (ICZN 1999, article 40.2).

*Monophyly:* The morphological features that confer their striking resemblance to ants — e.g., narrow body with constrictions in the thorax — are synapomorphies, although they have evolved elsewhere in the family several times. Most distinctive, then, are the genitalia. The bulb is round, with the fixed embolus looping one or more times around it. Instead of faithfully following the periphery of the bulb, some loops of the embolus typically fall beneath and across the tegulum (e.g., Edwards & Benjamin 2009, figs. 4A, C, 7). The epigynum has a stereotyped arrangement, with the loops of the copulatory ducts eventually reaching the midline near the posterior margin then proceeding together side by side to the anteriorly-placed fertilization ducts (Prószyński 1992b, figs. 87, 92; Edwards & Benjamin 2009, fig. 7).

### **Tribe Neonini** Maddison, **trib. nov.**

http://zoobank.org/?lsid=urn:lsid:zoobank.org:act:69DB2118-1C16-41E3-B914-150E0B96435A
(1 genus; Fig. 80)

**Type genus.**—*Neon* Simon, 1876

**Remarks.**—Although initially familiar from the Holarctic region, *Neon* is now recognized as extending to Southeast Asia (Logunov 1998) and as having "radiated widely" in Australia (Richardson et al. 2006; Richardson 2013). It is not surprising, therefore, that molecular data have placed it in the primarily Australasian Astioida (Maddison et al. 2008).

*Monophyly and Diagnosis:* Small salticids with a relatively cubic carapace, a freely movable embolus (Logunov 1998, fig. 21) that is often spiraled (e.g., Gertsch & Ivie 1955, figs. 19, 24; Prószyński 1976, fig. 438), and long macrosetae under the first leg's tibia. One possible synapomorphy is the shift of the embolus to arise on the prolateral side of the bulb. Although this shift is often seen in species with a fixed embolus, it is less common among species with a freely movable embolus.

An undescribed second lineage of neonines, larger-bodied, has been found in New Guinea (Maddison, unpublished data). The genus *Ananeon* (Richardson 2013) may be a neonine.

### **Tribe Astiini** Simon, 1901

(11 genera; Figs. 82, 83)

Simon, 1901: Astieae
Roewer, 1954: Astieae

**Remarks.—**This tribe more or less matches Wanless's Astieae (1988), as supplemented by Żabka (1995, 2009) and Prószyński & Deeleman-Reinhold (2010). Typically long-legged and somewhat delicate-bodied, these spiders are Australasian and Southeast Asian. The astiine *Orthrus* was formerly placed with lyssomanines (Simon 1901), based on its eye placement and delicate translucent green body (Fig. 82).

*Monophyly:* The palp has a simple bulb, with embolus and tegulum fused and typically without elaboration. Wanless (1988) gives as two of their characteristics that they are pluridentate, and that they have the posterior lateral eyes "separated from lateral margins of the carapace by a distinct space when viewed from above" (e.g., Wanless 1988, fig. 9A). Although these characteristics in themselves might give little confidence in monophyly, molecular data support the group (Maddison et al. 2008).

Żabka (2009) suggests *Astilodes* may belong in the Astieae. Żabka (1995) places *Megaloastia* within the Astieae. *Parahelpis* is closely similar to *Helpis* (Gardzińska & Żabka 2010). Prószyński & Deeleman-Reinhold (2010) suggest *Katya* may belong to the Astieae, and indeed it has close similarities in its body and genitalia with *Orthrus*, particularly the overhanging lip of the epigynum and spermathecal configuration.

### **Tribe Mopsini** Maddison, **trib. nov.**

http://zoobank.org/?lsid=urn:lsid:zoobank.org:act:99FA80D3-FF59-4C84-A1C7-347D280D0077
(3 genera; Fig. 81)

**Type genus.—***Mopsus* Karsch, 1878

**Remarks.—**This group of Australasian salticids includes just a handful of species in three genera, and yet is familiar through the often-photographed *Mopsus*.

*Monophyly and Diagnosis:* Large and robust Australasian salticids, with the embolus arising hidden behind the distal end of the tegulum and directed obliquely retrolateral (Żabka 2000, fig. 2). Żabka (2000) recognized the relationship of *Mopsus*, *Sandalodes*, and *Mopsolodes*, noting the similarities in male palps. The embolus appears movable, with a distinct embolic hematodocha (Maddison, unpublished data). Molecular data confirm the relationship of *Mopsus* and *Sandalodes* (Maddison et al. 2008). Those molecular data had suggested *Clynotis* was also closely related, which would be puzzling as *Clynotis* has a rather different embolus, possibly immovable. However, reexamination has shown that the 28S rRNA sequence used for *Clynotis severus* (L. Koch, 1879) by Maddison et al. (2008) is almost certainly a contaminant, as it is identical to that of the specimen of *Sandalodes scopifer* (Karsch, 1878). When reanalyzed with this sequence excluded, *Clynotis* groups more reasonably with the viciriines *Ocrisiona jovialis* (L. Koch, 1879) and *Holoplatys*.

### **Tribe Viciriini** Simon, 1901

(33 genera; Figs. 84–89)

Simon, 1901: Vicirieae, Rogmocrypteae
Simon, 1903: Triteae, Simaetheae
Roewer, 1954: Triteae, Rogmocrypteae, Simaetheae, Vicirieae

**Remarks.—**Members of this tribe show many body forms, including the elongate *Viciria*, the wide-bodied *Simaetha*, the flat *Holoplatys*, and the more mundane *Trite* and *Opisthoncus*.

One distinctive group, the simaethines, is separated as a subtribe. The remaining viciriines are diverse enough to deserve subdivision, but their phylogenetic relationships are too poorly known to assign them to subtribes even tentatively. The consequence of this is that *Viciria* is (necessarily) within the subtribe Viciriina, but all other non-simaethine viciriines remain as Viciriini *incertae sedis*. Of the four Simon group names that could apply to this tribe, Viciriini is chosen as it has priority over Triteae and Simaetheae (appearing in 1901 with diagnostic characters in the key of p. 517) and *Viciria* is better known than *Rogmocrypta*.

*Monophyly:* There are no known morphological synapomorphies of this group. The most comprehensive molecular data (Maddison et al. 2014) put *Trite*, *Nungia* and the simaethines together, while other studies (Maddison et al. 2008; Bodner & Maddison 2012) add to these *Viciria*, *Corambis*, *Holoplatys*, *Opisthoncus*, *Penionomus*, *Rhondes*, and some of their relatives. See note under Mopsini regarding molecular support for *Clynotis* being a viciriine.

*Paraplatoides*, *Zebraplatys*, *Holoplatys* and *Ocrisiona* are considered by Żabka (1992a) to form a monophyletic group. Żabka and Gray (2004) suggest *Huntiglennia* is related to *Zebraplatys*. Prószyński (2015) suggests that *Avarua* may be *Trite*, and indeed it resembles the viciriine *Corambis*. Żabka (1987a) concludes that *Tara* is closely related to *Clynotis*. By both body and genitalia, *Clynotis albobarbatus* L. Koch, 1879 and *Diplocanthopoda hatamensis* (Thorell, 1881) appear to be close to, or belong within, *Nungia*, of which there are several undescribed species in New Guinea (Maddison, unpublished data). The molecular data from cf. *Lystrocteisa* and cf. *Rogmocrypta* (Maddison et al. 2008) suggest that *Lystrocteisa* and *Rogmocrypta* are viciriines, at least if similarities of the sequenced specimens to those genera represent relationship. Two additional genera are included tentatively within the Viciriini, *Abracadabrella* and *Paraphilaeus*. Their placement is based on the fact that they resemble viciriines like *Opisthoncus* in having paired abdominal markings resembling those of dendryphantines, along with palps generally resembling some viciriines. It is likely the case that several other Australasian genera like *Grayenulla* (Żabka 1992b) and *Hinewaia* (Żabka & Pollard 2002a) are also viciriines, but the data are unclear, and they are left as Salticinae *incertae sedis*.

### **Subtribe Simaethina** Simon, 1903
(13 genera; Figs. 87, 88)

Simon, 1903: Simaetheae
Roewer, 1954: Simaetheae

**Remarks.—**These wide-bodied, often beetle-like salticids are distinctive components of Southeast Asian and Australasian faunas. They form a subgroup of the Viciriini.

*Monophyly:* The palp's bulb is round to oval, with a short embolus (e.g., Prószyński 1984a, p. 77, 1987, p. 107; Żabka 1994, fig. 1B). Among salticids with a fixed embolus, only the simaethines have such wide bodies with robust carapaces, with the exception of the tiny *Cylistella* in the amycoids. There are other salticids with such a wide body (e.g., *Beata*, *Coccorchestes*, *Omoedus*, *Pachyballus, Rhene*, *Rhetenor*), but these are marpissoids or euophryines, with a freely movable embolus. The molecular data confirm that the wide-bodied astioids form a clade (Bodner & Maddison 2012; Maddison et al. 2014, unpublished data).

*Urogelides* is included as it appears close to *Uroballus*, sharing elongate spinnerets (Żabka 2009). *Iona* is placed by Prószyński (2015) with the simaethines. *Simaethula* is considered by Żabka (1994) to be a relative of *Simaetha*. The type species of *Stertinius* is not well known, but other species placed in the genus (Prószyński & Deeleman-Reinhold 2013) share the unusual cymbial extension of some *Irura* species (Peng et al. 1993). Having robust bodies and genitalia typical of simaethines are *Mantius* (Workman & Workman 1894; Prószyński 1984a), *Phyaces* (Wanless 1986), *Porius* (Prószyński 1984a), and *Poecilorchestes* (Prószyński 1971a). *Flacillula, Microhasarius*, *Pilia*, *Simaethulina,* and *Stergusa*, listed as Salticinae *incertae sedis*, could also be simaethines. *Stergusa*, at least for the species described by Prószyński & Deeleman-Reinhold (2010), has the palp typical of a simaethine, but at the same time these are very similar in body and palp to the euophryine *Sobasina*. The placements of *Microhasarius* and *Pilia* are especially important to resolve, as an available family-group name (Simon 1903) is based on each.

### **Clade Marpissoida** Maddison & Hedin, 2003
(90 genera; Figs. 60–77)

Maddison & Hedin, 2003a: Marpissoida

**Remarks.—**Although the largest tribe of marpissoids (Dendryphantini) is primarily a New World group, the other two tribes are restricted to the Old World (ballines and tisanibines).

*Definition:* After its original conception, Marpissoida was expanded to include the ballines (Bodner & Maddison 2012) and then the tisanibines (Zhang & Maddison 2014). However, given that the placement of tisanibines with the marpissoids is not made with full confidence (Zhang & Maddison 2014), the definition of the Marpissoida will be conditional: The Marpissoida is the smallest clade containing the Dendryphantina, Marpissina, Ballini and the Tisanibini, except if *Tisaniba* is not a close relative of the other three, in which case the Marpissoida would be the smallest clade containing the Dendryphantina, Marpissina, and Ballini.

*Monophyly:* The embolus is ancestrally spiral and movable, with a well-developed embolic hematodocha. The spiral typically appears edge-on in ventral view (Maddison 1996, fig. 64c; Edwards 1999, fig. 14), as its axis is parallel to the axis of the palp, unlike that of euophryines whose axis is usually perpendicular to that of the palp (Zhang & Maddison 2015). A simple open spiral is seen in ballines, tisanibines, synagelines and itatines, while a compacted spiral is seen in dendryphantines (Maddison 1996). Within the Marpissina, however, the embolus has become secondarily fixed. While the spiral embolus and the full development of the embolic hematodocha could be synapomorphies of the Marpissoida, they are also present in hisponines (Szűts & Scharff 2009) and euophryines (Zhang & Maddison 2015). The marpissoids are well supported by molecular data (Bodner & Maddison 2012; Maddison et al. 2014) with some ambiguity about the inclusion of tisanibines (Zhang & Maddison 2014; Maddison et al. 2014).

### **Tribe Ballini** Banks, 1892
(15 genera; Figs. 60–63)

Banks, 1892: Ballinae
Simon, 1901: Balleae, Copocrosseae
Roewer, 1954: Balleae, Copocrosseae
Benjamin, 2004: Ballinae

**Remarks.—**Members of this Old World group have unusual and varied body forms, with some resembling beetles (*Ballus*, *Pachyballus*), others ants (*Afromarengo*, *Leikung*, *Marengo*). Two contrasting extremes are the wide-bodied *Pachyballus* and the narrow and tailed *Mantisatta* (Cutler & Wanless 1973). Benjamin (2004) reviews the group and its phylogeny. Andriamalala (2007) found that convergent evolution of remarkable cheliceral horns in *Padilla* was uncorrelated with environment, suggesting the action of sexual selection.

*Monophyly:* Benjamin (2004) lists 6 putative morphological synapomorphies for the ballines: (1) an embolic coil of more than 360°, lying flat on the tegulum; (2) a subtegulum that extends over the tibia; (3) a narrow septum on the epigynum, (4) long copulatory ducts and spermatheca with internal spicules; (5) an enlarged femur 1 with dark lateral bands; and (6) small to medium body size with enlarged tibia 1. However, the primary argument for these comes from an analysis that included just one outgroup taxon, and therefore cannot speak to the monophyly of the group. Trait (1) is seen in synagelines and tisanibines, while (3), (4), (5) and (6) are seen in other salticids. Nonetheless, among Old World salticids, ballines are recognizable for the embolus, the pale longitudinal trough on the tegulum (Benjamin 2004, fig. 20A), robust first legs, and resemblance to beetles, pseudoscorpions, or ants. The molecular data suggest they are indeed monophyletic (Bodner & Maddison 2012), although these studies do not include the atypical *Cynapes*.

Among the genera listed as Salticinae *incertae sedis*, *Ligdus* could be a balline, and *Homalattus* could be either a balline (*Pachyballus*), or a dendryphantine (*Rhene*).

### **Tribe Tisanibini** Maddison, **trib. nov.**
http://zoobank.org/?lsid=urn:lsid:zoobank.org:act:9A96C04C-E0B5-42CB-8D8E-5F7AFAC79133
(2 genera; Figs. 64, 65)

**Type genus.—***Tisaniba* Zhang & Maddison, 2014

**Remarks.—**Tisanibines are small leaf-litter dwellers in tropical forests of Southeast Asia. Although common in some areas (Zhang & Maddison 2014), they were entirely undescribed until recently (Logunov & Azarkina 2008b; Zhang & Maddison 2014).

*Monophyly and Diagnosis:* As in other marpissoids such as ballines and synagelines, the embolus is a spiral with axis parallel to that of the palp (Zhang & Maddison 2014). The body form is unusual among marpissoids, however, as the males are small, black, shiny, and with a dorsal abdominal scutum (Fig. 65). Molecular data (Zhang & Maddison 2014) show that *Tisaniba* is outside the Ballini and the Dendryphantini. A molecular synapomorphy of tisanibines is suggested by the broad sample alignments submitted by Zhang & Maddison (2014) to the Dryad data repository (http://dx.doi.org/10.5061/dryad.984fn), wherein site 138 of the 28S rRNA alignment has A in all four tisanibines sampled and different bases in other salticids.

Of the two genera placed here, *Tisaniba* and *Saaristattus*, the former is chosen as the type genus, rather than the older name *Saaristattus*, because the molecular data justifying the group's placement come from the type species of *Tisaniba*, and *Saaristattus* is only tentatively associated with *Tisaniba*.

### **Tribe Dendryphantini** Menge, 1879
(73 genera; Figs. 67–77)

Menge, 1879: Dendryphantidae
See also listings under subtribes

**Remarks.—**The Dendryphantini, including the synagelines, itatines, marpissines and dendryphantines proper, matches the original content of the Marpissoida (Maddison & Hedin 2003a), before ballines and tisanibines were added to the latter by Bodner & Maddison (2012) and Zhang & Maddison (2014). The Dendryphantini are primarily in the New World.

*Monophyly:* There are no known morphological synapomorphies. The monophyly of the group is well supported by molecular data (Hedin & Maddison 2001; Maddison & Hedin 2003a; Maddison et al. 2014).

*Semorina* by genitalia appears to be in the Dendryphantini (Gustavo Ruiz, pers. comm.), but within which subtribe is unclear.

#### **Subtribe Synagelina** F.O. Pickard-Cambridge, 1900
(6 genera; Figs. 67–70)

F.O. Pickard-Cambridge, 1900: Synageleae
Simon, 1901: Synageleae, Peckhamieae
Petrunkevitch, 1928: Synagelinae, Peckhamiinae
Roewer, 1954: Synagelinae, Synageleae, Peckhamiinae

**Remarks.—**In parallel to the ballines, this group's morphological spectrum extends from forms resembling ants (*Synageles*, *Peckhamia*) to beetles (*Attidops*) and pseudoscorpions (*Admestina*, *Cheliferoides*). The ant-like species are unusual in waving the second pair of legs like antennae (Fig. 68), rather than the first, which is typical for other ant-like salticids. Except for some species of *Synageles*, synagelines are entirely New World (Platnick 1984; Cutler 1988; Piel 1992; Edwards 1999).

*Monophyly:* There are no clear morphological synapomorphies of the group as a whole. The embolus typically is distinctly spiralled, in some cases winding several times, resembling many ballines (Edwards 1999). Molecular data support the group (Bodner & Maddison 2012; Maddison, unpublished data).

The second leg of *Descanso* has a darkened tip and is held aloft while walking (Gustavo Ruiz, unpublished data), which, combined with the body form and the spiral embolus (Galiano 1963a, 1986), confirm its placement in the Synagelina.

### **Subtribe Itatina** Simon, 1901
(1 genus; Fig. 66)

Simon, 1901: Itateae
Petrunkevitch, 1928: Itatinae
Roewer, 1954: Itatinae, Itateae

**Remarks.—**A single Neotropical genus of elongate spiders, green or yellowish, resembling baviines. It is here considered a distinct tribe as it falls outside the other major groups (Maddison & Hedin 2003a; Maddison et al. 2008; Zhang & Maddison 2014), without a clear sister group relation to any of them.

*Monophyly:* Although there are no described morphological synapomorphies for *Itata*, its species are recognizable by their elongate shape and yellow-green colour (Fig. 66) among New World salticids. The embolus has a distinct spiral.

### **Subtribe Marpissina** Simon, 1901
(9 genera; Figs. 71, 72)

Banks, 1892: Marptusi
F.O. Pickard-Cambridge, 1900: Marptuseae
Simon, 1901: Marpisseae
Simon, 1903: Maevieae
Petrunkevitch, 1928: Marpissinae, Maeviinae
Roewer, 1954: Marpissinae, Marpisseae, Maeviinae, Maevieae
Prószyński, 1976: Marpissinae

**Remarks.—**This mostly New World group includes many tree trunk or suspended litter dwellers, in contrast to the primarily foliage-dwelling dendryphantines. The North American *Maevia inclemens* (Walckenaer, 1837) is notable for having strikingly dimorphic males (Peckham & Peckham 1889; Painter 1913; Clark & Uetz 1992, 1993; Clark 1994; Clark & Morjan 2001; Clark & Biesiadecki 2002).

The old name Marptusi Banks was based on *Marptusa* Thorell, 1877, an unjustified replacement for *Marpissa* C.L. Koch, 1846 (Simon 1903), and thus a junior objective synonym thereof. On this basis, Simon (1901) rejected Marptusi and preferred Marpisseae. The preference for Marpisseae is therefore to be maintained (ICZN 1999, article 40.2).

*Monophyly:* The palp is narrow and in general resembles that of dendryphantines, but in many marpissines (e.g., *Fuentes* and *Balmaceda*, Edwards 2006), the embolic hematodocha is reduced and the embolus fixed to the tegulum and not spiral, presumably representing a secondary loss of the movable spiral embolus. However, this does not provide a synapomorphy for the group as a whole. Among New World salticids the group can be partially recognized by the general form of the palp and the slightly flattened or elongate body (Figs. 71, 72), but this simple characterization led us astray with *Breda*, assumed to be a marpissine by its resemblance to genera such as *Fuentes*, but in fact an amycoid (Ruiz & Maddison in press). Molecular data support the Marpissina (Maddison & Hedin 2003a).

The group was recognized approximately by Barnes (1958), but he included *Menemerus*, since shown to be a chrysilline (Maddison & Hedin 2003a). The concept of the group here is almost precisely that of Edwards (2006), with the exception that he included *Breda*. *Mendoza* is closely related to *Marpissa* (Logunov 1999b). Gustavo Ruiz (pers. comm.) indicates that *Empanda* is a marpissine.

### **Subtribe Dendryphantina** Menge, 1879
(56 genera; Figs. 73–77)

Menge, 1879: Dendryphantidae
Banks, 1892: Phidippi
F.O. Pickard-Cambridge, 1900: Phidippeae
Simon, 1901: Dendryphanteae, Rheneae
Simon, 1903: Rudreae, Zygoballeae
Petrunkevitch, 1928: Dendryphantinae, Zygoballinae
Roewer, 1954: Dendryphantinae, Dendryphanteae, Donaldieae, Rheneae, Rudreae, Zygoballinae, Zygoballeae
Prószyński, 1976: Dendryphantinae

**Remarks.—**Although well known in Eurasia for *Dendryphantes, Rhene,* and *Macaroeris*, this group is primarily from the Americas (Maddison 1996). Dendryphantines dominate the species diversity of salticids in many areas of North America. The largest subclade consists of high-bodied and reasonably robust spiders such as *Phidippus* and *Dendryphantes*; outside of that is a series of less speciose lineages that include more elongate or flattened spiders such as *Hentzia* and *Phanias* (Hedin & Maddison 2001). *Phidippus* (Edwards 2004) includes some of the largest salticids in the world, sometimes exceeding 20 mm in length while also being broad and high-bodied. *Phidippus* has been the subject of many studies, of movement and foraging (Givens 1978; Hill 1979, 2010a, b; Freed 1984; Edwards & Jackson 1993; Hoefler & Jakob 2006; Baker 2007; Stankowich 2009), vision and neurophysiology (Land 1969a, b; Hill 1975; Sivertson 1985; Jackson 1986a; Blest et al. 1988; Hoefler et al. 2002; Baker et al. 2009; Bednarski et al. 2012; Spano et al. 2012; Menda et al. 2014), learning and experience (Edwards & Jackson 1994; Skow & Jakob 2006; Jakob et al. 2007; Kasumovic et al. 2009), and mating behavior (Jackson 1977a, b, c, 1978, 1980a, b, c, d, e, 1981a, b, 1982; Edwards 1982; Robertson & Stephens 2002; Hoefler 2007, 2008; Elias et al. 2008, 2010; Sivalinghem et al. 2010). At least three separate lineages are in the Old World, represented by *Rhene*, *Macaroeris*, and *Dendryphantes*.

*Monophyly:* Maddison's (1996) composition of the Dendryphantinae, confirmed for many genera by molecular data (Hedin & Maddison 2001; Maddison & Hedin 2003a), was supported by several proposed synapomorphies: a carina on the underside of the male chelicera (Maddison 1996, fig. 10), the coil of the spiral embolus folded back so as to be hidden behind the base of embolus (Maddison 1996, fig. 64), and S-shaped epigynal openings (Maddison 1996, fig. 4). Males of many species have dark bodies with longitudinal white bands on either side of the thorax and continuing onto the abdomen (Fig. 77). Sexual dimorphism often involves enlarged chelicerae and first legs in males.

The genera listed here under Dendryphantina follow Maddison (1996), with some genera added, including *Pseudofluda* and *Naubolus* (Edwards et al. 2005). Gustavo Ruiz (pers. comm.) indicates that the poorly studied *Anokopsis*, *Alcmena*, *Pseudopartona* and *Monaga* are all dendryphantines. *Mirandia*, by Badcock's (1932) illustration, appears to be a dendryphantine. Based on the body form, shape of the palp and the sperm duct loop, both *Planiemen* (Wesołowska & Harten 1994) and *Xuriella* (Wesołowska & Russell-Smith 2000) are provisionally considered to be close to *Rhene*, although if so the embolus would be modified from the typical form. The palps of the two known male specimens of *Tuvaphantes* are highly unusual, without a recognizable spermophore or embolus (Logunov 1993). I suspect they are teratologies, as they closely resemble deformed palps in other otherwise-identifiable salticids I have seen (Maddison, unpublished data). For example, Levi's illustration of the palp of *Phidippus opifex* (McCook, 1883) (= *P. octopunctatus* (Peckham & Peckham, 1883)) in Gardner (1965, fig. 1) shows a similar, presumably deformed palp (compare to Edwards' 2004 fig. 11 of the same species). *Homalattus*, listed as Salticinae *incertae sedis*, could be either a dendryphantine (*Rhene*) or a balline (*Pachyballus*).

## **Clade Saltafresia** Bodner & Maddison, 2012
(277 genera; Figs. 90–136)

Bodner & Maddison, 2012: Saltafresia

**Remarks.—**The Saltafresia is the third and largest of the three major clades of the Salticoida *sensu stricto*. Despite the size of the group (more than 3000 species), it is rather conservative in body form, having relatively few species of ant-like, beetle-like, highly elongate or other unusual body forms. Saltafresians are largely Afro-Eurasian, with the exception of many euophryines and the freyines.

Although the molecular data are to some extent ambiguous, there is evidence for a subclade consisting of the Plexippini, Aelurillini, Leptorchestini, Salticini and the Euophryini (Bodner & Maddison 2012; Maddison et al. 2014, node 4). I name it here as the **Simonida**, in honour of Eugène Simon. It is formally defined as the smallest clade including the type genera of those 5 groups. Frequently seen among the Simonida are relatively robust legs — e.g., *Cytaea*, *Aelurillus*, *Freya*, *Pellenes*, *Evarcha*, *Hyllus*, *Plexippus* and *Yllenus*. Insofar as they might remind us of humans, these spiders appear as strong-legged athletes. Longer third legs, possibly accompanied by a shift in jumping mechanics, evolved several times in this subclade (e.g., Figs. 112, 117, 123, 125, 136; Otto & Hill 2012b).

*Definition:* The Saltafresia was defined by Bodner & Maddison (2012) as the smallest clade containing the Plexippini, the Aelurillini, Euophryini, Chrysillini, Leptorchestini, Hasariini, Salticini and *Nannenus*.

*Monophyly:* There is no known morphological synapomorphy of the Saltafresia, but the group is reasonably well supported by molecular data (Bodner & Maddison 2012; Maddison et al. 2014).

## **Tribe Nannenini** Maddison, **trib. nov.**
http://zoobank.org/?lsid=urn:lsid:zoobank.org:act:235D0370-6EBD-4A5B-B190-31914A98C1BD
(3 genera; Figs. 97–99)

**Type genus.—***Nannenus* Simon, 1902

**Remarks.—**This small Southeast Asian group makes up a poorly known but common component of Southeast Asian faunas, especially on leaf litter (Prószyński & Deeleman-Reinhold 2012; Maddison & Piascik, unpublished data). Only two generic names can be unequivocally assigned to the group (*Nannenus* and *Idastrandia*), but the number of genera is likely to grow as the many undescribed species become known.

*Monophyly and Diagnosis:* The macrosetae under the first tibia tend to be long (Szombathy 1915, fig. 5d; Prószyński 1987, p. 69), as in some thiratoscirtines and *Neon*, but this may be merely an adaptation to litter-dwelling. The embolus is fixed to the tegulum (Prószyński 1983b, fig. 7; Prószyński & Deeleman-Reinhold 2012, figs. 98, 100), with the possible exception of *"Bathippus" pahang* Zhang, Song & Li, 2003. Neither the macrosetae nor fixed embolus provides a clear synapomorphy for the group. Nonetheless, molecular data unite them (Zhang & Maddison 2013; Maddison et al. 2014, unpublished data), and they are relatively easy to recognize by being small to medium-sized compact-bodied salticids, relatively setose, Southeast Asian, and with an embolus that is generally more delicate than that of the hasariines. In the concatenated alignment submitted by Bodner & Maddison (2012) to TreeBASE (http://purl.org/phylo/treebase/phylows/study/TB2:S13034) are two synapomorphies for nannenines, with site 737 (within 28S rRNA) showing T in nannenines *versus* C in others, and site 2171 (within ND1) showing C *vs.* T.

*Langerra* is placed here only tentatively because its type species has not been studied recently. Although the species of *Langerra* studied for molecular phylogeny by Maddison et al. (2014) is clearly close to *Langerra longicymbium* Song & Chai, 1991, sharing its distinctive cymbial projection (Song & Chai 1991, fig. 7E), the question remains whether *L. longicymbium* belongs with the type species *L. oculina* Żabka, 1985. Females of the species studied by Maddison et al. (2014) have an epigynum (Maddison, unpublished data) that resembles that of *L. oculina* in having openings placed laterally beneath a transverse fold, with ducts proceeding anteriorly (Żabka 1985). Thus, the studied species' molecular placement with nannenines can be provisionally considered to apply to *Langerra*. "*Bathippus*" *pahang* does not belong to the euophryine genus *Bathippus*; it is a nannenine (Zhang & Maddison 2013). Among the genera listed as Salticinae *incertae sedis*, *Epidelaxia*, *Lechia* and *Leuserattus* could be nannenines.

## **Tribe Hasariini** Simon, 1903
(15 genera; Figs. 100–102)

Simon, 1903: Hasarieae
Petrunkevitch, 1928: Hasariinae
Roewer, 1954: Hasariinae, Hasarieae, Diplocanthopodeae

**Remarks.—**The cosmotropical *Hasarius adansoni* (Audouin, 1826) is the only widely known hasariine. In general they are ground dwellers, except for the trunk- or rock-dwelling *Gedea*. *Diplocanthopoda marina* Abraham, 1925 lives in the intertidal zone (Abraham 1925; Maddison, unpublished data). *Habrocestum* is reasonably speciose in Africa (Wesołowska & van Harten 1994, 2002, 2007; Wesołowska 2000, 2006b; Wesołowska & Russell-Smith 2000, 2011; Wesołowska & Haddad 2009; Haddad & Wesołowska 2013). Recent molecular work has assigned some small Southeast Asian genera to the group (Maddison et al. 2014). The single native New World species is the eastern North American *Chinattus parvulus* (Banks, 1895) (Edwards 2003a).

*Monophyly:* Hasariines are compact-bodied, often with distinctly white-edged palps that are held across the face. The palp's bulb is generally oval, with a reasonably robust embolus and a cleft across the face of the functional tegulum. A probable synapomorphy for the group is a small circular structure hidden in an overhanging lip at the back of the epigynum (see Logunov 1999a, figs. 17, 45), although a similar structure is seen in freyines (Edwards in press). Logunov (1999a) correctly surmises that *Chinattus* is related to *Habrocestum*. Although Logunov suggests that *Habrocestoides* is not near *Habrocestum* or *Chinattus*, the similarities to *Chinattus* in body form and genitalia, including the peculiar epigynal lip, suggest that *Habrocestoides* (for which molecular data are lacking) is a hasariine. The molecular data strongly link *Hasarius*, *Habrocestum*, *Chinattus*, and several other genera (Maddison et al. 2014).

*Meata* Żabka, 1985, known only from the female, is here synonymized with *Gedea* Simon, 1902 (**NEW SYNONYMY**), based on co-collecting and molecular data matching it with male *Gedea* (Maddison, unpublished data). *Curubis* is likely close to, or a synonym of, *Echeclus* (Maddison et al. 2014). *Hasarina*, *Imperceptus*, and *Madhyattus* are placed here based on the epigynum's overhanging lip with a circular notch; *Hasarina* in addition has a typical hasariine palp. *Mikrus* and *Uxuma* are included because of the resemblance of the palp to hasariines, and *Mikrus* in addition has a body and markings that strongly resemble *Chinattus*. Among the genera listed as Salticinae *incertae sedis*, *Ghumattus*, *Heliophanoides*, and *Jajpurattus*, *Pachypoessa*, and *Phausina* could be hasariines. Tentative molecular results (Maddison et al. 2014) suggest that *Bristowia* and *Cheliceroides* may be the sister group to the other hasariines. They are therefore included here provisionally.

### **Tribe Chrysillini** Simon, 1901
(31 genera; Figs. 90–96)

Simon, 1901: Chrysilleae, Flacilleae
Simon, 1903: Silereae
Petrunkevitch, 1928: Heliophaninae
Roewer, 1954: Augusteae, Chrysilleae, Heliophaninae, Silereae
Prószyński, 1976: Heliophaninae

**Remarks.**—Formerly known as heliophanines (see Problematic Names, below), the chrysillines are ubiquitous throughout the Old World. They are generally small to medium sized foliage-dwellers with delicate legs, often brightly coloured, including the large genera *Heliophanus* (Wesołowska 1986; Rakov & Logunov 1997) and *Cosmophasis* (Żabka & Waldock 2012). Exceptions to the delicate body form include *Menemerus* and *Pseudicius*, typically bark or rock dwellers, and the relatively large-bodied *Epocilla*. The group has many species with interesting features: some fluoresce (Lim et al. 2007), some reflect and respond to UV light (Lim & Li 2006a, b, 2007; Land et al. 2007; Lim et al. 2008; Li et al. 2008), some are myrmecophages (Pekár & Haddad 2011), *Orsima* resembles a bug or wasp in reverse (Reiskind 1976), some live in nest aggregations (Jackson 1986b; Maddison 1987), and many have a stridulatory apparatus in both males and females (Maddison 1987). The embolus is fixed to the tegulum.

*Monophyly:* Many, though not all, chrysillines have a bump on the tegulum about 90° clockwise from the base of the embolus (left palp ventral view; Maddison 1987; Maddison & Hedin 2003a). A smaller subset has distinctively swollen setal bases on the first femur and a rugose carapace side, suggested to be a stridulatory apparatus (Maddison 1987). Each of these could be a synapomorphy for a subclade of chrysillines, or for the group as a whole with subsequent losses. The Chrysillini is supported as monophyletic by molecular data (Maddison & Hedin 2003a; Bodner & Maddison 2012; Maddison et al. 2014).

Most of the genera included without molecular data can be easily placed here by the classic form of the palp with the tegular bump. The genera *Afraflacilla*, *Heliophanillus*, and *Wesolowskana* all have the chrysilline palp as well as the leg-carapace stridulatory apparatus. Based on the palp and stridulatory apparatus, Ruiz et al. (2007) and Ruiz (2010) place the genera *Kupiuka*, *Matagaia*, *Plesiopiuka*, and *Theriella* into the chrysillines, which along with *Helvetia*, *Marchena*, and *Yepoella* are the only New World representatives. Prószyński (2015) suggests that *Tasa* and *Paraheliophanus* are heliophanines and that *Echinussa*, *Hakka* and *Helicius* are chrysillines, placements that are supported by their palps. *Chrysilla* and *Natta* have the classic chrysilline palp, as well as body forms like those of *Siler*, *Mexcala* and *Orsima*. *Augustea* is included because it appears to be a synonym of *Orsima* or *Chrysilla*. Based on my examination of the type specimen of *Rooseveltia mutilla* Peckham & Peckham, 1907 in the Museum of Comparative Zoology, the body and markings of *Ogdenia* very closely resemble those of *Siler cupreus* Simon, 1889, though the epigynum has the openings oriented differently (Prószyński 1984b). Prószyński (2015) lists *Jaluiticola hesslei* Roewer, 1944 as a synonym of *Menemerus bivittatus* (Dufour, 1831). The genus *Toticoryx*, listed as Salticinae *incertae sedis*, could be a chrysilline.

