



Research article

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Strange new spiders: on *Roddenberryus*, a new and unusual caponiid genus (Araneae, Caponiidae)

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Abstract. The new nopine genus *Roddenberryus* gen. nov. is erected to include in total five species: three new species, *R. kirk* gen. et sp. nov. (male and female) from Costa Rica, *R. spock* gen. et sp. nov. (female) from Campeche, Mexico and *R. mccoys* gen. et sp. nov. (male) from Baja California Sur, Mexico, as well as two species previously misplaced in *Caponina* Simon, i.e., *R. sargi* (Pickard-Cambridge, 1899) gen. et comb. nov. from Guatemala and *R. pelegrina* (Bryant, 1940) gen. et comb. nov. from Cuba. A male specimen reported as *C. sargi* Pickard-Cambridge from Costa Rica by E. Kritscher (1957) is assigned to *Roddenberryus kirk* together with one female collected at the same locality. The new genus is characterized by the distally projected endites and a triangular, projected labium, a conformation unique among nopines; also by a triangular, very short, scaly gladius, serrula with interspersed multiple tooth rows, and a tarsal organ with strongly projected margins. *Roddenberryus* shares with *Tarsonops* Chamberlin the cracked tarsi and metatarsi, with multiple adesmatic joints intertwined on the cuticle and an unusual internal respiratory system with both posterior tracheae fused in a single trunk.

Keywords. Synspermiata, nopines, taxonomy, Neotropical region.

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Introduction

Caponiids are widely distributed spiders, occurring across the Americas, Africa and Asia. The family currently comprises 20 genera and 139 species (World Spider Catalog 2022). Endemism is very high, with most known species being single island endemics or restricted to small areas on mainland. These spiders are morphologically unusual in several aspects. For example, the genera of Nopinae have a variety of membranous modifications (crista, gladius and arolium) on the distal leg podomeres (Sánchez-Ruiz & Brescovit 2017, 2018). They are also remarkable by the presence of only two eyes (except for *Nopsides ceralbonus* Chamberlin, 1924 with four). On the other hand, non-nopine genera also show unusual dramatic modifications, such as the distally widened palpal endites, uniquely modified with a series

of setae with elongated sockets in *Tisentnops* Platnick, 1994, or the presence of a projected distally clypeal horn in *Nasutonops* Brescovit & Sánchez-Ruiz, 2016 (Brescovit & Sánchez-Ruiz 2016). Non-nopines show a great variety in the number of eyes, ranging from eight, as in *Calponia* Platnick, 1993 and in *Caponia* Simon, 1887, to the eyeless troglobitic genus *Carajas* Brescovit & Sánchez-Ruiz, 2016 (Brescovit & Sánchez-Ruiz 2016).

Despite this wide morphological variety, some structures appear to be conservative across caponiid taxa. For example, ultrastructures such as the bases of the trichobothria, the tarsal organs, the serrula, the sensilla, the cheliceral membranous lobes and some types of bristles are morphologically very similar in both nopinae and non-nopine genera. Also, the structures of the internal respiratory system are homogeneous in almost all known genera of caponiids. Among the leg membranous modifications of Nopinae, the crista and arolium show the greatest morphological variety among genera, species and even between sexes, as in species of *Aamunops* Galán-Sánchez & Álvarez-Padilla, 2022, where the crista is sexually dimorphic (Galán-Sánchez & Álvarez-Padilla 2022). However, the morphology of the gladius is almost constant in all nopines, except for representatives of *Tarsonops* Chamberlin, 1924 (see Sánchez-Ruiz & Brescovit 2015: fig. 50).

Studying the internal respiratory system of a wide range of caponiids, specimens of three undescribed nopine species from Mexico and Costa Rica were found to have the two posterior tracheae fused in a unique large tracheal trunk. These specimens also bear modifications in some structures that generally do not change in caponiids, such as the tarsal organ, the gladius and the serrula. Additionally, the morphology of their endites and labium are unique among the genera of Nopinae. This paper proposes the new nopine genus *Roddenberryus* to accommodate these three new Central American species as well as two species previously misplaced in *Caponina* Simon, 1892 (*C. sargi* Pickard-Cambridge, 1899 and *C. pelegrina* Bryant, 1940). In addition, male and female specimens from Costa Rica ascribed to *C. sargi* by Kritscher (1957) are assigned to *Roddenberryus kirk* gen. et sp. nov. Some aspects of the morphological diversity of the new genus and its closest relatives are discussed.

Material and methods

Repositories

The specimens examined were supplied by the following collections (curators in parentheses):

- CARCIB = Colección de Arácnodos e Insectos del Centro de Investigaciones Biológicas del Noroeste, La Paz, Mexico (M.L. Jiménez)
- CNAN = Colección Nacional de Arácnidos, Instituto de Biología, Universidad Nacional Autónoma de México, Mexico (E. González-Santillán)
- INBIO = Instituto Nacional de Biodiversidad, Santo Domingo de Heredia, Costa Rica (C. Viquez)
- MCZ = Museum of Comparative Zoology, Harvard, MA, USA (G. Giribet)
- NHM = Naturhistorisches Museum Wien, Vienna, Austria (C. Hörweg)
- USNM = Smithsonian Institution, Washington DC, USA (H. Wood)

Photos of representatives of *C. sargi* were provided by Christoph Hörweg from Naturhistorisches Museum Wien (NHM).

Morphological examinations

Observations were made using a Leica MZ12 stereo microscope. Coloration patterns are described based on specimens preserved in 80% ethanol. Internal female genitalia were dissected, and soft tissues were digested for 24 hours with Ultrazyme® enzymatic eye lens cleaner, diluted with distilled water at the proportion of 1 tablet/5 ml. Descriptions and terminology for copulatory structures mostly follow

Sánchez-Ruiz *et al.* (2015) and Sánchez-Ruiz & Brescovit (2018), but some terms for the female internal genitalia are newly introduced. Measurements are in millimeters (mm) and were made using a microscope micrometer eyepiece. Digital SEM micrographs were taken using a Quanta 250 scanning electron microscope with attached SLR digital camera at Instituto Butantan (São Paulo, Brazil) and a Tescan Mira3 scanning electron microscope at Museu Paraense Emilio Goeldi (Belém, Brazil), following standard procedures for sample preparation. Multifocal photos were taken with a Leica MC170 HD digital camera attached to a Leica M205 C stereo microscope, using Leica Application Suite ver. 4.10 software at Museu Paraense Emilio Goeldi.

Geographical distribution

Distribution maps were generated with ArcView® ver. 9.0. Locality coordinates are in parentheses when obtained from specimen labels, and square brackets when inferred from Google Maps® or converted to the DMS format (degrees, minutes and seconds). All figures were edited using Adobe Photoshop CC 2015 ver. 5.1.

Abbreviations used in text and figures

Ac	=	aciniiform gland spigot
aj	=	adesmatic joints
arb	=	anteromedian receptacle base
AT	=	anal tubercule
ca	=	crista
cml	=	cheliceral membranous lamina
dcp	=	dorsal chemosensory patch
ess	=	external sclerotization around spiracles
gl	=	gladius
ic	=	invaginations on clypeus margins
MaAm	=	major ampullate gland spigot
MtS	=	dorsal metatarsal stopper
Pi	=	piriform gland spigot
pr	=	posterior receptaculum or interpulmonary fold
sac	=	membranous sac-like structure
t	=	tracheal trunk
ue	=	uterus externus

Taxonomy

Class Arachnida Cuvier, 1812
 Order Araneae Clerck, 1757
 Family Caponiidae Simon, 1890

Genus *Roddenberryus* gen. nov.

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Type species

Roddenberryus kirk gen. et sp. nov. (here designated).

Diagnosis

Members of *Roddenberryus* gen. nov. can be distinguished from all non-nopine genera by the presence of tarsal adesmatic joints (Figs 1H, 5G, 9H, 12H) and from all other Nopinae by a conformation of

the unique characters of the endites and labium among these genera, in which the endites have an accentuated finger-shaped forward projection and the labium is triangular and projected (Figs 1E, 2C, 3C, 4C, 8F, 9E, 12E, 14C). Additionally, members of *Roddenberryus* gen. nov. can be distinguished by the triangular, very short, scaly gladius (Figs 5G, H, 9H, 12H), strongly projected tarsal organ margins (Fig. 6E–F) and the serrula composed by interspersed multiple rows of teeth (Fig. 4F).

