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Phylogenetic position and taxonomic review of the *Ianduba* spiders (Araneae: Corinnidae) endemic to the Brazilian Atlantic rainforest

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Abstract

The spider genus *Ianduba* is known from seven species, all restricted to the Brazilian Atlantic rainforest, a biodiversity hotspot. The genitalic morphology of these spiders is rather peculiar and they have been considered *incertae sedis* in Corinnidae. We present novel morphological data for the genus, including scanning electronic microscopy images for several somatic and genitalic features, and test their phylogenetic position by including one *Ianduba* species in a large morphological matrix of dionychan spiders. Our results suggest that *Ianduba* is a true corinnid, possibly belonging in a clade sister to Corinninae. Furthermore, we here describe eight new species of the genus: *I. acaraje* **sp.n.** (Bahia), *I. apururuca* **sp.n.** (Minas Gerais to Espírito Santo), *I. capixaba* **sp.n.** (Espírito Santo), *I. dabadu* **sp.n.** (Espírito Santo), *I. beaga* **sp.n.** (Minas Gerais), *I. benjori* **sp.n.** (Rio de Janeiro), *I. liberta* **sp.n.** (Minas Gerais) and *I. angeloi* **sp.n.** (Minas Gerais to São Paulo). Six of the new species seem to be closely related to *I. varia*, previously considered an aberrant species. Thus, we divide the genus into two morphological groups. All species from the *varia* group (except for *I. varia*, which is synanthropic in southeastern Brazil) appear to be restricted, or more common, at altitudes of at least 800 m above sea level. We argue that unsampled montane rainforest areas from southeastern Brazil are likely to yield new records or even undescribed species of *Ianduba*, and that montane species are likely to be under threat of extinction. New records for previously known species are provided, the female of *I. caxixe* Bonaldo, 1997 is described and illustrated for the first time, and distribution maps and an identification key for the fifteen known species are provided.

Key words

Dionycha, Espinhaço range, conservation hotspot, new species, Quadrilátero Ferrífero, Serra da Mantiqueira, Serra do Mar, taxonomy.

1. Introduction

The Brazilian Atlantic rainforest is considered one of the world's biodiversity hotspots, as it is highly species-rich and threatened (Myers et al. 2000; Ribeiro et al. 2009). Also, it is the best-known Brazilian region regarding its spider fauna, being the region which has been sampled and studied the most, and also the one from which more species have been recorded (Oliveira 2011). Yet, taxonomic revisions of Atlantic rainforest-associated groups continue to yield descriptions of several new taxa (e.g. Rheims 2010; Brescovit et al. 2012; Pinto-da-Rocha et al. 2014; Rodrigues & Bonaldo 2014; Huber 2015), indicating that a picture of the arachnid fauna of this region is still far from complete.

Fig. 1. Living female of *Ianduba varia* (Keyserling, 1891) from São Paulo, Brazil. Note white-colored distal end of tibia I. Photo by A. Anker.

Although it has a continuous distribution, the Atlantic rainforest is not homogeneous, and three main centers of endemism are recognized: the Pernambuco center, the Bahia center and the South/Serra do Mar center (see CARNAVAL & MORITZ 2008; SILVA et al. 2012; CARNAVAL et al. 2014; OLIVEIRA et al. 2015). In particular, the Serra do Mar center is located in a region where several mountain ranges can be found. Associated with these are several endemic birds (VASCONCELOS 2008), plants (SAFFORD 2007), spiders (POLOTOW & BRESCOVIT 2006) and harvestmen (PINTO-DA-ROCHA & SILVA 2005), amongst others.

The genus *Ianduba* Bonaldo was described in 1997 to include *Castianeira varia* Keyserling, 1891 and four new species. After that, two more species were described by BONALDO et al. (2007). Except for *Ianduba varia* (Fig. 1), which is distributed from southeastern Brazil to Argentina and is known to be synanthropic at least in southeastern Brazil, the other six species are restricted to the Bahia endemism center of the Atlantic rainforest, occurring at relatively northern latitudes. In addition to that, *I. varia* has until now been considered a species with a deviant genitalic morphology, bearing little resemblance to its congeners (BONALDO 1997).

The phylogenetic position of *Ianduba* within Corinnidae has been a matter of doubt since the original description of the genus. BONALDO (1997) argued that this genus and the African *Mandaneta* Strand, *Procopius* Thorell and *Pseudocorinna* Simon share a distinct trichobothrial morphology with Corinnidae. However, *Ianduba* and these African genera possess characters not found in typical corinnids, such as the presence of a male palpal median apophysis and courses of the sperm duct that do not match the patterns found in either Corinninae or Castianeirinae. Thus, they were considered as Corinnidae *incertae sedis* by BONALDO (1997, 2000). Indeed, a recent analysis has found no evidence for a monophyletic Corinnidae including these genera possessing a median apophysis, which were joined under the informal name "*Pronophaea* group" (RAMÍREZ 2014). However, *Ianduba* was not among the terminals analyzed, and thus its phylogenetic position remains untested – although BONALDO (2000) suggested it might be the sister group to the Corinninae. We here describe the fine morphology of *I. varia* and *I. caxixe* in detail and include the genus in RAMÍREZ's (2014) matrix to test its phylogenetic position. A better understanding of which groups are closely related to *Ianduba* would be essential for polarizing characters for inferring the internal phylogeny of the genus and interpreting the rather bizarre genitalic morphology of its representatives.

In this paper, we describe eight new species of *Ianduba* from the Brazilian Atlantic rainforest. Seven of these new species occur south of Bahia state, and six of these seem to be closely related to *Ianduba varia*. All species herein described are narrowly distributed, and six of them are recorded from montane regions in the Atlantic rainforest (at least 800 m above sea level). Additionally, we test the phylogenetic position of the genus, presenting evidence that it is a true corinnid, possibly allied to the Corinninae.

2. Material and methods

Specimens were examined completely immersed in 75% ethanol in an Olympus SZ40 stereoscopic microscope. The internal structure of female genitalia was examined after digestion in a pancreatin solution prepared according to Álvarez-Padilla & Hormiga (2008). Drawings were made on a Leica M205C stereoscopic microscope with a coupled *camera lucida*. The description format follows Bonaldo et al. (2007). Leg spines are counted in the dorsal (d), prolateral (p), ventral (v) and retrolateral (r) surfaces, generally on the proximal, median, and distal thirds of each surface (Platnick & Shadab 1975), but the number of longitudinal sectors counted in each surface may vary according to spine distribution. All measurements are in millimeters and were preferentially taken on the left side of specimens. Specimens without coordinates were georeferenced *post-hoc* using the GeoLoc tool in the SpeciesLink website (http://splink.cria.org.br/geoloc; last accessed May 4th, 2014). Original label information on coordinates is referred to between parentheses; *post-hoc* coordinates are referred to between square brackets. Altitude information for all specimens was extracted from an elevation raster using ArcMap10 software (ESRI).

We prepared specimens for scanning electron microscopy as described by Ramírez (2014), except that specimens were dehydrated using hexamethyldisilazane instead of critical-point dried. Parts were mounted on individual stubs, sputter-coated in gold-palladium and examined using a FEI XL 30 TMP scanning electron microscope.

For the phylogenetic analysis, we follow the same procedures for analyzing the data as explained in Ramírez (2014), using the same automated scripts mentioned there. As discussed in that work, results are sensitive to analysis parameters, so we explored the phylogenetic position of *Ianduba* under equal and implied weights (testing *k* concavity constants from 1 to 9). All analyses were run using TNT 1.1 (Goloboff et al. 2008).

The distribution of the *varia* group was modelled using records of all species in this group, except the widely distributed *I. varia*. The model was generated in MaxEnt 3.3.1 (Phillips et al. 2006) using the 19 climatic variables from the WorldClim database (Hijmans et al. 2005), an aridity index (Zomer et al. 2008) and altitudinal data.

3. Abbreviations

Collections. Examined specimens are deposited in the following collections (curators in brackets): **CHNUFPI** – Coleção de História Natural da Universidade Federal do Piauí, Floriano, Piauí, Brazil (L.S. Carvalho); **IBSP** – Instituto Butantan, São Paulo, Brazil (A.D. Brescovit); **MNRJ** – Museu Nacional, Rio de Janeiro, Brazil (A.B. Kury); **MPEG** – Museu Paraense Emílio Goeldi, Belém, Pará, Brazil (A.B. Bonaldo); **UFMG** – Coleções Taxonômicas da Universidade Federal de Minas Gerais, Belo Horizonte, Minas Gerais, Brazil (A.J. Santos).

Morphological structures. **A** – epigynal apodemes; **Ac** – aciniform gland spigot; **ALE** – anterior lateral eyes; **ALS** – anterior lateral spinnerets; **aMA** – apical sector of the median apophysis; **AME** – anterior median eyes; **AP** – apical process of the lobes of the RTA; **AS** – apical spur of the RTA; **AT** – anal tubercle; **AtP** – atrial pockets of the epigynum; **BP** – basal process of the lobes of the RTA; **C** – conductor; **CB** – conductor base; **CD** – copulatory ducts; **Co** – colulus; **CO** – copulatory openings; **Cy** – cylindrical gland spigot; **DL** – dorsal lobe of the RTA; **DP** – dorsal piece of the vulva; **DPP** – dorsal piece process; **E** – embolus; **EB** – embolic base; **EP** – embolic process; **FD** – fertilization ducts; **FDM** – fertilization duct membrane; **hpMA** – ‘hematodocha’ of the pMA; **IS** – inframammilary sclerite; **MA** – median apophysis; **mAP** – minor ampullate gland spigot; **MAP** – major ampullate gland spigot; **MP** – median plate of the epigynum; **MPr** – median process of the lobes of the RTA; **N** – nubbin; **P** – petiole; **Pi** – piriform gland spigot; **PLE** – posterior lateral eyes; **PLS** – posterior lateral spinnerets; **pMA** – prolateral sector of the median apophysis; **PME** – posterior median eyes; **PMS** – posterior median spinnerets; **rMA** – retrolateral sector of the median apophysis; **RTA** – retrolateral tibial apophysis; **S** – primary spermathecae; **Sp** – spinnerets; **SS** – secondary spermathecae; **T** – tartipore; **TM** – tegular modified area; **TP** – tegular projection; **Tr** – posterior tracheae; **TrS** – posterior tracheal spiracle; **VL** – ventral lobe of the RTA.

4. Results and discussion

Phylogenetic position and genital morphology. *Ianduba* has been recovered as sister to *Allomedmassa mae* Dankittipakul & Singtripop (labeled as “cf. *Medmassa* THA” in Ramírez 2014), and this group is part of the “true” Corinnidae under all weighting schemes (Fig. 2). However, its position within Corinnidae varies (sister to, or part of, Castianeirinae with *k* values lower or equal to 7; sister to Corinninae with *k* values higher than 8). We follow Ramírez (2014), presenting the results of the analysis with $k = 9$ (length = 3015, fit = 176.04, CI = 0.153, RI = 0.513), and an alternative resolution under equal weights (Fig. 2). The supports are generally low for most of the groupings, and of all the synapomorphies of Corinnidae listed in Table 1, *Ianduba* only presents a scutum on the male abdomen (although characters 100, 182 and 351 have ambiguous scorings for *Ianduba*). Bonaldo (2000) comments on some similarities between *Ianduba* and Corinninae, namely a T-shaped tegulum, a sperm duct restricted to the tegulum, and the shape of the ATR. These characters have not been included in the dataset we analyzed, but they would support the results we found under higher *k* values, where *Ianduba* + *Allomedmassa* Dankittipakul & Singtripop are a clade sister to Corinninae. At any rate, the pivotal position of *Ianduba* near the base of the subfamilies Corinninae and Castianeirinae makes the genus an important representative in future studies of corinnid phylogeny.

We here present novel morphological data for *Ianduba*, including SEM images of genitalic (Figs. 5 – 8) and somatic (Figs. 9, 10) structures. The structure of the median apophysis in *Ianduba* is quite unique. It is known that the median apophysis has a highly homoplasious evolution (consistency index is only 0.03 in Ramírez 2014,

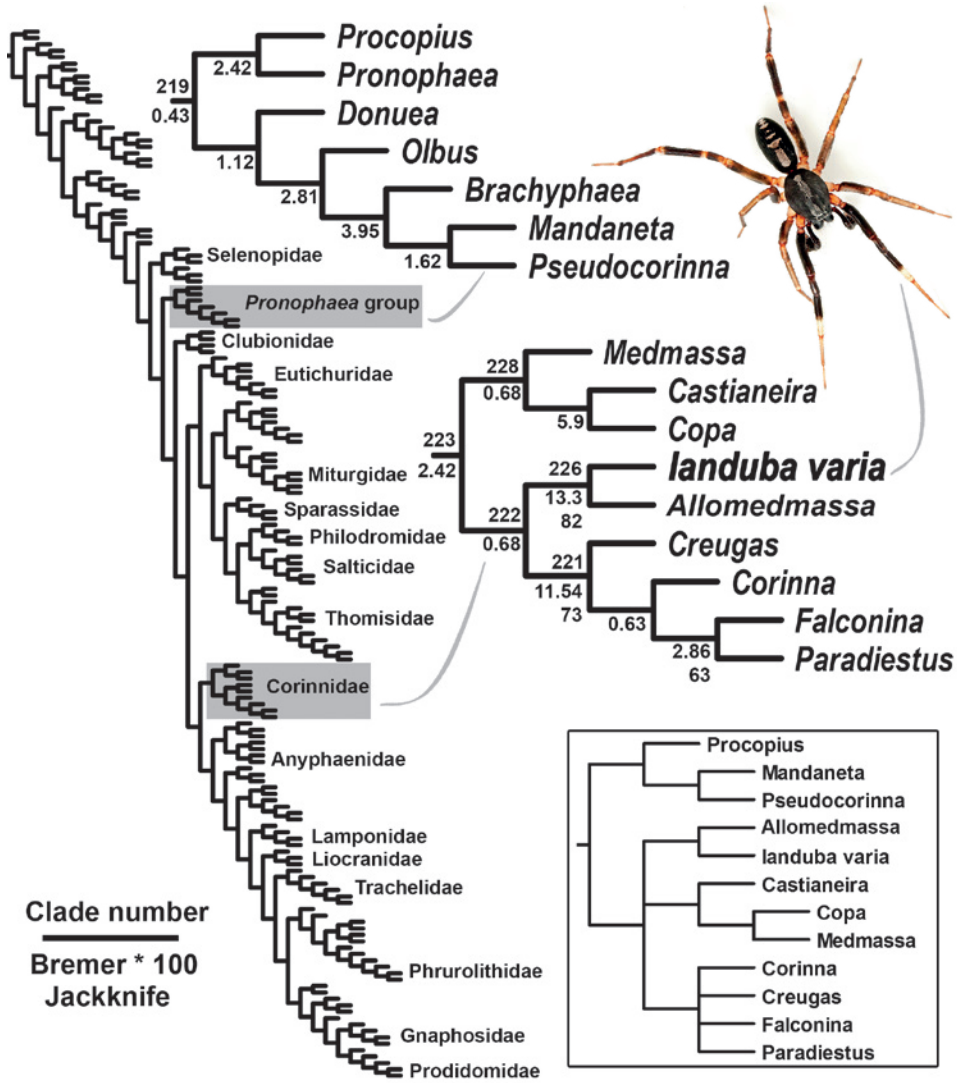

Fig. 2. Least-rejected cladogram obtained under implied weights (concavity constant *k* = 9). Values above branches are clade numbers as referred in Table 1, below branches are Bremer support (values multiplied by 100) and jackknifing frequencies (only values higher than 50 are shown). Inset shows an alternative resolution under equal weights, where part of the *Pronophaea* group appears as sister to classical corinnids. Photo of a *Ianduba varia* male by J.P. Burini.

see his character 356). Bonaldo & Brescovit (2005) discovered that the Attacobiini tegular process (as defined by Bonaldo & Brescovit 1998) is actually loosely attached to the tegulum and thus could be considered homologous to the median apophysis of other dionychan spiders. These authors stated that other tegular sclerites in Corinninae (as those found in *Xeropigo* O. Pickard-Cambridge and some *Corinna* C.L. Koch) also could be considered as such. Likewise, Ramírez (2014) states that the *Corinna* tegular process (PTC) in Bonaldo (2000: figs. 80–92) might be homologous to the median apophysis in other Dionycha. The structure in *Ianduba* could be homologous to the PTC in *Corinna*, to the PTX in *Xeropigo* and, especially, to the median apophysis in *Attacobius* Mello-Leitão, which is divided in sectors as in most *Ianduba*. This view might be supported by the close relationship between *Ianduba* and the Corinninae. Another possibility is that the ‘median apophysis’ in *Ianduba* has been misinterpreted and that it is an elaboration of the conductor, since in some species this sclerite is fused with the median apophysis at its base (see Figs. 5C, 6B). Even among species of *Ianduba*, the homology of genitalic structures is frequently unclear. Throughout this paper, we have applied the same names to structures that seem to be homologous across species, such as the tegular projections, the lobes of the RTA and the sectors of the median apophysis. However, their homology should be reassessed when a greater diversity of corinnids and potential relatives are known.

***Ianduba* species groups.** Bonaldo (1997) noted that *I. varia* has a palpal morphology differing in many aspects from that of the type species of the genus, *I. vatapa* Bonaldo, 1997. We here describe the first species of *Ianduba* that seem to be closely related to *I. varia* on the basis of genitalic morphology, particularly the retrolaterally curved embolus and the conductor positioned ventrally to the median apophysis. We erect two morphological

Table 1. List of synapomorphies for Corinnidae and internal groups, and the *Pronophaea* group. Clade numbers refer to Fig. 2, character numbers are the same as in Ramírez (2014).

Pronophaea group, clade 219
- tarsal cuticle texture (100): fingerprint → smooth
- trochanter distal ventral margin notch (105): deep at least legs I-II → shallow or absent
- scales (= feathery scales and all bent setae) (157): present → absent

Corinnidae, clade 223
- tarsal cuticle texture (100): fingerprint → smooth
- trichobothria distal plate transversal ridge (182): distal plate embedded below transversal ridge → distal ridge continuous in a closed alveolus
- dorsal scutum on male abdomen (205): absent → present
- embolus attachment (351): flexibly attached → fixed
- MA (356): present → absent
- epigynum lobes (365): LL+MF delimited by furrows or sutures → undivided plate suture not visible

Castianeirinae, clade 228
- cymbial tip ventral groove (323): absent → present
- cymbium dorsal chemosensory patch (324): present → absent
- conductor (359): present → absent
- SP2 lumen (372): SP2 blind sac with defined lumen → SP2 a pore field without its own lumen

Clade 222
- male epigastric sclerite (207): absent → present

***Ianduba + Allomedmassa*, clade 226**
- dorsal scutum on female abdomen (201): absent → present
- female inframammillary sclerite (210): absent → present
- male inframammillary sclerite (211): absent → present
- cymbial tip apical thick setae (327): absent → present

Corinninae, clade 221
- MaAm number in male (258): one plus nubbin (generally with Ta visible) → two (generally with Ta visible)
- male PMS MiAm number (274): one plus nubbin (generally with Tp visible) → two (generally with Tp visible)
- sperm duct distal thickness (346): gradually tapering, or thinned before embolus → thick sclerotized apical bulb
- sperm duct spiral meander in ventral tegulum (348): absent → present
- cuticular glands on epigyne (376): absent → present

groups to respectively accommodate species related to *I. vatapa* and to *I. varia*. Although both are potentially monophyletic, this should be tested in a future phylogenetic analysis of the genus. Interestingly enough, the two groups we propose have distributions that are largely coincident with endemism areas of the Atlantic forest: the *vatapa* group is associated with the Bahia center, and the *varia* group is associated with the South/Serra do Mar center (Fig. 21; see Carnaval & Moritz 2008; Silva et al. 2012; Oliveira et al. 2015).

Biogeography. Among *Ianduba* species, the only one that is widely distributed is *I. varia*, ranging from Minas Gerais, Brazil to Corrientes, Argentina (Fig. 21). All other species are very rare, being known from five localities at most, and often from a single one. In addition to that, all species of the *varia* group have been recorded from montane Atlantic rainforest regions. Although *I. varia* has been recorded from sea-level altitudes, and *I. dabadu* **sp.n.** has been recorded at 200 m, both can reach altitudes up to 1150 m, and the other five species range from 800 m to 1200 m above sea level (Fig. 3). As pointed out above, the montaintops of eastern Brazil are rich in endemic taxa (Pinto-da-Rocha & Silva 2005; Safford 2007; Vasconcelos 2008); in the case of arachnids, some species are narrow endemics of single mountain ranges (Levi 1988; Polotow & Brescovit 2006; Pinto-da-Rocha et al. 2014). Our results from distribution modeling suggest that *Ianduba* of the *varia* group are associated with these montane regions (Fig. 4). However, it also reveals that much of this potentially suitable habitat, as of yet, has no records of *Ianduba* spiders – mainly the Mantiqueira, Espinhaço, Canastra, Brigadeiro, Caparaó and Serra dos Órgãos ranges (Fig. 4). Most of these have not been adequately sampled for spiders yet. It may be that further collecting in these areas may yield new records of the known species – and considering that most *Ianduba* have narrow ranges, it would not be surprising to find new, endemic species from these unexplored mountaintops.

Conservation. Huber (2015) described several pholcid spiders known from single localities in the Atlantic forest, and suggested that this area harbours a higher proportion of narrowly distributed species than other regions in the Neotropics (e.g. the Amazon). *Ianduba* apparently has a similar pattern, with most species occurring in one or a few localities in the Atlantic forest. The fact that *Ianduba* species are so rare and narrowly distributed raises concerns about the conservation status of these spiders. They

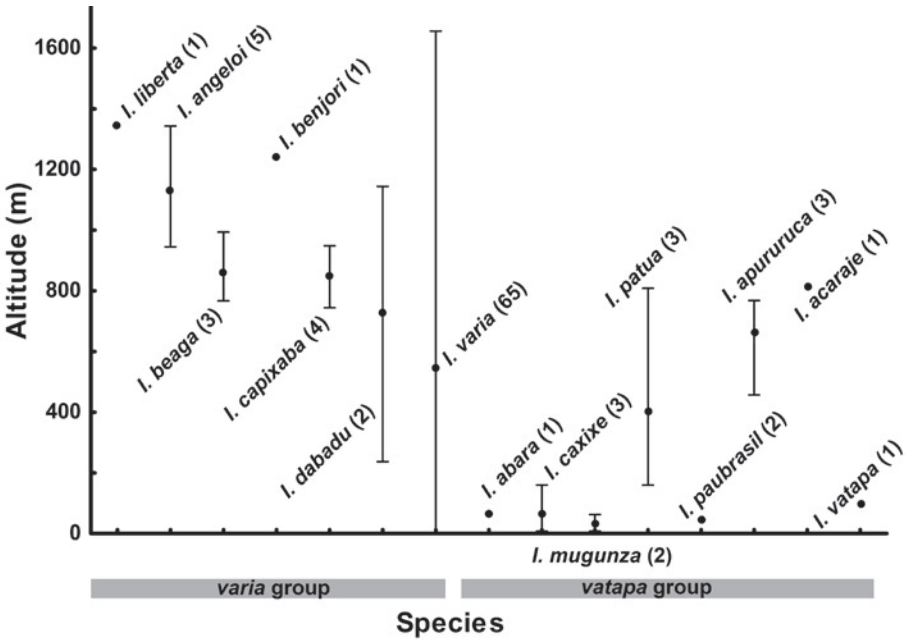

Fig. 3. Known altitudinal range of *Ianduba* species (mean, maximum and minimum). Numbers between parentheses indicate the number of unique records for each species.

