

## Two new species of *Idris* Foerster (Hymenoptera: Platygasteridae) from Southeastern Brazil, parasitoids of *Argyrodes elevatus* Walckenaer (Araneae: Theridiidae) and *Scytodes* sp. (Araneae: Scytodidae)

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**Abstract:** In this study two new species of *Idris* Foerster (Platygasteridae) are described and illustrated: *I. argyrodes* sp. nov. and *I. scytodes* sp. nov., from specimens reared from eggs of the spider species *Argyrodes elevatus* Walckenaer (Theridiidae) and *Scytodes* sp. (Scytodidae) collected in Minas Gerais State, Brazil. Scytodidae is a new host family for *Idris*.

**Key words:** *Idris*, endoparasitoids, spiders, eggsacs, *Scytodes*, *Argyrodes*

**Resumen:** Se describen e ilustran dos nuevas especies de *Idris* Foerster (Platygasteridae): *I. argyrodes* sp. nov. e *I. scytodes* sp. nov., emergidas de sacos de huevos de arañas de las especies *Argyrodes elevatus* Walckenaer (Theridiidae) y *Scytodes* sp. (Scytodidae) recolectadas en el estado de Minas Gerais, Brasil. Scytodidae es una nueva familia hospedadora para *Idris*.

**Palabras clave:** *Idris*, endoparasitoides, arañas, sacos de huevos, *Scytodes*, *Argyrodes*

### INTRODUCTION

Insects associated with spider eggsacs have been subject of great interest. Most species behave as predators –Ichneumonidae and most of Chalcidoidea (Hymenoptera), Diptera, and Mantispidae (Neuroptera)– and only a few act as endoparasitoids, completing their development at the expense of a unique spider egg. These true parasitoids are known in two families of hymenopterans: Platygasteridae (ex Scelionidae) and Encyrtidae. Their larvae develop inside the egg, and after consuming it, pupate and adults emerge at the same time of spiders (Howard, 1892; Auten, 1925; De Santis, 1964; Eason *et al.*, 1967; Evans, 1969; Askew, 1971; Valerio, 1971; Austin, 1984, 1985; Fitton *et al.*, 1987; La Salle, 1990; Loiácono & Margaría, 2004; Margaría *et al.*, 2006 a, b).

The tribe Baeini is unique among Platygasteridae as endoparasitoids of the spider eggs whereas all other platygasterids parasitize insect eggs (Carey *et al.*, 2006). They are ubiq-

uitous in most habitats and are postulated to be important regulating agents of spider populations (Iqbal & Austin, 2000). Host spiders are restricted to three main environments: soil and leaf litter, under the bark of trees, and foliage of shrubs and bushes (Stevens & Austin, 2007).

Members of the tribe Baeini can be recognized by the combination of three synapomorphies-plus-biological characteristics: female antenna with four fused, usually compact clavomeres; antennal scape not reaching the level of the anterior ocellus, the convex outer surface of the tridentate mandibles, and their behavior of attacking eggsacs of spiders (Austin & Field, 1997). Molecular studies have shown that most Baeini (*Idris* Foerster, *Ceratobaeus* Ashmead, *Baeus* Haliday and *Odontacolus* Priesner) form a monophyletic group, but that the australasian genera *Mirobaeoides* Dodd and *Neobaesus* Austin are more closely related to other genera of platygasterids associated with non-spiders hosts (Carey *et al.*, 2006; Murphy *et al.*, 2007; Stevens & Austin, 2007). Among Baeini there are still

many undescribed species (Steven & Austin, 2007). Mapping of wing-reduction states that occur in the Baeniini revealed multiple wing-reduction events, possibly associated with adaptations for searching host egg masses in cryptobiotic habitats, and/or penetrating the silk eggsacs of spiders (Carey *et al.*, 2006).

The genus *Idris* is cosmopolitan and contains 164 species associated with 11 families of spiders, among which are cited Dictynidae, Salticidae, Senoculidae and Theridiidae. Five species occur and are exclusively known from the Neotropical region: *Idris aureus* Girault from Peru, *I. cubensis* (Gahan) from Cuba, and *I. fascipennis* (Ashmead), *I. ochraceus* (Ashmead) and *I. subfuscus* (Ashmead) from the Antilles (Johnson, 2004, 2015). Only the biology of *I. ovivorus* is known, which develops as endoparasitoid of eggsacs of *Ctenus* sp. (Ctenidae); *I. cubensis* has been associated to an unidentified spider eggsac (Loiácono & Margaría, 2013).