Etymology

The generic name, masculine, is a patronymic honoring Eugene Wesley Roddenberry Sr, the creator of Star Trek, a science fiction media franchise that inspired generations of kids to pursue scientific careers.

Other species included

Roddenberryus spock gen. et sp. nov., *R. mccoys* gen. et sp. nov., *R. sargi* (F. O. Pickard-Cambridge, 1899) gen. et comb. nov. and *R. pelegrina* (Bryant, 1940) gen. et comb. nov.

Description

Caponiids with only two eyes (Fig. 1D). Carapace orange, elongate oval, widest at rear of coxae II, only gradually narrowed anterior of eyes, without conspicuous pattern (Figs 1D, 9D, 12D). Pars cephalica flattened, pars thoracica slight sloping posteriorly (Fig. 4A); thoracic groove absent. Anterior median eyes dark, situated on slightly elevated black ocular tubercle, separated by about a half of its diameter, set back from anterior margin of clypeus by about twice their diameter (Figs 1D, 9D, 12D). Chelicerae orange, with median lamina; most of distance between lamina and fang base occupied by white membranous lobe (Fig. 4G–J); cheliceral paturon with scattered, long, weak bristles (Fig. 4H–I); ectal side with stridulatory ridges (Fig. 4I); fang very short (Fig. 4J). Endites orange except for anterior tips due to a white membranous projection, finger-shaped, convergent along midline, but not touching (Figs 1E, 2C, 4C, 8F, 9E, 12E), covered with scattered long setae, and with strong distal serrula consisting of interspersed multiple tooth rows (Fig. 4E–F). Labium orange, triangular, projected, with broad base, fused to sternum along obsoleted posterior groove (Fig. 4C). Sternum orange, oval, surface with fine reticular lines with numerous long, stiff setae (Figs 1E, 4B, 8F, 9E, 12E); pleural membrane with three sclerotized intercoxal extensions between coxae I and II, II and III, and III and IV (Fig. 4A); long and thin precoxal triangles on coxae II, III and IV (Figs 1E, 4B, 8F, 9E, 12E). Legs orange, formula 4123, without spines; anterior femora slightly thickened (Figs 1I, 5A); all metatarsi with multiple adesmatic joints intertwined on cuticle, specific limits poorly defined (Figs 1H, 5G, 9H, 12H), with dorsal metatarsal stopper (Fig. 5I), I–II with a crista occupying almost all ventral part (Fig. 5G) and a triangular, very short, scaly gladius (Figs 1H, 5C, G, H, 9H, 12H); all tarsi with three claws (Fig. 5E) and multiple adesmatic joints intertwined on cuticle (Figs 1H, 5D, 9H, 12H); paired claws usually with 8–10 teeth, most distal one largest (Figs 5E–F, 6B); unpaired claw short, with 2–4 teeth (Fig. 5E, L); ventral frictional setae on tarsi (Fig. 5E, L) and several other setae around pretarsal claws. Tibiae, metatarsi and tarsi with trichobothria in a single row, bases with semicircular rim bearing slight longitudinal ridges (Fig. 6D), tarsal organ exposed, but with marginal ring strongly pronounced (Fig. 6E–F). Female palpal tarsus not elongated, without claw, prolateral surfaces covered with strong, long setae (Figs 1B–C, 9B–C, 12B–C), with an oval pad of fine chemoreceptor setae on dorsal, distal sector (Fig. 4K–L), without a tibial brush on prolateral side, but palpal tibia also covered with strong, long setae on prolateral side (Figs 1B, 4K, 9B, 12B); prolateral pick on palpal femur, located almost in middle of podomere (Figs 1B, 9B, 12B). Abdomen pale gray dorsally (Figs 1A, 2A, 3A, 8A, 9A, 12A), lighter ventrally, with sclerotized epigastric and postepigastric scuta (Figs 1F, 2B, 3B, 9F, 12F); with two pairs of respiratory spiracles clustered around epigastric groove; anterior spiracles leading to short tracheal trunk ending in numerous long tracheoles; posterior spiracles leading to only one wide tracheal trunk extending anteriorly into cephalothorax and several short, small tracheoles extending posteriorly (Fig. 11B, D, F). Six spinnerets in typical caponiid arrangement (Fig. 7G), PMS with one major ampullate gland spigot

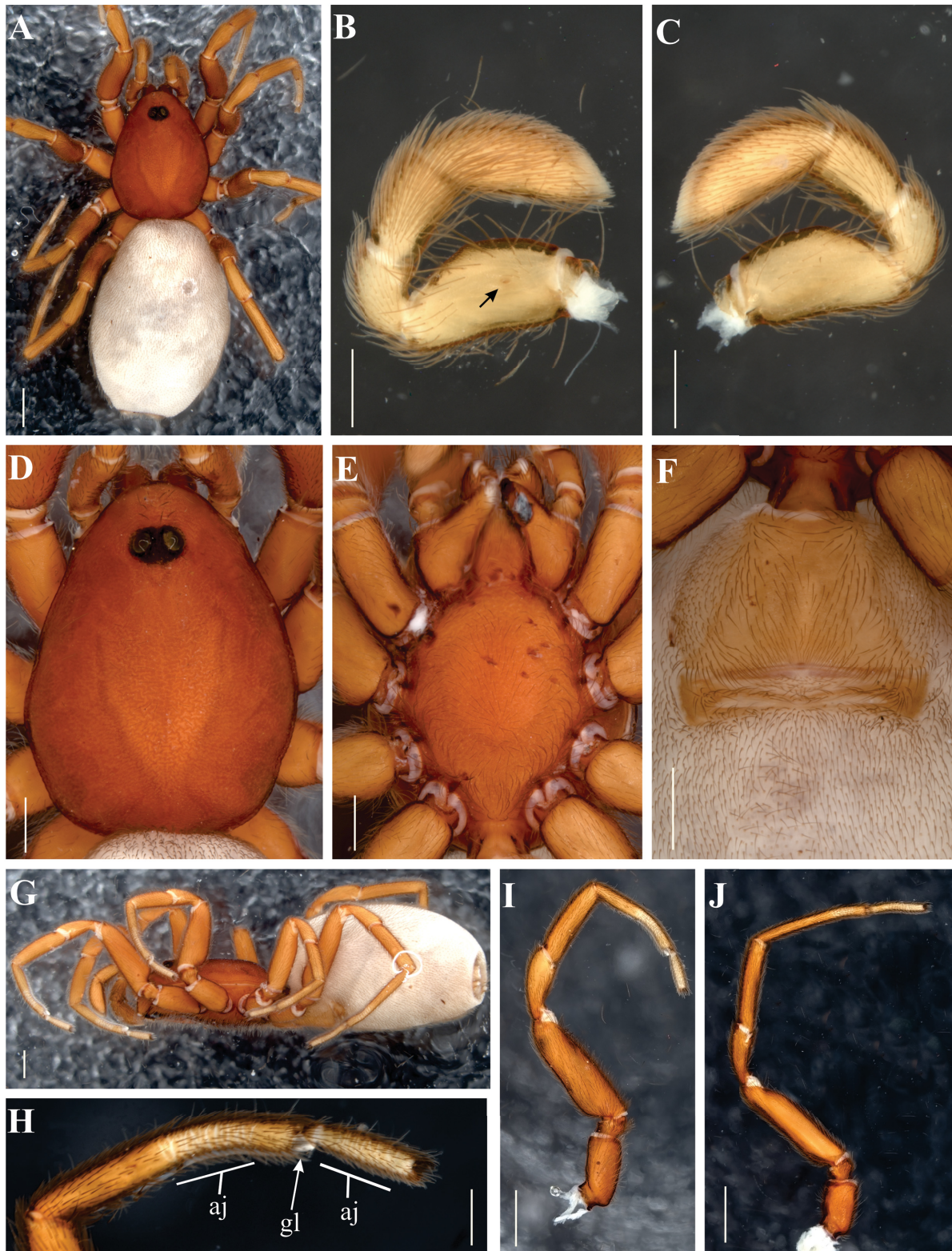


Fig. 1. *Roddenberryus kirk* gen. et sp. nov., ♀, holotype (INBIO 4407644). A. Habitus, dorsal view. B. Left palp, prolateral view, black arrow showing prolateral pick. C. Left palp, retrolateral view. D. Habitus, ventral view. E. Cephalothorax, ventral view. F. External genital area, ventral view. G. Habitus, lateral view. H. Tarsus and metatarsus on left leg I, prolateral view. I. Left leg I, prolateral view. J. Left leg IV, prolateral view. Scale bars: A, I–J = 1.0 mm; B–H = 0.5 mm.