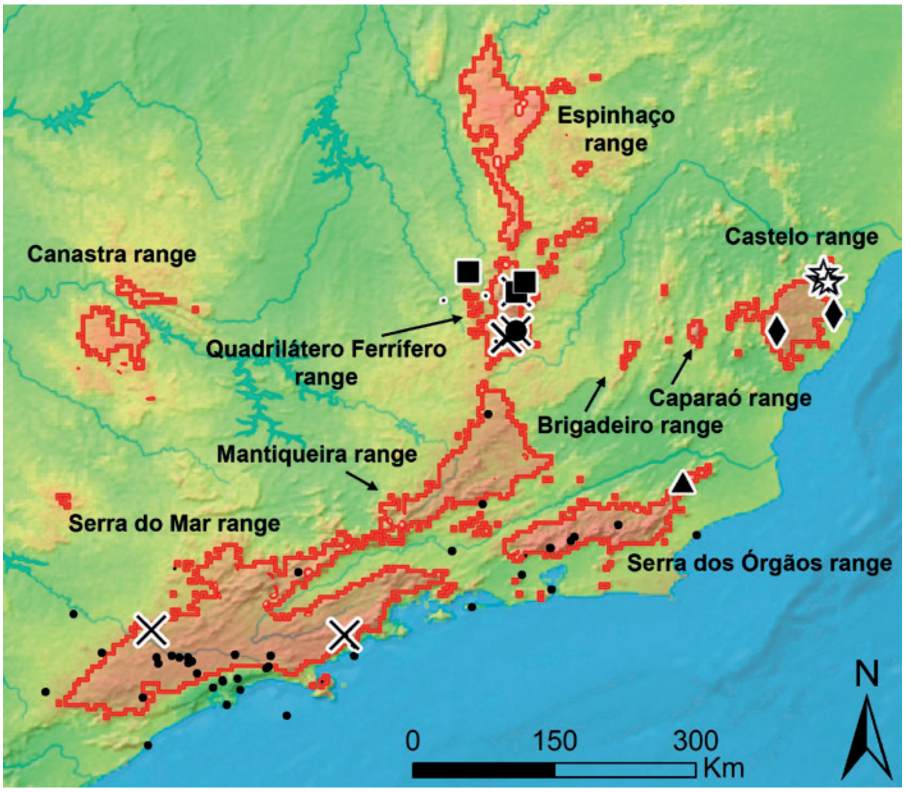

Fig. 4. Distribution model for *Ianduba* group *varia* (except *I. varia*). Highlighted areas have suitability greater than 0.7. Small dots represent records for *I. varia*, other symbols indicate records for other species: squares = *I. beaga*, circle = *I. liberta*, crosses = *I. angeloi*, triangle = *I. benjori*, losangles = *I. dabadu*, stars = *I. capixaba.*

are strictly associated with the Atlantic forest, a highly deteriorated and fragmented region with only 8–14% of the original cover still standing (Ribeiro et al. 2009). This has been noticed before, as four of the seven previously known species had been included in the Brazilian official list of endangered species due to habitat loss (Machado et al. 2008; but see Ministério do Meio Ambiente 2014). In the case of the newly described montane species, there are two additional threats. First, montane taxa are especially prone to extinction due to global warming (Sorte

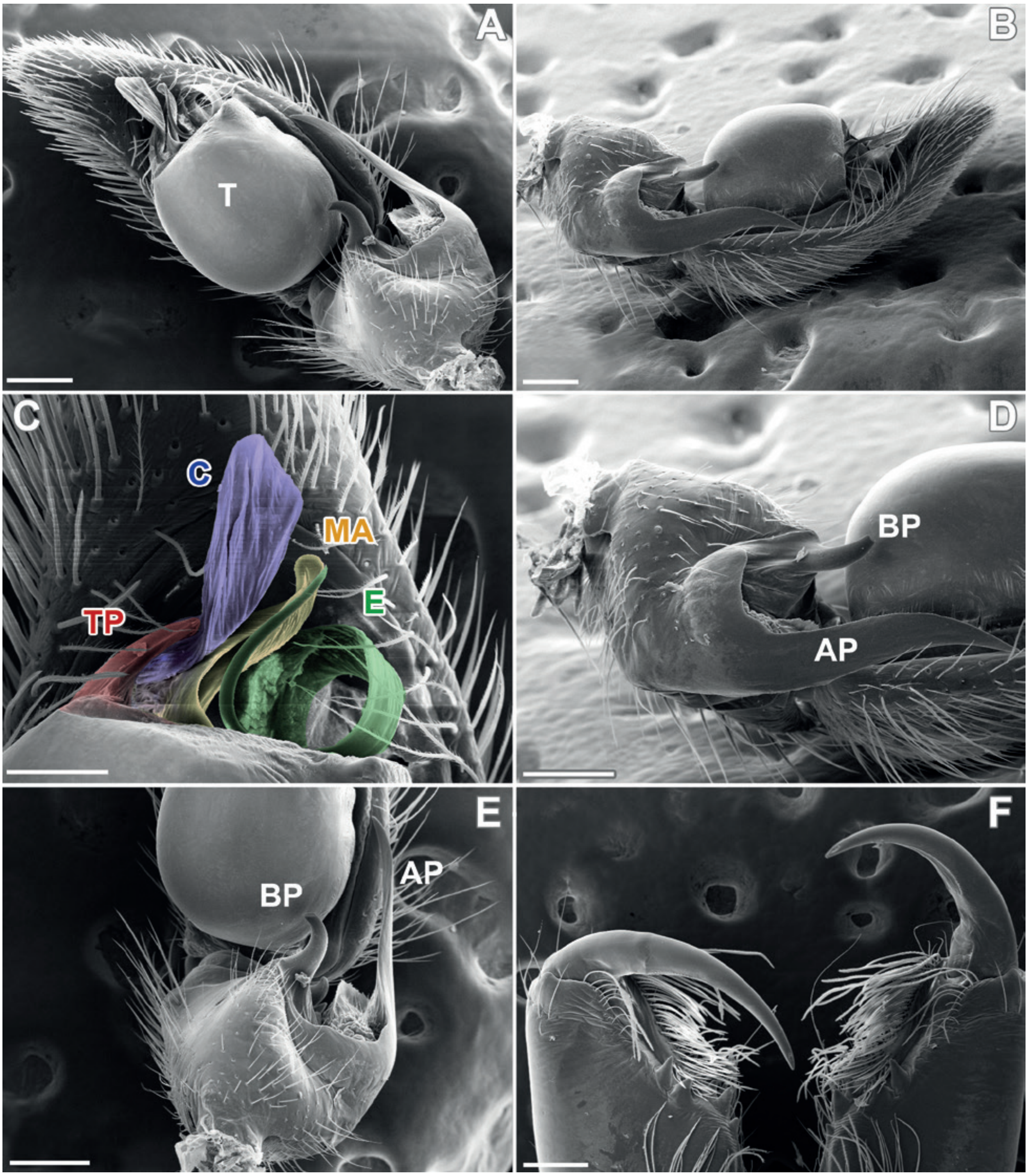

Fig. 5. Scanning electron microscopy, *Ianduba angeloi* **sp.n.**, male (UFMG). **A**: Left palpal tibia and bulb, ventral view. **B**: Same, retrolateral view. **C**: Apical area of bulb, ventral view. **D**: Palpal tibia, retrolateral view. **E**: Same, ventral view. **F**: Apex of chelicerae, retromarginal view (note absence of cheliceral apophysis). See chapter 3 for abbreviations. Scale bars = 0.2 mm, except C = 0.1 mm.

& Jetz 2010). Second, some of the mountain ranges in southeastern Brazil are under severe pressure due to ore exploration, particularly the Quadrilátero Ferrífero range (Jacobi et al. 2007) – a region where four species of *Ianduba* have been recorded, two of which are endemic. This calls for special conservation attention not only for these species, but for southeastern Brazil mountain ranges as a whole. The discovery of eight new species of *Ianduba* highlights the vast amount of undescribed taxa that are present, even in well-known regions such as the southeastern Atlantic rainforest. We hope that further studies on this fascinating genus will reveal interesting evolutionary and biogeographical patterns.

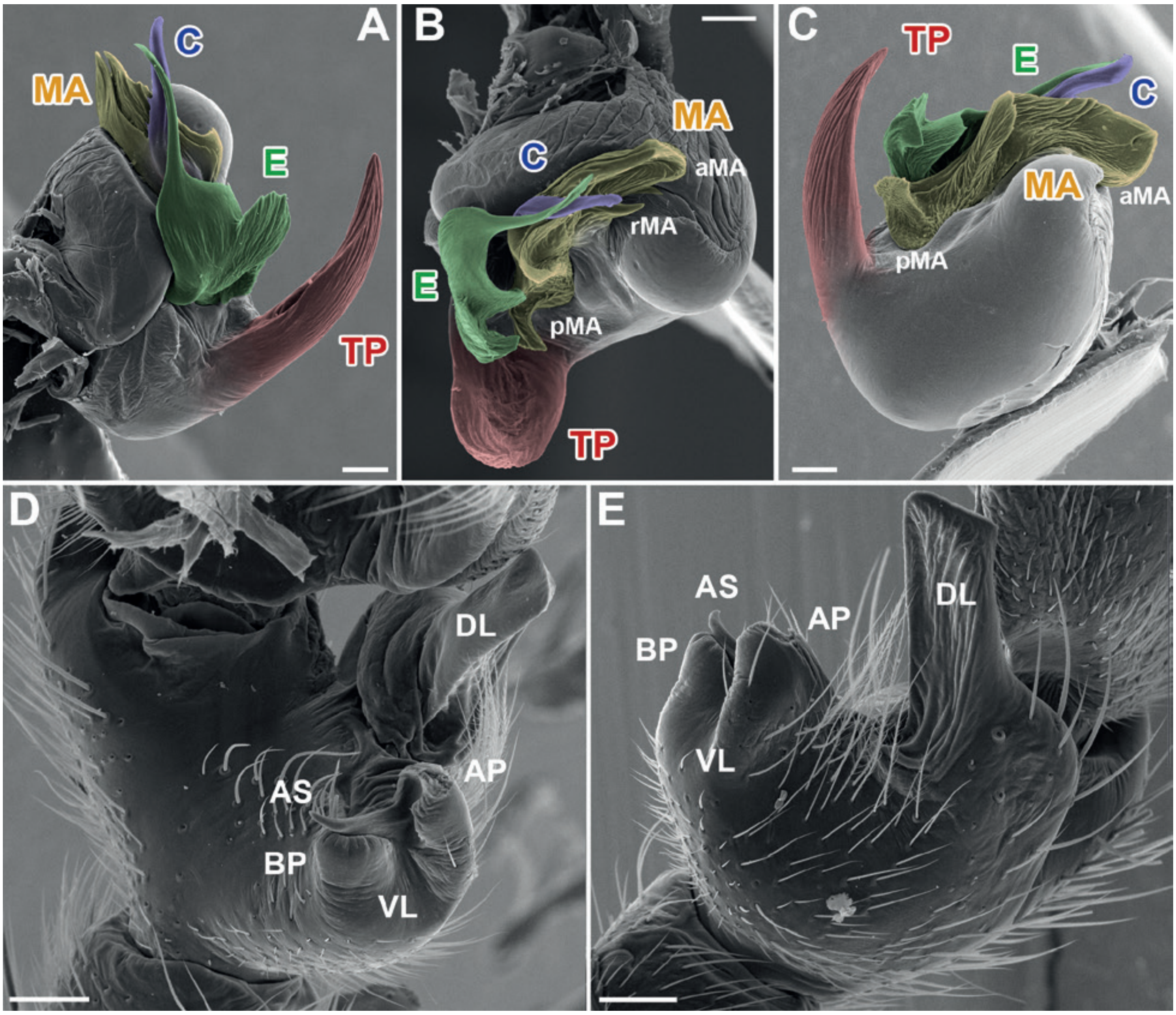

Fig. 6. Scanning electron microscopy, *Ianduba caxixe* Bonaldo, 1997 (IBSP 63907), male. **A**: Left bulb, prolateral view. **B**: Same, apical view. **C**: Same, retrolateral view. **D**: Left palpal tibia, subapical view. **E**: Same, retrolateral view. See chapter 3 for abbreviations. Scale bars = 0.1 mm.

5. Taxonomy

5.1. *Ianduba* Bonaldo, 1997

Ianduba Bonaldo, 1997: 168. Type species by original designation *I. vatapa* Bonaldo, 1997.

Emended diagnosis. All *Ianduba* species have the distal end of tibia I white to whitish yellow in color, contrasting with the rest of the leg, in both sexes (Fig. 1). In males, the metatarsus might be lightly colored as well. Males are further distinguished from other Neotropical corinnids by the combined presence of an uncoiled tegular duct and median apophysis in the palp (Figs. 5–7, 13, 14; MA); the petiole is large and its edge is always visible in retrolateral view (Figs. 13, 14; P); the retrolateral tibial apophysis is always bifurcate, and the ventral lobe might or might not have a prolaterally directed apical spur. Females are distinguished by the dorsal piece in the vulva, which is covered by a membrane that is posteriorly connected to the fertilization ducts (Figs. 8, 13, 14; DP).

Description. See Bonaldo (1997).

5.2. Identification key

1 Males **2**
1’ Females **16**

Males

2 Embolus prolaterally inserted (Fig. 6A) .... **3 (*vatapa* group)**
2’ Embolus retrolaterally inserted (Fig. 7C) .... **10 (*varia* group)**
3 Conductor large; tegular projection absent (Fig. 11A) .... ***Ianduba acaraje* sp.n.**
3’ Conductor small; tegular projection present (Fig. 13A) **4**

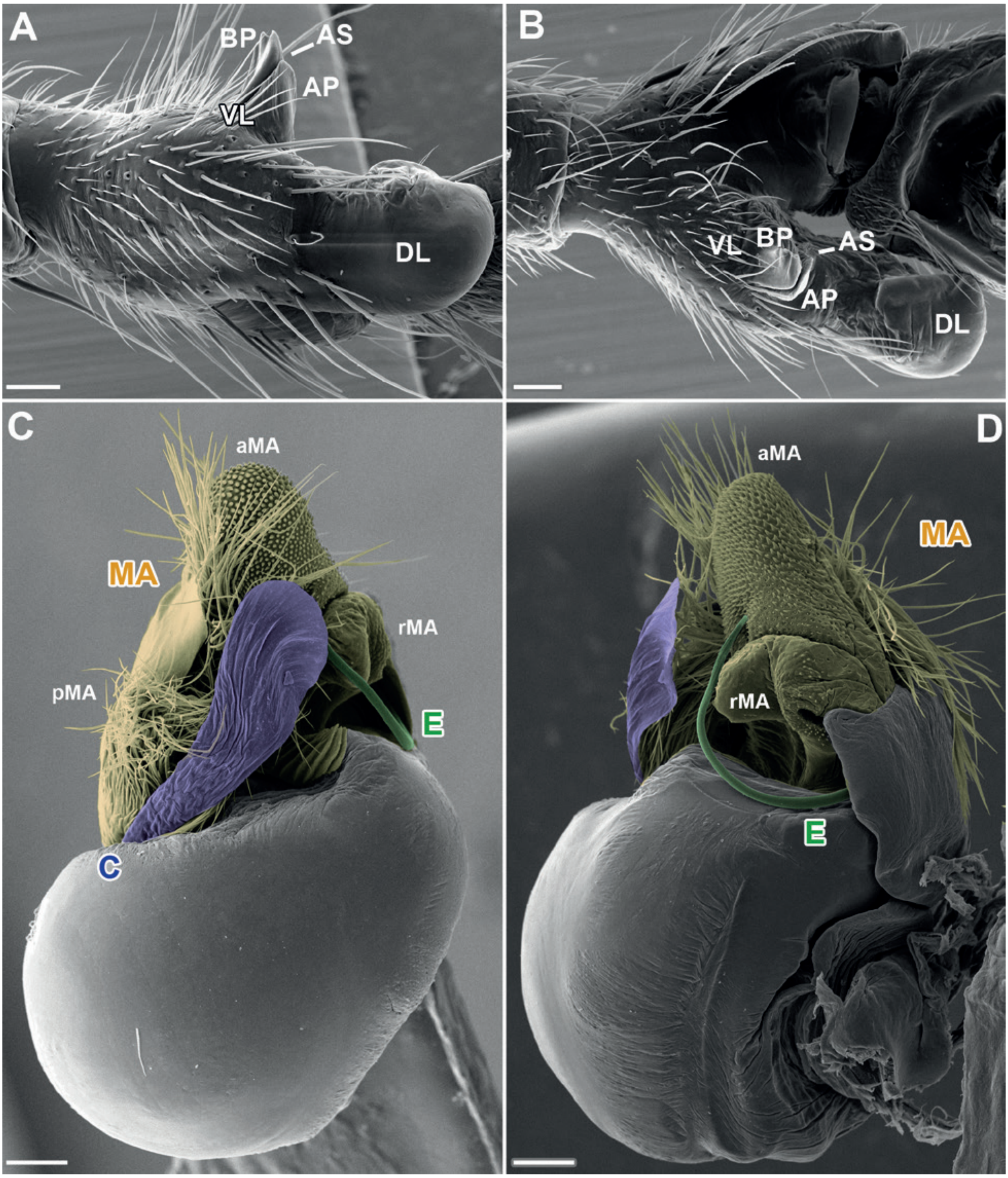

Fig. 7. Scanning electron microscopy, *Ianduba varia* (Keyserling, 1891) (UFMG 6055), male. **A**: Left palpal tibia, retrolateral view. **B**: Same, ventral view. **C**: Left bulb, ventral view. **D**: Same, retrolateral view. See chapter 3 for abbreviations. Scale bars = 0.1 mm.

4 Tegular projection short, lamellar and undulated (Bonaldo 1997: fig. 15) .... ***Ianduba vatapa***
4' Tegular projection long and curved (Fig. 13A) **5**
5 Tegular projection inserted prolaterally (Bonaldo 1997: fig. 23) **6**
5' Tegular projection inserted medially or retrolaterally (Fig. 13A; Bonaldo et al. 2007: fig. 27) **7**
6 Tegular projection inserted apically (Bonaldo 1997: fig. 23) .... ***Ianduba caxixe***
6' Tegular projection inserted basally (Bonaldo et al. 2007: fig. 1) .... ***Ianduba mugunza***
7 Tegular projection tubular (Bonaldo et al. 2007: fig. 26) .... ***Ianduba abara***
7' Tegular projection concave, with anterior surface excavated (Fig. 13B; Bonaldo 1997: fig. 26) **8**
8 Tegular projection with an additional, longitudinal prolateral excavation (Bonaldo 1997: fig. 26) .... ***Ianduba paubrasil***

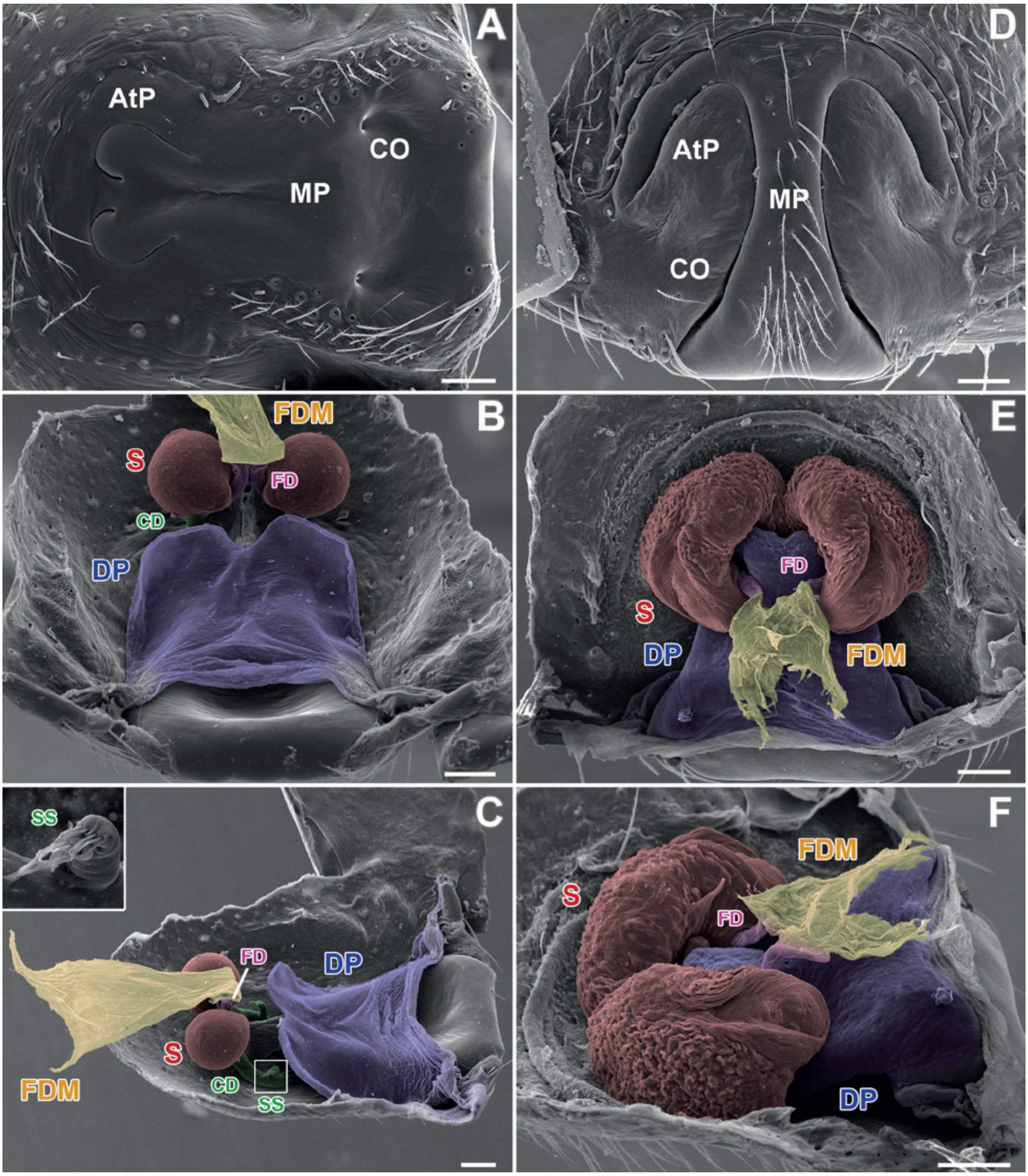

Fig. 8. Scanning electron microscopy, female genitalia, pancreatin digested. **A–C**: *Ianduba varia* (Keyserling, 1891) (UFMG 6055). **A**: Ventral view. **B**: Dorsal view. **C**: Dorsolateral view. **D–F**: *Ianduba caxixe* Bonaldo, 1997 (IBSP 63907). **D**: Ventral view. **E**: Dorsal view. **F**: Dorsolateral view. See chapter 3 for abbreviations. Scale bars = 0.1 mm.

