

Distribution: Recorded from the highlands (3,250–3,700 m) of Bogotá (Colombia) and lowlands of central and eastern Amazon rain forest.

Relationships: Kury and Pérez G. (2002) stated that Fissiphalliidae could form a monophyletic group with Zalmoxidae, or it could be a group within Zalmoxidae, on the basis of the tagmosis of the ventral plate divided by a setose median pergula and the presence of a stragalum (= capsula externa). These families are related to Guasiniidae and Icaleptidae (Pinto-da-Rocha & Kury, 2003b) by the presence of a stragalum.

Main references:

- **Systematics:** Martens (1988), Pinto-da-Rocha (2004).
- **Natural history:** Martens (1988).

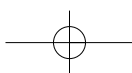
Gonyleptidae Sundevall, 1833

Adriano B. Kury and Ricardo Pinto-da-Rocha

Etymology: *Gonyleptes*, from Greek *gony*, joint, knee, and *leptos*, thin, fine, delicate.

Characterization: Gonyleptidae is one of the most diversified families of Opiliones, not only in number of species but also in morphological disparity and coloration patterns; the variation is large in most structures.

- **Size:** Small (Tricommatinae) to large (Gonyleptinae, Pachylinae, and Goniosomatinae); body length from 0.6 (male of *Berlesecaptus convexus*, Tricommatinae) to 17 mm (male of *Sadocus ingens*, Pachylinae); leg IV length from 2 (*Berlesecaptus convexus*) to 185 mm (male of *Mitobates triangulus*, Mitobatinae).
- **Dorsum:** Carapace much narrower than opisthosomal scutum in most species (Figures 4.29a,c–g) except some Tricommatinae, the caelopygine *Thereza* (Figure 4.29b), the Metasarcinae, and the mitobatines *Mitobates*, *Mitobatula*, and *Ruschia*, which present a subrectangular body; *Ampheres* shows almost triangular body shape; some genera of Tricommatinae have ovoid outline (Figure 4.29i). Frontal hump present except in Ampycinae; with tubercles short or long (Hernandariinae). Dorsal scutum normally longer than wide except in Cobaniinae (Figure 4.29g) and some Pachylinae such as *Discocyrtus* and *Sadocus*. With one or two ozopores on each side, sensorial pegs present in Goniosomatinae, Bourguyiinae, and some Pachylinae. Body depressed in Bourguyiinae, convex in most other gonyleptids. Common ocularium always present, normally on middle of carapace, sometimes near the anterior margin of scutum, normally convex, except in Bourguyiinae and some genera of Tricommatinae and Metasarcinae, in which it is flattened; armature ranges from absent, with one or two tubercles, to one or two straight apophyses (apex acuminate or blunt), a few species with curved spine directed frontward or straight inclined frontward. The armature of scutal areas and free tergites is