The aim of this contribution is the study of endoparasitoids of the genus *Idris* reared from spider eggsacs from Minas Gerais state, Brazil.

#### MATERIAL AND METHODS

Eggsacs of *Scytodes* sp. (Scytodidae) and *Argyrodes elevatus* Walckenaer (Theridiidae) were collected in an urban park (Parque do Sabiá - 18°54'43"S, 48°14'06"W) located in the eastern sector of the municipality of Uberlândia, State of Minas Gerais, Brazil. The park comprises an area of 1.85 Km<sup>2</sup> with 35 ha covered by woody savannas (Cerradão) and semideciduous forest. All the eggsacs collected were immediately placed in containers covered with a fine-mesh cloth and kept in the laboratory until the emergence of microhymenopterans or spiders. The emerged specimens were fixed in 70% alcohol.

Morphological terms follow Masner (1980), and Masner & Denis (1996). Measurements are given in micrometers (µm) as length or length:width. Abbreviations used are: A = antennal segments (A<sub>1</sub>-A<sub>6</sub>), T = metasomal terga (T<sub>1</sub>-T<sub>n</sub>). Samples examined herein were compared with photos of the holotype female of *Idris ochraceus* (Ashmead, 1894) deposited at British Museum of Natural History from Saint Vincent, West Indians [BMNH(E)#969515].

Type material of the new species are deposited in the collections of Universidade Federal de São Carlos (DCBU, Curator Angélica M Penteadodias), in Brazil, and Museo de La Plata (MLP) in Argentina. Voucher specimens of *Scytodes* sp.

were deposited in the arachnological collection of Instituto Butantan, São Paulo, Brazil (IBSP) and voucher specimens of *Argyrodes elevatus* were deposited in the collection of Universidade Federal de Minas Gerais (UFMG), Minas Gerais, Brazil.

*Idris scytodes* Margaría, Loiácono *et* Aquino sp. nov.

(Fig. 1A, B)

**Description:** Female: Body length 1100 µm (Fig. 1A). Body color light brown, legs including coxae, mandibles, labrum, antennae, T1 yellowish; wings slightly infuscate.

**Head** in dorsal view transverse, (387-416:337-362) wider than mesosoma, vertex with granular sculpture. Head in lateral view (501-562:228-255) higher than long; (228-255:312-350) lower than mesosoma. Head in frontal view (Fig. 1B) slightly higher than wide (384:320), with granular sculpture, except frons smooth and shiny with semidecumbent hairs, cheeks near mandibular base with longitudinal striae; occiput perpendicular, forming with the vertex a sharp angle which is margined by a delicate carina; eyes oval and with short hairs; eye height:interorbital space (187:118); lateral ocelli very near the eye margin and also close to occiput margin; vertex, face, and cheeks smooth; the frons immediately above antennae not shiny (opaque) and without median carina; eye height:malar space (187:118). Head in posterior view with occiput below hyperoccipital carina with microgranular sculpture. Antennal segments in the following relative proportions: A<sub>1</sub> (125:35), A<sub>2</sub> (52:33), A<sub>3</sub> (23:21), A<sub>4</sub> (10:23), A<sub>5</sub> (11.6:23), A<sub>6</sub> (10:29), club (127.7:46) abruptly differentiated from funicle, antennal club segmentation straight and very poorly differentiated.

**Mesosoma** in dorsal view longer than wide (375-400:337-362), mesoscutum transverse (337-362:212-225) with semidecumbent hairs, and granular sculptured; scutellum subtriangular longer than wide (225-250:150) with same pilosity and sculpture as mesoscutum; propodeum evenly canalculated, posterolateral corner only slightly projecting, median keels slightly projecting; mesosoma in lateral view longer than high (375-400:312-350); scutellar ring projecting moderately over dorsellum; lateral side of pronotum predominantly granular, without distinct crenulae in lower third, epomium sharp; posterolateral corners of propodeum projecting slightly. Wings fully developed, extending a little beyond apex of metasoma; submarginal vein with row of



Fig. 1. *Idris scytodes* sp. nov. Female. A. habitus, B. head in frontal view, C. host species of *Idris scytodes*: *Scytodes* sp. carrying its eggsac within a shelter made of dry curled leaves constructed by *Tidarren haemorrhoidale* (Bertkau) (Theridiidae). Scales: A, B: 0.1mm. c: 5mm.

long semierect bristles, distinctly surpassing fore margin of wing.