### **Tribe Leptorchestini** Simon, 1901
(7 genera; Figs. 103–105)

Simon, 1901: Leptorchesteae
Roewer, 1954: Leptorchesteae

**Remarks.**—This small but heterogeneous group, unexpected before molecular data (Maddison & Hedin 2003a; Bodner & Maddison 2012; Maddison et al. 2014), includes the pellenine-like *Yllenus* and the ant-like *Leptorchestes*. The only New World lineage is the elongate desert-dwelling *Paramarpissa*. The behavioural ecology of *Yllenus*, by far the largest leptorchestine genus (Logunov & Marusik 2003a) has been studied by Bartos (2002a, b, 2004, 2005, 2007, 2008; Bartos & Szczepko 2012; Bartos et al. 2013).

*Monophyly:* The only known morphological synapomorphy of this tribe is the loss of retromarginal cheliceral teeth (*Leptorchestes*: Wesołowska & Szeremeta 2001; *Paramarpissa*: Logunov & Cutler 1999; *Yllenus*: Logunov & Marusik 2003a), convergently lost in the Sitticini and some euophryines and aelurillines. Logunov & Marusik (2003a) suggested, without knowledge of the molecular results, that *Paramarpissa* and *Yllenus* may be related, based on the discreteness of a sclerite between the tegulum and the embolus, which they called the radix (Logunov & Cutler 1999, figs. 9-12; Logunov & Marusik 2003a, figs. 58–61). Although this sclerite may be common in salticids (hasariines, Logunov 1999a; freyines, Edwards in press; euophryines, Zhang & Maddison 2015; see also comments on palps under Methods), its distinctness in *Paramarpissa* and *Yllenus* is unusual, and thus provides a synapomorphy for these two genera. *Leptorchestes* and related ant-like leptorchestines do not appear to have such a distinct "radix" (Wesołowska & Szeremeta 2001). The group as a whole is well supported by molecular data (Maddison & Hedin 2003a; Bodner & Maddison 2012; Maddison et al. 2014).

*Kima* has palps very much like *Leptorchestes* (Wesołowska & Szeremeta 2001, figs. 12, 61). Photographs of the type specimen of *Araegeus mimicus* Simon, 1901 taken by Tamás Szűts show a spider whose body and epigynum closely resembles those of *Kima atra* Wesołowska & Russell-Smith, 2000. Wesołowska (2006a) places *Ugandinella* with *Leptorchestes* because of the ant-like form and the absence of a retromarginal cheliceral tooth.

### **Tribe Euophryini** Simon, 1901
(116 genera; Figs. 106–112)

Peckham, Peckham & Wheeler, 1889: Athamii
Simon, 1901: Bythocroteae, Chalcoscirteae, Coccorchesteae, Diolenieae, Evophrydeae, Saitideae, Sobasineae, Thianieae, Zenodoreae
Simon, 1903: Athameae, Bellieneae, Cytaeae, Emathideae, Laufeieae, Servaeae, Spilargeae
Petrunkevitch, 1928: Coccorchestinae, Cytaeinae, Spilarginae
Roewer, 1954: Coccorchestinae, Cytaeinae, Spilarginae; Athameae, Bellieneae, Bythocroteae, Chalcoscirteae, Cytaeeae, Diolenieae, Ematheae, Euophryeae, Laufeieae, Pensacoleae, Saiteae, Serveae, Sobasineae, Spilargeae, Thianieae, Zenodoreae.
Prószyński, 1976: Euophrydinae
Wanless, 1988: Euophryinae

**Remarks.**—Although speciose, euophryines are remarkably uniform in genitalia and body form except in tropical Australasia, where atypical forms such as *Diolenius*, *Sobasina*, *Paraharmochirus*, *Athamas* and *Coccorchestes* exist (Zhang & Maddison 2012b, 2015). Otherwise, the palp typically has a simple spiral embolus (Prószyński 1976; Zhang & Maddison 2015) and the epigynum has windows framed by circular folds that presumably guide the embolus. Elongate or ant-like body forms are rare. The Euophryini is the most cosmopolitan of all taxa ranked as tribes (Zhang & Maddison 2015) with high diversity in all tropics except African, and yet it also has a prominent role in the faunas of colder altitudes and latitudes. The group has recently been studied extensively by Zhang (Zhang & Maddison 2012a, b, c, d, 2013, 2015).

Euophryines are little studied ecologically, though there are many reports of ant feeding (Edwards et al. 1974; Cutler 1980; Jackson & van Olphen 1991, Li et al. 1996, Jackson et al. 1998; Clark et al. 2000; Jackson and Li 2001). Crane (1948) examined the life history and courtship of *Corythalia* in exquisite detail. Perhaps the most widely known euophryines are the peacock spiders (*Maratus*, Fig. 112), whose males have remarkably diverse, complex and colourful ornaments (Żabka 1987b; Otto & Hill 2011a, 2012a, b, 2013a, b, 2014a, b, c; Waldock 2013, 2014) and courtship behaviours (Hill 2009; Otto & Hill 2010, 2011a, b; Girard et al. 2011).

Regarding the decision to use the name "Euophryini" for this group, see the discussion below under "Problematic Names". Prószyński & Deeleman-Reinhold (2013) explain the shift in spelling from "Euophrydinae".

*Monophyly:* While other groups of salticids have a spiral embolus, its form in most euophryines is distinct from that in most other salticids in being an open spiral facing ventrally, with the axis of the spiral perpendicular to the axis of the palp (Maddison & Hedin 2003a). The loop of the sperm duct inside the tegulum (e.g., Zhang & Maddison 2015, fig. 8) is also partially distinctive, though also seen elsewhere (e.g., some dendryphantines such as *Phanias* and *Rhene*, Maddison 1996, figs. 20, 52). Most species with a long embolus also show distinctive "windows" in the epigynum (Maddison & Hedin 2003a; Zhang & Maddison 2015, fig. 39). Molecular data confirm the group is monophyletic, including the type genera of the Athamii and all of Simon's euophryine groups (Zhang & Maddison 2013; Maddison et al. 2014).

The list of genera here included follows that of Zhang & Maddison (2015) with the following additions. *Baviola*, *Gorgasella*, and *Lauharulla* have been added as per the suggestion of Zhang & Maddison (2015), but not *Lechia* and *Panysinus*, as their placement is too doubtful. *Platypsecas* is included following the tentative suggestion of Ruiz & Brescovit (2005b). *Pensacolops* and *Pseudocorythalia* are added based on figures in their original descriptions, showing euophryine genitalia. The new genera of Richardson (2013) are included except *Ananeon*, which is considered here Salticinae *incertae sedis*, possibly a neonine. *Rarahu* is included as it appears to be close to, or synonymous with, *Sobasina*, based on illustrations by Prószyński in Prószyński (2015). *Yacuitella* is included tentatively, as a possible close relative of *Amphidraus*, based on the form of the embolus, cheliceral teeth, and body. The Dominican amber fossil *Pensacolatus* seems clearly euophryine by its palp (Wunderlich 2004). *Udalmella* is not included, though it could be a derived *Tylogonus*, near *T. chiriqui* Galiano, 1994. *Stergusa* might be near *Sobasina*, or it could be a simaethine, and so is listed as Salticinae *incertae sedis*. *Tatari* and *Gambaquezonia*, possibly related, have a spiral embolus, but lack the sperm duct loop typical for euophryines (Berland 1938; Edwards 2009), and so are listed as Salticinae *incertae sedis*. Possible other euophryines among the genera listed as Salticinae *incertae sedis* are *Lechia*, *Leuserattus*, and *Muziris*.

### **Tribe Salticini** Blackwall, 1841
(7 genera; Figs. 113–115)

Blackwall, 1841: Salticidae
Prószyński, 1976: Salticinae

**Remarks.**—It is remarkable that previous literature has made so little mention of the Salticini or Salticinae, taxa that must exist and contain *Salticus* by traditional nomenclatural rules. While this may be due in part to the past difficulty of finding the close relatives of *Salticus*, it is also due to our failure to correct Simon's placement of *Salticus* in the Marpisseae, until Prószyński (1976) revived the required nominate subfamily. Recent molecular work (Maddison et al. 2014) consistently places *Salticus* as sister group to Maddison et al.'s (2008) "*Philaeus* group". For this reason Maddison et al. (2014) placed the *Philaeus* group within the taxon that is here re-ranked as the Salticini.

The seven genera known to belong to the Salticini occur in Africa, with some extending into Europe and Asia. *Salticus* is the only genus that reaches the New World, with a handful of native species.

*Monophyly:* There are no known morphological synapomorphies of the tribe. The embolus is fixed, and in all but *Salticus* there is a prominent lobe on the tegulum (Peckham & Peckham 1903, plate XXII fig. 4A [*Pignus*]; Andreeva et al. 1981, figs. 1, 6 [*Mogrus*]; Prószyński 1984a, p. 149 [*Tusitala*], 1992b, fig. 7 [*Carrhotus*], 2003, figs. 403 [*Mogrus*], 503 [*Philaeus*]). Prószyński (2003) suggested that *Mogrus* and *Philaeus* are related.

The claimed type locality for *Diagondas viridiaureus* Simon, 1902, Brazil, is almost certainly a result of mislabelling (as for *Thiratoscirtus patagonicus* Simon, 1886: Tamás Szűts, pers. comm; Wesołowska & Russell-Smith 2011). No other specimens of *Diagondas* have been reported from South America. *D. viridiaureus* is very close to, or a senior synonym of, *Carrhotus malayanus* Prószyński, 1992, from southest Asia (compare Prószyński 1992b: figs. 1–4 to Galiano 1963a: plate XV figs. 11–13; also, a male specimen recently collected by me in Borneo is a nearly perfect match to Galiano's drawings). *Diagondas* Simon, 1902 is therefore considered a junior synonym of *Carrhotus* Thorell, 1891, **NEW SYNONOMY**).

### **Tribe Aelurillini** Simon, 1901
(51 genera; Figs. 116–124)

Simon, 1901: Aelurilleae
Maddison, Bodner & Needham, 2008: Aelurilloida

**Remarks.—**This group of more than 500 species, called the Aelurilloida by Maddison et al. (2008), contains the distinctive aelurillines along with the Neotropical freyines and Afrotropical thiratoscirtines.

*Monophyly:* Although freyines and thiratoscirtines resemble each other in body form and markings, there are no known morphological synapomorphies to link them to each other or the somewhat more distinctive Aelurillina. The group is well supported by molecular data (Maddison et al. 2014).

### **Subtribe Aelurillina** Simon, 1901
(11 genera; Figs. 116–118)

Simon, 1901: Aelurilleae
Roewer, 1954: Aelurilleae
Prószyński, 1976: Aelurillinae

**Remarks.—**Although speciose, this ground-dwelling group is rather uniform in appearance, with a slightly narrowed carapace and stout legs. *Langelurillus* and *Phanuelus* are exceptions (Fig. 116; Caleb et al. 2015, figs. 26–37), being smaller and more compact, resembling small *Habrocestum*, *Naphrys* or *Aillutticus*. Among the best-known genera are *Aelurillus* and *Phlegra* (Azarkina 2002, 2003, 2004, 2006). Only a single species of this Afro-Eurasian group has reached the New World, *Phlegra hentzi* (Marx, 1890). Several aelurilline species are reported to live with or eat termites (Wesołowska & Cumming 2002; Wesołowska 2007; Wesołowska & Haddad 2009). Some *Langelurillus* and *Phanuelus* lack a tooth on the cheliceral retromargin (Wesołowska & Russell-Smith 2000; Caleb et al. 2015).

*Monophyly:* The palp has a distinctive appearance, with the tegulum oval, distally extended as a shield hiding the embolus, and proximally pointed (e.g., Logunov 1996a, fig. 32; Maddison 1996, fig. 18; Azarkina 2002, fig. 2). Logunov (1996a) proposes a pocket on the cymbium as a synapomorphy of the group (Logunov 1996a, figs. 2–4, 32). The embolus is spiral in many species, and separated from the tegulum by a hematodocha (e.g., Logunov, 1996b, figs. 1–5; Maddison 1996, fig. 18; Azarkina 2002, figs. 5, 6). The thorax is often marked by longitudinal bands of white or pale scales at or just medial to the PLE (Fig. 118).

### **Subtribe Freyina** Edwards, 2015
(26 genera; Figs. 119–121)

Edwards, 2015: Freyinae

**Remarks.—**A Neotropical group of medium- to large-bodied salticids typically having simple palps with a fixed embolus, resembling plexippines to some extent. It is the smallest and most morphologically uniform of the four major groups of Neotropical salticines (the other three being the Amycoida, Marpissoida and Euophryini). The group was a focus of study by Galiano (1961, 1968a, 1970, 1978, 1979a, b, c, 1981a, b, c, 1982, 1983, 1984, 1994, 1995, 2000, 2001). Edwards (in press) reviews the group comprehensively and describes several new genera.

*Monophyly:* Edwards (in press) notes there are no known strongly diagnostic synapomorphies for the group, but suggests two traits that could be synapomorphies, though not universally present: (1) subdistal and subproximal prolateral leg tibial macrosetae, and (2) a very thick basal division of the tegulum with a groove in its distal side. Edwards (in press) describes freyines as often having a conductor that accompanies the embolus, an anterior eye row about 5% wider than the posterior, and conspicuous setal tufts on the basal leg segments. The male palp has a strong and distinct cleft cutting diagonally across the front face of the bulb, and often bears a proximal tegular lobe as in euophryines (Galiano 1979b, figs. 36–43, 1979c, figs. 5, 6, 1994, figs. 7–10, 2001, figs. 14, 17). The thorax is often marked by one medial and two lateral longitudinal bands of white or pale scales below the PLE (Figs. 119, 120), more or less the negative of the aelurilline pattern. However, these features are not perfectly diagnostic. Even still, in the context of the Neotropics, freyines are usually easy to recognize, lacking the unusual body forms of amycoids, the angular carapaces and freely movable embolus of the Marpissoida, and the spiral embolus of euophryines. If not for geographical distribution, they would be difficult to distinguish from thiratoscirtines. Nonetheless, when such Neotropical species are accumulated, they are found to hold together by molecular data (Maddison & Hedin 2003a; Bodner & Maddison 2012).

Among the genera listed as Salticinae *incertae sedis*, *Hisukattus* could be a freyine.

### **Subtribe Thiratoscirtina** Bodner & Maddison, 2012
(14 genera; Figs. 122–124)

Bodner & Maddison, 2012: Thiratoscirtinae

**Remarks.—**A group endemic to Africa, concentrated in the wetter tropics of Central and West Africa. In Gabon at least, they are the most speciose and common group of salticids within the forests, while other groups such as plexippines and chrysillines dominate outside the forests (Bodner & Maddison 2012). Thiratoscirtines are remarkable for the large number of species that can be found on leaf litter sympatrically (Jocqué & Szűts 2001; Bodner & Maddison 2012). Most recent work on the group has been due to Szűts, Wesołowska and colleagues (Szűts & Jocqué 2001; Rollard & Wesołowska 2002; Szűts & Scharff 2005; Szűts & Rollard 2007; Wesołowska & Russell-Smith 2011; Wesołowska & Edwards 2012; Wesołowska & Haddad 2013).

*Monophyly:* Bodner & Maddison (2008) diagnosed the thiratoscirtines with molecular data, demonstrating their monophyly with data from five genes. The epigynum of thiratoscirtines often has an abrupt, deep and broad central depression, and often has a posterior tongue-like extension (Szűts & Jocqué 2001, fig. 4; Szűts & Rollard 2007, fig. 1C, Wesołowska & Russell-Smith 2011, figs. 171, 191, 199). The palps are almost always unusual, but seemingly in different ways. What might unite their atypicality has not been articulated. The embolus is usually fixed, but sometimes apparently not (e.g., Maddison et al. 2008, figs. 4, 5). When fixed, the embolus often appears to wander away from the tegulum in strange directions — e.g., *Pochyta fastibilis* Simon, 1903, *Thiratoscirtus capito* Simon, 1903. Indeed, this dissociation of the embolus from a typical path is what leads to the placement here of *Ajaraneola*, *Cembalea*, *Nimbarus*, and *Ureta*. This is tentative, however, as some Salticini (e.g., *Pignus*, Peckham & Peckham 1903, plate XXII fig. 4A) also have a loosely directed embolus. In some thiratoscirtine species, it appears that the subtegulum and hematodocha are unusally exposed (e.g., *Pochyta pannosa* Simon, 1903, Maddison et al. 2008, fig. 5). It may be that some functional shift in the bulb has released the thiratoscirtine palp to evolve in patterns not normally seen in salticids. Despite this lack of morphological clarity, when the non-plexippine salticines with generally freyine-like bodies in central African forests are studied, the molecular data clearly put them together as a group (Bodner & Maddison 2012).

*Gramenca* is placed here by its epigynum with posterior tongue; *Lamotella* by its palp closely resembling *Pochyta pulchra* (Thorell, 1899). Possible thiratoscirtines among the genera listed as Salticinae *incertae sedis* are *Hasarinella* and *Maltecora*.

### **Tribe Plexippini** Simon, 1901
(47 genera; Figs. 125–136)

Simon, 1901: Plexippeae
Maddison & Hedin, 2003a: Plexippoida
See further synonyms under subgroups.

**Remarks.**—This large group (nearly 800 species), first recognized by Maddison & Hedin (2003a) as the Plexippoida, is second among tribes only to the Euophryini in number of species, though that may reflect considerable attention by arachnologists, as they are often large, commonly collected by beating, and diverse in long-studied Eurasia. Compared to such groups as astioids or amycoids, they tend to be rather conservative in body form, with the elongate (e.g., *Telamonia*), beetle-like (*Hermotimus*), or ant-like (*Eburneana*) body forms being only weakly so. However, it should be remembered that they are merely a subgroup of the Saltafresia, and likely considerably younger than the astioids or amycoids (Fig. 1). The Plexippini includes two subgroups, the Plexippina and the Harmochirina.

The embolus is fixed to the tegulum, which is usually circular or slightly oval in shape.

*Monophyly:* Two synapomorphies, a modified serrula on the male endite (Maddison & Hedin 2003a, fig. 7) and a lobe on the tegulum just clockwise (left palp, ventral view) from the base of the embolus (Prószyński 1987, p. 80; Marusik & Logunov 1998, figs. 1, 4; Wesołowska & van Harten 1994, fig. 151), were originally thought by Maddison (1988, 1996) to delimit what is here called the subtribe Plexippina, but insofar as they apply also to *Harmochirus* and close relatives, they are better considered synapomorphies of the Plexippini (see Maddison & Hedin 2003a), secondarily lost in the pellenine harmochirines. The Plexippini is strongly supported by molecular data (Maddison & Hedin 2003a; Bodner & Maddison 2012; Maddison et al. 2014).

*Vatovia*, assigned to Salticinae *incertae sedis*, could be in the Plexippini judging by figures in Caporiacco's (1940) original description.

### **Subtribe Plexippina** Simon, 1901
(32 genera; Figs. 125–130)

Simon, 1901: Plexippeae, Hylleae, Thyeneae
Simon, 1903: Hermotimeae
Petrunkevitch, 1928: Plexippinae, Hyllinae, Thyeninae
Roewer, 1954: Plexippinae, Plexippeae, Barypheae, Hyllinae, Hylleae, Thyeninae, Thyeneae
Prószyński, 1976: Plexippinae, Hyllinae
Maddison, 1996: Plexippinae

**Remarks.**—This Old World group has only two native species in the New World, both *Evarcha*. It is approximately equivalent to Maddison's (1988, 1996) concept of the Plexippinae. Most are relatively large salticids with robust legs, including the familiar cosmotropical *Plexippus paykulli* (Audouin, 1826). Their conservatism in body and genitalia makes generic limits problematical, with genera such as *Evarcha*, *Pancorius* and *Hyllus* difficult to distinguish except perhaps by size.

*Monophyly:* Although there are no known synapomorphies of this group, they are generally easy to recognize by the large size, usually round palp bulb, simple fixed embolus, and robust legs. Many species have tufts of setae beneath the PMEs that project laterally and forward (Żabka 1985, fig. 217; Wesołowska & van Harten 1994, figs. 150, 152). The molecular data for monophyly are strong (Bodner & Maddison 2012). The guide of the epigynum is often shifted anteriorly from the margin, as in the related harmochirines, but often split into two lateral pockets (e.g., *Evarcha*, *Hyllus*, *Pancorius, Yaginumella*).

Given their simple palps and generalized (though usually robust) body form, the limits of this group have been unsettled. Prószyński (1984b) was the first to recognize that species formerly placed in *Viciria* pertain to two very different groups, some belonging with the plexippine *Telamonia*, others remaining in *Viciria*, which is now placed in the Astioida.

*Pseudamycus* and *Artabrus* are included on the basis of an epigynum with a divided guide pocket. In *Pseudamycus*, it is divided into two separate lateral pockets as in *Evarcha* and *Pancorius*. *Taivala invisitata* Peckham & Peckham, 1907 (types in Museum of Comparative Zoology, examined) is close to, or a synonym of, *Pancorius dentichelis* Simon, 1899. As noted by Prószyński & Deeleman-Reinhold (2013), *Vailimia* is a plexippine (type specimen of *Vailima masinei* Peckham & Peckham, 1907 in Museum of Comparative Zoology, examined). It is close to, and possibly a synonym of, *Pancorius*. Tamás Szűts (pers. comm.) was kind enough to supply photographs of the type specimen of *Pachyonomastus kittenbergeri* Capporiacco, 1947, by which it appears to be very similar to *Thyene semiargentea* (Simon, 1884). *Afrobeata* is placed here tentatively on the basis of the lateral pockets of the epigynum (Prószyński 1987), and the eye tufts reminiscent of *Hyllus* and *Thyene* (photograph of type supplied by Tamás Szűts, pers. comm.). *Dasycyptus* has an *Evarcha*-like palp (Prószyński 1987), but is poorly studied. Szűts & Scharff (2005) indicates that *Encymachus* "is most similar to the African *Hyllus*". Prószyński (2015) indicates that *Pseudoplexippus unicus* Caporiacco, 1947 is a synonym of *Plexippus petersi* (Karsch, 1878). *Paraplexippus* is likely a synonym of *Plexippus*, based on Franganillo's (1930) figures and comments. The robust body and eye tufts suggest that *Parajotus* belongs here, but this must be considered highly tentative. *Pharacocerus* resembles *Pancorius* in palp, robust body, and eye tubercles, but it may belong elsewhere. Possible plexippines among the genera listed as Salticinae *incertae sedis* are *Bokokius*, *Maltecora*, *Tamigalesus*, and *Yogetor*.

### **Subtribe Harmochirina** Simon, 1903
(15 genera; Figs. 131–136)

Simon, 1903: Harmochireae
Petrunkevitch, 1928: Pelleninae
Roewer, 1954: Harmochireae, Pelleninae
Prószyński, 1976: Pelleninae

**Remarks.**—This subtribe includes two primary subgroups, the harmochirines *sensu stricto* (e.g., *Bianor*, *Harmochirus*, *Sibianor*) and the pellenines (e.g., *Pellenes*, *Habronattus*, *Havaika*, *Neaetha*). The pellenines are well known for the Holarctic *Pellenes* and the primarily-Nearctic *Habronattus* (Griswold 1987; Maddison & Hedin 2003b), the latter remarkable for its complex and colourful courtship traits (Peckham & Peckham 1889, 1890; Maddison & Stratton 1988; Richman & Cutler 1998; Maddison & McMahon 2000; Elias et al. 2003, 2005, 2006a, b, 2012; Hebets & Maddison 2005; Taylor & McGraw 2013; Taylor et al. 2014a), visual system (Zurek et al. 2015) and chromosomes (Maddison 1982; Maddison & Leduc-Robert 2013). The pellenines are athletic salticids, typically dwelling on open sunny ground like aelurillines and sitticines. In contrast, the harmochirines *sensu stricto* are usually compact, often beetle-like, with more delicate walking legs.

For explanation of the decision to use "Harmochirina" rather than "Pellenina", see "Problematic Names", below.

*Monophyly:* The epigynal notch receiving the male's tibial apophysis has moved forward on the epigynum, yielding a more or less conical pocket flanked by two crescent shaped openings (e.g., Griswold 1987, figs. 108–149; Prószyński 2008, figs. 69–84; Logunov 2009, figs. 13, 31, 40). Although this has been obscured secondarily in some *Pellenes* and in *Habronattus paratus* (Peckham & Peckham, 1896), it is a synapomorphy of the group. Two of the three subgroups, the harmochirines *sensu stricto* and the pellenines, are strongly united by molecular data (Bodner & Maddison 2012; Maddison et al. 2014). The third subgroup, the ant-like *Eburneana*, is ambiguously linked to the first two by molecular data (Maddison et al. 2014), but can be placed in the group by the epigynal pocket.

*Iranattus* (Prószyński 1992a) and *Monomotapa* (Wesołowska 2000) share with *Pellolessertia* (Szűts & Scharff 2005) a robust carapace with PLE on tubercles, and with *Pellolessertia* and *Neaetha* extremely long third legs. (Prószyński 1992a says the long legs of *Iranattus* are the fourth pair, but his figures 35 and 36 appear to show they are the third pair.) Their palps are consistent with those of pellenines, and have an unusual cymbial extension like that seen in some *Pellenes* (e.g., *Pellenes bonus* Logunov, Marusik & Rakov, 1999), although similar extensions are seen elsewhere (e.g., the simaethine *Irura*). These features indicate a placement of *Iranattus* and *Monomotapa* with the pellenines, as *Pellolessertia* and *Neaetha* have typical harmochirine genitalia in both males and females. Denis's (1947) figure of the epigynum of *Paraneaetha* suggests it has the guide and atria typical of harmochirines. Thus, the pellenines provisionally include *Pellenes*, *Habronattus*, *Havaika*, *Neaetha*, *Iranattus*, *Monomotapa*, *Pellolessertia*, and *Paraneaetha*; the harmochirines *sensu stricto* include *Harmochirus*, *Bianor*, *Sibianor*, *Napoca*, and *Microbianor*; the eburneanines include only *Eburneana*. Whether *Modunda* is a harmochirine *sensu stricto* or a pellenine is unclear.

## PROBLEMATIC NAMES

With this review of salticid classification, several available suprageneric names have been found to be older than commonly used names. These are:

- Harmochireae Simon, 1903 is older than Pelleninae Petrunkevitch, 1928
- Chrysilleae Simon, 1901 is older than Heliophaninae Petrunkevitch, 1928
- Athamii Peckham, Peckham & Wheeler, 1889 is older than Euophrydeae Simon, 1901
- Cocalodeae, Cyrbeae, and Cocaleae Simon, 1901 are older than Spartaeinae Wanless, 1984.

In each case, the younger name has been used as a subfamily, while the older name was described as a taxon called simply a "group", with unclear rank in the modern scheme. Through much of the 20th century, there was a tradition of describing new subfamilies without regard to older "group" names (e.g., Petrunkevitch 1928; Wanless 1984) as if the latter were not coordinate with subfamily names for priority. For example, Simon (1901) placed the nominate genus *Salticus* in the group Marpisseae, and Roewer (1954) did likewise for several subfamilies (e.g., *Heliophanus* in the group Chrysilleae within the subfamily Heliophaninae). Bonnet (1955–1959), normally an activist in correcting errors, lists without comment synonymies showing older group names as synonyms beneath younger subfamily names. This treatment suggests that early 20th century authors viewed "group" names as following rather different rules than subfamilies, as if they were informal and acceptably ignored. However, more recently, arachnologists have treated these group names as within the ranks of the family group, available as subfamilies or at other ranks. This shift in interpretation challenges us to consider older names that were long disregarded. The taxonomic rank of these "groups" could be considered ambiguous, but they have been considered below the rank of subfamily (e.g., Roewer 1954), as if equivalent to tribes.

While article 35.5 of the current code (ICZN 1999) might have permitted us to retain the younger higher-ranked subfamily names, this article would no longer apply once their rank is reduced to tribe, which I do for all but Spartaeinae.

The simplest case is perhaps Harmochireae/Pelleninae. Insofar as both have continued to be used (e.g., Logunov 2009), but not commonly in the literature, it is best to give way to priority, with subtribe Harmochirina taking precedence over the alternative choice Pellenina. However, the pellenines are still recognized, informally, as a subgroup of the Harmochirina.

In the other three cases, a strict application of the Code would likewise support older and more-or-less forgotten names to displace names currently in common use. Of these, the displacement of "Heliophaninae" is the least disruptive, as its uses in the literature are not extensive. While the group's genera are among the most conspicuous salticids throughout the Old World, their collective labelling as heliophanines is not so conspicuous in the literature. Therefore, I use Chrysillini for the group, treating Heliophaninae as a junior synonym.

However, "Euophryinae" cannot be so painlessly set aside. Because of strong prevailing use in salticid systematics, I use Euophryini in preference to the older Athamii. Among the groups heretofore recognized as subfamilies, the Euophryinae is the largest and most widespread, with over 1000 species and 100 genera on all continents except Antarctica, from the tropics to cold temperate habitats (Zhang & Maddison 2015). Our current concept of this group dates to Prószyński's (1976) landmark paper. While it is easy to recognize a salticid as belonging to the group, it has been difficult to distinguish genera (Zhang & Maddison 2015). Thus, for the last 40 years we have often spoken of "euophryines" and identified specimens as "euophryine", without referring to the genus, both in the literature and in our informal parlance. The names "Euophryinae" and "euophryine" have come to be key parts of the vocabulary of salticid systematics (e.g., Prószyński 1976, 1983a, 2003, 2009b; Prószyński & Żabka 1980; Żabka 1980b, 2012; Griswold 1987; Logunov 1992, 1998; Maddison 1996; Wesołowska & Russell-Smith 2000; Wesołowska 2001, 2012; Żabka & Pollard 2002b, c; Edwards 2003a, b, 2004, 2009; Logunov & Kronestedt 2003; Maddison & Hedin 2003a; Benjamin 2004; Edwards et al. 2005; Ruiz & Brescovit 2005b, 2008a, b; Arnedo & Gillespie 2006; Andriamalala 2007; Ruiz et al. 2007; Su et al. 2007; Logunov & Azarkina 2008b; Azarkina 2009; Hill 2009, 2012; Otto & Hill 2011a, 2012a, b, 2013a, b, 2014a, b, c; Prószyński & Deeleman-Rheinhold 2012, 2013; Zhang & Maddison 2012a, b, c, d, 2013, 2015; Azarkina & Foord 2013; Edwards & Ruiz 2013; Richardson 2013; Ruiz 2011, 2013b; Waldock 2013, 2014; Wesołowska & Haddad 2013, 2014; Wesołowska et al. 2014). In contrast, the older name Athamii (or Athameae) has been used rarely (Simon 1903; Roewer 1954; Galiano 1976b; Szűts 2003b), though enough to prevent its being considered a *nomen oblitum*. The use of Athamii/Athameae has been restricted to the rarely collected and little studied nominate genus *Athamas* of Australasia and Pacific Islands (Jendrzejewska 1995). Prószyński & Deeleman-Rheinhold (2013) recognized that *Athamas* is a euophryine, but did not address the priority of names, possibly because the Athamii/Athameae has been misattributed to Simon (e.g., Jendrzejewska 1995, Szűts 2003b). Because of the importance of the name "Euophryinae" to salticid systematics, I will use Euophryini as the name of the tribe.

The case of Spartaeinae is more complex, but I use that familiar name instead of the alternatives because of its widespread use in literature on salticid behaviour and systematics, cited below. When Wanless (1984a) named the subfamily Spartaeinae because of homonymy of the former Boethinae's type genus, he ignored the availability of Simon's older group names Cocalodeae, Cyrbeae, and Cocaleae, possibly because he did not consider them as coordinate with family-group names. Noticing Wanless's error, Wunderlich (2004) proposed Cocalodinae instead. At first glance, it would appear that the Code rules out Wunderlich's change, with article 35.5 preventing Spartaeinae's replacement by a lower ranked name (Cocalodeae). However, that article specifies that the older name be in use (despite this requirement seeming against the intent of the article), and Cocalodeae arguably was not in use. Thus, a direct reading of the Code leads us to the subfamily name as the Cocalodinae.

What would be the name of the tribe excluding *Codalodes* but including *Cyrba*, *Cocalus*, and *Spartaeus* (Table 2)? Besides Spartaeini, there are two competing names for this tribe, based on Cyrbeae or Cocaleae, of which I would choose Cyrbeae because the type genus is considerably more widespread. Here again, article 35.5 cannot protect the Spartaeini, for any of three reasons: (1) Spartaeini as a tribe does not outrank Simon's group, if we treat groups as of tribal rank; (2) "Cyrbeae" has not been in use; (3) Cyrbeae does not represent a distinct taxon from the Spartaeini even at the lowest level, as *Cyrba* and *Spartaeus* have long been placed together even at the finest level (here, the same subtribe). This last requirement, for distinctness at the lowest level, I interpret as the spirit of the Code, implied by the example given in the Code for article 35.5. Even if 35.5 would protect the subfamily name Spartaeinae, the lower levels of tribe and subtribe would not be so protected, leading to the inconsistency that *Spartaeus* and *Cyrba* would find themselves together within the subtribe Cyrbina, tribe Cyrbini, subfamily Spartaeinae.

According to the cited articles of the Code and the principle of priority, therefore, the appropriate names for groups containing *Cyrba* and *Spartaeus* would be Cocalodinae: Cyrbini: Cyrbina, accepting Wunderlich (2004) as first revisor. However, there is a compelling argument to maintain current usage for stability. There is much work anchored to the name Spartaeinae in the literature of salticid behaviour (Blest 1984, 1987; Jackson & Hallas 1986b; Blest et al. 1990; Jackson 1990a, b, c, d, 2000, 2002; Jackson & Pollard 1990, 1996; Jackson & Li 1998; Harland et al. 1999; Bartos 2002b; Li 2000; Cerveira et al. 2003; Guseinov et al. 2004; Nelson & Jackson 2009a; Cerveira & Jackson 2011; Hu et al. 2012; Nelson et al. 2012; Cross & Jackson 2015) and systematics (Wanless 1984a, b, 1985, 1987; Bohdanowicz & Prószyński 1987; Griswold 1987; Davies & Żabka 1989; Rodrigo & Jackson 1992; Wijesinghe 1992, 1994; Maddison 1996, 2006, 2009; Żabka & Kovac 1996; Galiano 1998, 2000; Logunov 1998; Żabka 1999; Szűts & Azarkina 2002; Deeleman-Reinhold & Floren 2003; Maddison & Hedin 2003a; Prószyński 2003; Edwards 2004; Zhang & Li 2005; Maddison & Needham 2006; Maddison et al. 2007, 2008, 2014; Su et al. 2007; Logunov & Azarkina 2008a; Wesołowska & Haddad 2009, 2013; Azarkina & Logunov 2010; Benjamin 2010; Hill 2012; Prószyński & Deeleman-Reinhold 2012; Ruiz & Maddison 2012; Ruiz 2013a; Zhang & Maddison 2013, Zhou & Li 2013a; Logunov & Marusik 2014; Ramírez 2014; Patoleta & Żabka 2015). To avoid disconnecting that literature from the classification, I use Spartaeinae: Spartaeini: Spartaeina.

## EVOLUTION AND BIOGEOGRAPHY

While the arrangement is presented here as a classification, it also represents the first time that explicitly phylogenetic relationships have been proposed for all (or most) genera of salticids. Such a classification has two roles. First, by placing together related genera, it promotes species discovery and taxonomic work, by assembling together those genera that might hold species relevant for a study, facilitating the search for already-described species. Second, it promotes exploration of evolutionary patterns in salticids.