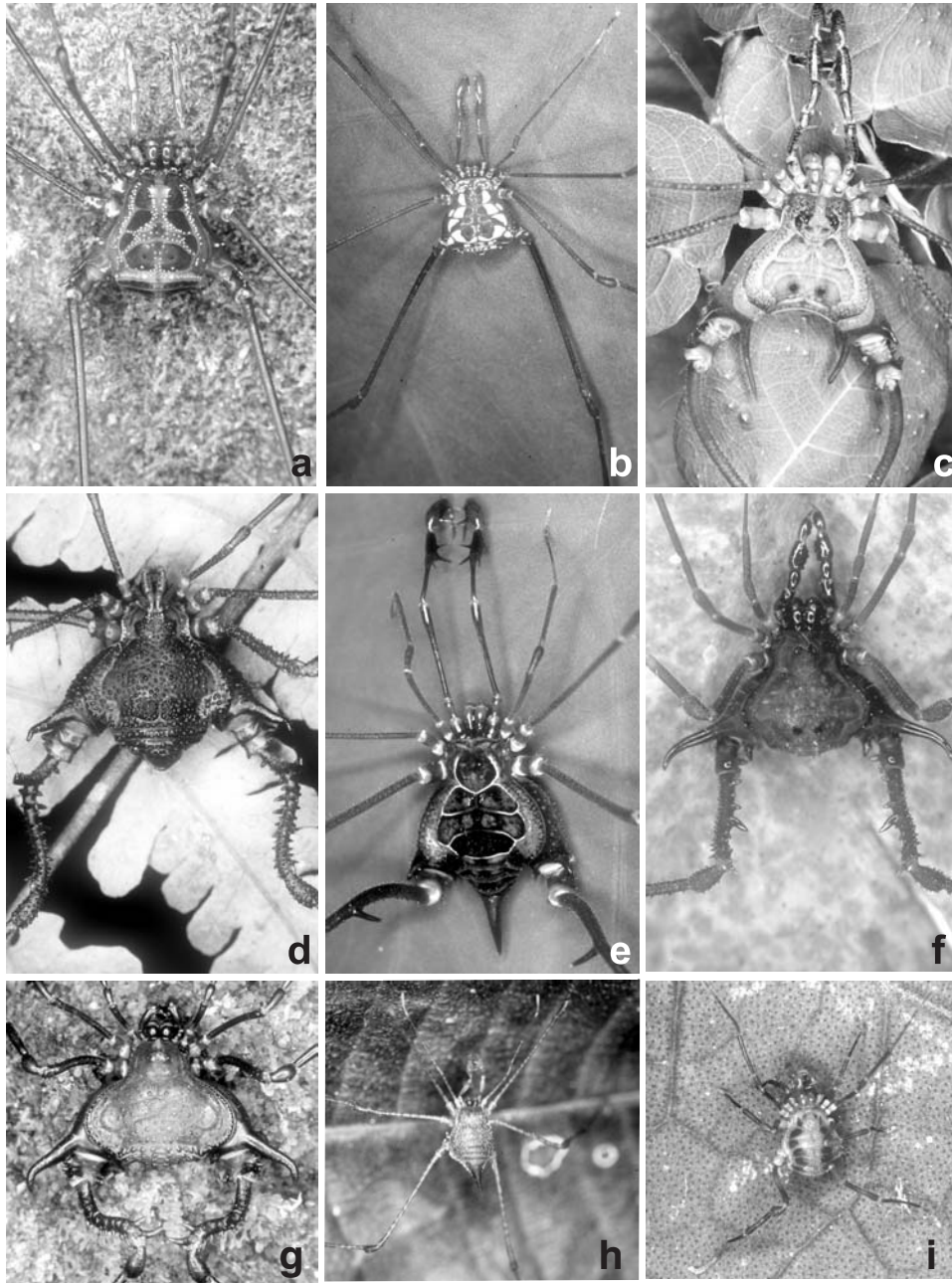
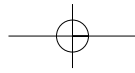
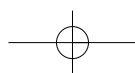
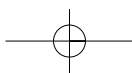


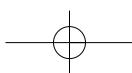
Figure 4.29. Gonyleptidae. Dorsal habitus of males: (a) Mitobatinae, *Promitobates ornatus*; (b) Caelopyginae, *Thereza speciosa*; (c) Goniosomatinae, *Goniosoma unicolor*; (d) Gonyleptinae, *Neosadocus* sp.; (e) Sodreaninae, *Gertia hatschbachi*; (f) Pachylinae, *Discocyrtus* sp.; (g) Cobaniinae, *Cobania picea*; (h) Hernandariinae, *Piassagera brieni*; (i) Tricommatinae, *Rezendesius lanei*. Photos: R. Pinto-da-Rocha.

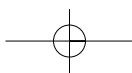




extremely variable, from smooth to armed with one or more tubercles or spini-form processes; the sculpture of the body is finely granular in most species. Area III often armed. Lateral margin of Gonyleptinae normally with a row of large and blunt protuberances. Three or four areas on dorsal scutum; sulci well marked; area I divided by median groove except in Tricommatinae; IV rarely divided. Posterior margin ("area V") may be armed with one or a pair of tubercles. Free tergites with long tubercles on the lateral angles in most Heteropachylinae and some females of Goniosomatinae; tergites II–III with median tubercle always present in Bourguyiinae and females of some Gonyleptinae (*Sphaerobunus*), and I–II or III conspicuously armed with apophyses in several Pachylinae.