**Metasoma** as long as head plus mesosoma, ovate, narrowed basally; T<sub>1</sub> longitudinally striated, about twice as broad as long; T<sub>2</sub> smooth, its basal one third with rather dense short narrow longitudinal striae; T<sub>3</sub> and following tergites finely sculptured. Metasomal terga in the following relative proportions T<sub>1</sub> (50:200), T<sub>2</sub> (137:225), T<sub>3</sub> (150:350), T<sub>4</sub> (87:262). Metasoma in lateral view slightly convex, sternites finely sculptured as tergites.

Male: unknown

**Distribution:** Brazil, Minas Gerais State, Uberlândia (18°54'43"S, 48°14'06"W).

**Parasitoid biology:** Reared from an eggsac of *Scytodes* sp. (Scytodidae) (new family host record).

**Host biology** (Fig. 1C): Individuals of *Scytodes* sp. were collected invading webs of the theriid spiders *Latrodectus geometricus* Koch, in an urban park in Uberlândia (Parque do Sabiá - 18°54'43"S, 48°14'06"W), and *Tidarren haemorrhoidale* (Bertkau) in an *Eucalyptus* plantation in Estrela do Sul (Fazenda Nova Monte Carmelo - 18°49'30"S, 47°51'45"W). Other *Scytodes* species were previously reported preying on spiders (Nentwig 1985; Jackson *et al.* 1998; Li *et al.*, 1999; Ades & Ramires, 2002). Araneophagy in *Scytodes* is favoured by its capacity to spit a gummy secretion over their prey and is possibly widespread within the genus. *Scytodes* sp. eggsacs are composed of a layer of loose silk threads and are continuously transported and protected by the mothers (Fig. 1C). Eggs, however, are probably easily accessed by parasitoids. *Idris scytodes* sp.

nov. was found in an eggsac of a female occupying a web of *L. geometricus* under a park bench in Parque do Sabiá, close to the forested area.

**Material examined:** Holotype female: Brazil, Minas Gerais State, Uberlândia (18°54'43"S, 48°14'06"W), 2-IV-2010, Tozzo-Neto coll. (DCBU). Paratypes, 3 females, same data as holotype (MLP).

**Etymology:** the specific name was taken from the host genus *Scytodes* Blackwall (Scytodidae).

**Remarks:** *Idris scytodes* sp. nov. agrees with *I. ochraceus* (Ashmead) in the following features: body color light brown, antennal club segmentation straight and very poorly differentiated, transparent wings, and T<sub>1</sub> longitudinally striate. *Idris scytodes* differs from *I. ochraceus* principally by the size of A3 and the sculpture of T<sub>2</sub>; *I. scytodes* is also related to *I. argyrodes*, as discussed below, but differs principally by size of A3 and the sculpture of T<sub>2</sub>. The type of *I. ochraceus* (Fig. 2A-D) is in the British Museum, and we have verified the characters of the original description with photos taken by David Notton, Senior Curator, Hymenoptera Natural History Museum, United Kingdom. Ashmead (1894) described "bare eyes" but we observed very fine and short hairs. *Idris argyrodes* and *I. scytodes* are easily separated from *I. aureus* and *I. fascipennis* principally by the different body color. The sculpture of the first abdominal segments allows to differentiate *Idris scytodes* from *I. argyrodes*, *I. ochraceus* and *I. cubensis*. *Idris argyrodes* differs from *I. ochraceus* by the presence of eye pilosity and the shape of T<sub>2</sub>, and differs from *I. cubensis* by the shape of A3.