8' Tegular projection without additional excavation **9**

9 Dorsal lobe of RTA tubular, pMA basal projection short (Fig. 13A) .... ***Ianduba apururuca* sp.n.**

9' Dorsal lobe of RTA with a basal constriction; pMA basal projection large (Bonaldo 1997: fig. 21) .... ***Ianduba patua***

10 Short prolateral tegular projection present; ventral lobe of RTA displaced dorsally (Fig. 15A–C) ... **11**

10' Short prolateral tegular projection absent; ventral lobe of RTA not displaced dorsally (Fig. 19A–B) **14**

11 Basal process of ventral lobe of the RTA with a blunt apex (Fig. 14A) .... ***Ianduba capixaba* sp.n.**

11' Basal process of ventral lobe of the RTA hook-shaped (Fig. 15A) **12**

12 Dorsal lobe of the RTA with a long median process, with a small spine at its blunt apex (Fig. 15B) .... ***Ianduba dabadu* sp.n.**

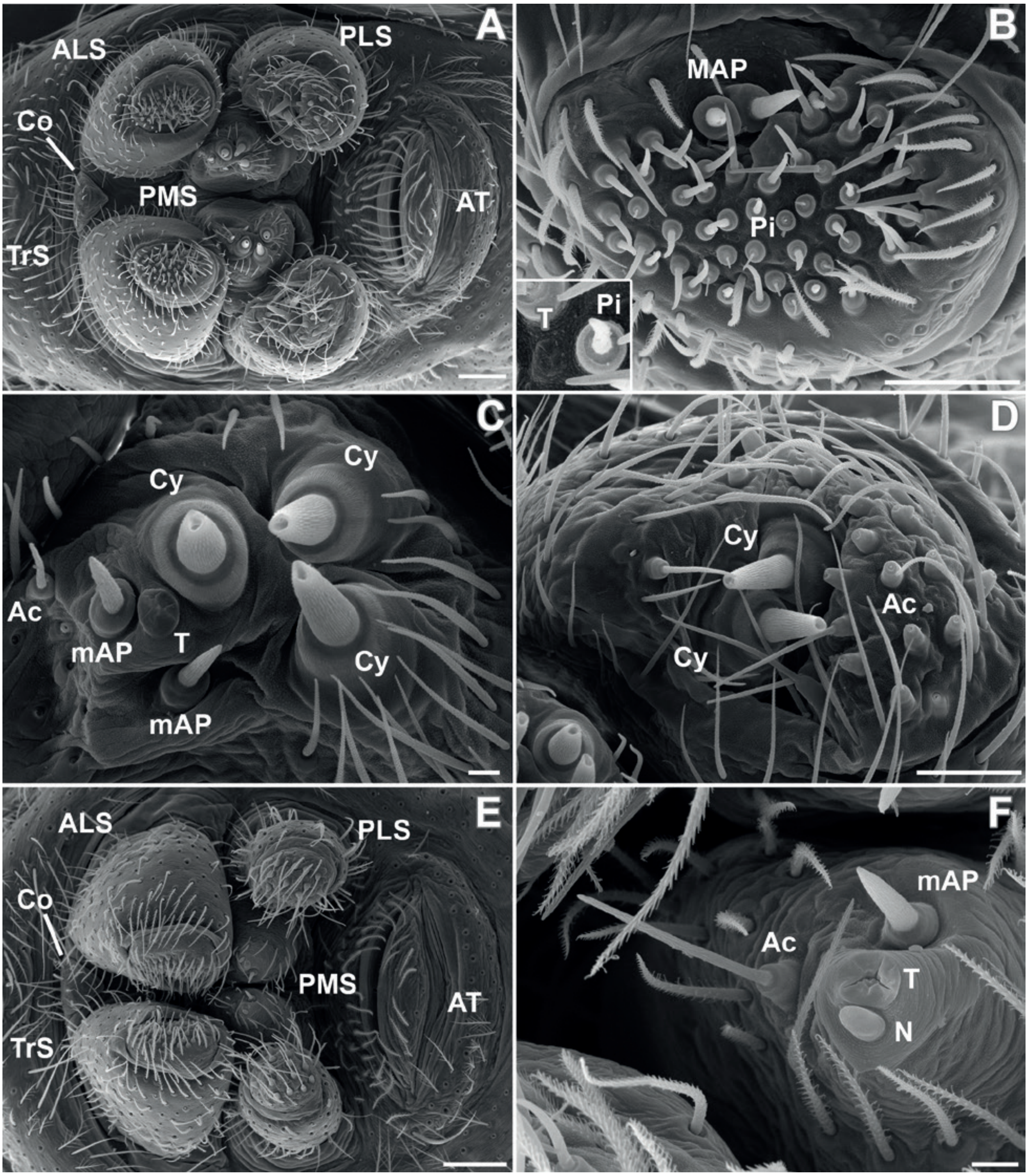

Fig. 9. Scanning electron microscopy, *Ianduba varia* (Keyserling, 1891) (UFMG 6055), spinnerets. **A–D**: Female. **A**: Spinnerets, ventral. **B**: Right ALS, ventral. **C**: Left PMS, ventral. **D**: Left PLS, ventral. **E**,**F**: Male. **E**: Spinnerets, ventral. **F**: Right PMS, ventral. See chapter 3 for abbreviations. Scale bars: A,E = 0.1 mm; B, D = 0.05 mm, C, F = 0.01 mm.

12' Median process of RTA's dorsal lobe represented by an unsclerotized median area, without spine (Fig. 17A) **13**

13 Tegular projection unsclerotized and pointing ventrally (Fig. 16A) .... ***Ianduba liberta* sp.n.**

13' Tegular projection sclerotized and pointing to the embolus (Fig. 17A) .... ***Ianduba angeloi* sp.n.**

14 Median apophysis without long hair-like projections; ventral lobe of the RTA hirsute (Fig. 18A) .... ***Ianduba benjori* sp.n.**

14' Median apophysis with hair-like projections; ventral lobe of the RTA not particularly hisute (Figs. 7C, 19A) **15**

15 Dorsal lobe of the RTA small and digitiform (Fig. 19B) .... ***Ianduba beaga* sp.n.**

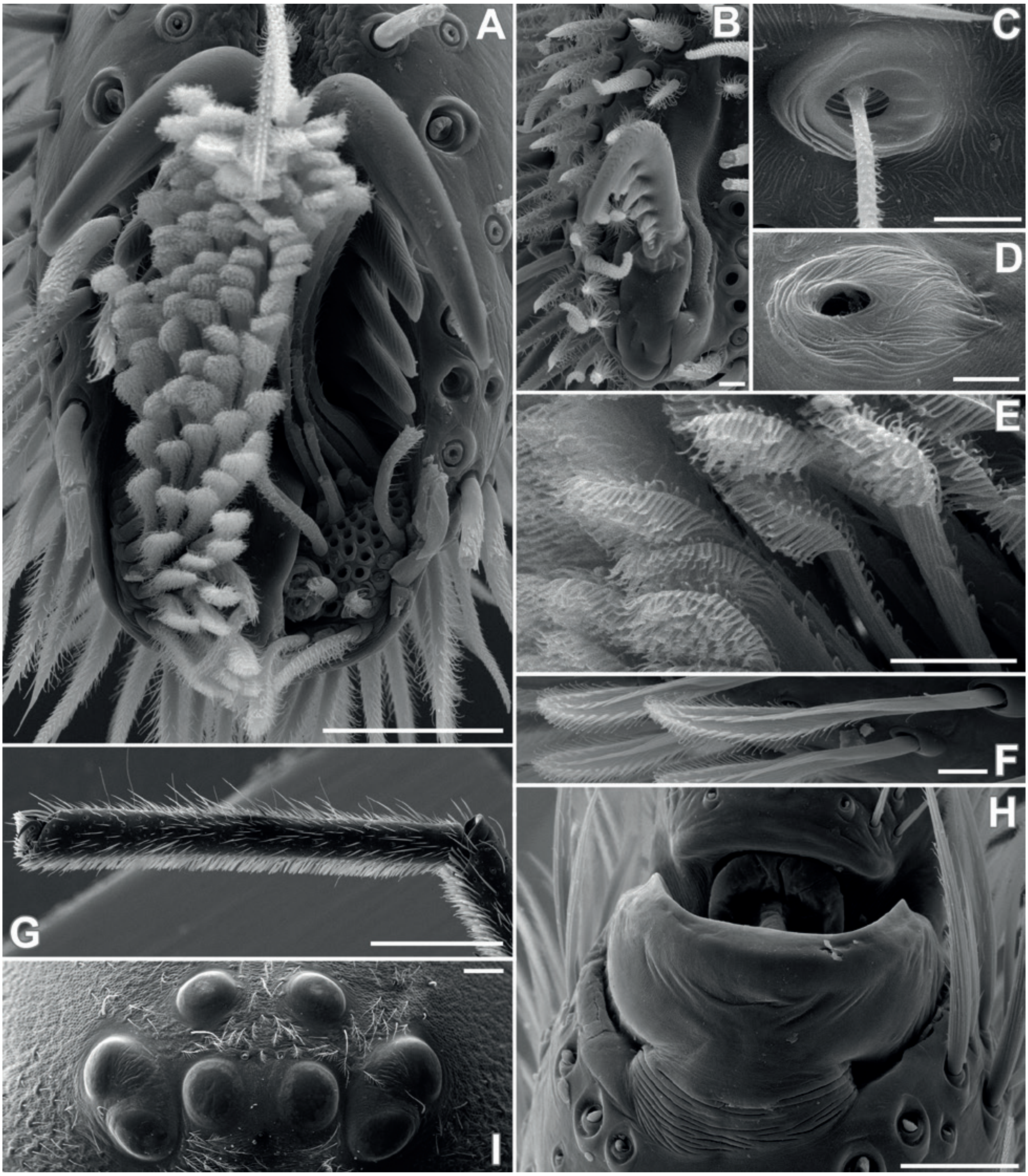

Fig. 10. Scanning electron microscopy, somatic morphology. **A–H**: *Ianduba varia* (Keyserling, 1891) (UFMG 6055), female. **A**: Left tarsus I, apical view. **B**: Left palp, claw, subapical view. **C**: Left tarsus I, trichobothrial socket. **D**: Left leg I, tarsal organ. **E**: Left tarsus I, claw tuft setae. **F**: Left metatarsus I, scopula setae. **G**: Left metatarsus I, retrolateral view. **H**: Left metatarsus I, metatarsus stopper, dorsal view. **I**: *Ianduba angeloi* **sp.n.** (UFMG), male, eye region, anterior. Scale bars: A, H = 0.05 mm; B–D, E–F = 0.01 mm; G = 0.5 mm; I = 0.1 mm.

15' Dorsal lobe of the RTA large and club-shaped (Fig. 7A) .... ***Ianduba varia***

Females (those of *I. patua* are unknown)

16 Secondary spermathecae (visible ventrally) large, globose (Fig. 11D) .... ***Ianduba acaraje* sp.n.**

16' Secondary spermathecae absent or inconspicuous, not visible ventrally (Figs. 13D, 19D) **17**

17 Copulatory ducts extend anteriorly to the spermathecae; epigynal median plate distinctly raised from epigynal area (Fig. 13C–D) .... **18 (remaining members of *vatapa* group)**

17' Copulatory ducts not extending anteriorly to the spermathecae; epigynal median plate at the same plane of epigynal area (Fig. 19C–D) .... **23 (*varia* group)**

18 Atrial pockets extended medially (Fig. 13C) **19**
18’ Atrial pockets restricted to anterior half of epigynum (Fig. 12A) **21**
19 Epigynal median plate notably expanded posteriorly (Bonaldo et al. 2007: fig. 28) .... ***Ianduba abara***
19’ Epigynal median plate not strongly expanded posteriorly (Fig. 13C) **20**
20 Anterior margins of epigynal median plate strongly incised (Fig. 13C) .... ***Ianduba apururuca* sp.n.**
20’ Anterior margins of epigynal median plate not strongly incised (Bonaldo 1997: fig. 27) .... ***Ianduba paubrasil***
21 Epigynal plate wide, almost wider than long (Bonaldo 1997: fig. 17) .... ***Ianduba vatapa***
21’ Epigynal plate narrow **22**
22 Anterior margins of epigynal plate arched (Bonaldo et al. 2007: fig. 3) .... ***Ianduba mugunza***
22’ Anterior margins of epigynal plate nearly straight (Fig. 12A) .... ***Ianduba caxixe***
23 Epyginal plate longer than wide; atrial pockets convergent (Fig. 8A) .... ***Ianduba varia***
23’ Epigynal plate and atrial pockets otherwise **24**
24 Epigynal plate strongly notched posteriorly; atrial pockets wide, posteriorly placed (Fig. 14C) .... ***Ianduba capixaba* sp.n.**
24’ Epigynal plate otherwise; atrial pockets, if wide, anteriorly placed **25**
25 Atrial pockets wide, anteriorly placed (Figs. 18C, 19C) **26**
25’ Atrial pockets inconspicuous, posteriorly placed (Figs. 16C, 17C) **27**
26 Atrial pockets openings anteriorly directed (Fig. 19C) .... ***Ianduba beaga* sp.n.**
26’ Atrial pockets openings laterally directed (Fig. 18C) .... ***Ianduba benjori* sp.n.**
27 Epigynal plate with M-shaped reinforced posterior margin; DPP absent (Fig. 15D) .... ***Ianduba dabadu* sp.n.**
27’ Epigynal plate without reinforced posterior margin; DPP present (Figs. 16D, 17D) **28**
28 Dorsal plate oval; spermathecae not covered by DP (Fig. 17D) .... ***Ianduba angeloi* sp.n.**
28’ Dorsal plate shield-shaped; spermathecae partially covered by DP (Fig. 16D) ..... ***Ianduba liberta* sp.n.**

5.3. The *vatapa* group

Diagnosis. Males of this group can be recognized by the prolaterally inserted, straight to slightly sinuous embolus; by the large, often sculptured, embolic base* (Figs. 6, 13; EB); by the reduced conductor* (large in *I. acaraje* **sp.n.**); and by the complex and folded RTA, with an apical spur in the ventral lobe that seems to be detached from the rest of the apophysis* (Figs. 6, 13; VL, AS). Females can be recognized by the large and raised median plate of the epigynum (Figs. 8D, 13; MP) and by the long copulatory ducts extending anteriorly to the spermathecae*; these are folded* in all species but *I. acaraje* **sp.n.** (Fig. 13; CD). (Potential synapomorphies of the group marked with an asterisk *.)

Notes. *Ianduba acaraje* **sp.n.** has a rather deviant palpal morphology, lacking many of the putative apomorphic features found in either the *vatapa* and *varia* groups. We have decided to allocate it in the *vatapa* group because it shares some morphological characters, notably the folded RTA with an apical spur in the ventral lobe and large copulatory ducts that extend anteriorly beyond the spermathecae. Also, its area of distribution is closer to that of members of the *vatapa* group. However, its taxonomic position would be better tested by means of a phylogenetic analysis of the genus.

Distribution. Southern Bahia endemism center of the Brazilian Atlantic rainforest (Fig. 21).

Included species. *I. abara* Bonaldo & Brescovit, 2007, *I. acaraje* **sp.n.**, *I. apururuca* **sp.n.**, *I. caxixe* Bonaldo, 1997, *I. mugunza* Bonaldo & Brescovit, 1997, *I. patua* Bonaldo, 1997, *I. paubrasil* Bonaldo, 1997, *I. vatapa* Bonaldo, 1997.

5.3.1. *Ianduba acaraje* sp.n.

Fig. 11

Type material. Male holotype from Serra da Jibóia, Santa Teresinha, Bahia, Brazil (–39.50145, –12.82132, 803 m), G.C. Ferreira col., 24–27/IV/2009 (IBSP 146285). Paratypes: two females with the same collecting data (IBSP 146283, IBSP 146287); one male from the same locality, 8/XI/2010, L.S. Carvalho col. (CNHUFPI 160).

Derivatio nominis. The Brazilian Portuguese word “acarajé” refers to a typical dish from the cuisine of State of Bahia, consisting of fried *fradinho*-bean pasta filled with dried shrimp, *vatapá*, *caruru* and chilli. The name should be treated as a noun in apposition.

Differential diagnosis. This is the most distinct species of *Ianduba*. Males have a short, prolaterally inserted embolus with an enlarged base, but no processes; a single-pieced median apophysis folded upon itself; a large, hyaline conductor; and no tegular projections (Fig. 11A,B). Females have two round, black atrial pockets at the epigynum, and the secondary spermathecae are large and extend anteriorly to the primary spermathecae (Fig. 11C,D).

Description. Male holotype: Carapace dark brown. Chelicerae, endites, labium and sternum brown. Leg I dark brown, except for white tibia and tarsus. Legs II–III yellow, except for brown femora and patellae. Leg IV brown, except for yellow metatarsus. Abdomen browish gray, with dark brown scutum. Total length 6.48. Carapace 3.08 long, 2.12 wide, 0.81 high. Clypeus 0.31 high. Anterior eye row 0.69 wide, posterior eye row 0.81 wide. Eye diameters and interdistances: AME 0.13, ALE 0.13, PME

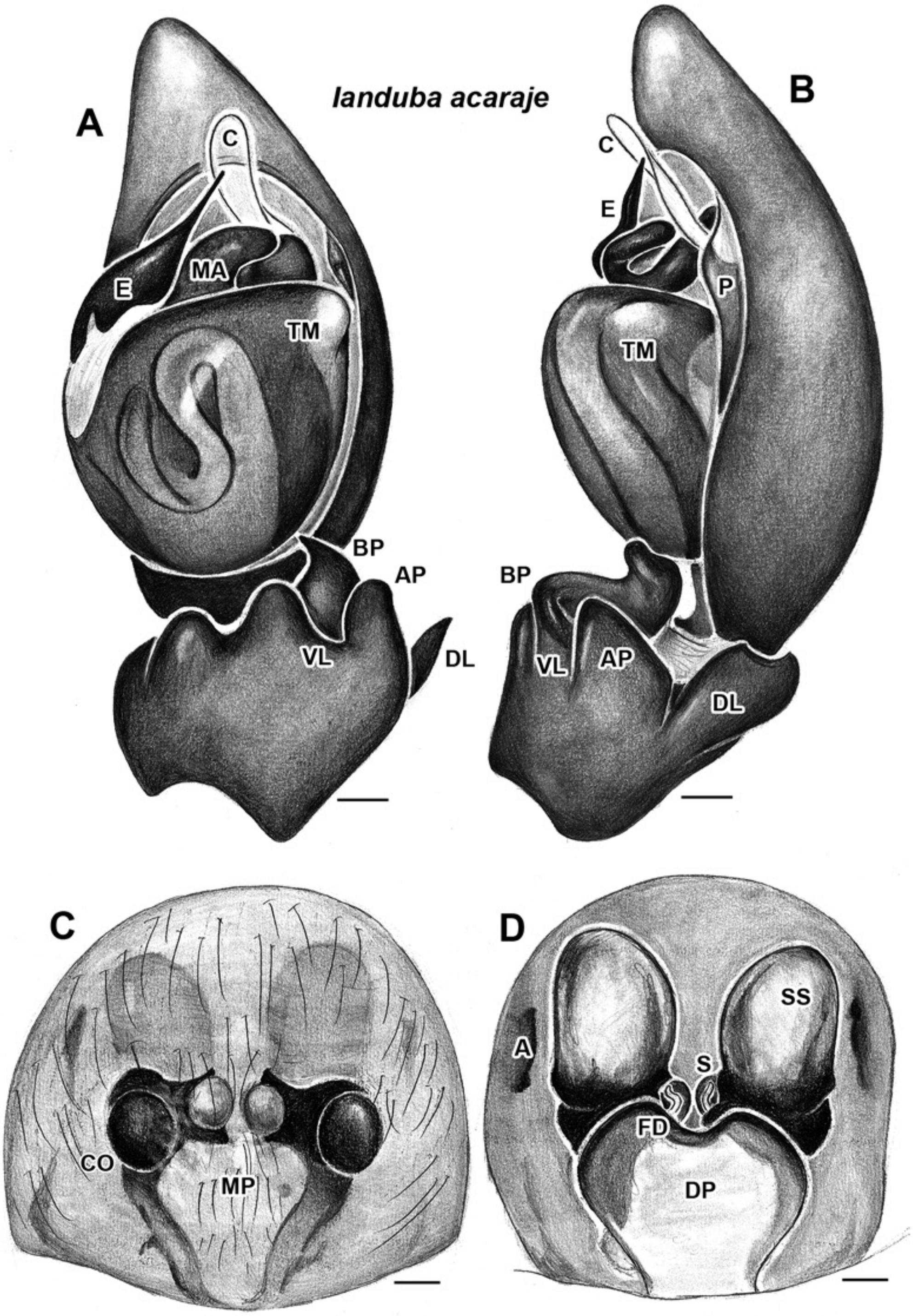

Fig. 11. *Ianduba acaraje* **sp.n.** **A**,**B**: Male holotype (IBSP 146285). **A**: Palp, ventral view. **B**: Palp, retrolateral view. **C**,**D**: Female paratype (IBSP 146283). **C**: Epigynum, ventral view. **D**: Epigynum, dorsal view, cleared. See chapter 3 for abbreviations. Scale bars = 0.1 mm.