**The age and biogeography of salticid radiations.**—Major clades of salticids are mostly restricted to a single continental area (Maddison & Hedin 2003a; Bodner & Maddison 2012). In the speciose Salticinae, the Amycoida are primarily Neotropical, the Astioida primarily Australasian, the Marpissoida primarily in the Americas (especially Central and North America), and the Saltafresia (with the exception of the euophryines and freyines) primarily Afro-Eurasian. The Spartaeinae is similarly divided, with the Americas, Afro-Eurasia and Australasia occupied by the lapsiines, spartaeines, and cocalodines respectively. This pattern suggests that each major group diversified mostly in isolation from the others, after the continents were fully isolated about 35 million years ago (Maddison & Hedin 2003a; Bodner & Maddison 2012). This timing of salticid radiations is supported by dating of divergence times using molecular data and fossils (Bodner & Maddison 2012; Zhang & Maddison 2013). Even before molecular data clarified relationships, Żabka (1990b, 2000) and Żabka et al. (2002) pointed out the lack of any trace of a Gondwanan salticid fauna.

At present, each continental area has its own distinct fauna consisting primarily of a few groups — e.g., Amycoida, Dendryphantini, Freyina, and Euophryini in the Neotropics, contrasted against Euophryini, Plexippina, Chrysillini, Spartaeina, and Astioida in the Asian tropics — but the faunas may have been even more distinct in the past. One is tempted to imagine a time in the mid-Cenozoic during which South America, North America, Afro-Eurasia and Australia each had its own major isolated radiation (the amycoids, marpissoids, saltafresians and astioids respectively).

It should be realized, however, that the relationships presented here are not entirely independent evidence for isolated radiations. The strength of this geographical pattern has likely influenced my assessments of the relationships of some poorly studied genera, such that I may have been more likely to predict that an Australian salticine species with fixed embolus is an astioid rather than a marpissine, for example.

**Salticid eyes and vision.**—Many studies have explored various aspects of salticid vision: anatomy (Scheuring 1914; Land 1969a, 1985; Eakin & Brandenburger 1971; Homann 1971; Hill 1975; Oberdorfer 1977; Blest & Maples 1979; Williams & McIntyre 1980; Blest 1983, 1984, 1985, 1987; Blest & Price 1984; Blest & Sigmund 1984, 1985; Blest & Carter 1987; Blest et al. 1988; Blest et al. 1990; Hu et al. 2012; Zurek et al. 2015), neurophysiology and cognition (Land 1969b; Hill 1975; Duelli 1978; Hardie & Duelli 1978; Sivertson 1985; Baker et al. 2009; Spano et al. 2012; Zurek & Nelson 2012a, b; Nagata et al. 2012; Menda et al. 2014), opsins and colour sensitivity (Devoe 1975; Yamashita and Tateda 1976; Blest et al. 1981; Peaslee & Wilson 1989; Nakamura & Yamashita 2000; Lim & Li 2006a; VanderSal & Hebets 2007; Koyanagi et al. 2008; Nagata et al. 2010; Terakita & Nagata 2014; Taylor et al. 2014b), and behavioural responses (Drees 1952; Land 1972; Giulo 1979; Zurek et al. 2010; Bednarski et al. 2012; Dolev & Nelson 2014). Their visual systems have even inspired robotic camera systems (Tonet et al. 2008).

With this phylogenetic arrangement of salticids, we are now in a position to interpret evolutionary patterns in visual system diversity. Diversity is expected, given that the family is comparable, in species diversity and age, to groups such as the eutherian Mammalia or the passerine birds. Indeed, the Salticinae (and possibly the hisponines) differ distinctly from the other salticids in having the AME retina boomerang-shaped and the AME rhabdomeres rotated to eliminate suture lines (Blest et al. 1990). However, we are hampered in exploring evolutionary patterns by a lack of data from diverse taxa. For instance, the ultrastructure of the AME has been studied in the Lyssomaninae, Asemoneinae, Spartaeinae (Spartaeina, Cocalodini); Amycoida (Gophoini, Sitticini, Scopocirini, Simonellini, Amycini); Astioida (Myrmarachnini, Astiini, Viciriini); Marpissoida (Dendryphantina, Itatina), and Saltafresia (Euophryini, Freyina), as compiled by Blest et al. (1990). The Plexippina is not included in this list, as the reported *Plexippus validus* Urquhart, 1893 is the euophryine *Servaea incana* (Karsch, 1878). Thus, there is scant coverage of the most diverse of the major clades, the Saltafresia. Nonetheless, we can conclude that there is convergence: the amycoids, astioids, and saltafresians each contain species with different conditions in whether the AME Layer 1 receptive segments are continuous or well separated (see Blest et al. 1990). Obtaining more data on anatomy and physiology of diverse salticids will be vital to understand how and why their remarkable eyesight has evolved.

**Salticids that look like ants, beetles, and other things.**—Ant-like body forms and behaviour in salticids are well known (Peckham & Peckham 1892; Cushing 1997; Ceccarelli 2008; Huang et al. 2011; Nelson 2011; Uma et al. 2013; Pekár 2014), and many of the spiders bearing them have special behaviours that enhance their resemblance to ants (Reiskind, 1972). The degree of resemblance, to human eyes, varies from mild (e.g., *Tutelina*, *Mexcala*) to highly convincing, with strangely constricted body parts and well-placed markings (e.g., *Synemosyna*, *Myrmarachne*).

A long-standing question is how many independent origins there are of ant-like bodies and behaviour in salticids

(Jackowska & Prószyński 1975). Pekár (2014) concludes that strongly ant-like bodies evolved in six salticid lineages. The more complete picture of salticid relationships presented here indicates that strong ant (or wasp) mimicry has evolved at least 12 or 13 times in salticids. The following list shows the scattered distribution of ant-like bodies:

- Cocalodini: *Depreissia* (Wesołowska 1997; Deeleman-Reinhold & Floren 2003)
- Amycoida
  - Thiodinini: *Atomosphyrus* (see Ruiz & Maddison in press)
  - Sarindini: *Sarinda*, *Zuniga*, etc. (Figs. 47, 48)
  - Simonellini: *Synemosyna*, *Fluda*, *Erica* (Figs. 41–43, 46)
- Salticoida
  - Agoriini: *Agorius*, *Synagelides* (Figs. 56, 57)
  - Astioida: *Myrmarachne*, etc. (Figs. 78, 79)
  - Marpissoida
    - Ballini: *Marengo*, *Leikung*, etc. (Fig. 61)
    - Dendryphantini
      - Synagelina: *Synageles*, *Peckhamia*, etc. (Figs. 68, 69)
      - Dendryphantina: *Bellota*, etc. (Fig. 74)
  - Saltafresia
    - Chrysillini: *Yepoella* (Fig. 95)
    - Leptorchestini: *Leptorchestes*, *Kima*, etc. (Fig. 105)
    - Euophryini: *Sobasina*, *Paraharmochirus* (Zhang & Maddison 2015, figs. 836–841)
    - Plexippini: *Eburneana* (Fig. 133)

In this list are at least 12 independent evolutionary origins, because, in each case, the ant-like species are embedded within clades of non-ant-like species, or have close relatives that are not ant-like. The agoriines are probably a 13th independent origin. However, given the uncertainty in their phylogenetic placement, we cannot yet rule out their sharing an origin of ant-like bodies with some other salticoids. Another caveat is that the selective force for these body forms may not have always been ant mimicry. For example, Christa Deeleman-Reinhold (pers. comm.) suggests that the ant-like *Depreissia* may have been selected for resemblance to polistine wasps. Nonetheless, the phylogenetic distribution of ant-like bodies suggests an answer to the question posed by Jackowska & Prószyński (1975): a strongly ant-like form has neither evolved once, forming a single clade of ant-like salticids, nor in every species independently. Rather, it has evolved a handful of times, with some origins leading to a large diversification of many ant-like species (myrmarachnines, simonellines), and others only a few.

Other salticids are round, dark and shiny, strongly resembling beetles. A striking beetle-like appearance has evolved at least eight times in salticids: in the Amycoida (*Cylistella*, Figs. 44, 45), the Astioida (*Simaetha* and others, Fig. 88), the Ballini (*Pachyballus*, Fig. 60), the Dendryphantini (*Sassacus, Rhene, Rhetenor*, Fig. 76), and the Euophryini (*Coccorchestes*, Fig. 109).

A surprising pattern is that in at least four of these beetle-like lineages, close relatives of the beetle-like forms are ant-like (*Cylistella*/*Synemosyna*, *Pachyballus*/*Marengo*, *Sassacus*/*Bellota* and *Coccorchestes*/*Sobasina*). A somewhat less-striking beetle-like form (*Attidops*) has the ant-like *Synageles* and *Peckhamia* as close relatives.

*Orsima* (Chrysillini) has been reported as resembling a backwards insect, with the spinnerets like the insect's mouthparts (Fig. 90; Reiskind 1976). This is indeed convincing, and is replicated in some *Asemonea* (Asemoneinae; Fig. 4), and in different form in *Abracadabrella* (Astioida?).

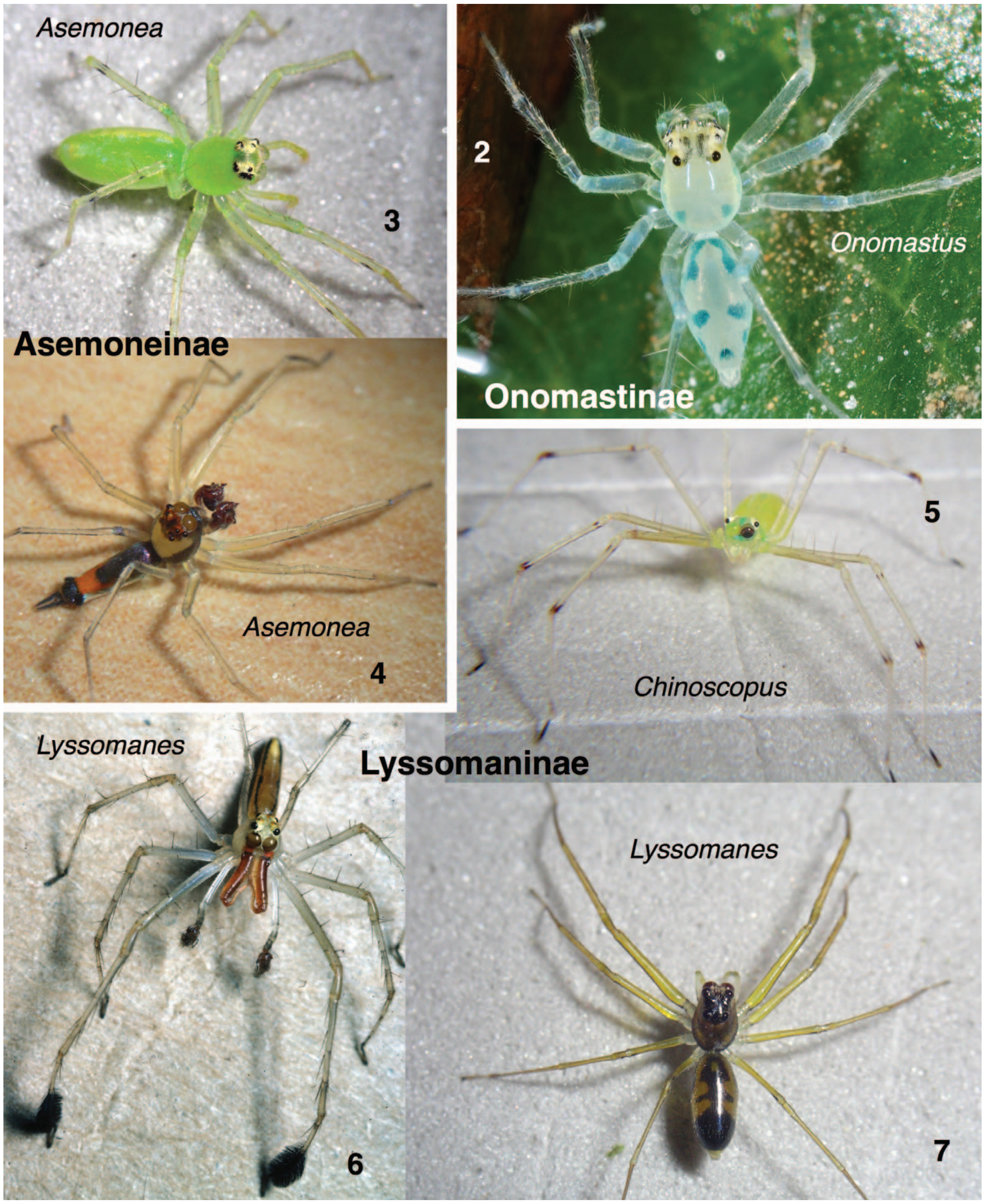
## PRIORITIES FOR FUTURE STUDY

Acquiring molecular data from many genes is the priority for resolving salticid relationships with greater clarity. However, for many salticid genera, finding more certain placement will require a better understanding of structures of the body and genitalia. While standard illustrations of palps and epigyna (both external and internal) are sufficient for species identification, they have not yet yielded many clear synapomorphies for groups. For that, we need to observe structures at much higher resolution than is usually done; a sketch at 80X magnification is not likely enough for phylogenetic work. We also need to go beyond genitalia to fine structures of the whole body. It is also critical that the morphological data be analyzed cladistically, seeking and explaining synapomorphies clearly and explicitly.

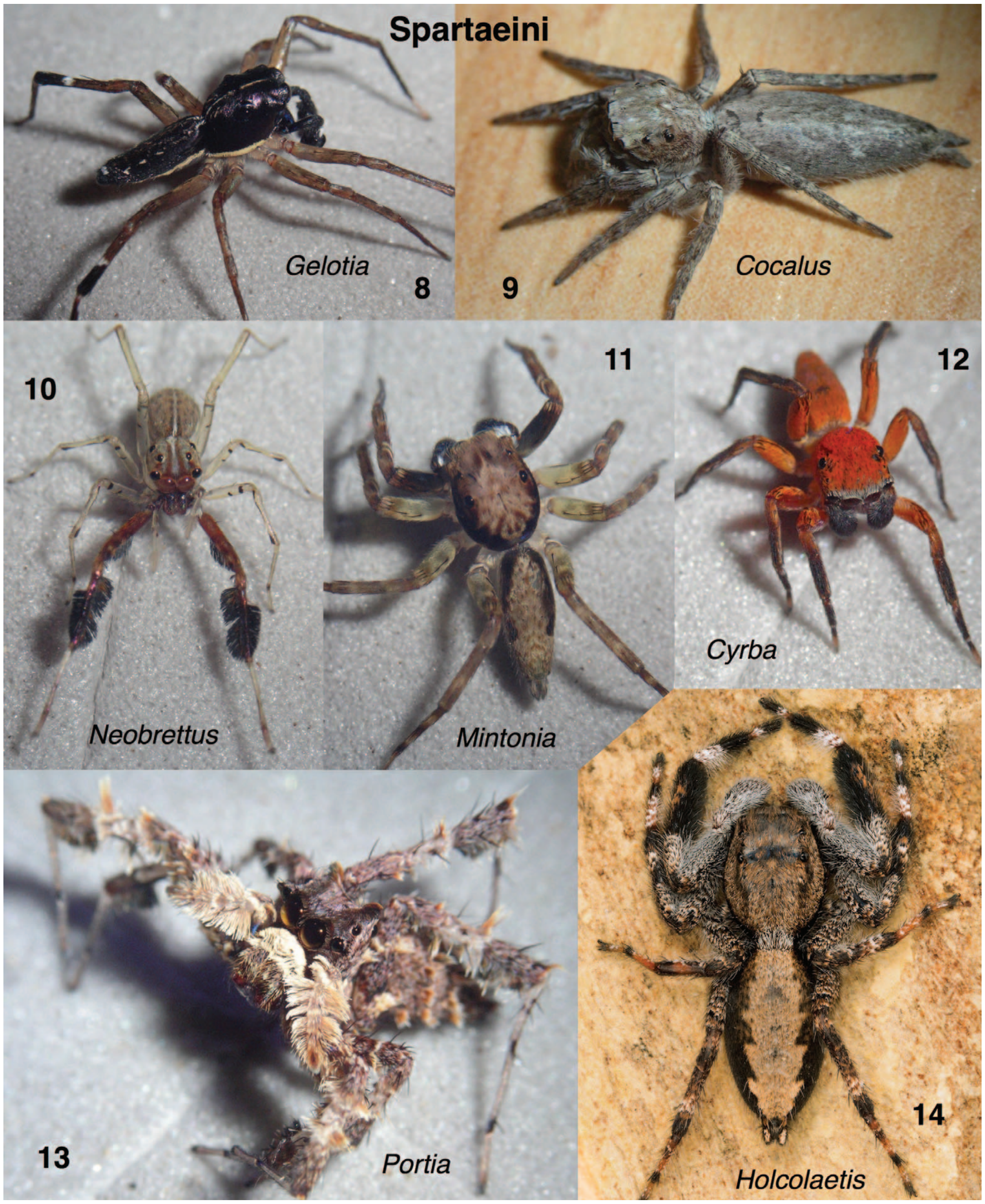
However, our greatest challenge is the size of the group compared to the number of active workers. The great bulk of work this century has been led by just a few people in each major continental area: Prószyński, Logunov, Marusik, Peng, and Azarkina for Eurasia; Wesołowska, Russell-Smith, Haddad, and van Harten for Africa and adjacent areas; Żabka for Australasia; Ruiz for the Americas; Maddison and Zhang for multiple areas. While each of the above has participated in describing at least 50 new species, the pace is far too slow given the family's size and the continuing loss of habitat. The need to recruit more workers is especially acute in the Neotropics, South Asia, Southeast Asia, and Australasia. Perhaps, as the family becomes better described and organized, young arachnologists will find it a less daunting vocation.

## ACKNOWLEDGMENTS

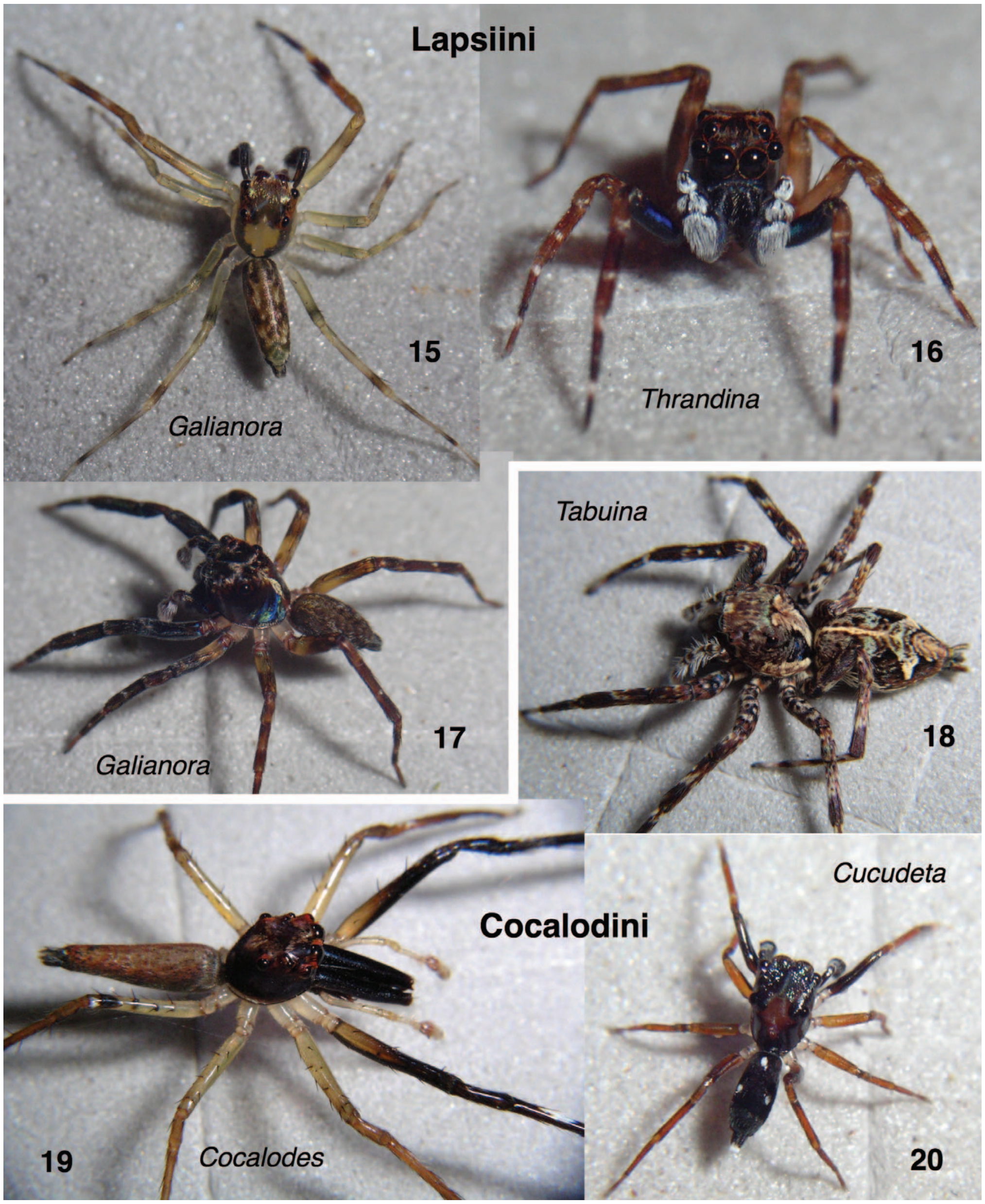
I thank David Maddison for sharing his wisdom, always, on systematics. I am grateful to G.B. Edwards for extensive discussion over the years about salticid relationships, and for hastening his publication on freyines on which this paper relied. I thank Gustavo Ruiz for his collaborations on salticid relationships, and for his hard work on various projects that served as prerequisites for this paper. He was generous and helpful with his advice, not only correcting errors but also permitting me to use his unpublished results on the placement of several Neotropical genera. I am grateful to Tamás Szűts for sharing his unpublished photographs of type specimens. Special thanks are due to Suresh Benjamin, Charles Haddad, Shuqiang Li, Jürgen Otto, Michael Schäfer, and Vida Van der Walt for permitting me to use their photographs of living spiders. Gustavo Ruiz, Martín Ramírez, Mark Harvey, G.B. Edwards, Michael Rix, and an anonymous reviewer gave helpful comments on the manuscript. I am thankful to Robert Suter, Rick Vetter, and Michael Rix for their extraordinary efforts in guiding this paper to publication. This paper was supported by an NSERC Discovery grant.



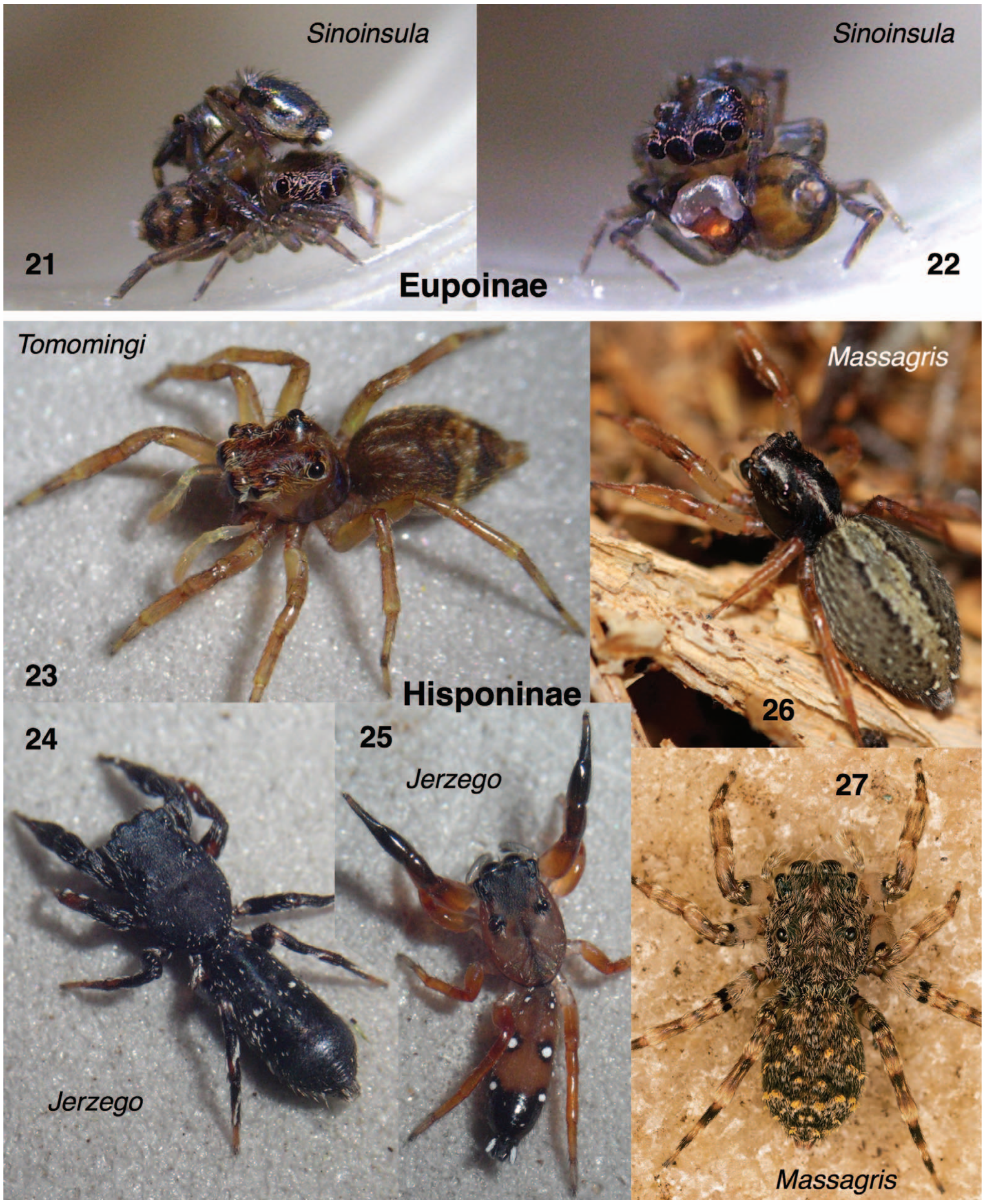
Figures 2–7.—**Onomastinae**: 2, *Onomastus pethiyagodai* Benjamin, 2010, female, Sri Lanka (photo from Benjamin 2010, fig. 18D). **Asemoneinae**: ,3 *Asemonea* sp., female, Gabon: Lambaréné; 4, *Asemonea tenuipes* (O. Pickard-Cambridge, 1869), male, Singapore. **Lyssomaninae**: 5, *Chinoscopus* cf. *flavus* (Peckham, Peckham & Wheeler, 1889), female, Panama; 6, *Lyssomanes jemineus* Peckham, Peckham & Wheeler, 1889, male, México: Campeche; 7, *Lyssomanes tenuis* Peckham, Peckham & Wheeler, 1889, female, Ecuador: Yasuní. Figure 2 is © 2010 The Linnean Society of London, with permission. Figures 3–7 are © 2015 W. Maddison, released under a Creative Commons Attribution (CC-BY) 3.0 license.



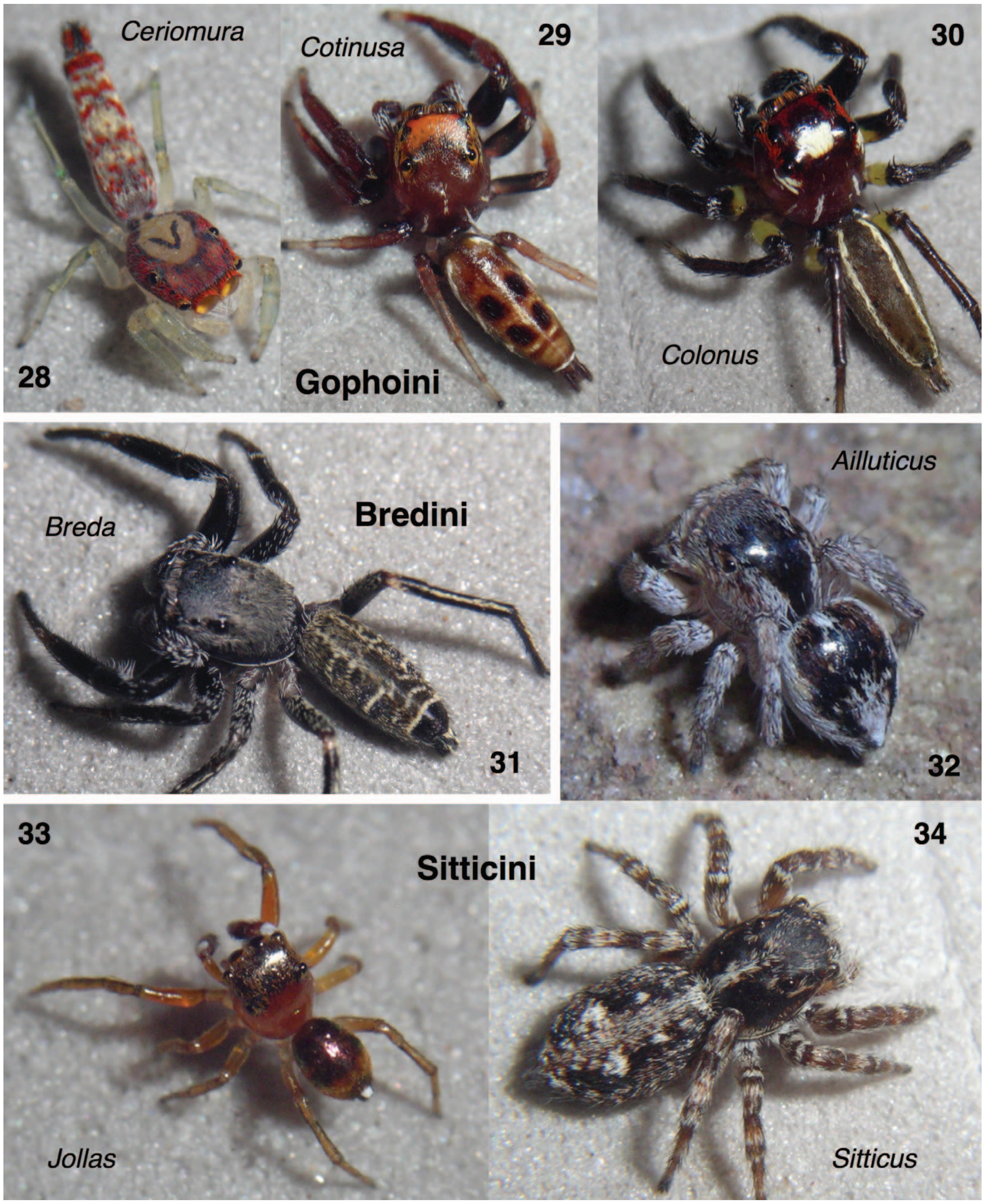
Figures 8–14.—Spartaeinae. **Spartaeini**: 8, *Gelotia bimaculata* Thorell, 1890, male, Malaysia: Sarawak: Kubah Nat. Pk.; 9, *Cocalus murinus* Simon, 1899, female, Singapore; 10, *Neobrettus* sp., female, Malaysia: Sarawak: Gunung Mulu Nat. Pk.; 11, *Mintonia silvicola* Wanless, 1987, male, Malaysia: Sarawak: Gunung Mulu Nat. Pk.; 12, *Cyrba* sp., male, Gabon: Estuaire, Cap Esterias; 13, *Portia* sp., female, Gabon: Ngounié: Waka Nat. Pk.; 14, *Holcolaetis vellerea* (Simon, 1910), male, South Africa: Pretoria: Kameeldrift, Pretoria (photo by Vida Van der Walt). Figures 8–13 are © 2015 W. Maddison, released under a Creative Commons Attribution (CC-BY) 3.0 license. Figure 14 is © 2014 Vida Van der Walt, used with permission.



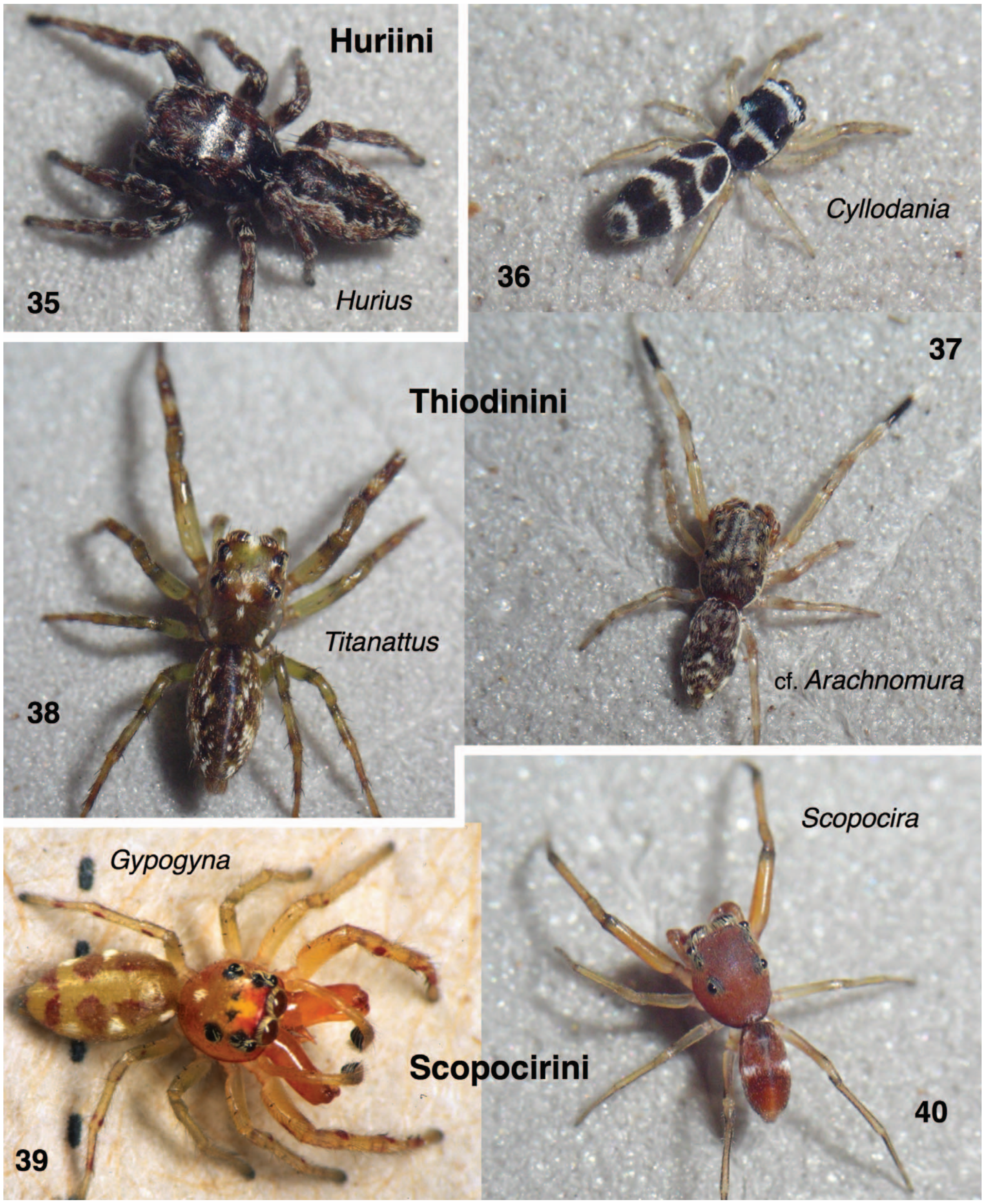
Figures 15–20.—Spartaeinae. **Lapsiini:** 15, *Galianora sacha* Maddison, 2006, male, Ecuador: Orellana: Río Bigal Reserve; 16, *Thrandina parocula* Maddison, 2006, male, Ecuador: Napo: Río Guamani; 17, *Galianora bryicola* Maddison, 2006, male, Ecuador: Orellana: Río Bigal Reserve. **Cocalodini:** 18, *Tabuina varirata* Maddison, 2009, female, Papua New Guinea: Varirata National Park; 19, *Cocalodes longicornis* Wanless, 1982, male, Papua New Guinea: Varirata National Park; 20, *Cucudeta zabkai* Maddison, 2009 — Papua New Guinea: Southern Highlands Province, Wanakipa. Figures 15, 17–20 are © 2015 W. Maddison, released under a Creative Commons Attribution (CC-BY) 3.0 license. Figure 16 is © 2012 W. P. Maddison, released under a Creative Commons Attribution (CC-BY) 3.0 license.