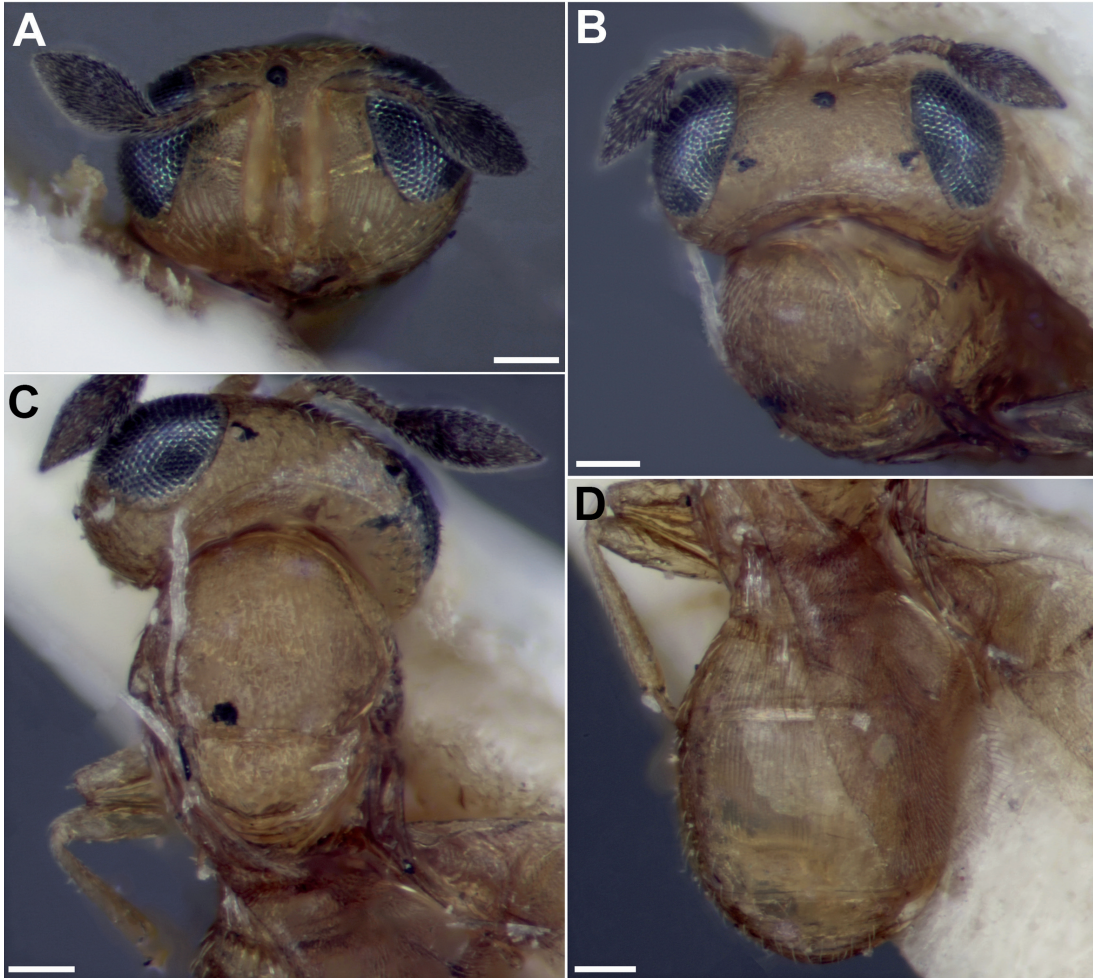


Fig. 2. *Idris ochraceus* (Ashmead). Female. A. head in frontal view, B. head and pronotum in dorsal view, C. mesosoma in dorsal view, D. metasoma in dorsal view. Scales: 0.1mm

*Idris argyrodes* Margaría, Loíacono et Aquino  
sp. nov.  
(Fig. 3a, B, C)

**Description:** Female: Body length 1900  $\mu\text{m}$ . Body color light brown, antennae, legs including coxae and T1 yellowish; wings slightly infuscate. **Head** in dorsal view transverse, slightly wider than mesosoma (400:256), vertex with granular sculpture. Head in lateral view higher than long (287:175), slightly lower than mesosoma (287:300). Head in frontal view (Fig. 3A) slightly wider than high (12:9), with slightly reticulate sculpture and semidecumbent hairs, cheeks near mandibular base with short striae; occiput perpendicular, forming with the vertex a sharp angle which is margined by a delicate carina; eyes rounded and with short hairs; eye