0.13, PLE 0.10, AME–AME 0.13, AME–ALE 0.10, PME–PME 0.15, PME–PLE 0.18, ALE–PLE 0.05. Median ocular quadrangle length 0.36, anterior width 0.33, posterior width 0.36. Chelicerae long, with three promarginal teeth, two retromarginal teeth and setal tufts on promargins; no ventral tooth-like apophysis. Sternum 1.58 long, 1.14 wide. Abdomen 2.36 long, 1.42 wide. Leg measurements: I– femur 2.31, patella 0.99, tibia 2.17, metatarsus 1.96, tarsus 1.30. II– 2.01, 0.84, 1.78, 1.68, 1.17. III– 1.81, 0.84, 1.50, 1.83, 1.04. IV(right leg)– 2.49, 1.02, 2.36, 2.75, 1.32. Leg spination: I– tibia v2-2-2, metatarsus v2-2. II– tibia v2-2-2, metatarsus v2-2. III– tibia d2-2, v1-2-2, metatarsus d2-2-2, v2-2-3. IV(right leg)– tibia d2-2, v2-2-2, metatarsus d2-2-2, v2-2-2. *Palp* (Fig. 11A,B). *Retrolateral tibial apophysis* with two-branched, folded ventral lobe, with apical spur with rounded apex; dorsal lobe spatulate. *Tegulum* without any apophyses, with incision near insertion of embolus and small, whitish bump on retrolateral edge. *Median apophysis* made of single piece with rounded, blunt margin that folds onto itself. *Conductor* large, rounded, hyaline, arising dorsally to median apophysis and positioned in apposition to embolus. *Embolus* short, prolaterally inserted, with enlarged base and acute apex, without any processes.

Female paratype (IBSP 146283): Carapace and chelicerae dark brown. Endites, labium and sternum brown. Leg I dark brown, except for whitish yellow distal end of tibia and tarsus. Legs II–III light brown, except for dark brown femora and patellae. Leg IV light brown, except for dark brown femur, patella and tibia. Abdomen browish gray. Total length 8.60. Carapace 3.92 long, 2.58 wide, 1.19 high. Clypeus 0.38 high. Anterior eye row 0.81 wide, posterior eye row 0.99 wide. Eye diameters and interdistances: AME 0.15, ALE 0.15, PME 0.13, PLE 0.13, AME–AME 0.08, AME–ALE 0.1, PME–PME 0.15, PME–PLE 0.23, ALE–PLE 0.08. Median ocular quadrangle length 0.46, anterior width 0.41, posterior width 0.41. Chelicerae 1.53 long, with three promarginal teeth, two retromarginal teeth and setal tufts on promargins; no ventral tooth-like apophysis. Sternum 1.96 long, 1.47 wide. Abdomen 4.50 long, 2.35 wide. Leg measurements: I– femur 2.64, patella 1.37, tibia 2.54, metatarsus 2.19, tarsus 1.45. II– 2.21, 1.04, 2.14, 2.08, 1.37. III– 1.83, 1.12, 1.83, 2.19, 1.17. IV– 3.02, 1.27, 2.87, 3.39, 1.5. Leg spination: I– tibia v2-2-2, metatarsus v2-2. II– tibia v2-2-2, metatarsus v2-2. III– tibia d2-2, v2-2-2, metatarsus d2-2-2, v2-2-3. IV– tibia d2-2, v2-2-2, metatarsus d2-2-2, v2-2-3. *Genitalia* (Fig. 11C,D). *Epigynum* with wide, subquadrate median plate between two black, rounded excavated areas that continue to two posterior incisions. *Vulva* with short dorsal piece which is widest anteriorly and notched anteriorly; secondary spermathecae huge, extending anteriorly and covering primary spermathecae dorsally; primary spermathecae small, oval, with fertilization ducts directed anteriorly.

Variation. Two males: total length 6.48–7.15; carapace length 3.08–3.47; femur I 2.31–2.47. Two females: total length 8.6–9.65; carapace length 3.92–3.99; femur I 2.64–2.87.

Natural history. This species has been manually collected from a secondary montane Atlantic rainforest fragment in Bahia, at 800 m above sea level. The lowlands surrounding the Serra da Jibóia range, where the species was found, are dominated by Caatinga (a strongly xeromorphic dry forest) and are heavily degraded (L.S. Carvalho, pers. comm.).

Note. The species is sympatric with *I. patua*, which is known only from the male. Although there is a possibility that the female here described might belong to *I. patua*, we believe that our matching is more likely since both sexes have a genital morphology quite distinct from other species of the *vatapa* group.

Distribution. Known from a single locality in eastern Bahia, Brazil (Fig. 23).

5.3.2. *Ianduba caxixe* Bonaldo, 1997

Figs. 6, 8D–F, 12

Ianduba caxixe Bonaldo, 1997: 175, figs. 12, 23, 24.

Type material. Male holotype from Matiapã Farm, Camacan, Bahia, Brazil, deposited in Museu de Ciências Naturais da Fundação Zoobotânica in Porto Alegre, Brazil (MCN 27666), examined.

Additional material examined. BRAZIL: **Bahia**: Ilhéus, CEPLAC [–39.0333, –14.8167, 8 m], 7/IV/1998, A.D. Brescovit col., 1♂ (IBSP 19364); Una, Estação Ecológica de Una (–39.07444, –15.29667, 31 m), 2003, M.F. Dias col., 1♂ (IBSP 62562), 1♂ 1♀ (IBSP 62563), 1♂ (IBSP 62564), 1♂ (IBSP 62565), 1♂ (IBSP 62566); same locality and collector, X/1999–IX/2000, 1♂ (IBSP 63901), 1♂ (IBSP 63904), 2♀ (IBSP 63906), 2♂ 1♀ (IBSP 63907), 1♂ (IBSP 63915), 1♀ (IBSP 64254), 1♀ (IBSP 64285), 1♀ (IBSP 64373), 1♀ (IBSP 64409), 1♂ (IBSP 64413), 1♀ (IBSP 64430), 1♀ (IBSP 64432), 1♂ (IBSP 64461), 1♂ (IBSP 64462), 1♂ (IBSP 64470), 2♂ (IBSP 64479), 1♂ (IBSP 64518), 1♀ (IBSP 64563), 1♀ (IBSP 65092), 1♀ (IBSP 65146), 1♀ (IBSP 65154), 1♂ 1♀ (IBSP 65180), 1♂ (IBSP 65191), 1♀ (IBSP 65195), 1♂ (IBSP 65204), 1♂ (IBSP 65243), 1♂ (IBSP 65253), 1♂ (IBSP 65332), 1♀ (IBSP 65336), 1♀ (IBSP 65349), 1♀ (IBSP 65355), 1♂ (IBSP 65358), 1♂ (IBSP 65368), 1♂ (IBSP 65371), 1♀ (IBSP 65403), 1♂ (IBSP 65406), 1♂ 1♀ (IBSP 65455), 1♂ (IBSP 65461), 1♂ (IBSP 65470).

Differential diagnosis. Male diagnosed by Bonaldo (1997). Females are most similar to those of *I. mugunza* in having a posteriorly widened median plate of the epigynum. They can be distinguished by the more angulose atrial pockets of the median plate, by the less convoluted copulatory ducts, and by the much narrower dorsal piece of the vulva (Fig. 12A,B).

Description. Male described by Bonaldo (1997).

Female from Una, Bahia (IBSP 63906): Carapace and chelicerae brown. Endites, labium and sternum light brown. Leg I light brown, except for whitish yellow distal end of tibia and yellow tarsus. Legs II–IV light brown, except for yellow metatarsi and tarsi. Abdomen browish gray, with tiny brown dorsal scutum on anterior end. Total length 8.51. Carapace 3.86 long, 2.67 wide, 1.37 high. Clypeus 0.37 high. Anterior eye row 0.83 wide, posterior eye row 0.95 wide. Eye diameters and interdistances: AME 0.17, ALE 0.15, PME 0.13, PLE 0.13, AME–AME 0.08, AME–ALE 0.10, PME–PME 0.17, PME–PLE 0.17, ALE–PLE 0.07. Median ocular quadrangle length 0.38, anterior width 0.42, posterior width 0.42. Chelicerae 1.53 long, with three promarginal teeth, four retromarginal teeth and setal tufts on promargins; no ventral tooth-like apophysis. Sternum 1.83 long, 1.40 wide. Abdomen 4.26 long, 2.10 wide. Leg measurements: I– femur 2.73, patella 1.40, tibia 2.77, metatarsus 2.30, tarsus 1.53. II– 2.50, 1.33, 2.40, 2.17, 1.50. III– 2.33, 1.00, 2.07, 2.27, 1.20. IV– 3.07, 1.40, 2.90, 3.59, 1.63. Leg spination: I– tibia v2-2-2, metatarsus v2-2. II– tibia v2-2-2, metatarsus v2-2. III– tibia d2-2, v1-2-2, metatarsus d2-2-2, v2-2-3. IV– tibia d2-2, v2-2-2, metatarsus d2-2-2, v2-2-3. Posterior tracheae as in Fig. 12C,D. *Genitalia* (Fig. 12A,B). *Epigynum* with posteriorly widened median plate flanked by two narrow atrial pockets. *Vulva* with trapezoidal dorsal piece much longer than wide; sclerotized copula-

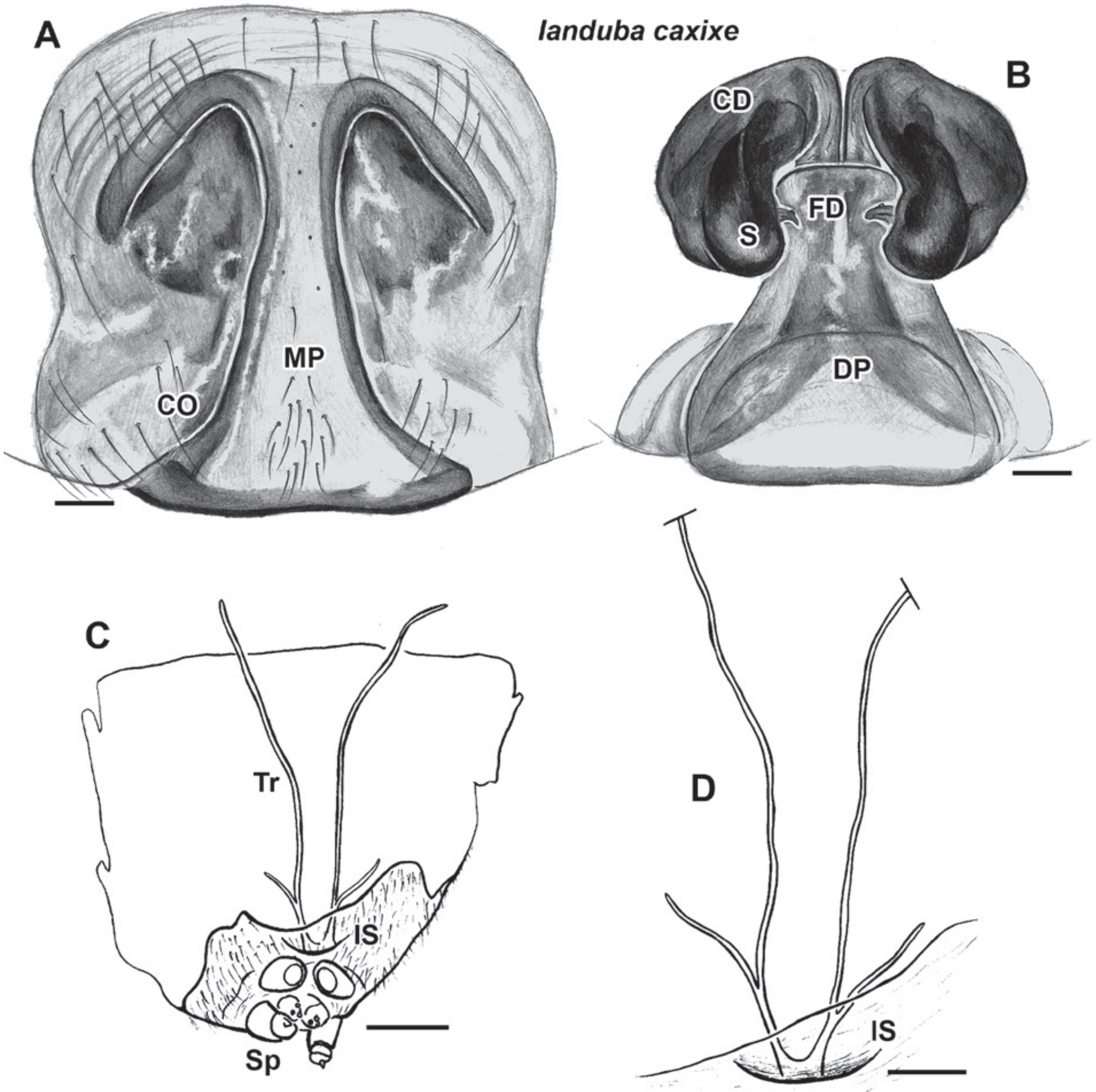

Fig. 12. *Ianduba caxixe* Bonaldo, 1997. **A**,**B**: Female from Una, Bahia (IBSP 65455). **A**: Epigynum, ventral view. **B**: Epigynum, dorsal view, cleared. **C**,**D**: Posterior tracheae, dorsal view. See chapter 3 for abbreviations. Scale bars: A, B = 0.1 mm; C = 0.5 mm; D = 0.25 mm.

tory ducts extend anteriorly; primary spermathecae small, oval, deeply attached to surrounding copulatory ducts, with fertilization ducts directed mesally.

Variation. Three females: total length 8.11 – 8.51; carapace length 3.30 – 3.86; femur I 2.23 – 2.73.

Natural history. Specimens were collected in pitfall traps in coastal Atlantic forest.

Note. Several males and females were collected in the same locality in Una, Bahia throughout the years of 1999 – 2000.

Distribution. Known from southern Bahia, Brazil (Fig. 23).

5.3.3. *Ianduba apururuca* sp.n.

Fig. 13

Type material. Male holotype from Fazenda Montes Claros, Estação Biológica de Caratinga, Caratinga, Minas Gerais, Brazil [–41.79222, –19.72417, 457 m], L.G. Dias col., 25/II/2000 (UFMG 1172). Paratype: one male from Estação de Preservação e Desenvolvimento Ambiental de Peti, Santa Bárbara, Minas Gerais, Brazil (–43.36667, –19.88333, 768 m), G.H.F. Azevedo et al. col., 8 – 9/XII/2012 (UFMG 13116).

Additional material examined. BRAZIL: **Espírito Santo**: Santa Teresa, Reserva Biológica Augusto Ruschi [–40.6003, –19.9356, 756 m], T. Souza, T. Bernabé & E. Soveiro col., IV – VIII/2006, 1♀ 1 juvenile (IBSP 121252).

Note. Males and females have not been collected in the same localities. They have been matched because they

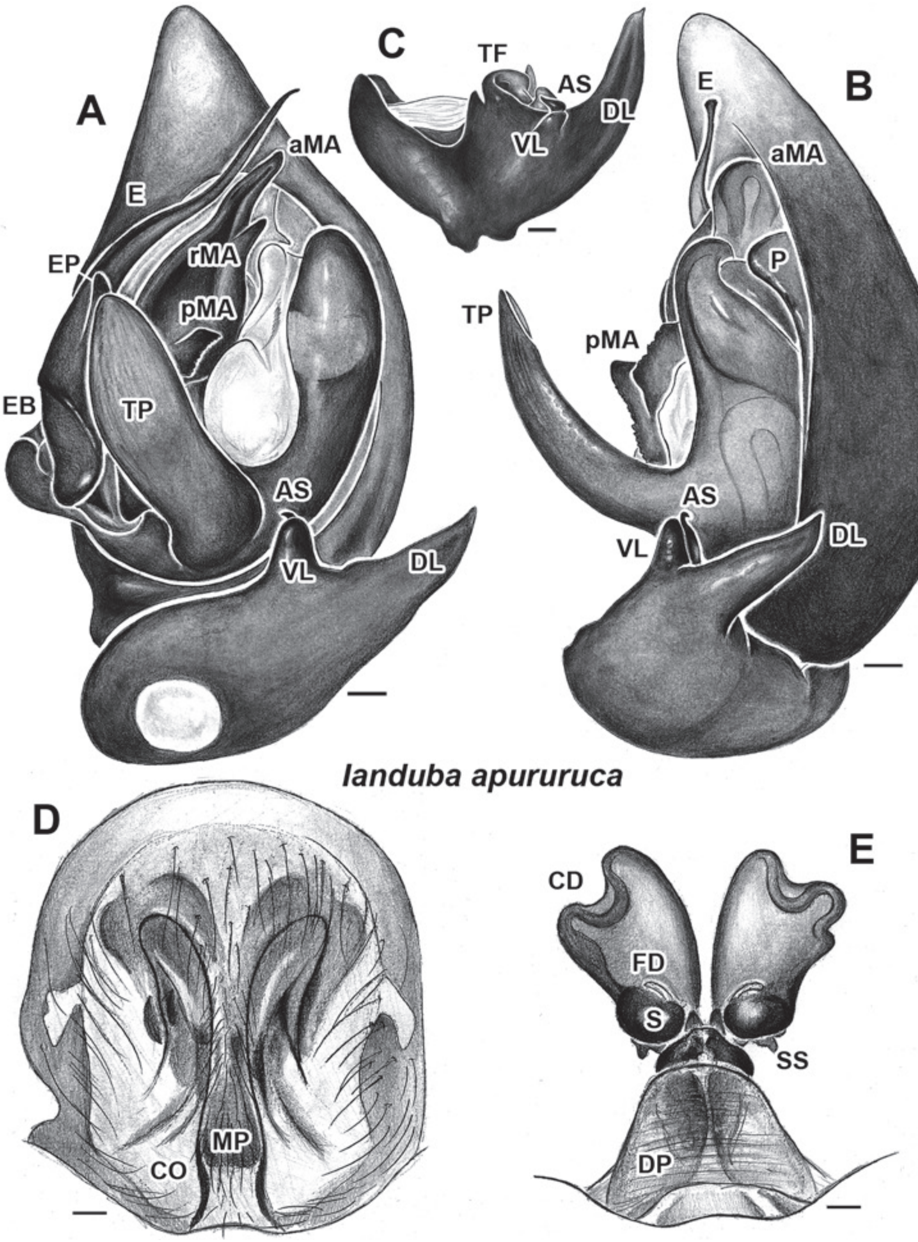

Fig. 13. *Ianduba apururuca* **sp.n. A–C**: Male holotype (UFMG 1172). **A**: Palp, ventral view. **B**: Palp, retrolateral view. **C**: Palpal tibia, ventral view. **D**,**E**: Female (IBSP 121252). **D**: Epigynum, ventral view. **E**: Epigynum, dorsal view, cleared. See chapter 3 for abbreviations. Scale bars = 0.1 mm.

are the only records of the *vatapa* group occurring south of the Doce river. The association is uncertain.

Derivatio nominis. The Brazilian Portuguese expression "à pururuca" is used to refer to a piglet that is whole-roasted and then bathed in hot oil, so that its skin becomes crispy while the interior is soft and tender. This is a typical dish from the cuisine of Minas Gerais, the type locality. The name should be treated as a noun in apposition.

Differential diagnosis. Males differ from other *Ianduba* species with a large, curved tegular projection by the large and conical dorsal lobe of the RTA, and by the elongated MA with a short, trapezoidal prolateral sector with denticles (Fig. 13A,B). Females differ by the medially widened median plate of the epigynum, by the short dorsal piece of the vulva, and by the anteriorly elongated copulatory ducts (Fig. 13D,E).

Description. Male holotype: Carapace, chelicerae, endites, labium and sternum dark brown. Leg I dark brown except for yellow tibia and tarsus. Legs II and III light brown except for dark brown coxae, trochanters and femora. Leg IV with dark brown coxa, trochanter and femur, light brown patella, tibia and metatarsus, and yellow tarsus. Abdomen dark brown. Total length 7.83. Carapace 3.84 long, 2.68 wide, 1.42 high. Clypeus 0.38 high. Anterior eye row 0.81 wide, posterior eye row 0.94 wide. Eye diameters and interdistances: AME 0.18, ALE 0.15, PME

0.10, PLE 0.13, AME–AME 0.10, AME–ALE 0.10, PME–PME 0.18, PME–PLE 0.20, ALE–PLE 0.08. Median ocular quadrangle length 0.46, anterior width 0.41, posterior width 0.43. Chelicerae 1.22 long, with two promarginal and two retromarginal teeth. Ventral retrolateral surface with short distal tooth-like apophysis. Sternum 1.88 long, 1.40 wide. Abdomen 4.26 long, 1.98 wide. Leg measurements: I– femur 2.81, patella 1.25, tibia 2.54, metatarsus 2.26, tarsus 1.63. II– 2.42, 1.17, 2.08, 1.96, 1.40. III– 2.16, 0.99, 1.83, 2.06, 1.14. IV– 2.95, 1.19, 2.75, 3.29, 1.58. Leg spination. I– tibia v2-2-2, metatarsus v2-2, II– tibia v2-2-2, metatarsus v2-2, III– tibia v2, metatarsus v2-2, d2-2-2, IV– tibia v1-2-2, d2-2, metatarsus v2-2, d2-2-2. *Palp* (Fig. 13A,B). *Retrolateral tibial apophysis* with short, single-branched ventral lobe with apical spur, a large, conical, single-branched dorsal lobe, and folded area prolaterad to dorsal lobe. *Tegulum* with deep incision occupied by membranous area and large, curved tegular projection. *Median apophysis* elongated and roughly triangular, with digitiform aMA and rMA and short, trapezoidal pMA with denticles. *Conductor* hidden by MA in ventral view, with basal prolateral sclerotized spur. *Embolus* long and slightly sinuous, prolaterally inserted, with enlarged base, ventral digitiform process and prolateral, folded process.

Female from Santa Tereza (IBSP 121252): Carapace and chelicerae brown. Endites, labium and sternum light brown. Leg I light brown, except for whitish yellow distal end of tibia and yellow tarsus. Legs II–III light brown. Leg IV light brown, except for yellow metatarsus and tarsus. Abdomen brownish gray, with light gray venter and dark transverse dorsal markings. Total length 8.50. Carapace 4.16 long, 2.87 wide, 1.47 high. Clypeus 0.36 high. Anterior eye row 0.92 wide, posterior eye row 1.04 wide. Eye diameters and interdistances: AME 0.18, ALE 0.18, PME 0.13, PLE 0.13, AME–AME 0.13, AME–ALE 0.08, PME–PME 0.20, PME–PLE 0.25, ALE–PLE 0.08. Median ocular quadrangle length 0.46, anterior width 0.48, posterior width 0.46. Chelicerae 1.70 long, with three promarginal teeth, three retromarginal teeth and setal tufts on promargins; no ventral tooth-like apophysis. Sternum 2.11 long, 1.65 wide. Abdomen 2.16 long, 2.34 wide. Leg measurements: I– femur 2.98, patella 1.45, tibia 2.81, metatarsus 2.21, tarsus 1.58. II– 2.70, 1.37, 2.44, 2.11, 1.50. III– 2.47, 1.25, 2.06, 2.31, 1.30. IV– 3.25, 1.45, 3.15, 3.71, 1.53. Leg spination: I– tibia v2-2-2, metatarsus v2-2. II– tibia v2-2-2, metatarsus v2-2. III– tibia d2-2, v2-2-2, metatarsus d2-2-2, v2-2-3. IV– tibia d2-2, v2-2-2, metatarsus d2-2-2, v2-2-3. *Genitalia* (Fig. 13D,E). *Epigynum* with medially widened median plate flanked by two atrial pockets. *Vulva* with short trapezoidal dorsal piece divided longitudinally; long, folded copulatory ducts extend anteriorly, with tiny secondary spermathecae directed posteriorly; primary spermathecae small, oval, with fertilization ducts directed laterally, inserted in internal surface of spermathecae.

