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## The Goblin Spider Genus *Costarina* (Araneae, Oonopidae), Part 3

NORMAN I. PLATNICK<sup>1</sup> AND LILY BERNIKER<sup>1</sup>

### ABSTRACT

The *Costarina* faunas of Panama and Colombia are revised. Because Chickering described the sexes from his Panamanian collections separately, several of his names based only on females are placed as junior synonyms of names based only on males: *C. humphreyi* (Chickering) is newly synonymized with *C. recondita* (Chickering), as are *C. belinda* (Chickering) with *C. intempina* (Chickering), *C. rigida* (Chickering) with *C. abdita* (Chickering), *C. silvatica* (Chickering) with *C. dura* (Chickering), and *C. improvisa* (Chickering) with *C. seclusa* (Chickering). The Costa Rican species *C. pittier* Platnick and Berniker is newly recorded from Panama. Nine new species are described from Panama (*C. sorkini*, *cerrocol*, *bocas*, *chiriqui*, *clara*, *fortuna*, *almirante*, *dybasi*, and *tskui*), as are 11 from Colombia (*C. sasaima*, *suiza*, *otun*, *choco*, *yotoco*, *saladito*, *antonio*, *anchicaya*, *gorgona*, *helechal*, and *taraira*). Previous studies on more northern species are supplemented; newly available collections from Nicaragua reveal the presence there of two new species (*C. kilambe* and *diablo*), and locality records are provided for the Costa Rican members of the genus.

### INTRODUCTION

One of the problems confronting students of goblin spiders, and other sexually dimorphic organisms, is correctly matching males and females, especially when two or more congeneric species occur sympatrically. The problem is well exemplified in the treatments by Chickering (1951, 1968) of the Panamanian species now placed in the genus *Costarina* Platnick and Dupérré (2011). Chickering described no fewer than 13 species of this genus from the collec-

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tions he made, over many years, at just a few sites in Panama; however, seven of those names were based only on males, and six were based only on females. In some cases, Chickering even collected the two sexes together; for example, in August of 1950 he collected two males and four females “during the same short period of nine days in Boquete” (1968: 9). These were the only specimens of *Costarina* Chickering collected at Boquete during that 1950 expedition; he described the females as *Dysderina belinda*. Later in the same paper, he described the males as *Dysderina intempina*, commenting (1968: 20) that “Females taken at the same time and in the same locality may also belong here but there can be no certainty at this time.”

Although Chickering’s statement is literally true, it misses the target. First, in this case, there is at least one morphological character suggesting that the two sexes that were collected together are indeed conspecific: they share an unusual, complexly shaped posterior sternal ridge (fig. 18). More importantly, though, Chickering’s approach resulted in a seriously flawed estimate of the total diversity of *Costarina* species found in his collections. Hypotheses matching the sexes, in any particular case, may prove to be erroneous, of course; there is no more “certainty” involved in these hypotheses than in those concerning the characters thought to differentiate species. The most “certain” outcome of Chickering’s approach, however, is grotesquely inflated estimates of an area’s biodiversity. As one would expect, in this case the six names based only on females each appear to be mere synonyms of the various species Chickering also described from males. The unparsimonious approach adopted by Chickering virtually guaranteed that roughly half of his names would become synonyms (cf. Edwards, 2013).

In Chickering’s case, the misguided search for “certainty” resulted in problems at higher taxonomic levels as well. His unwillingness to match males and females he had taken together precluded his discovery that some of the characters previously used to group species and genera of goblin spiders are actually sexually dimorphic (for details, see Bonaldo et al., 2014).

In the present paper, we complete our coverage of the speciose genus *Costarina* by revising the species found in the most southern part of the generic range, Panama and Colombia. We also take the opportunity to update previous studies of the more northern species (Platnick and Dupérré, 2012; Platnick et al., 2014), to provide detailed locality records for the Costa Rican species not presented in the latter paper, and to offer some comments on interrelationships among the many species involved.

The new taxa supply some novelties. For example, in both sexes of *C. choco*, new species, from Colombia, the dorsal scutum has fused to the epigastric scutum, a feature found in some other members of the *Dysderina* complex (see Platnick et al., 2013a: 5) but not previously noted in any *Costarina* species. Although fusion of the epigastric and postepigastric scuta is universal among males of the genus, females with fused ventral scuta were previously known only from Costa Rica (and further south, as detailed below), but one of the new species described below from Nicaragua also shows that unusual feature.

Understanding relationships within *Costarina* is a complex problem, not only because the genus is so speciose (now containing 108 species), but because many of the species remain poorly known—13 species are known only from males and three are known only from females. Given the large number of potential clades of two or more species, and that the species are at

present differentiated almost entirely by genitalic details, it isn't likely that anything close to a fully resolved cladogram will be obtainable soon. Even if we succeed in identifying features of the male palps that are actually synapomorphic for some subgroup, the likelihood of finding an exactly congruent genitalic character among the many females is low, and hypotheses of the monophyly of any of the groups will be suspect simply because of the species that are not yet known from the relevant sex.

Nevertheless, we have attempted to recognize some species groups. For example, there are seven species (*abdita* from Panama and *chonta*, *cima*, *cuerici*, *poas*, *rafael*, and *san* from Costa Rica) in which the distal prong of the male embolus is enlarged, fan shaped, and clearly divided into distal sclerotized and proximal translucent portions, and the proximal prong is reduced to a small projection that is largely hidden behind a prolateral fold of the distal prong (fig. 26). The females of these species share a thickened anterior atrial border, a reduced atrium, and (except possibly in *chonta*) a W-shaped sclerotization that extends posteriorly between the apodemes (fig. 33).

Four other species from Costa Rica (*aguirre*, *alturas*, *isidro*, and *monte*) share the distal-prong features of the *abdita* group, but the proximal prong is normal in size and position, and (in all save *aguirre*) notably narrowed, elongated, and sharply pointed (Platnick et al., 2014: fig. 259). Of these species, the females share a thickened anterior atrial border and all save *monte* have the posterior W-shaped sclerotization and a normal (rather than reduced) atrium. This group could thus be paraphyletic relative to the *abdita* group.

Five further species resemble those of these two groups. Two of them (*junio* and *macho*) seem to be sister species, sharing a spiraled distal prong (Platnick et al., 2014: fig. 294) that, like those of *intempina*, *palmar*, and *parapalmar*, is not fan shaped but is enlarged and divided into sclerotized and translucent portions (figs. 12, 14). Females of *parapalmar* are unknown, but those of the other four species resemble those above in having a notably thickened anterior atrial border and the posterior W-shaped sclerotization; the atrium is reduced in all save *junio*.

Another seven species from Costa Rica and Panama have the distal prong divided into sclerotized and translucent portions (figs. 80, 136) but unexpanded (*clara*, *frantzius*, *leones*, *nara*, *obtina*, *osa*, and *seclusa*); in all save *leones* and *obtina*, the proximal prong is long, narrow, and sharply pointed. The known females share the notably thickened anterior atrial margin and the posterior W-shaped sclerotization, and we therefore suspect that all of the above species may form a monophyletic group; each of the subgroups might be paraphyletic relative to those preceding their discussion (except for the first-discussed *abdita* group).

Some pairs of species share notable genitalic modifications. Perhaps the most obvious are two sharing an embolus that is long and narrow, with no trace of a separate proximal prong (*pittier* and *reventazon*, Platnick et al., 2014: figs. 306, 465). The female is known only for *pittier*, and it resembles those of the above-discussed groups. Another such pair (*coma* from Honduras and *helechal* from Colombia) share a long, sinuous proximal prong that is widely separated from a long, relatively narrow distal prong (fig. 241). The geographic disparity suggests that the similarity may be misleading; unfortunately, females are known only for *coma*. Another pair of possible sister species from Costa Rica share a wide, straight proximal prong that is overlaid,

in ventral view, by a lobe of the distal prong (*jimenez*, *ubicki*; Platnick et al., 2014: figs. 498, 542); males of two other species (*chiriqui* from Panama and *gorgona* from Colombia) have a similar embolar conformation but differently shaped proximal prongs (figs. 77, 230). Two other species from Costa Rica (*ramon*, *upala*) may be sister taxa, sharing an oddly cap-shaped, retrolaterally protuberant distal prong (Platnick et al., 2014: figs. 104, 105, 247, 248).

Similarly odd are two Costa Rican species that have deeply bifid dorsal prongs, the distalmost portion of which is subdivided into rounded basal and sharply pointed terminal portions (*azul*, *cruz*; Platnick et al., 2014: figs. 160, 331). Females of this species pair share fused ventral scuta, a greatly thickened anterior atrial border, and a widened base of the anterior genitalic process (Platnick et al., 2014: figs. 165, 336). The deeply bifid distal prong is found also in a large group of species from Costa Rica and Panama (*almirante*, *carrillo*, *elena*, *hitoy*, *meridina*, *mooreorum*, *murphyorum*, *penshurst*, *pity*, and *selva*; figs. 94, 95). There may be two subgroups involved; in one (*meridina*, *murphyorum*, *selva*) the distalmost prong is long and narrow, whereas in the others it is distally expanded. There seems to be little that unites the females of these species, although some members of each subgroup (such as *selva* and *carrillo*) have such autapomorphic female genitalia that detecting any close relatives is problematic. Males of three other species (*cerere* and *chiles* from Costa Rica, plus *dybasi* from Panama) have the dorsal prong appearing more trifid than bifid (fig. 106), and may be members of this group, or perhaps its sister taxon; females of all three species have an anteriorly widened anterior genitalic process (fig. 112).

Such highly unusual female genitalia do sometimes suggest relationships, however. For example, three species (*bocas* from Panama, plus *choco* and *yotoco* from Colombia) share a posterior genitalic atrium and an enormously expanded tip on the anterior genitalic process (figs. 65, 191), and their known males do share a medially excavated distal embolar prong (figs. 60, 186). Such an excavated distal prong may be shared with four other species (*carara*, *gemelo*, and *parabio* from Costa Rica plus *kilambe* from Nicaragua; fig. 250)

Among the remaining males, those of three species (*semibio* from Costa Rica, *cerrocol* from Panama, and *saladito* from Colombia) share an embolar conformation in which both the proximal and distal prongs are long, narrow, approximate, and largely parallel (figs. 49, 197). There are several species with a similar conformation, but with the two prongs more widely separated, including *iviei*, *llama*, *oaxaca*, and *naja* from Mexico, plus *barbilla* and *maritza* from Costa Rica; Platnick et al., 2014: figs. 38, 313).

Finally, there are numerous males that share the embolar conformation of the type species, *plena*, with a relatively short, often distally bent distal prong closely accompanied by the proximal prong, which is often retrolaterally expanded (as in fig. 38); such species resembling *plena* include *mixtepec*, *subplena*, *sepultura*, and *bochil* from Mexico; *peten*, *macha*, and *morales* from Guatemala; *cortes*, *cofradia*, *cusuco*, *tela*, *ceiba*, *branstetteri*, *olancho*, *muralla*, and *gracias* from Honduras; *waspuk*, *musun*, *blanco*, and *diablo* from Nicaragua; *paraplena*, *superplena*, *watina*, and *concinna* from Costa Rica; *recondita*, *sorkini*, and *fortuna* from Panama; plus *sasaima*, *suiza*, and *otun* from Colombia. Of course, it is possible that this conformation represents the plesiomorphic form for the genus; the known females of these species do tend to have relatively unmodified genitalia.

Our methods follow those of Platnick and Dupérré (2009); only differences from the males (beyond the obvious lack of male endite modifications) are mentioned in the descriptions of females. Scans were taken from uncoated right male palps, and the images were flipped for consistency. The taxa are treated in geographic order, beginning with the three species that occur in Costa Rica as well as Panama, and proceeding southward. All measurements are in mm; high-resolution versions of the images, a sortable version of the geocoded locality data, and a distribution map for each species (with dots linked to the specimen data) will be available on the goblin spider Planetary Biodiversity Inventory (PBI) project's website (<http://research.amnh.org/oonopidae>). Users should note that the relatively small published images are merely avatars for the actual image files on the website, which can each be enlarged several times before pixelating.

#### COLLECTIONS EXAMINED

AMNH American Museum of Natural History, New York, NY  
 CAS California Academy of Sciences, San Francisco, CA  
 FMNH Field Museum of Natural History, Chicago, IL  
 FSCA Florida State Collection of Arthropods, Gainesville, FL  
 IAVH Instituto Alexander von Humboldt, Bogotá, Colombia  
 ICN Instituto de Ciencias Naturales, Universidad Nacional, Bogotá, Colombia  
 INBIO Instituto Nacional de Biodiversidad, Santo Domingo, Costa Rica  
 MCZ Museum of Comparative Zoology, Harvard University, Cambridge, MA  
 MIUP Museo de Invertebrados, Universidad de Panamá, Panama  
 MRAC Musée Royal de l'Afrique Centrale, Tervuren, Belgium  
 USNM National Museum of Natural History, Smithsonian Institution, Washington, DC  
 ZMUC Zoological Museum, University of Copenhagen, Denmark

#### *Costarina* Platnick and Dupérré

*Costarina* Platnick and Dupérré, 2011: 50 (type species by original designation *Dysderina plena* O. P.-Cambridge, 1894).

**DIAGNOSIS:** Members of *Costarina* can be recognized by the presence of three transverse sternal ridges together with the absence of grooves connecting either the anterior or posterior pairs of spiracles (see Platnick and Dupérré, 2012: 3).

**DESCRIPTION:** For all characters not mentioned here, see Platnick and Dupérré, 2012: 3. Total length of females 1.7–2.8. Posterior portion of pars cephalica usually with large, U-shaped smooth area, but smooth area reduced in females of *C. anchicaya*, *cerroco*, *diablo*, *dura*, *dybasi*, *gorgona*, *intempina*, *kilambe*, *recondite*, *saladito*, *sasaima*, *seclusa*, *taraira*, *tskui*, *yotoco*, absent in females of *C. almirante*, reduced in both sexes of *C. antonio*, *bocas*. ALE separated by roughly their radius. Anterior margin of sternum usually with continuous transverse groove, but groove interrupted medially in at least *C. antonio*, *gorgona*, *kilambe*, *otun*, *saladito*, *suiza*, *taraira*,

*yotoco*; surface of sternum with three transverse ridges connected by median longitudinal ridge, longitudinal ridge usually with anastomosing branches but sometimes simple or weak, rarely reduced to connecting only two anteriormost transverse ridges or virtually obsolete. Cheliceral retromargin usually without tooth. Serrula apparently absent (scanned only in *C. plena*). Dorsal scutum of males usually covering full length, width of abdomen, fused to epigastric scutum in *C. choco*, of females covering from 3/4 to full length, width of abdomen. Postepigastric scutum of males usually extending to nearly full length of abdomen; postepigastric scutum of females almost semicircular, usually free, but fused to epigastric scutum in *C. almirante*, *antonio*, *bocas*, *choco*, *dybasi*, *gorgona*, *kilambe*, *otun*, *sasaima*, *seclusa*, *sorkini*, *taraira*, *tskui*, extending to at least 2/3 of abdomen length. Spinneret scutum present as incomplete ring with fringe of long setae in females, but often reduced to narrow rim or detectable only by setal positions in males.

#### Key to Species from Panama

1. Males ..... 2
  - Females (unknown in *chiriqui*, *clara*, and *fortuna*) ..... 18
2. Proximal and distal prongs of embolus largely or entirely fused ..... 3
  - Proximal and distal prongs of embolus clearly separate ..... 5
3. Embolus wide (fig. 27) ..... *abdita*
  - Embolus narrower ..... 4
4. Embolar base elongated (Platnick et al., 2014: fig. 465) ..... *pittier*
  - Embolar base short (fig. 60) ..... *bocas*
5. Proximal prong of embolus relatively wide (as in figs. 5, 38) ..... 6
  - Proximal prong of embolus relatively narrow (as in figs. 49, 83) ..... 10
6. Proximal prong of embolus smaller than distal prong (fig. 5) ..... *recondita*
  - Proximal prong of embolus larger than distal prong (as in figs. 38, 77) ..... 7
7. Distal prong of embolus widened distally (figs. 77, 78) ..... *chiriqui*
  - Distal prong of embolus narrowed distally ..... 8
8. Tips of embolar prongs widely separated (figs. 89, 90) ..... *fortuna*
  - Tips of embolar prongs approximate ..... 9
9. Proximal prong of embolus relatively long (figs. 38, 39) ..... *sorkini*
  - Proximal prong of embolus relatively short (Platnick et al., 2014: fig. 421) ..... *concinna*
10. Proximal or distal prongs of embolus bifid (figs. 95, 106) ..... 11
  - Proximal and distal prongs of embolus entire ..... 12
11. Embolus with three projections (figs. 94, 95) ..... *almirante*
  - Embolus with four projections (figs. 105, 106) ..... *dybasi*
12. Distal prong of embolus relatively wide, flat (as in figs. 83, 139) ..... 13
  - Distal prong of embolus otherwise ..... 15
13. Distal prong of embolus with distal notch (figs. 82, 83) ..... *clara*
  - Distal prong of embolus without distal notch ..... 14
14. Distal prong of embolus directed prolaterally (Platnick et al., 2014: fig. 443) ..... *obtina*

- Distal prong of embolus directed distally (fig. 139) . . . . . *seclusa*
- 15. Distal prong of embolus narrow (figs. 48, 49) . . . . . *cerrocol*
  - Distal prong of embolus wider . . . . . 16
- 16. Tips of embolar prongs approximate (figs. 15, 16) . . . . . *intempina*
  - Tips of embolar prongs widely separated . . . . . 17
- 17. Tip of proximal prong of embolus narrow (figs. 116, 117) . . . . . *tskui*
  - Tip of proximal prong of embolus wider (figs. 127, 128) . . . . . *dura*
- 18. Postepigastric scutum fused to epigastric scutum . . . . . 19
  - Postepigastric scutum not fused to epigastric scutum . . . . . 24
- 19. Tip of anterior genitalic process flared (figs. 66, 112, 123) . . . . . 20
  - Tip of anterior genitalic process not flared (figs. 44, 101, 145) . . . . . 22
- 20. Posterior margin of genitalia W-shaped (figs. 112, 123) . . . . . 21
  - Posterior margin of genitalia rounded (fig. 66) . . . . . *bocas*
- 21. Posterior genitalic sclerotization long (fig. 112) . . . . . *dybasi*
  - Posterior genitalic sclerotization shorter (fig. 123) . . . . . *tskui*
- 22. Apodemes relatively long (figs. 44, 101) . . . . . 23
  - Apodemes shorter (fig. 145) . . . . . *seclusa*
- 23. Anterior margin of apodemes procurved, corners angular (fig. 44) . . . . . *sorkini*
  - Anterior margin of apodemes straight, corners rounded (fig. 101) . . . . . *almirante*
- 24. Apodemes relatively long (as in figs. 11, 55) . . . . . 25
  - Apodemes shorter (as in figs. 22, 33) . . . . . 28
- 25. Posterior genitalic sclerotization short (fig. 55) . . . . . *cerrocol*
  - Posterior genitalic sclerotization almost as long as apodemes . . . . . 26
- 26. Posterior genitalic sclerotization narrow (fig. 11) . . . . . *recondita*
  - Posterior genitalic sclerotization wide, extending almost to apodemes . . . . . 27
- 27. Anterior genitalic process narrow (Platnick et al., 2014: fig. 449) . . . . . *obtina*
  - Anterior genitalic process wider (Platnick et al., 2014: fig. 471) . . . . . *pittier*
- 28. Posterior margin of genitalia W-shaped (figs. 22, 33) . . . . . 29
  - Posterior margin of genitalia rounded . . . . . 30
- 29. Posterior margin of genitalia with wide lobes (fig. 33) . . . . . *abdita*
  - Posterior margin of genitalia with narrow lobes (fig. 22) . . . . . *intempina*
- 30. Anterior genitalic process very long (Platnick et al., 2014: fig. 427) . . . . . *concinna*
  - Anterior genitalic process short (fig. 134) . . . . . *dura*

#### *Costarina concinna* (Chickering)

*Dysderina concinna* Chickering, 1968: 9, figs. 13–19 (male holotype from Volcán, Chiriquí, Panama, in MCZ; examined).

*Dysderina potena* Chickering, 1968: 24, figs. 50–52 (female holotype from Volcán, Chiriquí, Panama, in MCZ; examined). First synonymized by Platnick et al., 2014: 70.

*Costarina concinna*: Platnick and Dupérré, 2011: 50. – Platnick et al., 2014: 69, figs. 417–427.

*Costarina potena*: Platnick and Dupérré, 2011: 50.



**DIAGNOSIS:** This appears to be a southern vicariant of the widespread species *C. plena*; males have a much larger proximal embolar prong (Platnick et al., 2014: figs. 417–422) and females have a larger genital atrium (Platnick et al., 2014: figs. 426, 427).

**MALE:** See Platnick et al. (2014: 69).

**FEMALE:** See Platnick et al. (2014: 69).

**MATERIAL EXAMINED:** PANAMA: **Bocas del Toro:** no specific locality, 8°47'N, 82°11'W, July 14–16, 1987, premontane rain forest, elev. 800 m (D. Olson, MCZ PBI\_OON 37008), 2♂, 1♀; Quebrada Alicia cloud forest, 25 km NNE San Félix, 8°34'N, 81°50'W, June 6–11, 1980, Berlese, floor litter, root mat, near ridge top, elev. 1500 m (J. Wagner, FMNH 33638, 33652, PBI\_OON 10140, 10154, 51412), 4♂, 3♀, June 17, 1980, Berlese, epiphytic soil-root mat on log, elev. 1500 m (J. Wagner, FMNH PBI\_OON 10599), 1♂. **Chiriquí:** Baldwin Forest, 2 km W Cerro Punta, May 30–June 8, 1977, dung trap, elev. 1760 m (S. Peck, AMNH PBI\_OON 82), 1♀; Bambito Hotel, Cerro Punta, Aug. 10, 1983, leaf litter by road, elev. 1000 m (J. F. Murphy, AMNH PBI\_OON 36783), 1♀; Boquete, Aug. 4–11, 1954 (A. Chickering, MCZ 66660, PBI\_OON 51405), 1♀; “Casita Alta,” Finca Lerida, near Boquete, Mar. 17, 1959, Berlese, forest floor litter under palms, elev. 7750 ft (H. Dybas, FMNH PBI\_OON 51408), 2♂; Cerro Colorado, Jan. 7, 1981, under bamboo, elev. 1220 m (W. Suter, FMNH PBI\_OON 51416), 1♂, Jan. 8, 1981, flank, quebrada 1w, buttress of large tree along slope, elev. 1450 m (W. Suter, FMNH PBI\_OON 51417), 1♀, Jan. 11, 1981, quebrada 3w, grassy litter, pathside clearing, elev. 1490 m (W. Suter, FMNH 33677, PBI\_OON 10179), 1♀, Jan. 23, 1981, trail to peak, buttress of large tree above quebrada, elev. 1475 m (W. Suter, FMNH 33682, PBI\_OON 10184), 1♂, Jan. 24, 1981, semidry hillside litter, elev. 1290 m (W. Suter, FMNH PBI\_OON 10404), 1♂, same, quebrada 2w, litter pocket under roadside ferns, elev. 1485 m (W. Suter, FMNH 33676, PBI\_OON 10178), 1♀; Cerro Colorado minesite, 24 km NNE San Félix, 8°34'N, 81°50'W, June 24, 1980, Berlese, floor litter and root mat, elev. 1300 m (J. Wagner, FMNH 33646, PBI\_OON 10148), 2♂, 1♀; Cerro Pando, 12 km NE Santa Clara, 8°54.74'N, 82°43.29'W, June 17, 1996, wet cloud forest litter, elev. 2120 m (R. Anderson, AMNH PBI\_OON 51421), 1♂; Cerro Pata de Macho, 8°42'N, 82°13'W, July 23–25, 1987, elev. 1500 m (D. Olson, MCZ 72923, PBI\_OON 37015), 1♀; 2 km E Cerro Punta, June 1, 1977, oak forest litter, elev. 2200 m (S., J. Peck, FMNH 56496, 56515, PBI\_OON 10737, 10756), 1♂, 1♀; 5 km ESE Cerro Punta, May 23–28, 1977, carrion trap, elev. 2600 m (S. Peck, AMNH PBI\_OON 77), 1♀; Hartmann Finca, 30.7 km W Volcán, June 16, 1995, mixed oak forest litter, elev. 1800 m (R. Anderson, AMNH PBI\_OON 51422, 51423), 2♂, 1♀; La Amistad International Park, Cerro Punta, 8.87403°N, 82.5486°W, sifting litter near Los Quetzales Lodge, Sept. 20–23, 2008 (P. Sierwald et al., FMNH 43111, PBI\_OON 10654), 1♀; Las Nuevas, La Amistad International Park, 5.3 km W Cerro Punta, June 15, 1995, cloud forest litter, elev. 2150 m (R. Anderson, AMNH PBI\_OON 51420), 1♂; Parque Nacional Volcán Barú, 5.9 km E Cerro Punta, June 14, 1995, bamboo forest litter, oak ridge, elev. 2400 m (R. Anderson, AMNH PBI\_OON 51418), 2♂, 2♀; Parque Nacional Volcán Barú, 11 km W Boquete, June 18, 1995, mixed oak forest litter, elev. 2150 m (R. Anderson, AMNH PBI\_OON 51419), 2♀; Quebrada Honda, Reserva Forestal Fortuna, 8.75204°N, 82.23964°W, Sept. 22, 2008, cloudforest litter (M. Draney, FMNH 43132, PBI\_OON 10675), 1♂, 1♀, same, cloudforest litter, sparse undergrowth (M. Draney, A. McKenna-Foster, ex FMNH 43126, PBI\_OON 51454), 1♂, same, open treefall gap with lianas and sagittate-leaved palms (M. Draney, A. McKenna-Foster, FMNH 44214, PBI\_OON 10692), 1♂, 1♀, Sept. 23, 2008, sparse cloudforest litter with many ferns (M. Draney, A. McKenna-Foster, FMNH 43112, PBI\_OON 10655), 1♂, 1♀; Quebrada Samudio, Reserva Forestal Fortuna, 8.73502°N, 82.24719°W, Sept. 23, 2008, cloudforest litter (M. Draney, ex FMNH 43133, PBI\_OON 51453), 1♀, same, plot with spiny tree ferns (M. Draney, A. McKenna-Foster, FMNH 43119, PBI\_OON 10662), 1♀; Volcán, Aug. 9–14, 1950 (A. Chickering, MCZ 66635, PBI\_OON 51402, 51406), 3♂ (including holotype), same (MCZ 66661, PBI\_OON 38080, 51403, 51404), 5♀ (including holotype). **Darién:**

Estacion Rancho Frío, Cerro Pirre, Parque Nacional Darién, Mar. 21–Apr. 4, 2000, Malaise trap, elev. 80 m (R. Cambra et al., MIUP PBI\_OON 37742), 1 ♀, July 30–Aug. 8, 2002 (R. Miranda, A. Solis, MIUP PBI\_OON 37741), 1 ♂, 2 ♀. **Panamá:** Cerro Campana, June 5, 1995, wet montane forest litter, elev. 950 m (R. Anderson, AMNH PBI\_OON 51428), 1 ♂, 4 ♀, June 9, 1995, same (R. Anderson, AMNH PBI\_OON 51429), 1 ♂, 1 ♀.

**DISTRIBUTION:** Relatively widespread, from southern Costa Rica to southern Panama.

### *Costarina pittier* Platnick and Berniker

*Costarina pittier* Platnick and Berniker, in Platnick et al., 2014: 71, figs. 461–471 (male holotype from Estación Pittier, Puntarenas, Costa Rica, in INBIO; examined).

**DIAGNOSIS:** Males can easily be recognized by the long embolus without obvious prongs and with a sinuous tip (Platnick et al., 2014: figs. 461–466), females by the wide genital atrium with short, rounded posterior apodemal lobes (Platnick et al., 2014: figs. 470, 471).

**MALE:** See Platnick et al. (2014: 71).

**FEMALE:** See Platnick et al. (2014: 71).

**MATERIAL EXAMINED:** PANAMA: **Chiriquí:** Finca Palo Santo, W Nueva California, Mar. 6, 1959, Berlese, floor litter in ravine, elev. 4900 ft (FMNH 34129, PBI\_OON 10431), 1 ♂, 1 ♀; Hartmann Finca, 15 km NW Volcán, May 20–25, 1977, dung trap, elev. 1500 m (S. Peck, AMNH PBI\_OON 75), 1 ♀, 30.7 km W Volcán, June 16, 1995, mixed oak forest litter, elev. 1800 m (R. Anderson, AMNH PBI\_OON 51401), 4 ♂; Lagunas, 5 km SW Volcán, May 22–26, 1977, dung traps, elev. 1360 m (S. Peck, AMNH PBI\_OON 78), 2 ♀; 5 mi W Volcán, Aug. 10, 1983, rainforest edge, elev. 1000 m (J., F. Murphy, AMNH PBI\_OON 36542), 1 ♂, 1 ♀; Volcán, Aug. 9, 1983, hotel grounds, elev. 1000 m (J., F. Murphy, AMNH PBI\_OON 36782), 2 ♂, 1 ♀.

**DISTRIBUTION:** Southern Costa Rica (Puntarenas) and northern Panama (Chiriquí).

### *Costarina obtina* (Chickering)

*Dysderina obtina* Chickering, 1968: 21, figs. 42–45 (male holotype from Volcán, Chiriquí, Panama, in MCZ; examined).

*Costarina obtina:* Platnick and Dupérré, 2011: 50. – Platnick et al., 2014: 70, figs. 439–449.

**DIAGNOSIS:** Males of this dark, long-legged species can be recognized by the lobe-shaped distal embolar prong and narrow, sinuous, basally expanded proximal embolar prong (Platnick et al., 2014: figs. 439–444), females by the elaborate, heavily sclerotized posterior genitalic elements (Platnick et al., 2014: figs. 448, 449).

**MALE:** See Platnick et al. (2014: 70).

**FEMALE:** See Platnick et al. (2014: 70).

**MATERIAL EXAMINED:** PANAMA: **Chiriquí:** Hartmann Finca, 15 km NW Volcán, May 31, 1977, dung trap, elev. 1550 m (S., J. Peck, AMNH PBI\_OON 76), 1 ♂; Hartmann Finca, 30.7 km W Volcán, June 16, 1995, mixed oak forest litter, elev. 1800 m (R. Anderson, AMNH PBI\_OON 51439, 51440), 4 ♀; Volcán, Aug. 1950 (A. Chickering, MCZ PBI\_OON 51438), 1 ♂ (holotype). **Panamá:** Cerro Campana, June 5, 1995, wet montane forest litter, elev. 950 m (R. Anderson, AMNH PBI\_OON 51441), 1 ♂.

**DISTRIBUTION:** Relatively widespread, from central Costa Rica south to central Panama.

*Costarina recondita* (Chickering)

## Figures 1–11

*Dysderina recondita* Chickering, 1951: 211, fig. 4 (male holotype from Boquete, Chiriquí, Panama, in MCZ; examined); 1968: 25, figs. 57–59.

*Dysderina humphreyi* Chickering, 1968: 16, figs. 32–34 (female holotype from Boquete, Chiriquí, Panama, in MCZ; examined). NEW SYNONYMY.

*Costarina recondita*: Platnick and Dupérré, 2011: 50.

*Costarina humphreyi*: Platnick and Dupérré, 2011: 50.

DIAGNOSIS: Males can be recognized by the lobe-shaped distal and the short, rectangular proximal embolar prongs (figs. 1–6), females by the rebordered posterior margin of the genital atrium (figs. 9–11).

MALE (PBI\_OON 51424, figs. 1–6): Total length 1.86. Endite ventral process wide, long; dorsal process shorter, distally curved. Leg spination: femur I p0-0-2, r0-1-1; tibiae I, II v4-4-1p; metatarsi: I v2-2-1p; II v2-2-0. Embolus distal prong lobe-shaped; proximal prong short, rectangular.

FEMALE (PBI\_OON 51427, figs. 7–11): Total length 2.09. Leg spination: femora: I p0-1-1, r1-1-1; II p0-0-1, r1-1-1; tibiae I, II v4-4-1p; metatarsi: I v2-2-1p; II v3-0-2. Posterior margin of genital atrium rebordered.

MATERIAL EXAMINED: PANAMA: **Chiriquí**: Boquete, July 1939, sifted from debris on forest floor (A. Chickering, MCZ 66662, PBI\_OON 51424, 51425), 3♂ (including holotype), Aug. 4–11, 1954 (A. Chickering, MCZ 66663, PBI\_OON 27149), 10♂, same (MCZ 66653, PBI\_OON 51426, 51427), 8♀ (including holotype); Cerro Punta, Aug. 10, 1983, leaf litter, elev. 1000 m (J., F. Murphy, AMNH PBI\_OON 36785), 1♀.

DISTRIBUTION: Northern Panama (Chiriquí).

SYNONYMY: Chickering collected males and females together in 1954, but described them separately.

*Costarina intempina* (Chickering)

## Figures 12–22

*Dysderina intempina* Chickering, 1968: 19, figs. 37–39 (male holotype from Boquete, Chiriquí, Panama, in MCZ; examined).