height:interorbital space (149:176); lateral ocelli very near the eye margin and also close to occiput margin; the frons immediately above antennae not shiny (mate) and without median carina; eye height:malar space (149:93). Antennal segments in the following relative proportions:  $A_1$  (118:29),  $A_2$  (54:27),  $A_3$  (25:17),  $A_4$  (15:17),  $A_5$  (13:19),  $A_6$  (13:23), club (122:66) abruptly differentiated from funicle (Fig. 3B), antennal club segmentation rounded and poorly differentiated. **Mesosoma** in dorsal view (Fig. 3C) longer than wide (344:256) (350-375:312-337), mesoscutum transverse(144:208) (212:337) with semidecumbent hairs, and granular sculpturing; scutellum rounded wider than long (112-125:162) with same pilosity and sculpturing as mesoscutum; propodeum evenly canaliculated, posterolateral corner only slightly projecting, median keels slightly

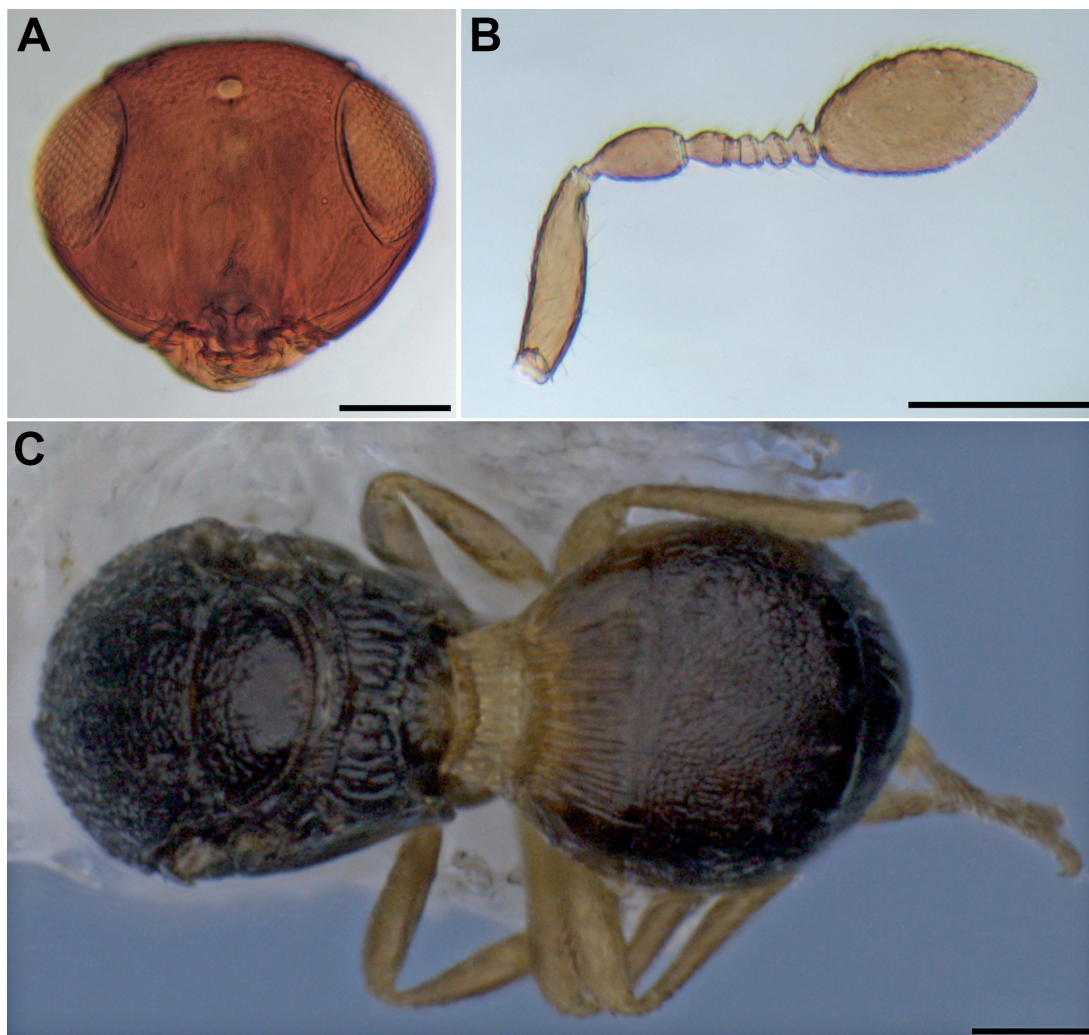


Fig. 3. *Idris argyrodes* sp. nov. Female. A. head in frontal view, B. antenna, C. meso and metasoma in dorsal view. Scales: 0.1mm.