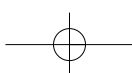
- Venter: Posterior margin of spiracular area deeply concave in most Progonyleptoidellinae, Gonyleptinae, and Pachylinae. Free sternite I (= sternite IV) may be projected in complex lobes matching the apophyses of coxa IV of males in Tricommatinae.
- Chelicerae: Similar in size in both sexes and small in relation to the body size except in Metasarcinae, where the male possesses segment II hypertelic; bulla of segment I (basichelicerite) often with low dorsal or marginal tubercles. Finger with teeth of variable sizes.
- Pedipalps: Femur longer than dorsal scutum in Sodreaninae (Figure 4.29e), cylindrical in Sodreaninae, Caelopyginae, and Progonyleptoidellinae, laterally compressed in others; with row of thick ventral setae on Metasarcinae, Ampycinae, and Goniosomatinae. Some genera of Tricommatinae with stridulatory rack basally on the inner surface. Patella long in Sodreaninae; with mesal setae in Goniosomatinae and Metasarcinae. Tarsus ventrally straight in most groups, convex in Caelopyginae, Progonyleptoidellinae, Hermandariinae, and Sodreaninae; with short and long ventral setae on tibia and tarsus; also with two median ventral rows of short and thick setae in mentioned groups, but thin setae in Gonyleptinae, Goniosomatinae, and some Pachylinae; claw long and curved, almost same length as tarsus.
- Legs: Coxa IV dorsally visible in entire extension (Figure 4.29d) except in Metasarcinae, Heteropachylinae, and Progonyleptoidellinae; with dorsoapical apophysis short to robust, single or bifid, much more developed on males, normally directed laterad, sometimes backward; sometimes also with internal apophyses. Trochanter, femur, and tibia IV armed with tubercles/apophyses in males of most groups in countless shapes and arrays, except Mitobatinae (Figure 4.29a), Bourguyiinae, and some Tricommatinae (Figure 4.29i); femur IV with dorsobasal apophysis in Heteropachylinae, Pachylospeleinae, Gonyleptinae, and some Pachylinae. Male femur IV ranging from straight (much elongated in Mitobatinae) to sigmoid or sinuous. Apex of femur and tibia sometimes slightly incrassate in males. Tarsal process either absent (most Tricommatinae), reduced to long setae on a well-developed socket, or well developed as claws. Scopulae on legs III–IV present in most groups except some Pachylinae and Mitobatinae. Claws smooth in most members of the family,





pectinate in tree-dwelling taxa such as Caelopyginae, *Heteromitobates discolor* (Goniosomatinae), and *Parampheres* (Gonyleptinae). Tarsal formula: from low in Tricommatinae (3:3:4:4), with cylindrical tarsomeres, to high in Progonyleptoidellinae (7:17:15:20), with globular tarsomeres. Male basitarsus normal to inflated (presumably with associated gland).

- Genitalia (Figures 4.30a–i): Penis with ventral plate well defined, rectangular or pyriform with basal lobes more or less developed in most subfamilies (extremely developed in Gonyleptinae-like subfamilies; see Figures 4.30e,i), basal lobes lacking in Heteropachylinae, Goniosomatinae (Figure 4.30a, ventral plate rectangular), Cobaniinae (Figure 4.30g, ventral plate trapezoid), and Ampycinae (Figure 4.30b, ventral plate ovoid). In Metasarcinae ventral plate provided with a pair of spiny laterobasal sacs. In Tricommatinae ventral plate with regionalization in a swollen basal part and a distal lamina parva (Figure 4.30f). Lateral margin of ventral plate with two groups of setae, extremely variable in size and shape. Distal margin of ventral plate entire or with a well-marked parabolic, U-shaped or V-shaped cleft (Figures 4.30e,i); in some cases the cleft is very deep, dividing the plate into two valves (Figure 4.30b, Ampycinae). Apical setae may be straight or helicoidal, sometimes very elongate (e.g., in Bourguiyinae, Figure 4.30d). Glans columnar, more or less elongate, rarely with thumblike dorsal process (Figure 4.30g), much more frequently with ventral process, which may be digitiform or flabelliform or adopt a variety of shapes in Pachylinae. Ventral and dorsal processes only occur together in the Bourguiyinae and *Parabalta* (Pachylinae). Stylus usually elongate and straight, but in many species it is short and thick, bent in the apex, with a varied covering of granules and small apophyses.
- Color: Extremely variable, from brownish (most Pachylinae, Metasarcinae, Tricommatinae) to black (most Gonyleptinae, Ampycinae, Cobaniinae, Hernandariinae) in most species, but some groups (Bourguiyinae, Caelopyginae, Progonyleptoidellinae, and Sodreaninae) with very colorful patterns (yellowish, orange, greenish), some of them with lighter or darker patches or spots on the tegument; apparently the yellowish or whitish patches are waxy and are deposited over the tegument. Most Goniosomatinae and many Pachylinae possess lighter color over sulci I–IV; some waxy patches are visible only in living or dried preserved specimens; arthrodial membranes of coxae and trochanters are sometimes pink to purple colored.
- Sexual dimorphism: Coxa IV of males is much wider and strongly developed, clearly visible under the scutum in dorsal view, while that of females is much smaller and often hidden under the scutum borders. In general, males have more and higher tubercles and/or apophyses on leg IV; sometimes the leg is thicker and more curved than in females. In pachyline-like species males can bear tubercles or apophyses (currently of diagnostic value) that are smaller or even lacking in females; sometimes the situation is just the opposite. Males of Bourguiyinae, some Tricommatinae (such as *Pseudopachylus* and *Camarana*), and especially Mitobatinae have a very elongate straight femur and tibia IV.



