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

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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-\(^\text{1}\)Division of Invertebrate Zoology, American Museum of Natural History.

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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 genital 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 synapomorphous for some subgroup, the likelihood of finding an exactly congruent genital 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 genital 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 genital 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 genital 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 genital atrium and an enormously expanded tip on the anterior genital 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 retrrolaterally 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, 2011: 50 (type species by original designation Dysderina plena O. P.-Cambridge, 1894).

Costarina Platnick and Dupérré

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) ........................................... 2

2. Proximal and distal prongs of embolus largely or entirely fused ........................... 3
   – Proximal and distal prongs of embolus clearly separate ...................................... 6

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) ......................... 8
   – Proximal prong of embolus relatively narrow (as in figs. 49, 83) ....................... 10

6. Proximal prong of embolus smaller than distal prong (fig. 5) ......................... 9
   – 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 .................................................. bocas
21. Posterior genitalic sclerotization long (fig. 112) ...................................... 22
   – 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) ............. 24
   – 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) .................................................... seclusa
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.
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. 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 10757, 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 sagitate-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).


**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 genital 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. 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 reordered 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 reordered.

**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.
**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 SYNONMY.**

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

*Costarina rigida*: Platnick and Dupérè, 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.
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, 8.73524°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 sagit-tate-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 epi-phytes 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).
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: *Chiriqui*: 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.
**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 scythe shaped; distal prong short, wide.

**Female**: Unknown.

**Other Material Examined**: None.

**Distribution**: Northern Panama (Chiriquí).

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**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).
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 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.
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 trifid 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 trifid.

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 genital process distally flared, posterior genitalia with conspicuous lobes visible through cuticle.


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. Solis), 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 genital process narrow, distally flared.


Distribution: Panama (Bocas del Toro).
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.


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 v4-4-0; 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.


**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.

**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, 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 10593), 1♂; Pipeline Road, N Río Limbo, Parque Nacional Soberanía, 9.15572°N, 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, PBI_OON 27151, 27156, 27158, 27161, 51359), 4♂, 8♀ (including holotype of C. improvisa, PBI_OON 51349), June–Aug. 1949 (J. Zetek, MCZ 66569, 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♀, May 23, 1976, Berlese, leaf litter (S. Levings, USNM PBI_OON 27857), 1♂, May 23, 1976, Berlese, leaf litter (S. Levings, USNM PBI_OON 27857), 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♀;

**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 genital process distally widened (figs. 169, 170) ....................................... *yotoco*
    – Anterior genital process not widened (figs. 203, 225). .................................................. 12
12. Genital atrium ovoid (figs. 202, 203). ................................................................. *saladito*
    – Genital atrium recurved (figs. 224, 225). ................................................................. *anchicaya*
13. Anterior genital process distally widened (figs. 181, 192, 236) ...................... 14
    – Anterior genital process not widened (figs. 156, 214, 248) .................................. 16
14. Tip of anterior genital 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*
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.


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♀. Quindio: 1 km S
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 Cucurrupí 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).
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.


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


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.


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

Costarina waspuk Platnick and Dupérré


Costarina musun Platnick and Dupérré


Costarina blanco Platnick and Dupérré

Costarina plena (O. P.-Cambridge)

84°47′53″W, June 11, 2001, cloud forest litter (R. Anderson, AMNH PBI_OON 29362), 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 paraplena** 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), $1\delta$, Edwin 5.2 (INBIO PBI_OON 49946), $1\varphi$, La Hacienda, Aeropuerto, Aug. 15–17, 2009, Berlese, cacao (A. Solis, C. Viquez, R. Guries, INBIO PBI_OON 49944), $5\varphi$, Montecristo, Plot R4, Apr. 13, 2007, humus (C. Viquez, INBIO PBI_OON 29748), $1\delta$, Plot 2B, Apr. 14, 2007, humus (C. Viquez, INBIO PBI_OON 29746), $2\varphi$. **Guanacaste**: Estación Pitilla, 9 km S Santa Cecilia, Apr. 1995, humus, elev. 700 m (P. Rios, INBIO 47299, PBI_OON 29817), $1\delta$, $1\varphi$.

**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), $2\delta$, $4\varphi$; 11 km ESE La Virgen, 10°21′N, 84°03′W, Feb. 18, 2004, elev. 250–350 m (INBIO PBI_OON 27642), $1\varphi$; 16 km SSE La Virgen, 10°16′N, 84°05′W, Feb. 20–23, 2001, elev. 1050–1150 m (INBIO PBI_OON 27997), $1\varphi$; 9 km NE Vara Blanca, 10°14′N, 84°06′W, Mar. 6–April 11, 2005, Winkler, elev. 1450–1550 m (INBIO PBI_OON 27639, 27644, 27654, 27999, 29749), $4\delta$.