Variation. Two males: total length 7.50–7.83; carapace length 3.32–3.84; femur I 2.58–2.81. The male from Santa Bárbara has transverse posterior gray markings on the posterior dorsum of the abdomen.

Natural history. Specimens have been collected in areas of semi-deciduous Atlantic forest. Male specimens have been collected in the rainy season (between December and February).

Distribution. Eastern Minas Gerais and western Espírito Santo states, Brazil (Fig. 22).

5.4. The *varia* group

Diagnosis. Males of this group can be recognized by the curved embolus, which starts going retrolaterally and then has a gentle curve to meet the conductor ventrally (Fig. 14; E)*; by the lack of a sculptured embolic base (except in *I. varia* and *I. beaga* **sp.n.**, visible in the expanded palp); and by the large, membranous conductor (also present in *I. acaraje* **sp.n.**); the conductor arises ventrally to the median apophysis (Figs. 5, 7, 14; C)*. Females can be recognized by the epigynum with very inconspicuous openings, with an unraised median plate at the same height as the lateral plates, and by the normal copulatory ducts, not extending anteriorly to the spermathecae (Figs. 8, 14; CO, CD). (Potential synapomorphies of the group marked with an asterisk *.)

Distribution. Serra do Mar and Southern Brazil endemism centers of the Brazilian Atlantic rainforest (Fig. 21).

Included species. *I. angeloi* **sp.n.**, *I. beaga* **sp.n.**, *I. benjori* **sp.n.**, *I. capixaba* **sp.n.**, *I. dabadu* **sp.n.**, *I. liberta* **sp.n.**, *I. varia* (Keyserling, 1891).

5.4.1. *Ianduba capixaba* sp.n.

Fig. 14

Type material. Male holotype from near Reserva Biológica Augusto Ruschi, Santa Teresa, Espírito Santo, Brazil (–40.57667, –19.86583, 896 m), 5–6/VII/2013, P.H. Martins & M.T.T. Santos col. (UFMG 13977). Paratypes: one female from Santa Teresa, Estação Biológica de Santa Lúcia (–40.53222, –19.96194, 935 m), 7/VII/2013, P.H. Martins & M.T.T. Santos col. (UFMG 14029); two males, one male and one female from Santa Teresa, Reserva Biológica Augusto Ruschi (–40.6003, –19.9356, 756 m), IV–VIII/2006, T. Souza, T. Bernabé & E. Soveiro col. (IBSP 121336, IBSP 121651, IBSP 121582); two males from Santa Teresa (–40.51667, –19.95, 729 m), IV–IX/2005, T. Souza col. (IBSP 132693).

Note. Males and females have been matched because both have been collected in two independent expeditions to Santa Teresa, Espírito Santo.

Derivatio nominis. The Brazilian Portuguese word "capixaba" is used to refer to people born in the State of Espírito Santo, where the type locality is placed. The name should be treated as a noun in apposition.

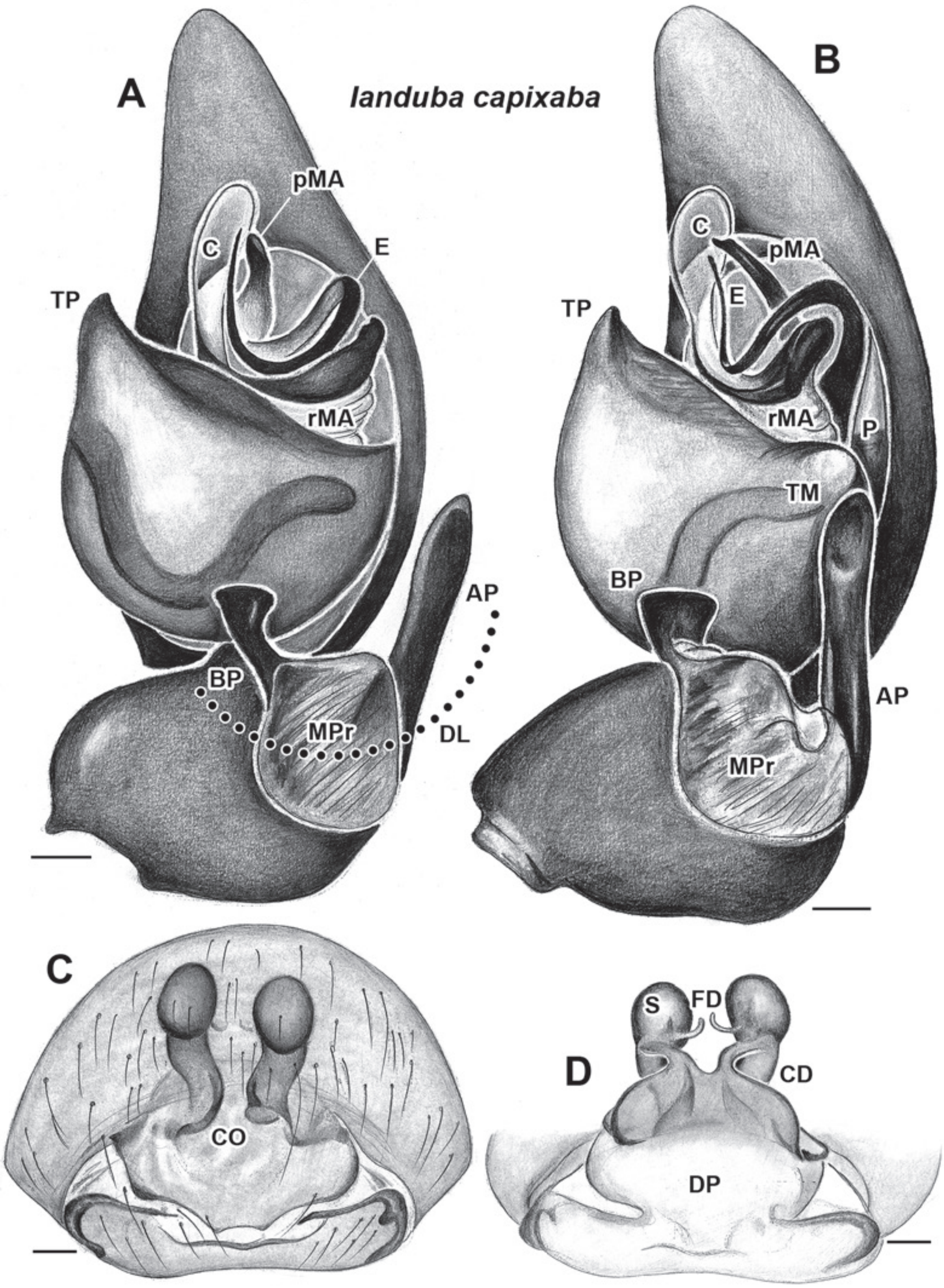

Fig. 14. *Ianduba capixaba* **sp.n. A**,**B**: Male holotype (UFMG 13977). **A**: Palp, ventral view. **B**: Palp, retrolateral view. **C**,**D**: Female paratype (IBSP 121582). **C**: Epigynum, ventral view. **D**: Epigynum, dorsal view, cleared. See chapter 3 for abbreviations. Dot line indicating DL. Scale bars = 0.1 mm.

Differential diagnosis. Males share a simple median apophysis and a short prolateral tegular projection with *I. liberta* **sp.n.** and *I. angeloi* **sp.n.**; they can be distinguished by the enlarged and sclerotized rMA, which is fused to the base of the conductor, and by having a broad, striate and transparent plate-shaped median process in the dorsal lobe of the RTA (Fig. 14A,B). Females can be distinguished by the strong and sinuous copulatory ducts, almost as wide as the primary spermathecae, visible in ventral and dorsal views; by the short median piece, and by the wide posterior piece of the vulva (Fig. 14C,D).

Description. Male holotype: Carapace, chelicerae and labium dark brown. Endites and sternum light brown. Leg I yellow, except for dark brown femur and white tibia and tarsus. Legs II–III yellow. Leg IV yellow, except for dark brown and white markings on tibia and metatarsus. Abdomen brown, with light gray venter and transverse dorsal markings. Total length 6.00. Carapace 2.98 long, 2.14 wide, 1.07 high. Clypeus 0.31 high. Anterior eye row 0.71 wide, posterior eye row 0.86 wide. Eye diameters and interdistances: AME 0.13, ALE 0.13, PME 0.13, PLE 0.13, AME–AME 0.10, AME–ALE 0.08,

PME–PME 0.15, PME–PLE 0.20, ALE–PLE 0.08. Median ocular quadrangle length 0.41, anterior width 0.36, posterior width 0.38. Chelicerae 1.25 long, with three promarginal teeth, two retromarginal teeth and setal tufts on promargins; no ventral tooth-like apophysis. Sternum 1.63 long, 1.32 wide. Abdomen 2.92 long, 1.40 wide. Leg measurements: I– femur 2.49, patella 1.07, tibia 2.59, metatarsus 2.29, tarsus 1.58. II(right leg)– 2.21, 1.02, 2.01, 1.88, 1.30. III– 1.91, 0.92, 1.65, 1.93, 1.04. IV– 2.67, 0.93, 2.70, 3.19, 1.37. Leg spination: I– tibia v2-2-2, metatarsus v2-2. II– tibia v2-2-2, metatarsus v2-2. III(right leg)– tibia d2-2, v2-2-2, metatarsus d2-2-2, v2-2-2. IV– tibia d2-2, v1-2-2, metatarsus d2-2-2, v2-2-2. *Palp* (Fig. 14A,B). *Retrolateral tibial apophysis* with ventral lobe displaced dorsally, dorsal lobe trifid, delimited and slightly detached from cuticle of tibia by membranous strip; with simple basal process with truncate apex, and simple apical process with acuminate apex; these processes are separated by a transparent, striate and wide median process. *Tegulum* with small prolateral apophysis and projected, whitish bump on its retrolateral edge. *Median apophysis* two-pieced, with two sectors: pMA with truncate apex, and sculptured rMA fused to base of conductor. *Conductor* large, rounded, membranous, arising ventrally to median apophysis, positioned in apposition to embolus. *Embolus* long, filiform, curved to meet conductor retrolaterally, without any processes.

Female paratype (IBSP 121582): Carapace and chelicerae brown, endites and labium dark brown. Sternum light brown. Leg I light brown, except for whitish yellow distal end of tibia and dark brown femur. Legs II–III light brown, except for dark brown femora. Leg IV light brown, except for dark brown femur and tibia; tibia with light brown markings. Abdomen brownish gray. Total length 7.25. Carapace 2.98 long, 2.24 wide, 1.14 high. Clypeus 0.23 high. Anterior eye row 0.71 wide, posterior eye row 0.81 wide. Eye diameters and interdistances: AME 0.13, ALE 0.13, PME 0.13, PLE 0.13, AME–AME 0.10, AME–ALE 0.10, PME–PME 0.15, PME–PLE 0.18, ALE–PLE 0.08. Median ocular quadrangle length 0.41, anterior width 0.36, posterior width 0.38. Chelicerae 1.22 long, with three promarginal teeth, two retromarginal teeth and setal tufts on promargins; no ventral tooth-like apophysis. Sternum 1.65 long, 1.27 wide. Abdomen 4.21 long, 2.54 wide. Leg measurements: I– femur 2.29, patella 1.19, tibia 2.36, metatarsus 1.96, tarsus 1.35. II– 2.16, 1.12, 2.03, 1.81, 1.25. III– 1.93, 0.94, 1.60, 1.88, 1.02. IV– 2.61, 1.14, 2.54, 2.98, 1.27. Leg spination: I– tibia v2-2-2, metatarsus v2-2. II– tibia v2-2-2, metatarsus v2-2. III– tibia d2-2, v1-2-2, metatarsus d2-2-2, v2-2-2. IV– tibia d2-2, v1-2-2, metatarsus d2-2-2-2, v2-2-2. *Genitalia* (Fig. 14C,D). *Epigynum* lightly sclerotized, with two narrow, median copulatory openings, posterior piece wide. *Vulva* with short dorsal piece, which is widest posteriorly and anteriorly connected to spermathecae; copulatory ducts almost as wide as primary spermathecae, sinuous and posteriorly directed; primary spermathecae small, oval, with fertilization ducts directed mesally.

Variation. Three males: total length 6.00–6.61; carapace length 2.98–3.25; femur I 2.49–2.67. Two females: total length 7.17–7.25; carapace length 2.98–3.05; femur I 2.29–2.36. The shape of the dorsal piece of the vulva is variable (some specimens have the sides slightly indented).

Natural history. This species has been manually collected in montane Atlantic rainforest, at altitudes between 750 and 930 m above sea level. All adult specimens have been collected in the dry season (April to September).

Distribution. Known from three localities in Santa Teresa, Espírito Santo, Brazil (Fig. 22).

5.4.2. *Ianduba dabadu* sp.n.

Figs. 15, 22

Type material. Male holotype from Reserva Estadual de Duas Bocas, Cariacica, Espírito Santo, Brazil (–40.47667, –20.27294, 237 m), 13–14/X/2005, A.Giupponi col. (IBSP 133310).

Additional material examined. BRAZIL: **Espírito Santo**: Domingos Martins, São Paulo do Aracê, private área near Parque Estadual de Pedra Azul (–41.02, –20.4325, 1148 m), 12/VII/2013, P.H. Martins & M.T.T.Santos col., 2♀ (UFMG 14211).

Note. Males and females have not been collected in the same locality; they have been matched because both occur in Espírito Santo, and both resemble *Ianduba capixaba* **sp.n.** in genitalic morphology. The association is uncertain: the male has been collected at 230 m above sea level, while the females were collected at 1150 m.

Derivatio nominis. The specific name is a combination of letters, which, in conjunction with the generic name, are intended to sound like the famous yell of Fred Flintstone, a fictional Hanna-Barbera's character.

Differential diagnosis. Males share a short prolateral tegular projection with *I. capixaba* **sp.n.**, *I. liberta* **sp.n.** and *I. angeloi* **sp.n.**; they can be distinguished by the two-pieced median apophysis; by the enlarged base of the embolus; and by the distinctive RTA: the dorsal lobe is trifid, having a simple basal process, a very large median process with a spine in the apex, and a slender, curved, digitiform apical process embracing the base of the median process (Fig. 15A,B). Females are distinguished by the very wide copulatory ducts (wider than the spermathecae); by the rectangular median piece, which is longer than wide; and by the M-shaped posterior piece of the vulva (Fig. 15C,D).

Description. Male holotype: Carapace and chelicerae brown, endites dark brown. Labium and sternum light brown. Leg I light brown, except for whitish yellow tibia and dark brown femur. Legs II–III light brown. Leg IV light brown, except for dark brown markings on femur, patella and tibia. Abdomen brown with light gray venter and transverse dorsal markings. Total length 6.14. Cara-

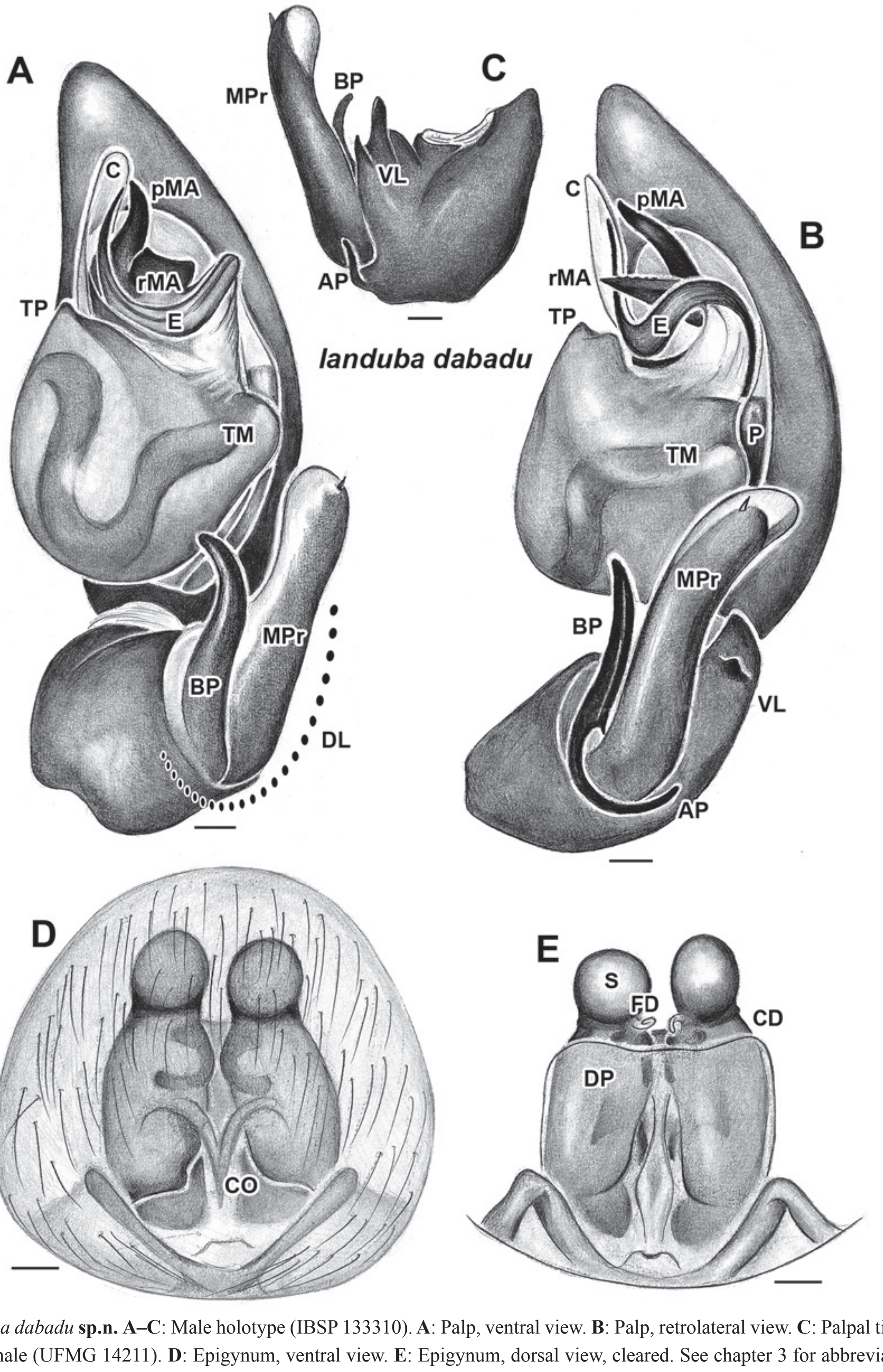

Fig. 15. *Ianduba dabadu* **sp.n. A–C**: Male holotype (IBSP 133310). **A**: Palp, ventral view. **B**: Palp, retrolateral view. **C**: Palpal tibia, dorsal view. **D**,**E**: Female (UFMG 14211). **D**: Epigynum, ventral view. **E**: Epigynum, dorsal view, cleared. See chapter 3 for abbreviations. Dot line indicating DL. Scale bars = 0.1 mm.

pace 3.08 long, 2.14 wide, 0.94 high. Clypeus 0.31 high. Anterior eye row 0.71 wide, posterior eye row 0.89 wide. Eye diameters and interdistances: AME 0.15, ALE 0.13, PME 0.13, PLE 0.13, AME–AME 0.08, AME–ALE 0.05, PME–PME 0.18, PME–PLE 0.20, ALE–PLE 0.05. Median ocular quadrangle length 0.38, anterior width 0.36, posterior width 0.41. Chelicerae 1.32 long, with three promarginal teeth, two retromarginal teeth and setal tufts on promargins; no ventral tooth-like apophysis. Sternum 1.58 long, 1.30 wide. Abdomen 3.05 long, 1.46 wide. Leg measurements: I– femur 2.49, patella 1.07, tibia 2.54, metatarsus 2.21, tarsus 1.50. II– 2.21, 1.04, 2.03, 1.91, 1.30. III– 1.93, 0.89, 1.68, 1.96, 1.04. IV– 2.67, 1.12, 2.70, 3.22, 1.37. Leg spination: I– tibia v2-2-2, metatarsus v2-2. II– tibia v2-2-2, metatarsus v2-2. III– tibia d2-2, v2-2-2, metatarsus d2-2-2, v2-2-3. IV– tibia d2-2, v2-2-2, metatarsus d2-2-2, v2-2-3. *Palp* (Fig. 15A,B). *Retrolateral tibial apophysis* with bifid ventral lobe displaced dorsally, and trifid dorsal lobe delimited by membranous strip, composed of digitiform basal process, slender finger-like apical process, which embraces base of median process, which is large, digitiform and bears spine near its apex. *Tegulum* with small prolateral apophysis and projected, whitish bump at retrolateral edge. *Median apophysis* made of two pieces: sharp, triangular retrolateral sector and digitiform prolateral sector. *Conductor* large, rounded, membranous, arising ventrally to median apophysis, positioned in apposition to embolus. *Embolus* long, ribbon-shaped, curved to meet conductor retrolaterally, with enlarged base but without any processes.

Female from Domingos Martins (UFMG 14211): Carapace and chelicerae dark brown. Endites, labium and sternum light brown. Leg I light brown, except for whitish yellow tibia and dark brown femur. Legs II–III light brown, except for dark brown femora. Leg IV light brown, except for dark brown markings on femur, tibia and metatarsus. Abdomen brown with light gray transverse dorsal markings. Total length 8.25. Carapace 3.08 long, 2.24 wide, 1.22 high. Clypeus 0.25 high. Anterior eye row 0.81 wide, posterior eye row 0.99 wide. Eyes diameters and interdistances: AME 0.15, ALE 0.15, PME 0.15, PLE 0.13, AME–AME 0.10, AME–ALE 0.10, PME–PME 0.20, PME–PLE 0.18, ALE–PLE 0.08. Median ocular quadrangle length 0.43, anterior width 0.41, posterior width 0.46. Chelicerae 1.32 long, with three promarginal teeth, two retromarginal teeth and setal tufts on promargins; no ventral tooth-like apophysis. Sternum 1.60 long, 1.40 wide. Abdomen 4.77 long, 2.75 wide. Leg measurements: I– femur 2.36, patella 1.19, tibia 2.31, metatarsus 1.91, tarsus 1.25. II– 2.19, 1.09, 1.98, 1.68, 1.12. III– 1.93, 0.94, 1.70, 1.81, 0.92. IV– 2.58, 1.14, 2.61, 2.98, 1.19. Leg spination: I– tibia v2-2-2, metatarsus v2-2. II– tibia v2-2-2, metatarsus v2-2. III– tibia d2-2, v1-2-2, metatarsus d2-2-2, v2-2-3. IV– tibia d2-2, v1-2-2, metatarsus d2-2-2, v2-2-3. *Genitalia* (Fig. 15C,D). *Epigynum* lightly sclerotized, with two narrow, median copulatory openings. *Vulva* with rectangular dorsal piece, which is wider than long; copulatory ducts wider than spermathecae, straight and posteriorly directed; primary spermathecae small, oval, with fertilization ducts directed mesally; M-shaped posterior piece of epigynum present.