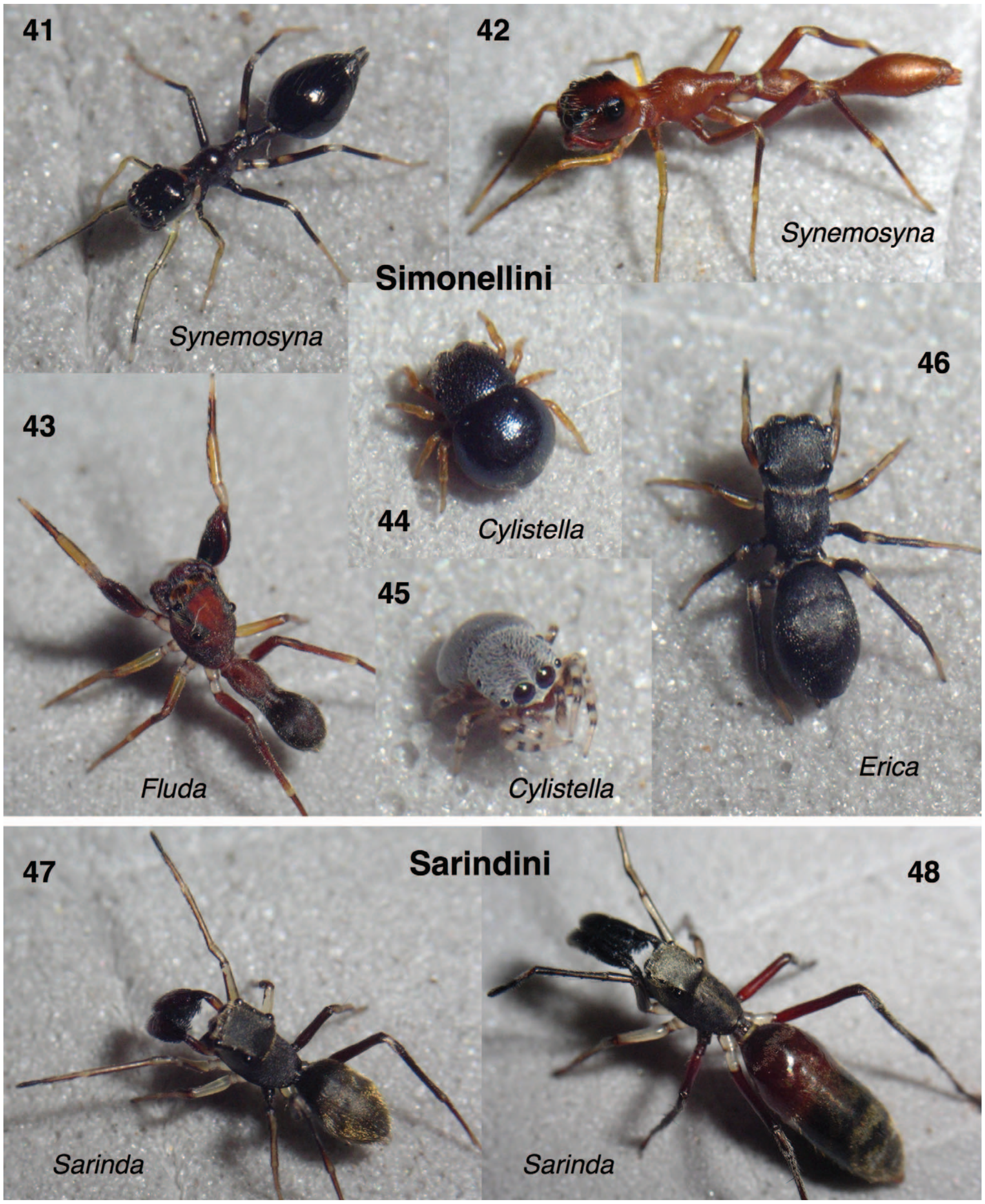
Figures 21–27.—**Eupoinae**: 21, 22, *Sinoinsula curva* (Zhou & Li, 2013), male and female in copula, China: Hainan: Mt. Limushan (photos by Yuanye Zhou). **Hisponinae**: 23, *Tomomingi* sp., female, Gabon: Monts de Cristal, Tchimbélé; 24, *Jerzego corticicola* Maddison, 2014, female, Malaysia: Sarawak: Gunung Mulu Nat. Pk.; 25, *Jerzego* cf. *alboguttatus* (Simon, 1903), juvenile, Malaysia: Sarawak: Lambir Hills Nat.; 26, *Massagris honesta* Wesołowska, 1993, female, South Africa: Eastern Cape, Hogsback (photo by Charles Haddad); 27, *Massagris natalensis* Wesołowska & Haddad, 2009, female, South Africa: Kwazulu Natal, Ndumo (photo by Vida Van der Walt). Figure 21 is from Zhou & Li (2013a: fig. 118) and is © 2013 Magnolia Press, with permission. Figure 22 is © 2013 Yuanye Zhou & Shuqiang Li, released under a Creative Commons Attribution (CC-BY) 3.0 license. Figures 23–25 are © 2015 W. Maddison, released under a Creative Commons Attribution (CC-BY) 3.0 license. Figure 26 is © 2010, Charles Haddad, used with permission. Figure 27 is © 2015 Vida Van der Walt, used with permission.



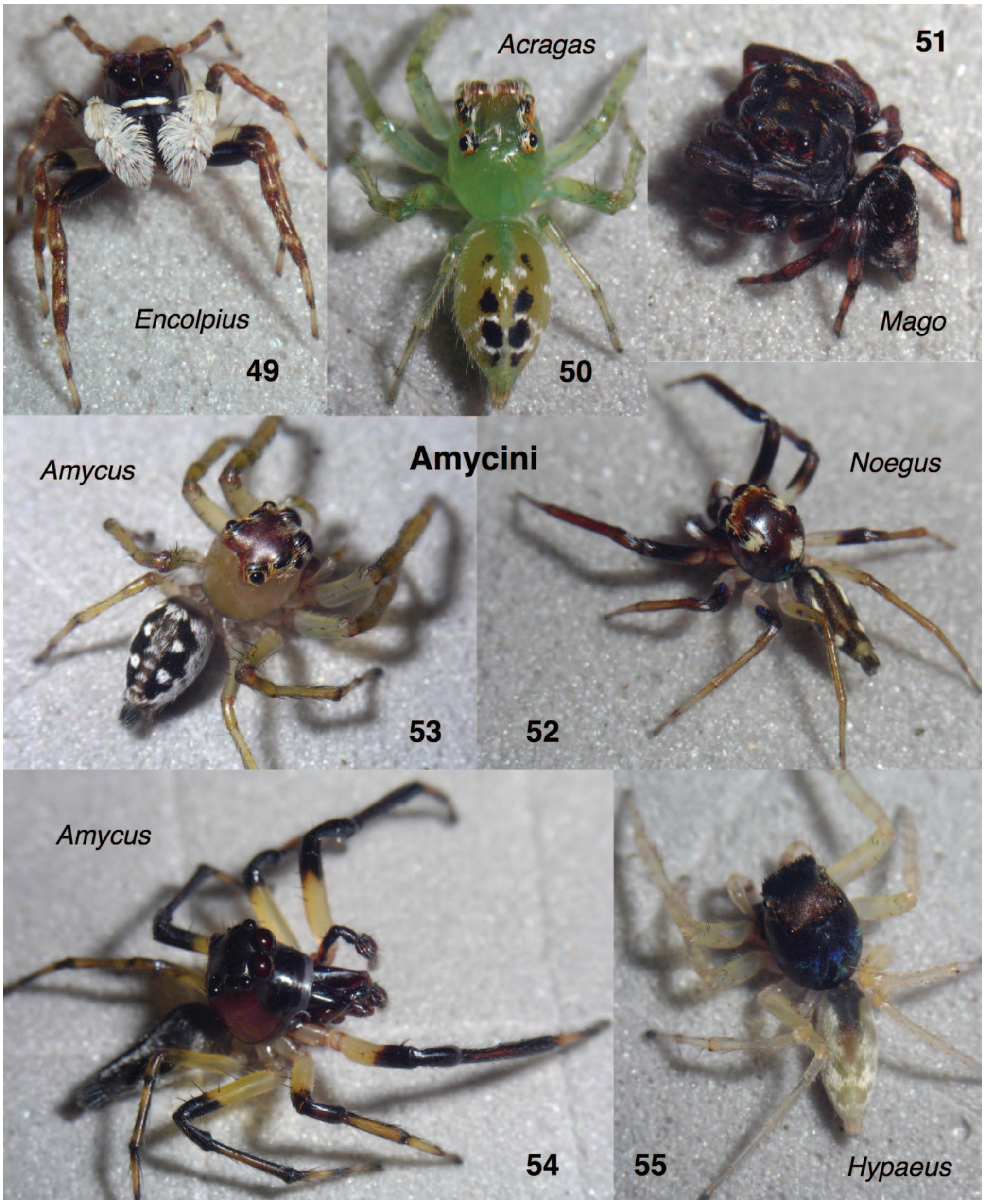
Figures 28–34.—Salticinae: Amycoida. **Gophoini:** 28, *Ceriomura* sp., female, Ecuador: Yasuní; 29, *Cotinusa* cf. *distincta* (Peckham & Peckham, 1888), male, México: Jalisco; 30, *Colonus* sp., México: Jalisco. **Bredini:** 31, *Breda akypueruna* Ruiz & Brescovit, 2013, male, Ecuador: Yasuní. **Sitticini:** 32, *Aillutticus nitens* Galiano, 1987, male, Uruguay: Canelones: Barra de Carrasco; 33, *Jollas* sp., male, Ecuador: Yasuní; 34, *Sitticus pubescens* (Fabricius 1775), female, Poland: near Neple. Figures 28–34 are © 2015 W. Maddison, released under a Creative Commons Attribution (CC-BY) 3.0 license.



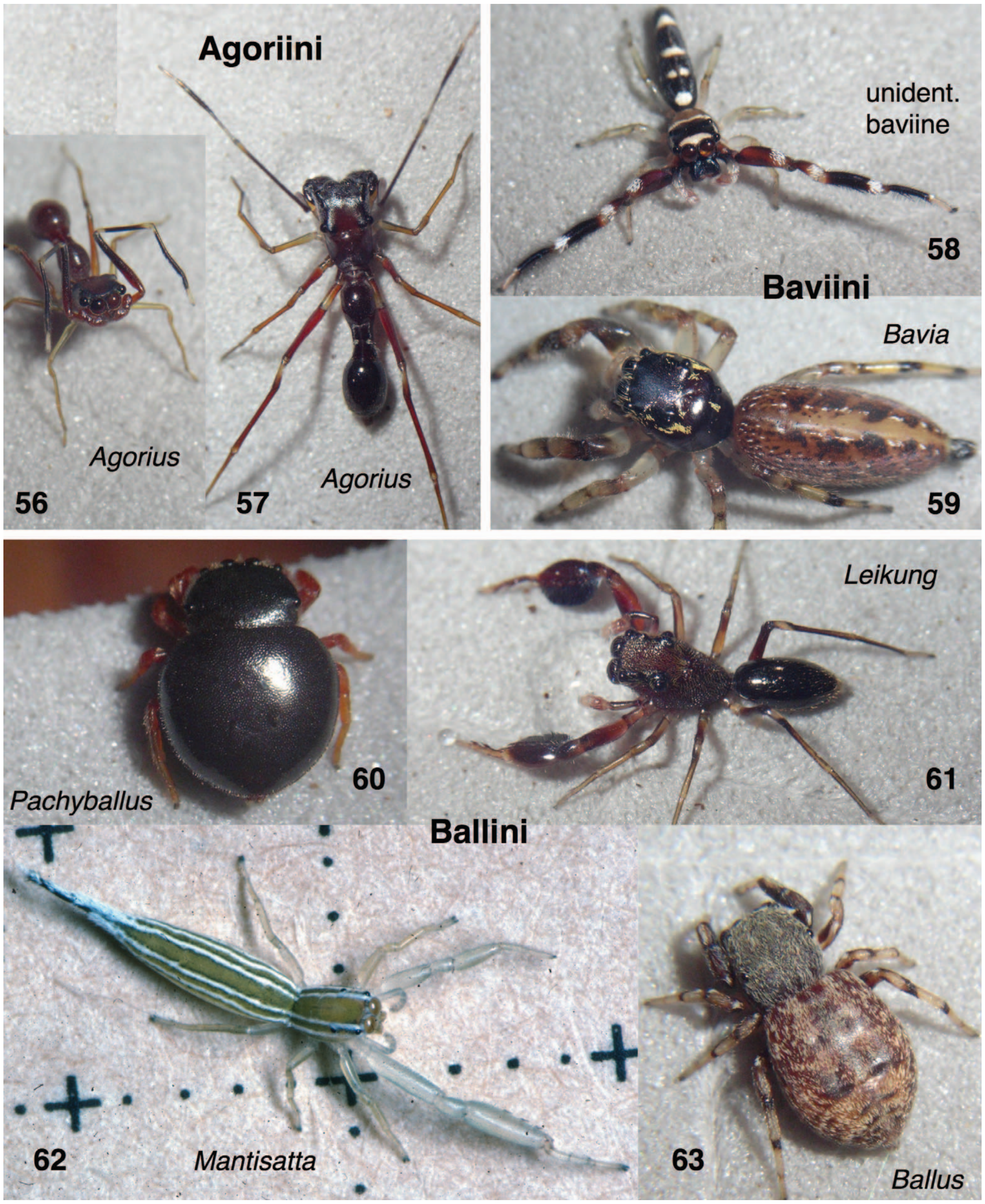
Figures 35–40.—Salticinae: Amycoida. **Huriini:** 35, *Hurius* sp. male, Ecuador, Pichincha: near Paso de la Virgen. **Thiodinini:** 36, *Cyllodania* sp., female, Ecuador: Esmeraldas: Reserva Canandé; 37, cf. *Arachnomura* sp., male, Ecuador: Yasuní; 38, *Titanattus* sp., male, Ecuador: Pichincha: Bellavista Cloud Forest Reserve. **Scopocirini:** 39, *Gypogyna* sp., male, México: Jalisco; 40, *Scopocira* cf. *cepa* Costa & Ruiz, 2014, male, Ecuador: Yasuní. Figures 35–39 are © 2015 W. Maddison, released under a Creative Commons Attribution (CC-BY) 3.0 license. Figure 40 is © 2014 W. Maddison, released under a Creative Commons Attribution 4.0 International license.



Figures 41–48.—Salticinae: Amycoida. **Simonellini:** 41, *Synemosyna* sp., female, Ecuador: Esmeraldas: Reserva Canandé; 42, *Synemosyna* sp. female, Ecuador: Yasuní; 43, *Fluda* sp., male, Ecuador: Orellana: Río Bigal Reserve; 44, *Cylistella* sp., female, México: Jalisco, Chamela; 45, *Cylistella* sp., female, Ecuador: Yasuní; 46, *Erica* sp., female, Ecuador: Yasuní. **Sarindini:** 47, *Sarinda* sp., female, Ecuador: Yasuní; 48, *Sarinda* cf. *nigra* Peckham & Peckham, 1892, female, Ecuador: Yasuní. Figures 41–48 are © 2015 W. Maddison, released under a Creative Commons Attribution (CC-BY) 3.0 license.

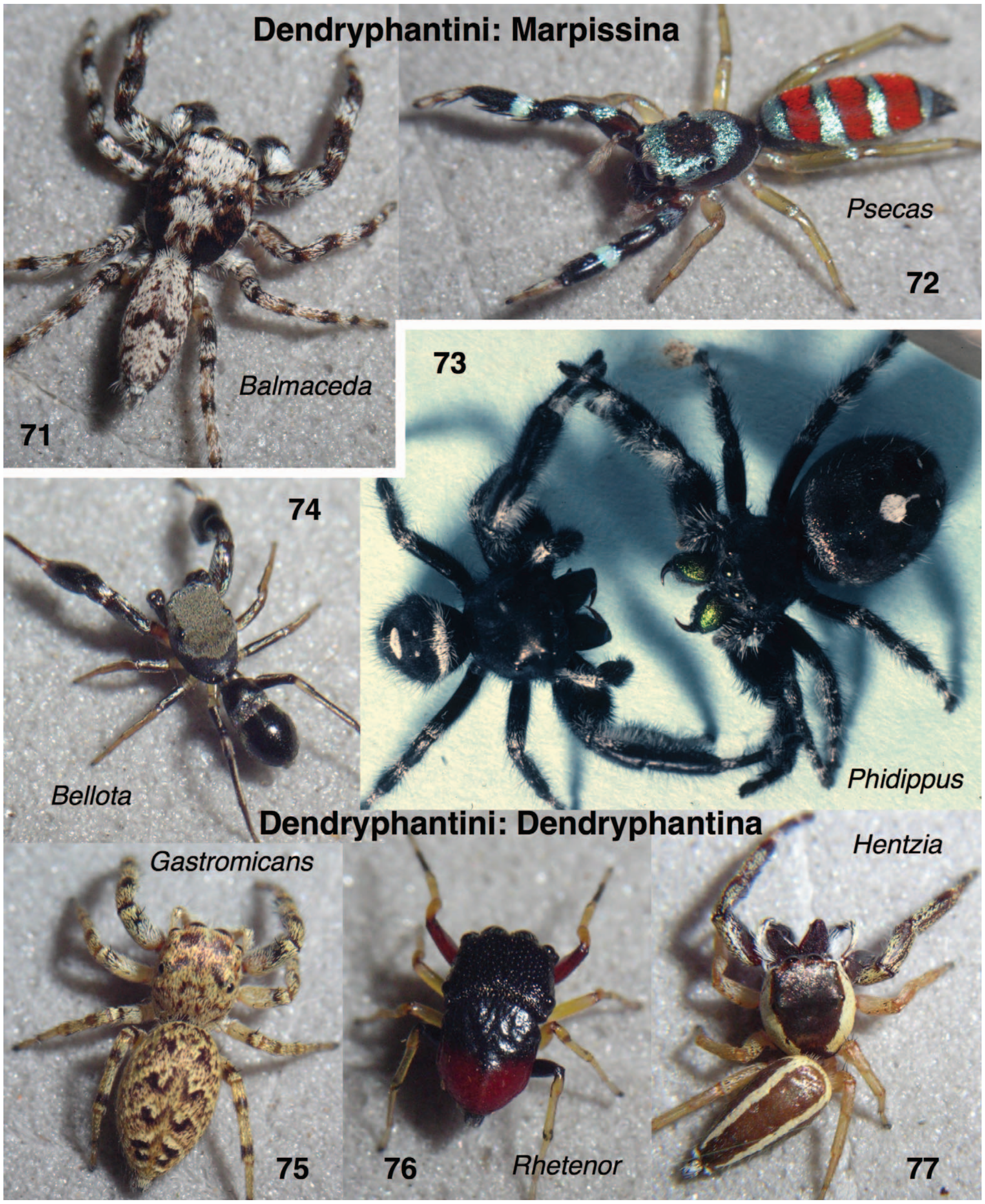


Figures 49–55.—Salticinae: Amycoida. **Amycini:** 49, *Encolpius* sp., male, Ecuador: Napo: Río Guamani; 50, *Acragas longimanus* Simon, 1900, female, Ecuador: Yasuní; 51, *Mago* sp., male, Ecuador: Esmeraldas: Reserva Canandé; 52, *Noegus* cf. *actinosus* Simon, 1900, male, Ecuador: Yasuní; 53, *Amycus* sp., female, Ecuador: Yasuní; 54, *Amycus* sp., male, Ecuador: Yasuní; 55, *Hypaeus* aff. *porcatus* (Taczanowski, 1871), male, Ecuador: Yasuní. Figures 49–55 are © 2015 W. Maddison, released under a Creative Commons Attribution (CC-BY) 3.0 license.

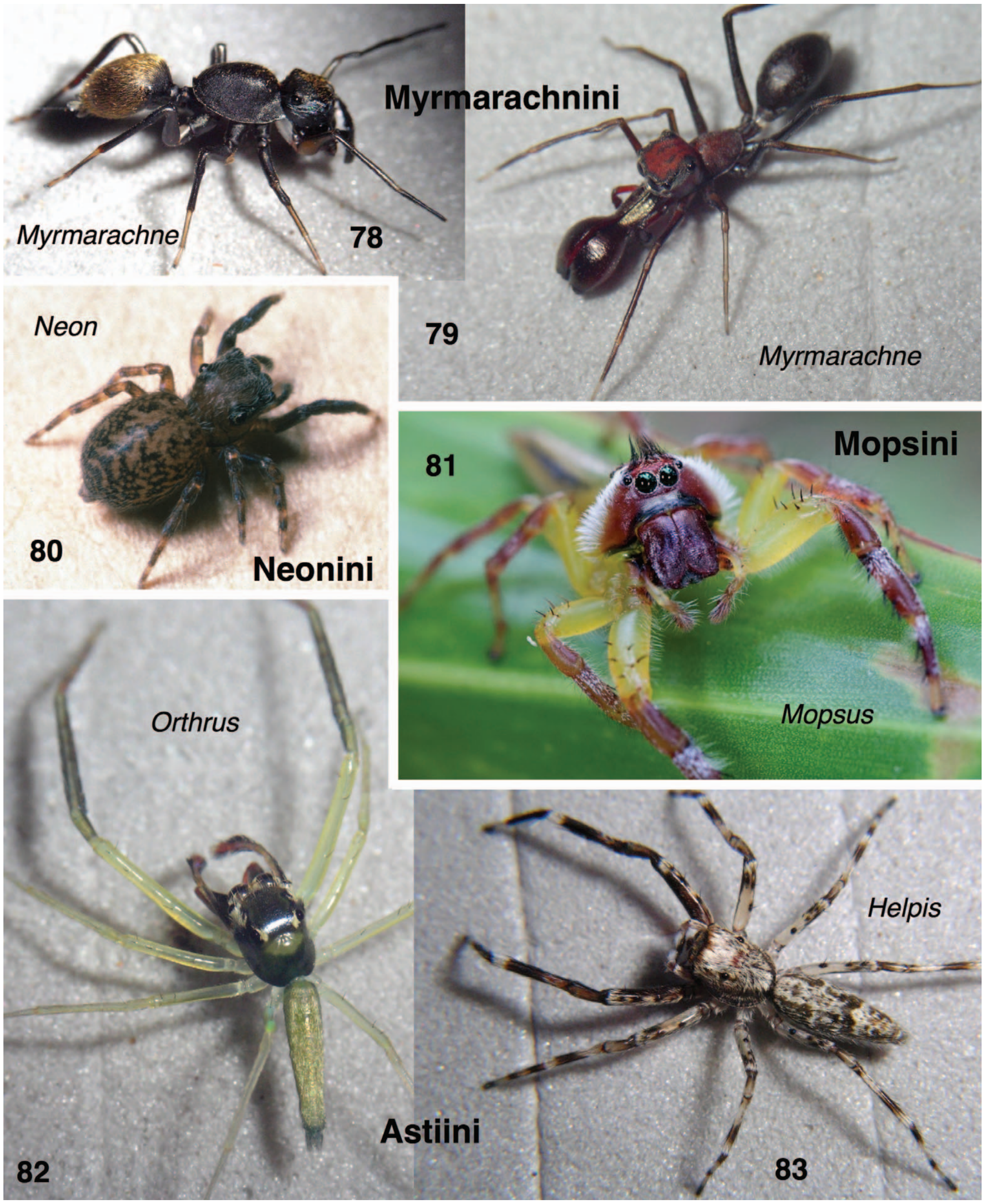


Figures 56–63.—Salticinae: Salticoida. **Agoriini:** 56, *Agorius* sp., male, Malaysia: Sarawak: Kubah Nat. Pk.; 57, *Agorius* sp., male, Malaysia: Sarawak: Gunung Mulu Nat. Pk.; **Baviini:** 58, unidentified baviine, male, Malaysia: Sarawak: Lambir Hills Nat. Pk.; 59, *Bavia* sp., female, Malaysia: Sarawak: Gunung Mulu Nat. Pk.; **Marpissoida: Ballini:** 60, *Pachyballus* sp., female, Gabon: Monts de Cristal, Tchimbélé; 61, *Leikung porosa* (Wanless, 1978), male, Malaysia: Sarawak: Gunung Mulu Nat. Pk.; 62, *Mantisatta longicauda* Cutler & Wanless, 1973, female, Philippines: Laguna Province: Los Baños; 63, *Ballus chalybeius* (Walckenaer, 1802), female, Poland: Janów Podiaski. Figures 56–63 are © 2015 W. Maddison, released under a Creative Commons Attribution (CC-BY) 3.0 license.

Figures 64–70.—Salticinae: Salticoida: Marpissoida. **Tisanibini:** 64, *Tisaniba mulu* Zhang & Maddison, 2014, female, Malaysia: Sarawak: Gunung Mulu Nat. Pk.; 65, *Tisaniba mulu* Zhang & Maddison, 2014, male, Malaysia: Sarawak: Gunung Mulu Nat. Pk. **Dendryphantini: Itatina:** 66, *Itata* sp., male, Ecuador: Yasuní. **Dendryphantini: Synagelina:** 67, *Attidops youngii* (Peckham & Peckham, 1888), male, Canada: Ontario: Port Cunnington; 68, *Peckhamia* sp., female, México: Jalisco; 69, *Synageles* sp., female, U.S.A.: Arizona: Santa Rita Mountains; 70, *Admestina* sp., female, U.S.A.: Florida: Gainesville. Figures 64–70 are © 2015 W. Maddison, released under a Creative Commons Attribution (CC-BY) 3.0 license.

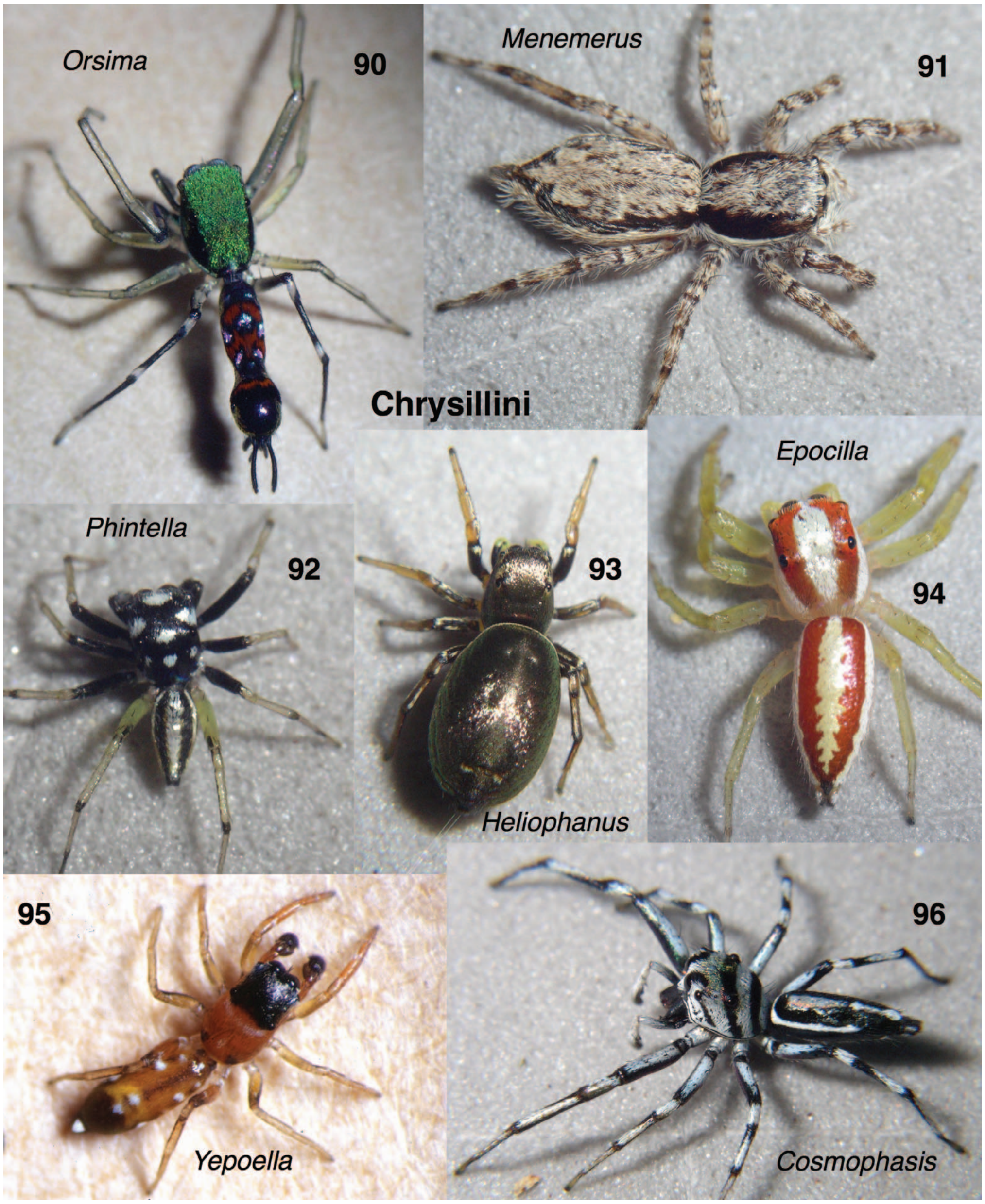


Figures 71–77.—Salticinae: Salticoida: Marpissoida: Dendryphantini. **Marpissina:** 71, *Balmaceda* sp., male, Ecuador: Yasuní; 72, *Psecas* sp., female, Ecuador: Yasuní. **Dendryphantina:** 73, *Phidippus audax* (Hentz, 1845), male and female, Canada: Ontario: Burlington; 74, *Bellota* sp., male, Ecuador: Esmeraldas: Reserva Canandé; 75, *Gastromicans* sp., female, Ecuador: Yasuní; 76, *Rhetenor* sp., female, Ecuador: Yasuní; 77, *Hentzia* sp., male, Dominican Republic: Barahona: Parque Nacional Sierra Martín García. Figures 71–77 are © 2015 W. Maddison, released under a Creative Commons Attribution (CC-BY) 3.0 license.



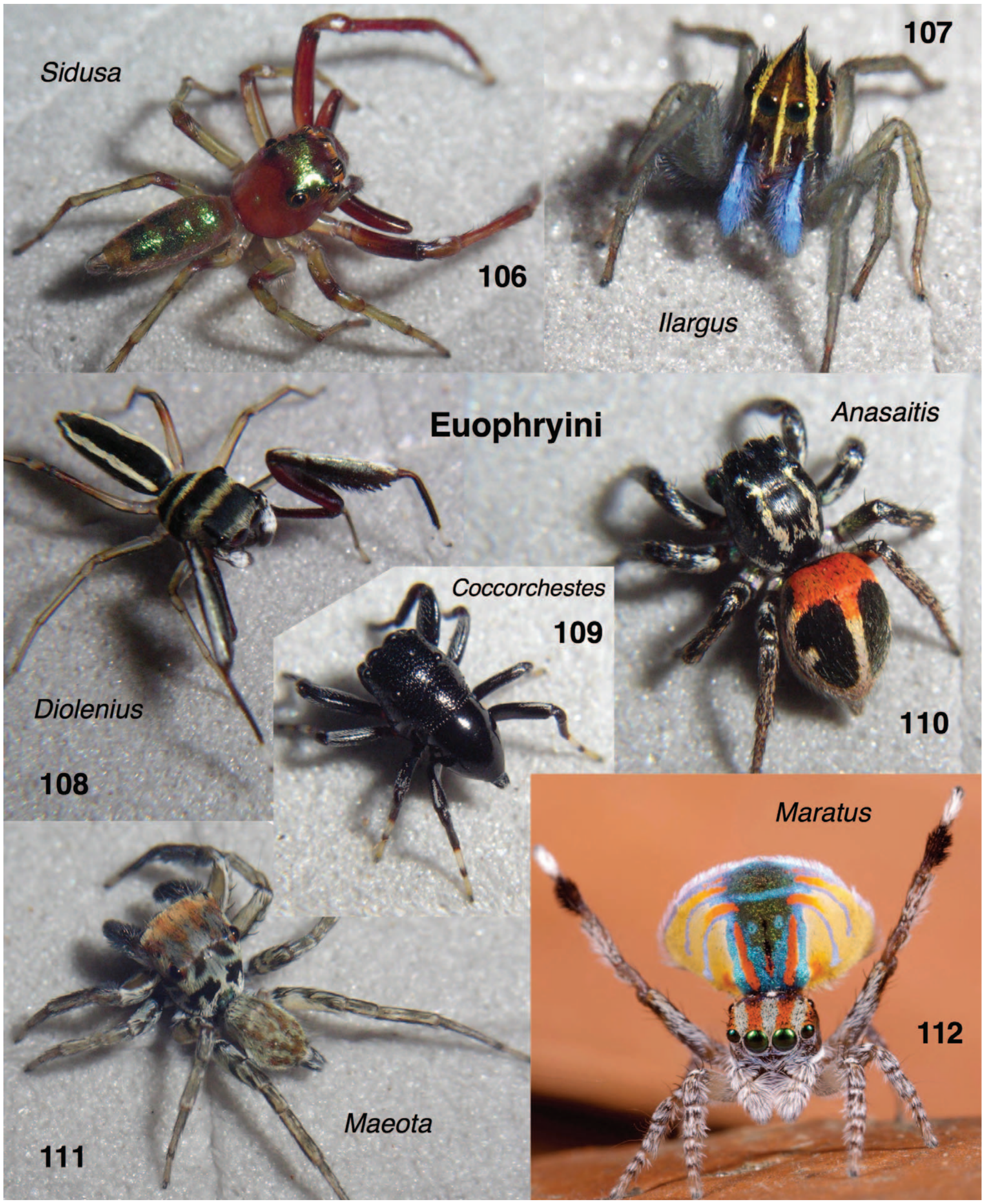
Figures 78–83.—Salticinae: Salticoida: Astioida. **Myrmarachnini:** 78, *Myrmarachne* sp., female, Gabon: Ngounié: Waka Nat. Park; 79, *Myrmarachne alticephalon* Yamasaki & Ahmad, 2013, male, Malaysia: Sarawak: Gunung Mulu Nat. Pk. **Neonini:** 80, *Neon* sp., female, U.S.A.: California: Monterey County. **Mopsini:** 81, *Mopsus mormon* Karsch, 1878, male, Australia: Queensland: Townsville (photo by Jürgen Otto). **Astiini:** 82, *Orthrus* cf. *muluensis* Wanless, 1980, male, Malaysia: Sarawak: Lambir Hills Nat. Pk.; 83, *Helpis minitabunda* (L. Koch, 1880), male, Papua New Guinea: Enga Province: Porgera. Figure 81 is © 2004 Jürgen Otto, used with permission. Figures 78–80, 82, 83 are © 2015 W. Maddison, released under a Creative Commons Attribution (CC-BY) 3.0 license.