and 10–11 aciniform gland spigot fields (Fig. 7I); PLS with several aciniform gland spigots (Fig. 7K); ALS with one presumed piriform gland spigot (Fig. 7J); PLS considerably greater than ALS (Fig. 7G). External female genitalia with a sclerotized anterior plate (Fig. 11A, C, E); posterior plate narrower, sclerotized; external sclerotization around spiracles (ess) pointy anteriorly on anterior spiracles and tear-shaped on posterior spiracles (Fig. 11A, C, E). Internal female genitalia consisting of a transverse, sclerotized, anteriorly directed posterior receptacle (pr) or interpulmonary fold, a presumed uterus externus (ue) and a membranous anteromedian receptacle formed by a membranous duct at base (arb) protruding anteriorly from bursa, leading to large, oval, membranous sac-like structure (sac) (Figs 7A–D, 11B, D, F). Male palpal patella short, with a few short setae on prolateral surface (Fig. 8G–H); tibia partially excavated ventrally, with prolateral surface densely covered with strong, long setae (Figs 2D–F, 8G–H); cymbium elongated, swollen, partially curved, with wide tip, proximal half of prolateral surface densely covered with strong, long setae (Figs 2D, 8G), distal half of prolateral surface and entire retrolateral surface with few short setae (Figs 2F, 8H), with oval dorsal distal pad of fine chemoreceptor setae; tegulum sub-spherical, with retrolateral groove which partially divides one sub-apical third (Figs 2D–F, 8G–H); embolus thin, pointed, curved upward on lateral position (Figs 2D–F, 8G–H).

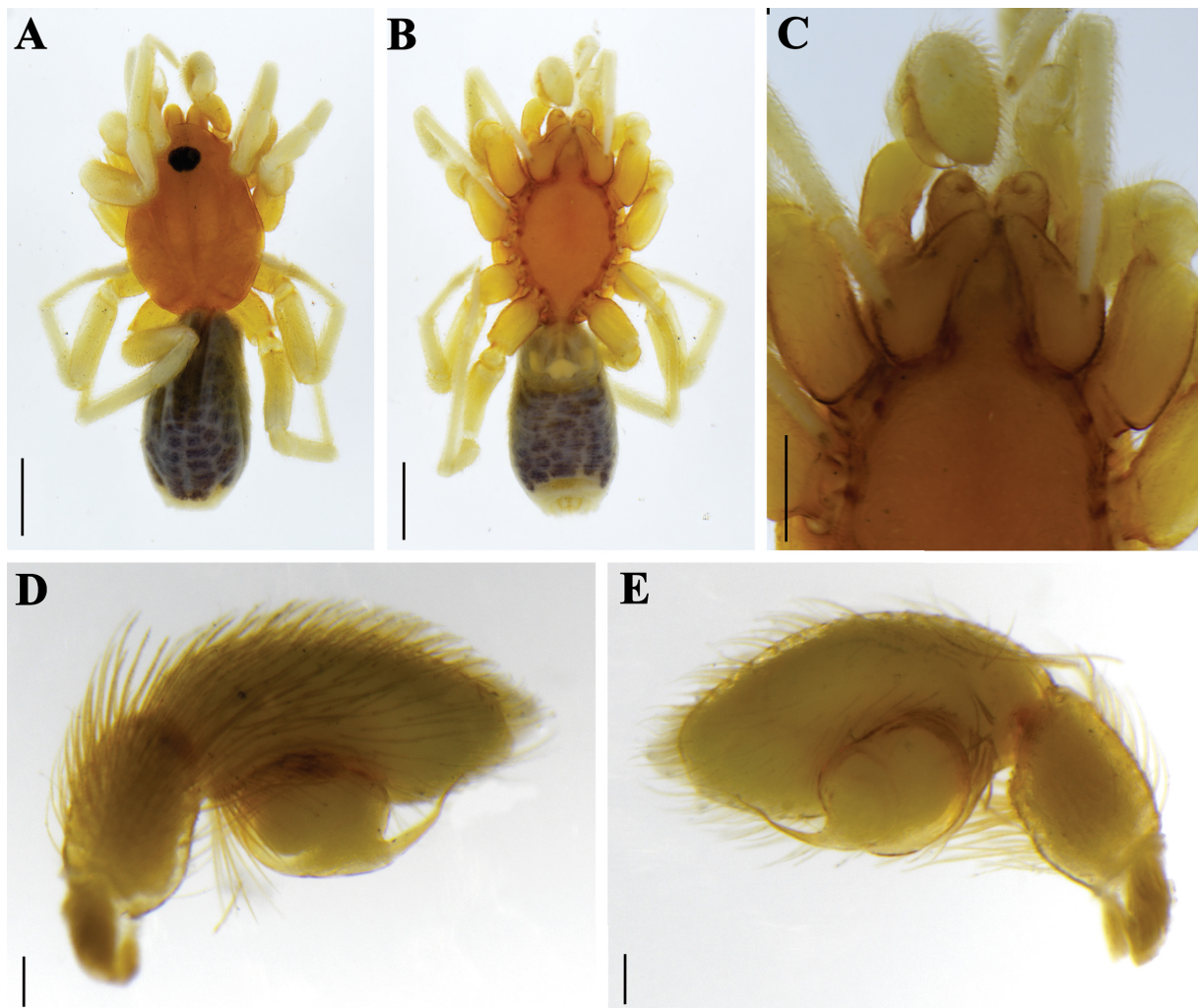


Fig. 2. *Roddenberryus kirk* gen. et sp. nov., ♂ (NHM 306). **A.** Habitus, dorsal view. **B.** Habitus, ventral view. **C.** Cephalothorax and mouthparts, ventral view. **D.** Left palp, prolateral view. **E.** Left palp, retrolateral oblique view. Scale bars: A–B = 1.0 mm; C = 0.5 mm; D–F = 0.1 mm. Photos by Christoph Hörweg.

Distribution

Mexico, Costa Rica, Guatemala and Cuba (Figs 6G, 15).

Key to the species of *Roddenberryus* gen. nov.

1. Males2
– Females3
2. Embolus short, not reaching half the length of tegulum; elongated tibia, width less than half the length (Fig. 8G–H)*R. mccoys* gen. et sp. nov.
– Embolus long, greater than half the length of tegulum; thickened tibia, width almost equal to length (Fig. 2D–F)*R. kirk* gen. et sp. nov.
3. Invaginations on clypeus margins absent (Fig. 1D)*R. kirk* gen. et sp. nov.
– Invaginations on clypeus margins present (Figs 9D, 12D, 14A)4