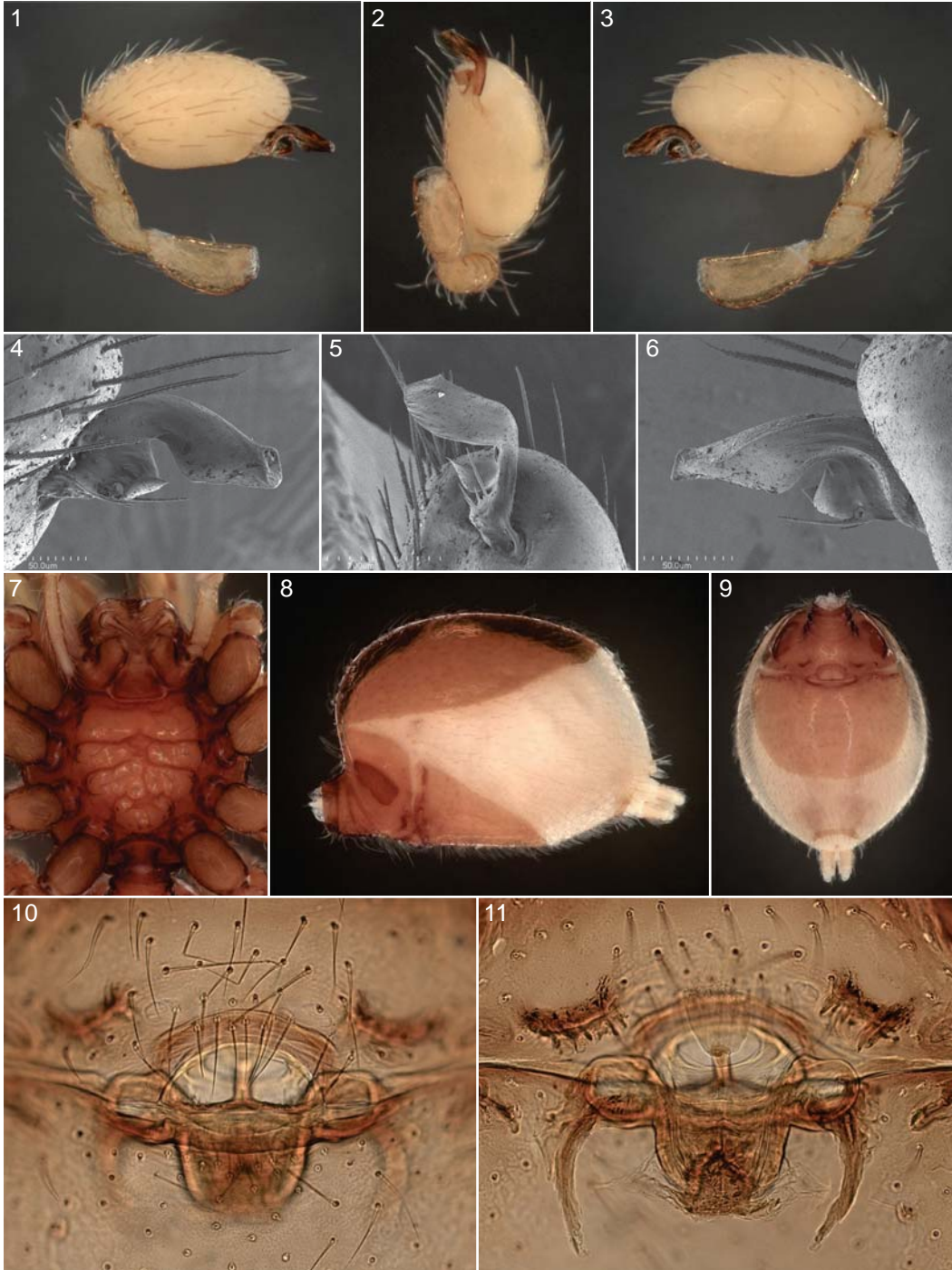
*Dysderina belinda* Chickering, 1968: 7, figs. 9–12 (female holotype from Boquete, Chiriquí, Panama, in MCZ; examined). NEW SYNONYMY.

*Costarina intempina*: Platnick and Dupérré, 2011: 50.

*Costarina belinda*: Platnick and Dupérré, 2011: 50.

DIAGNOSIS: Males resemble those of *C. recondita*, but have a larger distal prong and a longer proximal prong on the embolus, as well as a distinctive retrolateral projection on the embolar base (figs. 12–17); females also resemble those of *C. recondita* but have a wider genital atrium (figs. 19–21).

MALE (PBI\_OON 51430, figs. 12–17): Total length 1.94. Endite processes both long, thick, touching distally. Leg spination: femora: I p0-1-1, r1-1-1; II p0-0-2, r1-0-0; tibiae: I v4-4-2; II v4-4-1p; metatarsi: I v2-2-1p; II v3-0-2. Embolus proximal prong relatively narrow, twisted; distal prong sharply bent, twisted.



FIGURES 1–11. *Costarina recondita* (Chickering), male (1–6) and female (7–11). 1. Left palp, prolateral view. 2. Same, ventral view. 3. Same, retrolateral view. 4. Left embolus, prolateral view. 5. Same, ventral view. 6. Same, retrolateral view. 7. Sternum, ventral view. 8. Abdomen, lateral view. 9. Same, ventral view. 10. Digested female genitalia, ventral view. 11. Same, dorsal view.

FEMALE (PBI\_OON 51433, figs. 18–22): Total length 2.27. Leg spination: femora: I p0-1-1, r1-1-1; II p0-0-2, r1-1-1; tibiae: I v4-4-2; II v4-4-1p; metatarsi: I v2-2-1p; II v2-0-2. Genital atrium wide, anterior genitalic process narrow

MATERIAL EXAMINED: PANAMA: **Chiriquí**: Boquete, Aug. 1950 (A. Chickering, MCZ 66652, PBI\_OON 51430, 51431), 2♂ (including holotype), same (A. Chickering, MCZ PBI\_OON 51432, 51433), 4♀ (including holotype); La Fortuna, near Finca La Suisse, June 10, 1995, oak forest litter, elev. 1200 m (R. Anderson, AMNH PBI\_OON 51434), 1♂, same, oak ridge forest litter, elev. 1300 m (R. Anderson, AMNH PBI\_OON 51435), 3♂, 1♀; Cerro Bollo, 3.5 km E Escopeta, 8°34'N, 81°50'W, June 13, 1980, Berlese, cloudforest floor litter and root mat (J. Wagner, FMNH 33648, PBI\_OON 10150), 1♀; N Escopeta, along Río Escopeta, Jan. 9, 1981, litter under banana, elev. 860 m (W. Suter, FMNH PBI\_OON 51411), 1♂; 20.4 km N San Félix, June 6–8, 1995, wet montane forest litter, elev. 950 m (R. Anderson, AMNH PBI\_OON 51436, 51437), 4♂, 1♀.

DISTRIBUTION: Northern Panama (Chiriquí).

SYNONYMY: Chickering collected males and females together at Boquete in 1950, but described them separately.

### *Costarina abdita* (Chickering)

Figures 23–33

*Dysderina abdita* Chickering, 1968: 5, figs. 1–8 (male holotype from Volcán, Chiriquí, Panama, in MCZ; examined).

*Dysderina rigida* Chickering, 1968: 26, figs. 60, 61 (female holotype from Volcán, Chiriquí, Panama, in MCZ; examined). NEW SYNONYMY.

*Costarina abdita*: Platnick and Dupérré, 2011: 50.

*Costarina rigida*: Platnick and Dupérré, 2011: 50

DIAGNOSIS: Males can easily be recognized by having the proximal and distal embolar prongs largely fused into a single wide lobe (figs. 23–28), females by the distinctively rebordered, W-shaped posterior margin of the genital atrium (figs. 31–33).

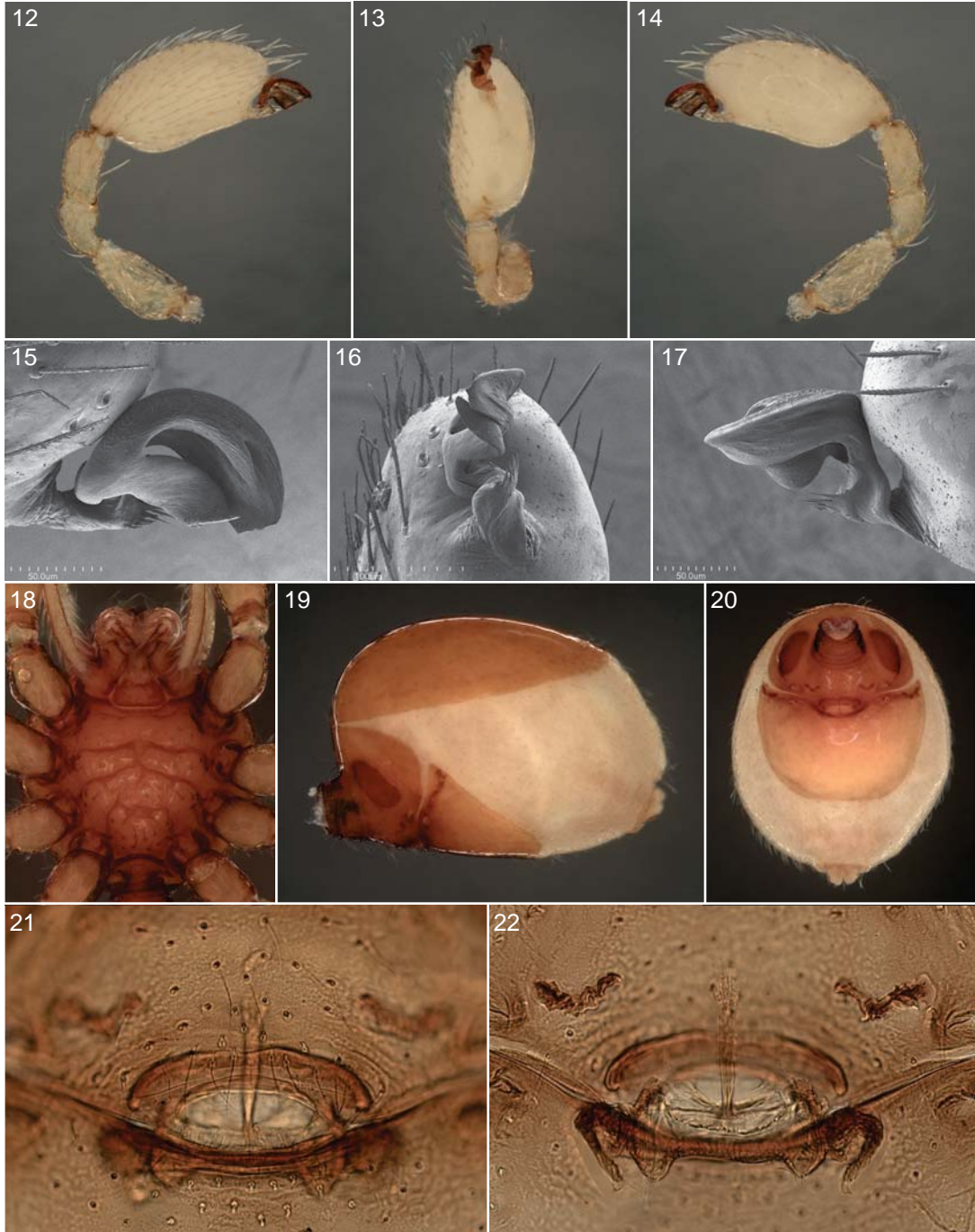
MALE (PBI\_OON 51446, figs. 23–28): Total length 2.24. Endite processes both relatively narrow, widely separated. Leg spination: femora: I p0-1-1, r1-1-1; II p0-0-1; tibiae: I v4-4-2; II v4-4-1p; metatarsi: I v2-2-1p; II v3-0-2. Embolus proximal and distal prongs largely fused into single, wide lobe.

FEMALE (PBI\_OON 51443, figs. 29–33): Total length 2.33. Leg spination: femora I, II p0-1-1, r1-1-1; tibiae: I v4-4-2; II v4-4-1p; metatarsi: I v2-2-1p; II v3-0-2. Genital atrium with straight posterior margin accompanied by long rebordering.

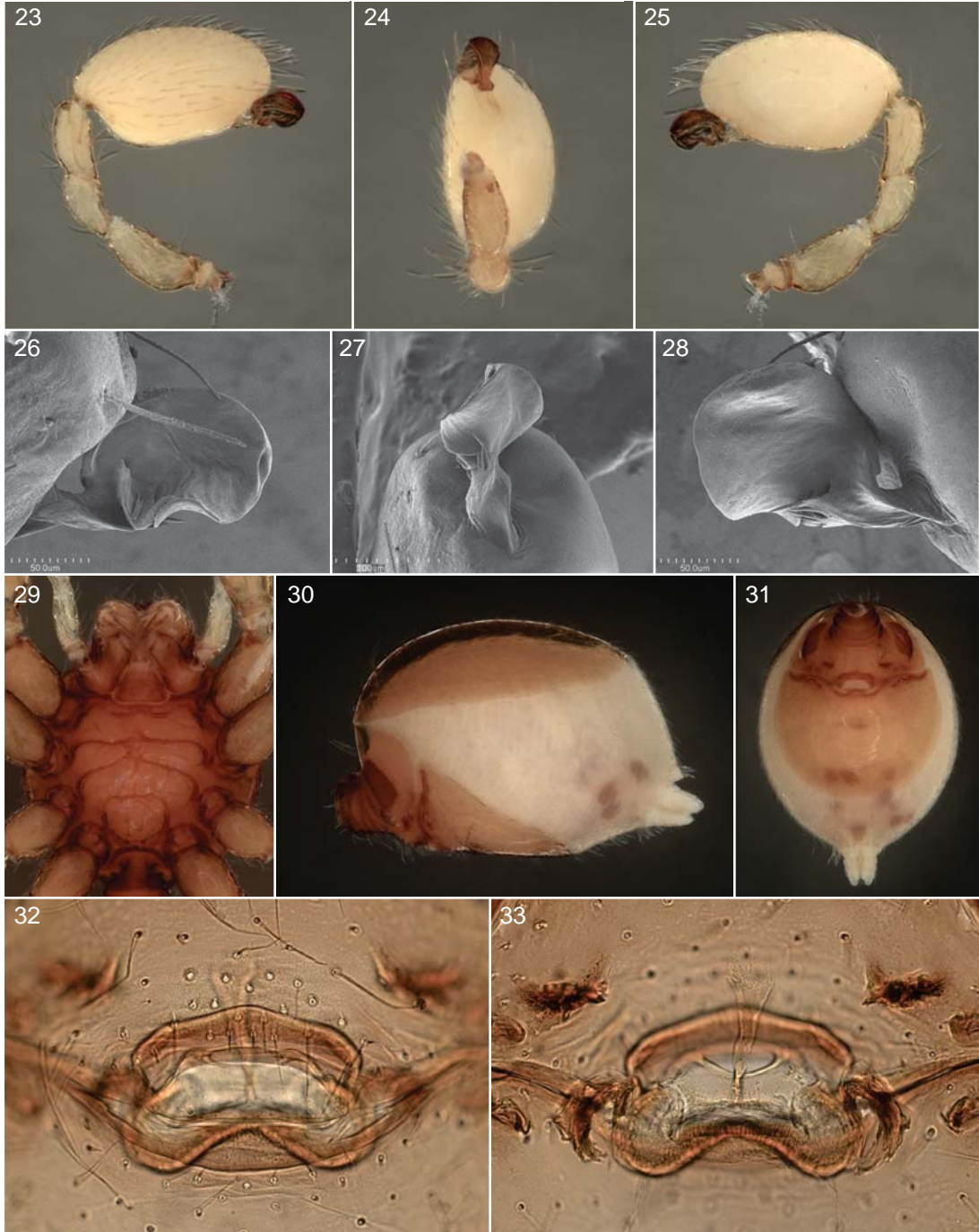
MATERIAL EXAMINED: PANAMA: **Chiriquí**: Volcán, Aug. 9–14, 1950 (A. Chickering, MCZ 66334, 66633, PBI\_OON 51444–51446), 7♂ (including holotype), same (A. Chickering, MCZ 66667, PBI\_OON 51442, 51443), 7♀ (including holotype).

DISTRIBUTION: Northern Panama (Chiriquí).

SYNONYMY: Chickering collected males and females together at Volcán in 1950, but described them separately.



FIGURES 12–22. *Costarina intempina* (Chickering), male (12–17) and female (18–22). 12. Left palp, prolateral view. 13. Same, ventral view. 14. Same, retrolateral view. 15. Left embolus, prolateral view. 16. Same, ventral view. 17. Same, retrolateral view. 18. Sternum, ventral view. 19. Abdomen, lateral view. 20. Same, ventral view. 21. Digested female genitalia, ventral view. 22. Same, dorsal view.



FIGURES 23–33. *Costarina abdita* (Chickering), male (23–28) and female (29–33). 23. Left palp, prolateral view. 24. Same, ventral view. 25. Same, retrolateral view. 26. Left embolus, prolateral view. 27. Same, ventral view. 28. Same, retrolateral view. 29. Sternum, ventral view. 30. Abdomen, lateral view. 31. Same, ventral view. 32. Digested female genitalia, ventral view. 33. Same, dorsal view.

*Costarina sorkini*, new species

Figures 34–44

**TYPES:** Holotype male, allotype female, and paratype male from leaf litter taken on Cerro Paté de Machu, near Bajo Boquete, Chiriquí, Panama (Aug. 11, 1983; L. Sorkin), deposited in AMNH (PBI\_OON 79).

**ETYMOLOGY:** The specific name is a patronym in honor of the collector of the types, Louis Sorkin of the AMNH.

**DIAGNOSIS:** Males resemble those of the frequently sympatric species *C. concinna* but have a much larger, more triangular proximal embolar prong (figs. 34–39); females have fully fused ventral scuta and a larger genital atrium (figs. 41–44).

**MALE** (PBI\_OON 79, figs. 34–39): Total length 2.00. Endite ventral process relatively short, wide; dorsal process relatively long, narrow. Leg spination: femora: I p0-1-1, r0-1-1; II p0-0-1; tibiae: I v4-4-2; II v4-4-1p; metatarsi: I v2-2-2; II v3-0-2. Embolus proximal prong much larger than distal prong, triangular in ventral view; distal prong short, with folded tip.

**FEMALE** (PBI\_OON 79, figs. 40–44): Total length 2.09. Leg spination: femora I, II p0-1-1, r1-1-1; tibiae: I v4-4-2; II v4-4-1p; metatarsi: I v2-2-2; II v3-0-2. Genital atrium large, ovoid, posterior portion slightly protuberant.

**OTHER MATERIAL EXAMINED:** PANAMA: **Bocas del Toro:** no specific locality, 8°47'N, 82°11'W, July 14–16, 1987, premontane rain forest, elev. 800 m (D. Olson, MCZ PBI\_OON 37011), 1 ♂; Almirante, Mar. 27–Apr. 1, 1959, Berlese, concentrated forest floor litter (H. Dybas, FMNH 33621, PBI\_OON 10129, 51413), 2 ♂. **Chiriquí:** Boquete, Aug. 11, 1983, litter, shrubs, elev. 1600 m (J., F. Murphy, AMNH PBI\_OON 36781), 1 ♂; 5.7 km NE Boquete, June 18, 1998, dry oak forest litter, elev. 1850 m (R. Anderson, AMNH PBI\_OON 51451), 2 ♂; Cerro Pata de Macho, 8°42'N, 82°13'W, July 23, 1987, elev. 1500 m (D. Olson, MCZ 72895, PBI\_OON 37018), 2 ♀; Continental Divide trail, La Fortuna area, June 9, 1995, wet montane cloud forest litter, elev. 1200 m (R. Anderson, AMNH PBI\_OON 51447), 3 ♂, 1 ♀; Finca Lerida, near Boquete, Mar. 14, 1959, Berlese, forest floor litter, elev. 5650 ft (H. Dybas, FMNH PBI\_OON 51409), 2 ♂, Mar. 17, 1959, Berlese, forest floor litter, elev. 7800 ft (H. Dybas, FMNH PBI\_OON 51407), 1 ♂; Parque Nacional Volcán Barú, 11 km W Boquete, June 18, 1995, mixed oak forest litter, elev. 2150 m (R. Anderson, AMNH PBI\_OON 51448), 1 ♂; Parque Nacional Volcán Barú, 5.9 km E Cerro Punta, June 14, 1995, bamboo forest litter, oak ridge, elev. 2400 m (R. Anderson, AMNH PBI\_OON 51449), 1 ♂; Quebrada Honda, Reserva Forestal Fortuna, 8.75204°N, 82.23964°W, Sept. 22, 2008, cloudforest litter, sparse undergrowth (M. Draney, A. McKenna-Foster, FMNH 43126, PBI\_OON 10669), 2 ♂, same, open treefall gap with lianas and sagittate-leaved palms (M. Draney, A. McKenna-Foster, ex FMNH 44214, PBI\_OON 51455), 2 ♀; Quebrada Samudio, Reserva Forestal Fortuna, 8.73502°N, 82.24719°W, Sept. 23, 2008, cloudforest litter (M. Draney, A. McKenna-Foster, ex FMNH 43127, PBI\_OON 51450), 1 ♂, same (M. Draney, FMNH 43133, PBI\_OON 10676), 1 ♀; Reserva Forestal Fortuna, 8.72857°N, 82.23665°W, Sept. 21, 2008, shaking cloudforest epiphytes on sheet, elev. 100 m (A. McKenna-Foster, FMNH 43134, PBI\_OON 10677), 1 ♀.

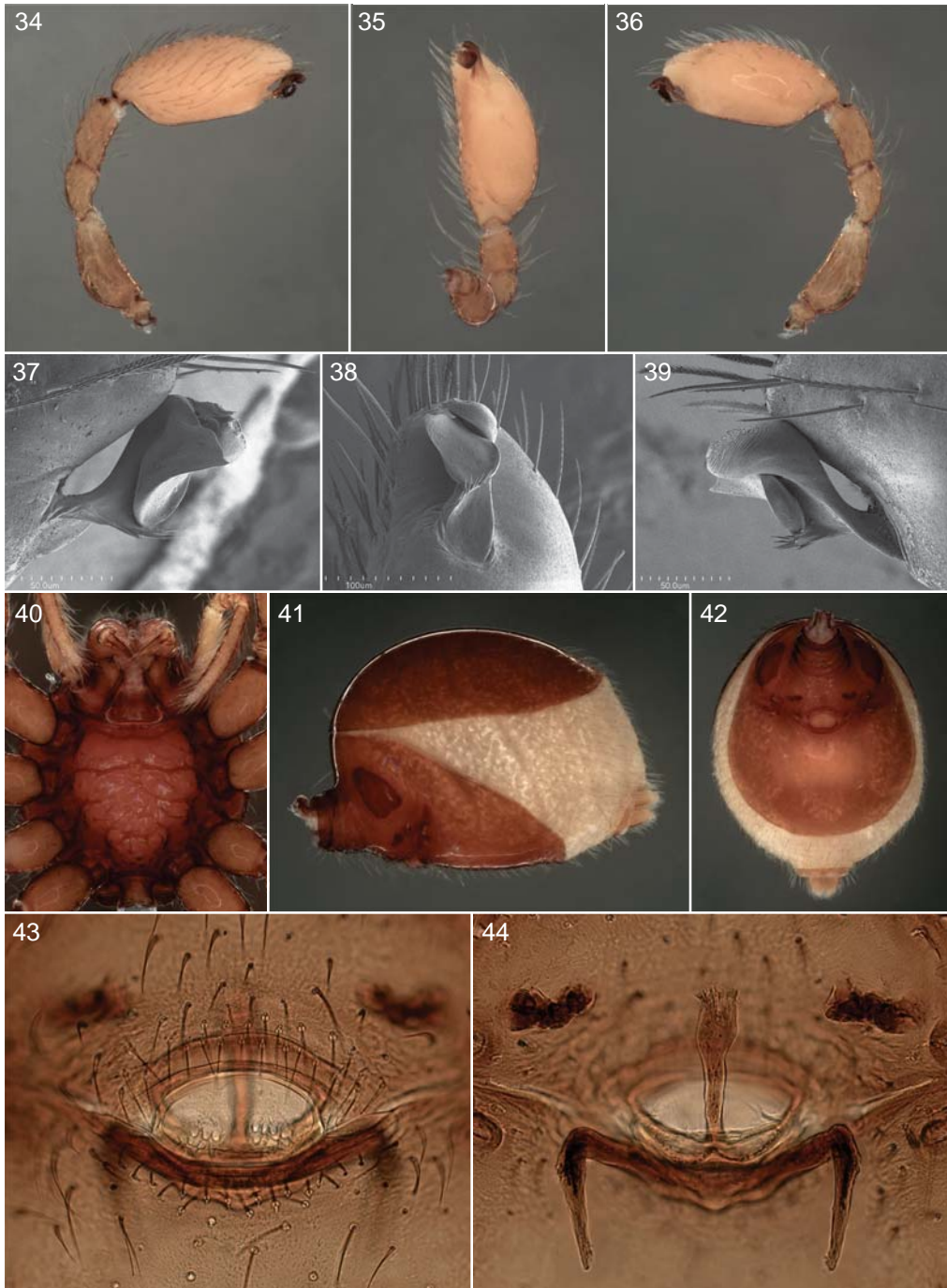
**DISTRIBUTION:** Northern Panama (Chiriquí, Bocas del Toro).

*Costarina cerrocol*, new species

Figures 45–55

**TYPE:** Male holotype taken from a stage IV stump with passalid burrows at an elevation of 1220 m on Cerro Colorado, Chiriquí, Panama (Jan. 8, 1981; W. Suter), deposited in FMNH (33666, PBI\_OON 10168).





FIGURES 34–44. *Costarina sorkini*, new species, male (34–39) and female (40–44). 34. Left palp, prolateral view. 35. Same, ventral view. 36. Same, retrolateral view. 37. Left embolus, prolateral view. 38. Same, ventral view. 39. Same, retrolateral view. 40. Sternum, ventral view. 41. Abdomen, lateral view. 42. Same, ventral view. 43. Digested female genitalia, ventral view. 44. Same, dorsal view.

**ETYMOLOGY:** The specific name is a noun in apposition shortened from the type locality.

**DIAGNOSIS:** This species appears to be a northern vicariant of *C. dura*, sharing an obliquely oriented proximal prong on the male embolus and a shortened postepigastric scutum in females, but can be distinguished by the narrower, sharper distal embolar prong of males (figs. 45–50) and the sinuous, slightly recurved posterior margin of the genital atrium of females (figs. 53–55).

**MALE** (PBI\_OON 10168, figs. 45–50): Total length 1.83. Endite processes both long, sharply pointed, tips widely separated. Leg spination: femora: I p0-1-1, r1-1-1; II p0-1-1, r1-1-0; tibiae I, II v4-4-1p; metatarsi: I v2-2-1p; II v3-0-2. Embolus with both prongs narrow, parallel to each other.

**FEMALE** (PBI\_OON 10190, figs. 51–55): Total length 2.03. Leg spination: femora I, II p0-1-1, r1-1-1; tibiae: I v4-4-2; II v4-4-1p; metatarsi: I v2-2-1p; II v3-0-2. Genital atrium short, wide, with W-shaped posterior margin.

**OTHER MATERIAL EXAMINED:** Panama: **Chiriquí:** Cerro Colorado, Jan. 6, 1981, grassy litter with ferns, elev. 1200 m (W. Suter, FMNH 33688, PBI\_OON 10190), 1 ♀, Jan. 7, 1981, under bamboo, elev. 1220 m (W. Suter, FMNH PBI\_OON 10387), 1 ♂, Jan. 15, 1981, litter at semiexposed log above road, elev. 1225 m (W. Suter, FMNH 33664, PBI\_OON 10166), 1 ♂, Jan. 26, 1981, buttress treehole, elev. 1235 m (W. Suter, FMNH 33626, PBI\_OON 10134), 1 ♀, Jan. 27, 1981, epiphytes on mossy log, elev. 1175 m (W. Suter, FMNH 33672, PBI\_OON 10174), 1 ♀; 24 km NNE San Félix, 8°34'N, 81°50'W, June 24, 1980, Berlese, moldy bromeliads, Cerro Colorado minesite (J. Wagner, FMNH 33639, PBI\_OON 10141), 1 ♂.

**DISTRIBUTION:** Northern Panama (Chiriquí). The species may also extend further south, as we have seen two females that resemble those from Cerro Colorado but have the genital atrium slightly shorter and wider. The data on those specimens is as follows: Veraguas: Leren, Bahía Honda, Dec. 7–18, 2001 (R. Miranda, MIUP PBI\_OON 37744); Panamá: Cerro Campana, June 5, 1995, wet montane forest litter, elev. 950 m (R. Anderson, AMNH PBI\_OON 51457). Males from those localities are needed to determine whether this species actually has a larger than usual range.

### *Costarina bocas*, new species

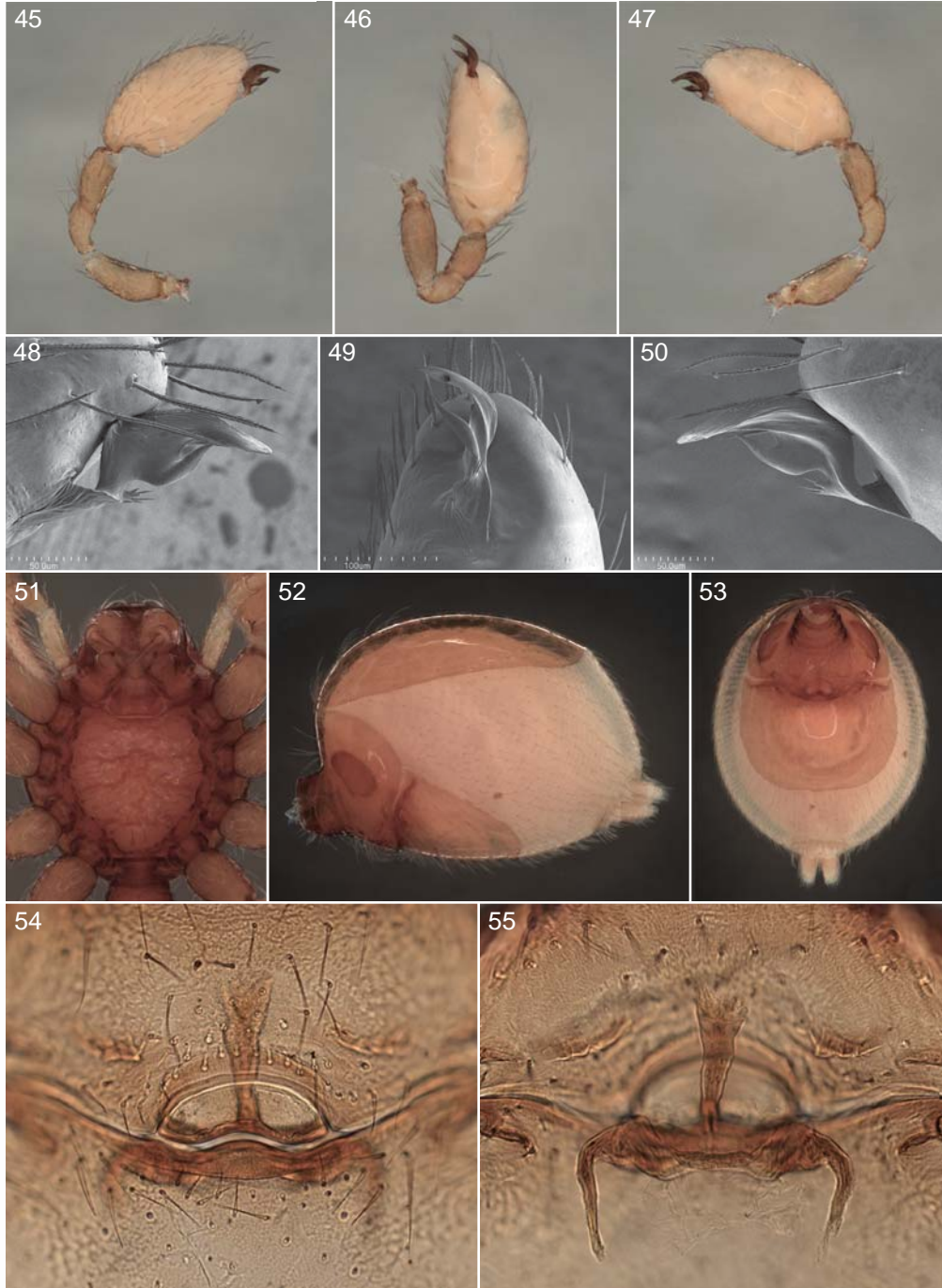
Figures 56–69

**TYPES:** Holotype male and allotype female taken at an elevation of 800 m in premontane rain forest at 8°47'N, 82°11'W, Bocas del Toro, Panama (July 14–16, 1987; D. Olson), deposited in MCZ (72896, PBI\_OON 37010).

**ETYMOLOGY:** The specific name is a noun in apposition taken from the type locality.

**DIAGNOSIS:** Males can easily be recognized by the elongated ventral process on the endites (figs. 67–69) and the shape of the embolus, in which the proximal and distal prongs appear to have fused (figs. 56–61), females by the fused ventral scuta and bipartite genital atrium (figs. 63–66).

**MALE** (PBI\_OON 37010, figs. 56–61, 67–69): Total length 2.27. Endite ventral prong basally triangular, tip enormously elongated, extending far beyond anterior margin of endites; dorsal prong narrow, short. Leg spination: femur I p0-1-1, r1-1-0; tibiae I, II v4-4-1p; metatarsi: I v2-2-1p; II v2-0-2. Embolus with proximal and distal prongs fused for at least most of their length.



FIGURES 45–55. *Costarina cerrocol*, new species, male (45–50) and female (51–55). 45. Left palp, prolateral view. 46. Same, ventral view. 47. Same, retrolateral view. 48. Left embolus, prolateral view. 49. Same, ventral view. 50. Same, retrolateral view. 51. Sternum, ventral view. 52. Abdomen, lateral view. 53. Same, ventral view. 54. Digested female genitalia, ventral view. 55. Same, dorsal view.