Variation. Two females: total length 7.83–8.25; carapace length 3.08–3.32; femur I 2.36–2.55.

Natural history. Specimens have been collected in lowland and montane Atlantic rainforest, at altitudes between 200 and 1150 m above sea level.

Distribution. Southern Espírito Santo state, Brazil (Fig. 22).

5.4.3. *Ianduba liberta* sp.n.

Fig. 16

Type material. Male holotype from Parque Estadual do Itacolomi, Ouro Preto, Minas Gerais, Brazil (–43.50906, –20.43481, 1343 m), K.P. Santos *et al.* col., 13/IV/2008 (UFMG 2371). One male paratype, same collecting data (MPEG 24752); one female and two male paratypes, same locality and collector, 2–4/XI/2007 (UFMG 2068, UFMG 2069, UFMG 2070).

Derivatio nominis. The name is a Latin adjective meaning “freed” or “set free”, and is an allusion to the fact that the *Inconfidência Mineira*, one of the separatist movements that eventually led to Brazilian independency from Portugal in 1822, had its main headquarters in Ouro Preto, the type locality of this species.

Differential diagnosis. Males share a short prolateral tegular projection with *I. capixaba* **sp.n.**, *I. dabadu* **sp.n.** and *I. angeloi* **sp.n.**; they are most similar to *I. angeloi* **sp.n.**, as both possess a membranous and short median process of the DL of the RTA. *I. liberta* **sp.n.** can be distinguished by the longer, unsclerotized tegular projection pointing away from the embolus, by the broad median apophysis with two pointed edges (one ventral and one retrolateral), and by the slender and shorter apical process of the dorsal lobe of the RTA (Fig. 16A,B). Females are most similar to *I. angeloi* **sp.n.** in having antero-lateral projections in the dorsal piece of the vulva; they can be distinguished by the less sclerotized epigynum, by the spermathecae being partially covered by the dorsal piece, and by the pointed shape of the dorsal piece projections (Fig. 16C,D).

Description. Male holotype: Carapace, chelicerae dark brown. Endites, labium dark brown, with light brown anterior borders. Sternum light brown. Leg I with dark brown coxa, trochanter and femur, light brown patella and metatarsus, whitish yellow tibia and tarsus. Legs II and III with dark brown femora, other articles yellow. Leg IV with yellow coxa, trochanter and tarsus, other articles dark brown with proximal and distal yellow borders. Abdomen dark brown. Total length 7.50. Carapace 3.51 long, 2.42 wide, 1.07 high. Clypeus 0.36 high. Anterior eye row 0.76 long, posterior eye row 0.97 long. Eye diameters and interdistances: AME 0.15, ALE 0.13, PME 0.15, PLE 0.15, AME–AME 0.10, AME–ALE 0.08, PME–PME 0.20, PME–PLE 0.23, ALE–PLE 0.05. Median ocular quadrangle length 0.43, anterior width 0.38, posterior width 0.43. Chelicerae 1.60 long, with three promarginal teeth, two retromarginal teeth and setal tufts on promargins. Sternum 1.73 long, 1.45 wide. Abdomen 3.76 long, 1.88 wide. Leg measurements: I– femur 2.81, patella 1.17, tibia 2.70, metatarsus 2.39, tarsus 1.60. II– 2.34, 1.02, 2.06, 1.96, 1.35. III– 2.01, 0.94, 1.73, 1.88, 1.02. IV– 2.78, 1.09, 2.67, 3.05, 1.32. Leg spination: I– tibia v2-2-2, metatarsus v2-2, II– tibia v2-2-2, metatarsus v2-2, III– tibia v2-2-2, metatarsus v2-2, d2-2-2, IV– tibia v1-2-2, metatarsus v2-2. *Palp* (Fig. 16A,B). *Retrolateral tibial apophysis* with ventral lobe

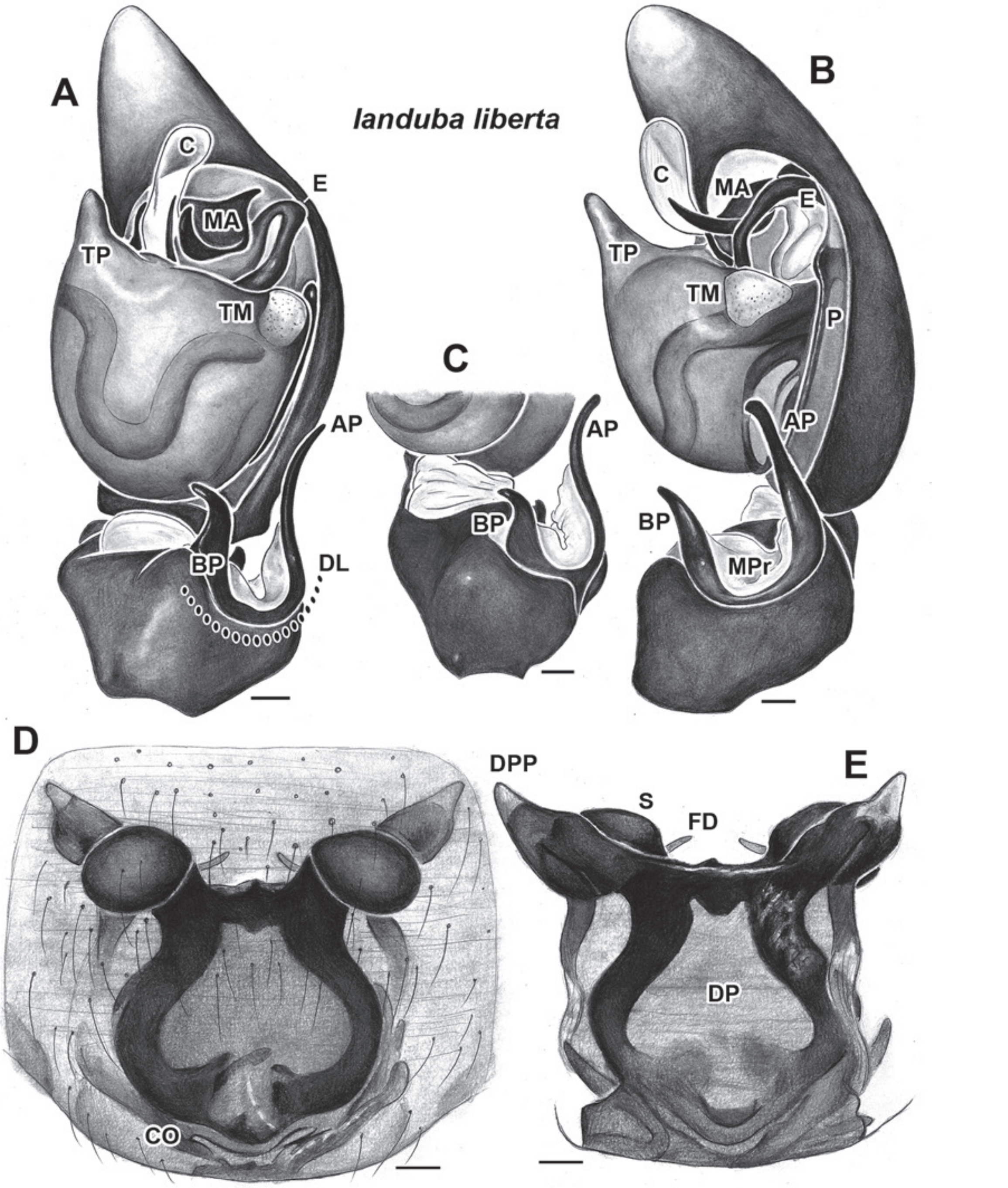

Fig. 16. *Ianduba liberta* **sp.n. A–C**: Male holotype (UFMG 2371). **A**: Palp, ventral view. **B**: Palp, retrolateral view. **C**: Palpal tibia, ventral view. **D**,**E**: Female paratype (UFMG 2069). **D**: Epigynum, ventral view. **E**: Epigynum, dorsal view, cleared. See chapter 3 for abbreviations. Dot line indicating DL. Scale bars = 0.1 mm.

displaced dorsally; dorsal lobe delimited by membranous strip, with simple, hook-shaped basal process, short and membranous median process, and apical process slender and slightly bent near apex. *Tegulum* with prominent prolateral apophysis pointing away from embolus and small clear bump in its retrolateral edge. *Median apophysis* made of single concave piece with two pointy edges, one ventral and one retrolateral. *Conductor* large, rounded, membranous, arising ventrally to median apophysis and positioned in apposition to embolus. *Embolus* long, retrolaterally inserted, without any processes.

Female paratype (UFMG 2069): Carapace, chelicerae dark brown. Endites, labium dark brown, with light brown anterior borders. Sternum dark brown. Leg I dark brown, except for light brown metatarsus and tarsus, whitish yellow tibia. Legs II and III with dark brown femora, other articles yellow. Leg IV light brown, with yellow bands on proximal ends of articles. Abdomen dark brown. Total length 7.25. Carapace 2.95 long, 2.10 wide, 0.98 high. Clypeus 0.23 high. Anterior eye row 0.66 wide, posterior eye row 0.81 wide. Eye diameters and interdistances: AME 0.13, ALE 0.10, PME 0.13, PLE 0.13, AME–AME

0.10, AME–ALE 0.08, PME–PME 0.15, PME–PLE 0.13, ALE–PLE 0.08. Median ocular quadrangle length 0.36, anterior width 0.33, posterior width 0.36. Chelicerae 1.35 long, with three promarginal teeth, two retromarginal teeth and setal tufts on promargins. Sternum 1.60 long, 1.37 wide. Abdomen 4.16 long, 2.38 wide. Leg measurements: I– femur 2.36, patella 1.07, tibia 2.16, metatarsus 1.78, tarsus 1.17. II– 2.08, 0.99, 1.93, 1.65, 1.07. III– 1.86, 0.86, 1.45, 1.63, 0.94. IV– 2.52, 1.07, 2.42, 2.75, 1.30. Leg spination: I– tibia v2-2-2, metatarsus v2-2. II– tibia v2-2-2, metatarsus v2-2. III– tibia d1-2, v2-2, metatarsus d2-2-2, v2-2-2. IV– tibia d2-2, v2-2-2, metatarsus d2-2-2, v1-2-2. *Genitalia* (Fig. 16C,D). *Epigynum* unsclerotized, with wide median plate; curved copulatory ducts seen by transparency, delimiting an inverted heart-shaped area; copulatory openings narrow, slit-shaped, posterior. *Vulva* with large, as wide as long dorsal piece, with two pointed projections directed antero-laterally, dorsal piece covering spermathecae almost completely; copulatory ducts S-shaped; spermathecae small, oval, with fertilization ducts directed medially.

Variation. Four males: total length 6.92–7.92; carapace length 3.25–3.96; femur I 2.81–3.08. Some specimens have five short, transverse light patches in the posterior portion of the abdominal dorsum.

Natural history. Specimens were collected in pitfall traps in a semi-deciduous Atlantic forest and a secondary semi-deciduous Atlantic forest area that was occupied by *Eucalyptus* plantations around 50 years ago. Adult specimens were obtained in both rainy and dry seasons.

Distribution. Known only from Ouro Preto in central Minas Gerais state, Brazil (Fig. 22).

5.4.4. *Ianduba angeloi* sp.n.

Figs. 5, 10I, 17

Type material. Male holotype from Serra do Ouro Branco, Ouro Branco, Minas Gerais, Brazil (–43.60139, –20.50056, 1095 m), Y. Antonini col., 23/III/2007 (UFMG 12683). Seven male and three female paratypes from the same locality, several collecting dates (UFMG 12680, UFMG 12681, UFMG 12682, UFMG 12684, UFMG 12685, UFMG 12686, UFMG 12687, MPEG 24568, MPEG 24569, MPEG 24570).

Additional material examined. BRAZIL: **Minas Gerais**: Ouro Preto, Parque Estadual do Itacolomi (–43.50906, –20.43481, 1343 m), 02–04/XI/2007, K.P. Santos *et al.* col., 1♀ (UFMG 2071); Santa Bárbara, RPPN Santuário do Caraça, Pico do Sol (–43.50548, –20.05885, 1127 m), 16/I/2010, L.N. Perillo col., 1♂ (UFMG 6558). **São Paulo**: Jundiaí, Parque Estadual da Serra do Japi (–46.98333, –23.28333, 1133 m), 21/IV/2008, J. Sobjack col., 1♀ (UFMG 6449); São Luís do Paraitinga, Núcleo Santa Virgínia, Parque Estadual da Serra do Mar (–45.14583, –23.33583, 945 m), 21/XI/2004, M. Uehara-Prado col., 1♂ (IBSP 143300), same locality and collector, 18/II/2005 1♀ (IBSP 143316).

Note. Males and females have been matched because they have been collected repeatedly at the type locality. Both sexes have also been recorded in São Luís do Piraitinga, São Paulo.

Derivatio nominis. The species name is a patronym in honor of Dr. Angelo Barbosa Monteiro Machado, a brilliant doctor, professor, neuroanatomist, Odonata taxonomist, conservationist and writer, in recognition for his decades of efforts on researching, teaching generations of students, and helping to conserve Brazilian biodiversity.

Differential diagnosis. Males share a short prolateral tegular projection with *I. capixaba* **sp.n.**, *I. dabadu* **sp.n.** and *I. liberta* **sp.n.**; they are most similar to *I. liberta* **sp.n.**, as both possess a membranous and short median process of the DL of the RTA. *I. angeloi* **sp.n.** can be distinguished by the short, curved and sclerotized tegular projection pointing towards the embolus, by the slender median apophysis, and by the blade-like apical process of the dorsal lobe of the RTA (Figs. 17A,B). Females are most similar to *I. liberta* **sp.n.** in having antero-lateral projections in the dorsal piece of the vulva; they can be distinguished by the strongly sclerotized, oval epigynal median plate, by the spermathecae not being covered by the dorsal piece, and by the membranous, wrinkled appearance of the dorsal piece projections (Figs. 17C,D).

Description. Male holotype: Carapace, chelicerae, endites, labium dark brown. Sternum light brown. Leg I with light brown coxae, whitish yellow tibiae and tarsi, other articles dark brown. Legs II–III with dark brown femora, other articles brownish yellow. Leg IV with browish yellow coxae, whitish yellow tarsus, other articles dark brown with yellow markings. Abdomen brownish gray, with white transverse markings near posterior end of dorsum. Total length 6.82. Carapace 3.18 long, 2.29 wide, 1.12 high. Clypeus 0.36 high. Anterior eye row 0.74 wide, posterior eye row 0.86 wide. Eye diameters and interdistances: AME 0.15, ALE 0.13, PME 0.13, PLE 0.18, AME–AME 0.08, AME–ALE 0.05, PME–PME 0.15, PME–PLE 0.18, ALE–PLE 0.05. Median ocular quadrangle length 0.38, anterior width 0.36, posterior width 0.38. Chelicerae 1.35 long, with three promarginal teeth, two retromarginal teeth and setal tufts on promargins. Sternum 1.63 long, 1.35 wide. Abdomen 3.29 long, 1.58 wide. Leg measurements: I– femur 2.55, patella 1.12, tibia 2.61, metatarsus 2.31, tarsus 1.50. II– 2.26, 0.97, 2.03, 1.86, 1.27. III– 1.93, 0.89, 1.63, 1.91, 0.99. IV– 2.70, 1.07, 2.34, 3.08, 1.37. Leg spination: I– tibia v2-2-2, metatarsus v2-2. II– tibia v2-2-2, metatarsus v2-2. III– tibia d2-2, v2-2-2, metatarsus d2-2-2, v2-2-2. IV– tibia d2-2, v1-2-2, metatarsus d2-2, v2-2-2. *Palp* (Fig. 17A,B). *Retrolateral tibial apophysis* with ventral lobe displaced dorsally; dorsal lobe delimited by membranous strip with simple, hook-shaped basal process and large, blade-like apical process; median process of dorsal lobe short, membranous. *Tegulum* with sclerotized, curved prolateral apophysis pointing towards embolus and small clear bump in its retrolateral edge. *Median apophysis* comprising single slender piece with blunt apex. *Conductor* large, rounded, membranous, arising prolaterally to median apophysis, positioned in appo-

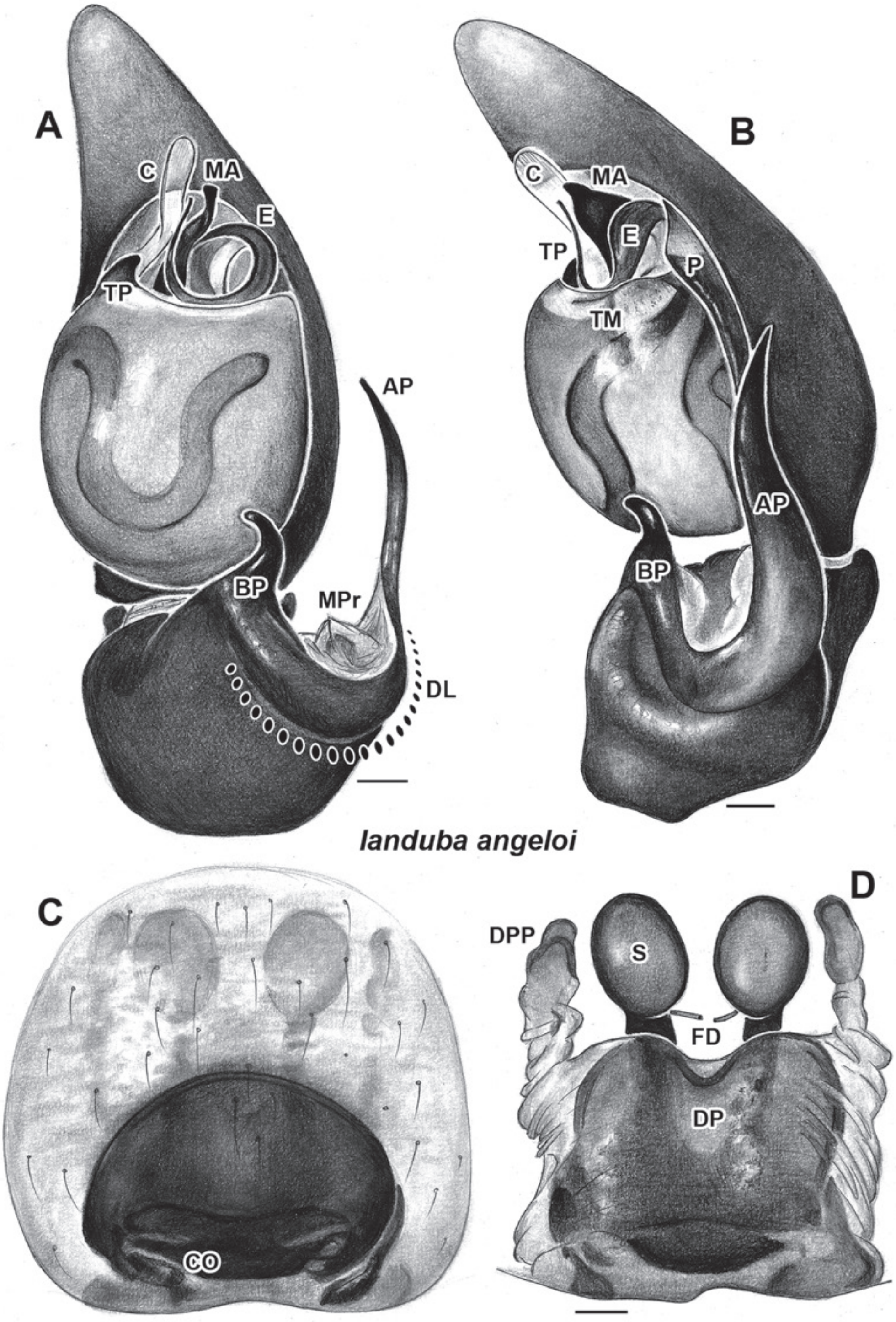

Fig. 17. *Ianduba angeloi* **sp.n. A**,**B**: Male holotype (UFMG 12683). **A**: Palp, ventral view. **B**: Palp, retrolateral view. **C**,**D**: Female (UFMG 2071). **C**: Epigynum, ventral view. **D**: Epigynum, dorsal view, cleared. See chapter 3 for abbreviations. Dot line indicating DL. Scale bars = 0.1 mm.

sition to embolus. *Embolus* long, retrolaterally inserted, without any processes.

Female (UFMG 2071): Carapace, chelicerae dark brown. Endites, labium, sternum light brown. Leg I light brown, except for whitish yellow distal end of tibia and dark brown femur. Legs II–III light brown, except for dark brown femora. Leg IV light brown, except for dark brown femur and tibia; femur with retrolateral, median light brown patch. Abdomen brownish gray. Total length 7.42. Carapace 3.25 long, 2.31 wide, 1.30 high. Clypeus 0.31 high. Anterior eye row 0.71 wide, posterior eye row 0.92 wide. Eye diameters and interdistances: AME 0.13, ALE 0.13, PME 0.13, PLE 0.10, AME–AME 0.10, AME–ALE 0.08, PME–PME 0.15, PME–PLE 0.18, ALE–PLE 0.08. Median ocular quadrangle length 0.41, anterior width 0.36, posterior width 0.41. Chelicerae 1.27

long, with three promarginal teeth, two retromarginal teeth and setal tufts on promargins. Sternum 1.65 long, 1.45 wide. Abdomen 4.21 long, 2.65 wide. Leg measurements: I– femur 2.36, patella 1.14, tibia 2.39, metatarsus 1.96, tarsus 1.27. II– 2.29, 1.09, 2.14, 1.73, 1.19. III– 1.96, 0.89, 1.70, 1.81, 1.02. IV– 2.64, 1.09, 2.61, 2.87, 1.32. Leg spination: I– tibia v2-2-2, metatarsus v2-2. II– tibia v2-2-2, metatarsus v2-2. III– tibia d2-2, v2-2-2, metatarsus d2-2-2, v2-2-2. IV– tibia d2-2, v1-2-2, metatarsus d2-2-2, v2-2-2. *Genitalia* (Figs. 17C,D). *Epigynum* heavily sclerotized, with wide median plate; copulatory openings narrow, slit-shaped and posterior. *Vulva* with large dorsal piece, wider than long, not covering spermathecae, with two blunt projections directed anteriorly; copulatory ducts S-shaped; spermathecae small, oval, with fertilization ducts directed medially.