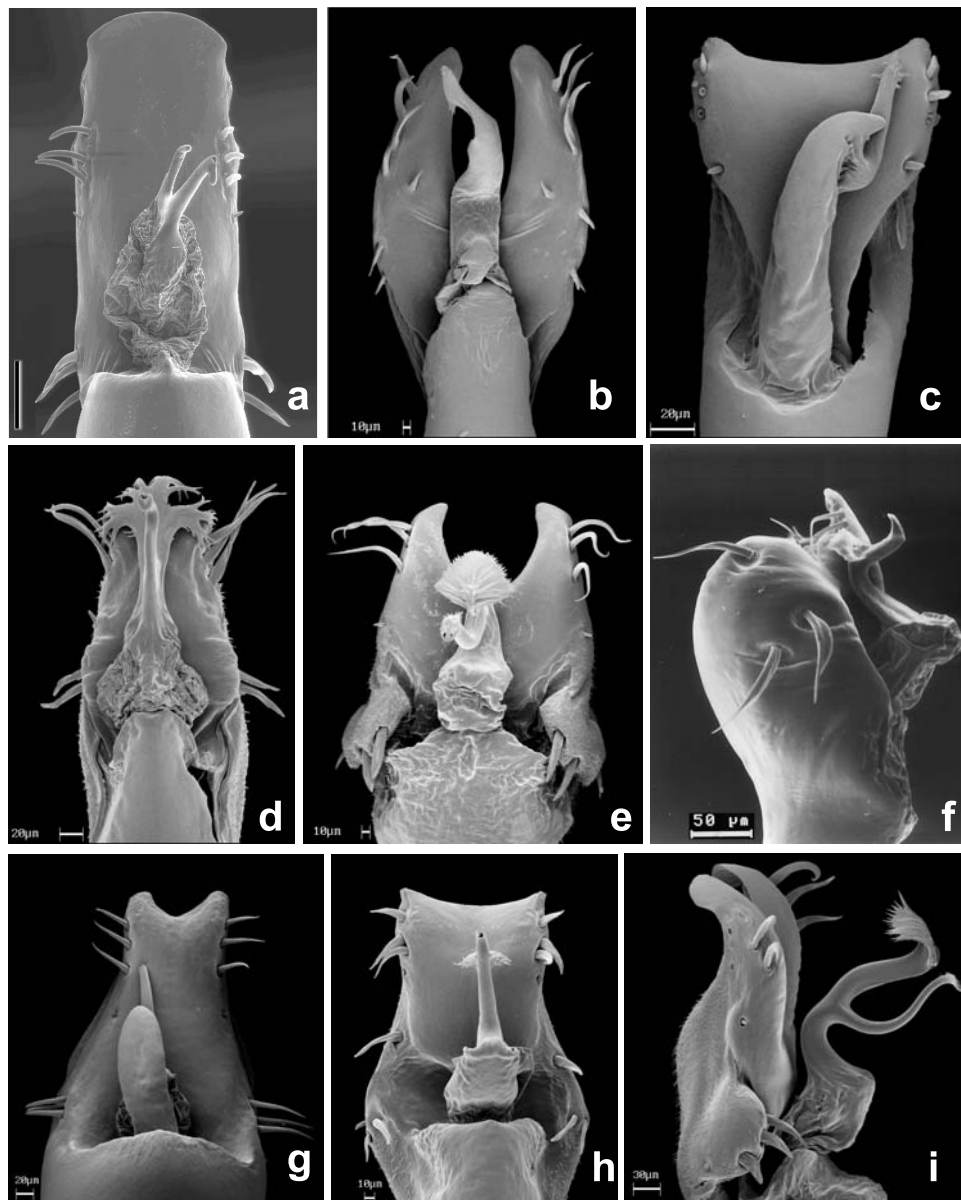
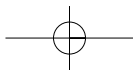
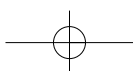
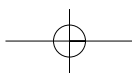


Figure 4.30. Gonyleptidae. Distal part of penis: (a) Goniosomatinae, *Goniosoma ensifer*; (b) Ampycinae, *Ampycus telifer*; (c) Heteropachylinae, *Pseudopucroliia mutica*; (d) Bourguyiinae, *Bogdana ingenua*; (e) Progonyleptoidellinae, *Cadeadoius niger*; (f) Tricommatinae, *Pseudopachylus longipes*; (g) Cobaniinae, *Cobania picea*; (h) Pachylinae, *Discocyrtus testudineus*; (i) *Zortalia inscripta*. Photos: a, M. B. da Silva; b–i, R. Pinto-da-Rocha.