Figures 84–89.—Salticinae: Salticoida: Astioida. **Viciriini:** 84, *Nungia* sp., male, Malaysia: Sarawak: Gunung Mulu Nat. Pk.; 85, *Holoplatys* sp., male, Papua New Guinea: Southern Highlands Province: Wanakipa; 86, *Viciria praemandibularis* (Hasselt, 1893), male, Malaysia: Sarawak: Gunung Mulu Nat. Pk.; 87, *Uroballus* sp., male, Malaysia: Sarawak: Lambir Hills Nat. Pk.; 88, *Simaetha* sp., female, Malaysia: Sarawak: Lambir Hills Nat. Pk.; 89, *Opisthoncus* sp., female, Papua New Guinea: Enga Province: Kai-ingri. Figures 84–89 are © 2015 W. Maddison, released under a Creative Commons Attribution (CC-BY) 3.0 license.

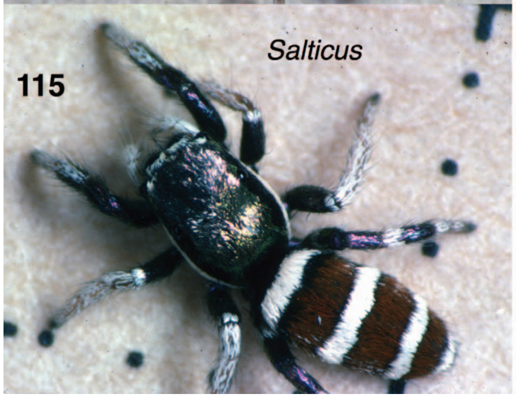


Figures 90–96.—Salticinae: Salticoida: Saltafresia. **Chrysillini:** 90, *Orsima ichneumon* (Simon, 1901), male, Malaysia: Sarawak: Gunung Mulu Nat. Pk.; 91, *Menemerus bivittatus* (Dufour, 1831), female, Ecuador: Yasuní; 92, *Phintella* sp., male, Malaysia: Sarawak: Kubah Nat. Pk.; 93, *Heliophanus* sp., female, Poland: near Stary Bubel; 94, *Epocilla* sp., female, Malaysia: Sarawak: Bako Nat. Pk.; 95, *Yepoella* sp., male, Ecuador: Sucumbios: Reserva Faunistica Cuyabeno; 96, *Cosmophasis* sp., male, Papua New Guinea: Southern Highlands Province: Wanakipa. Figures 90–96 are © 2015 W. Maddison, released under a Creative Commons Attribution (CC-BY) 3.0 license.

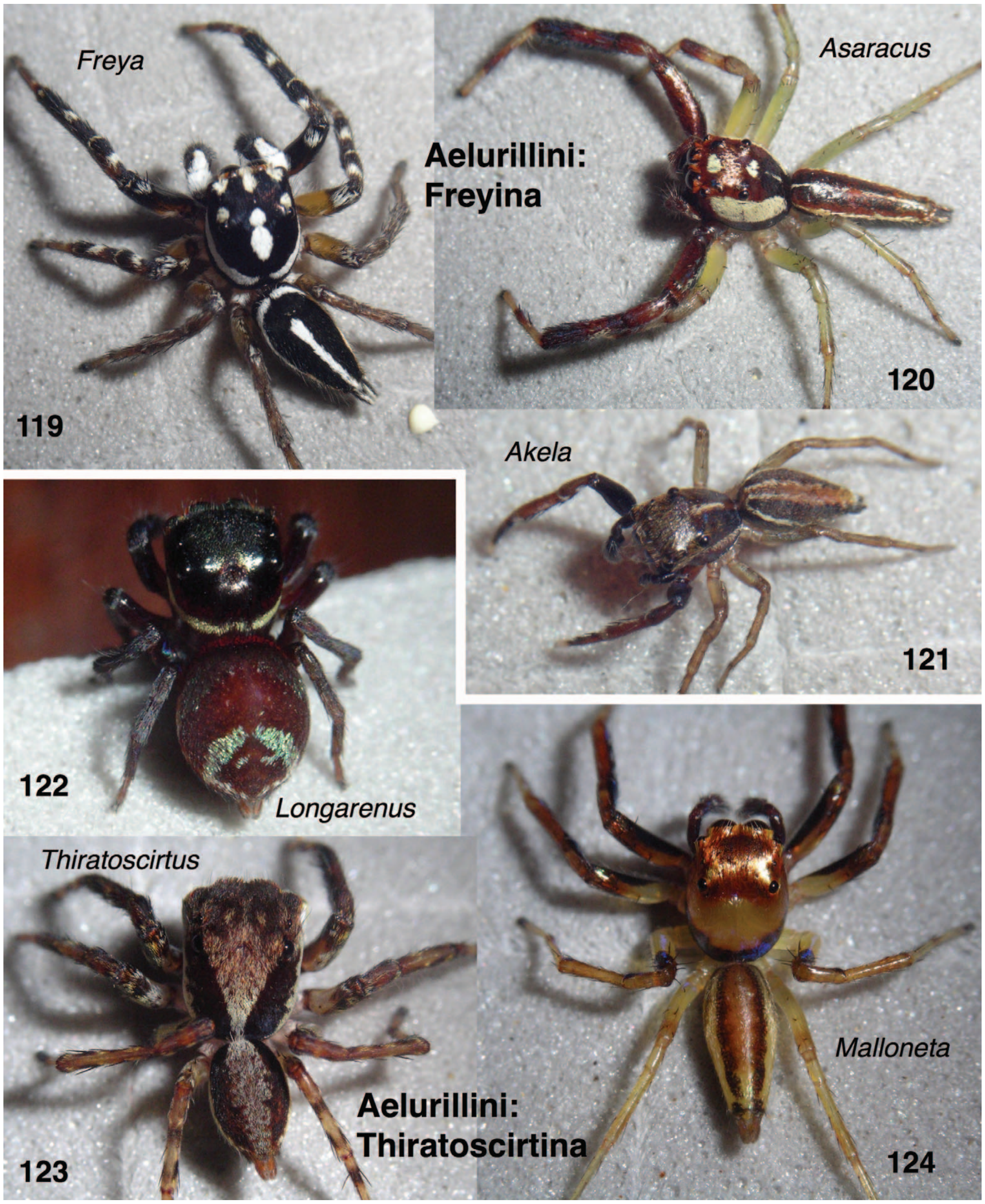
Figures 97–105.—Salticinae: Salticoida: Saltafresia. **Nannenini:** 97, *Nannenus syrphus* Simon, 1902, male, Malaysia: Sarawak: Lambir Hills Nat. Pk.; 98, *Idastrandia* cf. *orientalis* (Szombathy, 1915), male, Singapore; 99, *Langerra* aff. *longicymbium* Song & Chai, 1991, male, Malaysia: Sarawak: Lambir Hills Nat. Pk. **Hasariini:** 100, *Diplocanthopoda marina* Abraham, 1925, male, Singapore; 101, *Chinattus* sp., male, Malaysia: Sarawak: Lambir Hills Nat. Pk.; 102, *Gedea* sp., male, Malaysia: Sarawak: Gunung Mulu Nat. Pk. **Leptorchestini:** 103, *Paramarpissa* sp., male, U.S.A.: California: San Luis Obispo County; 104, *Yllenus vittatus* Thorell, 1875, female, Austria (photo by Michael Schäfer, from http://www.kleinesganzgross.de/gallery_art.php?ID=85); 105, *Enoplomischus* sp, juvenile, Gabon: Ngounié: Waka Nat. Park. Figures 97–103,105 are © 2015 W. Maddison, released under a Creative Commons Attribution (CC-BY) 3.0 license. Figure 104 is © 2014 Michael Schäfer, used with permission.



Figures 106–112.—Salticinae: Salticoida: Saltafresia. **Euophryini:** 106, *Sidusa* sp., male, Ecuador: Esmeraldas: Puerto Nuevo; 107, *Ilargus* sp., male, Ecuador: Pichincha: near Nono; 108, *Diolenius* sp., male, Papua New Guinea: Central Province: Varirata National Park; 109, *Coccorchestes* sp., male, Papua New Guinea: Southern Highlands Province: Wanakipa; 110, *Anasaitis elegantissima* (Simon, 1888), female, Dominican Republic: La Altagracia: Punta Cana; 111, *Maeota* sp., male, Ecuador: Tena; 112, *Maratus volans* (O. Pickard-Cambridge, 1874), male (photo by Jürgen Otto). Figures 106–110 are © 2015 W. Maddison, released under a Creative Commons Attribution (CC-BY) 3.0 license. Figure 111 is © 2015 W. P. Maddison & J. Zhang, released under a Creative Commons Attribution (CC-BY) 3.0 license. Figure 112 is © 2010 Jürgen Otto, used with permission.



Figures 113–118.—Salticinae: Salticoida: Saltafresia. **Salticini:** 113, *Tusitala* sp., male, Gabon: Moyen-Ogooué: Lambaréné; 114, *Carrhotus sannio* (Thorell, 1877), male, Malaysia: Sarawak: Gunung Mulu Nat. Pk.; 115, *Salticus* sp., female, U.S.A.: Arizona: near Santa Rita Mountains. **Aelurillini: Aelurillina:** 116, *Langelurillus* sp., female, Gabon: Monts de Cristal, Tchimbélé; 117, *Stenaelurillus* sp., male, Gabon: Estuaire: Cap Esterias; 118, *Phlegra* sp., female, Germany: Saxony: Authausen. Figures 113–118 are © 2015 W. Maddison, released under a Creative Commons Attribution (CC-BY) 3.0 license.



Figures 119–124.—Salticinae: Salticoida: Saltafresia: Aelurillini. **Freyina:** 119, *Freya decorata* (C.L. Koch, 1846), male, Ecuador: Yasuní; 120, *Asaracus* sp., male, Ecuador: Yasuní; 121, *Akela* sp., male, Ecuador: Napo: Río Salado at highway 45. **Thiratoscirtina:** 122, *Longarenus* sp., female, Gabon: Monts de Cristal, Tchimbélé; 123, *Thiratoscirtus* sp., male, Gabon: Monts de Cristal, Tchimbélé; 124, *Malloneta guineensis* Simon, 1902, male, Gabon: Ngounié: Waka Nat. Park. Figures 119–124 are © 2015 W. Maddison, released under a Creative Commons Attribution (CC-BY) 3.0 license.

Figures 125–130.—Salticinae: Salticoida: Saltafresia: Plexippini. **Plexippina:** 125, *Plexippus paykulli* (Audouin, 1826), male, Singapore; 126, *Hermotimus* sp., female, Gabon: Ngounié: Waka Nat. Park; 127, *Evarcha falcata* (Clerck, 1757), male, Spain: Barcelona: Bagà; 128, *Hyllus* cf. *keratodes* (Hasselt, 1882), male, Malaysia: Selangor: near Ulu Gombak; 129, *Telamonia dimidiata* (Simon, 1899), female, Malaysia: Sarawak: Gunung Mulu Nat. Pk.; 130, *Epeus* sp., male, Malaysia: Pahang: Cameron Highlands.

Figures 131–136.—Salticinae: Salticoida: Saltafresia: Plexippini. **Harmochirina:** 131, *Harmochirus* sp., male, Malaysia: Selangor: Ulu Gombak Field Station; 132, *Bianor* sp., male, Malaysia: Pahang: Cameron Highlands; 133, *Eburneana* sp., male, Gabon: Monts de Cristal, Tchimbélé; 134, *Pellenes tripunctatus* (Walckenaer, 1802), female, Germany: Saxony: Authausen; 135, *Habronattus americanus* (Keyserling, 1885), male, U.S.A.: Idaho; 136, *Habronattus mexicanus* (Peckham & Peckham, 1896), male, México: Jalisco. Figures 131–136 are © 2015 W. Maddison, released under a Creative Commons Attribution (CC-BY) 3.0 license.

Table 2.— Classification of genera of Salticidae. ? = placement especially tentative; * = placement in part by molecular data (Hedin & Maddison 2001; Maddison & Hedin 2003a, b; Su et al. 2007; Andriamalala 2007, Maddison et al. 2008, 2014; Bodner & Maddison 2012; Zhang & Maddison 2013, 2014; Ruiz & Maddison 2015; Maddison, unpublished data). Available in machine-readable form online at http://dx.doi.org/10.1636/R15-55.s1, http://doi.org/10.5886/gg3ud66w, and http://salticidae.org/classification/.

## Subfamily Onomastinae

*(12 species in 1 genus)*

*Onomastus* Simon, 1900*

## Subfamily Asemoneinae

*(38 species in 5 genera)*

*Asemonea* O. P.-Cambridge, 1869*
*Goleba* Wanless, 1980*
*Hindumanes* Logunov, 2004
*Macopaeus* Simon, 1900
*Pandisus* Simon, 1900*

## Subfamily Lyssomaninae

*(92 species in 2 genera)*

*Chinoscopus* Simon, 1900*
*Lyssomanes* Hentz, 1845*

## Subfamily Spartaeinae

*(165 species in 29 genera)*

**Tribe Spartaeini: Subtribe Spartaeina** (111 species in 16 genera)

*Brettus* Thorell, 1895*
*Cocalus* C. L. Koch, 1846*
*Cyrba* Simon, 1876*
*Gelotia* Thorell, 1890*
*Meleon* Wanless, 1984*
*Mintonia* Wanless, 1984*
*Neobrettus* Wanless, 1984*
*Paracyrba* Żabka & Kovac, 1996*
*Phaeacius* Simon, 1900*
*Portia* Karsch, 1878*
*Sparbambus* Zhang, Woon & Li, 2006*
*Spartaeus* Thorell, 1891*
*Taraxella* Wanless, 1984*
*Veissella* Wanless, 1984
*Wanlessia* Wijesinghe, 1992
*Yaginumanis* Wanless, 1984

**Tribe Spartaeini: Subtribe Holcolaetina** (9 species in 2 genera)

*Holcolaetis* Simon, 1886*
*Sonoita* Peckham & Peckham, 1903*

**Tribe Cocalodini** (25 species in 6 genera)

*Allococalodes* Wanless, 1982*
*Cocalodes* Pocock, 1897*
*Cucudeta* Maddison, 2009*
*Depreissia* Lessert, 1942*
*Tabuina* Maddison, 2009*
*Yamangalea* Maddison, 2009*

**Tribe Lapsiini** (20 species in 5 genera)

*Galianora* Maddison, 2006*
*Lapsamita* Ruiz, 2013
*Lapsias* Simon, 1900*
*Soesiladeepakius* Makhan, 2007*
*Thrandina* Maddison, 2006*

## Subfamily Eupoinae

*(34 species in 3 genera)*

*Eupoa* Żabka, 1985*
*Corusca* Zhou & Li, 2013
*Sinoinsula* Zhou & Li, 2013

## Subfamily Hisponinae

*(53 species in 9 genera)*

†*Almolinus* Petrunkevitch, 1958
†*Gorgopsina* Petrunkevitch, 1955
*Hispo* Simon, 1886*
*Jerzego* Maddison, 2014*
*Massagris* Simon, 1900*
†*Prolinus* Petrunkevitch, 1958
*Tomobella* Szűts & Scharff, 2009*
*Tomocyrba* Simon, 1900*
*Tomomingi* Szűts & Scharff, 2009*

## Subfamily Salticinae

*(5379 species in 538 genera)*

### Salticinae: Clade Amycoida

*(430 species in 63 genera)*

**Tribe Gophoini** (59 species in 8 genera)
*Banksetosa* Chickering, 1946
*Carabella* Chickering, 1946*
*Ceriomura* Simon, 1901*
*Colonus* F. O. P.-Cambridge, 1901*
*Cotinusa* Simon, 1900*
*Nilakantha* Peckham & Peckham, 1901*
*Parathiodina* Bryant, 1943
*Proctonemesia* Bauab & Soares, 1978

**Tribe Sitticini** (120 species in 10 genera)
*Aillutticus* Galiano, 1987*
*Amatorculus* Ruiz & Brescovit, 2005
*Attulus* Simon, 1889*
*Capeta* Ruiz & Brescovit, 2005
*Gavarilla* Ruiz & Brescovit, 2006
*Jollas* Simon, 1901*
*Nosferattus* Ruiz & Brescovit, 2005
*Pseudattulus* Caporiacco, 1947
*Semiopyla* Simon, 1901
*Sitticus* Simon, 1901*

**Tribe Bredini** (14 species in 2 genera)
*Breda* Peckham & Peckham, 1894*
*Druzia* Ruiz & Brescovit, 2013

**Tribe Scopocirini** (10 species in 2 genera)
*Gypogyna* Simon, 1900*
*Scopocira* Simon, 1900*

**Tribe Thiodinini** (24 species in 9 genera)
*Agelista* Simon, 1900*
*Arachnomura* Mello-Leitão, 1917*
*Atomosphyrus* Simon, 1902
*Bredana* Gertsch, 1936
*Cyllodania* Simon, 1902*
*Hyetussa* Simon, 1902*
*Micalula* Strand, 1932
*Thiodina* Simon, 1900
*Titanattus* Peckham & Peckham, 1885*

**Tribe Sarindini** (36 species in 7 genera)
*Corcovetella* Galiano, 1975
*Martella* Peckham & Peckham, 1892*
*Parafluda* Chickering, 1946
*Sarinda* Peckham & Peckham, 1892*
*Simprulla* Simon, 1901
*Tanybelus* Simon, 1902
*Zuniga* Peckham & Peckham, 1892*

**Tribe Simonellini** (39 species in 4 genera)
*Cylistella* Simon, 1901*
*Erica* Peckham & Peckham, 1892*
*Fluda* Peckham & Peckham, 1892*
*Synemosyna* Hentz, 1846*

**Tribe Huriini** (16 species in 6 genera)
*Admesturius* Galiano, 1988
*Atelurius* Simon, 1901
*Hurius* Simon, 1901*
*Scoturius* Simon, 1901
*Simonurius* Galiano, 1988
*Urupuyu* Ruiz & Maddison, 2015*

**Tribe Amycini** (110 species in 13 genera)
*Acragas* Simon, 1900*
*Amycus* C. L. Koch, 1846*
*Anaurus* Simon, 1900
*Arnoliseus* Braul, 2002
*Encolpius* Simon, 1900*
*Frespera* Braul & Lise, 2002*
*Hypaeus* Simon, 1900*
*Letoia* Simon, 1900*
*Macutula* Ruiz, 2011
*Maenola* Simon, 1900
*Mago* O. P.-Cambridge, 1882*
*Noegus* Simon, 1900*
*Vinnius* Simon, 1902

Amycoida *incertae sedis* (2 species in 2 genera)
*Orvilleus* Chickering, 1946
*Toloella* Chickering, 1946

### Salticinae: Clade Salticoida

*(4825 species in 427 genera)*

**Tribe Agoriini** (45 species in 2 genera)
*Agorius* Thorell, 1877*
*Synagelides* Strand, 1906*

**Tribe Baviini** (26 species in 3 genera)
*Bavia* Simon, 1877*
*Piranthus* Thorell, 1895$^{?}$
*Stagetillus* Simon, 1885

## Salticoida: Astioida

*(584 species in 55 genera)*

**Tribe Myrmarachnini** (246 species in 7 genera)
*Belippo* Simon, 1910*
*Bocus* Peckham & Peckham, 1892
*Damoetas* Peckham & Peckham, 1886
*Judalana* Rix, 1999
*Ligonipes* Karsch, 1878*
*Myrmarachne* MacLeay, 1839*
*Rhombonotus* L. Koch, 1879

**Tribe Neonini** (27 species in 1 genus)
*Neon* Simon, 1876*

**Tribe Astiini** (54 species in 11 genera)
*Arasia* Simon, 1901*
*Astia* L. Koch, 1879
*Astilodes* Żabka, 2009$^?$
*Helpis* Simon, 1901*
*Jacksonoides* Wanless, 1988*
*Katya* Prószyński & Deeleman-Reinhold, 2010$^?$
*Megaloastia* Żabka, 1995
*Orthrus* Simon, 1900*
*Parahelpis* Gardzińska & Żabka, 2010
*Sondra* Wanless, 1988*
*Tauala* Wanless, 1988*

**Tribe Mopsini** (12 species in 3 genera)
*Mopsolodes* Żabka, 1991
*Mopsus* Karsch, 1878*
*Sandalodes* Keyserling, 1883*

**Tribe Viciriini (other than Simaethina)** (176 species in, 20 genera)
*Abracadabrella* Żabka, 1991$^?$
*Avarua* Marples, 1955
*Clynotis* Simon, 1901*
*Corambis* Simon, 1901*
*Holoplatys* Simon, 1885*
*Huntiglennia* Żabka & Gray, 2004
*Lystrocteisa* Simon, 1884$^?$
*Nungia* Żabka, 1985*
*Ocrisiona* Simon, 1901*
*Opisthoncus* L. Koch, 1880*
*Paraphilaeus* Żabka, 2003$^?$
*Paraplatoides* Żabka, 1992
*Penionomus* Simon, 1903*
*Pungalina* Richardson, 2013$^?$
*Rhondes* Simon, 1901*
*Rogmocrypta* Simon, 1900$^?$
*Tara* Peckham & Peckham, 1886
*Trite* Simon, 1885*
*Viciria* Thorell, 1877*
*Zebraplatys* Żabka, 1992

**Tribe Viciriini: Subtribe Simaethina** (69 species in 13 genera)
*Heratemita* Strand, 1932*
*Iona* Peckham & Peckham, 1886
*Irura* Peckham & Peckham, 1901*
*Ligurra* Simon, 1903*
*Mantius* Thorell, 1891
*Phyaces* Simon, 1902
*Poecilorchestes* Simon, 1901
*Porius* Thorell, 1892
*Simaetha* Thorell, 1881*
*Simaethula* Simon, 1902
*Stertinius* Simon, 1890$^?$
*Uroballus* Simon, 1902*
*Urogelides* Żabka, 2009

## Salticoida: Marpissoida

*(840 species in 90 genera)*

**Tribe Ballini** (85 species in 15 genera)
*Afromarengo* Benjamin, 2004*
*Ballus* C. L. Koch, 1850*
*Colaxes* Simon, 1900
*Copocrossa* Simon, 1901
*Cynapes* Simon, 1900
*Goleta* Peckham & Peckham, 1894
*Indomarengo* Benjamin, 2004
*Leikung* Benjamin, 2004*
*Mantisatta* Warburton, 1900*
*Marengo* Peckham & Peckham, 1892*
*Pachyballus* Simon, 1900*
*Padilla* Peckham & Peckham, 1894*
*Peplometus* Simon, 1900*
*Philates* Simon, 1900
*Sadies* Wanless, 1984

**Tribe Tisanibini** (6 species in 2 genera)
*Saaristattus* Logunov & Azarkina, 2008$^?$
*Tisaniba* Zhang & Maddison, 2014*

**Tribe Dendryphantini: Subtribe Synagelina** (48 species in 6 genera)
*Admestina* Peckham & Peckham, 1888*
*Attidops* Banks, 1905*
*Cheliferoides* F. O. P.-Cambridge, 1901*
*Descanso* Peckham & Peckham, 1892
*Peckhamia* Simon, 1901*
*Synageles* Simon, 1876*

**Tribe Dendryphantini: Subtribe Itatina** (5 species in 1 genus)
*Itata* Peckham & Peckham, 1894*

**Tribe Dendryphantini: Subtribe Marpissina** (110 species in 9 genera)
*Balmaceda* Peckham & Peckham, 1894*
*Empanda* Simon, 1903
*Fuentes* Peckham & Peckham, 1894
*Maevia* C. L. Koch, 1846*
*Marpissa* C. L. Koch, 1846*
*Mendoza* Peckham & Peckham, 1894
*Metacyrba* F. O. P.-Cambridge, 1901*
*Platycryptus* Hill, 1979*
*Psecas* C. L. Koch, 1850*

**Tribe Dendryphantini: Subtribe Dendryphantina** (581 species in 56 genera)

*Alcmena* C. L. Koch, 1846
*Anokopsis* Bauab & Soares, 1980
*Anicius* Chamberlin, 1925
*Ashtabula* Peckham & Peckham, 1894*
*Avitus* Peckham & Peckham, 1896
*Bagheera* Peckham & Peckham, 1896
*Beata* Peckham & Peckham, 1895*
*Bellota* Peckham & Peckham, 1892*
*Bryantella* Chickering, 1946*
*Cerionesta* Simon, 1901
*Chirothecia* Taczanowski, 1878*
*Dendryphantes* C. L. Koch, 1837*
*Donaldius* Chickering, 1946
*Eris* C. L. Koch, 1846*
*Fritzia* O. P.-Cambridge, 1879*
*Gastromicans* Mello-Leitão, 1917*
*Ghelna* Maddison, 1996*
*Hentzia* Marx, 1883*
*Lurio* Simon, 1901
*Mabellina* Chickering, 1946*
*Macaroeris* Wunderlich, 1992
*Mburuvicha* Scioscia, 1993
*Messua* Peckham & Peckham, 1896*
*Metaphidippus* F. O. P.-Cambridge, 1901
*Mirandia* Badcock, 1932$^{?}$
*Monaga* Chickering, 1946
*Nagaina* Peckham & Peckham, 1896
*Naubolus* Simon, 1901
*Osericta* Simon, 1901
*Paradamoetas* Peckham & Peckham, 1885
*Paraphidippus* F. O. P.-Cambridge, 1901*
*Parnaenus* Peckham & Peckham, 1896
*Pelegrina* Franganillo, 1930*
*Phanias* F. O. P.-Cambridge, 1901*
*Phidippus* C. L. Koch, 1846*
*Planiemen* Wesołowska & van Harten, 2007$^{?}$
*Poultonella* Peckham & Peckham, 1909*
*Pseudofluda* Mello-Leitão, 1928
*Pseudopartona* Caporiacco, 1954
*Rhene* Thorell, 1869*
*Rhetenor* Simon, 1902*
*Rudra* Peckham & Peckham, 1885*
*Sassacus* Peckham & Peckham, 1895*
*Sebastira* Simon, 1901
*Selimus* Peckham & Peckham, 1901
*Semora* Peckham & Peckham, 1892
*Tacuna* Peckham & Peckham, 1901
*Terralonus* Maddison, 1996*
*Thammaca* Simon, 1902
*Tulpius* Peckham & Peckham, 1896
*Tutelina* Simon, 1901*
*Tuvaphantes* Logunov, 1993
*Uluella* Chickering, 1946
*Xuriella* Wesołowska & Russell-Smith, 2000$^{?}$
*Zeuxippus* Thorell, 1891
*Zygoballus* Peckham & Peckham, 1885*

Dendryphantini *incertae sedis* (5 species in 1 genus)
*Semorina* Simon, 1901

## Salticoida: Saltafresia

*(3330 species in 277 genera)*

**Tribe Nannenini** (8 species in 3 genera)

*Idastrandia* Strand, 1929*
*Langerra* Żabka, 1985*$^{?}$
*Nannenus* Simon, 1902*

**Tribe Hasariini** (116 species in 15 genera)

*Bristowia* Reimoser, 1934*
*Cheliceroides* Żabka, 1985*
*Chinattus* Logunov, 1999*
*Curubis* Simon, 1902
*Diplocanthopoda* Abraham, 1925*
*Echeclus* Thorell, 1890*
*Gedea* Simon, 1902*
*Habrocestoides* Prószyński, 1992
*Habrocestum* Simon, 1876*
*Hasarina* Schenkel, 1963
*Hasarius* Simon, 1871*
*Imperceptus* Prószyński, 1992$^{?}$
*Madhyattus* Prószyński, 1992$^{?}$
*Mikrus* Wesołowska, 2001
*Uxuma* Simon, 1902$^{?}$

**Tribe Chrysillini** (599 species in 31 genera)

*Afraflacilla* Berland & Millot, 1941
*Augustaea* Szombathy, 1915
*Chrysilla* Thorell, 1887
*Cosmophasis* Simon, 1901*
*Echinussa* Simon, 1901
*Epocilla* Thorell, 1887*
*Festucula* Simon, 1901
*Hakka* Berry & Prószyński, 2001
*Helicius* Żabka, 1981
*Heliophanillus* Prószyński, 1989
*Heliophanus* C. L. Koch, 1833*
*Helvetia* Peckham & Peckham, 1894*
*Icius* Simon, 1876*
*Jaluiticola* Roewer, 1944
*Kupiuka* Ruiz, 2010
*Marchena* Peckham & Peckham, 1909*
*Matagaia* Ruiz, Brescovit & Freitas, 2007
*Menemerus* Simon, 1868*
*Mexcala* Peckham & Peckham, 1902*
*Natta* Karsch, 1879
*Ogdenia* Peckham & Peckham, 1908
*Orsima* Simon, 1901*
*Paraheliophanus* Clark & Benoit, 1977
*Phintella* Strand, 1906*
*Plesiopiuka* Ruiz, 2010
*Pseudicius* Simon, 1885*
*Siler* Simon, 1889*
*Tasa* Wesołowska, 1981
*Theriella* Braul & Lise, 1996
*Wesolowskana* Koçak & Kemal, 2008
*Yepoella* Galiano, 1970*

## Salticoida: Saltafresia: Simonida

*(2607 species in 228 genera)*

**Tribe Leptorchestini** (92 species in 7 genera)

*Araegeus* Simon, 1901
*Enoplomischus* Giltay, 1931*
*Kima* Peckham & Peckham, 1902
*Leptorchestes* Thorell, 1870*
*Paramarpissa* F. O. P.-Cambridge, 1901*
*Ugandinella* Wesołowska, 2006
*Yllenus* Simon, 1868*

**Tribe Euophryini** (1087 species in 116 genera)

*Agobardus* Keyserling, 1885*
*Allodecta* Bryant, 1950
*Amphidraus* Simon, 1900*
*Anasaitis* Bryant, 1950*
*Antillattus* Bryant, 1943*
*Araneotanna* Özdikmen & Kury, 2006
*Aruattus* Logunov & Azarkina, 2008
*Ascyltus* Karsch, 1878
*Athamas* O. P.-Cambridge, 1877*
*Barraina* Richardson, 2013
*Bathippus* Thorell, 1892*
*Baviola* Simon, 1898$^{?}$
*Belliena* Simon, 1902*
*Bindax* Thorell, 1892
*Bulolia* Żabka, 1996*
*Bythocrotus* Simon, 1903*
*Canama* Simon, 1903*
*Caribattus* Bryant, 1950
*Chalcolecta* Simon, 1884*
*Chalcolemia* Zhang & Maddison, 2012*
*Chalcoscirtus* Bertkau, 1880*
*Chalcotropis* Simon, 1902*
*Chapoda* Peckham & Peckham, 1896*
*Charippus* Thorell, 1895
*Chinophrys* Zhang & Maddison, 2012*
*Coccorchestes* Thorell, 1881*
*Colyttus* Thorell, 1891*
*Commoris* Simon, 1902
*Compsodecta* Simon, 1903*
*Corticattus* Zhang & Maddison, 2012*
*Coryphasia* Simon, 1902*
*Corythalia* C. L. Koch, 1850*
*Cytaea* Keyserling, 1882*
*Darwinneon* Cutler, 1971
*Diolenius* Thorell, 1870*
*Ecuadattus* Zhang & Maddison, 2012*
*Efate* Berland, 1938*
*Emathis* Simon, 1899*
*Ergane* L. Koch, 1881
*Euophrys* C. L. Koch, 1834*
*Euryattus* Thorell, 1881*
*Featheroides* Peng, Ying & Kim, 1994
*Foliabitus* Zhang & Maddison, 2012*
*Frewena* Richardson, 2013
*Furculattus* Balogh, 1980
*Gorgasella* Chickering, 1946$^{?}$
*Hypoblemum* Peckham & Peckham, 1886*
*Ilargus* Simon, 1901*
*Jotus* L. Koch, 1881*
*Lagnus* L. Koch, 1879*
*Lakarobius* Berry, Beatty & Prószyński, 1998
*Laufeia* Simon, 1889*
*Lauharulla* Keyserling, 1889$^{?}$
*Lepidemathis* Simon, 1883*
*Leptathamas* Balogh, 1980*
*Lophostica* Simon, 1902
*Maeota* Simon, 1901*
*Magyarus* Żabka, 1985
*Maileus* Peckham & Peckham, 1907*
*Maratus* Karsch, 1878*
*Margaromma* Keyserling, 1882
*Marma* Simon, 1902*
*Mexigonus* Edwards, 2003*
*Mopiopia* Simon, 1902*
*Naphrys* Edwards, 2003*
*Neonella* Gertsch, 1936*
*Ohilimia* Strand, 1911*
*Omoedus* Thorell, 1881*
*Opisthoncana* Strand, 1913
*Parabathippus* Zhang & Maddison, 2012*
*Paraharmochirus* Szombathy, 1915*
*Parasaitis* Bryant, 1950
*Parvattus* Zhang & Maddison, 2012*
*Pensacola* Peckham & Peckham, 1885*
†*Pensacolatus* Wunderlich, 1988
*Pensacolops* Bauab, 1983
*Petemathis* Prószyński & Deeleman-Reinhold, 2012*
*Phasmolia* Zhang & Maddison, 2012*
*Platypsecas* Caporiacco, 1955$^{?}$
*Popcornella* Zhang & Maddison, 2012*
*Pristobaeus* Simon, 1902*
*Prostheclina* Keyserling, 1882*
*Pseudemathis* Simon, 1902
*Pseudeuophrys* Dahl, 1912*
*Pseudocorythalia* Caporiacco, 1938
*Rarahu* Berland, 1929$^{?}$
*Rhyphelia* Simon, 1902
*Rumburak* Wesołowska, Azarkina & Russell-Smith, 2014*
*Saitidops* Simon, 1901
*Saitis* Simon, 1876*
*Saitissus* Roewer, 1938
*Saphrys* Zhang & Maddison, 2015*
*Semnolius* Simon, 1902
*Servaea* Simon, 1888*
*Sidusa* Peckham & Peckham, 1895*
*Sigytes* Simon, 1902
*Sobasina* Simon, 1898*
*Soesilarishius* Makhan, 2007*
*Spilargis* Simon, 1902
*Stoidis* Simon, 1901
*Talavera* Peckham & Peckham, 1909*
*Tanzania* Koçak & Kemal, 2008
*Tarodes* Pocock, 1899
*Thiania* C. L. Koch, 1846*
*Thorelliola* Strand, 1942*
*Thyenula* Simon, 1902*
*Truncattus* Zhang & Maddison, 2012*
*Tylogonus* Simon, 1902*
*Udvardya* Prószyński, 1992
*Variratina* Zhang & Maddison, 2012*
*Viribestus* Zhang & Maddison, 2012*
*Viroqua* Peckham & Peckham, 1901
*Xenocytaea* Berry, 1998*
*Yacuitella* Galiano, 1999$^{?}$
*Yimbulunga* Wesołowska, Azarkina & Russell-Smith, 2014
*Zabkattus* Zhang & Maddison, 2012*

**Tribe Salticini** (134 species in 7 genera)

*Carrhotus* Thorell, 1891*
*Mogrus* Simon, 1882*
*Phaulostylus* Simon, 1902*
*Philaeus* Thorell, 1869*
*Pignus* Wesołowska, 2000*
*Salticus* Latreille, 1804*
*Tusitala* Peckham & Peckham, 1902*

**Tribe Aelurillini: Subtribe Aelurillina** (262 species in 11 genera)

*Aelurillus* Simon, 1884*
*Asianellus* Logunov & Heciak, 1996*
*Langelurillus* Próchniewicz, 1994*
*Langona* Simon, 1901
*Mashonarus* Wesołowska & Cumming, 2002
*Microheros* Wesołowska & Cumming, 1999
*Phanuelus* Caleb & Mathai, 2015
*Phlegra* Simon, 1876*
*Proszynskiana* Logunov, 1996
*Rafalus* Prószyński, 1999
*Stenaelurillus* Simon, 1886*