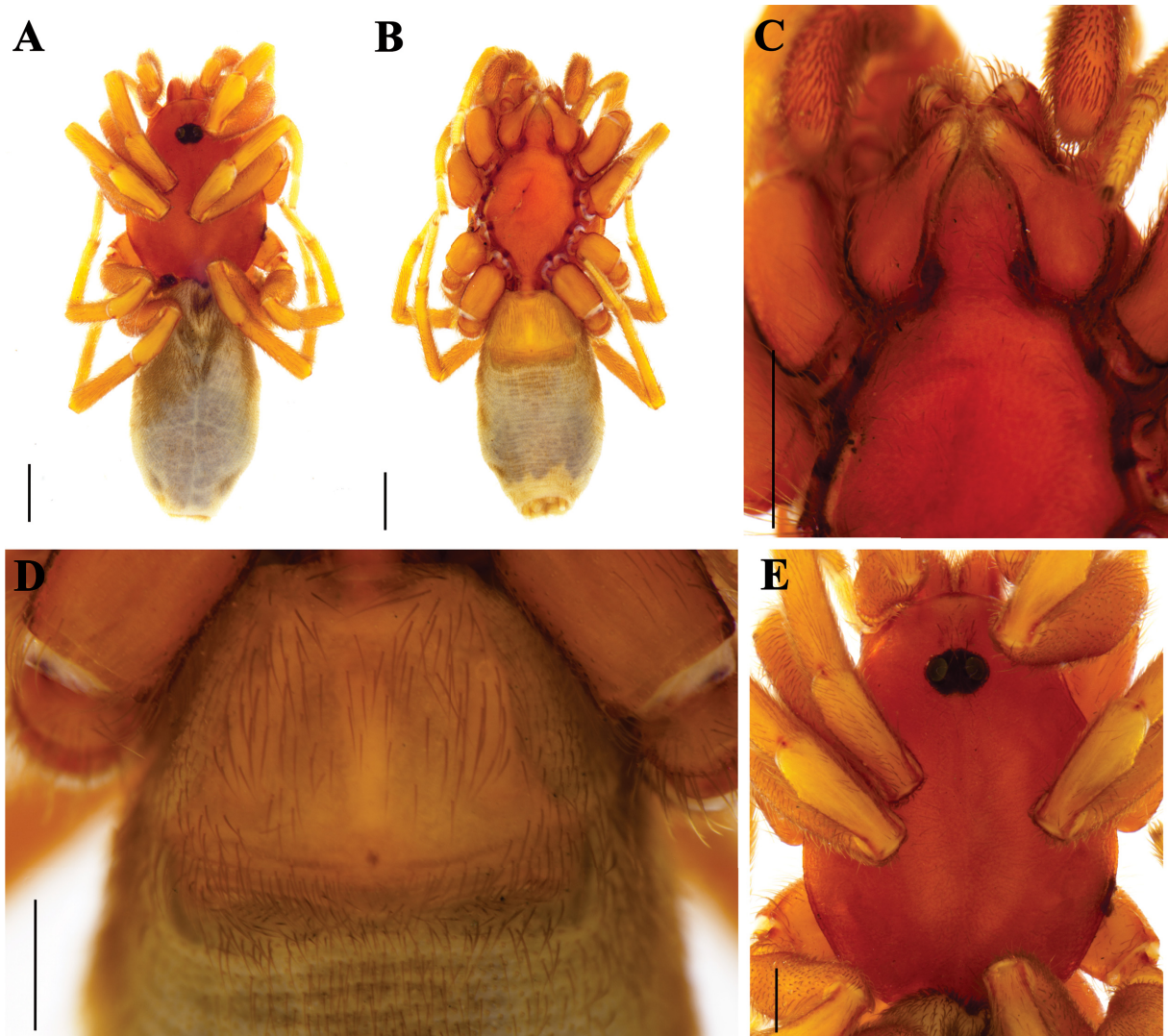


Fig. 3. *Roddenberryus kirk* gen. et sp. nov., ♀ (NHM 306). **A.** Habitus, dorsal view. **B.** Habitus, ventral view. **C.** Cephalothorax and mouthparts, ventral view. **D.** Abdomen and external genitalia, ventral view. **E.** Cephalothorax and carapace, dorsal view. Scale bars: A–C = 1.0 mm; D–F = 0.5 mm. Photos by Christoph Hörweg.

4. A few adesmatic joints occupying only last third of tarsus (Fig. 12H); epigastric furrow with median invagination and rounded laterals (Figs 11E, 12F)*R. sargi* (Pickard-Cambridge, 1899)
 - Several adesmatic joints occupying almost entire tarsus (Fig. 9H); epigastric furrow straight with slightly invagination (Figs 9F, 11C, 14B)5
5. Apical sector of tibia with dense tuft of black setae (Fig. 14A)*R. pelegrina* (Bryant, 1940)
 - Apical sector of tibia lacking dense tuft of black setae*R. spock* gen. et sp. nov.

Roddenberryus kirk gen. et sp. nov.

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Figs 1A–J, 2A–F, 3A–F, 4A–L, 5A–L, 6A–G, 7A–L, 11A–B, 15

Diagnosis

Roddenberryus kirk gen. et sp. nov. can be distinguished from other congeners by lacking the invaginations on the clypeus margins in both sexes (Figs 1D, 2A, 3A). Additionally, males can be recognized by the long embolus, with a length greater than half the length of the tegulum, and a thick tibia, width of which is almost equal to its length (Fig. 2D–F).

Etymology

The specific name refers to James Tiberius Kirk, a fictional character from the Star Trek universe who served aboard the starship USS Enterprise as captain, played in the original series by Canadian actor William Shatner.

Type material

Holotype

COSTA RICA • ♀; Guanacaste, Bagaces, Estación Palo Verde, P.N. Palo Verde; “N 259000, 388400” [10°20'57" N, 85°21'08" W]; 15 Jun. 1999; C. Viquez leg.; INBIO 4407644.

Paratype

COSTA RICA • ♀; Guanacaste, La Cruz, Santa Elena, Santa Rosa, P.N. Costa Rica, Estación Murciélagos, 8 km SW of Cuajiniquil; “N 320300, 347200” [10°04'00.0" N, 85°42'00.0" W]; 28 Feb. 1991; P. Rios leg.; INBIO 4407583.

Other material

COSTA RICA • 1 ♀; Guanacaste, Isla Colorada, Islas Murciélagos, P.N. Santa Rosa; 23 Nov. 2001; J. Jacobs leg.; INBIO 4407595 • 1 ♀; Guanacaste, P.N. Barra Honda; 17 Jun. 2000; W. Porras Vega leg.; INBIO 4407598 • 1 ♀; Guanacaste, Estación Biológica Maritza, P.N. Guanacaste, La Cruz; 22 Apr. 2004; G. Alayón leg.; INBIO 4407588 • 1 ♀; Guanacaste, Bagaces, Estación Palo Verde, P.N. Palo Verde; “N 259000, 388400” [10°20'57" N, 85°21'08" W]; 10 May 2005; M. Solis leg.; for SEM; INBIO 4407645 • 1 ♀, 2 immature spec.; San Jose, Bebedero; 15 Oct. 1938; H. Schmidt leg.; NHM 305 • 1 ♂, 1 ♀, 5 immature spec.; San Jose, La Caja; 15 Oct. 1938; H. Schmidt leg.; NHM 306.

Description

Male (NHM 306, Fig. 2A–F)

Carapace orange, lacking invaginations on clypeal margin (Fig. 2A). Chelicerae, palps, endites, labium, sternum, legs, coxae and trochanters pale orange. Abdomen pale gray, with dorsal and ventral patterns of several dark gray stains (Fig. 2A–B). Anal tubercle and spinnerets lighter than abdomen. Total length 4.8. Carapace 2.5 long, 1.7 wide. Sternum 1.8 long, 1.3 wide. Leg measurements unavailable. Cymbium elongated, swollen, partially curved, with wide tip, first half of basal prolateral surface densely covered