FEMALE (PBI\_OON 37010, figs. 62–66): Total length 2.71. Leg spination: femora I, II p0-1-1, r1-1-1; tibiae I, II v4-4-2; metatarsi: I v2-2-1p; II v3-0-2. Genital atrium bipartite, posterior portion about half as long as anterior portion.

OTHER MATERIAL EXAMINED: PANAMA: **Chiriquí**: Quebrada Samudio, Reserva Forestal Fortuna, 8.73502°N, 82.24719°W, Sept. 23, 2008, cloudforest litter (M. Draney, A. McKenna-Foster, FMNH 43127, PBI\_OON 10670), 1 ♂.

DISTRIBUTION: Panama (Chiriquí, Bocas del Toro).

*Costarina chiriqui*, new species

Figures 70, 73–78

TYPE: Holotype male from mixed oak forest litter taken at an elevation of 1800 m at Hartmann Finca, 30.7 km west of Volcán, Chiriquí, Panama (June 16, 1995; R. Anderson), deposited in AMNH (PBI\_OON 51410).

ETYMOLOGY: The specific name is a noun in apposition taken from the type locality.

DIAGNOSIS: Males can easily be recognized by the unusual embolar conformation, with the proximal prong situated almost lateral to the distal prong (figs. 73–78).

MALE (PBI\_OON 51410, figs. 70, 73–78): Total length 2.47. Endite ventral process triangular, displaced medially; dorsal process with long, curved, medially directed tip. Leg spination: femora: I p0-1-1, r1-1-1; II p0-1-1, r0-1-0; tibiae I, II v4-4-1p; metatarsi: I v2-2-2; II v3-0-2. Embolus proximal prong shifted prolaterally, widened; distal prong short, wide.

FEMALE: Unknown.

OTHER MATERIAL EXAMINED: None.

DISTRIBUTION: Northern Panama (Chiriquí).

*Costarina clara*, new species

Figures 71, 79–84

TYPE: Holotype male from wet cloud forest litter taken at an elevation of 2000 m at a site 12 km northeast of Santa Clara, Chiriquí, Panama (June 17, 1996; R. Anderson), deposited in AMNH (PBI\_OON 51452).

ETYMOLOGY: The specific name is a noun in apposition taken from the type locality.

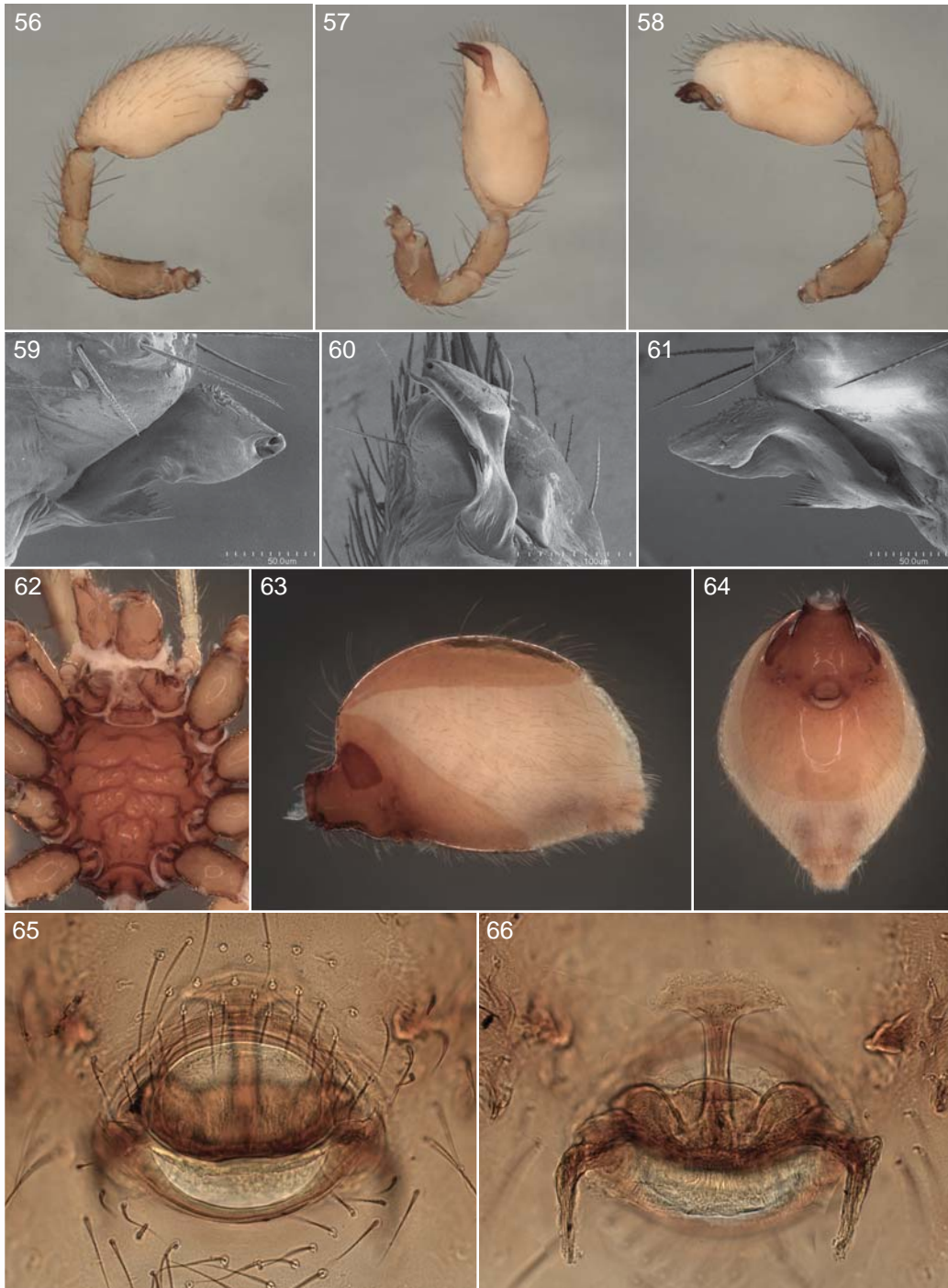
DIAGNOSIS: Males can easily be recognized by the rectangular, distally notched distal embolar prong (figs. 79–84).

MALE (PBI\_OON 51452, figs. 71, 79–84): Total length 2.31. Endite ventral process short, with narrow tip; dorsal process with long, medially directed tip. Leg spination: femora: I p0-1-1, r0-1-1; II p0-1-1; tibiae: I v4-4-2; II v4-4-1p; metatarsi: I v2-2-2; II v3-0-2. Embolus proximal prong scythe shaped; distal prong rectangular, with translucent prolateral portion.

FEMALE: Unknown.

OTHER MATERIAL EXAMINED: None.

DISTRIBUTION: Northern Panama (Chiriquí).



FIGURES 56–66. *Costarina bocas*, new species, male (56–61) and female (62–66). 56. Left palp, prolateral view. 57. Same, ventral view. 58. Same, retrolateral view. 59. Left embolus, prolateral view. 60. Same, ventral view. 61. Same, retrolateral view. 62. Sternum, ventral view. 63. Abdomen, lateral view. 64. Same, ventral view. 65. Digested female genitalia, ventral view. 66. Same, dorsal view.

*Costarina fortuna*, new species

Figures 72, 85–90

TYPE: Holotype male from wet montane forest litter taken at an elevation of 1450 m in the area of La Fortuna, Finca La Suisse, Chiriquí, Panama (June 12, 1995; R. Anderson), deposited in AMNH (PBI\_OON 51456).

ETYMOLOGY: The specific name is a noun in apposition taken from the type locality.

DIAGNOSIS: Males can be recognized by the arrow-shaped distal embolar prong and the presence of a basal spur on the proximal embolar prong (figs. 85–90).

MALE (PBI\_OON 51456, figs. 72, 85–90): Total length 2.35. Endite ventral process relatively long, narrow; dorsal process relatively short, curved; additional median, anteriorly directed process originating from soft cuticle lateral of ventral process. Leg spination: femur I p0-1-1, r1-1-1; tibiae: I v4-4-2; II v4-4-1p; metatarsi: I v2-2-2; II v3-0-2. Embolus proximal prong wide, with basal spur; distal prong sharply pointed.

FEMALE: UNKNOWN.

OTHER MATERIAL EXAMINED: None.

DISTRIBUTION: Northern Panama (Chiriquí).

*Costarina almirante*, new species

Figures 91–101

TYPE: Holotype male from Berlese sample sifted from decaying cacao pods taken at Almirante, Bocas del Toro, Panama (Mar. 27, 1959; H. Dybas), deposited in FMNH (34855, PBI\_OON 10572).

ETYMOLOGY: The specific name is a noun in apposition taken from the type locality.

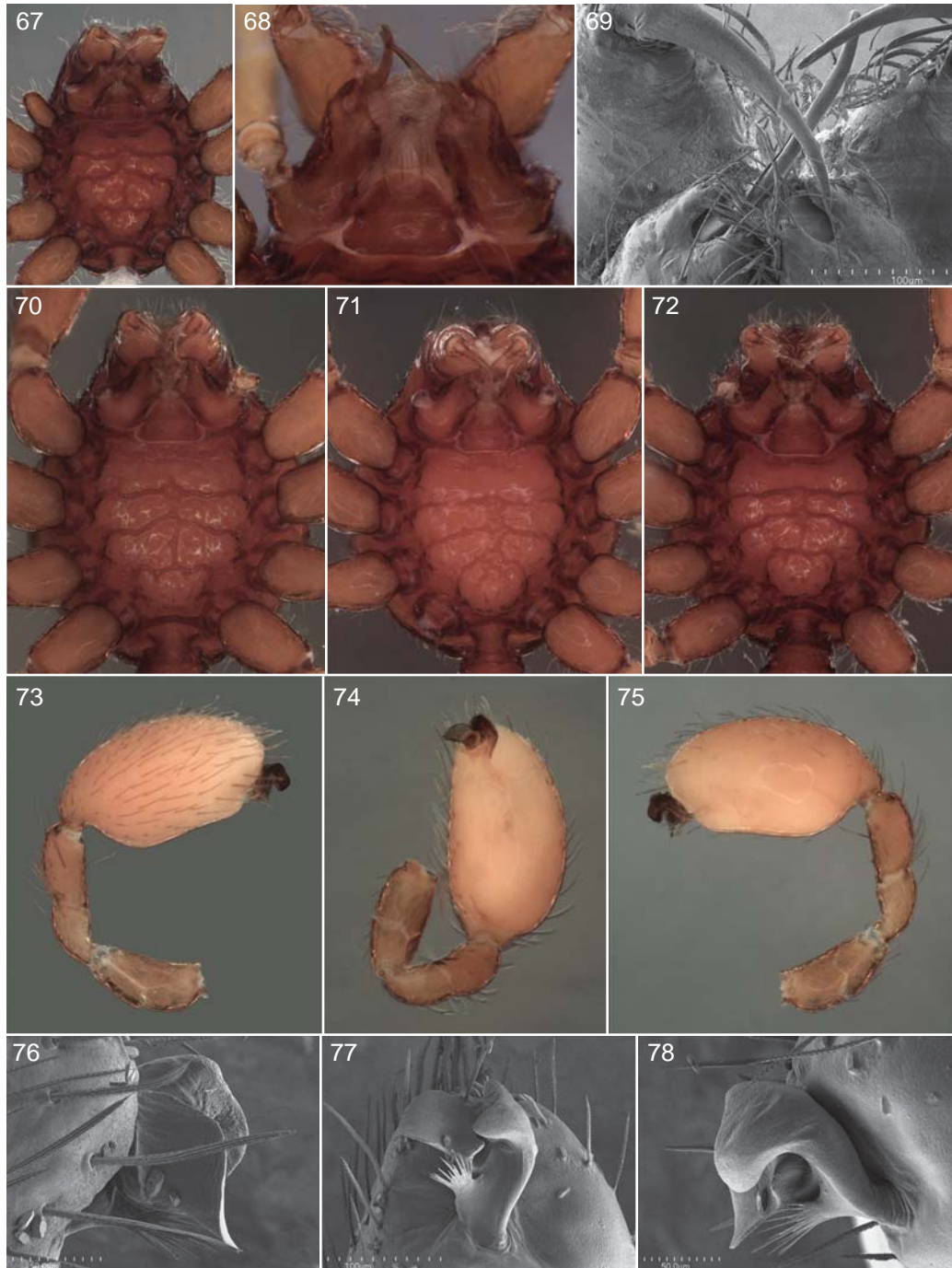
DIAGNOSIS: Males resemble those of the Costa Rican species *C. penshurst* in having a bifid proximal embolar prong, but have a greatly enlarged basal embolar projection (figs. 91–96); females resemble those of *C. dybasi* in having the postepigastric scutum fully fused to the epigastric scutum, but have a smaller genital atrium (figs. 98–101).

MALE (PBI\_OON 10572, figs. 91–96): Total length 2.01. Endite ventral process relatively small; dorsal process with long, curved, medially directed tip. Leg spination: femora: I p0-1-1, r1-1-1; II p0-0-1, r0-1-0; tibiae: I v4-4-2; II v4-4-1p; metatarsi: I v2-2-1p; II v3-0-2. Embolus proximal prong bifid, with both arms long, narrow; distal prong with flared, translucent tip.

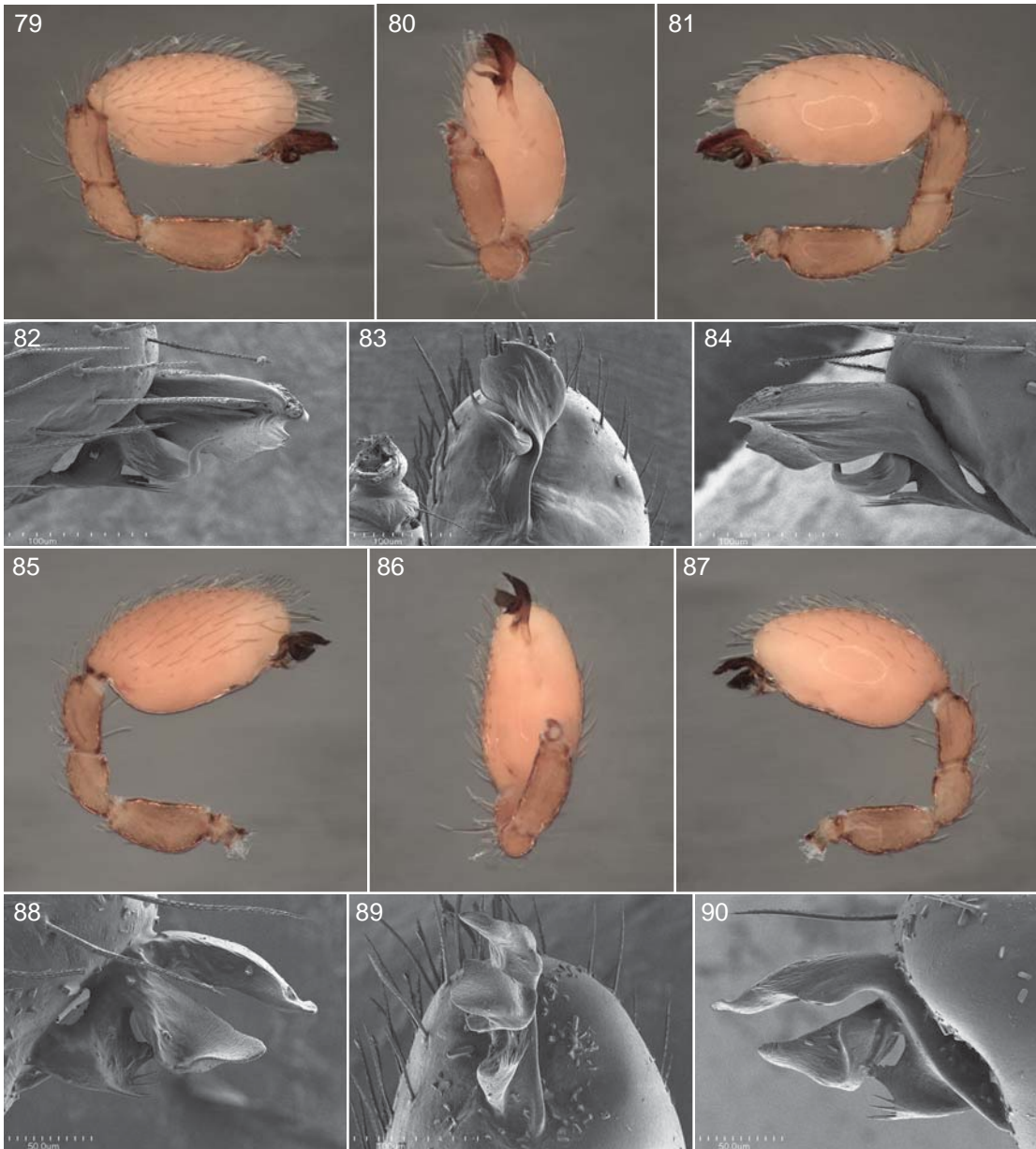
FEMALE (PBI\_OON 51414, figs. 97–101): Total length 2.50. Leg spination: femora I, II p0-1-1, r1-1-1; tibiae: I v4-4-2; II v4-4-1p; metatarsi: I v2-2-2; II v3-0-2. Genital atrium small, ovoid; anterior genitalic projection widened basally.

OTHER MATERIAL EXAMINED: PANAMA: **Bocas del Toro**: Almirante, Mar. 26, 1959, Berlese, decaying palm fruit stalk and sublitter on ground (H. Dybas, FMNH PBI\_OON 10393), 1 ♂, Mar. 27, 1959, Berlese, concentrated floor litter (H. Dybas, FMNH PBI\_OON 51414), 1 ♀; Chiriquí Grande, Sept. 15, 1985 (D. Quintero, MIUP PBI\_OON 37739), 2 ♀; 1.5 km E Río Tskui [near Yorkín, Limón, Costa Rica], Oct. 27–29, 2008, elev. 800 m (M. Moraga, A. Solis, INBIO PBI\_OON 51415), 1 ♂.

DISTRIBUTION: Panama (Bocas del Toro).

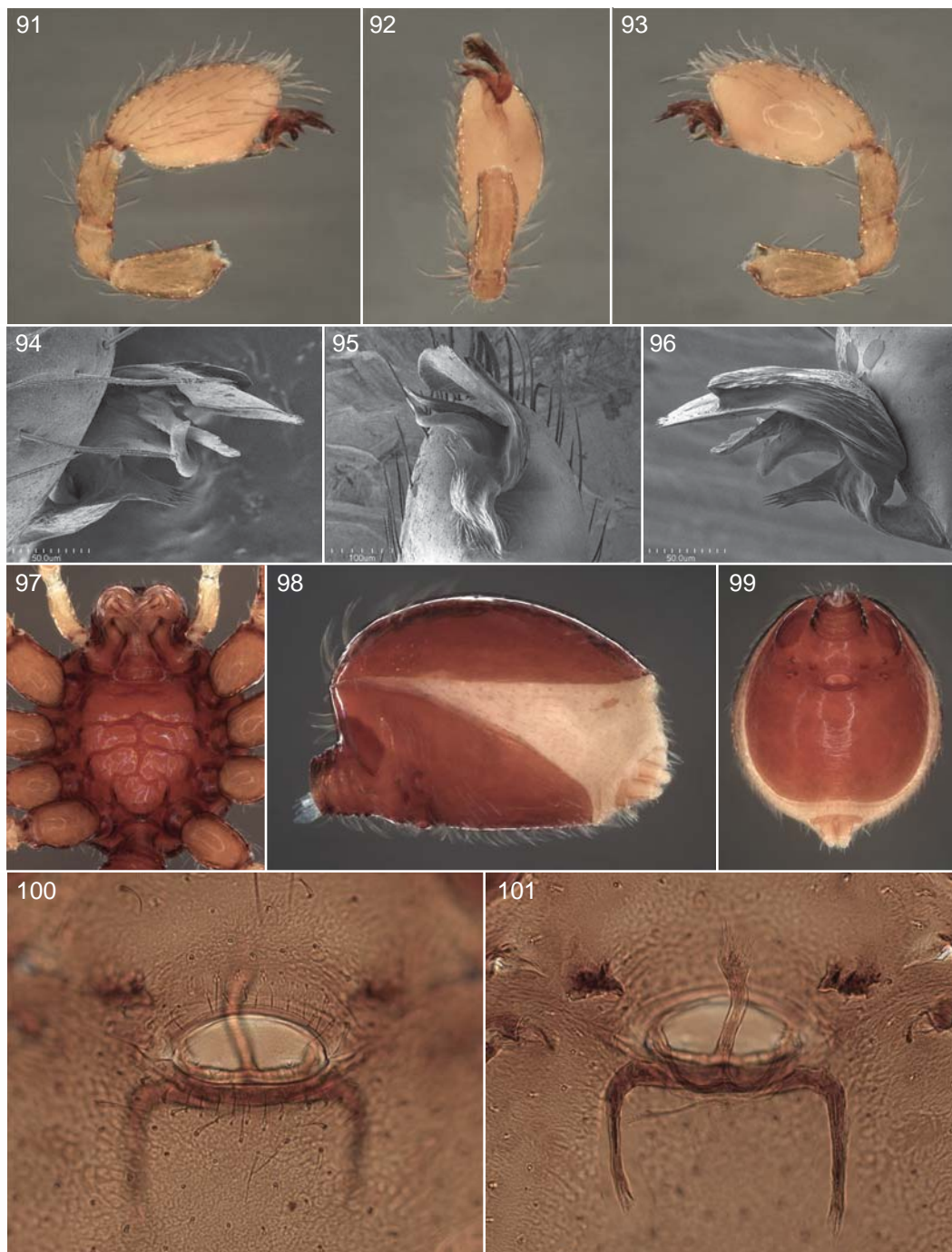


FIGURES 67–78. 67–69. *Costarina bocas*, new species, male. 70, 73–78. *C. chiriqui*, new species, male. 71. *C. clara*, new species, male. 72. *C. fortuna*, new species, male. 67, 70–72. Sternum, ventral view. 68, 69. Endites, ventral view. 73. Left palp, prolateral view. 74. Same, ventral view. 75. Same, retrolateral view. 76. Left embolus, prolateral view. 77. Same, ventral view. 78. Same, retrolateral view.



FIGURES 79–90. 79–84. *Costarina clara*, new species, male. 85–90. *C. fortuna*, new species, male. 79, 85. Left palp, prolateral view. 80, 86. Same, ventral view. 81, 87. Same, retrolateral view. 82, 88. Left embolus, prolateral view. 83, 89. Same, ventral view. 84, 90. Same, retrolateral view.





FIGURES 91–101. *Costarina almirante*, new species, male (91–96) and female (97–101). **91.** Left palp, prolateral view. **92.** Same, ventral view. **93.** Same, retrolateral view. **94.** Left embolus, prolateral view. **95.** Same, ventral view. **96.** Same, retrolateral view. **97.** Sternum, ventral view. **98.** Abdomen, lateral view. **99.** Same, ventral view. **100.** Digested female genitalia, ventral view. **101.** Same, dorsal view.

*Costarina dybasi*, new species

Figures 102–112

**TYPES:** Holotype male, allotype female, and paratype female from Berlese sample of concentrated floor litter taken at Almirante, Bocas del Toro, Panama (Mar. 27, 1959; H. Dybas), deposited in FMNH (33654, PBI\_OON 10156).

**ETYMOLOGY:** The specific name is a patronym in honor of the collector, Henry Dybas of the Field Museum of Natural History.

**DIAGNOSIS:** Males can easily be recognized by the trifold distal embolar prong (figs. 102–107), females by the fused ventral scuta and recurved genital atrium (figs. 109–112).

**MALE** (PBI\_OON 10156, figs. 102–107): Total length 2.07. Endite ventral process small; dorsal process with narrow, medially directed tip. Leg spination: femora: I p0-1-1, r1-1-0; II p0-0-1; tibiae: I v4-4-2; II v4-4-1p; metatarsi: I v2-2-2; II v3-0-2. Embolus proximal prong long, narrow; distal prong trifold.

**FEMALE** (PBI\_OON 10156, figs. 108–112): Total length 2.09. Leg spination: femora I, II p0-1-1, r1-1-1; tibiae: I v4-4-2; II v4-4-1p; metatarsi: I v2-2-2; II v3-0-2. Genital atrium recurved, almost boomerang shaped, anterior genitalic process distally flared, posterior genitalia with conspicuous lobes visible through cuticle.

**OTHER MATERIAL EXAMINED:** PANAMA: **Bocas del Toro:** Changuinola, July 30, 1981, forest litter (G. Edwards, FSCA PBI\_OON 51508), 1 ♀.

**DISTRIBUTION:** Panama (Bocas del Toro).

*Costarina tskui*, new species

Figures 113–123

**TYPE:** Holotype male taken at an elevation of 800 m at a site 1.5 km east of the Río Tskui, Bocas del Toro, Panama [near Yorkín, Limón, Costa Rica] (Oct. 27–29, 2008; M. Moraga, A. Solís), deposited in INBIO (PBI\_OON 37019).

**ETYMOLOGY:** THE specific name is a noun in apposition taken from the type locality.

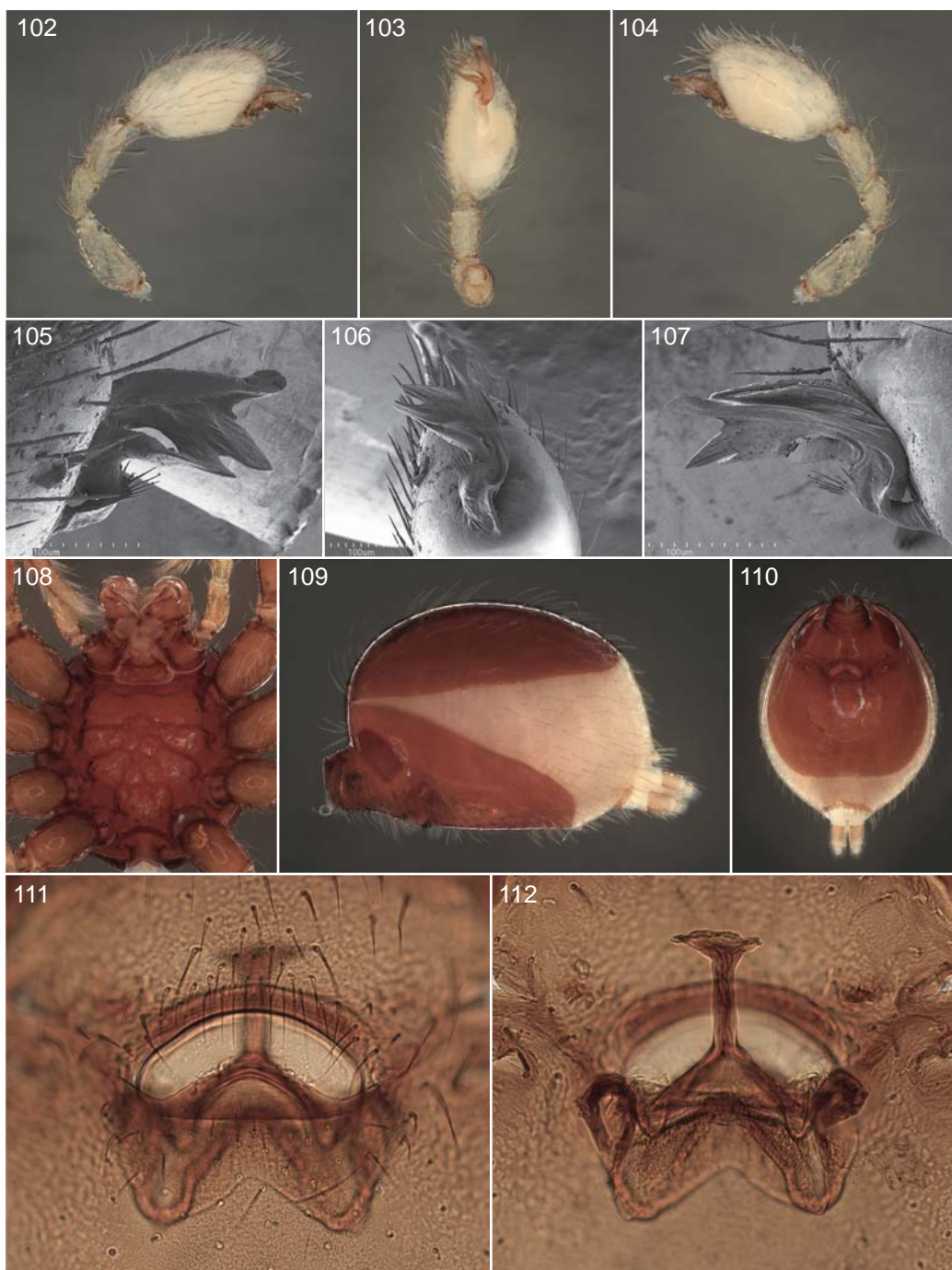
**DIAGNOSIS:** Males and females have not been collected together and may be mismatched. Males can easily be recognized by the extremely narrow proximal embolar prong (figs. 113–118), females by the fused ventral scuta and large, rounded genital atrium (figs. 120–123).

**MALE** (PBI\_OON 37019, figs. 113–118): Total length 2.13. Endite prongs both with long, narrow, anteriorly directed tips. Leg spination: femora: I p0-1-1, r1-1-1; II p0-1-1, r0-1-0; tibiae: I v4-4-2; II v4-4-1p; metatarsi: I v2-2-2; II v3-0-2. Embolus proximal prong basally enlarged, thin, needlelike throughout most of its length; distal prong wider, distally rounded.

**FEMALE** (PBI\_OON 81, figs. 119–123): Total length 2.20. Leg spination: femora I, II p0-1-1, r1-1-1; tibiae: I v4-4-2; II v4-4-1p; metatarsi: I v2-2-2; II v3-0-2. Genital atrium long, with recurved posterior margin; anterior genitalic process narrow, distally flared.

**OTHER MATERIAL EXAMINED:** PANAMA: **Bocas del Toro:** Distrito Changuinola, Jan. 18, 1925, in leaf mold (F. Swift, AMNH PBI\_OON 81), 1 ♀.

**DISTRIBUTION:** Panama (Bocas del Toro).



FIGURES 102–112. *Costarina dybasi*, new species, male (102–107) and female (108–112). **102.** Left palp, prolateral view. **103.** Same, ventral view. **104.** Same, retrolateral view. **105.** Left embolus, prolateral view. **106.** Same, ventral view. **107.** Same, retrolateral view. **108.** Sternum, ventral view. **109.** Abdomen, lateral view. **110.** Same, ventral view. **111.** Digested female genitalia, ventral view. **112.** Same, dorsal view.

*Costarina dura* (Chickering)

## Figures 124–134

*Dysderina dura* Chickering, 1951: 208, figs. 1–3 (male holotype from Canal Zone Biological Area [= Isla Barro Colorado], Panamá, Panama, in MCZ; examined), 1968: 12, figs. 24, 25.

*Dysderina silvatica* Chickering, 1951: 217, fig. 6 (female holotype from Canal Zone Biological Area [= Isla Barro Colorado], Panamá, Panama, in MCZ; examined). NEW SYNONYMY.

*Costarina dura*: Platnick and Dupérré, 2011: 50.

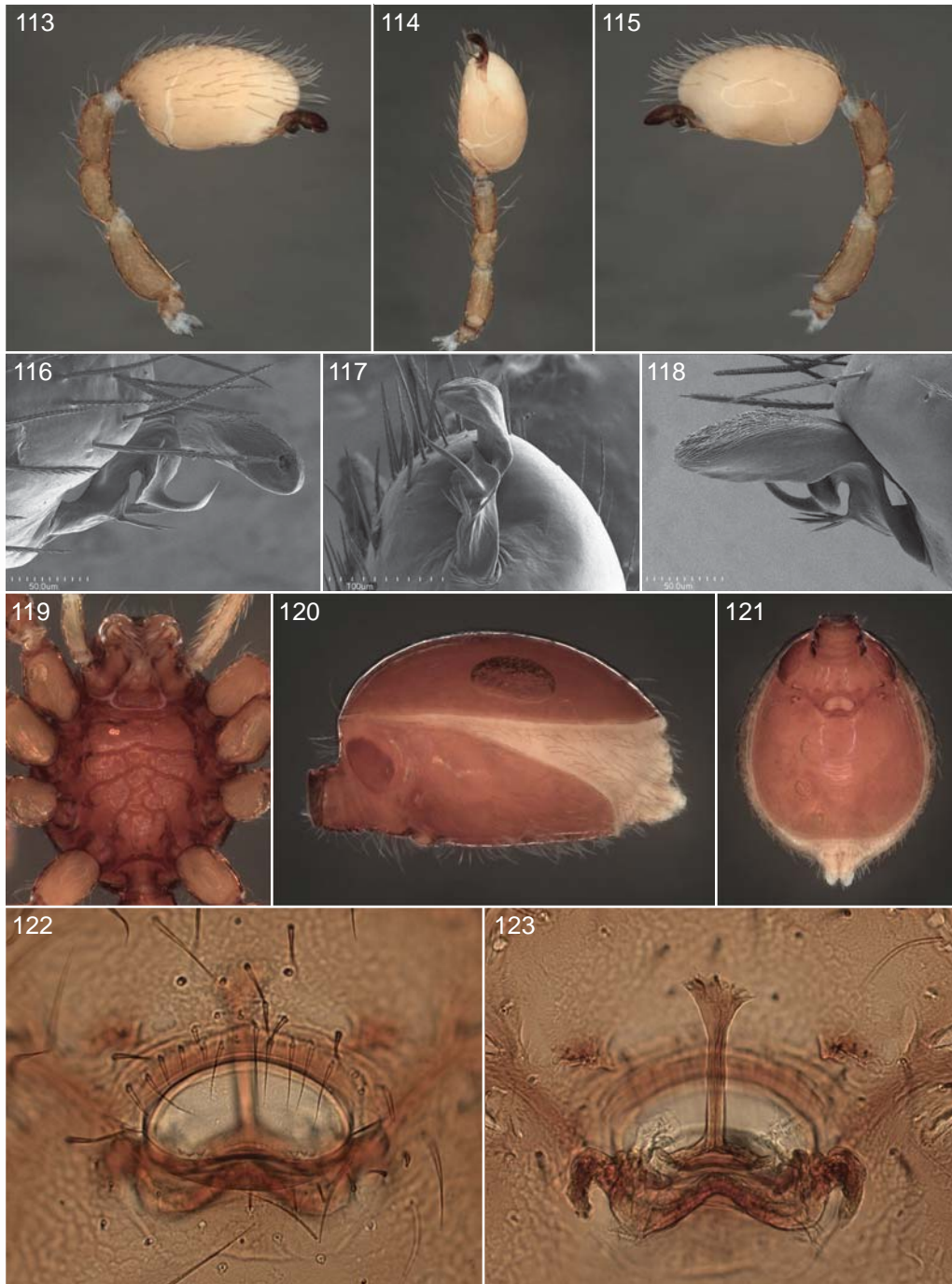
*Costarina silvatica*: Platnick and Dupérré, 2011: 50.