Variation. Six males: total length 6.08 – 7.33; carapace length 3.12 – 3.59; femur I 2.50 – 3.02. Three females: total length 7.30 – 7.60, carapace length 3.12 – 3.25, femur I 2.36 – 2.47. The shape and size of the tegular projection on the male palp is slightly variable, as is that of the dorsal piece projections on the female genitalia.

Natural history. Specimens were collected in pitfall traps in semi-deciduous Atlantic forest in Ouro Branco and Ouro Preto. All adult specimens were collected in the rainy season (from November to April). All records come from areas with altitudes above 800 m above sea level.

Distribution. Central Minas Gerais to Jundiaí, São Paulo, Brazil (Fig. 22).

5.4.5. *Ianduba benjori* sp.n.

Fig. 18

Type material. Male holotype from Morumbeca, Parque Estadual do Desengano, Santa Maria Madalena, Rio de Janeiro, Brazil [–41.91861, –21.87722, 1243 m], A. Chagas *et al.* col., 13 – 17/V/2008 (MNRJ 13956). Two female paratypes, same collecting data (MNRJ 13950, MNRJ 13961).

Derivatio nominis. The name is a patronym in honour of Jorge Duílio Lima Meneses, better known as Jorge Ben Jor, a Brazilian *samba* singer born in Rio de Janeiro, Brazil.

Differential diagnosis. Males of *I. benjori* **sp.n.** share a globose tegulum, without prolateral tegular projection, with *I. varia* and *I. beaga* **sp.n.** It can be diagnosed by the fan-shaped conductor, which is prolaterally inserted, by the prolateral sector of the median apophysis embracing its retrolateral sector, by the retrolateral, apical blade-like modification in the tegulum, by the hirsute ventral lobe of the RTA, and by the simple, blade-like dorsal lobe of the RTA (Fig. 18A,B). Females are recognized by the wider than long epigynum with a narrow median plate and by the rectangular, much wider than long dorsal piece of the vulva (Fig. 18C,D).

Description. Male holotype: Carapace, chelicerae dark brown. Endites, labium, sternum light brown. Leg I brownish yellow, except for whitish yellow distal end of tibia and dark brown femur, patella and proximal end of tibia. Legs II – III brownish yellow, except for dark brown femora. Leg IV light brown, except for dark brown tibia with yellow proximal and distal extremities. Abdomen purplish gray, with dark brown abdominal scutum and gray, transverse markings on dorsum. Total length 6.34. Carapace 3.07 long, 2.21 wide, 0.97 high. Clypeus 0.31 high. Anterior eye row 0.71 wide, posterior eye row 0.86 wide. Eye diameters and interdistances: AME 0.15, ALE 0.15, PME 0.13, PLE 0.13, AME – AME 0.13, AME – ALE 0.05, PME – PME 0.15, PME – PLE 0.20, ALE – PLE 0.05. Median ocular quadrangle length 0.41, anterior width 0.38, posterior width 0.41. Chelicerae 1.19 long, with three promarginal teeth, two retromarginal teeth and setal tufts on promargins. Sternum 1.58 long, 1.30 wide. Abdomen 3.15 long, 1.65 wide. Leg measurements: I– femur 2.47, patella 1.14, tibia 2.39, metatarsus 2.08, tarsus 1.32. II– 2.19, 1.09, 2.03, 1.83, 1.22. III– 2.01, 0.99, 1.70, 1.88, 0.92. IV– 2.72, 1.07, 2.55, 2.58, 1.25. Leg spination: I– tibia v2-2-2, metatarsus v2-2. II– tibia v2-2-2, metatarsus v2-2. III– tibia d2-2, v2-2-2, metatarsus d2-2-2, v2-2-2. IV– tibia d2-2, v1-2-2, metatarsus d2-2, v2-2-2. *Palp* (Fig. 18A,B). *Retrolateral tibial apophysis* with simple, hirsute, blunt ventral lobe, and simple, blade-like dorsal lobe. *Tegulum* without prolateral apophysis, with modified, blade-like retrolateral area. *Median apophysis* two-pieced, with large prolateral sector which folds itself around small, pointed retrolateral sector. Conductor large, fan-shaped, membranous, arising prolaterally to median apophysis, positioned in apposition to embolus. *Embolus* short, retrolaterally inserted.

Female paratype (MNRJ 13691): Carapace, chelicerae dark brown. Endites, labium, sternum light brown. Leg I light brown, except for whitish yellow distal end of tibia and dark brown femur, patella and proximal end of tibia. Legs II – III light brown, except for dark brown femora. Leg IV light brown, except for dark brown femur and tibia; femur with retrolateral, distal light brown patch. Abdomen brownish gray. Total length 8.33. Carapace 3.51 long, 2.55 wide, 0.94 high. Clypeus 0.28 high. Anterior eye row 0.79 wide, posterior eye row 1.04 wide. Eye diameters and interdistances: AME 0.15, ALE 0.15, PME 0.13, PLE 0.15, AME – AME 0.10, AME – ALE 0.05, PME – PME 0.18, PME – PLE 0.15, ALE – PLE 0.03. Median ocular quadrangle length 0.46, anterior width 0.41, posterior width 0.46. Chelicerae 1.50 long, with three promarginal teeth, two retromarginal teeth and setal tufts on promargins. Sternum 1.83 long, 1.47 wide. Abdomen 4.82 long, 3.22 wide. Leg measurements: I– femur 2.61, patella 1.29, tibia 2.47, metatarsus 2.08, tarsus 1.27. II– 2.42, 1.27, 2.21, 1.91, 1.25. III– 2.19, 1.12, 1.73, 2.03, 1.02. IV– 2.92, 1.30, 2.16, 3.29, 1.32. Leg spination: I– tibia v2-2-2, metatarsus v2-2. II– tibia v2-2-2, metatarsus v2-2. III– tibia d2-2, v2-2-2, metatarsus d2-2-2, v2-2-2. IV– tibia d2-2, v1-2-2, metatarsus d2-2-

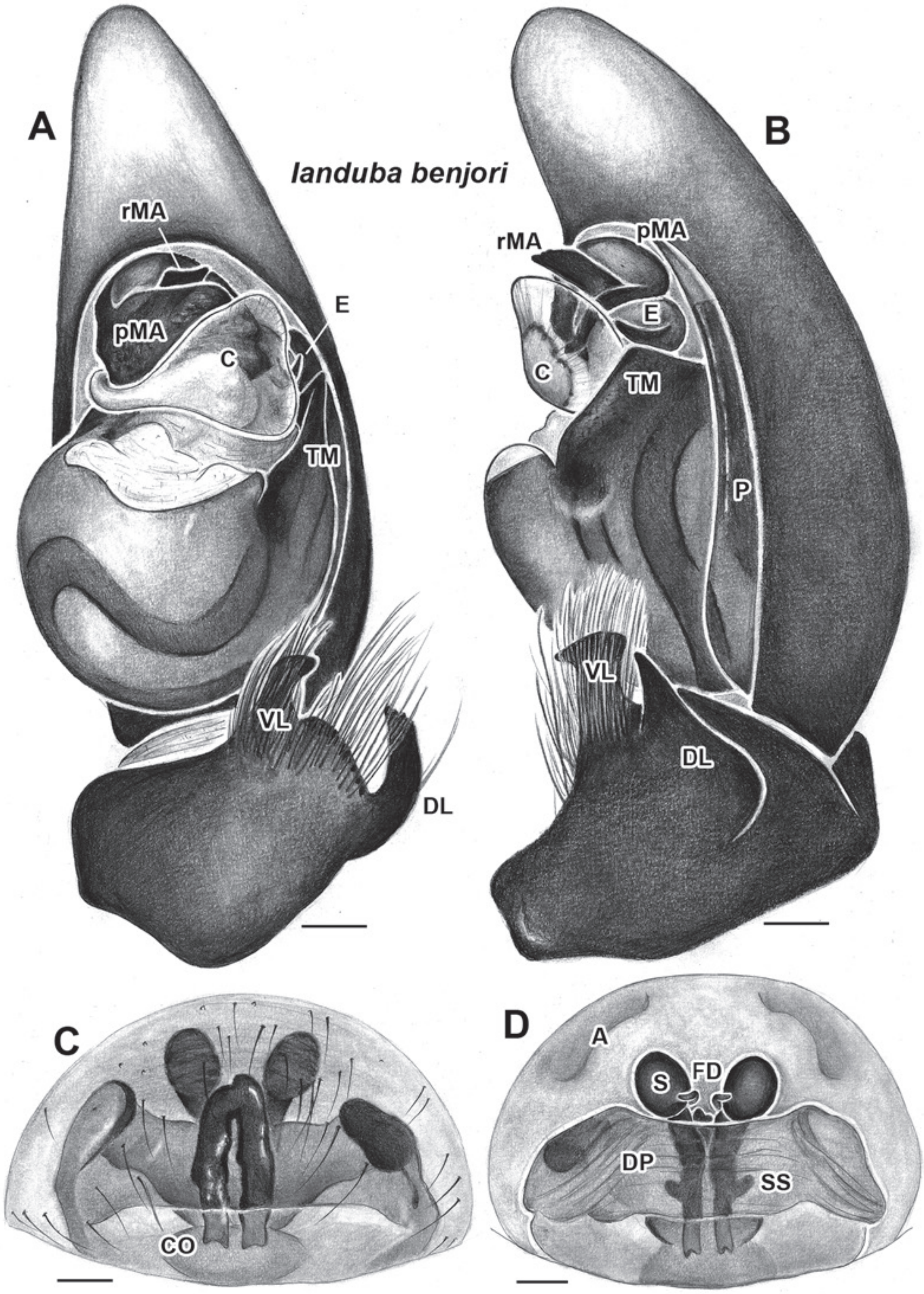

Fig. 18. *Ianduba benjori* **sp.n. A**,**B**: Male holotype (MNRJ 13956). **A**: Palp, ventral view. **B**: Palp, retrolateral view. **C**,**D**: Female paratype (MNRJ 13961). **C**: Epigynum, ventral view. **D**: Epigynum, dorsal view, cleared. See chapter 3 for abbreviations. Scale bars = 0.1 mm.

2, v2-2-2. *Genitalia* (Fig. 18C,D). *Epigynum* with narrow bottle-shaped median plate between lip-shaped margins of atrial pockets. *Vulva* with short dorsal plate, which is much wider than long; copulatory ducts straight, parallel to body axis; secondary spermathecae short, digitiform, laterally directed, visible by transparency through dorsal piece; primary spermathecae small, oval, with fertilization ducts directed mesally; two small apodemes located in cuticle near spermathecae.

Variation. Two females: total length 8.33 – 8.60, carapace length 3.30 – 3.51, femur I 2.58 – 2.61.

Natural history. Specimens were collected in montane Atlantic forest at altitudes of approximately 1100 m above sea level.

Distribution. Known from a single locality in northern Rio de Janeiro, Brazil (Fig. 22).

5.4.6. *Ianduba beaga* sp.n.

Figs. 19, 20

Type material. Male holotype from Pico do Sol, Reserva Particular do Patrimônio Natural Serra do Caraça, Santa Bárbara, Minas Gerais, Brazil (-43.50547, -20.05883, 1000 m) L.N. Perillo col., 7/X/2010 (UFMG 6655). Paratypes: one male, same collecting data (MPEG 24571); one female, same locality and collector, 15/IX/2010 (UFMG 6654); one female, Serra do Baú, Santa Bárbara, Minas Gerais, Brazil (-43.42887, -19.96764, 767 m), B.V.S. Pimenta & M.W.F. Faria col., 25/X – 4/XI/2008 (UFMG 8421).

Additional material examined. BRAZIL: **Minas Gerais**: Belo Horizonte, Estação Ecológica da UFMG (-43.96667, -19.86667, 817 m), XI/2012, A.A.S. Monteiro & R.C. Digue-Loja col., 3♂ (UFMG 13237), same locality and collector, XI – XII/2012, 3♂ (UFMG 13238).

Derivatio nominis. "Beagá" is a commonly used nickname for Belo Horizonte, one of the localities where the species is known to occur and also the homeland of the first author. The name should be treated as a noun in apposition.

Differential diagnosis. Males are similar to those of *I. varia* and *I. benjori* **sp.n.** by lacking a prolateral tegular projection; they are easily distinguished by the laminar prolateral sector of the median apophysis (pMA), which bears many long hair-like projections, and by the short, digitiform dorsal lobe of the RTA (Figs. 19A,B, 20). Females are distinguished by the trapezoidal dorsal piece of the epigynum, which is widest posteriorly and covers the spermathecae partially; by the laterally projecting secondary spermathecae, visible laterally to the dorsal piece; and by the large and strongly sclerotized apodemes just anterior to the vulva (Fig. 19C,D).

Description. Male holotype: Carapace, chelicerae, endites, labium dark brown. Sternum light brown. Leg I dark brown, except for light brown metatarsus and yellowish white tarsus and distal half of tibia. Legs II – III light brown, except for dark brown femora. Leg IV light brown, except for dark brown femur, tibia and metatarsus; femur with retrolateral, median light brown patch. Abdomen dark brown, with gray, transverse markings on posterior end of dorsum. Total length 6.61. Carapace 3.36 long, 2.52 wide, 1.35 high. Clypeus 0.36 high. Anterior eye row 0.81 wide, posterior eye row 1.04 wide. Eye diameters and interdistances: AME 0.18, ALE 0.18, PME 0.15, PLE 0.15, AME – AME 0.13, AME – ALE 0.08, PME – PME 0.18, PME – PLE 0.20, ALE – PLE 0.10. Median ocular quadrangle length 0.43, anterior width 0.41, posterior width 0.46. Chelicerae 1.68 long, with three promarginal teeth, two retromarginal teeth and setal tufts on promargins. Sternum 1.73 long, 1.53 wide. Abdomen 3.12 long, 1.86 wide. Leg measurements: I– femur 2.75, patella 1.22, tibia 2.31, metatarsus 2.42, tarsus 1.68. II– 2.42, 1.12, 2.24, 2.08, 0.89. III– 2.19, 1.04, 1.73, 2.06, 1.17. IV– 2.95, 1.22, 2.42, 3.39, 1.53. Leg spination: I– tibia v2-2-2, metatarsus v2-2. II– tibia v2-2-2, metatarsus v2-2. III– tibia d2-2, v2-2-2, metatarsus d2-2-2, v2-2-2. IV– tibia d2-2, v1-2-2, metatarsus d2-2-2, v2-2-2. *Palp* (Figs. 19A,B, 20A). *Retrolateral tibial apophysis* with two lobes: two-branched ventral lobe, with blunt basal process and acuminate apical process; and narrow, digitiform dorsal lobe. *Tegulum* globose, without any apophyses, with shallow incision near insertion of embolus. *Median apophysis* made of three pieces: short, pointed retrolateral sector; globular, unsclerotized apical sector bearing spine-like projections, and large, laminar prolateral sector bearing long hair-like projections (shorter near apex), with hematodocha-like membranous area at base. *Conductor* large, rounded, membranous, arising prolaterally to median apophysis, positioned in apposition to embolus. *Embolus* short and retrolaterally inserted, with process visible in expanded palp.

Female paratype (UFMG 8421): Carapace, chelicerae dark brown. Endites, labium, sternum light brown. Leg I light brown, except for whitish yellow distal end of tibia and dark brown femur, patella and proximal end of tibia. Legs II – III light brown, except for dark brown femora. Leg IV light brown, except for dark brown femur and tibia; femur with a retrolateral, median light brown patch. Abdomen brownish gray, with gray transverse markings on dorsum. Total length 7.25. Carapace 3.50 long, 2.54 wide, 1.07 high. Clypeus 0.31 high. Anterior eye row 0.84 wide, posterior eye row 1.04 wide. Eye diameters and interdistances: AME 0.18, ALE 0.18, PME 0.15, PLE 0.18, AME – AME 0.13, AME – ALE 0.08, PME – PME 0.18, PME – PLE 0.23, ALE – PLE 0.08. Median ocular quadrangle length 0.43, anterior width 0.41, posterior width 0.46. Chelicerae 1.35 long, with three promarginal teeth, two retromarginal teeth and setal tufts on promargins. Sternum 1.70 long, 1.50 wide. Abdomen 3.86 long, 2.34 wide. Leg measurements: I– femur 2.70, patella 1.17, tibia 2.61, metatarsus 2.11, tarsus 1.47. II– 2.47, 1.12, 2.29, 1.98, 1.35. III– 2.16, 1.07, 1.83, 2.03, 1.12. IV– 2.98, 1.25, 2.98, 3.35, 1.47. Leg spination: I– tibia v2-2-2, metatarsus v2-2. II– tibia v2-2-2, metatarsus v2-2. III– tibia d2-2, v2-2-2, metatarsus d2-2-2, v2-2-2. IV– tibia d2-2, v1-2-2, metatarsus d2-2-2, v2-2-2. *Genitalia* (Fig. 19C,D). *Epigynum* very lightly sclerotized, with widely separated copulatory openings positioned medially. *Vulva* with short, trapezoidal dorsal piece, which is widest posteriorly, with an anterior notch; copulatory ducts thin; secondary spermathecae partially visible laterally to dorsal piece in dorsal view; primary spermathecae small, oval, partially covered by dorsal piece; fertilization ducts directed medially, with apex bended anteriorly. With two strong, sclerotized apodemes near apex of dorsal piece.

Variation. Five males: total length 6.61 – 7.10; carapace length 3.36 – 3.72; femur I 2.75 – 2.99. Two females: total length 7.25 – 7.40, carapace length 3.50 – 3.47, femur I 2.70 – 3.87. The palpal morphology is distinct between males from Santa Bárbara and Belo Horizonte: the latter have a less slender palpus, and the shape of the retrolateral tibial apophysis is slightly different (Fig. 20B,C). We have not considered this rather small variation as sufficient to recognize these populations as distinct species, as closely related species of *Ianduba* have strikingly

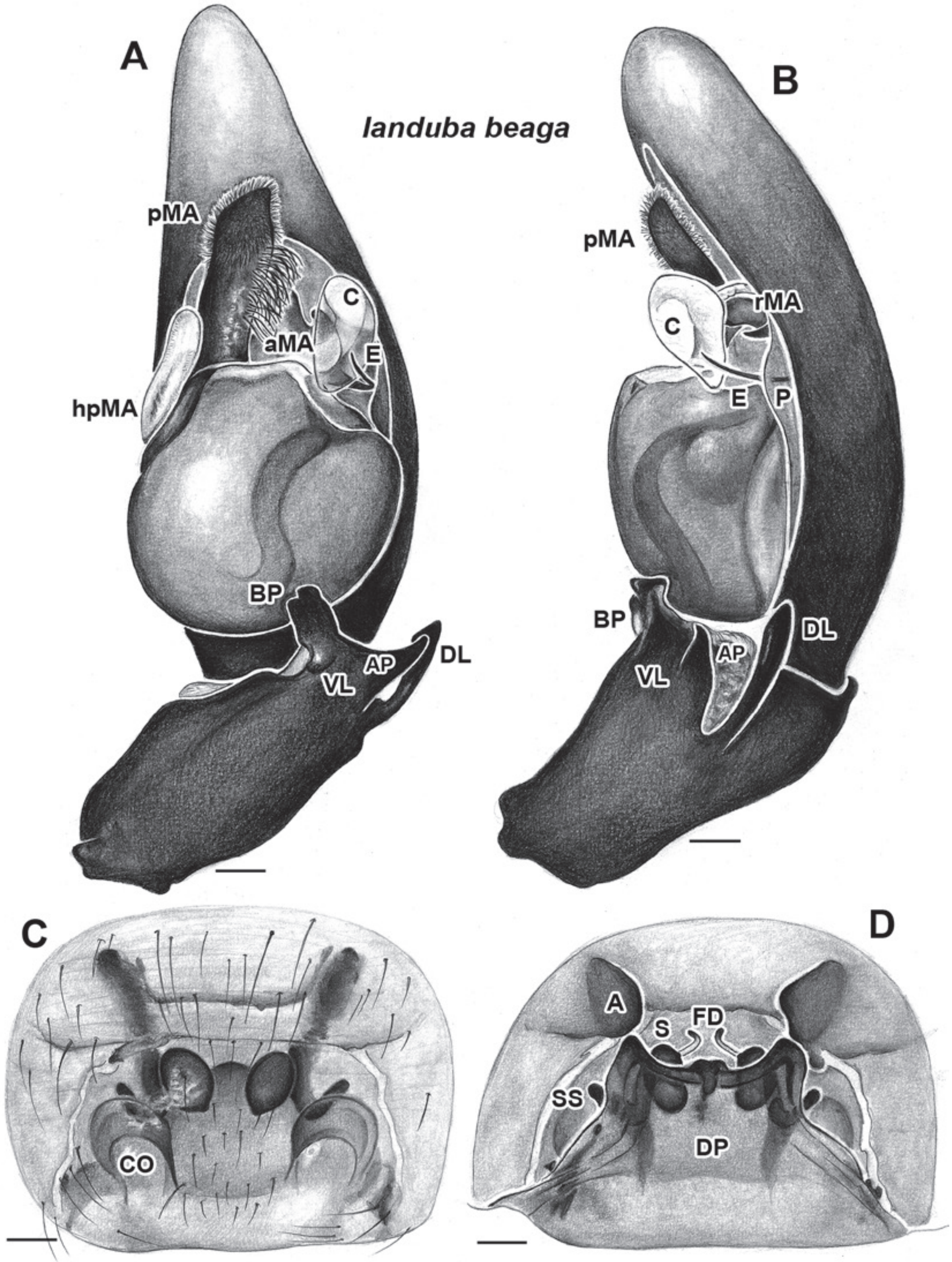

Fig. 19. *Ianduba beaga* **sp.n.** **A**,**B**: Male holotype (UFMG 6655). **A**: Palp, ventral view. **B**: Palp, retrolateral view. **C**,**D**: Female paratype (UFMG 8421). **C**: Epigynum, ventral view. **D**: Epigynum, dorsal view, cleared. See chapter 3 for abbreviations. Scale bars = 0.1 mm.

different palpal morphologies. As more populations are discovered, it will become clearer whether this is a clinal variation or these populations are independent evolutionary lineages.

Natural history. Label data indicate that specimens were collected in Möricke traps at altitudes of approximately 1000 m, and in pitfall traps at 767 – 834 m above sea level. All records are located in areas of secondary semi-decidual Atlantic forest. Adults were collected in the rainy season (October to November).

Distribution. Known from three nearby localities in central Minas Gerais, Brazil (Fig. 22).

6. New records

During the course of this work, several new records of previously described species were found. They are listed below.