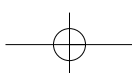


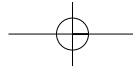


Iporangaia has an unusual dimorphism on metatarsus IV, which has the calcaneus swollen. Many Pachylinae have basitarsus I thickened in males. Metasarcinae males possess an enlarged chelicera. In most species of Progonyleptoidellinae the spines of the mesotergum are present as low rounded tubercles in males and high pointed spiniform processes in females.

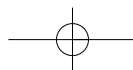
Key to subfamilies:

1. Pedipalpal femur with row of strong spines on ventral surface; pedipalpal patella with mesal subdistal spine. 2
 - . Pedipalpal femur without row of strong spines on ventral surface; pedipalpal patella unarmed. 3
2. Area II invading area I up to scutal groove; ocularium without median depression (Figure 4.29c) (Southern and southeastern Brazil). **Goniosomatinae**
 - . Area II not invading area I (groove II does not touch groove I); ocularium with median depression (Peru, Bolivia, and Argentina). **Metasarcinae**
3. Pedipalpus at least twice as long as body, femur very long and slender; often scutal grooves underlined in white (Figure 4.29e) (southern and southeastern Brazil). **Sodreaninae**
 - . Pedipalpus shorter or nearly as long as body, femur more or less robust; scutal grooves not underlined in white. 4
4. Tarsi III–IV with high count (usually above 12) of globular tarsomeres; pedipalpal tarsus long with ventral surface convex, provided with double row of setae; distitarsus II with 4–6 tarsomeres. 5
 - . Tarsi III–IV with low count (below 10, usually 6–7) of cylindrical tarsomeres; pedipalpal tarsus short, with ventral surface flattened without double row of setae; distitarsus II with 3 tarsomeres (rarely 4–5). 6
5. Tarsal claws III–IV pectinated; coxa IV of males appearing under scutum in dorsal view (Brazilian Atlantic forest). **Caelopyginae**
 - . Tarsal claws III–IV smooth; coxa IV of males hidden under scutum in dorsal view (Brazilian Atlantic forest). **Progonyleptoidellinae**
6. At least one free tergite of male fused to opisthosomal scutum or all tergites fused among them (Brazilian Atlantic forest, north of Espírito Santo).
 - **Heteropachylinae**
 - . No tergite fused, all of them actually free in both sexes. 7
7. Ocularium as a high cone on the anterior margin of carapace with a hook at the apex. 8
 - . Ocularium as an ovoid variedly armed with spines and apophyses, but never with hook. 10
8. Coxa IV of male clearly surpassing scutum. **Pachylinae** (part).
 - . Coxa IV of male hidden under scutum. 9