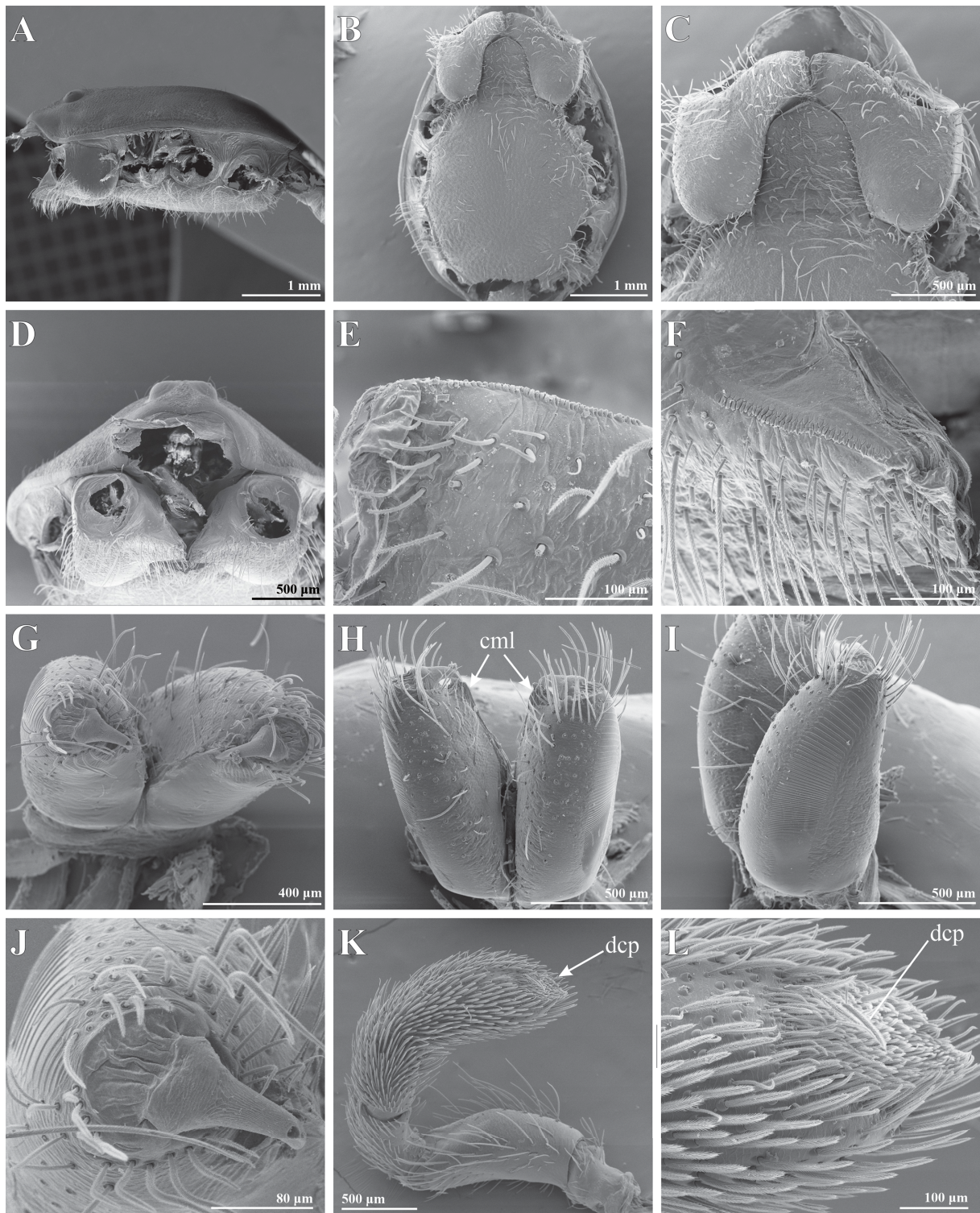


Fig. 4. Micrographs of *Roddenberryus kirk* gen. et sp. nov., ♀ (INBIO 4407645). **A.** Prosoma, lateral view. **B.** Prosoma, ventral view. **C.** Labium and endites, ventral view. **D.** Prosoma, anterior view. **E.** Serrula, ventral view. **F.** Serrula, anterior view. **G.** Chelicerae, ventral view. **H.** Chelicerae, anterior view. **I.** Chelicerae, lateral view. **J.** Right cheliceral fang, ventral view. **K.** Left palp, prolateral view. **L.** Detail of tip on left palp, prolateral view.

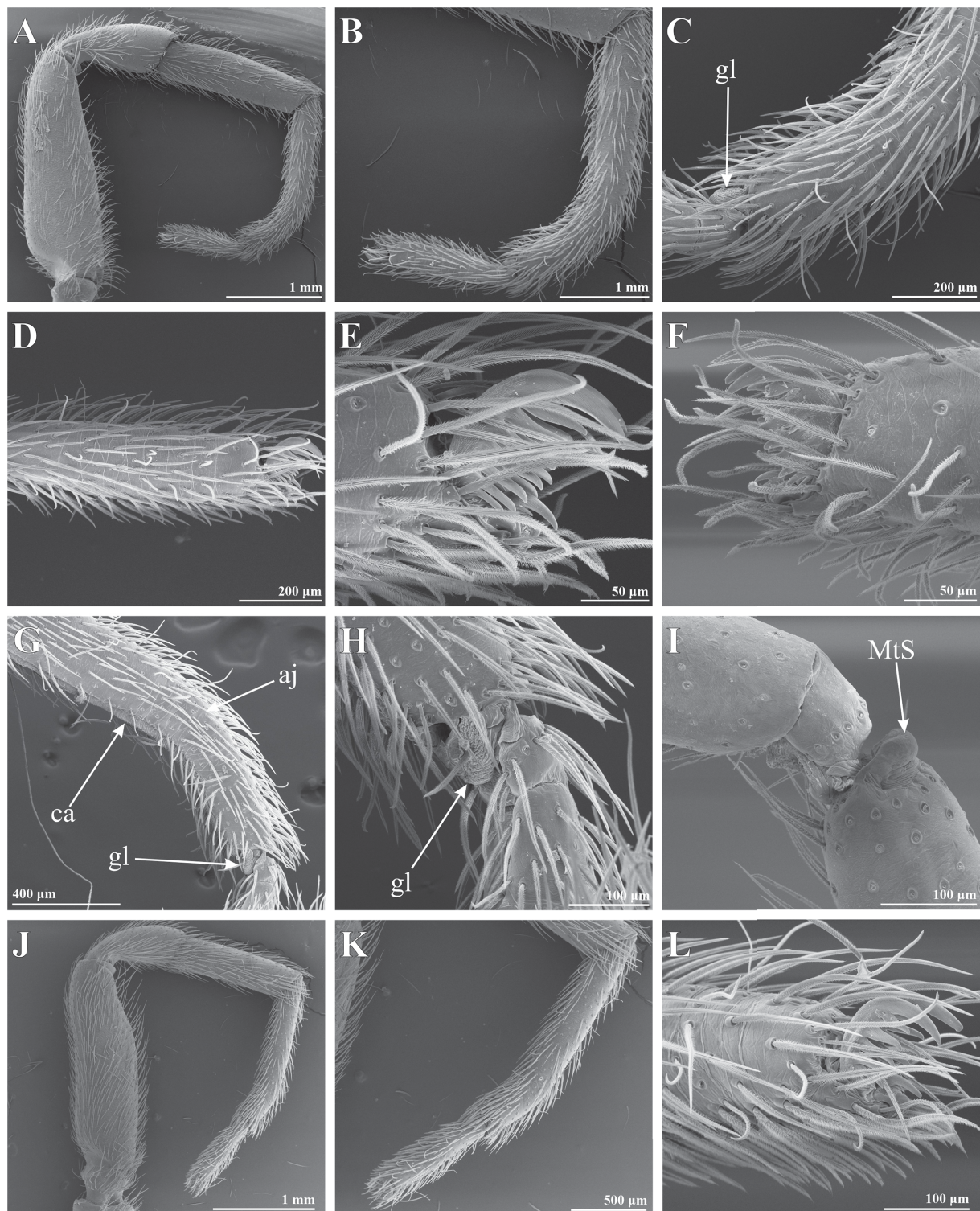


Fig. 5. Micrographs of *Roddenberryus kirk* gen. et sp. nov., ♀ (INBIO 4407645). **A–E.** Left leg I. **F–I.** Left leg II. **J–L.** Left leg III. **A.** Entire leg, prolateral view. **B.** Metatarsus and tarsus, prolateral view. **C.** Metatarsus, prolateral view. **D.** Tarsus, prolateral view. **E.** Tarsal claws, prolateral view. **F.** Tarsal claws, retrolateral view. **G.** Metatarsus, retrolateral view. **H.** Joint of tarsus and metatarsus, retrolateral oblique view. **I.** Joint of tarsus and metatarsus, dorsal oblique view. **J.** Entire leg, retroalateral view. **K.** Metatarsus and tarsus, retrolateral view. **L.** Tarsal claws, retrolateral view.

with strong, long setae (Fig. 2D), other half of apical prolateral surface and retrolateral surface with a few short setae (Fig. 2F); tibia thick; tegulum sub-spherical, with retrolateral groove; embolus long, pointed, curved upward on lateral position (Fig. 2D–F).