projecting; mesosoma in lateral view longer than high (350-375:287-300); scutellar ring projecting moderately over dorsellum; lateral side of pronotum predominantly granular, without distinct crenulae in lower third, epomium sharp; posterolateral corners of propodeum projecting slightly. Wings fully developed, extending a little beyond apex of metasoma; submarginal vein with row of long semierect bristles, distinctly surpassing fore margin of wing.

**Metasoma** (Fig. 3C) as long as the head plus mesosoma, ovate, narrowed basally; T1 and T2 longitudinally striated, T1 about twice as broad as long; T3 and following tergites finely sculptured. Metasomal terga in the following relative proportions T<sub>1</sub> (104:46), T<sub>2</sub> (182:77), T<sub>3</sub> (39), T<sub>4</sub>

(31:10). **Metasoma in lateral view slightly convex**, sternites finely sculptured as tergites.

Male: unknown

**Distribution:** Brazil, Minas Gerais state, Uberlândia, Uberlândia locality (18°54'37"S, 48°13'45"W).

**Parasitoid biology:** Reared from eggsacs of *Argyrodes elevatus* Walckenaer (Theridiidae).

**Host biology:** *Argyrodes elevatus* (Fig. 4A) is a kleptoparasitic spider often found in webs of larger spiders of the families Araneidae, Nephilidae and Theridiidae (Vollrath, 1979; Cobbold & Su, 2010; Silveira & Japyassú, 2012). Individuals of this species usually feed with the hosts to obtain food, exploiting host's efforts involved in capturing and subduing processes, and having access to