**DIAGNOSIS:** Males can be recognized by the elaborately twisted embolar prongs (figs. 124–129), females by the relatively short, sinuous anterior genitalic process (figs. 132–134).

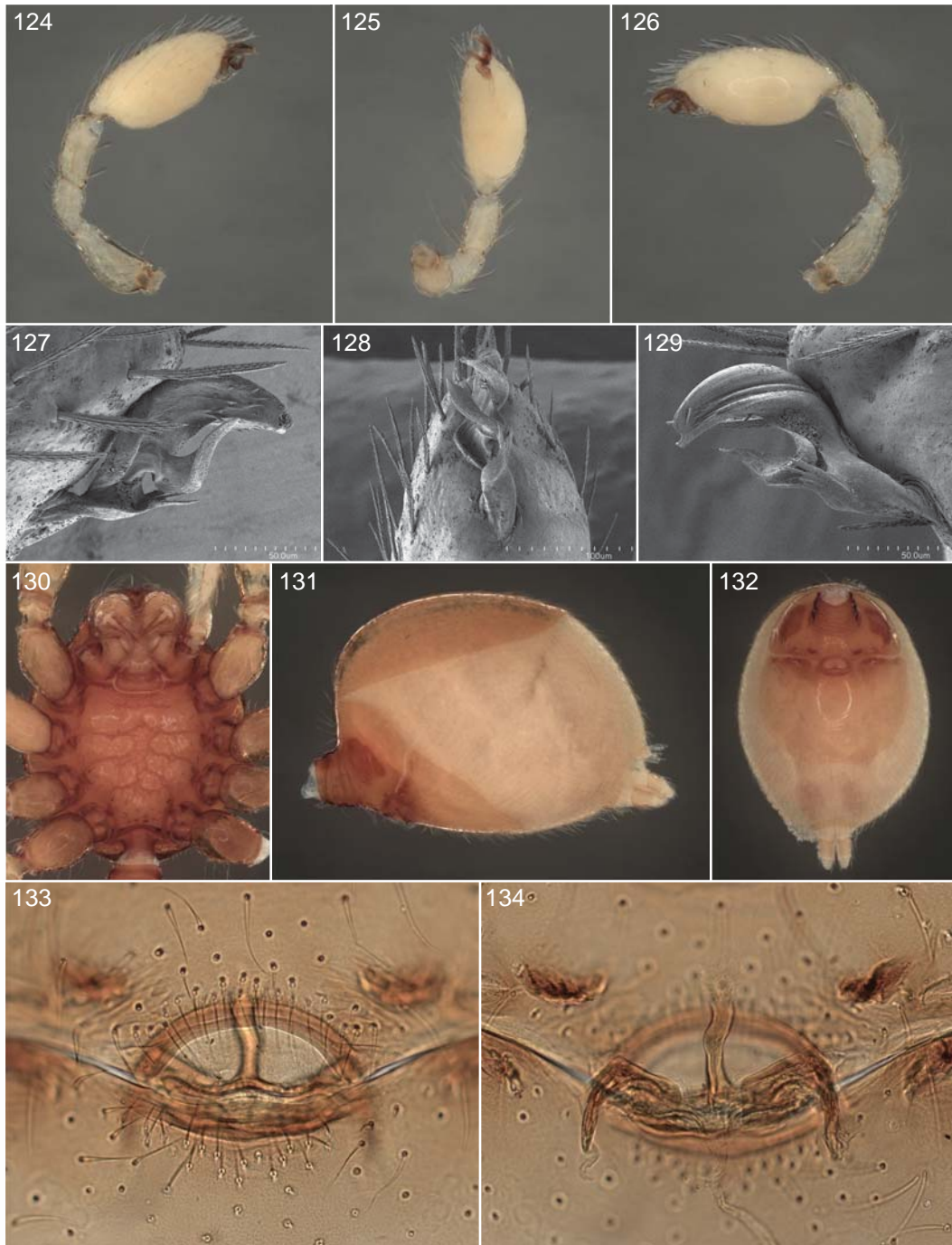
**MALE** (PBI\_OON 37893, figs. 124–129): Total length 1.86. Endite ventral process short, wide; dorsal process long, narrow, with recurved tip. Leg spination: femur I p0-0-1; tibiae: I v4-4-1p; II v4-4-0; metatarsi: I v2-2-1p; II v3-0-2. Embolus proximal prong narrow, set at oblique angle; distal prong claw shaped.

**FEMALE** (PBI\_OON 37896, figs. 130–134): Total length 2.13. Leg spination: femora I, II p0-1-1, r1-1-1; tibiae: I v4-4-2; II v4-4-1p; metatarsi: I v2-2-1p; II v3-0-2. Genital atrium wide, short, anterior margin angular.

**MATERIAL EXAMINED:** PANAMA: **Coclé:** Antón, between El Narino and El Nance, Sept. 3–5, 1988 (D. Quintero, MIUP PBI\_OON 37674), 1♂; El Valle, July 1936 (A. Chickering, MCZ 66645, 83759, PBI\_OON 51362, 51374), 1♂, 3♀. **Colón:** Colón, July 2–14, 1979, canopy fogging, humid forest (E. Broadhead et al., USNM PBI\_OON 27880), 1♀; Fort Sherman, Aug. 1939 (A. Chickering, MCZ 83752, PBI\_OON 51378), 1♀; Gamboa, Aug. 1939 (A. Chickering, MCZ 83758, PBI\_OON 51373), 1♀; Gamboa, Pipeline Road, Aug. 7, 1983, jungle, elev. 10 m (J., F. Murphy, AMNH PBI\_OON 36784), 1♀; Limbo, Pipeline Road, Gamboa, Aug. 15, 1983, litter (N. Milton, J. Garcia, MIUP PBI\_OON 37743), 1♂; 5 km SE Piña, June 11, 1996, leaf litter, Atlantic rainforest, elev. 20 m (R. Anderson, AMNH PBI\_OON 51393), 1♂, 1♀; Pipeline Road, Río Frijolito, 9.14773°N, 79.72965°W, Sept. 28–Oct. 3, 2008, litter, palm-dominated forest (A. McKenna-Foster et al., FMNH 43113, 43115, 43120, 44215, ex 44212, PBI\_OON 10656, 10658, 10663, 10693, 51399), 4♂, 4♀; Pipeline Road, 0.5 km S Río Frijolito, Parque Nacional Soberanía, 9.14792°N, 79.72908°W, Jan. 1, 2008, litter, rainforest with spiny palms (M. Draney et al., FMNH PBI\_OON 10419), 1♂, 9.14793°N, 79.72935°W, Jan. 8, 2008, litter, rainforest with spiny palms (M. Draney et al., FMNH PBI\_OON 51395), 1♂, 9.14804°N, 79.72937°W, Jan. 1, 2008, litter, rainforest with spiny palms (M. Draney et al., FMNH PBI\_OON 51397), 1♂, 2♀; Pipeline Road, Río Limbo, 9.16099°N, 79.74671°W, Sept. 28–Oct. 3, 2008, mature rainforest litter (M. Draney et al., FMNH 43110, 43124, 43129, ex 43116, PBI\_OON 10653, 10667, 51396, 51398), 4♂, 4♀; Pipeline Road, just N Río Limbo bridge, 9.15836°N, 79.74256°W, Sept. 27, 2008, litter (M. Draney et al., FMNH 43121, 44218, PBI\_OON 10664, 10697), 1♂, 2♀; Porto Bello, Aug. 1936 (A. Chickering, MCZ 66646, PBI\_OON 51367), 1♂; San Lorenzo Protected Area (ZMUC 12502, 12504, PBI\_OON 40151, 40152), 2♂, (ZMUC 12506–12508, PBI\_OON 40154–40156), 3♀, May 18, 2004 (Schmidt, Bail, ZMUC, 12510, PBI\_OON 40182), 2♀, Oct. 8–13, 2004 (MRAC PBI\_OON 51384, 51385), 2♀, 9.28082°N, 79.97471°W, flight intercept traps (ZMUC PBI\_OON 40158, 40159), 1♂, 1♀, Sept. 30, 2004 (ZMUC 12509, PBI\_OON 40153), 1♀, 9.28097°N, 79.97445°W, flight intercept trap (ZMUC PBI\_OON 40157, 40160), 1♂, 1♀, 9.28134°N, 79.97477°W, Feb. 3, 2004, flight intercept trap (ZMUC 12511, PBI\_OON 40150), 1♂, Sept. 25–28, 2004, pitfall (ZMUC PBI\_OON 51386), 1♀, 9.28706°N, 79.98568°W, flight intercept trap (ZMUC PBI\_OON 40161), 1♀. **Panamá:** Cerro Azul, June 22, 1976, elev. 2000 ft (A. Newton, MCZ 72907, PBI\_OON 37021), 1♀; Cerro Campana, Feb. 14–23, 1976, Berlese, cloud forest leaf litter, elev. 3200 ft (A. Newton,



FIGURES 113–123. *Costarina tsalui*, new species, male (113–118) and female (119–123). **113.** Left palp, prolateral view. **114.** Same, ventral view. **115.** Same, retrolateral view. **116.** Left embolus, prolateral view. **117.** Same, ventral view. **118.** Same, retrolateral view. **119.** Sternum, ventral view. **120.** Abdomen, lateral view. **121.** Same, ventral view. **122.** Digested female genitalia, ventral view. **123.** Same, dorsal view.



FIGURES 124–134. *Costarina dura* (Chickering), male (124–129) and female (130–134). **124.** Left palp, prolateral view. **125.** Same, ventral view. **126.** Same, retrolateral view. **127.** Left embolus, prolateral view. **128.** Same, ventral view. **129.** Same, retrolateral view. **130.** Sternum, ventral view. **131.** Abdomen, lateral view. **132.** Same, ventral view. **133.** Digested female genitalia, ventral view. **134.** Same, dorsal view.

MCZ PBI\_OON 37895), 1 ♂; Cerro Jefe, Oct. 26, 1969, under bark, elev. 700–800 m (B. Malkin, FMNH 43135, PBI\_OON 10678), 1 ♂; Isla Barro Colorado, July 1916 (N. Banks, MCZ PBI\_OON 51353), 1 ♂, July 1934 (A. Chickering, MCZ 66644, PBI\_OON 51363), 4 ♂, June–Aug. 1936 (A. Chickering, MCZ 83750, PBI\_OON 51369), 18 ♀, July 1936 (A. Chickering, MCZ 66643, PBI\_OON 51356, 51365), 3 ♂ (including holotype of *D. dura*), July 14–25, 1938 (E. Williams, AMNH PBI\_OON 37896, 38038, 38039), 3 ♀, June–Aug. 1939 (A. Chickering, MCZ 66668, 83757, PBI\_OON 51357, 51376, 51377), 5 ♀ (including holotype of *D. silvatica*), Oct. –Dec. 1941, Berlese (J. Zetek, MCZ 66640, PBI\_OON 51361), 2 ♂, July 1943–Mar. 1944, Berlese (J. Zetek, MCZ 66641, 83760, PBI\_OON 51364, 51370), 3 ♂, 7 ♀, May–Oct. 1946, Berlese (J. Zetek, MCZ 66639, 71695, 71709, 83751, PBI\_OON 26657, 26669, 51366, 51375), 11 ♂, 7 ♀, June 1950 (A. Chickering, MCZ 71708, PBI\_OON 26652), 4 ♀, Berlese (J. Zetek, MCZ 71705, PBI\_OON 26650), 6 ♀, June–Aug. 1950 (A. Chickering, MCZ 66648, 66651, 66656, 66669, 71704, 71746, PBI\_OON 26651, 26654, 26658, 26659, 26663, 26670), 9 ♂, 10 ♀, Nov. 1952–Mar. 1953, Berlese (J. Zetek, AMNH PBI\_OON 37892, 37893), 3 ♂, Apr. 1953 (A. Nadler, AMNH PBI\_OON 37894), 1 ♂, July–Aug. 1954 (A. Chickering, MCZ 71694, 71703, 71710, 71747, PBI\_OON 26648, 26653, 26662, 26664), 4 ♂, 10 ♀, Jan. 1958 (A. Chickering, MCZ 71698, 71706, PBI\_OON 26649, 26661), 2 ♂, 1 ♀, June 1, 1961 (AMNH PBI\_OON 80), 1 ♂, May 1964 (A. Chickering, MCZ 68300, 71707, PBI\_OON 26656, 26668), 5 ♂, 5 ♀, Dec. 25, 1975, Berlese, litter (S. Levings, USNM PBI\_OON 27845), 1 ♂, Jan. 4–Feb. 7, 1976, Berlese, litter (S. Levings, USNM PBI\_OON 27847, 27848, 27850), 3 ♂, Feb. 17, 1976, Berlese, litter (S. Levings, USNM PBI\_OON 27873), 1 ♀, May 2–30, 1976, Berlese, litter (S. Levings, USNM PBI\_OON 27877, 27879, 51355), 3 ♀, Dec. 12, 1976, Berlese, litter (S. Levings, USNM PBI\_OON 27846), 1 ♂, June 18–27, 1977, Berlese, litter (S. Levings, USNM PBI\_OON 27856, 27878), 3 ♀, July 25, 1977, Berlese, litter (S. Levings, USNM PBI\_OON 27849), 1 ♂, 2 ♀; Isla Barro Colorado, intersection of Barbour, Fairchild, and Wheeler trails, Dec. 31, 2007, rainforest litter (M. Draney, M. Olemos, FMNH PBI\_OON 51354), 1 ♀; Isla Barro Colorado, mature rainforest S Lutz trail, 9.16045°N, 79.84043°W, Sept. 30, 2008, sifting litter, elev. 310 ft (P. Sierwald et al., FMNH PBI\_OON 51358), 1 ♀; La Filipinas, Bejuco, Apr. 12, 2002, from stomach of frog, *Atelopus zeteki* (Maxwell, MIUP PBI\_OON 37673), 1 ♂; Madden Dam, Aug. 1936 (A. Chickering, MCZ 83762, PBI\_OON 51368), 1 ♀, Aug. 1939 (A. Chickering, MCZ 83754, PBI\_OON 51372), 1 ♀; Madden Forest Preserve, Aug. 1936 (A. Chickering, MCZ 83749, PBI\_OON 51379), 1 ♀, July 1939 (A. Chickering, MCZ 83755, PBI\_OON 51371), 1 ♀, July 1950 (A. Chickering, MCZ 71697, 71700, PBI\_OON 26647, 26667), 1 ♂, 1 ♀, July 1954 (A. Chickering, MCZ 71701, PBI\_OON 26646), 1 ♀, Jan. 1958 (A. Chickering, MCZ 71699, PBI\_OON 26660), 1 ♂; Parque Nacional Metropolitana, 8.99408°N, 79.54398°W, Sept. 29, 2008, sifting litter, Pacific rainforest under STRI canopy crane (M. Draney et al., FMNH 43114, 44216, PBI\_OON 10657, 10694, 49208), 2 ♂, 3 ♀; Pedro Miguel, Aug. 26, 1954 (A. Chickering, MCZ 71696, PBI\_OON 26666), 1 ♂; Summit Gardens, Aug. 17, 1954 (A. Chickering, MCZ 71692, PBI\_OON 26665), 1 ♂, May 12, 1964 (A. Chickering, MCZ 71702, PBI\_OON 26655), 1 ♀.

DISTRIBUTION: Panama (Coclé, Colón, Panamá).

SYNONYMY: Chickering (1968: 29), when reporting on additional females of *Dysderina silvatica*, already thought “it probable that these females belong with *D. dura* Chickering.”

### *Costarina seclusa* (Chickering)

Figures 135–145

*Dysderina seclusa* Chickering, 1951: 213, fig. 5 (male holotype from Canal Zone Biological Area [= Isla Barro Colorado], Panamá, Panama, in MCZ; examined), 1968: 27, figs. 62–64.

*Dysderina improvisa* Chickering, 1968: 17, figs. 35, 36 (female holotype from Isla Barro Colorado, Panamá, Panama, in MCZ; examined). NEW SYNONYMY.

*Costarina seclusa*: Platnick and Dupérré, 2011: 50.

*Costarina improvisa*: Platnick and Dupérré, 2011: 50.

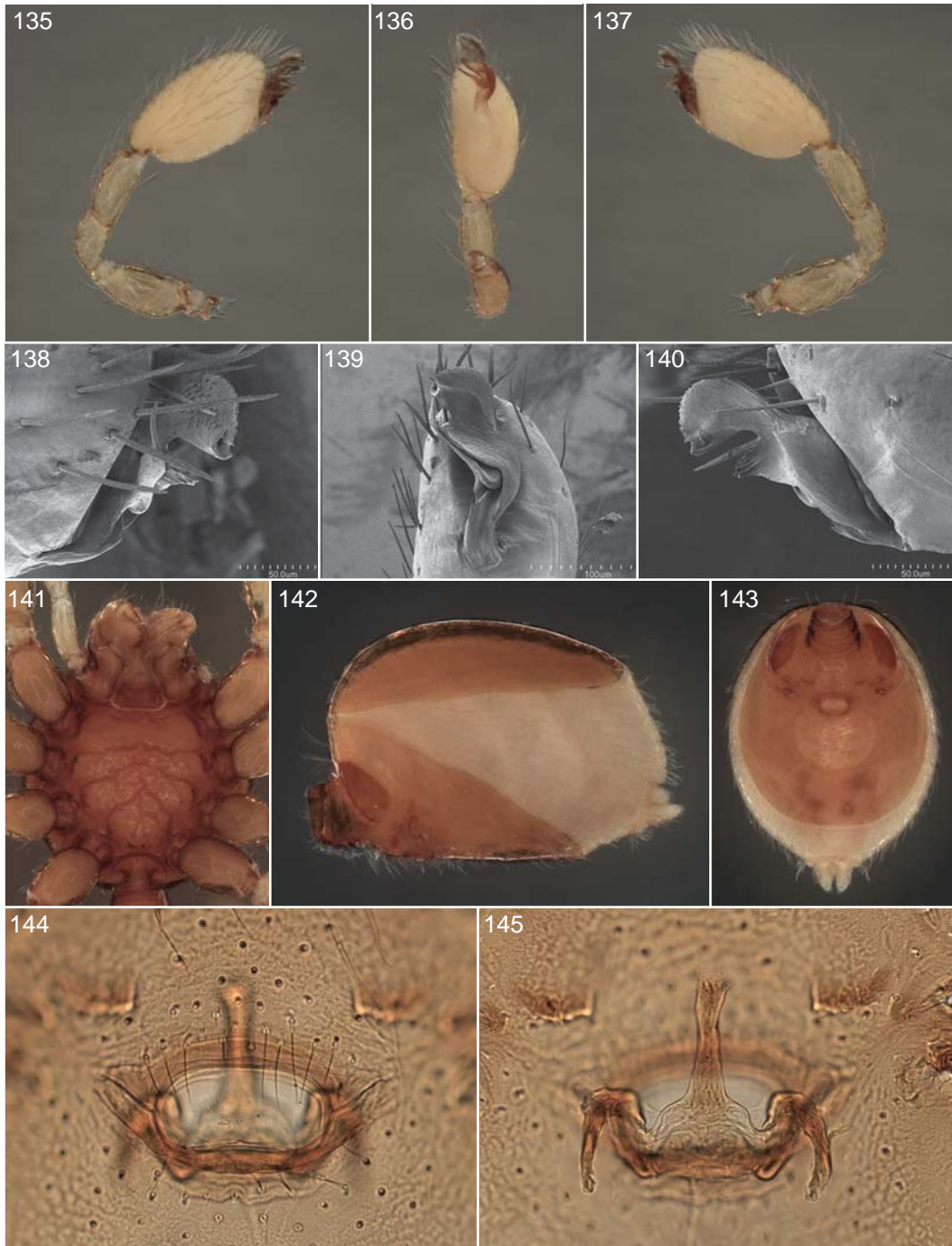
**DIAGNOSIS:** Males can be recognized by the long, narrow proximal embolar prong (figs. 135–140), females by the fused ventral scuta and large, oval genital atrium (figs. 142–145).

**MALE** (PBI\_OON 51387, figs. 135–140): Total length 1.76. Endite processes both relatively long, narrow. Leg spination: femur I p0-1-1, r1-1-0; tibiae: I v4-4-1p; II v4-4-0; metatarsi: I v2-2-1p; II v2-0-2. Embolus proximal prong long, narrow, straight for most of its length; distal prong large, rectangular, twisted.

**FEMALE** (PBI\_OON 51387, figs. 141–145): Total length 2.02. Leg spination: femora: I p0-1-1, r1-1-1; II p0-1-1, r1-1-0; tibiae: I v4-4-2; II v4-4-1p; metatarsi: I v2-2-2; II v3-0-2. Genital atrium large, oval, rebordered.

**MATERIAL EXAMINED:** PANAMA: **Colón:** Limbo, Pipeline Road, Gamboa, Aug. 15, 1983, litter (N. Milton, J. Garcia, MIUP PBI\_OON 51388), 1♂, 1♀; 5 km SE Piña, June 11, 1996, leaf litter, Atlantic rainforest, elev. 20 m (R. Anderson, AMNH PBI\_OON 51387), 2♂, 4♀; Pipeline Road, Río Frijolito, 9.14773°N, 79.72965°W, Sept. 28, 2008, litter, palm-dominated forest (M. Draney et al., FMNH ex 43120, PBI\_OON 51390), 1♂, 1♀, Oct. 3, 2008, litter, beating vegetation (A. McKenna-Foster et al., FMNH 43118, 44212, ex 43113, 43115, PBI\_OON 10661, 10691, 51391, 51392), 3♂, 4♀; Pipeline Road, 0.5 km S Río Frijolito, Parque Nacional Soberanía, 9.14804°N, 79.72937°W, Jan. 1, 2008, litter, rainforest with spiny palms (M. Draney et al., FMNH PBI\_OON 10597), 1♂, 1♀; Pipeline Road, Río Limbo, 9.16099°N, 79.74671°W, Sept. 28, 2008, mature rainforest litter (M. Draney et al., FMNH 43116, ex 43129, PBI\_OON 10659, 51389), 3♂; Pipeline Road, N Río Limbo, Parque Nacional Soberanía, 9.15572°N, 79.75029°W, Jan. 7, 2008, rainforest leaf litter (M. Draney, FMNH 34880, PBI\_OON 10593), 1♀; San Lorenzo Protected Area (ZMUC 12496, 12497, 12499, 12500, 12514, PBI\_OON 40137–40143, 40148), 8♂, (ZMUC 12498, 12501, 12517, PBI\_OON 40144–40146, 40149), 4♀, Sept. 12–23, 2004 (ZMUC 12505, PBI\_OON 40147), 1♀, 9.27597°N, 79.97715°W, Oct. 23–Nov. 2, 2004, flight intercept traps (M. Rapp et al., MRAC, PBI\_OON 51380, 51382), 2♂, 1♀, 9.28082°N, 79.97471°W, May 6–9, 2004 (E. Medianero, MRAC PBI\_OON 51381), 1♀, 9.28134°N, 79.97477°W, May 6–9, 2004 (E. Medianero, MRAC PBI\_OON 51383), 1♀. **Darién:** Chucantí, Nov. 11–14, 2009 (R. Miranda, S. Bermudez, MIUP PBI\_OON 51400), 1♂. **Panamá:** Isla Barro Colorado, July 1916 (N. Banks, MCZ PBI\_OON 27152), 1♀, June–Aug. 1936 (A. Chickering, MCZ 71713, PBI\_OON 27162), 1♀, Aug. 21, 1938 (E. Williams, AMNH PBI\_OON 38050), 1♂, Apr.–May, 1942 (J. Zetek, MCZ 71745, PBI\_OON 27160), 1♀, July 1943–Mar. 1944, Berlese (J. Zetek, MCZ 66666, PBI\_OON 51350, 51360), 5♂, 2♀ (including holotype of *C. seclusa*), May–Oct. 1946 (J. Zetek, MCZ 66664, 66665, 71712, 71716, 71717, PBI\_OON 27151, 27156, 27158, 27161, 51359), 4♂, 8♀ (including holotype of *C. improvisa*, PBI\_OON 51349), June–Aug. 1949 (J. Zetek, MCZ 66659, PBI\_OON 27150), 2♂, Nov. 1952–Mar. 1953, Berlese (J. Zetek, AMNH PBI\_OON 38048, 38049), 2♂, Aug. 1954 (A. Chickering, MCZ 71714, PBI\_OON 27159), 1♀, Aug. 16, 1954, hay debris (A. Chickering, MCZ 66658, PBI\_OON 27154), 1♂, Jan. 1958 (A. Chickering, MCZ 71715, PBI\_OON 27157), 1♀, Sept. 21, 1975, Berlese, leaf litter (S. Levings, USNM PBI\_OON 27875), 1♀, Nov. 9–Dec. 21, 1975, Berlese, leaf litter (S. Levings, USNM PBI\_OON 27851, 27861), 2♂, Dec. 25, 1975, Berlese, leaf litter (S. Levings, USNM PBI\_OON 51352), 1♀, Jan. 4, 1976, Berlese, leaf litter (S. Levings, USNM PBI\_OON 27857), 1♂, May 23, 1976, Berlese, leaf litter (S. Levings, USNM PBI\_OON 27859), 2♂, 1♀, June 13, 1976, Berlese, leaf litter (S. Levings, USNM PBI\_OON 27876), 1♀, Dec. 12, 1976, Berlese, leaf litter (S. Levings, USNM PBI\_OON 27872), 1♀, Feb. 2–28, 1977, Berlese, leaf litter (S. Levings, USNM PBI\_OON 27852–27855), 6♂, June 18, 1977, Berlese, leaf litter (S. Levings, USNM PBI\_OON 51351), 1♂, July 2–25, 1977, Berlese, leaf litter (S. Levings, USNM PBI\_OON 27858, 27860, 27874), 2♂, 1♀;





FIGURES 135–145. *Costarina seclusa* (Chickering), male (135–140) and female (141–145). 135. Left palp, prolateral view. 136. Same, ventral view. 137. Same, retrolateral view. 138. Left embolus, prolateral view. 139. Same, ventral view. 140. Same, retrolateral view. 141. Sternum, ventral view. 142. Abdomen, lateral view. 143. Same, ventral view. 144. Digested female genitalia, ventral view. 145. Same, dorsal view.

Isla Barro Colorado, intersection of Barbour, Fairchild, and Wheeler trails, Dec. 31, 2007, rainforest litter (M. Draney, M. Olemos, FMNH 34878, PBI\_OON 10591), 1 ♂; Isla Barro Colorado, mature rainforest S Lutz trail, 9.16045°N, 79.84043°W, Sept. 30, 2008, sifting litter, elev. 310 ft (P. Sierwald et al., FMNH 43123, 43125, 43128, PBI\_OON 10666, 10668, 10671), 1 ♂, 3 ♀; Madden Forest Preserve, Feb. 14, 1958 (A. Chickering, MCZ 71711, PBI\_OON 27153), 1 ♀.

DISTRIBUTION: Panama (Colón, Panamá, Darién).

SYNONYMY: Similarities in sternal morphology indicate that *C. improvisa* is the female of *C. seclusa* rather than of the sympatric *C. dura*.

### Key to Species from Colombia

1. Males (those of *yotoco* and *taraira* unknown) ..... 2
- Females (those of *suiza* and *helechal* unknown) ..... 10
2. Proximal and distal prongs of embolus long, narrow, widely separated (fig. 238).. *helechal*
- Embolus otherwise ..... 3
3. Proximal prong of embolus sharply pointed (figs. 151, 198, 209)..... 4
- Proximal prong of embolus blunter ..... 6
4. Proximal prong of embolus elongated (fig. 197) ..... *saladito*
- Proximal prong of embolus shorter ..... 5
5. Basal spur of embolus with several long teeth (fig. 151)..... *sasaima*
- Basal spur of embolus with few teeth (fig. 209) ..... *antonio*
6. Proximal prong of embolus elongated (figs. 186)..... *choco*
- Proximal prong of embolus shorter ..... 7
7. Distal prong of embolus with tiny, prolateral teeth (figs. 174, 218) ..... 8
- Distal prong of embolus without teeth. .... 9
8. Tip of proximal prong of embolus wide (figs. 174, 175)..... *otun*
- Tip of proximal prong of embolus narrow (figs. 218, 219)..... *anchicaya*
9. Distal prong of embolus relatively long (figs. 229, 230) ..... *gorgona*
- Distal prong of embolus relatively short (figs. 163, 164)..... *suiza*
10. Postepigastric scutum separate from epigastric scutum (figs. 167, 200, 222)..... 11
- Postepigastric scutum fused to epigastric scutum (as in figs. 153, 154) ..... 13
11. Anterior genitalic process distally widened (figs. 169, 170) ..... *yotoco*
- Anterior genitalic process not widened (figs. 203, 225)..... 12
12. Genital atrium ovoid (figs. 202, 203)..... *saladito*
- Genital atrium recurved (figs. 224, 225)..... *anchicaya*
13. Anterior genitalic process distally widened (figs. 181, 192, 236) ..... 14
- Anterior genitalic process not widened (figs. 156, 214, 248) ..... 16
14. Tip of anterior genitalic process as wide as atrium (figs. 191, 192)..... *choco*
- Tip of anterior genitalia process narrower than atrium..... 15
15. Posterior margin of genital atrium procurved (figs. 235, 236) ..... *gorgona*
- Posterior margin of genital atrium W-shaped (figs. 180, 181) ..... *otun*
16. Apodemes relatively wide (figs. 213, 214) ..... *antonio*

- Apodemes relatively narrow (figs. 156, 248) ..... 17
- 17. Apodemes relatively long (fig. 248)..... *taraira*
- Apodemes shorter (figs. 156) ..... *sasaima*

***Costarina sasaima*, new species**

Figures 146–156

**TYPES:** Male holotype and female allotype taken under damp leaves and rocks at Finca Bella Vista, near Sasaima, Cundinamarca, Colombia (Apr. 8, 1965; P., D. Craig), deposited in CAS (26313, PBI\_OON 2745).

**ETYMOLOGY:** The specific name is a noun in apposition taken from the type locality.

**DIAGNOSIS:** This species is a member of the *plena* group and resembles *C. concinna* from Panama, but males have a more sharply pointed proximal embolar prong (figs. 146–151) and females have fully fused ventral scuta and a conspicuous, procurved unsclerotized strip just behind the genital atrium (figs. 153–156).

**MALE** (PBI\_OON 2745, figs. 146–151): Total length 1.80. Endite ventral process relatively short, wide; dorsal process long, narrow, with sinuous tip. Leg spination: femur I p0-1-1, r0-1-0; tibiae: I v4-4-1p; II v4-4-0; metatarsi: I v2-2-1p; II v2-0-2. Embolus proximal prong relatively small, sharply pointed; distal prong short, bent at tip.

**FEMALE** (PBI\_OON 2745, figs. 152–156): Total length 1.72. Leg spination: femora I, II p0-1-1, r1-1-1; tibiae I, II v4-4-2; metatarsi: I v2-2-2; II v3-0-2. Genital atrium ovoid, followed posteriorly by procurved unsclerotized strip.