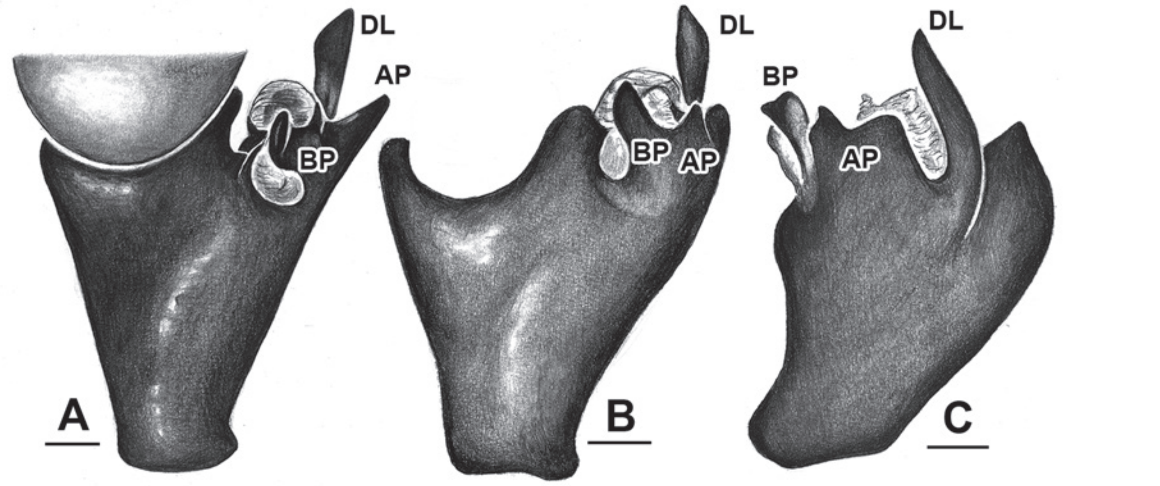

Fig. 20. Variation in palpal tibia morphology in *Ianduba beaga* **sp.n. A**: Male holotype (UFMG 6655), ventral view. **B**,**C**: Male from Belo Horizonte (UFMG 13237). **B**: Ventral view. **C**: Lateral view. See chapter 3 for abbreviations. Scale bars = 0.1 mm.

Ianduba abara **Bonaldo & Brescovit, 2007** (Fig. 23). **BRAZIL**: **Bahia**: Porto Seguro, Estação Vera Cruz Celulose [–39.17194, –16.39194, 63 m], 2006, J.P. Souza-Alves col., 1♂ (IBSP 70175), 1♂ (IBSP 70177), 1♂ (IBSP 70179).

Ianduba mugunza **Bonaldo & Brescovit, 2007** (Fig. 23). **BRAZIL**: **Bahia**: Ilhéus, CEPLAC [–39.0333, –14.8167, 8 m], 7/IV/1998, A.D. Brescovit col., 1♀ (IBSP 19429).

Ianduba patua **Bonaldo, 1997** (Fig. 23). **BRAZIL**: **Bahia**: Santa Teresinha, Serra da Jibóia (–39.48111, –12.0375, 253 m), 24–27/IV/2009, G.C. Ferreira col., 1♂ (IBSP 146296), 08/XI/2010, L.S. Carvalho col., 1♂ (CHNUFPI 120).

Ianduba paubrasil **Bonaldo, 1997** (Fig. 22). **BRAZIL**: **Bahia**: Prado, Cumuruxatiba (–39.18186, –17.10073), 1♂ (UFMG 17859). **Espírito Santo**: Conceição da Barra, Floresta Nacional do Rio Preto [–39.8493, –18.37159, 47 m], 19/X/2005, T. Souza *et al.* col., 1♀ (IBSP 135186).

Ianduba varia **(Keyserling, 1891)** (Figs. 1, 7, 8A–C, 9, 10A–H, 21). **BRAZIL**: **Minas Gerais**: Belo Horizonte, Estação Ecológica da UFMG (–43.96667, –19.86667, 817 m), 29/III/2000, E.S.S. Álvares & C.S.Azevedo col., 1♂ (IBSP 27211), 1♂ 1 juvenile (IBSP 27213, IX/1999–II/2001, 1♂ (IBSP 32260), VII/1999–II/2001, 1♂ 3♀ (IBSP 32332), 27/III/2000, 1♂ 1♀ (UFMG 3193), III/2001, E.S.S. Álvares col., 8♂ 7♀ (UFMG 3199), I–III/2001, 8♂ 8♀ (UFMG 6055); Belo Horizonte, Parque Municipal das Mangabeiras (–43.90532, –19.95413, 1035 m), 20/I/2005, H.H. Santos col., 1♂ (UFMG 8495); Brumadinho, Condomínio da Aldeia do Rio das Pedras [–44.1997, –20.1433, 777 m], 01/I/1998, A.J. Santos col., 1♂ (IBSP 36231); Ouro Branco, Serra do Ouro Branco (–43.60139, –20.50056, 1095 m), 25/IV/2007, Y. Antonini col., 1♀ (UFMG 12672), 26/III/2007, 1♂ (UFMG 12673), 9/V/2007, 1♂ (UFMG 12674), 22/X/2007, 1♂ (UFMG 12675), 21/X/2007, 1♀ (UFMG 12676), 25/III/2007, 1♂ (UFMG 12677), 24/X/2007, 1♀ (UFMG 12678), 20/VII/2007, 1♀ (UFMG 12679); Rio Acima, Condomínio Cachoeiras do Tangará [–43.79806, –20.09639, 871 m], I/2005, T.S. Moreira col., 1♀ (UFMG 1073); Rio Preto [–43.8275, –22.0864, 521 m], 1♀ 2 juveniles (MNRJ 06676). **Paraná**: Fenix, Parque Estadual de Vila Rica do Espírito Santo [–51.95, –23.9, 328 m], 2001–2003, Equipe Embrapa col., 1♀ (IBSP 124262), 24–29/IV/2003, 2♂ (IBSP 124265); Londrina, Parque Estadual Mata dos Godoys [–51.15, –23.3, 552 m], 13/IV/1999, J. Lopes col., 2♂ (IBSP 38241). **Rio de Janeiro**: Ilha Marambaia [–41.7833, –22.3833, 8 m], 27/IV/2001, E.F. Ramos col., 1♀ (IBSP 28229), 28/IV/2001, 1♀ (IBSP 28400); Macaé, Parque Nacional Restinga de Jurubatiba, Fazenda São Lázaros [–41.78291, –22.38257, 8 m], 27/III/2010, R.L.C. Baptista col., 1♂ 1♀ (MNRJ 06476); Nova Iguaçu, Reserva Biológica do Tinguá (–43.4511, –22.7592, 69 m), II/2002, E.F.Ramos col., 1♀ (IBSP 118091), III/2002, E.F. Ramos *et al.* col., 1♀ (IBSP 119267); Barrelão [–43.4511, –22.7592, 69 m], 2002, E. Folly col., 1♂ (IBSP 125353), 1♂ (IBSP 125354); Rio de Janeiro, Parque Nacional da Tijuca [–43.1667, –22.9, 7 m], 2♀ 6 juveniles (MNRJ 6669), 1♂ 2♀ (MNRJ 6670), 4♂ (MNRJ 6671), 2♀ (MNRJ 6672), 2♂ 4 juveniles (MNRJ 6673), Pedra Bonita, 1♂ 2 juveniles (MNRJ 6674), Cochrano, 1♂ (MNRJ 6675); Santa Maria Madalena, Parque Estadual do Desengano, Morumbéca [–41.91861, –21.87722, 1243 m], 1♀ (MNRJ 6771); Teresópolis, Parque Nacional da Serra dos Órgãos [–42.9833, –22.4333, 1001 m], 1♀ (MNRJ 6677); Volta Redonda, Floresta Cicuta, Trilha da Pedra do Sino [–44.1167, –22.5333, 399 m], 11/III/2002, E. Folly col., 1♂ (IBSP 39602). **Santa Catarina**: Urussanga, Rio Molha, Gruta da Santa [–49.3167, –28.5167, 90 m], 19–26/VII/2007, R.A. Teixeira col., 1♀ (IBSP 133875), 23/XI/2007, 1♂ (IBSP 132860). **São Paulo**: Amparo, Fazenda São Bento da Lapa [–46.7644, –22.7011, 745 m], 09/VIII/2004, L.S. Uchoa Jr. col., 1♀ (IBSP 50876); Bertioga, Trilha do rio Itatinga [–46.1386, –23.8544, 17 m], VII/2000, M.S.C. Morini col. col., 1♀ (IBSP 62356); Biritiba Mirim, Barragem do Rio Biritiba [–45.8667, –23.6333, 905 m], V/2003, Equipe IBSP col., 1♂ 1♀ (IBSP 122418); Campos do Jordão, Gruta dos Crioulos [–45.5833, –22.7333, 1656 m], X/2001, P. Gnaspini col., 1♂ (IBSP 31893); Catanduva, Usina São Domingos [–48.9728, –21.1378, 526 m], 03/X/2001, C. Rheims col., 1♂ (IBSP 31897); Cotia, Caucaia do Alto, Laboratório de Artrópodes [–46.9192, –23.6039, 792 m], 02/V/2004, F.S. Cunha col., 1♀ (IBSP 43560), 25/II/1998, M. Magro col., 1♀ (IBSP 16268), IV/1973, V. Haddad col., 1♂ 1♀ (IBSP 2630); Cubatão, Mata de Encosta da Copebrás (–46.39778, –23.835, 38 m), VI, IX, XII/2008, A.A. Nogueira col., 1♀ (IBSP 141872), 1♂ (IBSP 141873), 1♂ (IBSP 141874), 1♂ (IBSP 141875); Guarujá, Ilha da Moela [–46.2667, –24,6 m], 17–19/VIII/2009, R.P. Indicatti & G.P. Perroni col., 1♀ (IBSP 145308), 29–31/III/2009, R.P. Indicatti & F.U. Yamamoto col., 1♂ 1♀ (IBSP 134479); Itapevi, Condomínio Trensurb, Praia do Tombo [–46.9342, –23.5489, 785 m], 29/IX/2000, V. Onofrio & D.M. Battesti col., 1♂ (IBSP 123526); Mogi das Cruzes, Parque das Neblinas (–46.16222, –23.74778, 777 m), 20/III/2006, M. Uehara-Prado col., 1♂ (IBSP 142159), 1♂ (IBSP 142161), 01/XII/2005, 1♀ (IBSP 142162), 03/I/2006, 1♀ (IBSP 142163); Núcleo Santa Vírginia, Parque Estadual Serra do Mar [–45.1253, –23.3444, 863 m], 13/IV/2005, M.V. Prado col., 2♂ (IBSP 58538), 14/III/2005, 1♂ (IBSP 58541), 17/II/2005, 1♀ (IBSP 58549), 14/III/2005, 1♂ (IBSP 58552); Peruíbe, Estação Ecológica Juréia-Itatins (–47.01758, –24.38711, 146 m), 21–26/IV/2012, G.H.F. Azevedo & J.P.P. Pena-Barbosa col., 1♀ (UFMG 13011); Salesópolis, Es-

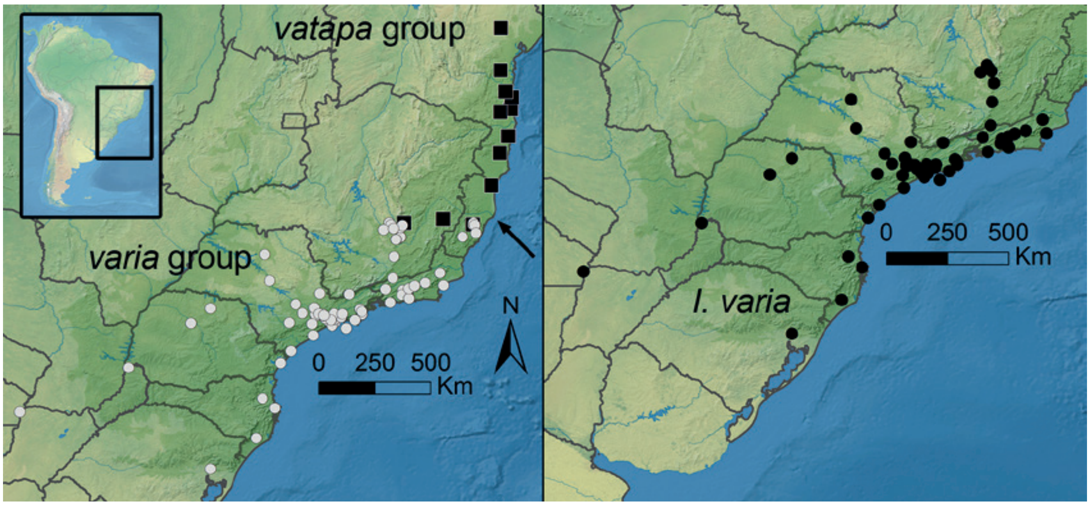

Fig. 21. Left: distribution of *Ianduba* species groups: *varia* (gray circles) and *vatapa* (black squares). Arrow indicates the mouth of the Doce River. **Right**: distribution of *Ianduba varia* (Keyserling, 1891).

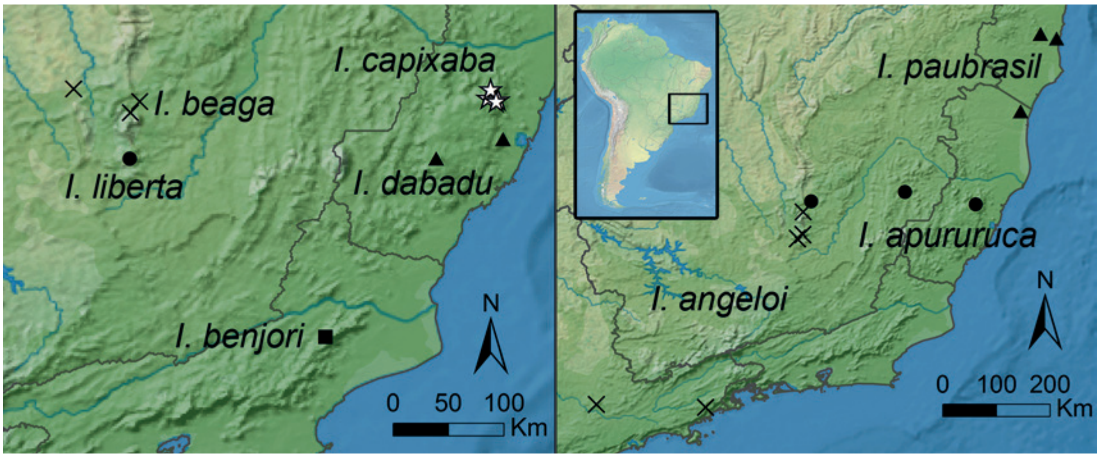

Fig. 22. Left: distribution of *Ianduba beaga* **sp.n.** (crosses), *I. liberta* **sp.n.** (circle), *I. benjori* **sp.n.** (square), *I. dabadu* **sp.n.** (triangles) and *I. capixaba* **sp.n.** (stars). **Right**: distribution of *I. paubrasil* Bonaldo, 1997 (triangles), *I. apururuca* **sp.n.** (circles) and *I. angeloi* **sp.n.** (crosses).

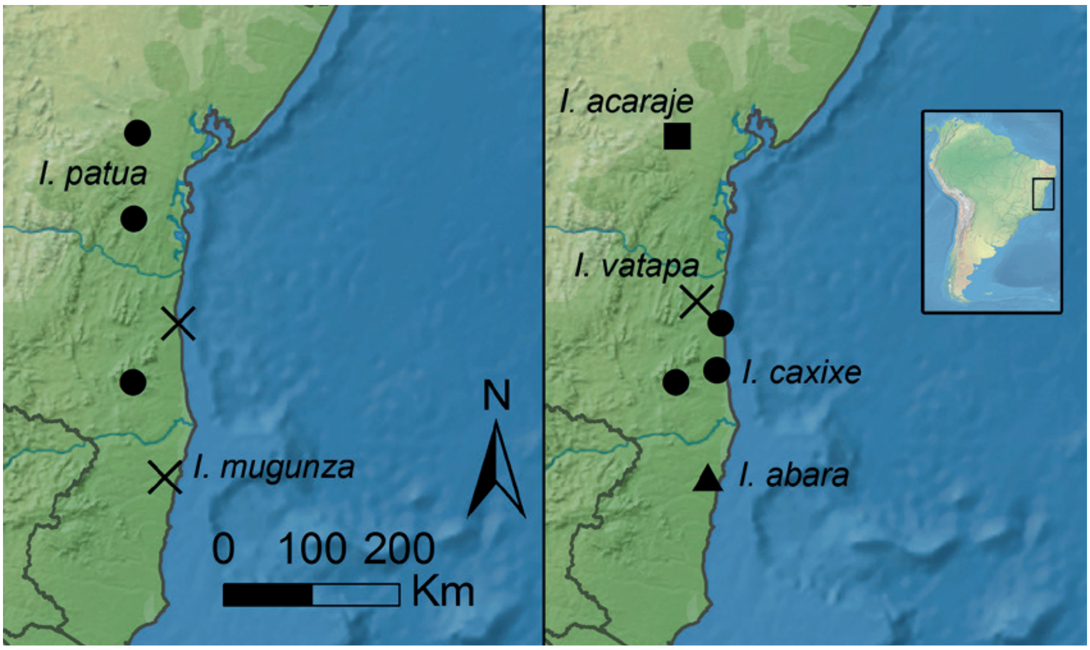

Fig. 23. Left: distribution of *Ianduba patua* Bonaldo, 1997 (circles) and *I. mugunza* Bonaldo & Brescovit, 2007 (crosses). **Right**: distribution of *I. acaraje* **sp.n.** (square), *I. vatapa* Bonaldo, 1997 (cross), *I. caxixe* Bonaldo, 1997 (circles) and *I. abara* Bonaldo & Brescovit, 2007 (triangle).

tação Biológica de Boracéia (–45.88889, –23.65278, 883 m), 27/III/2006, M. Uehara-Prado col., 1♀ (IBSP 142145), 1♂ (IBSP 142146), 12/I/2006, 1♀ (IBSP 142147), 27/III/2006, 1♂ (IBSP 142148), 08/XII/2005, 1♀ (IBSP 142150), 09/XII/2005, 1♀ (IBSP 142152), 20/II/2006, 1♀ (IBSP 142153), 28/IV/2006, 1♂ 1♀ (IBSP 142154), 25/V/2006, 1♂ (IBSP 142155); Santo André, Reserva Biológica do Alto da Serra de Paranapiacaba (–46.30556, –23.76667, 806 m), 20/III/2007, 1♀ (IBSP 142628), 17/XI/2006, 1♀ (IBSP 142630), 18/XII/2006, 1♂ (IBSP 142636); São Bernardo do Campo, Parque Estoril [–46.55, –23.7, 771 m], 12–19/III/2008, C.V. Janini et al. col., 1♂ (IBSP 119064), 05–10/IV/2006, B.Távora col. col., 1♂ (IBSP 72250); São Luiz do Paraitinga, Parque Estadual da Serra do Mar (–45.14583, –23.33583, 945 m), 20/XI/2004, M. Uehara-Prado col., 1♀ (IBSP 143315); São Paulo, Campus da USP [–46.71667, –23.55, 745 m], 28/V/2007, E.O. Machado col., 1♂ (IBSP 116743) 2000, R.Willemart col., 1♀ (IBSP 27270), V/2001, Alunos USP col., 1♂ (IBSP 41740), Mata do Cuaso, 1♂ 1♀ (IBSP 41742), 2♂ (IBSP 41746), 1♀ (IBSP 41796), 16–23/IV/1999, D.F. Candiani col., 1♀ (IBSP 42217), 16–23/XI/1999, 1♀ (IBSP 42226), 1♀ (IBSP 42227), V/2000–II/2001, 9♂ 14♀ (IBSP 76254); São Paulo, Campus IBSP, Mata da Cidade Universitária Armando de Salles Oliveira [–46.71667, –23.55, 745 m], 22/II/1999, A.D. Brescovit col., 1♂ (IBSP 21448), 06/XI/2000, R. Martins col., 1♂ (IBSP 27351); São Paulo, Horto Florestal Oswaldo Cruz, [–46.6333, –23.6, 781 m], 16–23/II/2000, D.F. Candiani col., 1♂ (IBSP 42210); São Paulo, Ilha Parque dos Eucaliptos, 06–12/XI/1999, R.P. Indicatti col., 1♀ (IBSP 131676), 09–15/IX/1999, 1♂ (IBSP 131677); São Paulo, Jardim Angela, 1♀ (IBSP 131678), 1♂ (IBSP 131679), 06–12/XI/1999, 1♀ (IBSP 131680); São Paulo, Parque Alfrodo Volpi, 19–23/III/2005, A. Bagio col., 1♀ (IBSP 59303); São Paulo, Parque Burle Marx, 18–25/VII/2005, 1♀ (IBSP 59307), 1♀ (IBSP 59310); São Paulo, Parque do Estado, 28/II–06/III/2002, J.R. Valvassori col., 1♀ (IBSP 59202); São Paulo, Parque do Ibirapuera, 06/IX/2007, R. Pando col., 1♀ (IBSP 123974); São Paulo, Parque Estadual da Cantareira, Núcleo Águas Claras, 14–19/XI/2004, F.U. Yamamoto col., 1♀ (IBSP 66363), 02–07/II/2005, 1♂ (IBSP 66364), 14–19/XI/2004, 1♂ (IBSP 66366); São Paulo, Reservatório Guarapiranga, 06–12/XI/1999, R.P. Indicatti *et al.* col., 1♂ (IBSP 132304), 07–13/IV/2005, I. Cizauskas & C.R.M Garcia col., 1♀ (IBSP 61558), 1♂ (IBSP 61561), 07–13/X/2004, 1♀ (IBSP 61566); São Paulo, 07/VI/1999, P.E.S. Cantagalo col., 1♂ (IBSP 23830); 25/VII/2006, P.C.E. Berti col., 1♂ (IBSP 75823); São Paulo, Bairro Butantã, VI/2001, H.F. Japyassú *et al.* col., 1♂ (IBSP 28919), Campus da USP, Jardim Rizzo, 23/II/2000, F.S. Cunha col., 1♂ (IBSP 32930); São Roque, Reserva Florestal Cuaso [–47.7272, –23.135, 544 m], 29/IV/1996, J.C.C. Korte col., 1♂ (IBSP 10989); São Sebastião, Ilha de Alcatrazes [–45.6942, –24.10179, 1 m], XII/1996, R. Bertani col., 1♀ (IBSP 7893); Sorocaba, Mata de Eucalipto da Mata da UNIP [–47.4581, –23.5017, 598 m], 14/VI/2008, I. Cizauskas *et al.* col., 1♂ (IBSP 99042), 1♀ (IBSP 99044); Ubatuba, Parque Estadual da Ilha Anchieta (–45.05, –23.53333, 51 m), 23–30/VII/2001, Equipe Biota col., 1♀ (IBSP 56425), 1♀ (IBSP 56428), 1♀ (IBSP 56429), 1♂ (IBSP 56430), 1♂ (IBSP 56433), 1♀ (IBSP 56434).

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