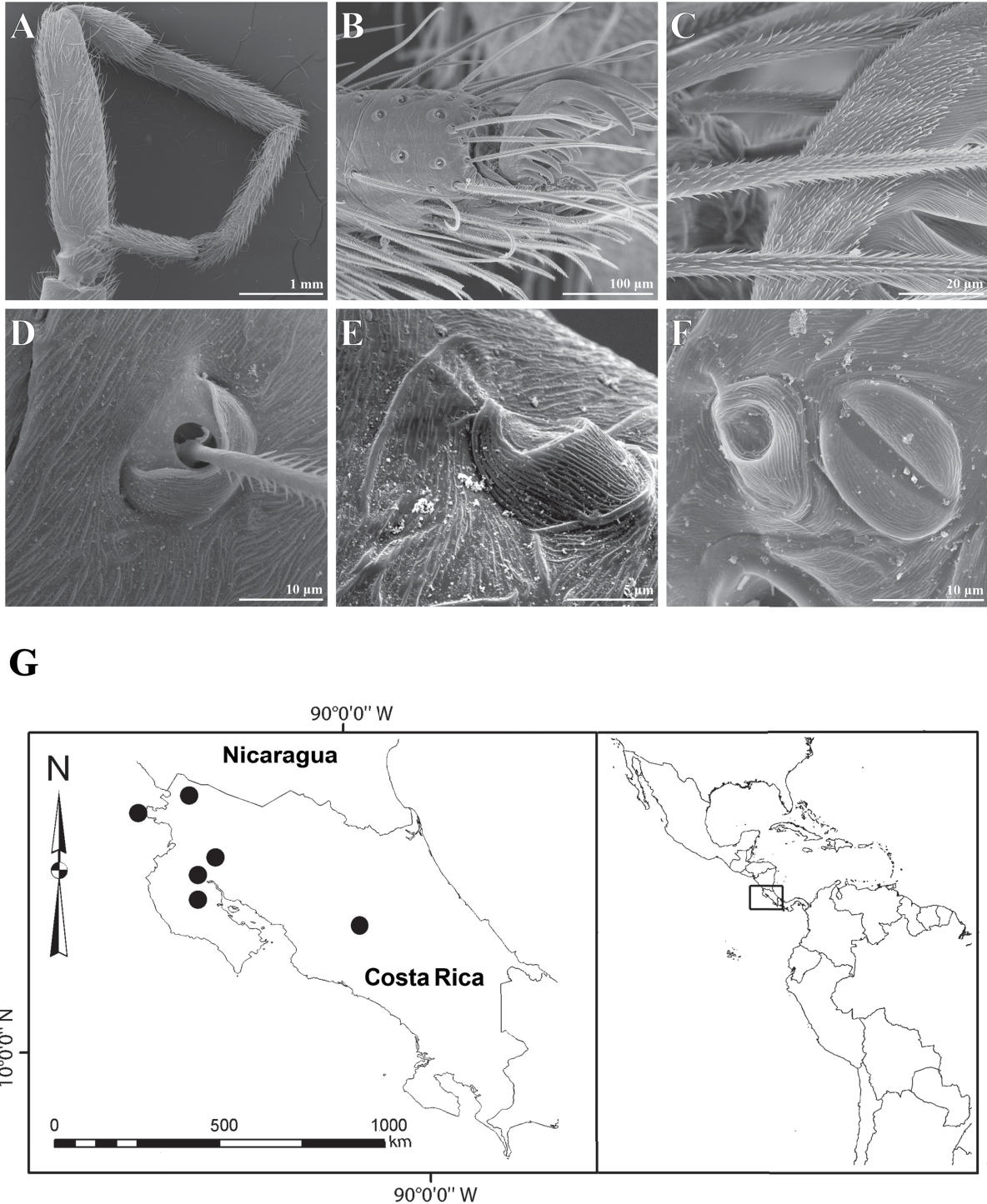


Fig. 6. A–F. Micrographs of *Roddenberryus kirk* gen. et sp. nov., ♀ (INBIO 4407645). **A.** Left leg IV, retrolateral view. **B.** Tarsal claws on left leg IV, retrolateral view. **C.** Detail of paired claws on left leg IV, retrolateral view. **D.** Base of trichobothria, dorsal view. **E.** Tarsal organ on left leg IV, retrolateral oblique view. **F.** Tarsal organ and sesilla on left leg IV, retrolateral view. **G.** Distribution map of *R. kirk*.

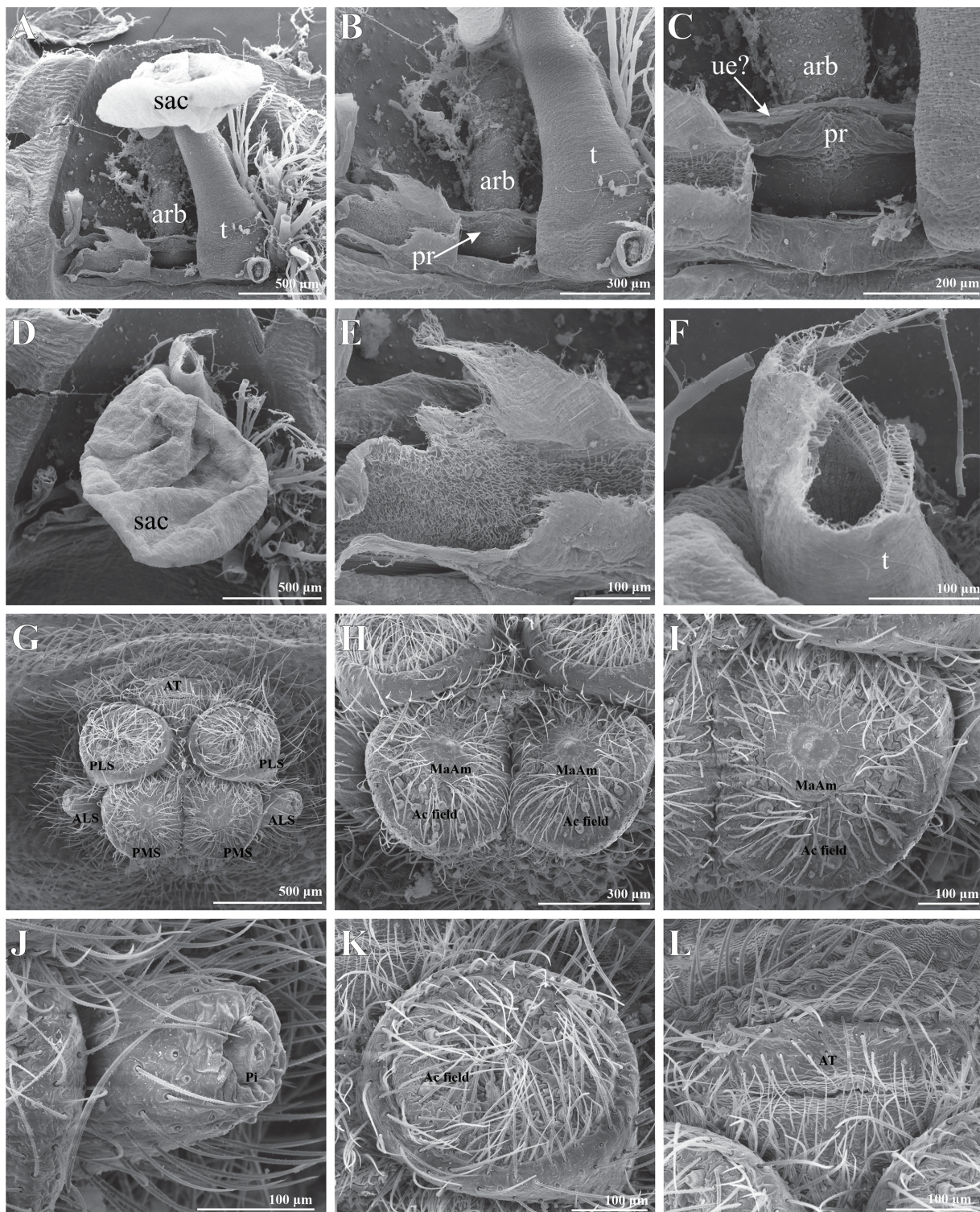


Fig. 7. Micrographs of *Roddenberryus kirk* gen. et sp. nov., ♀ (INBIO 4407645). **A.** Internal genitalia, dorsal view. **B.** Detail of anteromedian receptacle, dorsal view. **C.** Detail of presumed uterus externus (ue), base of anteromedian receptacle (arb) and posterior receptaculum (pr), dorsal view. **D.** Oval membranous sac-like structure (sac), anterior view. **E.** Detail of right trachea, dorsal view. **F.** Detail of right trachea, anterior view. **G.** Spinnerets, posterior view. **H.** PMS, posterior view. **I.** Right PMS, posterior view. **J.** Right ALS, posterior view. **K.** Left PLS, posterior view. **L.** Anal tubercle (AT), posterior view.