**OTHER MATERIAL EXAMINED:** COLOMBIA: **Cundinamarca:** Cachipay, Feb. 24, 2002, litter, elev. 1450 m (H. Pulido, ICN 1726, PBI\_OON 49614), 1 ♀; Charrascales, Parque Nacional Natural Chingaza, 4°31'N, 73°45'W, June 19–21, 2002, Winkler, elev. 2990 m (F. Guzmán, IAVH 108091, PBI\_OON 51335), 1 ♂; Finca Bella Vista, near Sasaima, Mar. 2, 1965, leaf litter (P., D. Craig, CAS 26309, PBI\_OON 2601), 1 ♂, Apr. 16, 1965, leaf litter above creek on bank (P. Craig, CAS 26325, PBI\_OON 2758), 2 ♂, May 5, 1975, under damp leaf mold (P. Craig, CAS 26322, PBI\_OON 2754), 1 ♂, May 7, 1965, leaf litter at night (P., D. Craig, CAS 26319, PBI\_OON 2751), 1 ♂, 1 ♀, May 26, 1965, leaf litter (P. Craig, CAS 26323, PBI\_OON 2755), 2 ♂ (one with abnormal left palp), 1 ♀, June 5, 1965, bamboo leaf litter (P., D. Craig, CAS 26310, PBI\_OON 2603), 5 ♀; highway below Finca Bella Vista, toward Sasaima, Apr. 17, 1965, under stones on steep cliff above highway (P. Craig, J. Robb, CAS 26308, PBI\_OON 2599), 1 ♂; Finca San Pablo, 3 km N Albán, Aug. 1–12, 1967 (P., B. Wygodzinsky, AMNH PBI\_OON 51330), 2 ♂; La Playa, Vereda La Cristalina, Fomeque, Parque Nacional Natural Chingaza, 4°31'50"N, 73°45'32"W, Nov. 18–20, 2003, pitfalls, elev. 3220 m (I. Quintero, M. Torres, González, IAVH 108168, 108169, PBI\_OON 51333, 51336), 1 ♂, 1 ♀; Palacio, Reserva Forestal Río Blanco, Vereda San Francisco, Guasca, Parque Nacional Natural Chingaza, 4°42'13"N, 73°51'4"W, Nov. 22–24, 2003, dung trap, elev. 2970 m (E. González, IAVH 108162, PBI\_OON 51334), 1 ♀; Páramo de Montserrate, Bogotá, Apr.–Nov. 1968, pitfalls (H. Sturm, AMNH PBI\_OON 51331), 5 ♂, 3 ♀; San Antonio del Tequendama, Vereda La Máquina, Bosque El Ermitaño, Dec. 1997–Jan. 1998, pitfalls, low vegetation, secondary cloud forest, elev. 2000 m (S. Forero, ICN 2456, PBI\_OON 51332), 1 ♂, 3 ♀; Zipacón, Vereda La Cabaña, July 15, 2010, sifting litter above rock wall (D. Luna, ICN 6479, PBI\_OON 40763), 1 ♂.

**DISTRIBUTION:** Colombia (Cundinamarca).

*Costarina suiza*, new species

Figures 157, 158, 160–165

**TYPES:** Male holotype and two male paratypes from a Berlese sample of early secondary forest litter taken at an elevation of 1800 m in the Otún Quimbaya Flora and Fauna Sanctuary, La Suiza, Pereira, 4°44'N, 75°35'W, Risaralda, Colombia (June 10, 2005; A. Sabogal), deposited in ICN (PBI\_OON 51337).

**ETYMOLOGY:** The specific name is a noun in apposition taken from the type locality.

**DIAGNOSIS:** This species is a member of the *plena* group and resembles *C. sasaima*, but males have a prolonged tip on the distal embolar prong and an abruptly bent proximal prong (figs. 160–165). Differences in sternal morphology make it unlikely that this could be the male of *C. yotoco* or *C. taraira*.

**MALE** (PBI\_OON 51337, figs. 157, 158, 160–165): Total length 2.20. Endite ventral process short, wide; dorsal process hypertrophied, with tip extending far anterior of anterior margin of endites, tip expanded distally. Leg spination: femur I p0-1-1, r0-1-0; tibiae: I v4-4-2; II v4-4-1p; metatarsi: I v2-2-1p; II v3-0-2. Embolus proximal prong scythe shaped; distal prong with enlarged tip.

**FEMALE:** Unknown.

**OTHER MATERIAL EXAMINED:** Two males taken with the holotype (AMNH, PBI\_OON 51338).

**DISTRIBUTION:** Colombia (Risaralda), where the species occurs sympatrically with the new species *C. otun* as well as *Prodysderina otun* Platnick et al. (2013a), *Pseudodysderina suiza* (Platnick et al., 2013b), and *Tinadysderina pereira* Platnick et al. (2013b).

*Costarina otun*, new species

Figures 159, 171–181

**TYPES:** Male holotype and female allotype from a Berlese sample of early secondary forest litter taken at an elevation of 1800 m in the Otún Quimbaya Flora and Fauna Sanctuary, La Suiza, Pereira, 4°44'N, 75°35'W, Risaralda, Colombia (June 10, 2005; A. Sabogal), deposited in ICN (PBI\_OON 51339).

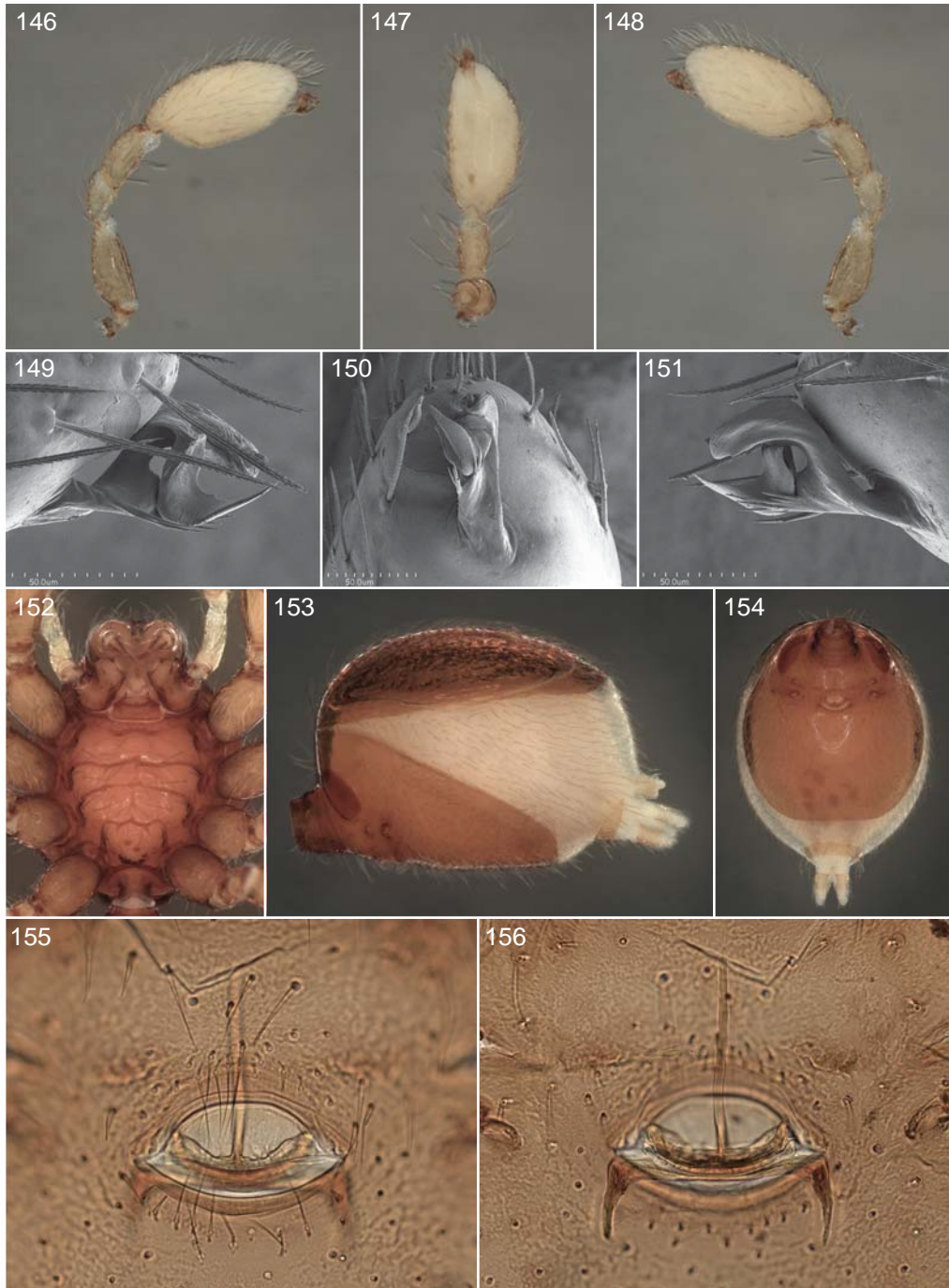
**ETYMOLOGY:** The specific name is a noun in apposition taken from the type locality.

**DIAGNOSIS:** Males have an arched and distally twisted distal embolar prong and a subdistally flared proximal prong (figs. 171–176); females have fused ventral scuta and a W-shaped posterior margin of the genital atrium (figs. 178–181).

**MALE** (PBI\_OON 51339, figs. 159, 171–176): Total length 1.94. Endite ventral process wide, ventrally protuberant; distal process hypertrophied, tip curled, extending far anterior of endite tip. Leg spination: femur I p0-1-1; tibiae: I v4-4-2; II v4-4-1p; metatarsi: I v2-2-2; II v2-0-2. Embolus proximal prong subdistally flared; distal prong arched, twisted at tip.

**FEMALE** (PBI\_OON 51339, figs. 177–181): Total length 2.41. Leg spination: femora: I p0-1-1, r1-1-1; II p0-1-1, r1-1-0; tibiae I, II v4-4-2; metatarsi: I v2-2-2; II v3-0-2. Genital atrium large, squared, rebordered, with W-shaped posterior margin.

**OTHER MATERIAL EXAMINED:** COLOMBIA: **Risaralda:** Otún Quimbaya Flora and Fauna Sanctuary, La Suiza, Pereira, 4°44'N, 75°35'W, June 10, 2005, Berlese, early secondary forest litter, elev. 1800 m (ICN 4111, PBI\_OON 21246), 7♂, 2♀, same (AMNH, PBI\_OON 51340), 1♂, 1♀. **Quindío:** 1 km S



FIGURES 146–156. *Costarina sasaima*, new species, male (146–151) and female (152–156). **146.** Left palp, prolateral view. **147.** Same, ventral view. **148.** Same, retrolateral view. **149.** Left embolus, prolateral view. **150.** Same, ventral view. **151.** Same, retrolateral view. **152.** Sternum, ventral view. **153.** Abdomen, lateral view. **154.** Same, ventral view. **155.** Digested female genitalia, ventral view. **156.** Same, dorsal view.

Calarcá, Mar. 8, 1974, Berlese, forest litter with fleshy mushrooms, elev. 5000 ft (S. Peck, FMNH 33613, PBI\_OON 10120), 1 ♂.

DISTRIBUTION: Colombia (Risaralda, where sympatric with *C. suiza* and three other members of the *Dysderina* complex, as indicated under that species, and Quindío).

*Costarina choco*, new species

Figures 182–192

TYPES: Male holotype and female allotype taken from dead foliage in the Quebrada Docordo, between Cucurupí and Noanamá, Río San Juan, Chocó, Colombia (Jan. 1–5, 1969; B. Malkin), deposited in AMNH (PBI\_OON 38062).

ETYMOLOGY: The specific name is a noun in apposition taken from the type locality.

DIAGNOSIS: Males can easily be recognized by the greatly elongated proximal embolar prong (figs. 182–187), females by the fused ventral scuta and large unsclerotized semicircle behind the genital atrium (189–192). In both sexes, the dorsal scutum is fused to the epigastric scutum, a character not noted in any other members of the genus.

MALE (PBI\_OON 38062, figs. 182–188): Total length 1.72. Endite ventral process relatively short, wide; dorsal process with arched, medially directed tip. Leg spination: femur I p0-1-1, r1-1-0; tibiae: I v4-4-2; II v4-4-1p; metatarsi: I v2-2-1p; II v2-0-2. Embolus with both prongs greatly elongated, parallel throughout most of their length.

FEMALE (PBI\_OON 38062, figs. 189–192): Carapace missing, abdomen 1.14 long. Genital atrium followed posteriorly by large semicircle of weakly sclerotized cuticle.

OTHER MATERIAL EXAMINED: None.

DISTRIBUTION: Colombia (Chocó).

*Costarina yotoco*, new species

Figures 166–170

TYPE: Female holotype taken at an elevation of 1550 m in the Reserva Nacional Bosque de Yotoco, Valle del Cauca, Colombia (Oct. 2002; E. Florez), deposited in ICN (1090, PBI\_OON 51343).

ETYMOLOGY: The specific name is a noun in apposition taken from the type locality.

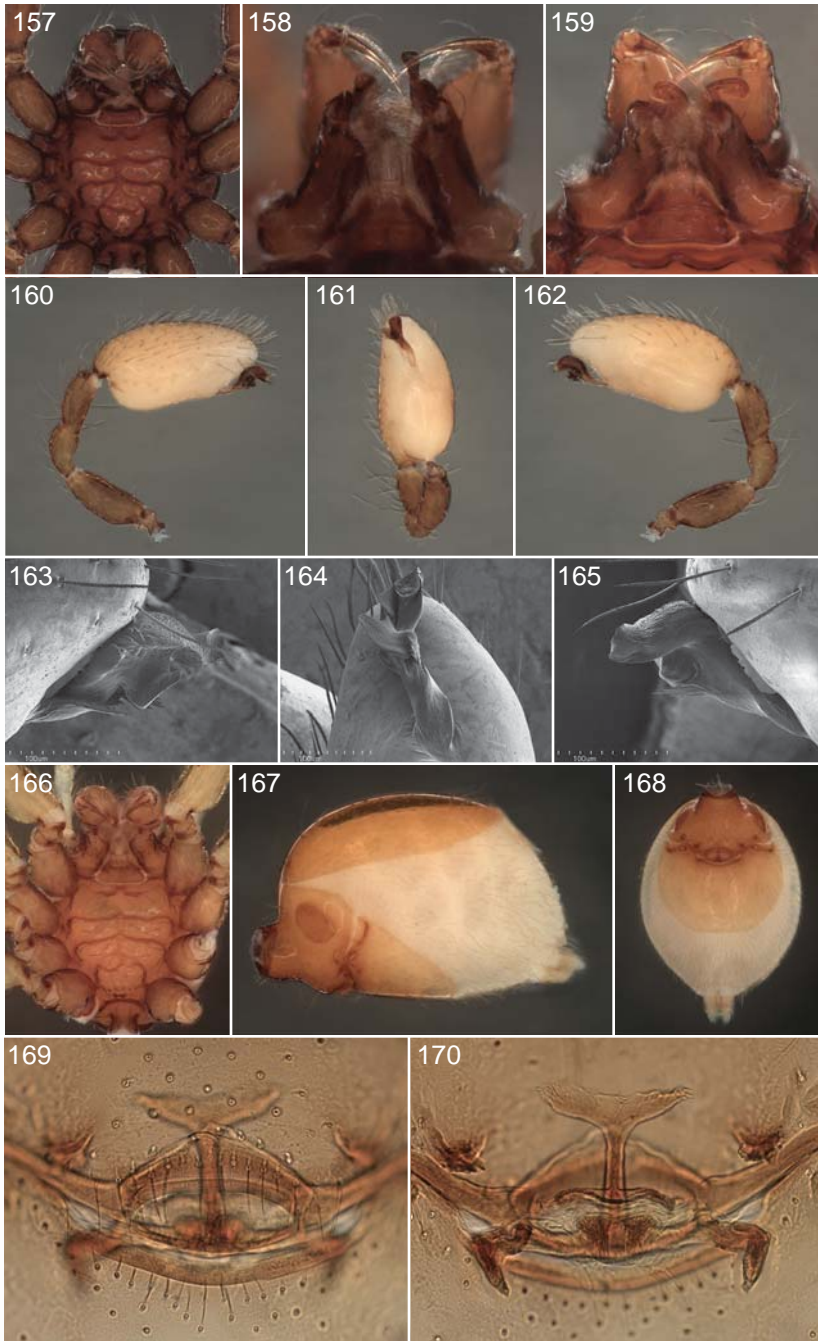
DIAGNOSIS: Females can easily be recognized by the large, conspicuous, posteromedian sclerotization in the genital atrium (figs. 168–170).

MALE: Unknown.

FEMALE (PBI\_OON 51343, figs. 166–170): Total length 2.23. Leg spination: femora: I p0-1-1, r1-1-1; II p0-1-1, r1-1-0; tibiae: I v4-4-2; II v4-4-1p; metatarsi: I v2-2-2; II v3-0-2. Posterior portion of genital atrium sclerotized, wide base of anterior genitalic projection visible through cuticle, tip greatly widened.

OTHER MATERIAL EXAMINED: None.

DISTRIBUTION: Colombia (Valle del Cauca).



FIGURES 157–170. 157, 158, 160–165. *Costarina suiza*, new species, male. 159. *C. otun*, new species, male. 166–170. *C. yotoco*, new species, female. 157, 166. Sternum, ventral view. 158, 159. Endites, ventral view. 160. Left palp, prolateral view. 161. Same, ventral view. 162. Same, retrolateral view. 163. Left embolus, prolateral view. 164. Same, ventral view. 165. Same, retrolateral view. 167. Abdomen, lateral view. 168. Same, ventral view. 169. Digested female genitalia, ventral view. 170. Same, dorsal view.

*Costarina saladito*, new species

Figures 193–203

**TYPES:** Male holotype and female allotype taken by sifting litter at night at an elevation of 2085 m at San Antonio, near El Saladito, Cali, 3°29'49.2"N, 76°37'29.1"W, Valle del Cauca, Colombia (Feb. 16, 1998; G. Hormiga et al.), deposited in USNM (PBI\_OON 27862).

**ETYMOLOGY:** The specific name is a noun in apposition taken from the type locality.

**DIAGNOSIS:** Males can easily be recognized by the long, straight proximal embolar prong (figs. 193–198); females resemble those of *C. yotoco* in having a small postepigastric scutum, but have a much smaller posterior sclerotization in the genital atrium and an unexpanded tip of the anterior genitalic projection (figs. 201–203).

**MALE** (PBI\_OON 27862, figs. 193–198): Total length 2.38. Endite ventral process very short, with heavily sclerotized tip; dorsal process with long, arched, medially directed tip. Leg spination: femur I p0-0-1; tibiae: I v4-4-2; II v4-4-1p; metatarsi: I v2-2-2; II v3-0-2. Embolus proximal prong long, narrow, sharply pointed; distal prong gently curved.

**FEMALE** (PBI\_OON 27862, figs. 199–203): Total length 2.60. Leg spination: femur I p0-1-1, r1-1-1; tibiae I, II v4-4-2; metatarsi: I v2-2-2; II v3-0-2. Genital atrium very small, only base of narrow anterior genitalic projection visible externally.

**OTHER MATERIAL EXAMINED:** None.

**DISTRIBUTION:** Colombia (Valle del Cauca), where sympatric with *C. antonio*.

*Costarina antonio*, new species

Figures 204–214

**TYPE:** Male holotype and male paratype taken by sifting litter at night at an elevation of 2085 m at San Antonio, near El Saladito, Cali, 3°29'49.2"N, 76°37'29.1"W, Valle del Cauca, Colombia (Feb. 16, 1998; G. Hormiga et al.), deposited in USNM (PBI\_OON 27863).

**ETYMOLOGY:** The specific name is a noun in apposition taken from the type locality.

**DIAGNOSIS:** Males can easily be recognized by the bifid proximal embolar prong (figs. 204–209); the female here tentatively matched with the males has fused ventral scuta and a distinctive pair of sclerotizations situated posterolaterally of the genital atrium (figs. 211–214).

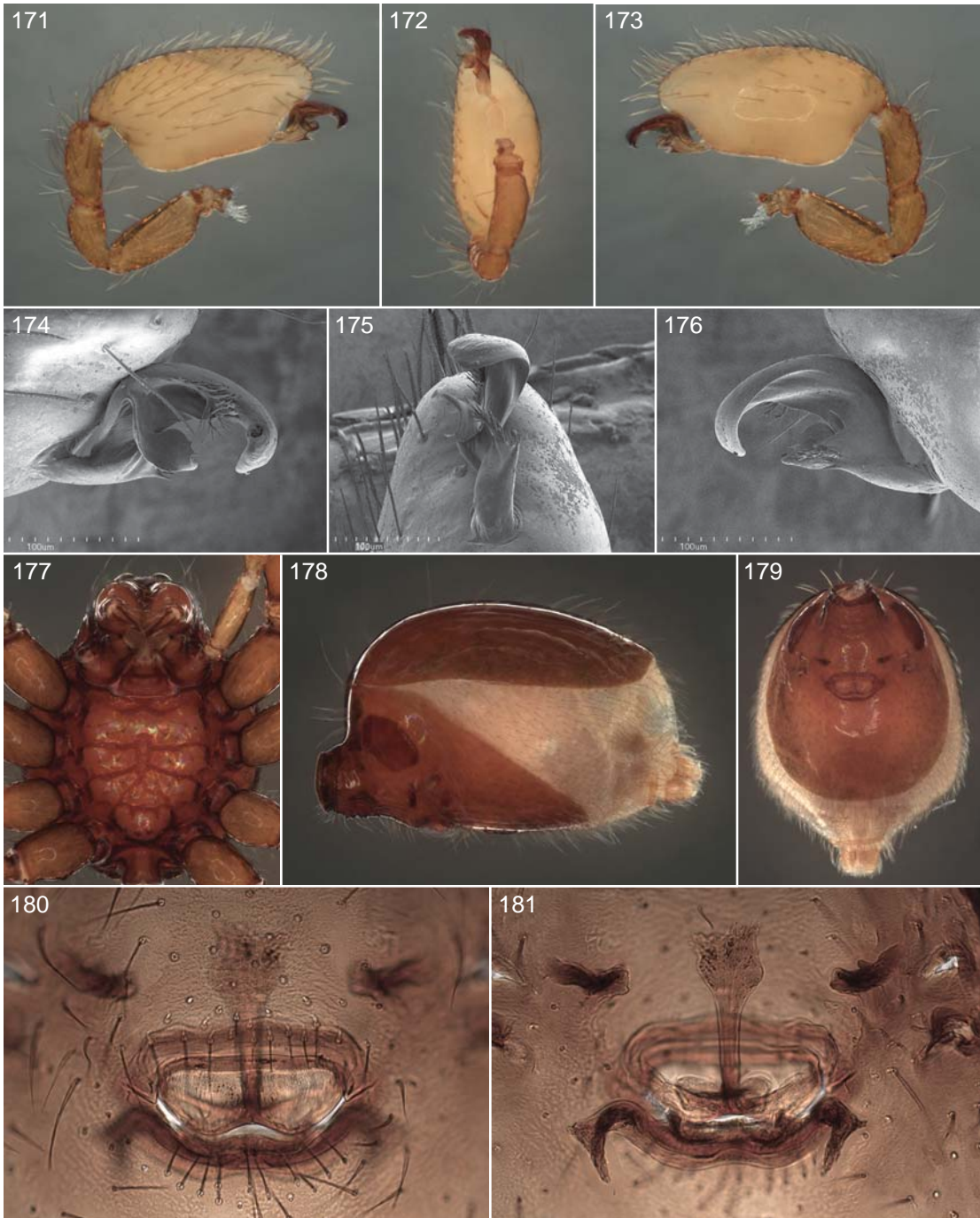
**MALE** (PBI\_OON 27863, figs. 204–209): Total length 2.28. Endites with both processes relatively long, narrow, dorsal process with anteromedially directed tip. Leg spination: femur I p0-1-1, r1-1-0; tibiae: I v4-4-2; II v4-4-1p; metatarsi: I v2-2-2; II v3-0-2. Embolus proximal prong bifid; distal prong short, stubby.

**FEMALE** (PBI\_OON 27883, figs. 210–214): Total length 2.67. Leg spination: femora: I p0-1-1, r1-1-1; II p0-1-1, r1-1-0; tibiae I, II v4-4-2; metatarsi: I v2-2-2; II v3-0-2. Genital atrium with squared rebordered anterior margin, sclerotizations visible at sides of posterior margin.

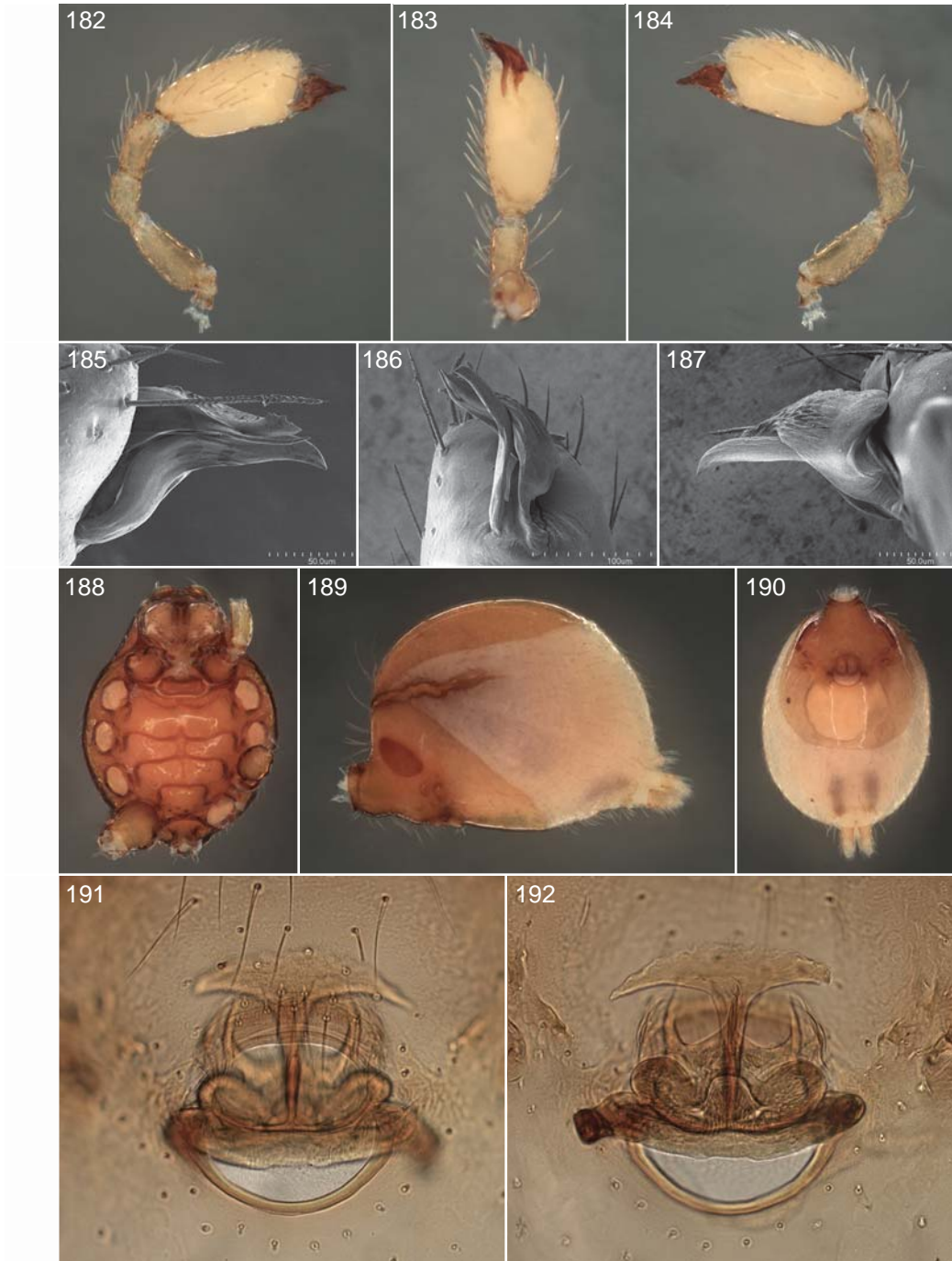
**OTHER MATERIAL EXAMINED:** COLOMBIA: **Valle del Cauca:** Reserva Natural Hato Vieja, near Pance, Parque Nacional Naturale Farallones de Cali, 3°20'53"N, 76°40'16.7"W, Valle del Cauca, Colombia, Feb. 12–13, 1998 (G. Hormiga et al., USNM PBI\_OON 27883), 1 ♀.

**DISTRIBUTION:** Colombia (Valle del Cauca), where sympatric with *C. saladito*.

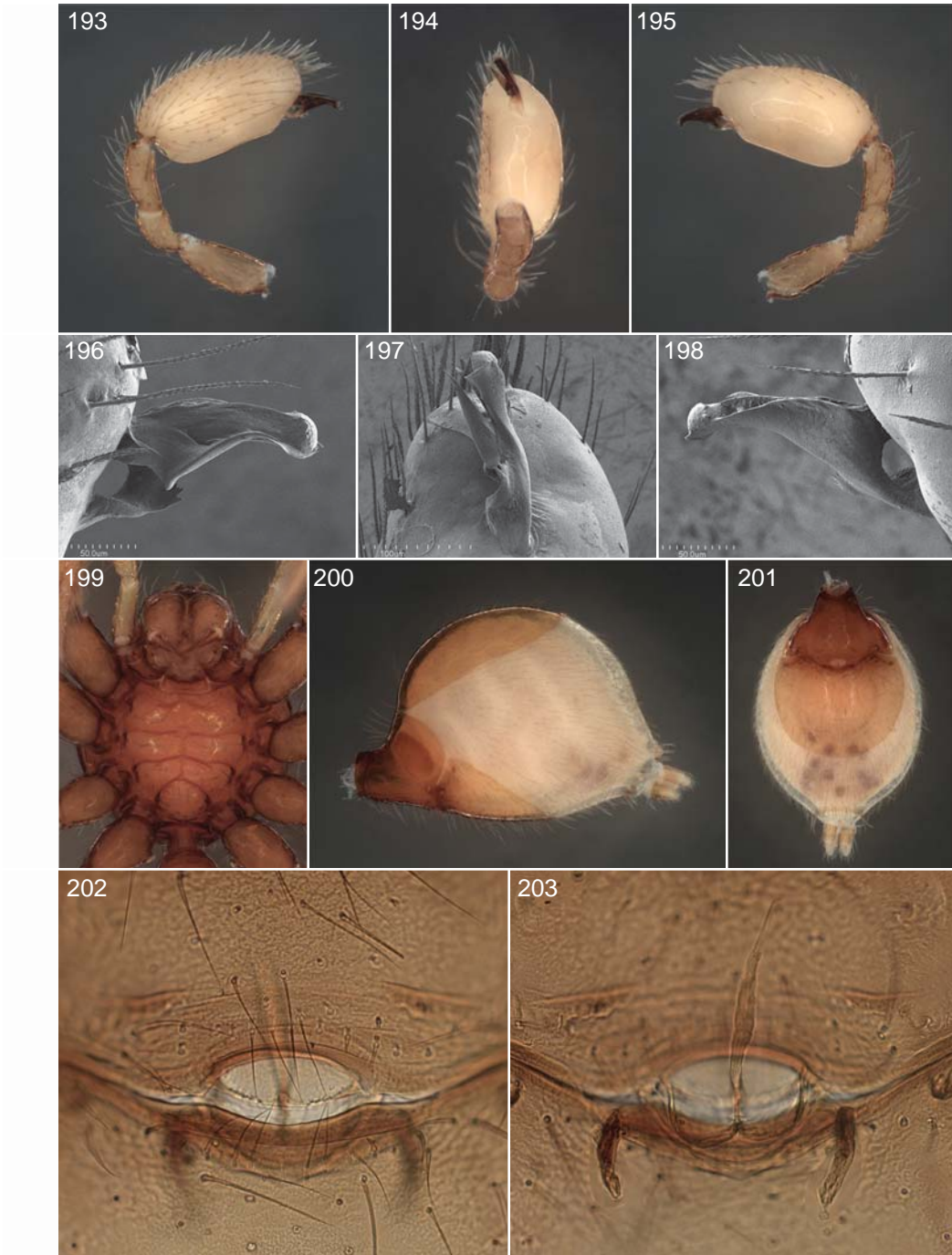




FIGURES 171–181. *Costarina otun*, new species, male (171–176) and female (177–181). **171.** Left palp, prolateral view. **172.** Same, ventral view. **173.** Same, retrolateral view. **174.** Left embolus, prolateral view. **175.** Same, ventral view. **176.** Same, retrolateral view. **177.** Sternum, ventral view. **178.** Abdomen, lateral view. **179.** Same, ventral view. **180.** Digested female genitalia, ventral view. **181.** Same, dorsal view.



FIGURES 182–192. *Costarina choco*, new species, male (182–188) and female (189–192). **182.** Left palp, prolateral view. **183.** Same, ventral view. **184.** Same, retrolateral view. **185.** Left embolus, prolateral view. **186.** Same, ventral view. **187.** Same, retrolateral view. **188.** Sternum, ventral view. **189.** Abdomen, lateral view. **190.** Same, ventral view. **191.** Digested female genitalia, ventral view. **192.** Same, dorsal view.



FIGURES 193–203. *Costarina saladito*, new species, male (193–198) and female (199–203). **193.** Left palp, prolateral view. **194.** Same, ventral view. **195.** Same, retrolateral view. **196.** Left embolus, prolateral view. **197.** Same, ventral view. **198.** Same, retrolateral view. **199.** Sternum, ventral view. **200.** Abdomen, lateral view. **201.** Same, ventral view. **202.** Digested female genitalia, ventral view. **203.** Same, dorsal view.

*Costarina anchicaya*, new species

Figures 215–225

TYPE: Male holotype from Winkler sample taken at an elevation of 650 m at Anchicaya, Parque Nacional Naturale Farallones de Cali, 3°26'N, 76°48'W, Valle del Cauca, Colombia (Oct. 16–19, 2001; S. Sarria), deposited in IAVH (108142, PBI\_OON 51341).

ETYMOLOGY: The specific name is a noun in apposition taken from the type locality.

DIAGNOSIS: Males can easily be recognized by the large, distally incised distal embolar prong (figs. 215–220), females by the short genital atrium (figs. 223–225).

MALE (PBI\_OON 51341, figs. 215–220): Total length 2.03. Endite ventral process relatively narrow, sharply pointed; dorsal process with narrow, arched, anteromedially directed tip. Leg spination: femur I p0-1-1; tibiae: I v4-4-2; II v4-4-1p; metatarsi: I v2-2-2; II v3-0-2. Embolus proximal prong sharply bent; distal prong flared, distally incised.