**Tribe Aelurillini: Subtribe Freyina** (192 species in 26 genera)

*Akela* Peckham & Peckham, 1896*
*Aphirape* C. L. Koch, 1850*
*Asaracus* C. L. Koch, 1846*
*Capidava* Simon, 1902
*Chira* Peckham & Peckham, 1896*
*Drizztius* Edwards, 2015*
*Edilemma* Ruiz & Brescovit, 2006
*Eustiromastix* Simon, 1902*
*Freya* C. L. Koch, 1850*
*Frigga* C. L. Koch, 1850*
*Kalcerrytus* Galiano, 2000*
*Leptofreya* Edwards, 2015
*Megafreya* Edwards, 2015
*Nycerella* Galiano, 1982*
*Onofre* Ruiz & Brescovit, 2007
*Pachomius* Peckham & Peckham, 1896*
*Phiale* C. L. Koch, 1846*
*Philira* Edwards, 2015
*Rishaschia* Makhan, 2006*
*Sumampattus* Galiano, 1983
*Tarkas* Edwards, 2015
*Triggella* Edwards, 2015
*Trydarssus* Galiano, 1995*
*Tullgrenella* Mello-Leitão, 1941
*Wedoquella* Galiano, 1984
*Xanthofreya* Edwards, 2015

**Tribe Aelurillini: Subtribe Thiratoscirtina** (60 species in 14 genera)

*Ajaraneola* Wesołowska & A. Russell-Smith, 2011$^{?}$
*Alfenus* Simon, 1902*
*Bacelarella* Berland & Millot, 1941*
*Cembalea* Wesołowska, 1993$^{?}$
*Gramenca* Rollard & Wesołowska, 2002$^{?}$
*Lamottella* Rollard & Wesołowska, 2002$^{?}$
*Longarenus* Simon, 1903*
*Malloneta* Simon, 1902*
*Nimbarus* Rollard & Wesołowska, 2002$^{?}$
*Pochyta* Simon, 1901*
*Saraina* Wanless & Clark, 1975*
*Tarne* Simon, 1886*
*Thiratoscirtus* Simon, 1886*
*Ureta* Wesołowska & Haddad, 2013$^{?}$

**Tribe Plexippini: Subtribe Plexippina** (493 species in 32 genera)

*Afrobeata* Caporiacco, 1941
*Anarrhotus* Simon, 1902*
*Artabrus* Simon, 1902
*Baryphas* Simon, 1902*
*Brancus* Simon, 1902*
*Burmattus* Prószyński, 1992*
*Dasycyptus* Simon, 1902$^{?}$
*Dexippus* Thorell, 1891
*Encymachus* Simon, 1902$^{?}$
*Epeus* Peckham & Peckham, 1886*
*Erasinus* Simon, 1899
*Evarcha* Simon, 1902*
*Hermotimus* Simon, 1903*
*Hyllus* C. L. Koch, 1846*
*Nigorella* Wesołowska & Tomasiewicz, 2008*
*Pachyonomastus* Caporiacco, 1947
*Pancorius* Simon, 1902*
*Parajotus* Peckham & Peckham, 1903$^{?}$
*Paraplexippus* Franganillo, 1930$^{?}$
*Pharacocerus* Simon, 1902$^{?}$
*Plexippoides* Prószyński, 1984*
*Plexippus* C. L. Koch, 1846*
*Polemus* Simon, 1902*
*Pseudamycus* Simon, 1885
*Pseudoplexippus* Caporiacco, 1947
*Ptocasius* Simon, 1885*
*Schenkelia* Lessert, 1927*
*Taivala* Peckham & Peckham, 1907
*Telamonia* Thorell, 1887*
*Thyene* Simon, 1885*
*Vailimia* Kammerer, 2006
*Yaginumaella* Prószyński, 1979*

**Tribe Plexippini: Subtribe Harmochirina** (287 species in 15 genera)

*Bianor* Peckham & Peckham, 1886*
*Eburneana* Wesołowska & Szűts, 2001*
*Habronattus* F. O. P.-Cambridge, 1901*
*Harmochirus* Simon, 1885*
*Havaika* Prószyński, 2002*
*Iranattus* Prószyński, 1992
*Microbianor* Logunov, 2000
*Modunda* Simon, 1901
*Monomotapa* Wesołowska, 2000
*Napoca* Simon, 1901
*Neaetha* Simon, 1884
*Paraneaetha* Denis, 1947
*Pellenes* Simon, 1876*
*Pellolessertia* Strand, 1929
*Sibianor* Logunov, 2001

## Salticinae *incertae sedis* (124 species in 48 genera)

**Africa**
*Bokokius* Roewer, 1942
*Cavillator* Wesołowska, 2000
*Giuiria* Strand, 1906
*Hasarinella* Wesołowska, 2012
*Homalattus* White, 1841
*Maltecora* Simon, 1910
*Pachypoessa* Simon, 1902
*Poessa* Simon, 1902
*Salpesia* Simon, 1901
*Simaethulina* Wesołowska, 2012
*Thyenillus* Simon, 1910
*Toticoryx* Rollard & Wesołowska, 2002
*Yogetor* Wesołowska & Russell-Smith, 2000
*Zulunigma* Wesołowska & Cumming, 2011

**Asia**
*Epidelaxia* Simon, 1902
*Flacillula* Strand, 1932
*Gambaquezonia* Barrion & Litsinger, 1995
*Ghumattus* Prószyński, 1992
*Heliophanoides* Prószyński, 1992
*Jajpurattus* Prószyński, 1992
*Lechia* Żabka, 1985
*Leuserattus* Prószyński & Deeleman-Reinhold, 2012
*Ligdus* Thorell, 1895
*Microhasarius* Simon, 1902
*Necatia* Özdikmen, 2007
*Panysinus* Simon, 1901
*Phausina* Simon, 1902
*Pilia* Simon, 1902
*Similaria* Prószyński, 1992
*Stichius* Thorell, 1890
*Tamigalesus* Żabka, 1988

**Australasia/Oceania**
*Adoxotoma* Simon, 1909
*Ananeon* Richardson, 2013
*Aruana* Strand, 1911
*Grayenulla* Żabka, 1992
*Hinewaia* Żabka & Pollard, 2002
*Maddisonia* Żabka, 2014
*Muziris* Simon, 1901
*Proszynellus* Patoleta & Żabka, 2015
*Pseudomaevia* Rainbow, 1920
*Pseudosynagelides* Żabka, 1991
*Stergusa* Simon, 1889
*Tatari* Berland, 1938

**Americas**
*Albionella* Chickering, 1946
*Haplopsecas* Caporiacco, 1955
*Hisukattus* Galiano, 1987
*Sarindoides* Mello-Leitão, 1922
*Udalmella* Galiano, 1994

## Salticidae *incertae sedis* (13 extant species in 9 genera; 28 fossil species in 13 genera)

**Africa**
*Vatovia* Caporiacco, 1940

**Australasia/Oceania**
*Hyctiota* Strand, 1911

**Asia**
*Ballognatha* Caporiacco, 1935
*Ceglusa* Thorell, 1895
*Dolichoneon* Caporiacco, 1935
*Thianella* Strand, 1907

**Americas**
*Arachnotermes* Mello-Leitão, 1928
*Clynotoides* Mello-Leitão, 1944
*Stenodeza* Simon, 1900

**Fossil Salticidae *incertae sedis*** (8 species in 6 genera)

†*Attoides* Brongniart, 1877
†*Descangeles* Wunderlich, 1988
†*Eoattopsis* Gourret, 1887
†*Evagoratus* Zhang, Sun & Zhang, 1994
†*Phlegrata* Wunderlich, 1988
†*Steneattus* Bronn, 1856

**Fossil Salticidae *incertae sedis*, not in the Salticinae** (20 species in 7 genera)

†*Calilinus* Wunderlich, 2004
†*Cenattus* Petrunkevitch, 1942
†*Distanilinus* Wunderlich, 2004
†*Eolinus* Petrunkevitch, 1942
†*Gorgopsidis* Wunderlich, 2004
†*Microlinus* Wunderlich, 2004
†*Paralinus* Petrunkevitch, 1942

# LITERATURE CITED

Abraham, H.C. 1925. A marine spider of the family Attidae. Proceedings of the Zoological Society of London 95:1357–1363.

Andreeva, E.M., A.P. Kononenko & J. Prószyński. 1981. Remarks on genus *Mogrus* Simon, 1882 (Aranei, Salticidae). Annales Zoologici (Warszawa) 36:85–104.

Andriamalala, D. 2007. Revision of the genus *Padilla* Peckham and Peckham, 1894 (Araneae: Salticidae)—Convergent evolution of secondary sexual characters due to sexual selection and rates of molecular evolution in jumping spiders. Proceedings of the California Academy of Sciences 58:243–330.

Arnedo, M.A. & R.G. Gillespie. 2006. Species diversification patterns in the Polynesian jumping spider genus *Havaika* Prószyński, 2001 (Araneae, Salticidae). Molecular Phylogenetics and Evolution 41:472–495.

Azarkina, G.N. 2002. New and poorly known species of the genus *Aelurillus* Simon, 1884 from central Asia, Asia Minor and the eastern Mediterranean (Araneae: Salticidae). Bulletin of the British Arachnological Society 12:249–263.

Azarkina, G.N. 2003. *Aelurillus ater* (Kroneberg, 1875) and related species of jumping spiders in the fauna of middle Asia and the Caucasus (Aranei: Salticidae). Arthropoda Selecta 11:89–107.

Azarkina, G.N. 2004. New and poorly known Palaearctic species of the genus *Phlegra* Simon, 1876 (Araneae, Salticidae). Revue Arachnologique 14:73–108.

Azarkina, G.N. 2006. Four new species of the genus *Aelurillus* Simon, 1884 (Araneae: Salticidae). *In* European Arachnology 2005. (C. Deltshev & P. Stoev, eds.). Acta Zoologica Bulgarica Supplement 1:63–72.

Azarkina, G.N. 2009. A review of the West African genus *Saraina* (Araneae, Salticidae). ZooKeys 16:291–300.

Azarkina, G.N. & S.H. Foord. 2013. Redescriptions of poorly known species of jumping spiders (Araneae: Salticidae) from South Africa and Namibia. Zootaxa 3686:165–182.

Azarkina, G.N. & D.V. Logunov. 2010. New data on the jumping spiders of the subfamily Spartaeinae (Araneae: Salticidae) from Africa. African Invertebrates 51:163–182.

Badcock, A.D. 1932. Reports of an expedition to Paraguay and Brazil in 1926–1927 supported by the Trustes of the Percy Sladen Memorial Fund and the Executive Committee of the Carnegie Trust for the Universities of Scotland. Arachnida from the Paraguayan Chaco. Journal of the Linnean Society of London, Zoology 38:1–48.

Baker, L. 2007. Effect of corridors on the movement behavior of the jumping spider *Phidippus princeps* (Araneae, Salticidae). Canadian Journal of Zoology 85:802–808.

Baker, L., E.C. Kelty & E.M. Jakob. 2009. The effect of visual features on jumping spider movements across gaps. Journal of Insect Behavior 22:350–361.

Banks, N. 1892. A classification of the North American spiders. The Canadian Entomologist 24:88–97.

Barnes, R.D. 1958. North American jumping spiders of the subfamily Marpissinae (Araneae, Salticidae). American Museum Novitates 1867:1–50.

Bartos, M. 2002a. The sub-sand nests of *Yllenus arenarius* (Araneae, Salticidae): structure, function and construction behavior. Journal of Arachnology 30:275–280.

Bartos, M. 2002b. Distance of approach to prey is adjusted to the prey's ability to escape in *Yllenus arenarius* Menge (Araneae, Salticidae). Pp. 33–38. *In* European Arachnology 2000. (S. Toft & N. Scharff, eds.), Aarhus University Press, Aarhus.

Bartos, M. 2004. The prey of *Yllenus arenarius* (Araneae, Salticidae). Bulletin of the British Arachnological Society 13:83–85.

Bartos, M. 2005. The life history of *Yllenus arenarius* (Araneae, Salticidae) —Evidence for sympatric populations isolated by the year of maturation. Journal of Arachnology 33:214–221.

Bartos, M. 2007. Hunting prey with different escape potentials — Alternative predatory tactics in a dune dwelling salticid. Journal of Arachnology 35:499–508.

Bartos, M. 2008. Alternative predatory tactics in a juvenile jumping spider. Journal of Arachnology 36:300–305.

Bartos, M. & K. Szczepko. 2012. Development of prey-specific predatory behavior in a jumping spider (Araneae: Salticidae). Journal of Arachnology 40:228–233.

Bartos, M., K. Szczepko & M. Stanska. 2013. Predatory response to changes in camouflage in a sexually dimorphic jumping spider. Journal of Arachnology 41:381–386.

Bednarski, J.V., P. Taylor & E.M. Jakob. 2012. Optical cues used in predation by jumping spiders, *Phidippus audax* (Araneae, Salticidae). Animal Behaviour 84:1221–1227.

Benjamin, S.P. 2004. Taxonomic revision and phylogenetic hypothesis for the jumping spider subfamily Ballinae (Araneae, Salticidae). Zoological Journal of the Linnean Society 142:1–82.

Benjamin, S.P. 2010. Revision and cladistic analysis of the jumping spider genus *Onomastus* (Araneae: Salticidae). Zoological Journal of the Linnean Society 159:711–745.

Benjamin, S.P. 2015. Model mimics: antlike jumping spiders of the genus *Myrmarachne* from Sri Lanka. Journal of Natural History DOI: 10.1080/00222933.2015.1034209.

Berland, L. 1938. Araignées des Nouvelles Hébrides. Annales de la Société Entomologique de France 107:121–190.

Blackwall, J. 1841. The difference in the number of eyes with which spiders are provided proposed as the basis of their distribution into tribes; with descriptions of newly discovered species and the characters of a new family and three new genera of spiders. Transactions of the Linnean Society of London 18: 601–670.

Blackwall, J. 1877. A list of spiders captured in the Seychelle Islands by Professor E. Perceval Wright, M. D., F. L. S.; with descriptions of species supposed to be new to arachnologists. Notes and preface by the Rev. O. P.-Cambridge, M.A., C.M.Z.S., etc. Proceedings of the Royal Irish Academy (Second Series) 3:1–22.

Blest, A.D. 1983. Ultrastructure of secondary retinae of primitive and advanced jumping spiders (Araneae, Salticidae). Zoomorphology 102:125–141.

Blest, A.D. 1984. Secondary retinae of a primitive jumping spider, *Yaginumanis* (Arachnida, Araneida, Salticidae). Zoomorphology 104:223–225.

Blest, A.D. 1985. Retinal mosaics of the principal eyes of jumping spiders (Salticidae) in some Neotropical habitats — optical trade-offs between sizes and habitat illuminances. Journal of Comparative Physiology A-Sensory Neural and Behavioral Physiology 157:391–404.

Blest, A.D. 1987. The retinae of *Euryattus bleekeri*, an aberrant salticid spider from Queensland. Journal of Zoology 211:399–408.

Blest, A.D. & M. Carter. 1987. Morphogenesis of a tiered principal retina and the evolution of jumping spiders. Nature 328:152–155.

Blest, A.D., R.C. Hardie, P. McIntyre & D.S. Williams. 1981. The spectral sensitivities of identified receptors and the function of retinal tiering in the principal eyes of a jumping spider. Journal of Comparative Physiology 145:227–239.

Blest, A.D. & J. Maples. 1979. Exocytotic shedding and glial uptake of photoreceptor membrane by a salticid spider. Proceedings of the Royal Society B (Biological Sciences) 204:105–112.

Blest, A.D., P. McIntyre & M. Carter. 1988. A re-examination of the principal retinae of *Phidippus johnsoni* and *Plexippus validus* (Araneae, Salticidae) - Implications for optical modeling. Journal of Comparative Physiology A-Sensory Neural and Behavioral Physiology 162:47–56.

Blest, A.D., D.C. O'Carroll & M. Carter. 1990. Comparative ultrastructure of layer-I receptor mosaics in principal eyes of jumping spiders – The evolution of regular arrays of light guides. Cell and Tissue Research 262:445–460.

Blest, A.D. & G.D. Price. 1984. Retinal mosaics of the principal eyes of some jumping spiders (Salticidae, Araneae) – Adaptations for high visual-acuity. Protoplasma 120:172–184

Blest, A.D. & C. Sigmund. 1984. Retinal mosaics of the principal eyes of 2 primitive jumping spiders, *Yaginumanis* and *Lyssomanes* – Clues to the evolution of salticid vision. Proceedings of the Royal Society B (Biological Sciences) 221:111–125.

Blest, A.D. & C. Sigmund. 1985. Retinal mosaics of a primitive jumping spider, Spartaeus (Salticidae, Araneae) – A transition between principal retinae serving low and high spatial acuities. Protoplasma 125:129–139.

Bodner, M.R. & W.P. Maddison. 2012. The biogeography and age of salticid spider radiations (Araneae: Salticidae). Molecular Phylogenetics and Evolution 65:213–240.

Bohdanowicz, A. & J. Prószyński. 1987. Systematic studies on East Palaearctic Salticidae (Araneae), IV. Salticidae of Japan. Annales Zoologici (Warszawa) 41:43–151.

Bonnet, P. 1955–59. Bibliographia Araneorum, A–B (1955), C–F (1956), G–M (1957), N–S (1958), T–Z (1959). Analyse méthodique de toute la littérature aranéologique jusqu'en 1939. Toulouse, Paris.

Bustamante, A.A., G.R.S. Ruiz & W.P. Maddison. 2015. The jumping spider genus *Thiodina* Simon 1900 reinterpreted, and a revalidation of *Nilakantha* Peckham & Peckham, 1901 (Araneae: Salticidae: Amycoida). Zootaxa 4012:181–190.

Caleb, T.D.J., S. Mungkung & M.T. Mathai. 2015. Four new species of jumping spider (Araneae: Salticidae: Aelurillinae) with the description of a new genus from South India. Peckhamia 124.1: 1–18

Caporiacco, L. di 1940. Aracnidi raccolte nella Reg. dei Laghi Etiopici della Fossa Galla. Atti della Reale Accademia d'Italia 11: 767–873.

Ceccarelli, F.S. 2008. Behavioral mimicry in *Myrmarachne* species (Araneae, Salticidae) from North Queensland, Australia. Journal of Arachnology 36:344–351.

Ceccarelli, F.S. & R.H. Crozier. 2007. Dynamics of the evolution of Batesian mimicry: molecular phylogenetic analysis of ant-mimicking *Myrmarachne* (Araneae : Salticidae) species and their ant models. Journal of Evolutionary Biology 20:286–295.

Cerveira, A.M. & R.R. Jackson. 2011. Interpopulation variation in kairomone use by *Cyrba algerina*, an araneophagic jumping spider from Portugal. Journal of Ethology 29:121–129.

Cerveira, A.M., R.R. Jackson & E.F. Guseinov. 2003. Stalking decisions of web-invading araneophagic jumping spiders from Australia, Azerbaijan, Israel, Kenya, Portugal, and Sri Lanka: The opportunistic smokescreen tactics of *Brettus*, *Cocalus*, *Cyrba*, and *Portia*. New Zealand Journal of Zoology 30:21–30.

Clark, D.L. 1994. Sequence-analysis of courtship behavior in the dimorphic jumping spider *Maevia inclemens* (Araneae, Salticidae). Journal of Arachnology 22:94–107.

Clark, D.L. & B. Biesiadecki. 2002. Mating success and alternative reproductive strategies of the dimorphic jumping spider, *Maevia inclemens* (Aaneae, Salticidae). Journal of Arachnology 30:511–518.

Clark, D.L. & C.L. Morjan. 2001. Attracting female attention: The evolution of dimorphic courtship displays in the jumping spider *Maevia inclemens* (Araneae : Salticidae). Proceedings of the Royal Society B (Biological Sciences) 268:2461–2465.

Clark, D.L. & G.W. Uetz. 1992. Morph-independent mate selection in a dimorphic jumping spider — Demonstration of movement bias in female choice using video-controlled courtship behavior. Animal Behaviour 43:247–254.

Clark, D.L. & G.W. Uetz. 1993. Signal efficacy and the evolution of male dimorphism in the jumping spider, *Maevia inclemens*. Proceedings of the National Academy of Sciences (USA) 90:11954–11957.

Clark, R.J. & R.R. Jackson. 2000. Web use during predatory encounters between *Portia fimbriata*, an araneophagic jumping spider, and its preferred prey, other jumping spiders. New Zealand Journal of Zoology 27:129–136.

Clark, R.J., R.R. Jackson & B. Cutler. 2000. Chemical cues from ants influence predatory behavior in *Habrocestum pulex*, and ant-eating jumping spider (Araneae, Salticidae). Journal of Arachnology 28:309–318.

Costa, E.L.S. & G.R.S. Ruiz. 2014. Taxonomic revision of *Scopocira* Simon, 1900 (Araneae: Salticidae). Zootaxa 3893:151–195.

Crane, J. 1948. Comparative biology of salticid spiders at Rancho Grande, Venezuela I. Systematics and life histories in *Corythalia*. Zoologica (New York) 33:1–38.

Cross, F.R. & R.R. Jackson. 2014. Specialised use of working memory by *Portia africana*, a spider-eating salticid. Animal Cognition 17:435–444.

Cross, F.R. & R.R. Jackson. 2015. Solving a novel confinement problem by spartaeine salticids that are predisposed to solve problems in the context of predation. Animal Cognition 18:509–515.

Cushing, P.E. 1997. Myrmecomorphy and myrmecophily in spiders: A review. Florida Entomologist 80:165–193.

Cutler, B. 1980. Ant predation by *Habrocestum pulex* (Hentz) (Araneae: Salticidae). Zoologischer Anzeiger 204:97–101.

Cutler, B. 1988. A revision of the American species of the antlike jumping spider genus *Synageles* (Araneae, Salticidae). Journal of Arachnology 15:321–348.

Cutler, B. & F.R. Wanless. 1973. A review of the genus *Mantisatta* (Araneae: Salticidae). Bulletin of the British Arachnological Society 2:184–189.

Davies, V.T. & M. Żabka. 1989. Illustrated keys to the genera of jumping spiders (Araneae: Salticidae) in Australia. Memoirs of the Queensland Museum 27:189–266.

Deeleman-Reinhold, C.L. & A. Floren. 2003. Some remarkable, new or little-known pluridentate salticid spiders from Bornean tree canopy (Araneae: Salticidae). Bulletin of the British Arachnological Society 12:335–344.

Denis, J. 1947. Spiders. *In* Results of the Armstrong College expedition to Siwa Oasis (Libyan desert), 1935. Bulletin de la Société Fouad 1er d'Entomologie 31:17–103.

Devoe, R.D. 1975. Ultraviolet and green receptors in principal eyes of jumping spiders. Journal of General Physiology 66:193–207.

Dolev, Y. & X.J. Nelson. 2014. Innate Pattern Recognition and Categorization in a Jumping Spider. PLoS ONE 9: e97819.

Drees, O. 1952. Untersuchungen über die angeborenen Verhaltensweisen bei Springspinnen (Salticidae). Zeitschrift für Tierpsychologie 9:169–207.

Duelli, P. 1978. Movement detection in posterolateral eyes of jumping spiders (*Evarcha arcuata*, Salticidae). Journal of Comparative Physiology 124:15–26.

Dunlop, J.A., D. Penney & D. Jekel. 2015. A summary list of fossil spiders and their relatives. *In* World Spider Catalog, version 15.5. Accessed 11 April 2015. Natural History Museum Bern. Online at http://wsc.nmbe.ch

Eakin, R.M., & J.L. Brandenburger. 1971. Fine structure of the eyes of jumping spiders. Journal of Ultrastructure Research 37: 618–663.

Edmunds, M. 2006. Do Malaysian *Myrmarachne* associate with particular species of ant? Biological Journal of the Linnean Society 88:645–653.

Edwards, G.B. 1982. Sound production by courting males of *Phidippus mystaceus* (Araneae: Salticidae). Psyche (Cambridge) 88:199–214.

Edwards, G.B. 1999. The genus *Attidops* (Araneae, Salticidae). Journal of Arachnology 27:7–15.

Edwards, G.B. 2003a. A review of the Nearctic jumping spiders (Araneae: Salticidae) of the subfamily Euophryinae north of Mexico. Insecta Mundi 16:65–75.

Edwards, G.B. 2003b. A new species of *Neonella* (Araneae: Salticidae) from southeast Florida. Insecta Mundi 16:157–159.

Edwards, G.B. 2004. Revision of the jumping spiders of the genus *Phidippus* (Araneae: Salticidae). Occasional Papers of the Florida State Collection of Arthropods 11:1–156.

Edwards, G.B. 2006. A review of described *Metacyrba*, the status of *Parkella*, and notes on *Platycryptus* and *Balmaceda*, with a comparison of the genera (Araneae: Salticidae: Marpissinae). Insecta Mundi 19:193–226.

Edwards, G.B. 2009. Males of *Gambaquezonia itimana* (Araneae, Salticidae), with notes on females. Journal of Arachnology 37: 103–105.

Edwards, G.B. 2011. A review of the type designations of the genus *Salticus* Latreille, genus *Attus* Walckenaer, and the family Salticidae Blackwall (Arachnida: Araneae), with special reference to historical connections with the genus *Myrmarachne* MacLeay. Peckhamia 93.1:1–11.

Edwards, G.B. 2013. A review of the synonyms of *Myrmarachne* (Araneae: Salticidae), with comments on the availability of each genus name. Peckhamia 110.1:1–9.

Edwards, G.B. In press. Freyinae, a major new subfamily of Neotropical jumping spiders (Araneae: Salticidae). Zootaxa.

Edwards, G.B. & S.P. Benjamin. 2009. A first look at the phylogeny of the Myrmarachninae, with rediscovery and redescription of the type species of *Myrmarachne* (Araneae: Salticidae). Zootaxa 2309: 1–29.

Edwards, G.B. & R.R. Jackson. 1993. Use of prey-specific predatory behavior by North American jumping spiders (Araneae, Salticidae) of the genus *Phidippus*. Journal of Zoology 229:709–716.

Edwards, G.B. & R.R. Jackson. 1994. The role of experience in the development of predatory behavior in *Phidippus regius*, a jumping spider (Araneae, Salticidae) from Florida. New Zealand Journal of Zoology 21:269–277.

Edwards, G.B., J.F. Carroll & W.H. Whitcomb. 1974. *Stoides aurata* (Araneae: Salticidae), a spider predator of ants. Florida Entomologist 57:337–346.

Edwards, G.B., I.M.P. Rinaldi & G.R.S. Ruiz. 2005. A review of some South American species of jumping spiders (Araneae: Salticidae) described by Mello-Leitão from Brasil, with resolution of the genus *Asaphobelis*. Biota Neotropica 5:1–31.

Edwards, G.B. & G.R.S. Ruiz. 2013. *Freya ambigua* (Araneae: Salticidae) introduced to the continental United States, with new synonyms. Journal of Arachnology 41:11–17.

Elias, D.O., A.C. Mason, W.P. Maddison & R.R. Hoy. 2003. Seismic signals in a courting male jumping spider (Araneae: Salticidae). Journal of Experimental Biology 206:4029–4039.

Elias, D.O., E.A. Hebets, R.R. Hoy & A.C. Mason. 2005. Seismic signals are crucial for male mating success in a visual specialist jumping spider (Araneae: Salticidae). Animal Behaviour 69: 931–938.

Elias, D.O., E.A. Hebets & R.R. Hoy. 2006a. Female preference for complex/novel signals in a spider. Behavioural Ecology 17: 765–771.

Elias, D.O., E.A. Hebets, R.R. Hoy, W.P. Maddison & A.C. Mason. 2006b. Regional seismic song differences in sky island populations of the jumping spider *Habronattus pugillis* Griswold (Araneae, Salticidae). Journal of Arachnology 34:545–556.

Elias, D.O., M.M. Kasumovic, D. Punzalan, M.C.B. Andrade & A.C. Mason. 2008. Assessment during aggressive contests between male jumping spiders. Animal Behaviour 76:901–910.

Elias, D.O., S. Sivalinghem, A.C. Mason, M.C.B. Andrade & M.M. Kasumovic. 2010. Vibratory communication in the jumping spider *Phidippus clarus*: Substrate-borne courtship signals are important for male mating success. Ethology 116:990–998.

Elias, D.O., W.P. Maddison, C. Peckmezian, M.B. Cirard & A.C. Mason. 2012. Orchestrating the score: complex multimodal courtship in the *H. coecatus* group of *Habronattus* jumping spiders (Araneae: Salticidae). Biological Journal of the Linnaean Society 105:522–547.

Franganillo, P. 1930. Arácnidos de Cuba: Mas arácnidos nuevos de la Isla de Cuba. Memorias del Instituto Nacional de Investigaciones Cientificas 1: 47–99. [reprinted separately, pp. 1–55].

Freed, A.N. 1984. Foraging behavior in the jumping spider *Phidippus audax* — bases for selectivity. Journal of Zoology 203:49–61.

Galiano, M.E. 1957. Una nueva especie del género *Thiodina* Simon, 1900 (Araneae, Salticidae). Revista de la Sociedad Entomológica Argentina 19:57–61.

Galiano, M.E. 1958. Novedades sobre los géneros *Scopocira* Simon y *Gypogyna* Simon (Araneae, Salticidae). Revista de la Sociedad Entomológica Argentina 20:21–32.

Galiano, M.E. 1961. Revision del género *Chira* Peckham, 1896 (Araneae, Salticidae). Comunicaciones del Museo Argentino de Ciencias Naturales "Bernardino Rivadavia" 3:159–188.

Galiano, M.E. 1963a. Las especies americanas de arañas de la familia Salticidae descriptas por Eugène Simon: Redescripciones basadas en los ejemplares típicos. Physis, Revista de la Sociedad Argentina de Ciencias Naturales (C) 23:273–470.

Galiano, M.E. 1963b. Revisión del género *Agelista* Simon, 1900, con nota sobre *Titanattus notabilis* (Mello-Leitão) comb. n. (Araneae, Salticidae). Physis, Revista de la Sociedad Argentina de Ciencias Naturales (C) 24:29–34.

Galiano, M.E. 1964a. Salticidae (Araneae) formiciformes. II. Revisión del género Zuniga Peckham, 1892. Acta Zoologica Lilloana 20:67–79.

Galiano, M.E. 1964b. Salticidae (Araneae) formiciformes. I. Revisión del género *Martella* Peckham, 1892. Physis, Revista de la Sociedad Argentina de Ciencias Naturales (C) 24:353–363.

Galiano, M.E. 1964c. Salticidae (Araneae) formiciformes. III. Revisión del género *Simprulla* Simon, 1901. Physis, Revista de la Sociedad Argentina de Ciencias Naturales (C) 24:419–423.

Galiano, M.E. 1965. Salticidae (Araneae) formiciformes IV. Revisión del género *Sarinda* Peckham, 1892. Revista del Museo Argentino de Ciencias Naturales Bernardino Rivadavia (Ent.) 1:267–312.

Galiano, M.E. 1966a. Salticidae (Araneae) formiciformes V. Revisión del género *Synemosyna* Hentz, 1846. Revista del Museo Argentino de Ciencias Naturales Bernardino Rivadavia (Ent.) 1:339–380.

Galiano, M.E. 1966b. Salticidae (Araneae) formiciformes VI. El género *Atomosphyrus* Simon, 1902. Physis, Revista de la Sociedad Argentina de Ciencias Naturales (C) 26:279–284.

Galiano, M.E. 1968a. Adiciones a la revisión del género *Chira* Peckham, 1896 (Araneae, Salticidae). Physis, Revista de la Sociedad Argentina de Ciencias Naturales (C) 27:349–366.

Galiano, M.E. 1968b. Revisión de los géneros *Acragas*, *Amycus*, *Encolpius*, *Hypaeus*, *Mago* y *Noegus* (Salticidae, Araneae). Revista del Museo Argentino de Ciencias Naturales Bernardino Rivadavia (Ent.) 2:267–360.

Galiano, M.E. 1969. Salticidae (Araneae) formiciformes. VII. El género *Myrmarachne* Mac Leay, 1839, en America. Revista del Museo Argentino de Ciencias Naturales Bernardino Rivadavia (Ent.) 3:107–148.

Galiano, M.E. 1970. Revisión del género *Tullgrenella* Mello-Leitão, 1941 (Araneae, Salticidae). Physis, Revista de la Sociedad Argentina de Ciencias Naturales (C) 29:323–355.

Galiano, M.E. 1971a. Salticidae (Araneae) formiciformes. X. Revisión del género *Fluda* Peckham, 1892. Physis, Revista de la Sociedad Argentina de Ciencias Naturales (C) 30:573–599.

Galiano, M.E. 1971b. Salticidae (Araneae) formiciformes. XII. Descripcion del allotypus de *Synemosyna paraensis* Galiano, 1967. Revista de la Sociedad Entomológica Argentina 33:133–135.

Galiano, M.E. 1975. Salticidae (Araneae) formiciformes. XV. Descripción de *Corcovetella aemulatrix*, género y especie nuevos. Physis, Revista de la Sociedad Argentina de Ciencias Naturales (C) 34:33–39.

Galiano, M.E. 1976a. Revisión de los géneros *Cerionesta* y *Hyetussa* (Araneae, Salticidae). Physis, Revista de la Sociedad Argentina de Ciencias Naturales (C) 35: 57–64, 231–242.

Galiano, M.E. 1976b. Comentarios sobre la categoria sistematica del taxon Lyssomanidae (Araneae). Revista del Museo Argentino de Ciencias Naturales Bernardino Rivadavia (Ent.) 5:59–70.

Galiano, M.E. 1977. Nota sobre los géneros *Cyllodania* y *Arachnomura* (Araneae, Salticidae). Journal of Arachnology 3:137–150.

Galiano, M.E. 1978. Revisión del género *Phiale* Koch, C. L., 1846. (Araneae, Salticidae). I. Redescripción de *Phiale gratiosa, P. mimica y P. rufoguttata.* Physis, Revista de la Sociedad Argentina de Ciencias Naturales (C) 37:161–167.

Galiano, M.E. 1979a. Revisión del género *Eustiromastix* Simon, 1902 (Araneae, Salticidae). Journal of Arachnology 7:169–186.

Galiano, M.E. 1979b. Revisión del género *Frigga* C. L. Koch, 1851 (Araneae, Salticidae). Acta Zoologica Lilloana 33:113–135.

Galiano, M.E. 1979c. Revision of the genus *Phiale* C. L. Koch, 1846 (Araneae, Salticidae). II. Phiale guttata (C. L. Koch, 1846) new combination. Bulletin of the British Arachnological Society 4:345–348.

Galiano, M.E. 1980. Revisión del género *Lyssomanes* Hentz, 1845 (Araneae, Salticidae). Opera Lilloana 30:1–104.

Galiano, M.E. 1981a. Revisión del género *Phiale* C. L. Koch, 1846 (Araneae, Salticidae) III. Las especies polimorficas del grupo *mimica*. Journal of Arachnology 9:61–85.

Galiano, M.E. 1981b. Revision of the genus *Phiale* C. L. Koch, 1846 (Araneae, Salticidae. IV. The polymorphic species of the *gratiosa* group. Bulletin of the British Arachnological Society 5:205–216.

Galiano, M.E. 1981c. Revisión del género *Aphirape* C. L. Koch, 1851 (Araneae, Salticidae). Comunicaciones del Museo Argentino de Ciencias Naturales "Bernardino Rivadavia" (Ent.) 1:93–111.