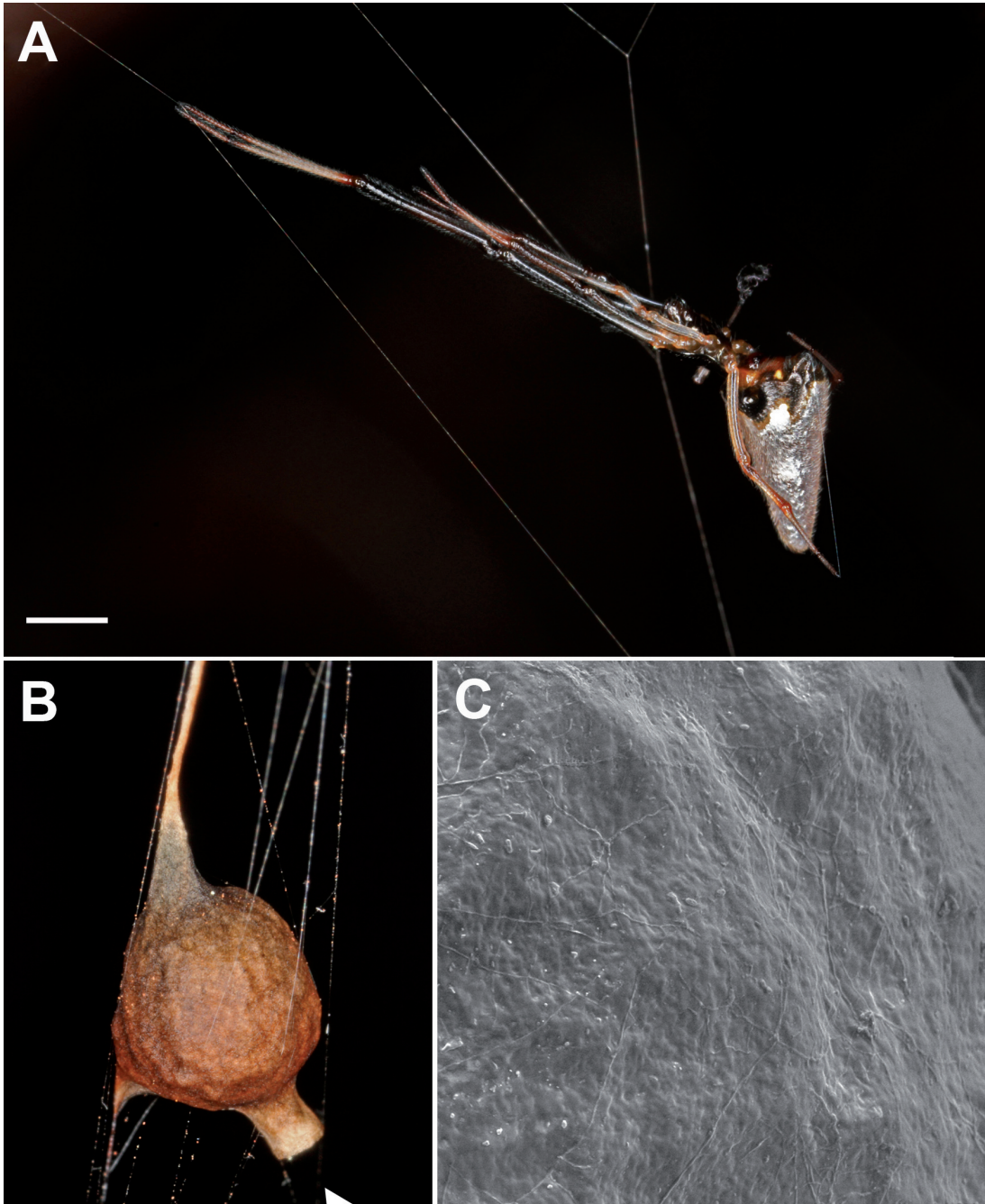


Fig. 4. Host species of *Idris argyrodes* sp. nov. A. *Argyrodes elevatus* in resting position, holding web threads connected to the web of its host, *Nephila clavipes* (Linnaeus) (Nephilidae); B. egg sac of *A. elevatus*. The arrow indicates the opening used by spiderlings to get out; C. Detail of the wall of the egg sac of *A. elevatus*, showing its compact and resistant structure. Scales: A and B. 1mm, C. 300  $\mu$ m.

predigested items (Vollrath, 1979). In addition, *A. elevatus* is able to prey on their hosts (Cobbold & Su, 2010; Silveira & Japyassú, 2012) and on

host's eggsacs, to capture small prey items entangled by the web and ignored by their hosts and to steal wrapped preys stored by their hosts

(Silveira & Japyassú, 2012). Interestingly, there are a few cases of observations of males offering stolen prey items to females as nuptial gifts (Cobbold & Su, 2010; Uetz et al., 2010). Unlike other Argyrodiines, such as *Faiditus ululans* (O. Pickard-Cambridge) (Cangialosi, 1990), females of *A. elevatus* leave their eggsacs unattended, attached to threads of the host's web (Marcelo O. Gonzaga pers. obs., Vollrath, 1987). This behavior may facilitate the attack by parasitoid species and/or egg predators. The eggsacs of *A. elevatus*, however, are composed of a very resistant and dense silk layer (Fig. 4B, C), which possibly include substances other than those usually present in silk threads, to confer the tough structure involved in egg protection. Spiderlings left the eggsac through a hole situated at the bottom position (indicated by an arrow in Fig. 4B). The same opening is probably used by the parasitoid to have access to the eggs. *Idris argyrodes* sp. nov. was found in an eggsac attached to the web of *Nephila clavipes* (Linnaeus) in the forested area of Parque do Sabiá, in Uberlândia.

**Material examined:** Holotype female: Brazil, Minas Gerais State, Uberlândia, Uberlândia locality (18°54'37"S, 48°13'45"W), 5-III-2010, Gonzaga coll. (DCBU). Paratypes, 2 females, same data as holotype (MLP).

**Etymology:** the specific name was taken from the host genus *Argyrodes* Simon (Theridiidae).

**Remarks:** Considering the Neotropical species, *Idris argyrodes* sp. nov. is also related to *I. ochraceus* (Ashmead) (Fig. 2-D) but differs by the size of T2. *Idris argyrodes* sp. nov. differs from *I. scytodes* sp. nov. by the narrower interorbital space, rounded internal border of eyes, antennal club longer than wide, and cheeks with longer striae.

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