**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), $3\varphi$; Reserva Biológica Gandoca-Manzanillo, Laguna Gandoca, Feb. 8, 2002, sifting leaf litter (D. Chandler, INBIO 67542, PBI_OON 29745), $1\delta$.

**Puntarenas**: Parcela Alemán, Centro Científico Tropical, Monteverde, Aug. 17–19, 2009, elev. 920 m (D. Gutierrez, INBIO PBI_OON 51261), $1\varphi$.

### 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), $1\delta$. **Heredia**: La Selva, 10.422139°N, 84.001523°W, June 25, 1999, Winkler (INBIO 51223), $1\varphi$, Aug. 9–15, 2010 (INBIO PBI_OON 51212), $1\delta$.

### 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), $1\delta$; 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), $1\delta$; 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), $2\delta$, $1\varphi$, Mar. 25, 1999, humus (C. Viquez, INBIO PBI_OON 29807), $1\varphi$; Upala, Aeropuerto 2.2, Mar. 19, 2010 (C. Viquez, INBIO PBI_OON 49952), $1\varphi$, Dago 1.1, Mar. 19, 2010 (C. Viquez, INBIO PBI_OON 49950), $1\varphi$, Dago 2.2 (INBIO PBI_OON 49953), $1\delta$; La Hacienda, Aeropuerto, Aug. 15–17, 2009, Berlese, cacao (A. Solis, C. Viquez, R. Guries, INBIO PBI_OON 49949), $8\delta$, $7\varphi$, Montecristo, Plot 1, Jan. 10, 2008, Berlese (C. Viquez, INBIO PBI_OON 29345), $1\delta$, Plot 2D, Apr. 14, 2007, humus (C. Viquez, INBIO PBI_OON 29787), $1\delta$, Plot 2E, Apr. 14, 2007, humus (C. Viquez, INBIO PBI_OON 29788), $1\delta$; Plot T, #10, Apr. 13, 2007, humus (C. Viquez, INBIO PBI_OON 29810), $1\varphi$. **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), $1\delta$. **Guanacaste**: Estación Biológica Maritza, Feb. 17, 1990, wet montane forest litter, elev. 875 m (R. Anderson, AMNH PBI_OON 49235), $1\varphi$, 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. 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:
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′08″W, June 12, 2001, montane forest litter, elev. 1730 m (R. Anderson, AMNH PBI_OON 29355), 1 ♂, 10°19′40″N, 84°49′00″W, June 9–16, 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 29362, 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


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
Costarina selva Platnick and Berniker


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...
Costarina rafael Platnick and Berniker


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


Costarina aguirre Platnick and Berniker

Costarina quepos Platnick and Berniker


Costarina meridina (Chickering)


Costarina watina (Chickering)


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 Meterológica 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 (Porras 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

Costarina barbilla Platnick and Berniker


Costarina espavel Platnick and Berniker


Costarina veragua Platnick and Berniker


Costarina pity Platnick and Berniker


Costarina hitoy Platnick and Berniker


Costarina mooreorum Platnick and Berniker

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)


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 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. Azofeifa, 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°42'26"N, 83°31'13"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 Evangelico. 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♂, 2♀; 35 km NE San Vito, near Las Alturas, Rio 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. Víquez, 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. Víquez, 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, FSCH 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 10610), 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♂.

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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♂.

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Acknowledgments

This study is part of the oonopid PBI project supported by the U.S. National Science Foundation (grant DEB-0613754) and organizations in several other countries. The assistance of the many participants in that project is immensely appreciated. As always, we thank the many
curators of collections that have supplied specimens: Jonathan Coddington (USNM), G.B. Edwards (FSCA), Eduardo Florez (ICN), Gonzalo Giribet and Laura Leibensperger (MCZ), Charles Griswold and Darrell Ubick (CAS), Rudy Jocqué (MRAC), Claudia Medina (IA vH), Dio Quintero (MIUP), Nikolaj Scharff (ZMUC), Petra Sierwald (FMNH), and Carlos Viquez (INBIO). We also thank Steve Thurston for composing the plates, and Angelo Bolzern and Cristian Grismado for their helpful comments on a draft of the manuscript.

REFERENCES
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