Galiano, M.E. 1982. Revisión del género *Nycerella* (Araneae, Salticidae). Physis, Revista de la Sociedad Argentina de Ciencias Naturales (Secc. C) 41:53–63.

Galiano, M.E. 1983. Descripción de *Sumampattus* nuevo genero (Araneae, Salticidae). Physis, Revista de la Sociedad Argentina de Ciencias Naturales (Secc. C) 41:151–157.

Galiano, M.E. 1984. Descripción de *Wedoquella* nuevo genero (Araneae, Salticidae). Journal of Arachnology 11:343–352.

Galiano, M.E. 1985. Revisión del género *Hurius* Simon, 1901 (Araneae, Salticidae). Journal of Arachnology 13:9–18.

Galiano, M.E. 1986. Salticidae (Araneae) formiciformes. XVI. Especies nuevas o poco conocidas de *Simprulla, Fluda, Descanso y Peckhamia*. Physis, Revista de la Sociedad Argentina de Ciencias Naturales (Secc. C) 44:129–139.

Galiano, M.E. 1987. Description of *Aillutticus*, new genus (Araneae, Salticidae). Bulletin of the British Arachnological Society 7:157–164.

Galiano, M.E. 1988. Revision de los géneros del grupo Hurieae (Araneae, Salticidae). Journal of Arachnology 15:285–301.

Galiano, M.E. 1989. Las especies de *Sitticus* del grupo *leucoproctus* (Araneae, Salticidae). Revista de la Sociedad Entomológica Argentina 45:257–269.

Galiano, M.E. 1991a. Las especies de *Sitticus* Simon del grupo *palpalis* (Araneae, Salticidae). Acta Zoologica Lilloana 40:59–68.

Galiano, M.E. 1991b. Revision del género *Jollas* (Araneae, Salticidae). Physis, Revista de la Sociedad Argentina de Ciencias Naturales (C) 47:15–29.

Galiano, M.E. 1994. Revision of the genus *Pachomius* (Araneae, Salticidae). Bulletin of the British Arachnological Society 9:214–220.

Galiano, M.E. 1995. Descripción de *Trydarssus*, nuevo género (Araneae, Salticidae). Boletin de la Sociedad de Biologia de Concepcion 66:103–112.

Galiano, M.E. 1998. Revision of the genus *Chinoscopus* (Araneae, Salticidae, Lyssomanidae). Bulletin of the British Arachnological Society 11:1–9.

Galiano, M.E. 2000. Descripción de *Kalcerrytus*, nuevo género (Araneae, Salticidae). Physis, Revista de la Sociedad Argentina de Ciencias Naturales, Sección C 132–133:53–71.

Galiano, M.E. 2001. Revisión de las especies de *Freya* del grupo *decorata* (Araneae, Salticidae). Journal of Arachnology 29:21–41.

Gardner, B.T. 1965. Observations on three species of *Phidippus* jumping spiders (Araneae: Salticidae). Psyche (Cambridge) 72: 133–147.

Gardzińska, J. & M. Żabka. 2010. A new genus and five new species of Astieae (Araneae: Salticidae) from Australia, with remarks on distribution. Zootaxa 2526:37–53.

Gertsch, W.J. & W. Ivie. 1955. The spider genus *Neon* in North America. American Museum Novitates 1743:1–17.

Girard, M.B., M.M. Kasumovic & D.O. Elias. 2011. Multi-modal courtship in the peacock spider, *Maratus volans* (O.P.-Cambridge, 1874). PLoS ONE 6(9): e25390.

Giulo, L. 1979. Optomotor responses of the jumping spider *Heliophanus muscorum* Walck. (Araneae Salticidae) elicited by turning spiral. Monitore Zoologico Italiano 13:143–157.

Givens, R.P. 1978. Dimorphic foraging strategies of a salticid spider (*Phidippus audax*). Ecology 59:309–321.

Griswold, C.E. 1987. A revision of the jumping spider genus *Habronattus* F. O. P.-Cambridge (Araneae; Salticidae), with phenetic and cladistic analyses. The University of California Publications in Entomology 107:1–344.

Guseinov, E.F., A.M. Cerveira & R.R. Jackson. 2004. The predatory strategy, natural diet, and life cycle of *Cyrba algerina*, an araneophagic jumping spider (Salticidae : Spartaeinae) from Azerbaijan. New Zealand Journal of Zoology 31:291–303.

Haddad, C.R. & W. Wesołowska. 2013. Additions to the jumping spider fauna of South Africa (Araneae: Salticidae). Genus (Wroclaw) 24:459–501.

Hardie, R.C. & P. Duelli. 1978. Properties of single cells in posterior lateral eyes of jumping spiders. Zeitschrift für Naturforschung C – A Journal of Biosciences 33:156–158.

Harland, D.P., R.R. Jackson & A.M. Macnab. 1999. Distances at which jumping spiders (Araneae : Salticidae) distinguish between prey and conspecific rivals. Journal of Zoology 247:357–364.

Hebets, E.A. & W.P. Maddison. 2005. Xenophilic mating preferences among populations of the jumping spider *Habronattus pugillis* Griswold. Behavioural Ecology 16:981–988.

Hedin, M.C. & W.P. Maddison. 2001. A combined molecular approach to phylogeny of the jumping spider subfamily Dendryphantinae (Araneae, Salticidae). Molecular Phylogenetics and Evolution 18:386–403.

Hill, D.E. 1975. The structure of the central nervous system of jumping spiders of the genus *Phidippus* (Araneae: Salticidae). M.S. thesis, Oregon State University: 1–94.

Hill, D.E. 1979. Orientation by jumping spiders of the genus *Phidippus* (Araneae, Salticidae) during the pursuit of prey. Behavioral Ecology and Sociobiology 5:301–322.

Hill, D.E. 2009. Euophryine jumping spiders that extend their third legs during courtship (Araneae: Salticidae: Euophryinae: *Maratus*, *Saitis*). Peckhamia 74.1:1–27.

Hill, D.E. 2010a. Use of location (relative direction and distance) information by jumping spiders (Araneae, Salticidae, *Phidippus*) during movement toward prey and other sighted objectives. Peckhamia 83.1:1–103.

Hill, D.E. 2010b. Targeted jumps by salticid spiders (Araneae: Salticidae: Phidippus). Peckhamia 84.1:1–35.

Hill, D.E. 2012. Notes on the jumping spiders *Thiodina puerpera* (Hentz 1846) and *Thiodina sylvana* (Hentz 1846) in the southeastern United States (Araneae: Salticidae). Peckhamia 99.1:1–63.

Hoefler, C.D. 2007. Male mate choice and size-assortative pairing in a jumping spider, *Phidippus clarus*. Animal Behaviour 73: 943–954.

Hoefler, C.D. 2008. The costs of male courtship and potential benefits of male choice for large mates in *Phidippus clarus* (Araneae, Salticidae). Journal of Arachnology 36:210–212.

Hoefler, C.D. & E.M. Jakob. 2006. Jumping spiders in space: movement patterns, nest site fidelity and the use of beacons. Animal Behaviour 71:109–116.

Hoefler, C.D., M. Taylor & E.M. Jakob. 2002. Chemosensory response to prey in *Phidippus audax* (Araneae, Salticidae) and *Pardosa milvina* (Araneae, Lycosidae). Journal of Arachnology 30:155–158.

Homann, H. 1971. Die Augen der Araneae: Anatomie, Ontogenie und Bedeutung für die Systematik (Chelicerata, Arachnida). Zeitschrift für Morphologie der Tiere 69:201–272.

Hu, Z., F. Liu, X. Xu, Z. Chen, J. Chen & D.Q. Li. 2012. Spectral transmission of the principal-eye corneas of jumping spiders: implications for ultraviolet vision. Journal of Experimental Biology 215:2853–2859.

Huang, J.N., R.C. Cheng, D.Q. Li & I.M. Tso. 2011. Salticid predation as one potential driving force of ant mimicry in jumping spiders. Proceedings of the Royal Society B (Biological Sciences) 278:1356–1364.

ICZN (International Commission on Zoological Nomenclature). 1999. International Code of Zoological Nomenclature, fourth edition. Accessed 10 July 2014. Online at http://www.nhm.ac.uk/hosted-sites/iczn/code/

ICZN (International Commission on Zoological Nomenclature). 2012. Amendment of Articles 8, 9, 10, 21 and 78 of the International Code of Zoological Nomenclature to expand and refine methods of publication. Bulletin of Zoological Nomenclature 69:161–169.

Jackowska, B. & J. Prószyński 1975. In search of the natural system of ant-like Salticidae. Pp. 39–43. Proceedings of the 6th International Arachnological Congress.

Jackson, R.R. 1977a. Predation as a selection factor in the mating strategy of the jumping spider *Phidippus johnsoni* (Salticidae, Araneae). Psyche (Cambridge) 83:243–255.

Jackson, R.R. 1977b. Analysis of alternative mating tactics of jumping spider *Phidippus johnsoni* (Araneae, Salticidae). Journal of Arachnology 5:185–230.

Jackson, R.R. 1977c. Courtship versatility in jumping spider, *Phidippus johnsoni* (Araneae-Salticidae). Animal Behaviour 25: 953–957.

Jackson, R.R. 1978. Mating strategy of *Phidippus johnsoni* (Araneae, Salticidae) 1. Pursuit time and persistence. Behavioral Ecology and Sociobiology 4:123–132.

Jackson, R.R. 1980a. Cannibalism as a factor in the mating strategy of the jumping spider *Phidippus johnsoni* (Araneae, Salticidae). Bulletin of the British Arachnological Society 5:129–133.

Jackson, R.R. 1980b. Nest disturbance as a factor in the mating strategy of the jumping spider *Phidippus johnsoni*. Peckhamia 2:3–4.

Jackson, R.R. 1980c. The mating strategy of *Phidippus johnsoni* (Araneae, Salticidae) 2. Sperm competition and the function of copulation. Journal of Arachnology 8:217–240.

Jackson, R.R. 1980d. The mating strategy of *Phidippus johnsoni* (Araneae, Salticidae) 3. Intermale aggression and a cost-benefit-analysis. Journal of Arachnology 8:241–249.

Jackson, R.R. 1980e. The mating strategy of *Phidippus johnsoni* (Araneae, Salticidae) 4. Interpopulational variation in courtship persistence. Behavioral Ecology and Sociobiology 6:257–263.

Jackson, R.R. 1981a. Nest-mediated sexual discrimination by a jumping spider (*Phidippus johnsoni*). Journal of Arachnology 9: 87–92.

Jackson, R.R. 1981b. Relationship between reproductive security and intersexual selection in a jumping spider *Phidippus johnsoni* (Araneae, Salticidae). Evolution 35:601–604.

Jackson, R.R. 1982. The courtship behavior of *Phidippus femoratus* (Araneae, Salticidae). Southwestern Naturalist 27:187–195.

Jackson, R.R. 1986a. Use of pheromones by males of *Phidippus johnsoni* (Araneae, Salticidae) to detect subadult females that are about to molt. Journal of Arachnology 14:137–139.

Jackson, R.R. 1986b. Communal jumping spiders (Araneae, Salticidae) from Kenya – Interspecific nest complexes, cohabitation with web-building spiders, and intraspecific interactions. New Zealand Journal of Zoology 13:13–26.

Jackson, R.R. 1986c. The biology of ant-like jumping spiders (Araneae, Salticidae) – Prey and predatory behavior of *Myrmarachne* with particular attention to *Myrmarachne lupata* from Queensland. Zoological Journal of the Linnean Society 88:179–190.

Jackson, R.R. 1990a. Ambush predatory behavior of *Phaeacius malayensis* and *Phaeacius* sp indet, spartaeine jumping spiders (Araneae, Salticidae) from tropical Asia. New Zealand Journal of Zoology 17:491–498.

Jackson, R.R. 1990b. Predatory and nesting-behavior of *Cocalus gibbosus*, a spartaeine jumping spider (Araneae, Salticidae) from Queensland. New Zealand Journal of Zoology 17:483–490.

Jackson, R.R. 1990c. Predatory and silk utilization behavior of *Gelotia* sp indet (Araneae, Salticidae, Spartaeinae), a web-invading aggressive mimic from Sri Lanka. New Zealand Journal of Zoology 17:475–482.

Jackson, R.R. 1990d. Predatory versatility and intraspecific interactions of *Cyrba algerina* and *Cyrba ocellata*, web-invading spartaeine jumping spiders (Araneae, Salticidae). New Zealand Journal of Zoology 17:157–168.

Jackson, R.R. 1992a. 8-legged tricksters — Spiders that specialize in catching other spiders. Bioscience 42:590–598.

Jackson, R.R. 1992b. Predator-prey interactions between web-invading jumping spiders and a web-building spider, *Holocnemus pluchei* (Araneae, Pholcidae). Journal of Zoology 228:589–594.

Jackson, R.R. 1995. Cues for web invasion and aggressive mimicry signaling in *Portia* (Araneae, Salticidae). Journal of Zoology 236:131–149.

Jackson, R.R. 2000. Prey preferences and visual discrimination ability of *Brettus*, *Cocalus* and *Cyrba*, araneophagic jumping spiders (Araneae : Salticidae) from Australia, Kenya and Sri Lanka. New Zealand Journal of Zoology 27:29–39.

Jackson, R.R. 2002. Trial-and-error derivation of aggressive-mimicry signals by *Brettus* and *Cyrba*, spartaeine jumping spiders (Araneae: Salticidae) from Israel, Kenya, and Sri Lanka. New Zealand Journal of Zoology 29:95–117.

Jackson, R.R. & A.D. Blest. 1982. The biology of *Portia fimbriata*, a web-building jumping spider (Araneae, Salticidae) from Queensland — Utilization of webs and predatory versatility. Journal of Zoology 196:255–293.

Jackson, R.R. & S.E.A. Hallas. 1986a. Comparative biology of *Portia africana*, *Portia albimana*, *Portia fimbriata*, *Portia labiata*, and *Portia shultzi*, araneophagic, web-building jumping spiders (Araneae, Salticidae) – Utilization of webs, predatory versatility, and intraspecific interactions. New Zealand Journal of Zoology 13:423–489.

Jackson, R.R. & S.E.A. Hallas. 1986b. Predatory versatility and intraspecific interactions of spartaeine jumping spiders (Araneae, Salticidae) – *Brettus adonis*, *Brettus cingulatus*, *Cyrba algerina*, and *Phaecius* sp indet. New Zealand Journal of Zoology 13:491–520.

Jackson, R.R. & S.E.A. Hallas. 1990. Evolutionary origins of displays used in aggressive mimicry by *Portia*, a web-invading araneophagic jumping spider (Araneae, Salticidae). New Zealand Journal of Zoology 17:7–23.

Jackson, R.R. & D.Q. Li. 1998. Prey preferences and visual discrimination ability of *Cyrba algerina*, an araneophagic jumping spider (Araneae : Salticidae) with primitive retinae. Israel Journal of Zoology 44:227–242.

Jackson, R.R. & D.Q. Li. 2001. Prey-capture techniques and prey preferences of *Zenodorus durvillei*, *Z. metallescens* and *Z. orbiculatus*, tropical ant-eating jumping spiders (Araneae: Salticidae) from Australia. New Zealand Journal of Zoology 28:299–341.

Jackson, R.R. & X.J. Nelson. 2011. Reliance on trial and error signal derivation by *Portia africana*, an araneophagic jumping spider from East Africa. Journal of Ethology 29:301–307.

Jackson, R.R. & A. van Olphen. 1991. Prey-capture techniques and prey preferences of *Corythalia canosa* and *Pystira orbiculata*, ant-eating jumping spiders (Araneae, Salticidae). Journal of Zoology 223:577–591.

Jackson, R.R. & S.D. Pollard. 1990. Web-building and predatory behavior of *Spartaeus spinimanus* and *Spartaeus thailandicus*, primitive jumping spiders (Araneae, Salticidae) from South-east Asia. Journal of Zoology 220:561–567.

Jackson, R.R. & S.D. Pollard. 1996. Predatory behavior of jumping spiders. Annual Review of Entomology 41:287–308.

Jackson, R.R. & R.S. Wilcox. 1990. Aggressive mimicry, prey-specific predatory behavior and predator-recognition in the predator-prey interactions of *Portia fimbriata* and *Euryattus* sp, jumping spiders from Queensland. Behavioral Ecology and Sociobiology 26:111–119.

Jackson, R.R. & R.S. Wilcox. 1993. Spider flexibly chooses aggressive mimicry signals for different prey by trial and error. Behaviour 127:21–36.

Jackson, R.R. & M.B. Willey. 1994. The comparative-study of the predatory behavior of Myrmarachne, ant-like jumping spiders (Araneae, Salticidae). Zoological Journal of the Linnean Society 110:77–102.

Jackson, R.R., D.Q. Li, A.T. Barrion & G.B. Edwards. 1998. Prey-capture techniques and prey preferences of nine species of ant-eating jumping spiders (Araneae: Salticidae) from the Philippines. New Zealand of Zoology 25:249–272.

Jackson, R.R., C.M. Carter & M.S. Tarsitano. 2001. Trial-and-error solving of a confinement problem by a jumping spider, *Portia fimbriata*. Behaviour 138:1215–1234.

Jackson, R.R., X.J. Nelson & K. Salm. 2008a. The natural history of *Myrmarachne melanotarsa*, a social ant-mimicking jumping spider. New Zealand Journal of Zoology 35:225–235.

Jackson, R.R., S.D. Pollard & K. Salm. 2008b. Observations of *Portia africana*, an araneophagic jumping spider, living together and sharing prey. New Zealand Journal of Zoology 35:237–242.

Jakob, E.M., C.D. Skow, M.P. Haberman & A. Plourde. 2007. Jumping spiders associate food with color cues in a T-maze. Journal of Arachnology 35:487–492.

Jendrzejewska, B. 1995. Genus *Athamas* Pickard-Cambridge, 1877, an unusual salticid from the Pacific area (Araneae: Salticidae). Genus (Wroclaw) 6:181–190.

Jocqué, R. & T. Szűts. 2001. *Bacelarella* (Araneae, Salticidae) in eastern Côte d'Ivoire: salticid radiation in a poorly lit environment. Annales, Musée Royal de l'Afrique Centrale, Sciences Zoologiques 285:93–99.

Kasumovic, M.M., D.O. Elias, D. Punzalan, A.C. Mason & M.C.B. Andrade. 2009. Experience affects the outcome of agonistic contests without affecting the selective advantage of size. Animal Behaviour 77:1533–1538.

Koyanagi, M., T. Nagata, K. Katoh, S. Yamashita & F. Tokunaga. 2008. Molecular evolution of arthropod color vision deduced from multiple opsin genes of jumping spiders. Journal of Molecular Evolution 66:130–137.

Land, M.F. 1969a. Structure of retinae of principal eyes of jumping spiders (Salticidae — Dendryphantinae) in relation to visual optics. Journal of Experimental Biology 51:443–470.

Land, M.F. 1969b. Movements of retinae of jumping spiders (Salticidae — Dendryphantinae) in response to visual stimuli. Journal of Experimental Biology 51:471–493.

Land, M.F. 1972. Stepping movements made by jumping spiders during turns mediated by lateral eyes. Journal of Experimental Biology 57:15–40.

Land, M.F. 1985. Fields of view of the eyes of primitive jumping spiders. Journal of Experimental Biology 119:381–384.

Land, M.F., J. Horwood, M.L.M. Lim & D.Q. Li. 2007. Optics of the ultraviolet reflecting scales of a jumping spider. Proceedings of the Royal Society B (Biological Sciences) 274:1583–1589.

Li, D.Q. 2000. Prey preferences of *Phaeacius malayensis*, a spartaeine jumping spider (Araneae : Salticidae) from Singapore. Canadian Journal of Zoology 78:2218–2226.

Li, D.Q., R.R. Jackson & B. Cutler. 1996. Prey-capture techniques and prey preferences of *Habrocestum pulex*, an ant-eating jumping spider (Araneae, Salticidae) from North America. Journal of Zoology 240:551–562.

Li, J.J., Z.T. Zhang, F.X. Liu, Q.Q. Liu, W.J. Gan, J. Chen, et al. 2008. UVB-based mate-choice cues used by females of the jumping spider *Phintella vittata*. Current Biology 18:699–703.

Lim, M.L.M., M.F. Land & D.Q. Li. 2007. Sex-specific UV and fluorescence signals in jumping spiders. Science 315:481.

Lim, M.L.M. & D.Q. Li. 2006a. Behavioural evidence of UV sensitivity in jumping spiders (Araneae : Salticidae). Journal of Comparative Physiology A –Neuroethology, Sensory, Neural, and Behavioral Physiology 192:871–878.

Lim, M.L.M. & D.Q. Li. 2006b. Extreme ultraviolet sexual dimorphism in jumping spiders (Araneae : Salticidae). Biological Journal of the Linnean Society 89:397–406.

Lim, M.L.M. & D.Q. Li. 2007 Effects of age and feeding history on structure-based UV ornaments of a jumping spider (Araneae : Salticidae). Proceedings of the Royal Society B (Biological Sciences) 274:569–575.

Lim, M.L.M., J.J. Li & D.Q. Li. 2008. Effect of UV-reflecting markings on female mate-choice decisions in *Cosmophasis umbratica*, a jumping spider from Singapore. Behavioral Ecology 19:61–66.

Logunov, D.V. 1992. Definition of the spider genus *Talavera* (Araneae, Salticidae), with a description of a new species. Bulletin de l'Institut Royal des Sciences Naturelles de Belgique (Ent.) 62:75–82.

Logunov, D.V. 1993. New data on the jumping spiders (Aranei Salticidae) of Mongolia and Tuva. Arthropoda Selecta 2:47–53.

Logunov, D.V. 1996a. Salticidae of Middle Asia. 3. A new genus, *Proszynskiana* gen. n., in the subfamily Aelurillinae (Araneae, Salticidae). Bulletin of the British Arachnological Society 10: 171–177.

Logunov, D.V. 1996b. A review of the genus *Phlegra* Simon, 1876 in the fauna of Russia and adjacent countries (Araneae: Salticidae: Aelurillinae). Genus (Wroclaw) 7:533–567.

Logunov, D.V. 1998. The spider genus *Neon* Simon, 1876 (Araneae, Salticidae) in SE Asia, with notes on the genitalia and skin pore structures. Bulletin of the British Arachnological Society 11:15–22.

Logunov, D.V. 1999a. Redefinition of the genus *Habrocestoides* Prószyński, 1992, with establishment of a new genus, *Chinattus* gen n. (Araneae: Salticidae). Bulletin of the British Arachnological Society 11:139–149.

Logunov, D.V. 1999b. Redefinition of the genera Marpissa C. L. Koch, 1846 and *Mendoza* Peckham & Peckham, 1894 in the scope of the Holarctic fauna (Araneae, Salticidae). Revue Arachnologique 13:25–60.

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.

Logunov, D.V. 2009. Further notes on the Harmochireae of Africa (Araneae, Salticidae, Pelleninae). ZooKeys 16:265–290.

Logunov, D.V. 2014. New species and records of *Lyssomanes* Hentz, 1845 from Central and South Americas (Aranei: Salticidae). Arthropoda Selecta 23:57–56.

Logunov, D.V. & G.N. Azarkina. 2008a. New species of and records for jumping spiders of the subfamily Spartaeinae (Aranei: Salticidae). Arthropoda Selecta 16:97–114.

Logunov, D.V. & G.N. Azarkina. 2008b. Two new genera and species of Euophryinae (Aranei: Salticidae) from SE Asia. Arthropoda Selecta 17:111–115.

Logunov, D.V. & B. Cutler. 1999. Revision of the genus *Paramarpissa* F. O. P.-Cambridge, 1901 (Araneae, Salticidae). Journal of Natural History 33:1217–1236.

Logunov, D.V. & J. Hereward. 2006. New species and synonymies in the genus *Synagelides* Strand in Bösenberg & Strand, 1906 (Araneae: Salticidae). Bulletin of the British Arachnological Society 13:281–292.

Logunov, D.V. & T. Kronestedt. 2003. A review of the genus *Talavera* Peckham and Peckham, 1909 (Arareae, Salticidae). Journal of Natural History 37:1091–1154.

Logunov, D.V. & Y.M. Marusik. 2003a. A revision of the genus *Yllenus* Simon, 1868 (Arachnida, Araneae, Salticidae). KMK Scientific Press, Moscow.

Logunov, D.V. & Y.M. Marusik. 2003b. Taxonomic and faunistic notes on *Chinoscopus* Simon, 1900 and *Lyssomanes* Hentz, 1845 from the Neotropical region (Araneae, Salticidae). Bulletin of the British Arachnological Society 12:415–424.

Logunov, D.V. & Y.M. Marusik. 2014. Taxonomic notes on the genus *Eupoa* Żabka, 1985 (Arachnida, Araneae, Salticidae). ZooKeys 410:63–93.

Maddison, W.P. 1982. XXXY sex chromosomes in males of the jumping spider genus *Pellenes* (Araneae: Salticidae). Chromosoma (Berlin) 85:23–37.

Maddison, W.P. 1987. *Marchena* and other jumping spiders with an apparent leg-carapace stridulatory mechanism (Araneae: Salticidae: Heliophaninae and Thiodinae). Bulletin of the British Arachnological Society 7:101–106.

Maddison, W.P. 1988. A revision of jumping spider species groups formerly placed in the genus *Metaphidippus*, with a discussion of salticid phylogeny (Araneae). PhD thesis, Harvard University.

Maddison, W.P. 1996. *Pelegrina* Franganillo and other jumping spiders formerly placed in the genus *Metaphidippus* (Araneae: Salticidae). Bulletin of the Museum of Comparative Zoology 154:215–368.

Maddison, W.P. 2006. New lapsiine jumping spiders from Ecuador (Araneae: Salticidae). Zootaxa 1255:17–28.

Maddison, W.P. 2009. New cocalodine jumping spiders from Papua New Guinea (Araneae: Salticidae: Cocalodinae). Zootaxa 2021:1–22.

Maddison, W.P. 2012. Five new species of lapsiine jumping spiders from Ecuador (Araneae: Salticidae). Zootaxa 3424:51–65.

Maddison, W.P., M.R. Bodner & K.M. Needham. 2008. Salticid spider phylogeny revisited, with the discovery of a large Australasian clade (Araneae: Salticidae). Zootaxa 1893:49–64.

Maddison, W.P. & M.C. Hedin. 2003a. Jumping spider phylogeny (Araneae: Salticidae). Invertebrate Systematics 17:529–549.

Maddison, W.P. & M.C. Hedin. 2003b. Phylogeny of *Habronattus* jumping spiders (Araneae: Salticidae), with consideration of genital and courtship evolution. Systematic Entomology 28:1–21.

Maddison, W.P. & G. Leduc-Robert. 2013. Multiple origins of sex chromosome fusions correlated with chiasma localization in *Habronattus* jumping spiders (Araneae: Salticidae). Evolution 67:2258–2272.

Maddison, W.P., D.Q. Li, M.R. Bodner, J.X. Zhang, X. Xu, Q.Q. Liu et al. 2014. The deep phylogeny of jumping spiders (Araneae, Salticidae). ZooKeys 440:57–87.

Maddison W.P. & D.R. Maddison. 2014. Mesquite: A modular system for evolutionary analysis. Version 3.01. Accessed 16 September 2014. Online at http://mesquiteproject.org

Maddison, W.P., D.R. Maddison, J.X.Zhang & T. Szűts. In press. Phylogenetic placement of the unusual jumping spider *Depreissia* Lessert, and a new synapomorphy uniting Hisponinae and Salticinae (Araneae, Salticidae). ZooKeys.

Maddison, W.P. & M.M. McMahon. 2000 Divergence and recticulation among montane populations of the jumping spider *Habronattus pugillis* Griswold. Systematic Biology 49:400–421.

Maddison, W.P. & K.M. Needham. 2006. Lapsiines and hisponines as phylogenetically basal salticid spiders (Araneae: Salticidae). Zootaxa 1255:37–55.

Maddison, W.P. & E.K. Piascik. 2014. *Jerzego*, a new hisponine jumping spider from Borneo (Araneae: Salticidae). Zootaxa 3852:569–578.

Maddison, W.P. & G.E. Stratton. 1988. Sound production and associated morphology in male jumping spiders of the *Habronattus agilis* species group (Araneae: Saltcidae). Journal of Arachnology 16:199–211.

Maddison, W.P., J.X. Zhang & M.R. Bodner. 2007. A basal phylogenetic placement for the salticid spider *Eupoa*, with descriptions of two new species (Araneae: Salticidae). Zootaxa 1432:23–33.

Makhan, D. 2007. *Soesiladeepakius aschnae* gen. et sp. nov. and Soesilarishius amrishi gen. et sp. nov. from Suriname (Araneae: Salticidae). Calodema Supplementary Paper 60:1–8.

Marusik, Y.M. & D.V Logunov. 1998. Taxonomic notes on the *Evarcha falcata* species complex (Aranei Salticidae). Arthropoda Selecta 6:95–104.

Mello-Leitão, C.F. de. 1917. Aranhas novas ou pouco conhecidas de Thomisidas e Salticidas brasileiras. Archivos da Escola Superior de Agricultura e Medicina Veterinaria, Rio de Janeiro 1:117–153.

Menda, G., P.S. Shamble, E.I. Nitzany, J.R. Golden & R.R. Hoy. 2014. Visual perception in the brain of a jumping spider. Current Biology 24:2580–2585.

Menge, A. 1879. Preussische Spinnen. XI. Fortsetzung und Schluss. Schriften der Naturforschenden Gesellschaft in Danzig (N. F.) 4: 543–560.

Metzner, H. 2015. Jumping spiders (Arachnida: Araneae: Salticidae) of the world. Accessed 27 January 2015. Online at http://www.jumping-spiders.com

Nagata, T., M. Koyanagi, H. Tsukamoto, S. Saeki, K. Isono, Y. Shichida, et al. 2012. Depth perception from image defocus in a jumping spider. Science 335:469–471.

Nagata, T., M. Koyanagi, H. Tsukamoto & A. Terakita. 2010. Identification and characterization of a protostome homologue of peropsin from a jumping spider. Journal of Comparative Physiology A – Neuroethology, Sensory, Neural and Behavioral Physiology 196:51–59.

Nakamura, T. & S. Yamashita. 2000. Learning and discrimination of colored papers in jumping spiders (Araneae, Salticidae). Journal of Comparative Physiology A – Neuroethology, Sensory, Neural and Behavioral Physiology 186:897–901.

Nelson, X.J. 2011. A predator's perspective of the accuracy of ant mimicry in spiders. Psyche (Cambridge) 2012:1–5.

Nelson, X.J. & R.R. Jackson. 2008. Anti-predator creches and aggregations of ant-mimicking jumping spiders (Araneae : Salticidae). Biological Journal of the Linnean Society 94:475–481.

Nelson, X.J. & R.R. Jackson. 2009a. Prey classification by an araneophagic ant-like jumping spider (Araneae: Salticidae). Journal of Zoology 279:173–179.

Nelson, X.J. & R.R. Jackson. 2009b. Aggressive use of Batesian mimicry by an ant-like jumping spider. Biology Letters 5:755–757.

Nelson, X.J., R.R. Jackson, G.B. Edwards & A.T. Barrion. 2005. Living with the enemy: Jumping spiders that mimic weaver ants. Journal of Arachnology 33:813–819.

Nelson, X.J., C.M. Warui & R.R. Jackson. 2012. Widespread reliance on olfactory sex and species identification by lyssomanine and spartaeine jumping spiders. Biological Journal of the Linnaean Society 107:664–677.

Oberdorfer, M.D. 1977. Neural organization of 1st optic ganglion of principal eyes of jumping spiders (Salticidae). Journal of Comparative Neurology 174:95–117.

Otto, J.C. & D.E. Hill. 2010. Observations of courtship display by a male *Maratus* amabilis Karsch 1878 (Araneae: Salticidae). Peckhamia 79.1:1–16.

Otto, J.C. & D.E. Hill. 2011a. An illustrated review of the known peacock spiders of the genus *Maratus* from Australia, with description of a new species (Araneae: Salticidae: Euophryinae). Peckhamia 96.1:1–27.

Otto, J.C. & D.E. Hill. 2011b. Visual display by male *Maratus pavonis* (Dunn 1947) and *Maratus splendens* (Rainbow 1896) (Araneae: Salticidae: Euophryinae). Peckhamia 89.1:1–41.

Otto, J.C. & D.E. Hill. 2012a. Notes on *Maratus* Karsch 1878 and related jumping spiders from Australia, with five new species (Araneae: Salticidae: Euophryinae). Peckhamia 103.1:1–81.

Otto, J.C. & D.E. Hill. 2012b. Two new Australian peacock spiders that display inflated and extended spinnerets (Araneae: Salticidae: Euophryinae: *Maratus* Karsch 1878). Peckhamia 104.1:1–28.

Otto, J.C. & D.E. Hill. 2013a. A new peacock spider from Australia displays three 'sapphire gems' on a field of gold (Araneae: Salticidae: Euophryinae: *Maratus* Karsch 1878). Peckhamia 105.1: 1–8.

Otto, J.C. & D.E. Hill. 2013b. Three new Australian peacock spiders (Araneae: Salticidae: *Maratus*). Peckhamia 108.1:1–39.

Otto, J.C. & D.E. Hill. 2014a. Spiders of the *mungaich* group from Western Australia (Araneae: Salticidae: Euophryinae: *Maratus*), with one new species from Cape Arid. Peckhamia 112:1–35.

Otto, J.C. & D.E. Hill. 2014b. Description of a new peacock spider from Cape Le Grand, Western Australia, with observations on display by males and females and comparative notes on the related *Maratus volans* (Araneae: Salticidae: Euophryinae: *Maratus*). Peckhamia 114:1–38.

Otto, J.C. & D.E. Hill. 2014c. Description of a new peacock spider from the Gnangara Mound north of Perth, Western Australia (Araneae: Salticidae: Euophryinae: *Maratus*). Peckhamia 115.1: 1–8.

Painter, T.S. 1913. On the dimorphism of the males of *Maevia vittata*, a jumping spider. Zoologische Jahrbücher, Abteilungen für Systematik 35:625–636.

Parry, D.A. & R.H.J. Brown. 1959. The jumping mechanism of salticid spiders. Journal of Experimental Biology 36:654–664.

Patello, T.J.C. & G.R.S. Ruiz. 2014. Revision of the *acutidens* group of *Mago* (Araneae: Salticidae: Amycinae). Zootaxa 3786: 443–457.

Patoleta, B. & M. Żabka. 2015 *Proszynellus* – a new jumping spider genus from Australia (Araneae: Salticidae). Zootaxa 3926:257–267.

Peaslee, A.G. & G. Wilson. 1989. Spectral sensitivity in jumping spiders (Araneae, Salticidae). Journal of Comparative Physiology A – Sensory, Neural, and Behavioral Physiology 164:359–363.

Peckham, G.W. & E.G. Peckham. 1886. Genera of the family Attidae: With a partial synonymy. Transactions of the Wisconsin Academy of Sciences, Arts and Letters 6:255–342.

Peckham, G.W. & E.G. Peckham. 1889. Observations on sexual selection in spiders of the family Attidae. Occasional Papers of the Wisconsin Natural History Society 1:1–60.

Peckham, G.W. & E.G. Peckham. 1890. Additional observations on sexual selection in spiders of the family Attidae, with some remarks on Mr Wallace's theory of sexual ornamentation. Occasional Papers of the Wisconsin Natural History Society 1:117–151.

Peckham, G.W. & E.G. Peckham. 1892. Ant-like spiders of the family Attidae. Occasional Papers of the Natural History Society of Wisconsin 2:1–84.