FEMALE (PBI\_OON 51342, figs. 221–225): Total length 2.45. Leg spination: femora I, II p0-1-1, r1-1-1; tibiae I, II v4-4-2; metatarsi: I v2-2-1p; II v3-0-2. Genital atrium very short, wide, posterior margin recurved.

OTHER MATERIAL EXAMINED: COLOMBIA: **Valle del Cauca:** Anchicaya, Parque Nacional Naturale Farallones de Cali, 3°26'N, 76°48'W, July 21–23, 2000, Winkler, elev. 650 m (S. Sarria, IAVH 108141, PBI\_OON 51342), 1 ♀.

DISTRIBUTION: Colombia (Valle del Cauca).

*Costarina gorgona*, new species

Figures 226–236

TYPE: Male holotype from Winkler sample taken at an elevation of 30 m at El Helechal, Parque Nacional Natural Gorgona, 2°58'N, 78°11'W, Cauca, Colombia (Mar. 6–9, 2000; R. Duque), deposited in IAVH (ex 108086, PBI\_OON 51344).

ETYMOLOGY: The specific name is a noun in apposition taken from the type locality.

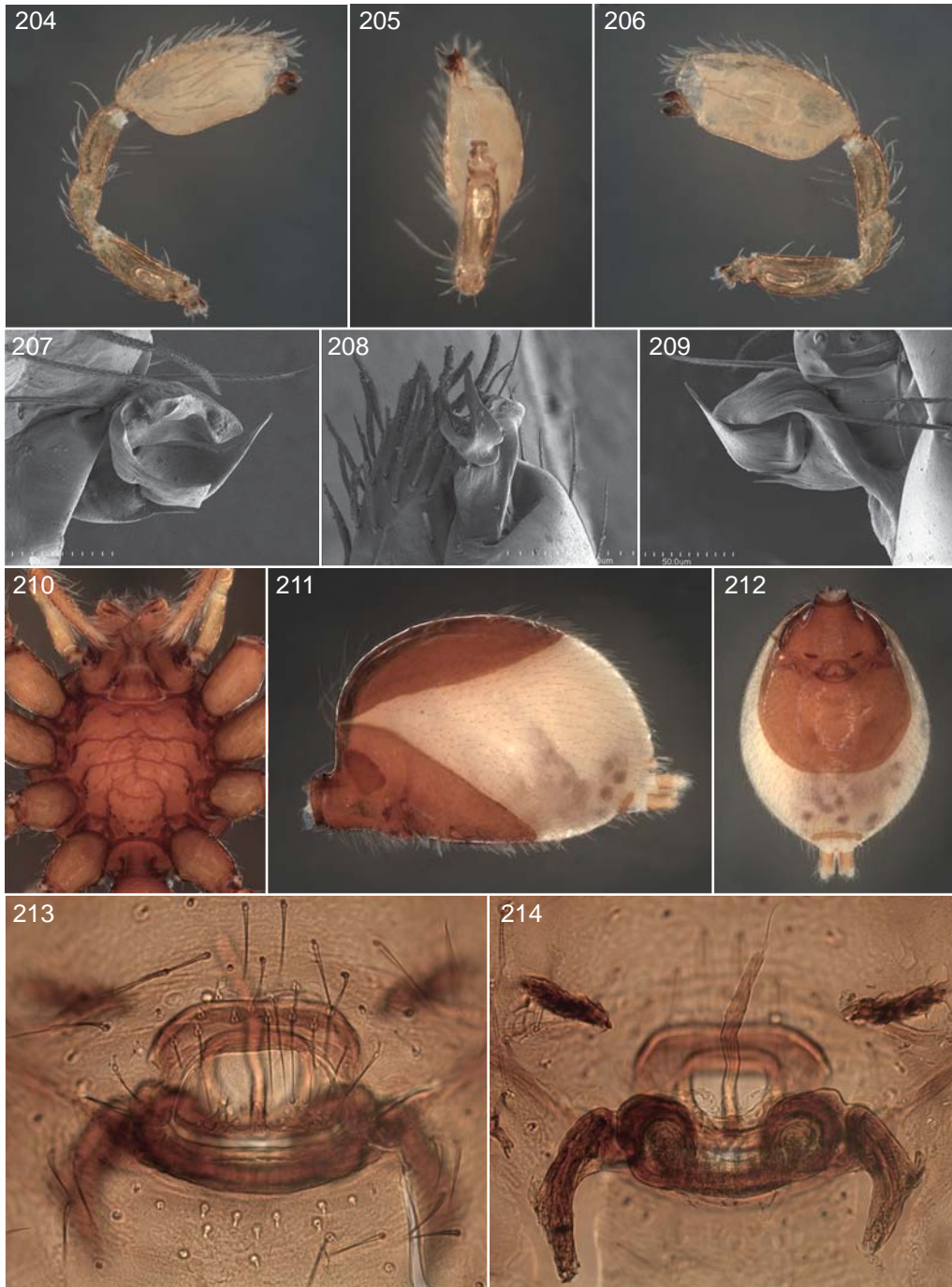
DIAGNOSIS: Males can easily be recognized by having both embolar prongs greatly elongated (figs. 226–231), females by the fused ventral scuta and relatively large, rectangular genital atrium (figs. 233–236).

MALE (PBI\_OON 51344, figs. 226–231): Total length 1.78. Endite ventral process very long, narrow; dorsal process hypertrophied, triangular, tip directed anteriorly, extending far beyond anterior tip of endites. Leg spination: femur I p0-1-1, r1-1-0; tibiae: I v4-4-2; II v4-4-1p; metatarsi: I v2-2-1p; II v2-0-2. Embolus with both prongs greatly elongated, distal prong bifid.

FEMALE (PBI\_OON 51346, figs. 232–236): Total length 2.29. Leg spination: femora I, II p0-1-1, r1-1-1; tibiae I, II v4-4-2; metatarsi: I v2-2-2; II v3-0-2. Genital atrium short, wide, rectangular.

OTHER MATERIAL EXAMINED: COLOMBIA: **Cauca:** Antigua Laguna, Parque Nacional Natural Gorgona, 2°58'N, 78°11'W, Sept. 7–9, 2000, Winkler, elev. 70 m (R. Duque, IAVH 108081, PBI\_OON 51345), 1 ♀; El Roble, Parque Nacional Natural Gorgona, 2°58'N, 78°11'W, Mar. 6–9, 2000, Winkler, elev. 130 m (H. Torres, IAVH 108083, PBI\_OON 51347), 1 ♀, June 28–30, 2001, pitfall, elev. 130 m (H. Torres, IAVH 108084, PBI\_OON 51346), 1 ♀.

DISTRIBUTION: Colombia (Cauca), where sympatric with *C. helechal*.



FIGURES 204–214. *Costarina antonio*, new species, male (204–209) and female (210–214). **204.** Left palp, prolateral view. **205.** Same, ventral view. **206.** Same, retrolateral view. **207.** Left embolus, prolateral view. **208.** Same, ventral view. **209.** Same, retrolateral view. **210.** Sternum, ventral view. **211.** Abdomen, lateral view. **212.** Same, ventral view. **213.** Digested female genitalia, ventral view. **214.** Same, dorsal view.

*Costarina helechal*, new species

Figures 237–243

TYPE: Male holotype from Winkler sample taken at an elevation of 30 m at El Helechal, Parque Nacional Natural Gorgona, 2°58'N, 78°11'W, Cauca, Colombia (Mar. 6–9, 2000; R. Duque), deposited in IAVH (108086, PBI\_OON 51348).

ETYMOLOGY: The specific name is a noun in apposition taken from the type locality.

DIAGNOSIS: Males can easily be recognized by the sinuous proximal embolar prong (figs. 237–242). Differences in sternal morphology make it unlikely that this could be the male of *C. yotoco* or *C. taraira*.

MALE (PBI\_OON 51348, figs. 237–243): Total length 1.97. Endite ventral process narrow, with arched ventral surface; dorsal process with narrow tip. Leg spination: femur I p0-1-1; tibiae: I v4-4-2; II v4-4-0; metatarsi: I v2-2-1p; II v2-0-2. Embolus proximal prong long, narrow, sinuous, almost corkscrew shaped; distal prong narrow, evenly curved.

FEMALE: Unknown.

OTHER MATERIAL EXAMINED: None.

DISTRIBUTION: Colombia (Cauca), where sympatric with *C. gorgona*.

*Costarina taraira*, new species

Figures 244–248

TYPE: Female holotype taken in the Estación Biológica Caparú, Taraira, Lago Taraira, below Río Apaporis, 1°04'N, 69°29'W, Vaupés, Colombia (Apr. 2, 2004; J. Pinzon), deposited in ICN (PBI\_OON 40764).

ETYMOLOGY: The specific name is a noun in apposition taken from the type locality.

DIAGNOSIS: Females can easily be recognized by the fused ventral scuta and inverted T-shaped sclerotization in the genital atrium (figs. 245–248).

MALE: Unknown.

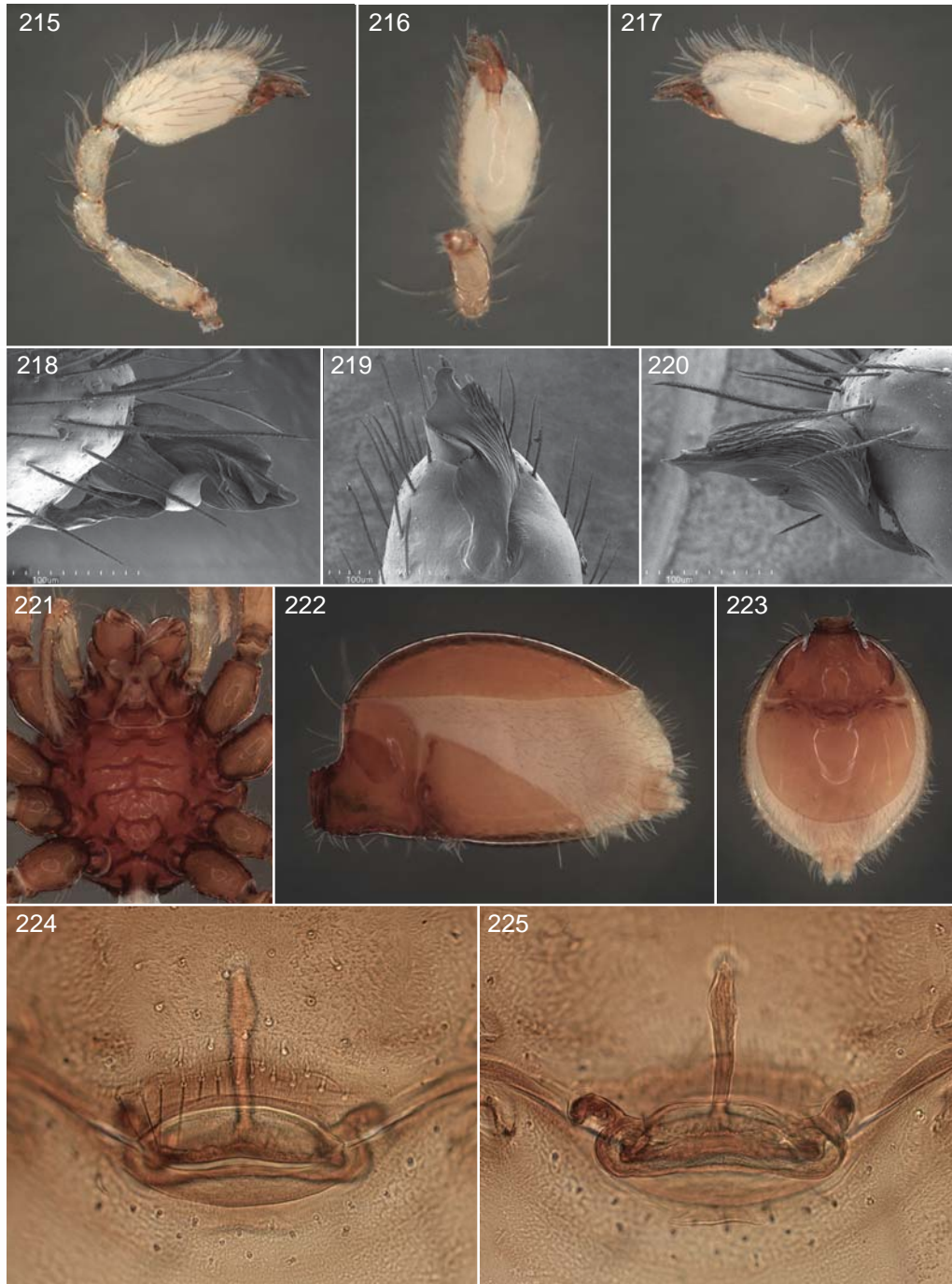
FEMALE (PBI\_OON 40764, figs. 244–248): Total length 1.91. Leg spination: femora: I p0-1-1, r1-1-1; II p0-1-1, r1-1-0; tibia I v4-4-0; metatarsus I v2-2-0; (leg II: only femur present). Genital atrium small, with inverted T-shaped sclerite, followed posteriorly by band of weakly sclerotized cuticle.

OTHER MATERIAL EXAMINED: None.

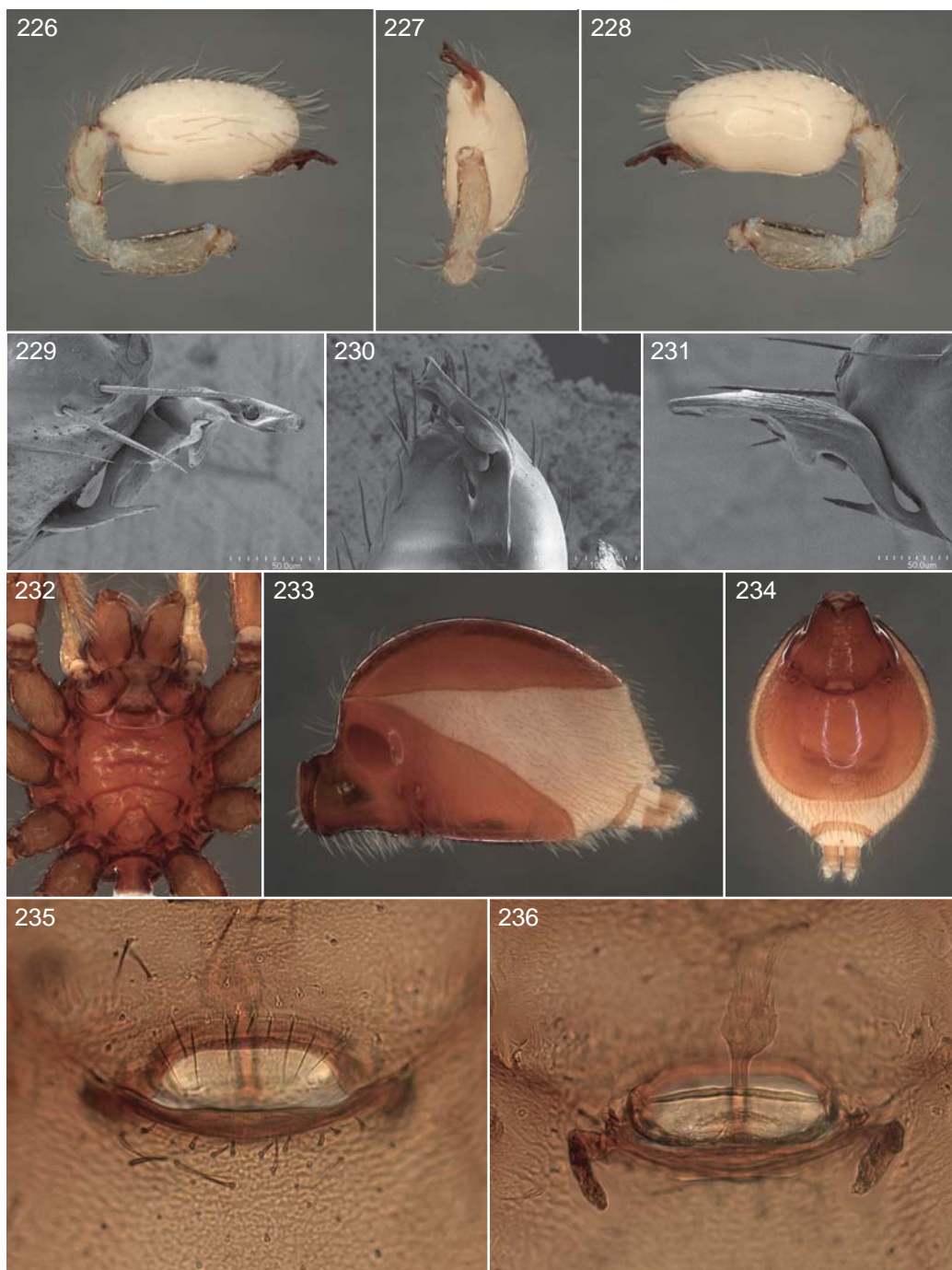
DISTRIBUTION: Colombia (Vaupés).

## Notes on More Northern Species

Previous papers dealt with the *Costarina* species found from Mexico south to Nicaragua (Platnick and Dupérré, 2012) and with those known from Costa Rica (Platnick et al., 2014). Newly available collections resulting from the Leaf Litter Arthropods of Mesoamerica project (LLAMA, see <http://llama.evergreen.edu/>) allow us to present here substantial new information on the *Costarina* fauna of Nicaragua; previously only three endemic species (plus the widespread species *C. plena*) were known from that country. We also present here full locality data on Costa Rican species that were omitted from part 2 of this series (Platnick et al., 2014).



FIGURES 215–225. *Costarina anchicaya*, new species, male (215–220) and female (221–225). **215.** Left palp, prolateral view. **216.** Same, ventral view. **217.** Same, retrolateral view. **218.** Left embolus, prolateral view. **219.** Same, ventral view. **220.** Same, retrolateral view. **221.** Sternum, ventral view. **222.** Abdomen, lateral view. **223.** Same, ventral view. **224.** Digested female genitalia, ventral view. **225.** Same, dorsal view.



FIGURES 226–236. *Costarina gorgona*, new species, male (226–231) and female (232–236). **226.** Left palp, prolateral view. **227.** Same, ventral view. **228.** Same, retrolateral view. **229.** Left embolus, prolateral view. **230.** Same, ventral view. **231.** Same, retrolateral view. **232.** Sternum, ventral view. **233.** Abdomen, lateral view. **234.** Same, ventral view. **235.** Digested female genitalia, ventral view. **236.** Same, dorsal view.





FIGURES 237–248. 237–243. *Costarina helechal*, new species, male. 244–248. *C. taraira*, new species, female. 237. Left palp, prolateral view. 238. Same, ventral view. 239. Same, retrolateral view. 240. Left embolus, prolateral view. 241. Same, ventral view. 242. Same, retrolateral view. 243, 244. Sternum, ventral view. 245. Abdomen, lateral view. 246. Same, ventral view. 247. Digested female genitalia, ventral view. 248. Same, dorsal view.

*Costarina kilambe*, new species

Figures 249–259

**TYPES:** Male holotype and female allotype sifted from ridgetop cloud forest leaf litter taken at an elevation of 1620 m in the Reserva Natural Cerro Kilambé, 13.57237°N, 85.69529°W, Jinotega, Nicaragua (May 24, 2011), deposited in MCZ (125324, PBI\_OON 51458).

**ETYMOLOGY:** The specific name is a noun in apposition taken from the type locality.

**DIAGNOSIS:** Males have the proximal and distal embolar prongs fused (figs. 249–254); females have fused ventral scuta, an ovoid genital atrium, and a distally expanded anterior genitalic projection (figs. 256–259).

**MALE** (PBI\_OON 51458, figs. 249–254): Total length 2.01. Endite ventral process greatly elongated, tip extending far anterior of endite edge; dorsal process recessed behind extension of ventral process. Leg spination: femur I p0-1-1, r0-1-0; tibiae: I v4-4-2; II v4-4-1p; metatarsi: I v2-2-2; II v3-0-2. Embolus proximal and distal prongs fused, with 90° bend.

**FEMALE** (PBI\_OON 51458, figs. 255–259): Total length 2.20. Leg spination: femora I, II p0-1-1, r1-1-1; tibiae: I v4-4-2; II v4-4-1p; metatarsi: I v2-2-2; II v3-0-2. Genital atrium ovoid, with rebordered anterior margin; anterior genitalic process long, distally widened.

**OTHER MATERIAL EXAMINED:** NICARAGUA: **Atlántico Norte:** Parque Nacional Cerro Saslaya, 13.76867°N, 84.98446°W, May 7, 2011, sifted mature wet montane forest litter, elev. 360 m (MCZ 124826, PBI\_OON 51497), 7 ♀. **Jinotega:** Reserva Natural Cerro Kilambé, 13.56730°N, 85.69774°W, May 23, 2011, sifted cloud forest litter, elev. 1400 m (MCZ PBI\_OON 51460), 1 ♂, 13.56899°N, 85.69483°W, May 24, 2011, sifted cloud forest litter, elev. 1520 m (MCZ 124925, PBI\_OON 51459), 1 ♂. **Matagalpa:** Reserva Natural Cerro Musún, 12.95934°N, 85.22486°W, May 1, 2011, sifted tropical wet forest litter, elev. 700 m (MCZ 125612, PBI\_OON 51498), 2 ♀. **Nueva Segovia:** 9 km NW Jalapa, 13.96828°N, 86.17773°W, May 31, 2011, sifted disturbed riparian forest litter, elev. 1080 m (MCZ 124932, PBI\_OON 49615), 1 ♀.

**DISTRIBUTION:** Northern Nicaragua (Nueva Segovia, Jinotega, Atlántico Norte, Matagalpa), where sometimes sympatric with *C. waspuk*, *C. plena*, and/or *C. blanco*.

*Costarina diablo*, new species

Figures 260–270

**TYPES:** Male holotype and female allotype sifted from montane wet forest leaf litter taken at an elevation of 1170 m in the Reserva Natural Cerro Datanlí El Diablo, 13.08051°N, 85.87452°W, Jinotega, Nicaragua (May 20, 2011), deposited in MCZ (125228, PBI\_OON 51475).

**ETYMOLOGY:** The specific name is a noun in apposition taken from the type locality.

**DIAGNOSIS:** Males can be recognized by the enlarged, bipartite proximal embolar prong (figs. 260–265), females by the short genital atrium and distally expanded anterior genitalic projection (figs. 268–270).

**MALE** (PBI\_OON 51475, figs. 260–265): Total length 2.11. Endite ventral process long, distally narrow; dorsal process with prolonged, anteriorly directed tip. Leg spination: femora: I p0-1-1, r0-1-0; II p0-0-1; tibiae I, II v4-4-1p; metatarsi: I v2-2-1p; II v3-0-2. Embolus proximal prong U-shaped; distal prong short, with hooked tip.

**FEMALE** (PBI\_OON 51475, figs. 266–270): Total length 2.09. Leg spination: femora: I p0-1-1, r1-1-1; II p0-1-1, r1-1-0; tibiae: I v4-4-2; II v4-4-1p; metatarsi: I v2-2-2; II v3-0-2. Genital

atrium short, wide, anterior margin heavily rebordered; anterior genitalic process greatly expanded distally.

OTHER MATERIAL EXAMINED: NICARAGUA: **Jinotega**: Parque Nacional Cerro Saslaya, 13.77165°N, 85.01184°W, May 12, 2011, sifted ridgetop cloud forest litter, elev. 1100 m (MCZ ex 124765, PBI\_OON 51478), 3♂; Reserva Natural Cerro Datanlí El Diablo, 13.10953°N, 85.86767°W, May 18, 2011, sifted cloud forest litter, elev. 1440 m (MCZ ex 124828, PBI\_OON 51477), 2♀.

DISTRIBUTION: Northern Nicaragua (Jinotega), where sometimes sympatric with both *C. waspuk* and *C. plena*.

*Costarina waspuk* Platnick and Dupérré

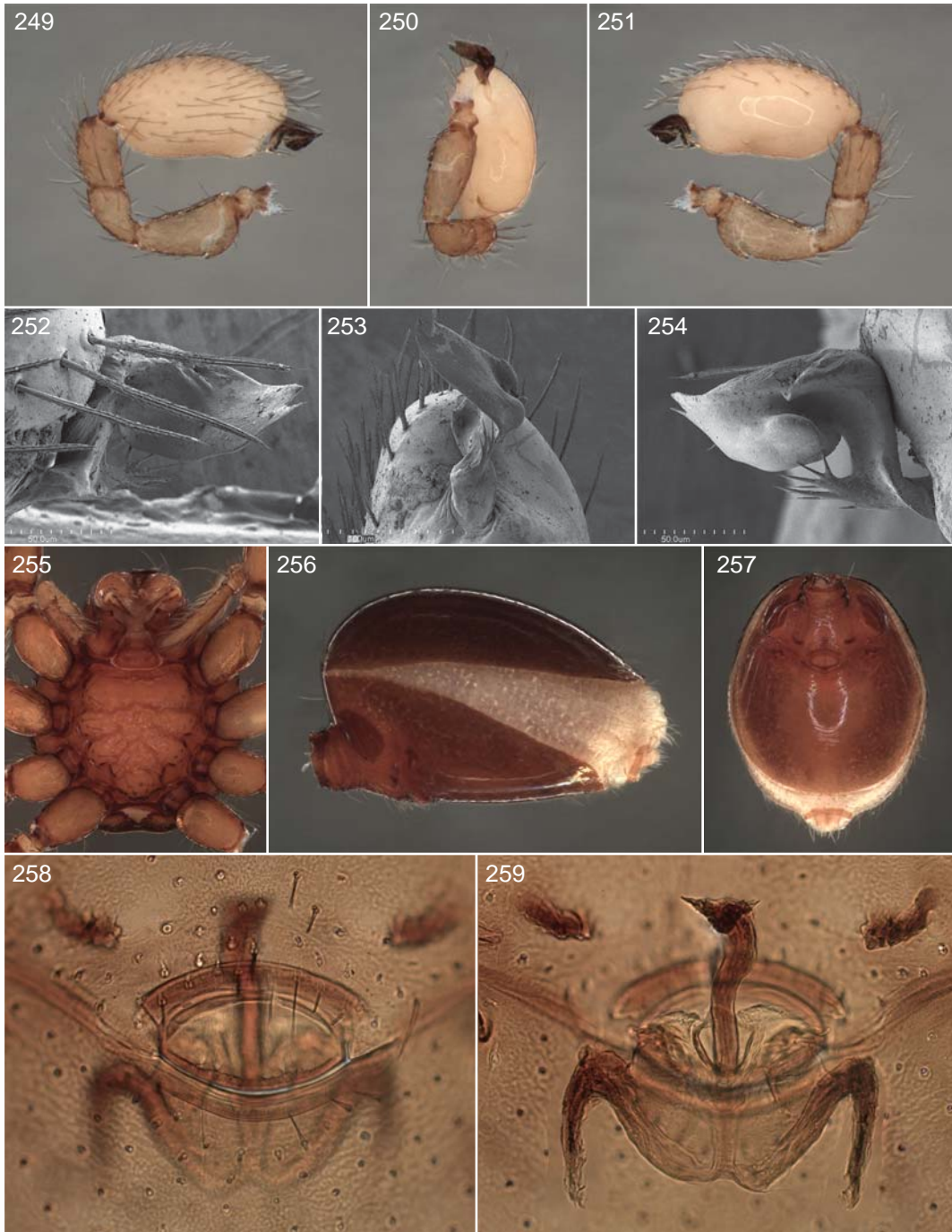
NEW RECORDS: NICARAGUA: **Atlántico Norte**: Parque Nacional Cerro Saslaya, 13.76867°N, 84.98446°W, May 7, 2011, sifted mature wet montane forest litter, elev. 360 m (MCZ ex 124826, PBI\_OON 51484), 1♂, 1♀. **Jinotega**: Parque Nacional Cerro Saslaya, 13.76753°N, 85.02451°W, May 12, 2011, sifted wet montane forest litter, elev. 1040 m (MCZ 124971, PBI\_OON 51479), 1♂, 1♀, 13.77125°N, 85.00076°W, May 8, 2011, sifted wet montane forest litter, elev. 820 m (MCZ 124801, PBI\_OON 51480), 1♀, 13.77165°N, 85.01184°W, May 12, 2011, sifted ridgetop cloud forest litter, elev. 1100 m (MCZ ex 124765, PBI\_OON 51481) 1♂, 6♀; Reserva Natural Cerro Datanlí El Diablo, 13.08051°N, 85.87452°W, May 20, 2011, sifted montane wet forest litter, elev. 1170 m (MCZ ex 125228, PBI\_OON 51473), 2♂, 13.10953°N, 85.86767°W, May 18, 2011, sifted cloud forest litter, elev. 1440 m (MCZ PBI\_OON 51462), 2♂; Reserva Natural Cerro Kilambé, 13.56730°N, 85.69774°W, May 23, 2011, sifted cloud forest litter, elev. 1400 m (MCZ PBI\_OON 51461), 1♂. **Nueva Segovia**: 9 km NW Jalapa, 13.98436°N, 86.19017°W, May 29, 2011, sifted oak cloud forest litter, elev. 1770 m (MCZ 124831, PBI\_OON 51483), 1♂.

*Costarina musun* Platnick and Dupérré

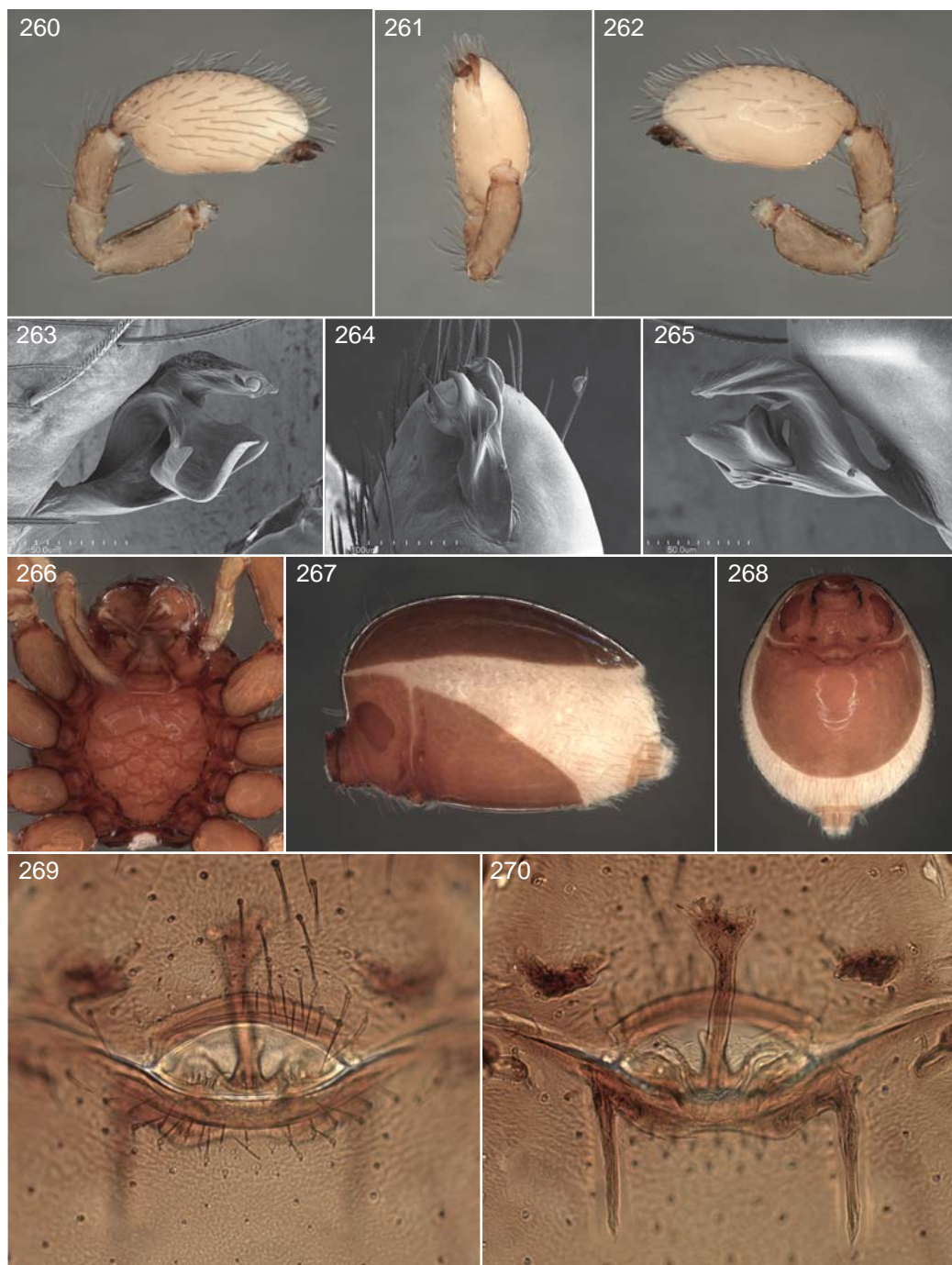
NEW RECORDS: NICARAGUA: **Jinotega**: Parque Nacional Cerro Saslaya, 13.77165°N, 85.01184°W, May 12, 2011, sifted ridgetop cloud forest litter, elev. 1100 m (MCZ 124765, PBI\_OON 51485) 7♂.