Female (holotype, Fig. 1A–J)

Carapace orange, lacking invaginations on clypeal margin (Fig. 1A). Chelicerae, palps, endites, labium, sternum and legs orange, coxas and trochanters lighter. Abdomen pale gray, without dorsal pattern. Anal tubercle and spinnerets lighter than abdomen. Total length 14.0. Carapace 7.4 long, 5.1 wide. Sternum 8.3 long, 5.2 wide. Leg measurements: I: 6.8; II: 6.7; III: 5.9; IV: 7.0. External genital area with strongly sclerotized anterior and posterior plates, straight epigastric furrow (Figs 1F, 11A). Internal genitalia with transversal posterior receptacle with triangular, median projection on distal margin; behind posterior receptacle a presumed uterus externus; anteromedian receptacle formed by tube-shaped membranous base and sac-like membranous structure (Figs 7A–D, 11B).

Variation

The Costa Rican males and females from San Jose (Figs 2A–F, 3A–F) were identified by Kritscher (1957) as *Caponina sargi*, but they actually belong to *Roddenberryus kirk* gen. et sp. nov.; these specimens have dorsal and ventral patterns of several dark gray stains on the abdomen (Figs 2A–B, 3A–B), which does not appear in any of the *R. kirk* specimens examined from Guanacaste, Costa Rica (Fig. 1A).

Distribution

Known only from Guanacaste and San Jose provinces in Costa Rica (Figs 6G, 15).

***Roddenberryus mccoys* gen. et sp. nov.**

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Figs 8A–H, 15

Diagnosis

Males of *Roddenberryus mccoys* gen. et sp. nov. can be distinguished from males of *Roddenberryus kirk* gen. et sp. nov. by having a shorter embolus, the length of which does not reach half the length of tegulum, and also by having an elongated tibia, the width of which is less than half the length (Fig. 8G–H).

Etymology

The specific name refers to the fictional character Leonard H. McCoy from the Star Trek universe, who served aboard the starship USS Enterprise as the chief medical officer, played in the original series by American actor DeForest Kelley.

Type material

Holotype

MEXICO • ♂; Baja California Sur, Comundú, Arroyo Carambuche, San Isidro; 26°14'13.2" N, 112°00'08" W; 119 m a.s.l.; 8 May 2010; C. Palacios leg.; mesophilic vegetation; CARCIB 2246.

Description

Male (holotype, Fig. 8A–H)

Carapace orange, with invaginations on the clypeal margin (Fig. 8C). Chelicerae, palps, endites, labium, sternum and femur lighter, patella, tibia and basal half of metatarsi pale orange, distal half of metatarsi and tarsi lighter, almost white (Fig. 8A–B). Abdomen pale gray, without dorsal or ventral patterns (Fig. 8A–B). Anal tubercle and spinnerets lighter than abdomen. Total length 3.2. Carapace 1.3 long, 1.1 wide. Sternum 1.2 long, 1.0 wide. Leg measurements: I: 4.8; II: 4.7; III: 3.9; IV: 5.0. Cymbium elongated, swollen, partially curved with wide tip, first half of basal prolateral surface densely covered with strong, long setae (Fig. 8G), other half of apical prolateral surface and retrolateral surface with a

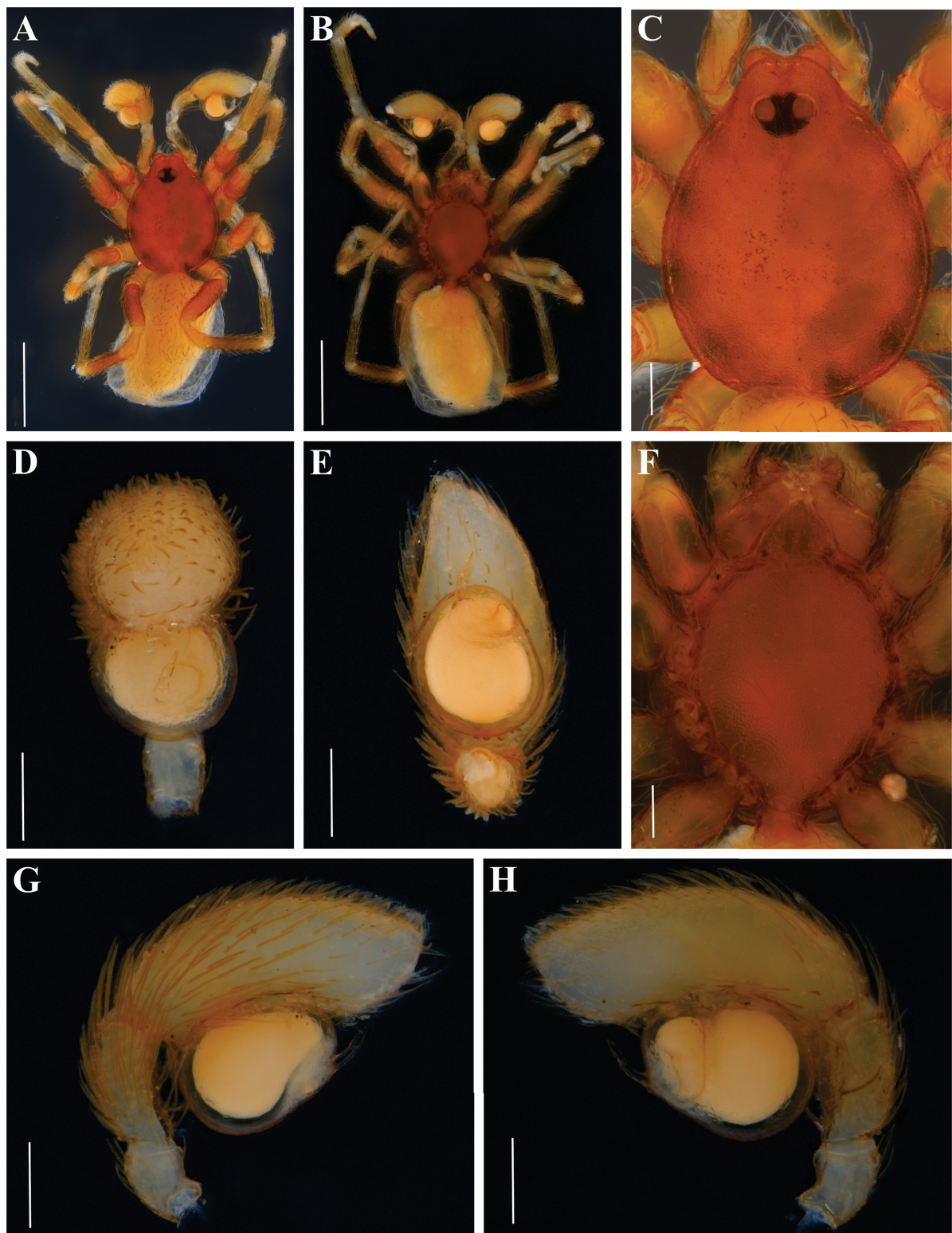


Fig. 8. *Roddenberryus mccoys* gen. et sp. nov., ♂, holotype (CARCIB 2246). A. Habitus, dorsal view. B. Habitus, ventral view. C. Cephalothorax, dorsal view. D. Left palp, posterior view. E. Left palp, ventral view. F. Cephalothorax, ventral view. G. Left palp, prolateral view. H. Left palp, retrolateral view. Scale bars: A–B = 1 mm; C–H = 0.2 mm.

few short setae (Fig. 8G–H); tibia elongated; tegulum sub-spherical, with retrolateral groove; embolus short, pointed, curved upward on lateral position (Fig. 8G–H).

Female

Unknown.

Distribution

Known only from the type locality in Baja California Sur, Mexico (Fig. 15).

***Roddenberryus spock* gen. et sp. nov.**

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Figs 9A–I, 10A–B, 11C–D, 15

Diagnosis

Roddenberryus spock gen. et sp. nov. resembles *R. mccoys* gen. et sp. nov., *R. pelegrina* gen. nov. and *R. sargi* gen. nov. by having invaginations in the margins of the clypeus (Fig. 9D), but can be distinguished by its larger size and by having several adesmatic joints occupying almost the entire tarsi and almost a half of the metatarsi (Fig. 9H). Additionally, members of *R. spock* gen. et sp. nov. lack a dense tuft of black setae on the apical part of tibia.

Etymology

The specific name refers to the fictional character S'Chn T'Gai Spock, a Vulcan/Human hybrid from the Star Trek universe, who served aboard the starship USS Enterprise as the chief science officer, played in the original series by American actor Leonard Nimoy.

Type material

Holotype

MEXICO • ♀; Quintana Roo, Othon, Ruinas Kohunlinch; 18°25'09" N, 88°47'24" W; 8 Mar. 1985; W. Lopez, Formen and P. Blanco leg.; CNAN 9523.