Peckham, G.W. & E.G. Peckham. 1903. New species of the family Attidae from South Africa, with notes on the distribution of the genera found in the Ethiopian region. Transactions of the Wisconsin Academy of Sciences, Arts and Letters 14:173–278.

Peckham, G.W. & E.G. Peckham. 1909. Revision of the Attidae of North America. Transactions of the Wisconsin Academy of Sciences, Arts and Letters 16:355–655.

Peckham, G.W., E.G. Peckham & W.H. Wheeler. 1889. Spiders of the subfamily Lyssomanae. Transactions of the Wisconsin Academy of Sciences, Arts and Letters 7:222–256.

Pekár, S. 2014. Is inaccurate mimicry ancestral to accurate in myrmecomorphic spiders (Araneae)? Biological Journal of the Linnaean Society 113:97–111.

Pekár, S. & C.R. Haddad. 2011. Trophic strategy of ant-eating *Mexcala elegans* (Araneae: Salticidae): looking for evidence of evolution of prey-specialization. Journal of Arachnology 39:133–138.

Peng, X.J., L.P. Xie, X.Q. Xiao, & C.M. Yin. 1993. Salticids in China (Arachnida: Araneae). Hunan Normal University Press.

Penney, D. 2008. Dominican amber spiders: A comparative palaeontological– neontological approach to identification, faunistics, ecology and biogeography. Siri Scientific Press.

Petrunkevitch, A.I. 1928. Systema Aranearum. Transactions of the Connecticut Academy of Arts and Sciences 29:1–270.

Petrunkevitch, A.I. 1942. A study of amber spiders. Transactions of the Connecticut Academy of Arts and Sciences 34:119–464.

Pickard-Cambridge, F.O. 1900. Arachnida - Araneida and Opiliones. In: Biologia Centrali-Americana, Zoology. London 2:89–192.

Piel, W.H. 1992. The Nearctic jumping spiders of the genus *Admestina* (Araneae: Salticidae). Psyche (Cambridge) 98:265–282.

Platnick, N.I. 1984. On the pseudoscorpion-mimicking spider *Cheliferoides* (Araneae: Salticidae). Journal of The New York Entomological Society 92:169–173.

Platnick, N.I. 2014. The World Spider Catalog, version 15. Accessed 20 January 2015. American Museum of Natural History. Online at http://research.amnh.org/iz/spiders/catalog

Pollard, S.D. 1994. Consequences of sexual selection on feeding in male jumping spiders (Araneae, Salticidae). Journal of Zoology 234:203–208.

Prószyński, J. 1968. Revision of the spider genus *Sitticus* Simon, 1901 (Araneida, Salticidae), I. The *terebratus* group. Annales Zoologici (Warszawa) 26:391–407.

Prószyński, J. 1971a. Redescriptions of type-species of genera of Salticidae (Aranei), VIII–X. Revision of the subfamily Coccorchestinae. Annales Zoologici (Warszawa) 28:153–182.

Prószyński, J. 1971b. Revision of the spider genus *Sitticus* Simon, 1901 (Aranei, Salticidae). II. *Sitticus saxicola* (C. L. Koch, 1848) and related forms. Annales Zoologici (Warszawa) 28:183–204.

Prószyński, J. 1973. Revision of the spider genus *Sitticus* Simon, 1901 (Aranei, Salticidae), III. *Sitticus penicillatus* (Simon, 1875) and related forms. Annales Zoologici (Warszawa) 30:71–95.

Prószyński, J. 1976. Studium systematyczno-zoogeograflczne nad rodziną Salticidae (Aranei) Regionów Palearktycznego i Nearktycznego. Wyższa Szkola Pedagogiczna Siedlcach 6:1–260.

Prószyński, J. 1980. Revision of the spider genus *Sitticus* Simon, 1901 (Aranei, Salticidae), IV. *Sitticus floricola* (C. L. Koch) group. Annales Zoologici (Warszawa) 36:1–35.

Prószyński, J. 1983a. Position of genus *Phintella* (Araneae: Salticidae). Acta Arachnologica 31:43–48.

Prószyński, J. 1983b. Redescriptions of types of Oriental and Australian Salticidae (Aranea) in the Hungarian Natural History Museum, Budapest. Folia Entomologica Hungarica 44:283–297.

Prószyński, J. 1984a. Atlas rysunków diagnostycznych mniej znanych Salticidae (Araneae). Wyższa Szkola Rolniczo-Pedagogiczna, Siedlcach 2:1–177.

Prószyński, J. 1984b. Remarks on *Viciria* and *Telamonia* (Araneae, Salticidae). Annales Zoologici (Warszawa) 37:417–436.

Prószyński, J. 1987. Atlas rysunków diagnostycznych mniej znanych Salticidae 2. Zeszyty Naukowe Wyższej Szkoly Rolniczo-Pedagogicznej, Siedlcach.

Prószyński, J. 1992a. Salticidae (Araneae) of the Old World and Pacific Islands in several US collections. Annales Zoologici (Warszawa) 44:87–163.

Prószyński, J. 1992b. Salticidae (Araneae) of India in the collection of the Hungarian National Natural History Museum in Budapest. Annales Zoologici (Warszawa) 44:165–277.

Prószyński, J. 1995. Salticidae: Diagnostic Drawings Library. Accessed 21 April 1996 [no longer accessible].

Prószyński, J. 2003. Salticidae (Araneae) of the Levant. Annales Zoologici (Warszawa) 53:1–180.

Prószyński, J. 2008. A survey of *Havaika* (Aranei: Salticidae), an endemic genus from Hawaii, including descriptions of new species. Arthropoda Selecta 16:195–213.

Prószyński, J. 2009a. Comments on the Oriental genera *Agorius* and *Synagelides* (Araneae: Salticidae). *In* Advances in Arachnology and Developmental Biology. S.E. Makarov & R.N. Dimitrijević (eds.). Institute of Zoology, Bulgarian Academy of Sciences Monographs 12:311–325.

Prószyński, J. 2009b. Redescriptions of 16 species of Oriental Salticidae (Araneae) described by F. Karsch, E. Keyserling and C.L. Koch, with remarks on some related species. Arthropoda Selecta 18:153–168.

Prószyński, J. 2015. Monograph of the Salticidae (Araneae) of the World 1995–2012. Accessed 10 February 2015. Online at http://peckhamia.com/Salticidae/Salticidae.php

Prószyński, J. & C.L. Deeleman-Reinhold. 2010. Description of some Salticidae (Araneae) from the Malay Archipelago. I. Salticidae of the Lesser Sunda Islands, with comments on related species. Arthropoda Selecta 19:153–188.

Prószyński, J. & C.L. Deeleman-Reinhold. 2012. Description of some Salticidae (Aranei) from the Malay archipelago. II. Salticidae of Java and Sumatra, with comments on related species. Arthropoda Selecta 21:29–60.

Prószyński, J. & C.L. Deeleman-Reinhold. 2013. Description of some Salticidae (Araneae) from the Malay Archipelago. III. Salticidae of Borneo, with comments on adjacent territories. Arthropoda Selecta 22:113–144.

Prószyński, J. & M. Żabka. 1980. Remarks on Oligocene amber spiders of the family Salticidae. Acta Palaeontologica Polonica 25:213–223.

Prószyński, J. & M. Żabka. 1983. Genus *Tomocyrba* (Aranei, Salticidae) –hypothetic survivor of the amber fauna. Systematic study with description of four new species. Acta Zoologica Cracoviensia 26:563–578.

Rakov, S.Y. & D.V. Logunov. 1997. A critical review of the genus *Heliophanus* C. L. Koch, 1833, of Middle Asia and the Caucasus (Aranei Salticidae). Arthropoda Selecta 5:67–104.

Ramírez, M.J. 2014. The morphology and phylogeny of dionychan spiders (Araneae: Araneomorphae). Bulletin of the American Museum of Natural History 390:1–374.

Reiskind J. 1972. Morphological adaptation for ant-mimicry in spiders. Proceedings of the fifth International Congress on Arachnology, Brno 1971: 221–226.

Reiskind, J. 1976. *Orsima formica*: A Bornean salticid mimicking an insect in reverse. Bulletin of the British Arachnological Society 3:235–236.

Richardson, B.J. 2013. New unidentate jumping spider genera (Araneae: Salticidae) from Australia. Zootaxa 3716:460–474.

Richardson, B.J., M. Żabka, M.R. Gray & G. Milledge. 2006. Distributional patterns of jumping spiders (Araneae: Salticidae) in Australia. Journal of Biogeography 33:707–719.

Richman, D.B. 2015. On the generic name *Peckhamia* Simon 1900 (Araneae, Salticidae). Bulletin of Zoological Nomenclature 72:102–105.

Richman, D.B. & B. Cutler. 1998. The courtship of a Kansas population of *Habronattus borealis* (Araneae, Salticidae). Journal of Arachnology 26:244–246.

Robertson, M.W. & A. Stephens. 2002. Mating behavior, reproductive biology, and development of *Phidippus princeps* (Araneae: Salticidae). Transactions of the Illinois State Academy of Science 95:335–345.

Rodrigo, A.G. & R.R. Jackson. 1992. Four jumping spider genera of the *Cocalodes*-group are monophyletic with genera of the Spartaeinae (Araneae: Salticidae). New Zealand Natural Sciences 19:61–67.

Roewer, C.F. 1954. Katalog der Araneae von 1758 bis 1940, bzw. 1954. Bruxelles 2:927–1751.

Rollard, C. & W. Wesołowska. 2002. Jumping spiders (Arachnida, Araneae, Salticidae) from the Nimba Mountains in Guinea. Zoosystema 24:283–307.

Ruiz, G.R.S. 2010. Proposal of *Kupiuka* and *Plesiopiuka*, two new genera of jumping spiders from Brazil (Araneae: Salticidae: Heliophaninae). Zootaxa 2630:57–68.

Ruiz, G.R.S. 2011. Systematics of the genus *Soesilarishius* (Araneae: Salticidae: Euophryinae). Zootaxa 3022:22–38.

Ruiz, G.R.S. 2013a. Proposal and phylogenetic relationships of *Lapsamita*, new genus of lapsiines, and description of a new species (Araneae, Salticidae). PLoS One 8(2): e56188, 1–5.

Ruiz, G.R.S. 2013b. Nine new species of *Soesilarishius* from Brazil (Araneae: Salticidae: Euophryinae). Zootaxa 3664:586–600.

Ruiz, G.R.S. & A.D. Brescovit. 2005a. Three new genera of jumping spider from Brazil (Araneae, Salticidae). Revista Brasileira de Zoologia 22:687–695.

Ruiz, G.R.S. & A.D. Brescovit. 2005b. Notes on the Venezuelan jumping spiders described by Caporiacco (Araneae, Salticidae). Revista Brasileira de Zoologia 22:753–760.

Ruiz, G.R.S. & A.D. Brescovit. 2006a. *Gavarilla*, a new genus of jumping spider from Brazil, and description of two new species of the genera *Capeta* Ruiz & Brescovit and *Amatorculus* Ruiz & Brescovit (Araneae, Salticidae, Sitticinae). Revista Brasileira de Zoologia 23:350–356.

Ruiz, G.R.S. & A.D. Brescovit. 2006b. Description of the male of *Aillutticus rotundus* Galiano and five new species of *Aillutticus* Galiano from Brazil (Araneae, Salticidae, Sitticinae). Revista Brasileira de Zoologia 23:529–536.

Ruiz, G.R.S. & A.D. Brescovit. 2008a. On some Chilean jumping spider type specimens described by Nicolet (Araneae, Salticidae). Journal of Arachnology 35:535–537.

Ruiz, G.R.S. & A.D. Brescovit. 2008b. Redescription and resolution of some Neotropical species of jumping spiders described by Caporiacco and description of a new species (Araneae: Salticidae). Revista Brasileira de Zoologia 25:487–494.

Ruiz, G.R.S. & A.D. Brescovit. 2013. Revision of *Breda* and proposal of a new genus (Araneae: Salticidae). Zootaxa 3664:401–433.

Ruiz, G.R.S. & W.P. Maddison. 2012. DNA sequences corroborate *Soesiladeepakius* as a non-salticoid genus of jumping spiders: placement with lapsiines, phylogeny, and description of six new species (Araneae, Salticidae). Zoological Journal of the Linnean Society 165:274–295.

Ruiz, G.R.S. & W.P. Maddison. In press. The new Andean jumping spider genus *Urupuyu* and its placement within a revised classification of the Amycoida (Araneae: Salticidae). Zootaxa.

Ruiz, G.R.S., A.D. Brescovit & G.C.C. Freitas. 2007. Spiders from Fernando de Noronha, Brazil. Part II. Proposal of a new genus and description of three new species of jumping spiders (Araneae, Salticidae). Revista Brasileira de Zoologia 24:771–776.

Scheuring, L. 1914. Die Augen der Arachnoideen. II. Zoologische Jahrbücher, Abteilung für Anatomie 37:369–464.

Simon, E. 1901. Histoire naturelle des araignées. Paris. 2, 381–668.

Simon, E. 1903. Histoire naturelle des araignées. Paris. 2, 669–1080.

Sivalinghem, S., M.M. Kasumovic, A.C. Mason, M.C.B. Andrade & D.O. Elias. 2010. Vibratory communication in the jumping spider *Phidippus clarus*: polyandry, male courtship signals, and mating success. Behavioural Ecology 21:1308–1314.

Sivertson, D. 1985. Visual neurons in the central nervous system of a jumping spider (Salticidae, genus *Phidippus*). American Arachnology 32:14.

Skow, C.D. & E.M. Jakob. 2006. Jumping spiders attend to context during learned avoidance of aposematic prey. Behavioural Ecology 17:34–40.

Song, D.X. & J.Y. Chai. 1991. New species and new records of the family Salticidae from Hainan, China (Arachnida: Araneae). Pp. 13–30. *In* Animal Science Research. (Y.W. Qian, E. M. Zhao & K. T. Zhao, eds.). China Forestry Publishing House, Beijing.

Spano, L, S.M. Long & E.M. Jakob. 2012. Secondary eyes mediate the response to looming objects in jumping spiders (*Phidippus audax*, Salticidae). Biology Letters 8:949–951.

Stankowich, T. 2009. When predators become prey: flight decisions in jumping spiders. Behavioural Ecology 20:318–327.

Su, K.F., R. Meier, R.R. Jackson, D.P. Harland & D.Q. Li. 2007 Convergent evolution of eye ultrastructure and divergent evolution of vision-mediated predatory behaviour in jumping spiders. European Society for Evolutionary Biology 20:1478–1489.

Sundevall, C.J. 1833. Conspectus Arachnidum. Londini Gothorum, pp. 1–39.

Szombathy, C. 1915. Attides nouveaux appartenant aux collections du Musée national hongrois. Annales Historico-Naturales Musei Nationalis Hungarici 13:468–490.

Szűts, T. 2003a. New species of *Agorius* Thorell, 1877 (Araneae: Salticidae) from New Guinea. Acta Zoologica Academiae Scientiarum Hungaricae 49:61–69.

Szűts, T. 2003b. On remarkable jumping spiders (Araneae: Salticidae) from Papua New Guinea. Folia Entomologica Hungarica 64:41–57.

Szűts, T. & G.N. Azarkina. 2002. Redescription of *Aelurillus subaffinis* Caporiacco, 1947 (Araneae: Salticidae). Annales Historico-Naturales Musei Nationalis Hungarici 94:209–215.

Szűts, T. & R. Jocqué. 2001. New species in the genus *Bacelarella* (Araneae, Salticidae) from Côte d'Ivoire. Annales, Musée Royal de l'Afrique Centrale, Sciences zoologiques 285:77–92.

Szűts, T. & C. Rollard. 2007. Redescription of the genus *Tarne* Simon, 1886 (Araneae: Salticidae). Insect Systematics & Evolution 38:427–432.

Szűts, T. & N. Scharff. 2005. Redescriptions of little known jumping spider genera (Araneae: Salticidae) from West Africa. Acta Zoologica Academiae Scientiarum Hungaricae 51:357–378.

Szűts, T. & N. Scharff. 2009. Revision of the living members of the genus *Tomocyrba* Simon, 1900 (Araneae: Salticidae). Contributions to Natural History 12:1337–1372.

Szűts, T. & W. Wesołowska. 2003. Notes on *Depreissia myrmex* (Araneae: Salticidae). Folia Entomologica Hungarica 64:345–347.

Taylor, L.A., D.L. Clark & K.J. McGraw. 2014a. Natural variation in condition-dependent display colour does not predict male courtship success in a jumping spider. Animal Behaviour 93:267–278.

Taylor, L.A., E.B. Maier, K.J. Byrne, Z. Amin & N.I. Morehouse. 2014b. Colour use by tiny predators: Jumping spiders show colour biases during foraging. Animal Behaviour 90:149–157.

Taylor, L.A. & K.J. McGraw. 2013. Male ornamental coloration improves courtship success in a jumping spider, but only in the sun. Behavioral Ecology 24:955–967.

Terakita, A. & T. Nagata. 2014. Functional properties of opsins and their contribution to light-sensing physiology. Zoological Science 31:653–659.

Thorell, T. 1895. Descriptive Catalogue of the Spiders of Burma. London.

Tonet, O., F. Focacci, M. Piccigallo, L. Mattei, C. Quaglia, G. Megali, et al. 2008. Bioinspired robotic dual-camera system for high-resolution vision. IEEE Transactions on Robotics 24:55–64.

Uma, D., C. Durkee, G. Herzner, & M. Weiss. 2013. Double deception: Ant-mimicking spiders elude both visually- and chemically-oriented predators. PLoS One 8(11):e79660. DOI: 10.1371/journal.pone.0079660

VanderSal, N.D. & E.A. Hebets. 2007. Cross-modal effects on learning: A seismic stimulus improves color discrimination learning in a jumping spider. Journal of Experimental Biology 210:3689–3695.

Waldock, J.M. 2013. A review of the peacock spiders of the *Maratus mungaich* species-group (Araneae: Salticidae), with descriptions of four new species. Records of the Western Australian Museum 28:66–81.

Waldock, J.M. 2014. Two new species of peacock spider of the *Maratus mungaich* species-group (Araneae: Salticidae) from south-western Australia. Records of the Western Australian Museum 29:149–158.

Wanless, F.R. 1978a. A revision of the spider genera *Belippo* and *Myrmarachne* (Araneae: Salticidae) in the Ethiopian region. Bulletin of the British Museum of Natural History (Zool.) 33:1–139.

Wanless, F.R. 1978b. A revision of the spider genus *Portia* (Araneae: Salticidae). Bulletin of the British Museum of Natural History (Zool.) 34:83–124.

Wanless, F.R. 1979. A revision of the spider genus *Brettus* (Araneae: Salticidae). Bulletin of the British Museum of Natural History (Zool.) 35:183–190.

Wanless, F.R. 1980a. A revision of the spider genus *Macopaeus* (Araneae: Salticidae). Bulletin of the British Museum of Natural History (Zool.) 38:219–223.

Wanless, F.R. 1980b. A revision of the spider genus *Onomastus* (Araneae: Salticidae). Bulletin of the British Museum of Natural History (Zool.) 39:179–188.

Wanless, F.R. 1980c. A revision of the spider genera *Asemonea* and *Pandisus* (Araneae: Salticidae). Bulletin of the British Museum of Natural History (Zool.) 39:213–257.

Wanless, F.R. 1981a. A revision of the spider genus *Hispo* (Araneae: Salticidae). Bulletin of the British Museum of Natural History (Zool.) 41:179–198.

Wanless, F.R. 1981b. A revision of the spider genus *Phaecius* (Araneae: Salticidae). Bulletin of the British Museum of Natural History (Zool.) 41:199–212.

Wanless, F.R. 1981c. A revision of the spider genus *Cocalus* (Araneae: Salticidae). Bulletin of the British Museum of Natural History (Zool.) 41:253–261.

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 (Zool.) 42:263–298.

Wanless, F.R. 1984a. 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 (Zool.) 46:135–205.

Wanless, F.R. 1984b. A revision of the spider genus *Cyrba* (Araneae: Salticidae) with the description of a new presumptive pheromone dispersing organ. Bulletin of the British Museum of Natural History (Zool.) 47:445–481.

Wanless, F.R. 1985. A revision of the spider genera *Holcolaetis* and *Sonoita* (Araneae: Salticidae). Bulletin of the British Museum of Natural History (Zool.) 48:249–278.

Wanless, F.R. 1986. A revision of the spider genus *Phyaces* (Araneae: Salticidae). Bulletin of the British Museum of Natural History (Zool.) 50:103–108.

Wanless, F.R. 1987. Notes on spiders of the family Salticidae. 1. The genera *Spartaeus, Mintonia* and *Taraxella*. Bulletin of the British Museum of Natural History (Zool.) 52:107–137.

Wanless, F.R. 1988. A revision of the spider group Astieae (Araneae: Salticidae) in the Australian region. New Zealand Journal of Zoology 15:81–172.

Wesołowska, W. 1986. A revision of the genus *Heliophanus* C. L. Koch, 1833 (Aranei: Salticidae). Annales Zoologici (Warszawa) 40:1–254.

Wesołowska, W. 1993. A revision of the spider genus *Massagris* Simon, 1900 (Araneae, Salticidae). Genus (Wroclaw) 4:133–141.

Wesołowska, W. 1997. A redescription of ant-like jumping spider *Depreissia myrmex* Lessert, 1942 (Araneae: Salticidae). Genus (Wroclaw) 8:715–717.

Wesołowska, W. 2000. New and little known species of jumping spiders from Zimbabwe (Araneae: Salticidae). Arnoldia Zimbabwe 10:145–174.

Wesołowska, W. 2001. *Mikrus ugandensis*, a new genus and species of diminutive jumping spider from eastern Africa (Araneae: Salticidae). Genus (Wroclaw) 12:585–588.

Wesołowska, W. 2006a. A new genus of ant-mimicking salticid spider from Africa (Araneae: Salticidae: Leptorchestinae). Annales Zoologici (Warszawa) 56:435–439.

Wesołowska, W. 2006b. Jumping spiders from the Brandberg massif in Namibia (Araneae: Salticidae). African Entomology 14:225–256.

Wesołowska, W. 2007. A new species of *Langona* from South Africa (Araneae: Salticidae: Aelurillinae). Genus (Wroclaw) 18: 783–786.

Wesołowska, W. 2012. Redescriptions of some salticid species (Araneae: Salticidae) from South Africa and Zimbabwe described by G. and E. Peckham. African Entomology 20:325–342.

Wesołowska, W. & M.S. Cumming. 2002. *Mashonarus guttatus*, gen. and sp. n., the second termitivorous jumping spider from Africa (Araneae: Salticidae). Bulletin of the British Arachnological Society 12:165–170.

Wesołowska, W. & G.B. Edwards. 2012. Jumping spiders (Araneae: Salticidae) of the Calabar area (SE Nigeria). Annales Zoologici (Warszawa) 62:733–772.

Wesołowska, W. & C.R. Haddad. 2009. Jumping spiders (Araneae: Salticidae) of the Ndumo Game Reserve, Maputaland, South Africa. African Invertebrates 50:13–103.

Wesołowska, W. & C.R. Haddad. 2013. New data on the jumping spiders of South Africa (Araneae: Salticidae). African Invertebrates 54:177–240.

Wesołowska, W. & C.R. Haddad. 2014. An overview of the jumping spiders of Lesotho (Araneae: Salticidae), with descriptions of six new species. African Invertebrates 55:229–268.

Wesołowska, W. & A. van Harten. 1994. The Jumping Spiders (Salticidae, Araneae) of Yemen. Yemeni-German Plant Protection Project, Sana'a.

Wesołowska, W. & A. van Harten. 2002. Contribution to the knowledge of the Salticidae (Araneae) of the Socotra Archipelago, Yemen. Fauna of Arabia 19:369–389.

Wesołowska, W. & A. van Harten. 2007. Additions to the knowledge of jumping spiders (Araneae: Salticidae) of Yemen. Fauna of Arabia 23:189–269.

Wesołowska, W. & A. Russell-Smith. 2000. Jumping spiders from Mkomazi Game Reserve in Tanzania (Araneae Salticidae). Tropical Zoology 13:11–127.

Wesołowska, W. & A. Russell-Smith. 2011. Jumping spiders (Araneae: Salticidae) from southern Nigeria. Annales Zoologici (Warszawa) 61:553–619.

Wesołowska, W. & M. Szeremeta. 2001. A revision of the ant-like salticid genera *Enoplomischus* Giltay, 1931, *Kima* Peckham & Peckham, 1902 and *Leptorchestes* Thorell, 1870 (Araneae: Salticidae). Insect Systematics and Evolution 32:217–240.

Wesołowska, W., G.N. Azarkina & A. Russell-Smith. 2014. Euophryine jumping spiders of the Afrotropical Region—new taxa and a checklist (Araneae: Salticidae: Euophryinae). Zootaxa 3789:1–72.

Wijesinghe, D.P. 1992. A new genus of jumping spider from Borneo with notes on the spartaeine palp (Araneae: Salticidae). Raffles Bulletin of Zoology 40:9–19.

Wijesinghe, D.P. 1994. On the spider genus *Meleon* Wanless (Araneae: Salticidae). Journal of The New York Entomological Society 102:56–61.

Williams, D.S. & P. McIntyre. 1980. The principal eyes of a jumping spider have a telephoto component. Nature 288:578–580.

Wolff, R.J. 1990. A new species of *Thiodina* (Araneae: Salticidae) from Dominican amber. Acta Zoologica Fennica 190:405–408.

Workman, T. & M.E. Workman. 1894. Malaysian spiders. Belfast, pp. 9–24.

World Spider Catalog 2015. World Spider Catalog, version 16. Accessed 10 February 2015. Natural History Museum Bern. Online at http://wsc.nmbe.ch

Wunderlich, J. 1982. Die häufigsten Spinnen (Araneae) des Dominikanischen Bernsteins. Neue Entomologische Nachrichten 1:26–45.

Wunderlich, J. 1988. Die fossilen Spinnen im dominikanischen Bernstein. Beiträge zur Araneologie 2:1–378.

Wunderlich, J. 2004. Fossil spiders in amber and copal. Conclusions, revisions, new taxa and family diagnoses of fossil and extant taxa. Beiträge zur Araneologie 3:1–1908.

Yamashita, S. & H. Tateda. 1976. Spectral sensitivities of jumping spider eyes. Journal of Comparative Physiology 105:29–41.

Żabka, M. 1980b. Salticidae from the Nepal Himalayas. *Chalcoscirtus* Bertkau 1880 and *Euophrys* C. L. Koch 1834 (Arachnida: Araneae). Senckenbergiana Biologica 60:359–369.

Żabka, M. 1985. Systematic and zoogeographic study on the family Salticidae (Araneae) from Viet-Nam. Annales Zoologici (Warszawa) 39:197–485.

Żabka, M. 1987a. Salticidae (Araneae) of Oriental, Australian and Pacific Regions, I. Genera *Clynotis* and *Tara*. Annales Zoologici (Warszawa) 40:437–450.

Żabka, M. 1987b. Salticidae (Araneae) of Oriental, Australian and Pacific Regions, II. Genera *Lycidas* and *Maratus*. Annales Zoologici (Warszawa) 40:451–482.

Żabka, M. 1988. Salticidae (Araneae) of Oriental, Australian and Pacific regions, III. Annales Zoologici (Warszawa) 41:421–479.

Żabka, M. 1990a. Salticidae (Araneae) of Oriental, Australian and Pacific regions, IV. Genus *Ocrisiona* Simon, 1901. Records of the Australian Museum 42:27–43.

Żabka, M. 1990b. Remarks on Salticidae (Araneae) of Australia. Annales Zoologici Fennici 190:415–418.

Żabka, M. 1991a. Salticidae (Arachnida: Araneae) of Oriental, Australian and Pacific regions, VII. *Mopsolodes*, *Abracadabrella* and *Pseudosynagelides* – new genera from Australia. Memoirs of the Queensland Museum 30:621–644.

Żabka, M. 1991b. Salticidae (Arachnida: Araneae) of Oriental, Australian and Pacific regions, V. Genus *Holoplatys* Simon, 1885. Records of the Australian Museum 43:171–240.

Żabka, M. 1992a. Salticidae (Arachnida: Araneae) of Oriental, Australian and Pacific regions, VIII. A new genus from Australia. Records of the Western Australian Museum 15:673–684.

Żabka, M. 1992b. Salticidae (Arachnida: Araneae) from Oriental, Australian and Pacific regions, VII. *Paraplatoides* and *Grayenulla* — new genera from Australia and New Caledonia. Records of the Australian Museum 44:165–183.

Żabka, M. 1994. Salticidae (Arachnida: Araneae) of Oriental, Australian and Pacific regions, X. Genus *Simaetha* Thorell. Records of the Western Australian Museum 16:499–534.

Żabka, M. 1995. Salticidae (Arachnida: Araneae) of Oriental, Australian and Pacific regions, XI. A new genus of Astieae from Western Australia. Records of the Western Australian Museum, Supplement 52:159–164.

Żabka, M. 1999. Salticidae (Arachnida: Araneae) of Oriental, Australian and Pacific regions, XII. *Marengo* Peckham & Peckham 1892 from Papua New Guinea. Memoirs of the Queensland Museum 43:893–905.

Żabka, M. 2000. Salticidae (Arachnida: Araneae) of the Oriental, Australian and Pacific regions, XIII: the genus *Sandalodes* Keyserling. Invertebrate Taxonomy 14:695–704.

Żabka, M. 2001. Salticidae (Arachnida: Araneae) from the Oriental, Australian and Pacific regions, XIV. The genus *Adoxotoma* Simon. Records of the Western Australian Museum 20:323–332.

Żabka, M. 2002. Salticidae (Arachnida: Araneae) from the Oriental, Australian and Pacific regions, XV. New species of Astieae from Australia. Records of the Australian Museum 54:257–268.

Żabka, M. 2003. Salticidae (Arachnida: Araneae) from Oriental, Australian and Pacific regions, XVII. *Paraphilaeus*, a new genus from Australia. Annales Zoologici (Warszawa) 53:723–727.

Żabka, M. 2004. Salticidae (Arachnida: Araneae) of New Zealand. Genus *Adoxotoma* Simon, 1909. Annales Zoologici (Warszawa) 54:591–594.

Żabka, M. 2009. Salticidae (Arachnida: Araneae) from Oriental, Australian and Pacific regions: *Astilodes* and *Urogelides*, new genera from Australia. Insect Systematics & Evolution 40:349–359.

Żabka, M. 2012. *Phlegra* Simon, 1876, *Phintella* Strand 1906 and *Yamangalea* Maddison, 2009 (Arachnida: Araneae: Salticidae)—new species and new generic records for Australia. Zootaxa 3176:61–68.

Żabka, M. 2014. *Maddisonia* — a new jumping spider genus from Australia (Arachnida: Araneae: Salticidae). Records of the Australian Museum 66:217–223.

Żabka, M. & M.R. Gray. 2002. Salticidae (Arachnida: Araneae) from Oriental, Australian and Pacific regions, XVI. New species of *Grayenulla* and *Afraflacilla*. Records of the Australian Museum 54:269–274.

Żabka, M. & M.R. Gray. 2004. Salticidae (Arachnida: Araneae) from the Oriental, Australian and Pacific regions, XVIII. *Huntiglennia* – a new genus from Australia. Annales Zoologici (Warszawa) 54:587–590.

Żabka, M. & D. Kovac. 1996. *Paracyrba wanlessi* — a new genus and species of Spartaeinae from peninsular Malaysia, with notes on its biology (Arachnida: Araneae: Salticidae). Senckenbergiana Biologica 76:153–161.

Żabka, M. & B.M. Patoleta. 2014. New species of *Helpis* Simon, 1901 from Australia (Araneae: Salticidae), with a new definition of the genus. Zootaxa 3873:571–589.

Żabka, M. & S.D. Pollard. 2002a. *Hinewaia*, a new genus of Salticidae (Arachnida: Araneae) from New Zealand. Annales Zoologici (Warszawa) 52:597–600.

Żabka, M. & S.D. Pollard. 2002b. Salticidae (Arachnida: Araneae) of New Zealand: genus *Hypoblemum* Peckham and Peckham, 1886. Records of the Canterbury Museum 16:64–72.

Żabka, M. & S.D. Pollard. 2002c. A check-list of Salticidae (Arachnida: Araneae) of New Zealand. Records of the Canterbury Museum 16:73–82.

Żabka, M. & J. Waldock. 2012. Salticidae (Arachnida: Araneae) from Oriental, Australian and Pacific regions. Genus *Cosmophasis* Simon, 1901. Annales Zoologici (Warszawa) 62:115–198.

Żabka, M., S.D. Pollard & M. Anstey. 2002. Zoogeography of Salticidae (Arachnida: Araneae) of New Zealand – first approach. Annales Zoologici (Warszawa) 52:459–464.

Zhang, J.X. & D.Q. Li. 2005. Four new and one newly recorded species of the jumping spiders (Araneae: Salticidae: Lyssomaninae & Spartaeinae) from (sub)tropical China. The Raffles Bulletin of Zoology 53:221–229.

Zhang, J.X. & W.P. Maddison. 2012a. New euophryine jumping spiders from the Dominican Republic and Puerto Rico (Araneae: Salticidae: Euophryinae). Zootaxa 3476:1–54.

Zhang, J.X. & W.P. Maddison. 2012b. New euophryine jumping spiders from Papua New Guinea (Araneae: Salticidae: Euophryinae). Zootaxa 3491:1–74.

Zhang, J.X. & W.P. Maddison. 2012c. New euophryine jumping spiders from Central and South America (Araneae: Salticidae: Euophryinae). Zootaxa 3578:1–35.

Zhang, J.X. & W.P. Maddison. 2012d. New euophryine jumping spiders from Southeast Asia and Africa (Araneae: Salticidae: Euophryinae). Zootaxa 3581:53–80.

Zhang, J.X. & W.P. Maddison. 2013. Molecular phylogeny, divergence times and biogeography of spiders of the subfamily Euophryinae (Araneae: Salticidae). Molecular Phylogenetics and Evolution 68:81–92.

Zhang, J.X. & W.P. Maddison. 2014. *Tisaniba*, a new genus of marpissoid jumping spiders from Borneo (Araneae: Salticidae). Zootaxa 3852:252–272.

Zhang, J.X. & W.P. Maddison. 2015. Genera of euophryine jumping spiders (Araneae: Salticidae), with a combined molecular-morphological phylogeny. Zootaxa 3938:1–147.

Zhou, Y.Y. & S.Q. Li. 2013a. Two new genera of jumping spiders from Hainan Island, China (Araneae, Salticidae). Zootaxa 3712: 1–84.

Zhou, Y.Y. & S.Q. Li. 2013b. *Sinoinsula*, a name to replace *Insula* (Araneae, Salticidae). Acta Arachnologica Sinica 21:95.

Zurek, D.B., T.W. Cronin, L.A. Tayler, K. Byrne, M.L.G. Sullivan & N.I. Morehouse. 2015. Spectral filtering enables trichromatic vision in colorful jumping spiders. Current Biology 25:R1–R3.

Zurek, D.B. & X.J. Nelson. 2012a. Saccadic tracking of targets mediated by the anterior-lateral eyes of jumping spiders. Journal of Comparative Physiology A –Neuroethology, Sensory, Neural, and Behavioral Physiology 198:411–417.

Zurek, D.B. & X.J. Nelson. 2012b. Hyperacute motion detection by the lateral eyes of jumping spiders. Vision Research 66:26–30.

Zurek, D.B., A.J. Taylor, S.C. Evans & X.J. Nelson. 2010 The role of the anterior lateral eyes in the vision-based behaviour of jumping spiders. Journal of Experimental Biology 213: 2372–2378.

*Manuscript received 27 July 2015, revised 15 September 2015.*