*Costarina blanco* Platnick and Dupérré

NEW RECORDS: NICARAGUA: **Atlántico Norte**: Parque Nacional Cerro Saslaya, 13.77005°N, 84.98072°W, May 7, 2011, sifted mature wet forest litter, elev. 310 m (MCZ PBI\_OON 51486), 4♂, 2♀. **Atlántico Sur**: Reserva Natural Kahka Creek, 12.67239°N, 83.71588°W, June 6, 2011, sifted lowland secondary rainforest litter, elev. 30 m (MCZ 125352, PBI\_OON 51489), 1♀, 12.69421°N, 83.71216°W, June 8, 2011, sifted lowland rainforest litter, elev. 50 m (MCZ 125326, PBI\_OON 51488), 2♂. **Matagalpa**: Reserva Natural Cerro Musún, 12.95934°N, 85.22486°W, May 1, 2011, sifted tropical wet forest litter, elev. 700 m (MCZ 125606, PBI\_OON 51487), 2♀. **Nueva Segovia**: 9 km NW Jalapa, 13.98436°N, 86.19017°W, May 29, 2011, sifted oak cloud forest litter, elev. 1770 m (MCZ ex 124831, PBI\_OON 51496), 1♂; 13.98462°N, 86.19008°W, June 1, 2011, sifted oak cloud forest litter, elev. 1780 m (MCZ 124770, PBI\_OON 51495), 1♂.



FIGURES 249–259. *Costarina kilambe*, new species, male (249–254) and female (255–259). 249. Left palp, prolateral view. 250. Same, ventral view. 251. Same, retrolateral view. 252. Left embolus, prolateral view. 253. Same, ventral view. 254. Same, retrolateral view. 255. Sternum, ventral view. 256. Abdomen, lateral view. 257. Same, ventral view. 258. Digested female genitalia, ventral view. 259. Same, dorsal view.



FIGURES 260–270. *Costarina diablo*, new species, male (260–265) and female (266–270). **260.** Left palp, prolateral view. **261.** Same, ventral view. **262.** Same, retrolateral view. **263.** Left embolus, prolateral view. **264.** Same, ventral view. **265.** Same, retrolateral view. **266.** Sternum, ventral view. **267.** Abdomen, lateral view. **268.** Same, ventral view. **269.** Digested female genitalia, ventral view. **270.** Same, dorsal view.

*Costarina plena* (O. P.-Cambridge)

NEW RECORDS: NICARAGUA: **Atlántico Norte:** Parque Nacional Cerro Saslaya, 13.77005°N, 84.98072°W, May 7, 2011, sifted mature wet forest litter, elev. 310 m (MCZ PBI\_OON 51492), 1 ♂; **Atlántico Sur:** Reserva Natural Kahka Creek, 12.67292°N, 83.71336°W, June 9, 2011, sifted lowland secondary rainforest litter, elev. 40 m (MCZ 124830, PBI\_OON 51493), 2 ♂, 12.68981°N, 83.71172°W, June 8, 2011, sifted lowland secondary rainforest litter, elev. 50 m (MCZ 125220, PBI\_OON 51494), 1 ♂. **Jinotega:** Parque Nacional Cerro Saslaya, 13.76753°N, 85.02451°W, May 12, 2011, sifted wet montane forest litter, elev. 1040 m (MCZ ex 124971, PBI\_OON 51482), 1 ♂, 13.77165°N, 85.01184°W, May 12, 2011, sifted ridgetop cloud forest litter, elev. 1100 m (MCZ ex 124765, PBI\_OON 51491), 3 ♀; Reserva Natural Cerro Datanlí El Diablo, 13.08051°N, 85.87452°W, May 20, 2011, sifted montane wet forest litter, elev. 1170 m (MCZ ex 125228, PBI\_OON 51474), 1 ♂, 2 ♀, 13.09543°N, 85.85804°W, May 20, 2011, sifted montane wet forest litter, elev. 1310 m (MCZ 125234, PBI\_OON 51470), 1 ♀, 13.10452°N, 85.86771°W, May 18, 2011, sifted cloud forest litter, elev. 1400 m (MCZ 124829, PBI\_OON 51472), 1 ♂, 1 ♀, 13.10735°N, 85.86933°W, May 19, 2011, sifted cloud forest litter, elev. 1430 m (MCZ 124768, PBI\_OON 51468), 2 ♂, 13.10754°N, 85.86831°W, May 19, 2011, sifted cloud forest litter, elev. 1450 m (MCZ 125294, PBI\_OON 51468, 51476), 2 ♂, 1 ♀, 13.10953°N, 85.86767°W, May 18, 2011, sifted cloud forest litter, elev. 1440 m (MCZ 124828, PBI\_OON 51467), 7 ♂, 1 ♀, 13.10981°N, 85.86755°W, May 19, 2011, sifted cloud forest litter, elev. 1440 m (MCZ 124813, PBI\_OON 51471), 1 ♂, 13.11105°N, 85.86770°W, May 19, 2011, sifted cloud forest litter, elev. 1430 m (MCZ 124937, PBI\_OON 51469), 1 ♂; Reserva Natural Cerro Kilambé, 13.56730°N, 85.69774°W, May 23, 2011, sifted cloud forest litter, elev. 1400 m (MCZ 124827, PBI\_OON 51466), 2 ♂, 1 ♀, 13.57023°N, 85.69737°W, May 23, 2011, sifted cloud forest litter, elev. 1500 m (MCZ PBI\_OON 51464), 3 ♂, 1 ♀, 13.57230°N, 85.69411°W, May 24, 2011, sifted ridgetop cloud forest litter, elev. 1610 m (MCZ 124930, PBI\_OON 51465), 1 ♂. **Nueva Segovia:** 9 km NW Jalapa, 13.98436°N, 86.19017°W, May 29, 2011, sifted oak cloud forest litter, elev. 1770 m (MCZ ex 124831, PBI\_OON 51490), 2 ♂. COSTA RICA: **Alajuela:** 15.5 km N junction Routes 126(9) and 140, 1.2 km E on road to Virgen de Socorro, Río Sarapiquí, Mar. 28, 1991, leaf litter from shore and banks, elev. 2300 ft (L. Herman, AMNH PBI\_OON 89), 2 ♀; Parque Nacional Volcán Poás, campground, May 10, 2005 (C. Viquez, INBIO PBI\_OON 29375), 1 ♀. **Cartago:** Cerro Chirripo, base Crestones, 9°27'17"N, 83°30'16"W, June 25, 1999, elfin forest litter, elev. 3350 m (R. Anderson, AMNH PBI\_OON 51248), 1 ♂; km 45, Inter-American Highway, 9 km NE Empalme (San José, at border with San José), 9°45'N, 83°58'30"W, June 8, 1997, mixed alder/oak litter, elev. 1975 m (R. Anderson, INBIO PBI\_OON 29831), 1 ♀; La Palma (Banks collection, MCZ 66655, PBI\_OON 27155), 1 ♀; Reserva Forestal Río Macho, km 70, Inter-American Highway, 9°39'N, 83°51'W, Mar. 22–26, 1999, sifted moss, litter in bog, elev. 2850 m (J. Miller, USNM PBI\_OON 27864), 2 ♂, sifting forest litter, elev. 2850 m (J. Miller, USNM PBI\_OON 17882), 1 ♀. **Guanacaste:** Macizo Miravalles, 700 m W Estación Cabro Muco, Sept 24–Oct. 4, 2003, flight intercept trap, elev. 1100 m (B. Hernández, INBIO 75735, PBI\_OON 29823), 1 ♀; Miravalles, May 2005, flight intercept trap, elev. 1200–1300 m (J. Azofiefa, INBIO PBI\_OON 29809), 1 ♀; Santa Elena Cloud Forest Reserve, Santa Elena, 10°20'42"N,

84°47'53"W, June 11, 2001, cloud forest litter (R. Anderson, AMNH PBI\_OON 29362), 1 ♂. **Heredia:** Estación Biológica La Selva, 10°26'N, 84°01'W, Mar. 6, 1993, fogging *Pentaclethra macroloba*, elev. 50–150 m (INBIO PBI\_OON 27678), 1 ♂; 11 km SE La Virgen, 10°20'N, 84°04'W, Feb. 17, 2003, elev. 450–550 m (INBIO PBI\_OON 27647), 1 ♀; 11 km ESE La Virgen, 10°21'N, 84°03'W, Feb. 18–Apr. 20, 2004, elev. 250–350 m (INBIO PBI\_OON 27673, 27995), 1 ♂, 1 ♀; 16 km SSE La Virgen, 10°16'N, 84°05'W, Mar. 14–17, 2001, elev. 1050–1150 m (INBIO PBI\_OON 27646), 1 ♀; 1 km N Montaña Azul, May 7–8, 1987, sifting leaf litter, cloud forest, elev. 1500 m (D. Ubick, CDU PBI\_OON 51225), 1 ♀; 3.2 km N junction Routes 126(9) and 140, 0.3 km E on road to San Rafael, Mar. 18, 1991 (L. Herman, AMNH PBI\_OON 51226), 1 ♀; 6 km ENE Vara Blanca, 10°11'N, 84°07'W, Feb. 14–Apr. 20, 2002, Winkler, elev. 2000 m (INBIO PBI\_OON 29805, 51220–51222), 3 ♂, 1 ♀; 9 km NE Vara Blanca, 10°14'N, 84°06'W, Mar. 6–12, 2005, Winkler, elev. 1450–1550 m (INBIO PBI\_OON 27670, 27671, 51224), 3 ♀. **Limón:** Finca Alberto Moore, Hone Creek, all collected by C. Viquez, Jan. 5, 2004, humus, cacao/banana (INBIO 541, PBI\_OON 29378, 51249), 2 ♂, Feb. 14–15, 2004, humus, under logs, abandoned cacao (INBIO 542, 544, PBI\_OON 27685, 27703), 4 ♀, Mar. 12–15, 2004, humus, under log, abandoned cacao, cacao/banana, cacao/cordia, mangos (INBIO 326, 327, 344, 596, 2734, PBI\_OON 27679, 27682, 27687, 29377, 29388), 2 ♂, 4 ♀, Apr. 5–8, 2004, humus, cacao/cordia (INBIO 331, PBI\_OON 29381), 1 ♂, May 14–17, 2004, humus, cacao/banana/cordia (INBIO 335, PBI\_OON 27704), 1 ♀, June 4–7, 2004, humus, cacao/cordia/banana, mangos (INBIO 329, 336, 357, 2735, PBI\_OON 27684, 29380, 29383, 29384), 6 ♂, 2 ♀, July 8–11, 2004–2005, humus, abandoned cacao (INBIO 334, 1917, PBI\_OON 27706, 29385), 1 ♂, 1 ♀, Aug. 3, 2004, humus, abandoned cacao (INBIO 347, PBI\_OON 29382), 4 ♂, Sept. 3, 2004, humus, mangos (INBIO 359, PBI\_OON 27683), 1 ♀, Jan. 6–7, 2005, humus, mangos (INBIO 1838, PBI\_OON 29387), 1 ♂, Oct. 21–23, 2005, humus, cacao/banana/cordia, mangos (INBIO 1918, PBI\_OON 27702, 27705), 3 ♀, Nov. 19–22, 2004, humus, cacao/cordia (INBIO 1837, PBI\_OON 29379), 1 ♂; 5.5 km E Guápiles, May 14–16, 1987, sifting leaf litter, tropical wet forest, elev. 200 m (D. Ubick, CDU PBI\_OON 51250), 1 ♂, 1 ♀; Reserva Biológica Hitoy Cerere, May 12, 1998, humus, elev. 160 m (E. Rojas, INBIO 50908, PBI\_OON 29742), 5 ♂, Sendero Bobocara, Aug. 24–Sept. 12, 1998, yellow pan trap, elev. 500–600 m (E. Rojas, INBIO 58437, 58498, PBI\_OON 29376, 29389), 3 ♂, 2 ♀; Sendero Espavel, Mar. 28, 2002, dry litter, elev. 200 m (P. Thomas, INBIO 72372, PBI\_OON 29744), 2 ♂, 9°40'N, 83°02'W, wet litter, elev. 500 m (J. Longino, FMNH PBI\_OON 51253), 1 ♂. **Puntarenas:** Cerro Nara, Quepos, May 29–31, 2010 (A. Solis, T. Fogo, INBIO PBI\_OON 51629), 1 ♂; Estación Biológica Monteverde, 10°19'40"N, 84°49'08"W, June 16, 2001, montane forest litter (R. Anderson, AMNH PBI\_OON 29349), 1 ♂; Monteverde, July 1, 1976, cloud forest (C., M. Goodnight, AMNH PBI\_OON 91), 1 ♀.

*Costarina paraplana* Platnick and Berniker

RECORDS: COSTA RICA: **Alajuela:** Upala, Aeropuerto 1.1, Mar. 19, 2010 (C. Viquez, INBIO PBI\_OON 49943), 1 ♂, Aeropuerto 1.2 (INBIO PBI\_OON 49948), 1 ♀, Aeropuerto 5.2 (INBIO PBI\_OON 49947), 1 ♀, Anita 1.1, Mar. 19, 2010 (C. Viquez, INBIO PBI\_OON 49945), 1 ♀, Edwin 3.1, Mar. 19, 2010 (C. Viquez, INBIO PBI\_OON 49942), 1 ♂, Edwin 4.2 (INBIO

PBI\_OON 49941), 1 ♂, Edwin 5.2 (INBIO PBI\_OON 49946), 1 ♀, La Hacienda, Aeropuerto, Aug. 15–17, 2009, Berlese, cacao (A. Solis, C. Viquez, R. Guries, INBIO PBI\_OON 49944), 5 ♀, Montecristo, Plot R4, Apr. 13, 2007, humus (C. Viquez, INBIO PBI\_OON 29748), 1 ♂, Plot 2B, Apr. 14, 2007, humus (C. Viquez, INBIO PBI\_OON 29746), 2 ♂. **Guanacaste:** Estación Pitilla, 9 km S Santa Cecilia, Apr. 1995, humus, elev. 700 m (P. Rios, INBIO 47299, PBI\_OON 29817), 1 ♂, 1 ♀. **Heredia:** 11 km SE La Virgen, 10°20'N, 84°04'W, Feb. 22–Mar. 22, 2003, elev. 450–550 m (INBIO PBI\_OON 27645, 27648, 27658, 27662, 27996), 2 ♂, 4 ♀; 11 km ESE La Virgen, 10°21'N, 84°03'W, Feb. 18, 2004, elev. 250–350 m (INBIO PBI\_OON 27642), 1 ♀; 16 km SSE La Virgen, 10°16'N, 84°05'W, Feb. 20–23, 2001, elev. 1050–1150 m (INBIO PBI\_OON 27997), 1 ♀; 9 km NE Vara Blanca, 10°14'N, 84°06'W, Mar. 6–Apr. 11, 2005, Winkler, elev. 1450–1550 m (INBIO PBI\_OON 27639, 27644, 27654, 27999, 29749), 4 ♂. **Limón:** 5.5 km E Guápiles, May 14–16, 1987, sifting leaf litter, tropical wet forest, elev. 200 m (D. Ubick, CAS 26324, PBI\_OON 2757), 3 ♀; Reserva Biológica Gandoca-Manzanillo, Laguna Gandoca, Feb. 8, 2002, sifting leaf litter (D. Chandler, INBIO 67542, PBI\_OON 29745), 1 ♂. **Puntarenas:** Parcela Alemán, Centro Científico Tropical, Monteverde, Aug. 17–19, 2009, elev. 920 m (D. Gutierrez, INBIO PBI\_OON 51261), 1 ♀.

*Costarina superplena* Platnick and Berniker

RECORDS: COSTA RICA: **Alajuela:** 6.5 km E Monteverde, 10°18'N, 84°45'W, Aug. 22, 1985, wet forest litter, elev. 950 m (J. Longino, FMNH 56553, PBI\_OON 10771), 1 ♂. **Heredia:** La Selva, 10.422139°N, 84.001523°W, June 25, 1999, Winkler (INBIO 51223), 1 ♀, Aug. 9–15, 2010 (INBIO PBI\_OON 51212), 1 ♂.

*Costarina maritza* Platnick and Berniker

RECORDS: COSTA RICA: **Alajuela:** Finca de PCI Rojas y Madrigal, Los Chiles, Feb. 9, 2009, pitfall trap, elev. 0–100 m (M. Solis, M. Moraga, INBIO 96610, PBI\_OON 21113), 1 ♂; Quebrada Grande de Upala, 1.5 km S Bosque de Julio Hernández, 10°56'30"N, 85°04'53"W, Jan. 11–13, 2009, pitfall, elev. 40 m (A. Solis, C. Viquez, R. Guries, INBIO PBI\_OON 49951), 1 ♂; Reserva Biológica San Ramón, 27 km N, 8 km W San Ramón, 10°13'30"N, 84°35'30"W, June 14, 1997, wet premontane forest litter, elev. 950 m (R. Anderson, INBIO PBI\_OON 29789, 29790, 29813), 2 ♂, 1 ♀, Mar. 25, 1999, humus (C. Viquez, INBIO PBI\_OON 29807), 1 ♀; Upala, Aeropuerto 2.2, Mar. 19, 2010 (C. Viquez, INBIO PBI\_OON 49952), 1 ♀, Dago 1.1, Mar. 19, 2010 (C. Viquez, INBIO PBI\_OON 49950), 1 ♀, Dago 2.2 (INBIO PBI\_OON 49953), 1 ♂, La Hacienda, Aeropuerto, Aug. 15–17, 2009, Berlese, cacao (A. Solis, C. Viquez, R. Guries, INBIO PBI\_OON 49949), 8 ♂, 7 ♀, Montecristo, Plot 1, Jan. 10, 2008, Berlese (C. Viquez, INBIO PBI\_OON 29345), 1 ♂, Plot 2D, Apr. 14, 2007, humus (C. Viquez, INBIO PBI\_OON 29787), 1 ♂, Plot 2E, Apr. 14, 2007, humus (C. Viquez, INBIO PBI\_OON 29788), 1 ♂; Plot T, #10, Apr. 13, 2007, humus (C. Viquez, INBIO PBI\_OON 29810), 1 ♀. **Cartago:** Reserva Biológica El Copal, Pejibaye, 9°46'69"N, 83°45'06"W, May 15–16, 2006 (V. Vignoli, C. Viquez, H. Ajuria, AMNH PBI\_OON 49236), 1 ♂. **Guanacaste:** Estación Biológica Maritza, Feb. 17, 1990, wet montane forest litter, elev. 875 m (R. Anderson, AMNH PBI\_OON 49235), 1 ♀, May 3, 1995,



wet montane forest litter, elev. 950 m (R. Anderson, AMNH PBI\_OON 49250), 1 ♀; Estación Cacao, 2 km SW Cerro Cacao, Apr. 3–25, 1991, yellow pan trap, elev. 1100 m (C. Chavez, INBIO 45807, PBI\_OON 27680), 1 ♀; Estación Pitilla, 9 km S Santa Cecilia, Aug. 1993, humus, elev. 700 m (C. Moraga, INBIO 4518, PBI\_OON 29812), 2 ♀, May 2, 1995, Berlese, leaf litter, low montane rainforest, elev. 600 m (R. Anderson, AMNH PBI\_OON 51213), 1 ♀. **Heredia:** Estación Biológica La Selva, 10°26'N, 84°01'W, June 21, 1999, elev. 50–150 m (INBIO PBI\_OON 29818), 1 ♀, July 1999, Winkler, elev. 50–150 m (INBIO PBI\_OON 29791), 1 ♂, 1 ♀; La Selva, Mar. 10, 1973, rotten palm leaf mold (J. Wagner, J. Kethley, FMNH PBI\_OON 51210), 1 ♂, Feb. 1997, elev. 20 m (W. Eberhard, MCZ PBI\_OON 51211), 1 ♂; 11 km SE La Virgen, 10°20'N, 84°04'W, Feb. 22, 2003, elev. 450–550 m (INBIO PBI\_OON 27653), 1 ♂; 11 km ESE La Virgen, 10°21'N, 84°03'W, Feb. 18–Mar. 21, 2004, elev. 250–350 m (INBIO PBI\_OON 27656, 27667, 27998), 2 ♂, 1 ♀; 16 km SSE La Virgen, 10°16'N, 84°05'W, Feb. 20–23, 2001, elev. 1050–1150 m (INBIO PBI\_OON 27643), 1 ♀. **Limón:** 5.5 km E Guápiles, May 14–16, 1987, sifting leaf litter, tropical wet forest, elev. 200 m (D. Ubick, CDU PBI\_OON 51255), 8 ♂, 9 ♀; Parque Nacional Tortuguero, Apr. 17–23, 1983, nature trail, wet second growth forest (D. Ubick, CAS 26317, PBI\_OON 2749), 18 ♂, 10 ♀; Reserva Biológica Hitoy Cerere, Espavel trail, Mar. 31, 1998 (E. Rojas, INBIO PBI\_OON 29754), 2 ♂. **Puntarenas:** Monteverde, May 1984, elev. 1200 m (J. Ashe, R. Laschen, FMNH 34868, PBI\_OON 10585), 1 ♂.

*Costarina cima* Platnick and Berniker

RECORDS: COSTA RICA: **Alajuela:** 16.5 km NW Barva (Heredia), Mar. 16, 1991, litter near stream, elev. 6000 ft (L. Herman, AMNH PBI\_OON 92), 1 ♂; Zarcero, near Río Espino, Palmitas, 10°10'21"N, 84°23'45"W, Aug. 5, 2007, elev. 1580 m (C. Viquez, A. Solis, INBIO PBI\_OON 29751), 1 ♂, 1 ♀. **Guanacaste:** Cacao Field Station, Parque Nacional Guanacaste, May 4, 1995, Berlese, litter, montane hardwood cloud forest, elev. 1100–1200 m (R. Anderson, AMNH PBI\_OON 49237, 49239, 49246), 3 ♂, Feb. 2, 1996, wet cloud forest litter, elev. 1400 m (R. Anderson, AMNH PBI\_OON 49238), 3 ♂; Rincón de la Vieja, Las Palas, Feb. 18, 1996, *Clusea* forest litter, elev. 1400 m (R. Anderson, AMNH PBI\_OON 49243, 49245), 4 ♂. **Puntarenas:** Estación Biológica Monteverde, July 15, 1975, elev. 1300–1500 m (E. Fisher, CAS PBI\_OON 2731), 1 ♂, Aug. 28, 1983, litter, elev. 1500 m (J. F. Murphy, AMNH PBI\_OON 36780), 1 ♂, 2 ♀, May 10–14, 1989, window traps, elev. 1570–1760 m (R. Leschen, R. Brooks, FMNH 34165, 34166, PBI\_OON 10468, 10469), 3 ♀, July 17, 1989, window trap, elev. 1400 m (R. Pine, FMNH 34108, PBI\_OON 10410), 1 ♂, Feb. 23–27, 1991, sifting leaf litter, elev. 1500 (H., A. Howden, AMNH PBI\_OON 88), 1 ♂, 4 ♀, 10°18'53"N, 84°47'49"W, June 10–13, 2001, montane forest litter, cloud forest litter, elev. 1650–1800 m (R. Anderson, AMNH PBI\_OON 29367, 29369, 29371), 7 ♂, 2 ♀, 10°19'10"N, 84°49'57"W, June 12, 2001, montane forest litter, elev. 1730 m (R. Anderson, AMNH PBI\_OON 29366), 2 ♂, 1 ♀, 10°19'40"N, 84°49'08"W, June 9–15, 2001, montane forest litter, elev. 1540 m (R. Anderson, AMNH PBI\_OON 29365, 29368, 29370, 29372), 8 ♂, 3 ♀, Campbell's bullpen, July 14–16, 1983, pitfall (D. Linderian, AMNH PBI\_OON 84), 1 ♀, Campbell's woods, July 5–7, 1983 (D. Linderian, AMNH PBI\_OON 90), 1 ♂, 1 ♀.

*Costarina elena* Platnick and Berniker

RECORDS: COSTA RICA: **Puntarenas:** Estación Biológica Monteverde, May 11, 1989, flight intercept, elev. 1240 m (J. Ashe, R. Leschen, R. Brooks, FMNH 34861, PBI\_OON 10578), 1 ♀, Feb. 23–27, 1991, sifting litter, elev. 1500 m (H., A. Howden, AMNH PBI\_OON 51263), 1 ♂, 10°18'53"N, 84°47'49"W, June 10, 2001, cloud forest litter, elev. 1800 m (R. Anderson, AMNH PBI\_OON 29356), 1 ♂, June 10–13, 2001, montane forest litter, elev. 1650 m (R. Anderson, AMNH PBI\_OON 29352, 29358), 7 ♂, June 15, 2001, cloud forest litter, elev. 1750 m (R. Anderson, INBIO PBI\_OON 29357), 1 ♂, 1 ♀, 10°19'10"N, 84°49'57"W, June 12, 2001, montane forest litter, elev. 1730 m (R. Anderson, AMNH PBI\_OON 29355), 1 ♂, 10°19'40"N, 84°49'08"W, June 9–15, 2001, montane forest litter, elev. 1540 m (R. Anderson, AMNH PBI\_OON 29353, 29354, 29359), 5 ♂, 3 ♀; Reserva Biológica Bosque Nuboso Monteverde, Sendero Pantanoso, May 12, 1987, sifting cloud forest litter, elev. 1500 m (D. Ubick, CDU PBI\_OON 51264), 1 ♂, 1 ♀.

*Costarina monte* Platnick and Berniker

RECORDS: COSTA RICA: **Puntarenas:** Estación Biológica Monteverde, July 18, 1989, window trap, elev. 1400 m (R. Leschen, R. Brooks, FMNH 34167, PBI\_OON 10470), 1 ♂, 10°19'40"N, 84°49'08"W, June 9–16, 2001, montane forest litter, elev. 1480–1540 m (R. Anderson, INBIO PBI\_OON 29351, AMNH PBI\_OON 29363, 29364, 51262), 7 ♂, 1 ♀; Monteverde, Aug. 24, 1983, roadside scrub, elev. 1500 m (J., F. Murphy, AMNH PBI\_OON 36794), 1 ♂, 1 ♀.

*Costarina murphyorum* Platnick and Berniker

RECORDS: COSTA RICA: **Puntarenas:** Monteverde, Aug. 26, 1983, scrub near hotel, elev. 1500 m (J., F. Murphy, AMNH PBI\_OON 36786), 5 ♂, 1 ♀.

*Costarina chiles* Platnick and Berniker

RECORDS: COSTA RICA: **Alajuela:** Finca San Luis, Los Chiles, Feb. 8–10, 2009, pitfall trap, elev. 100 m (M. Solis, B. Hernández, INBIO 96608, PBI\_OON 1828), 1 ♂, 2 ♀.

*Costarina upala* Platnick and Berniker

RECORDS: COSTA RICA: **Alajuela:** San Carlos, El Tanque, 10.49522°N, 84.58535°W, May 14–17, 2008, Berlese, riparian forest, elev. 130 m (C. Viquez, INBIO PBI\_OON 29348, 49962), 3 ♂, 1 ♀; Upala, Aeropuerto 2.1, Mar. 19, 2010 (C. Viquez, INBIO PBI\_OON 49959), 1 ♀, Dago 2.2, Mar. 19, 2010 (C. Viquez, AMNH PBI\_OON 49955), 1 ♂, 3 ♀, Dago 3.1 (C. Viquez, INBIO PBI\_OON 49957), 2 ♂, Dago 3.2 (C. Viquez, INBIO PBI\_OON 49958), 1 ♂, La Hacienda, Aeropuerto, Aug. 15–17, 2009, Berlese, cacao (A. Solis, C. Viquez, R. Guries, INBIO PBI\_OON 49956), 1 ♂, Plot 2B, Apr. 14, 2007, humus (C. Viquez, INBIO PBI\_OON 29779), 1 ♂, Montecristo, 10°54'22"N, 84°58'09"W, June 7, 2007, humus in cacao plantation (C. Viquez, INBIO PBI\_OON 49960), 2 ♂.

*Costarina poas* Platnick and Berniker

RECORDS: COSTA RICA: **Alajuela:** Bosque a orillas de Río Frío, 6 km W comunidad de Parque, Feb. 13–15, 2007, elev. 40 m (A. Solis et al., INBIO PBI\_OON 51285), 1 ♀; Parque

Nacional Volcán Poás, May 25, 1987, sifting leaf litter, cloud forest, elev. 2500 m (D. Ubick, CDU PBI\_OON 49961), 1 ♂, June 6, 1997, wet cloud forest litter, elev. 2500 m (R. Anderson, INBIO PBI\_OON 31187), 1 ♂, Sendero Escallonia, 10°11'33"N, 84°13'56"W, Mar. 5, 2002, sifting mixed leaf litter, elev. 2570 m (D. Chandler, INBIO 67585, AMNH PBI\_OON 31186), 3 ♂, 1 ♀, Sendero Tierra Fria, Apr. 6, 2002, dry litter, elev. 2500–2600 m (P. Thomas, INBIO 72373, PBI\_OON 29833), 1 ♂. **Heredia:** 5–8 km ENE Vara Blanca, 10°11'N, 84°07'W, Feb. 17–Apr. 20, 2002, Winkler, elev. 2000–2100 m (INBIO PBI\_OON 27660, 27655, 27657, 27661, 29832, 29834, 51216–51219), 6 ♂, 4 ♀. **San José:** Jardín, Quebradillas Quinta Colibri, Dec. 3, 2007, Berlese, humus, elev. 2040 m (P. Thomas, FMNH 128970, PBI\_OON 51519), 4 ♂, 3 ♀, Nov. 26, 2008, Berlese, damp leaf humus, elev. 2040 m (P. Thomas, FMNH 129021, PBI\_OON 51514), 2 ♀, Nov. 27–Dec. 7, 2008. Berlese, leaf litter, elev. 2040 m (P. Thomas, FMNH 129010, PBI\_OON 51516), 3 ♂, 2 ♀, Dec. 5, 2008, Berlese, tree mosses, elev. 2040 m (P. Thomas, FMNH 129034, PBI\_OON 51512), 1 ♀, Dec. 27, 2008, Berlese, murta humus, elev. 2040 m (P. Thomas, FMNH 128996, PBI\_OON 51518), 1 ♂, Jan. 7, 2009, tree humus, elev. 2040 m (P. Thomas, FMNH 128992, PBI\_OON 51517), 1 ♂, Jan. 21–31, 2009, Berlese, duraznillo humus, elev. 2040 m (P. Thomas, FMNH 128976, 128993, PBI\_OON 51511, 51515), 4 ♀, Mar. 3, 2009, Berlese, humus, elev. 2040 m (P. Thomas, FMNH 129020, PBI\_OON 51513), 1 ♂, 1 ♀, Apr. 13, 2009, Berlese, murta debris pile, elev. 2040 m (P. Thomas, FMNH 129009, PBI\_OON 51509), 8 ♂, 5 ♀, Dec. 14, 2010, moist litter, elev. 2040 m (P. Thomas, FMNH 128999, PBI\_OON 51510), 4 ♂, 1 ♀; Jardín, Quebradillas Quinta de a Riviera, Nov. 24, 2008, Berlese, wet leaf humus, elev. 2040 m (P. Thomas, FMNH 128973, PBI\_OON 51520), 2 ♀, Dec. 19, 2008, Berlese, ground mosses, elev. 2040 m (P. Thomas, FMNH 129028, PBI\_OON 51521), 1 ♀; 1 km SW Parque Nacional Braulio Carrillo, above road to Guápiles, Feb. 28, 2002, elev. 1580 m (D. Chandler, INBIO 67565, PBI\_OON 31188), 1 ♂; Río Virilla, 9°59.159'N, 83°56.576'W, June 21, 2010, humus, elev. 2050 m (C. Viquez, B. Hernandez, INBIO 99844, PBI\_OON 51234), 1 ♂.

*Costarina selva* Platnick and Berniker

RECORDS: COSTA RICA: **Heredia:** Estación Biológica La Selva, 10°26'N, 84°01'W, Mar. 13, 1987 (D. Olson, MCZ 72962, PBI\_OON 37009), 2 ♂, 1 ♀, Feb. 1997, elev. ca. 20 m (W. Eberhard, MCZ 72562, PBI\_OON 29394), 5 ♂, 2 ♀; June 13–July 6, 1999, Winkler traps, elev. 50–150 m (INBIO PBI\_OON 29783, 29784, 29786, 29821, 29827, 49964–49966), 6 ♂, 7 ♀; Finca La Selva, 4 km SE Puerto Viejo de Sarapiquí, Oct. 1981, Berlese, litter (C. Griswold, CAS 26326, PBI\_OON 2733), 1 ♂, Oct. 14, 1981, Berlese, forest litter (C. Griswold, CAS 26302, PBI\_OON 2593), 1 ♀; La Selva, 10.422139°N, 84.001523°W, Aug. 9–15, 2010, Berlese, successional plots, elev. 50 m (AMNH PBI\_OON 51199–51202), 5 ♂, 3 ♀.