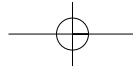




- 9. Frontal margin of carapace unarmed; femur IV of male dimorphically elongate. **Tricommatinae** (part, e.g., *Pseudopachylus*)
- . Frontal margin of carapace with strong apophyses below paracheliceral projections; femur IV without dimorphism, short in both sexes (southeastern Brazil). **Gonyassamiinae**
- 10. Scutal area I often undivided; tarsus III–IV without tarsal process; distitarsus I two- or three-segmented. **Tricommatinae** (part)
- . Scutal area I almost always divided into left and right halves; tarsus III–IV with tarsal process; distitarsus I three- (rarely four-) segmented. 11
- 11. Femur IV dimorphically elongate, much longer in male, with armature very weak or absent in both sexes (Figure 4.29a).. 12
- . Femur IV with other manifestations of sexual dimorphism, usually more curved and/or with more spines on male. 14
- 12. Ocularium with paired armature; area III usually with a pair of spines or tubercles; femur IV entirely straight and unarmed (Figure 4.29a), posterior ozopore absent or much smaller than anterior ozopore (Brazilian Atlantic forest). **Mitobatinae**
- . Ocularium unarmed or with paired armature; area III unarmed; femur IV with weak distal armature, posterior ozopore present, of the same size as anterior ozopores. 13
- 13. Coxa IV with apical outer apophysis bifurcate with subequal branches; ocularium low and wide, unarmed or with a median hemispheric tubercle; base of femur IV always unarmed; distitarsus II three-segmented (Brazilian Atlantic forest). **Bourguyiinae**
- . Coxa IV with apical outer apophysis bifurcate with very unequal branches; ocularium high, narrow, unarmed; base of femur IV with rows of tubercles; distitarsus II four- or five-segmented (São Paulo). **Pachylospeleinae**
- 14. Frontal hump of carapace armed with two spines or acute tubercles. 15
- . Frontal hump of carapace unarmed. 16
- 15. Pedipalpal tarsus flattened ventrally; ocularium never with geminated armature (eastern Brazil, Argentina). **Gonyleptinae**
- . Pedipalpal tarsus biconvex; ocularium with two tubercles united apically (Southern Brazil, Argentina, Paraguay). **Hernandariinae**
- 16. Coxa IV strongly projected laterally, making the body much wider than long; tegument glossy black (Figure 4.29g) (Southeastern Brazilian highlands). **Cobaniinae**
- . Coxa IV moderately projected, body at most slightly wider than long, tegument dark yellow to dark brown (rarely black), leatherlike. 17
- 17. Body covered with protuberances; coxa IV with powerful uniramous apophysis in male; trochanter IV with weak tubercles; ocularium armed with two cones



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oblique frontward or unarmed, never with unpaired armature; free tergites (at least the third) with strong median spine (Amazonia)..... **Ampycinae**

. Body smooth or with setiferous tubercles; coxa IV with apophysis recurved (Figure 4.29f) and mostly bifid in male, often pointed posteriorly; trochanter IV often with powerful recurved apophyses; ocularium with unpaired armature (sometimes in hook) or two erect spines; free tergites with variable armature, commonly weak..... **Pachylinae**

Distribution: Recorded from southern South America (including Falkland Islands) to Costa Rica, with one isolated record from Guatemala. The highest diversity is found in southern Chile, Brazilian coastal forests, and the Andes up to Peru. They are rare in Amazonia and the Andes of Ecuador and Colombia. Seven subfamilies are endemic to the Brazilian coast: *Caelopyginae*, *Sodreaninae*, *Goniosomatinae*, *Pachylospeleinae*, *Gonyassamiinae*, *Progonyleptoidellinae*, and *Bourguyiinae*. The majority of the diversity of the *Hernandariinae* and *Tricommatinae* also occurs in this environment. The degree of endemism is highly dependent on the terrain; species of gonyleptids associated with mountain ranges show a marked trend to occupy restricted areas, whereas species from flatter areas possess much wider distributions. Gonyleptids are rare and little diversified in xeric vegetation formations in Pantanal, Cerrado, and Caatinga. In the Chaco the environment varies, and gonyleptids thrive in the humid parts. However, central Argentina (semiarid vegetation of mountains of Córdoba and humid vegetation of Yungas in the northwest) and the temperate forests—called *Bosque Valdiviano*—of Chile harbor an impressive number of endemic species. *Metasarcinae* is exclusive to the Andean and sub-Andean realms (see Acosta, 2002b).

Relationships: Gonyleptidae is the sister group to Cosmetidae, and both are related to Stygnidae and Cranidae (Kury, 1992b). The family seems to be monophyletic on the basis of several characters, including the presence of a frontal hump on the carapace, a well-developed coxa IV, dorsal process of glans lost and ventral process present, two pairs of ozopores, chelicera not dimorphic, and opisthosomal scutum much wider than prosomal scutum. However, not all of these characters are present in all members of the family. The relationships among gonyleptid subfamilies are poorly understood, although most of the subfamilies seem to be monophyletic, perhaps with the exception of the two most diverse subfamilies, *Pachylinae* and *Gonyleptinae*.

Main references:

- **Systematics:** Roewer (1923), Mello-Leitão (1932), Ringuelet (1959), Pinto-da-Rocha (2002), Kury (2003), Pinto-da-Rocha et al. (2005).
- **Natural history:** Muñoz-Cuevas (1971a), Matthiesen (1983), Acosta et al. (1993, 1995), Gnaspini (1995, 1996), Machado & Oliveira (1998, 2002), Elpino-Campos et al. (2001), Machado & Raimundo (2001), Machado (2002), Pérez G. & Kury (2002), Mestre & Pinto-da-Rocha (2004), Pereira et al. (2004).