*Costarina viejo* Platnick and Berniker

RECORDS: COSTA RICA: **Heredia:** Estación Biológica La Selva, 10°26'N, 84°01'W, Mar. 1, 1987 (D. Olson, MCZ 72955, PBI\_OON 37007), 3 ♂, June 18–25, 1999, elev. 50–150 m (INBIO PBI\_OON 29757, 29804, 51203, 51204), 5 ♂, 4 ♀; Finca La Selva, 4 km SE Puerto

Viejo de Sarapiquí, Sept. 27–30, 1981, Berlese (C. Griswold, CAS 26330, PBI\_OON 2738), 2♂; La Selva, near Puerto Viejo de Sarapiquí, Mar.10, 1973, rotten palm leaf mold (J. Wagner, J. Kethley, FMNH PBI\_OON 51208), 1♀, Feb. 1980, elev. 50 m (W. Mason, CNC PBI\_OON 38128), 1♀, no date, elev. 20 m (W. Eberhard, MCZ 72561, PBI\_OON 29395), 1♀, Dec. 1982, elev. 100 m (W. Eberhard, MCZ 72957, PBI\_OON 37017), 1♀, Jan. 11–16, 2003 (C. Rivera, C. Viquez, INBIO PBI\_OON 29828), 1♀, Feb. 2003 (C. Viquez, INBIO PBI\_OON 51207), 1♂; La Selva, 10.422139°N, 84.001523°W, Aug. 9–15, 2010 (INBIO PBI\_OON 51205, 51209), 3♂, 1♀; La Selva, 10.426946°N, 84.001449°W, Aug. 9–15, 2010, clearing, elev. 60 m (C. Viquez, INBIO PBI\_OON 51206), 1♀; 10 km SE La Virgen, 10°20'N, 84°05'W, Mar. 17, 2003, humus, elev. 450–550 m (R. Anderson, AMNH PBI\_OON 29758), 1♂, 1♀; 11 km SE La Virgen, 10°20'N, 84°04'W, Feb. 22–Apr. 19, 2003, elev. 450–550 m (C. Viquez, INBIO PBI\_OON 27650–27652, 27668, 27675, 27676), 4♂, 2♀; 11 km ESE La Virgen, 10°21'N, 84°03'W, Feb. 22, 2004, elev. 250–350 m (C. Viquez, INBIO PBI\_OON 27669), 1♀. **Limón:** 5.5 km E Guápiles, May 14–16, 1987, sifting leaf litter, tropical wet forest, elev. 200 m (D. Ubick, CDU PBI\_OON 51254), 3♂, 2♀.

*Costarina rafael* Platnick and Berniker

RECORDS: COSTA RICA: **Cartago:** Parque Nacional Tapantí, Quebrada Segunda, Nov. 20–Dec. 10, 1997, Berlese, elev. 1600 m (R. Dalgaso, INBIO PBI\_OON 29775), 1♂, Sendero La Pava, Apr. 7, 2009, Winkler (M. Solis, INBIO 96613, PBI\_OON 51245), 1♂, 1♀, July 1, 2009, humus (C. Viquez, INBIO PBI\_OON 51246), 1♂, Sendero Oropendola, Jan. 5, 2009, Winkler, elev. 1200–1300 m (M. Solis, INBIO PBI\_OON 51247), 1♀. **Heredia:** 1 km N Montaña Azul, May 7–8, 1987, sifting leaf litter, cloud forest, elev. 1500 m (D. Ubick, CDU PBI\_OON 51214), 2♂, 4♀; 6 km ENE Vara Blanca, 10°11'N, 84°07'W, Feb. 21–Apr. 20, 2002, Winkler, elev. 1900–2000 m (INBIO PBI\_OON 27659, 27663–27665, 29822), 2♂, 3♀. **Puntarenas:** Estación Biológica Monteverde, 10°18'53"N, 84°47'49"W, June 15, 2001, cloud forest litter (R. Anderson, AMNH PBI\_OON 29361), 1♂, 1♀.

*Costarina azul* Platnick and Berniker

RECORDS: COSTA RICA: **Heredia:** 9 km NE Vara Blanca, 10°14'N, 84°06'W, Mar. 6–Apr. 15, 2005, Winkler, elev. 1450–1550 m (INBIO PBI\_OON 27640, 27641, 27649, 27666, 27672, 27674, AMNH PBI\_OON 27637, 27638), 4♂, 4♀.

*Costarina carara* Platnick and Berniker

RECORD: COSTA RICA: **Puntarenas:** Jacó, Garabo, Mar. 23–24, 2003 (B. Hernandez, INBIO PBI\_OON 51267), 1♀.

*Costarina aguirre* Platnick and Berniker

RECORDS: COSTA RICA: **Puntarenas:** Parque Nacional Manuel Antonio, Quepos, May 24–31, 2010, mini-Winkler (M. Solis, INBIO PBI\_OON 51273), 1♀; Rainmaker Park, Parrita, July 27–28, 2010 (C. Viquez, AMNH PBI\_OON 51274), 1♀.

*Costarina quepos* Platnick and Berniker

RECORD: COSTA RICA: **Puntarenas**: Rainmaker Park, Parrita, July 27–28, 2010 (C. Viquez, INBIO PBI\_OON 51272), 1 ♀.

*Costarina meridina* (Chickering)

RECORDS: COSTA RICA: **Cartago**: Finca Kirkua, Ochoмого, 9°54'29"N, 83°56'08"W, Sept. 5, 2007, forest humus, elev. 1690 m (C. Viquez, W. Porras, INBIO 29819), 2 ♀, Feb. 14, 2008, elev. 1750 m (W. Porras, INBIO 29347), 1 ♂, 1 ♀. **Heredia**: Cariari, Río Virilla, 9°57.970'N, 84°09.193'W, June 22, 2010, humus, elev. 950 m (C. Viquez, M. Solis, INBIO 99846, PBI\_OON 51232), 1 ♂. **San José**: Cerros Escazú, Oct. 1996, in bromeliads, elev. 1900 m (C. Flores, INBIO PBI\_OON 29803), 1 ♂; Parque Zoológico Simón Bolívar, Río Torres, 9°56.373'N, 84°04.354'W, June 13, 2010 (B. Hernandez, M. Solis, INBIO PBI\_OON 51230), 1 ♂; Puente Mulas, Río Virilla, 9°58.1918'N, 84°11.0332'W, humus, June 23, 2010, elev. 860 m (C. Viquez, M. Solis, INBIO 97847, PBI\_OON 49963), 4 ♀; Río María Aguilar, 9°55.061'N, 84°02.331'W, June 21, 2010, humus (C. Viquez, B. Hernandez, INBIO 99838, PBI\_OON 51231), 1 ♀; Río Tiribí, 9°54.443'N, 84°01.877'W, June 17, 2010, humus (B. Hernandez, M. Solis, INBIO 99840, PBI\_OON 51233), 2 ♂, 1 ♀; Río Torres, 9°56.499'N, 83°58.931'W, June 17, 2000, humus, elev. 1550 m (B. Hernandez, M. Solis, INBIO PBI\_OON 51229), 2 ♂, 3 ♀; San Antonio de Escazú, Dec. 1981, elev. 1350 m (MCZ 72952, PBI\_OON 37024), 1 ♀; San José (E. Schmidt, AMNH PBI\_OON 51127), 1 ♂ (holotype), (E. Schmidt, AMNH PBI\_OON 38059), 1 ♂ (paratype), (E. Schmidt, AMNH PBI\_OON 93), 6 ♂, 5 ♀; San Ramón de Tres Ríos, Mar. 1990, elev. 1400 m (W. Eberhard, MCZ 72960, PBI\_OON 37020), 1 ♀; San Ramón, Río María Aguilar, 9°56.085'N, 83°59.296'W, Sept. 30, 2010, Berlese, humus, elev. 1425 m (B. Hernandez, M. Moraga, INBIO PBI\_OON 51228), 1 ♀.

*Costarina watina* (Chickering)

RECORDS: COSTA RICA: **Cartago**: Tapantí, July, 1991, yellow pan trap, elev. 1150 m (G. Mora, INBIO 45802, AMNH PBI\_OON 27681), 1 ♀; Turrialba, July 25–Aug. 15, 1965, weed and hay debris (A. Chickering, MCZ 51236), 1 ♂, 1 ♀ (holotype, paratype), same (A. Chickering, MCZ 66676, PBI\_OON 51243), 3 ♀. **San José**: Parque Nacional Braulio Carrillo, Apr. 28–30, 1983, nature trail, cloud forest/rainforest transect, elev. 1100 m (D. Ubick, CDU PBI\_OON 51237), 1 ♂, trail to Río Patria, 8 km NE San Isidro, Apr. 6, 2002, litter, elev. 1800 m (D. Chandler, INBIO 67471, AMNH PBI\_OON 29769), 1 ♂.

*Costarina ramon* Platnick and Berniker

RECORDS: Four males and one female taken with the types (INBIO, AMNH PBI\_OON 51239).

*Costarina cuerici* Platnick and Berniker

RECORDS: COSTA RICA: **Cartago**: trail to Cerro Chirripó, 9°26'47"N, 83°32'12"W, June 27, 1999, mixed oak forest litter, elev. 2800 m (R. Anderson, AMNH PBI\_OON 51244), 1 ♂; near Estación Meteorológica del CATIE, road to Cuerici, Feb. 15, 1998, elev. 2750 m (R.

Anderson, C. Víquez, INBIO PBI\_OON 31185), 1 ♂. **San José:** Estación Biológica de Cuerici, June 2008 (C. Víquez, INBIO PBI\_OON 51241), 1 ♀; Sendero Quebrada de los Leones, Cuerici, Oct. 23, 1995, humus, elev. 2600 m (A. Picado, INBIO 45771, PBI\_OON 31184), 1 ♂, 1 ♀; km 68, Inter-American Highway, Tres de Junio, Feb. 2, 1996, litter, forest next to sphagnum bog, elev. 2600 m (R. Anderson, AMNH PBI\_OON 49234), 1 ♂, near Tres de Junio, 9°39'46"N, 83°50'59"W, June 18, 1998, wet cloud forest litter, elev. 2560 m (R. Anderson, AMNH PBI\_OON 49232), 1 ♂, 1 ♀.

*Costarina leones* Platnick and Berniker

RECORDS: COSTA RICA: **San José:** Estación Biológica de Cuerici, 4.6 km E Villa Mills, Nov. 26, 1995, humus, elev. 2640–2700 m (A. Picado, INBIO 45775, PBI\_OON 27700), 1 ♂.

*Costarina junio* Platnick and Berniker

RECORDS: COSTA RICA: **Cartago:** Cerro de La Muerte, km 92, Inter-American Highway, above house of Federico Valverde, 9°34'N, 83°44'W, sifting litter, oak forest, elev. 3250 m (J. Miller, USNM PBI\_OON 27843), 1 ♂; Parque Nacional Tapantí, Macizo de La Muerte, km 79, Inter-American Highway, Mar. 23, 2002, Berlese, elev. 2840 m (P. Thomas, INBIO 72385, PBI\_OON 29774), 1 ♂. **San José:** Río La Hondura, Mar. 9, 1991, elev. 1000 m (W. Eberhard, MCZ 48972, PBI\_OON 37016), 1 ♀.

*Costarina reventazon* Platnick and Berniker

RECORDS: COSTA RICA: **Cartago:** Estación Biológica Barbilla, Parque Nacional Barbilla, Mar. 10, 2001 (C. Víquez, INBIO PBI\_OON 29793), 1 ♂; Parque Nacional Barbilla, Jan. 19, 2001, humus, elev. 600 m (C. Víquez, AMNH PBI\_OON 29762), 1 ♂. **Limón:** Agua Fría, trail to Río Sierpe, Aug. 17–21, 2004, elev. 2050 m (Porrás et al., INBIO 77937, PBI\_OON 29764), 1 ♂; 5.5 km E Guápiles, May 14–16, 1987, sifting leaf litter, tropical wet forest, elev. 200 m (D. Ubick, CDU PBI\_OON 51251), 2 ♂.

*Costarina macho* Platnick and Berniker

RECORDS: COSTA RICA: **Cartago:** km 93, Highway #2, 9°36'N, 83°45'W, Apr. 1985, elev. 3200 m (H. Goulet, L. Masner, CNC PBI\_OON 38132), 1 ♀; Reserva Forestal Río Macho, km 70, Inter-American Highway, 9°39'N, 83°51'W, Mar. 22–26, 1999, sifted moss, litter in bog, elev. 2850 m (J. Miller, USNM PBI\_OON 27841), 1 ♂, 1 ♀, sifted litter, forest, elev. 2850 m (J. Miller, USNM PBI\_OON 27881), 1 ♀; Reserva Forestal Río Macho, km 71, Inter-American Highway, Mar. 23, 2002, litter, elev. 2710 m (P. Thomas, INBIO 72407, AMNH PBI\_OON 29773), 3 ♂, 2 ♀.

*Costarina chonta* Platnick and Berniker

RECORDS: COSTA RICA: **Cartago:** Parque Nacional Tapantí, Macizo de La Muerte, Estación Biológica la Esperanza del Guarco, Nov. 17, 2001, elev. 2600 m (R. Tenorio, INBIO PBI\_OON 31182), 1 ♂, border trail with UNA parcel, Bosque Río Roble, Sept. 19–Oct. 19, 2002 (R. Tenorio, INBIO PBI\_OON 29829), 1 ♀.

*Costarina barbilla* Platnick and Berniker

RECORDS: COSTA RICA: **Cartago**: Instituto Interamericano de Cooperación para la Agricultura facility, Turrialba, Mar. 25, 1967, leaf litter (W. Peck, CAS 26329, PBI\_OON 2736), 1 ♂.

*Costarina espavel* Platnick and Berniker

RECORDS: COSTA RICA: **Cartago**: Reserva Biológica El Copal, Pejibaye, 9°46'69"N, 83°45'06"W, May 15–16, 2006 (V. Vignoli, C. Viquez, H. Ajurla, AMNH PBI\_OON 49248), 1 ♂, 1 ♀. **Limón**: Reserva Biológica Hitoy Cerere, Aug. 29–Sept. 30, 2000 (INBIO PBI\_OON 29816), 1 ♀, Apr. 1, 2002 (INBIO PBI\_OON 29811), 1 ♀, Sendero Bobocara, Aug. 24–27, 1998, humus, elev. 500 m (E. Rojas, INBIO 58498, PBI\_OON 27699), 2 ♂, Sept. 12, 1998, humus, elev. 500–600 m (E. Rojas, INBIO 58437, PBI\_OON 27698), 2 ♂, Sendero Espavel, Mar. 31, 1993 (E. Rojas, INBIO PBI\_OON 51260), 1 ♀. **Puntarenas**: Estación Biológica Monteverde, 10°18'53"N, 84°47'49"W, June 15, 2001, cloud forest litter, elev. 1750 m (R. Anderson, AMNH PBI\_OON 51266), 2 ♀, 10°19'10"N, 84°49'57"W, June 12, 2001, montane forest litter, elev. 1730 m (R. Anderson, AMNH PBI\_OON 51265), 1 ♀, 10°19'40"N, 84°49'08"W, June 16, 2001, montane forest litter (R. Anderson, AMNH PBI\_OON 29350), 1 ♂, 2 ♀.

*Costarina veragua* Platnick and Berniker

RECORD: COSTA RICA: **Limón**: Sendero El Pity, Veragua Rainforest, Mar. 19, 2009, mini-Winkler (M. Solis, INBIO 51257), 1 ♂.

*Costarina pity* Platnick and Berniker

RECORD: COSTA RICA: **Limón**: Reserva Biológica Hitoy Cerere, May 12, 1998, litter, elev. 160 m (E. Rojas, INBIO ex 50908, PBI\_OON 49247), 1 ♀.

*Costarina hitoy* Platnick and Berniker

RECORDS: COSTA RICA: **Limón**: Reserva Biológica Hitoy Cerere, May 12, 1998, litter, elev. 160 m (E. Rojas, INBIO 50908, PBI\_OON 29759), 5 ♂, 5 ♀, Sendero Bobocara, Aug. 24–27, 1998, humus, elev. 500 m (E. Rojas, INBIO 58498, PBI\_OON 27694), 1 ♂, Sendero Espavel, July 10, 1998, litter, elev. 300–400 m (E. Rojas, INBIO 58495, AMNH PBI\_OON 29760, 29761), 6 ♂, 3 ♀.

*Costarina mooreorum* Platnick and Berniker

RECORDS: COSTA RICA: **Limón**: Finca Alberto Moore, Hone Creek, Mar. 12–June 7, 2004, humus, abandoned cacao, cacao/cordia (C. Viquez, INBIO 323, 333, 338, PBI\_OON 27693, AMNH PBI\_OON 27692, 27701), 2 ♂, 1 ♀, Aug. 3, 2004, humus, under logs, cacao/cordia (C. Viquez, INBIO 543, 2733, PBI\_OON 29373, 29386), 2 ♀, Oct. 21–25, 2005, humus, cacao/cordia, mango (C. Viquez, INBIO 1913, 1919, PBI\_OON 27688, 27690), 2 ♂, July 21, 2006, Berlese, humus (C. Viquez, INBIO 3009, PBI\_OON 27691), 1 ♂; Parque Nacional Cahuita, Punta Cahuita, Apr. 25, 1983, maritime wet forest (D. Ubick, CDU PBI\_OON 51252), 3 ♂.

*Costarina cerere* Platnick and Berniker

RECORDS: COSTA RICA: **Limón:** Agua Fría, trail to Lomas de Sierpe, in the Estación, Nov. 2, 1997, elev. 900 m (E. Rojas, INBIO PBI\_OON 29814), 1 ♂ (missing both palps), 1 ♀; Reserva Biológica Hitoy Cerere, 9°40'N, 83°02'W, Aug. 29, 1985, wet forest litter, elev. 200 m (J. Longino, FMNH 56541, PBI\_OON 10762), 1 ♂.

*Costarina concinna* (Chickering)

RECORDS: COSTA RICA: **Limón:** Reserva Biológica Hitoy Cerere, Feb. 26, 2002, humus, elev. 160 m (INBIO PBI\_OON 29806), 1 ♀, Sendero Espavel, Mar. 28, 2002, dry litter, elev. 200 m (P. Thomas, INBIO PBI\_OON 29753), 1 ♂; Parque Internacional La Amistad, Valle del Silencio, Mar. 17–24, 2003, yellow pan trap, elev. 2480 m (R. González et al., INBIO 73760, PBI\_OON 29374), 1 ♀; Valle del Silencio, Bajando Cerro Quemado, 9°03'43"N, 82°59'01"W, Feb. 26–27, 2005, forest litter, elev. 2200 m (R. Anderson, AMNH PBI\_OON 29743), 1 ♂, Cerro Hoffman, 9°04'41"N, 82°58'36"W, Feb. 26–27, 2005, forest litter, elev. 2300 m (R. Anderson, AMNH PBI\_OON 29815), 1 ♀. **Puntarenas:** Las Alturas de Cotón, July 27–31, 2010 (C. Viquez, INBIO PBI\_OON 51279), 1 ♀.

*Costarina obtina* (Chickering)

RECORDS: COSTA RICA: **Puntarenas:** 1 km SW Cerro Biolley, Altimira, Buenos Aires, Jan. 1–28, 1996, humus, elev. 1350 m (R. Villalobos, INBIO 47294, PBI\_OON 29756), 2 ♂, 2 ♀; Estación Biológico Las Alturas, 2 km NE Alturas, 8°56'56"N, 82°50'01"W, June 20, 1998, litter, upper montane/cloud forest transect, elev. 1520 m (R. Anderson, AMNH PBI\_OON 51277), 2 ♂, 8°58'26"N, 82°50'04"W, July 29–31, 2010, pitfall, elev. 1720 m (A. Solis, C. Viquez, INBIO PBI\_OON 51278), 1 ♂; Estación Biológico Las Cruces, 4 km S San Vito, 8°47'03"N, 82°57'36"W, June 19, 1998, upper wet montane forest litter, elev. 1150 m (R. Anderson, AMNH PBI\_OON 51283), 1 ♂; 5 km SW Estación Biológico Las Cruces, 8°47'13"N, 82°59'13"W, June 22, 1998, wet cloud forest litter, elev. 1400 m (R. Anderson, AMNH PBI\_OON 51281), 3 ♂; Estación Pittier, 4 km SW Cerro Gemelo, 9.025663°N, 82.962695°W, July 4, 1995 (C. Viquez, INBIO PBI\_OON 51275), 1 ♀; La Fila, 5 km SW Finca Las Cruces, Mar. 15, 1973, Berlese, forest slope leaf litter, elev. 4700 ft (J. Wagner, J. Kethley, FMNH PBI\_OON 10643), 1 ♂; 35 km NE San Vito, near Las Alturas, Río Bella Vista, road to gravel pit, Mar. 22, 1991, dry leaf litter, elev. 4300 ft (L. Herman, AMNH PBI\_OON 87), 3 ♂.

*Costarina pittier* Platnick and Berniker

RECORDS: COSTA RICA: **Puntarenas:** Estación Biológico Las Alturas, 2 km NE Alturas, 8°56'56"N, 82°50'01"W, June 20, 1998, litter, upper montane/cloud forest transect, elev. 1520 m (R. Anderson, AMNH PBI\_OON 51276), 1 ♂; Estación Biológico Las Cruces, 4 km S San Vito, 8°46'N, 82°58'W, Mar. 15, 1973, Berlese, leaf mold, elev. 4000 ft (J. Wagner, J. Kethley, FMNH 33516, 33520, PBI\_OON 10023, 10027), 4 ♂, Mar. 16, 1973, Berlese, forest floor litter, dry slope, elev. 4000 ft (J. Wagner, J. Kethley, FMNH PBI\_OON 10608), 1 ♂, Mar. 17, 1983, Berlese, epiphytic humus, 3 month old dead fall, elev. 4000 ft (J. Wagner, J. Kethley, FMNH 34948, PBI\_OON 10619), 1 ♂, Mar. 18, 1973, Berlese, leaf litter in



stream bed, virgin forest floor litter, moderate slope, elev. 4000 ft (J. Wagner, J. Kethley, FMNH 33533, PBI\_OON 10040, 10633), 1 ♂, 3 ♀, Mar. 20, 1973, Berlese, stream bed litter from rocky crevices, elev. 4000 ft (J. Wagner, J. Kethley, FMNH 33525, PBI\_OON 10032), 1 ♂, 1 ♀, 8°47'03"N, 82°57'36"W, June 19, 1998, upper wet montane forest litter, elev. 1150 m (R. Anderson, AMNH PBI\_OON 51282), 1 ♂; 5 km SW Estación Biológico Las Cruces, 8°47'13"N, 82°59'13"W, June 22, 1998, wet cloud forest litter, elev. 1400 m (R. Anderson, AMNH PBI\_OON 49233), 1 ♂; Estación Pittier, June 8–11, 1995, litter, elev. 900 m (INBIO 47161, PBI\_OON 29781), 1 ♂; Golfito, Parque Nacional Piedras Blancas, Cerro Nicuesa, Nov. 28, 2000–Feb. 3, 2001, Malaise trap, elev. 580 m (J. Azoifeifa, INBIO 61321, PBI\_OON 27696), 1 ♂; 3 km NE Golfito, May 22–23, 1987, sifting leaf litter, tropical wet forest, elev. 100 m (D. Ubick, CDU PBI\_OON 51300), 1 ♂; La Fila, 5 km SW Finca Las Cruces, Mar. 21, 1973, Berlese, mixed floor litter, palm fibers, log mold, elev. 4700 ft (J. Wagner, J. Kethley, FMNH PBI\_OON 51280), 2 ♂; Rancho Quemado, Península de Osa, Dec. 1991, humus (F. Quesada, ex INBIO 45750, PBI\_OON 51304), 1 ♀, Feb. 12, 1998 (F. Quesada, INBIO 45747), 1 ♂; 5 km W Rincón de Osa, Península de Osa, 8°42'N, 83°31'W, Mar. 24, 1973, Berlese, forest floor litter in pockets halfway up ridge, elev. 500 m (J. Wagner, J. Kethley, FMNH PBI\_OON 10637), 1 ♂, 2 ♀; 6 km S San Vito, 8°42'N, 83°00'W, Mar. 13–18, 1967, under log (MCZ 72961, PBI\_OON 37023), 1 ♀.

*Costarina alturas* Platnick and Berniker

RECORDS: COSTA RICA: **Puntarenas**: Bosque Pito el Evangélico. Aug. 8–10, 2008, pitfall, elev. 1100–1200 m (B. Hernández, M. Moraga, INBIO PBI\_OON 51288), 1 ♀; Estación Biológico Las Alturas, 2 km NE Alturas, 8°58'26"N, 82°50'04"W, June 21, 1998, litter, upper montane/oak forest transect, elev. 1720 m (R. Anderson, AMNH PBI\_OON 49249), 1 ♂; Estación Biológico Las Cruces, 4 km S San Vito, 8°47'03"N, 82°57'36"W, June 19, 1998, upper wet montane forest litter, elev. 1150 m (R. Anderson, AMNH PBI\_OON 49251), 2 ♀; 5 km SW Estación Biológico Las Cruces, 8°47'13"N, 82°59'13"W, June 22, 1998, wet cloud forest litter, elev. 1400 m (R. Anderson, AMNH PBI\_OON 49242), 1 ♂, 2 ♀; La Fila, 5 km SW Finca Las Cruces, Mar. 15, 1973, Berlese, forest slope leaf litter, elev. 4700 ft (J. Wagner, J. Kethley, FMNH PBI\_OON 51284), 1 ♂, Mar. 21, 1973, Berlese, mixed floor litter, palm fibers, log mold, elev. 4700 ft (J. Wagner, J. Kethley, FMNH PBI\_OON 10641), 1 ♂, 1 ♀; 35 km NE San Vito, near Las Alturas, Río Bella Vista, road to gravel pit, Mar. 22, 1991, moist litter near stream, elev. 4300 ft (L. Herman, AMNH PBI\_OON 83), 2 ♂, 1 ♀.

*Costarina cruces* Platnick and Berniker

RECORDS: COSTA RICA: **Puntarenas**: Estación Biológico Las Cruces, 4 km S San Vito, 8°47'03"N, 82°57'36"W, June 19, 1998, upper wet montane forest litter, elev. 1150 m (R. Anderson, AMNH PBI\_OON 49244), 1 ♂, 2 ♀; 5 km SW Estación Biológico Las Cruces, 8°47'13"N, 82°59'13"W, June 22, 1998, wet cloud forest litter, elev. 1400 m (R. Anderson, INBIO PBI\_OON 51287), 1 ♂, 2 ♀.

*Costarina ubicki* Platnick and Berniker

RECORDS: COSTA RICA: **Puntarenas:** Fundación Neotrópica, 10 km W Rincón, Península de Osa, 8°42'30"N, 83°31'30"W, June 23, 1997, ridge forest litter, elev. 130 m (R. Anderson, INBIO PBI\_OON 29765), 3 ♂, June 2001, humus (R. Anderson, C. Viquez, INBIO 78664, PBI\_OON 29767), 2 ♂; 8 km W Puerto Jiménez, May 19, 1987, sifting litter, tropical moist forest, elev. 100 m (D. Ubick, CDU PBI\_OON 51299), 3 ♂; Rancho Quemado, Península de Osa, Dec. 1991, humus (F. Quesada, ex INBIO 45750, PBI\_OON 29766), 1 ♂; 6.5 km W Rincón, near Fundación Neotrópica, Península de Osa, Mar. 25. 1991, litter near stream (L. Herman, AMNH PBI\_OON 86), 1 ♂, 1 ♀.

*Costarina palmar* Platnick and Berniker

RECORDS: COSTA RICA: **Puntarenas:** Estación Biológico Las Cruces, San Vito, 8°46'N, 82°58'W, Mar. 14, 1973, Berlese, leaf mold on floor of moderately dense forest, elev. 4000 ft (J. Wagner, J. Kethley, FMNH ex 33523, PBI\_OON 51303), 1 ♂; Fundación Neotrópica, Rincón de Osa, Península de Osa, June 2001, humus (R. Anderson, C. Viquez, INBIO 78664, AMNH PBI\_OON 29794), 2 ♂, 1 ♀; 3 km NE Golfito, May 22–23, 1987, on and under logs, tropical wet forest, elev. 100 m (D. Ubick, CDU PBI\_OON 51301), 1 ♂, 1 ♀; Parque Nacional Corcovado, Estación La Leona, Río Madrigal trail, Península de Osa, Apr. 4, 2002, humus, secondary forest (A. Azofeifa, INBIO PBI\_OON 29795, 29797), 3 ♂, 1 ♀, July 5–15, 2002 (A. Azofeifa, INBIO 29830), 1 ♀; 8 km W Puerto Jiménez, May 19, 1987, sifting litter, tropical moist forest, elev. 100 m (D. Ubick, CDU PBI\_OON 51294), 4 ♂, 5 ♀; 15 km SSW Puerto Jiménez, 8.40798°N, 83.32755°W, Mar. 7, 2010, sifted leaf litter, mature wet forest, elev. 170 m (J. Longino, MCZ PBI\_OON 51292), 1 ♂, 2 ♀; Rancho Avena, Península de Osa, Feb. 12, 1998 (F. Aedro, INBIO PBI\_OON 29771), 2 ♂, 1 ♀; 5 km W Rincón de Osa, Península de Osa, 8°42'N, 83°31'W, Mar. 24, 1973, Berlese, forest floor litter in pockets on high ridge, elev. 500 m (J. Wagner, J. Kethley, FMNH 34947, PBI\_OON 10618), 1 ♀.

*Costarina parabio* Platnick and Berniker

RECORDS: COSTA RICA: **Puntarenas:** Golfito, July 26, 1981, forest litter, elev. 400 m (G. Edwards, FSCA PBI\_OON 51507), 2 ♂; 3 km NE Golfito, May 22–23, 1987, on or under log, tropical wet forest, elev. 100 m (D. Ubick, CDU PBI\_OON 51302), 1 ♂; Rancho Avena, Península de Osa, Feb. 12, 1998 (F. Aedro, INBIO PBI\_OON 29768), 1 ♂, 1 ♀; Rancho Quemado, Península de Osa, Nov. 1992 (F. Quesada, INBIO 45745, AMNH PBI\_OON 29770), 1 ♂.

*Costarina semibio* Platnick and Berniker

RECORDS: COSTA RICA: **Puntarenas:** Parque Nacional Corcovado, Estación La Leona, Río Madrigal trail, Península de Osa, Apr. 4, 2002, humus, secondary forest (A. Azofeifa, INBIO 29792), 1 ♂, 2 ♀; Parque Nacional Corcovado, Estación Sirena, Península de Osa, 8°28'N, 83°31'W, Mar. 12, 1999, sifting litter, primary rainforest, elev. 10 m (J. Miller, USNM PBI\_OON 27840), 3 ♂, 4 ♀, Espavel trail, Feb. 12–15, 2001, litter (A. Azofeifa, INBIO PBI\_OON 29825), 1 ♀, May 18–30, 2001, humus (A. Azofeifa, INBIO 99985, PBI\_OON 29808), 1 ♀; Parque

Nacional Corcovado, 3 km W Madrigal, Península de Osa, May 20–21, 1987, sifting leaf litter, tropical wet forest (D. Ubick, CAS 26307, PBI\_OON 2598), 1 ♀; Parque Nacional Corcovado, Río Madrigal trail, Península de Osa, Nov. 15, 2002, humus, elev. 100–200 m (A. Azofeifa, INBIO 73555, AMNH PBI\_OON 27697), 1 ♂, 1 ♀; 15 km SSW Puerto Jiménez, 8.40798°N, 83.32755°W, Mar. 7, 2010, sifted leaf litter, mature wet forest, elev. 170 m (J. Longino, MCZ PBI\_OON 51293), 2 ♂, 1 ♀; 5 km W Rincón de Osa, 8°42'N, 83°31'W, Mar. 24, 1973, Berlese, old epiphytic humus, sticks, leaves near floor, elev. 50 m (J. Wagner, J. Kethley, FMNH PBI\_OON 10610), 1 ♂.

*Costarina jimenez* Platnick and Berniker

RECORDS: COSTA RICA: **Puntarenas**: Estación Agujas, Península de Osa, Oct. 7, 2000, humus (A. Azofeifa, INBIO PBI\_OON 29796, 29798, 29799), 3 ♂, 1 ♀; Parque Nacional Corcovado, Estación La Leona, Río Madrigal trail, Península de Osa, Dec. 12–27, 2001, humus, secondary forest (A. Azofeifa, INBIO PBI\_OON 29800), 1 ♂, 1 ♀, Apr. 4, 2002, humus (A. Azofeifa, INBIO ex 70757, AMNH PBI\_OON 29801), 1 ♂, 1 ♀; 13 SSW Puerto Jiménez, 8.40667°N, 83.32833°W, Mar. 10, 2010, elev. 130 m (J. Longino, MCZ PBI\_OON 51296), 3 ♂; Rancho Quemado, Península de Osa, Dec. 1991, humus (F. Quesada, ex INBIO 45750, PBI\_OON 51305), 1 ♀; 2.5 mi SW Rincón, Península de Osa, 8°42'N, 83°29'W, Mar 1–7, 1967 (OTS course, MCZ 72951, PBI\_OON 37022), 1 ♀.

*Costarina parapalmar* Platnick and Berniker

RECORDS: COSTA RICA: **Puntarenas**: Fundación Neotrópica, 10 km N Rincón de Osa, Península de Osa, 8°48'30"N, 83°31'30"W, June 23, 1997, ridge forest litter, elev. 180 m (R. Anderson, INBIO PBI\_OON 29772), 2 ♂; 13 SSW Puerto Jiménez, 8.40667°N, 83.32833°W, Mar. 10, 2010, elev. 130 m (J. Longino, MCZ PBI\_OON 51298), 1 ♂; 5 km W Rincón de Osa, Península de Osa, 8°42'N, 83°31'W, Mar. 24, 1973, Berlese, mixed litter, base of “forest giant,” elev. 50 m (J. Wagner, J. Kethley, FMNH 34969, PBI\_OON 10640), 1 ♂, forest floor litter (J. Wagner, J. Kethley, FMNH PBI\_OON 10631), 1 ♂.

*Costarina osa* Platnick and Berniker

RECORDS: COSTA RICA: **Puntarenas**: Fundación Neotrópica, Rincón de Osa, Península de Osa, June 2001, humus (R. Anderson, C. Viquez, INBIO ex 78664, PBI\_OON 51306), 1 ♀; Rancho Quemado, Península de Osa, Mar. 20, 1992 (F. Quesada, INBIO 45746, PBI\_OON 29820), 1 ♀; 6.5 km W Rincón, near Fundación Neotrópica, Península de Osa, Mar. 25, 1991, litter near stream (L. Herman, AMNH PBI\_OON 51307), 2 ♀.

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