Paratype

MEXICO • ♀; Campeche, Calakmul; 18°07'21" N, 89°47'00" W; 24 Jul. 1998; F. Alvarez and J.L. Castelo leg.; CNAN.

Description

Male

Unknown.

Female (holotype, Fig. 9A–I)

Carapace orange, with invaginations on clypeal margin (Fig. 9D). Chelicerae, palps, endites, labium, sternum, legs, coxae and trochanters orange (Fig. 9E). Abdomen pale gray, without dorsal pattern (Fig. 9A). Anal tubercle and spinnerets lighter than abdomen (Fig. 9G). Total length 21.2. Carapace 10.9 long, 8.4 wide. Sternum 8.3 long, 6.6 wide. Leg measurements: I: 6.8; II: 6.7; III: 6.0; IV: 7.05. External genital area with strongly sclerotized anterior and posterior plate, straight epigastric furrow (Figs 9F, 11F). Internal genitalia with transversal posterior receptacle with conspicuous, median concave projection on distal margin; behind posterior receptacle a presumed membranous uterus externo (Fig. 10A); anteromedian receptacle formed by tube-shaped membranous base and sac-like membranous structure (Figs 10A–B, 11D).

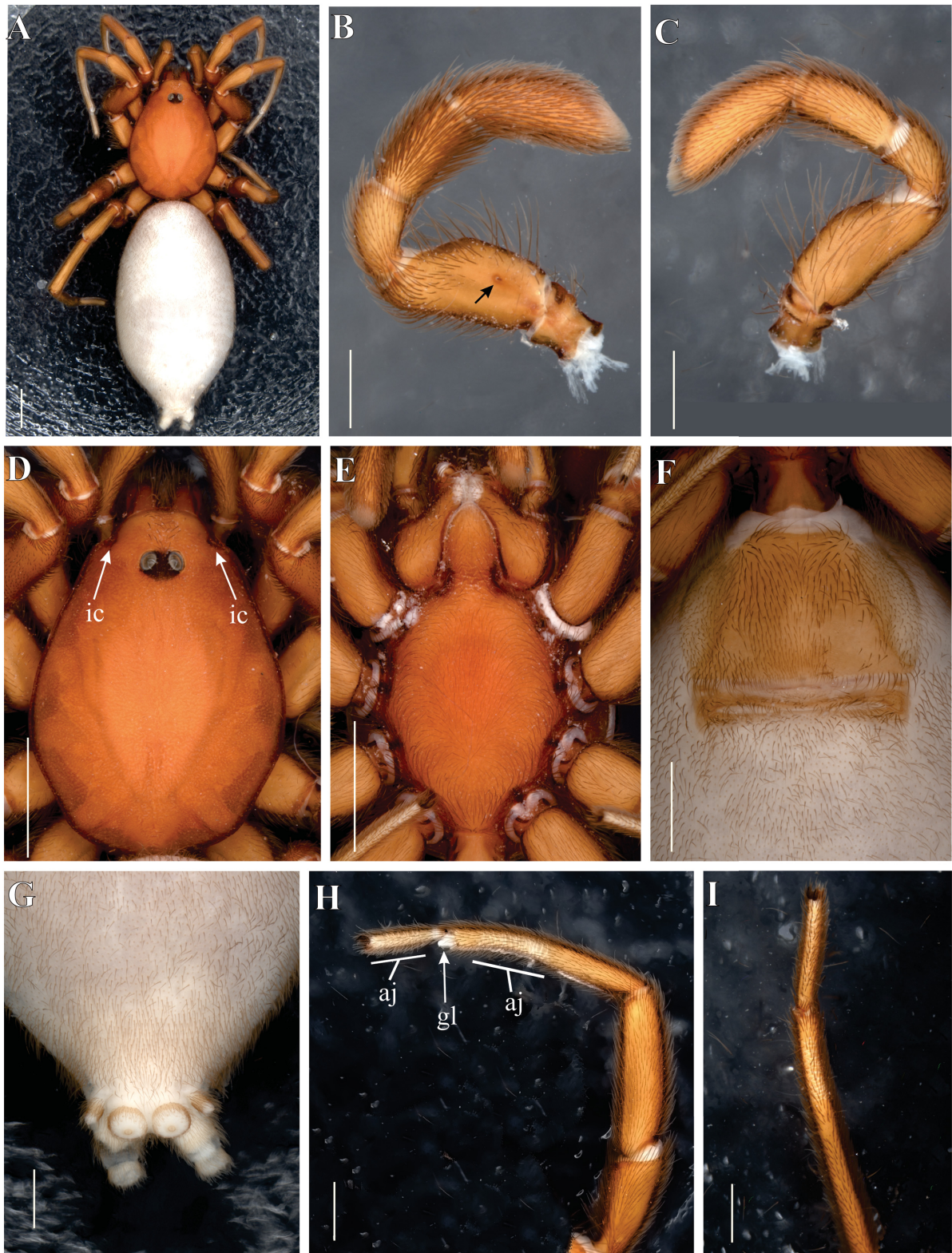


Fig. 9. *Roddenberryus spock* gen. et sp. nov., ♀, holotype (CNAN 9523). **A.** Habitus, dorsal view. **B.** Left palp, prolateral view, black arrow showing prolateral pick. **C.** Left palp, retrolateral view. **D.** Habitus, ventral view. **E.** Cephalothorax, ventral view. **F.** External genital area, ventral view. **G.** Spinnerets, ventral view. **H.** Left leg I, prolateral view. **I.** Left leg IV, prolateral view. Scale bars: A, D–F = 1.0 mm; B–C, G–I = 0.5 mm.

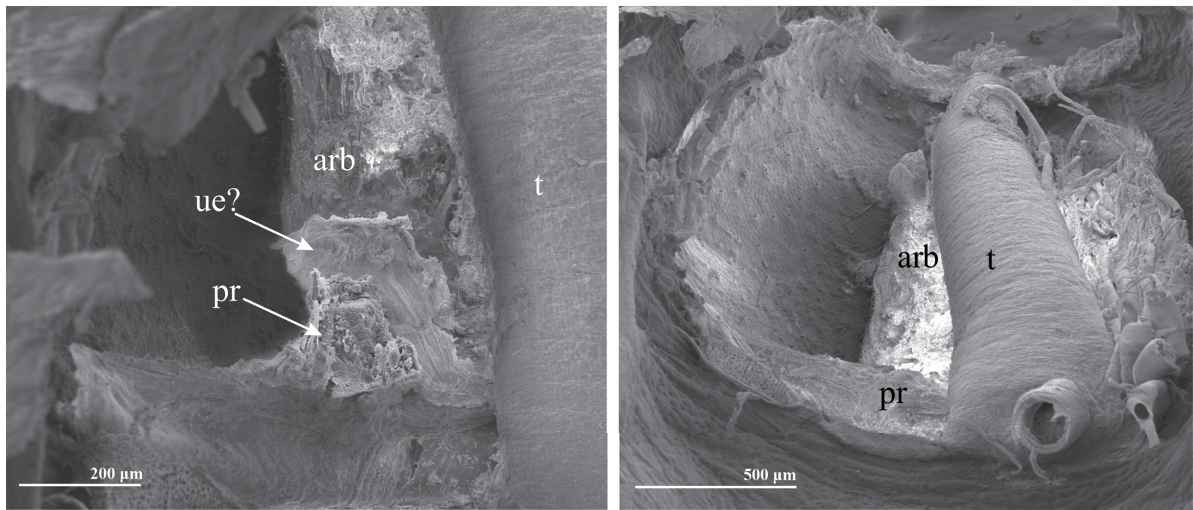


Fig. 10. Micrographs of internal female genitalia of *Roddenberryus spock* gen. et sp. nov., ♀, paratype (CNAN). **A.** Dorsal view. **B.** Posterior oblique view.

Distribution

Known only from Campeche and Quintana Roo in Mexico (Fig. 15).

Roddenberryus sargi (Pickard-Cambridge, 1899) gen. et comb. nov.

Figs 11E–F, 12A–H, 13, 15

Caponina sargi Pickard-Cambridge, 1899: 44, pl. 3, fig. 6.

Caponina sargi – Kritscher 1957: 261, fig. 13 (misidentification, male and female specimens belong to *R. kirk* gen. et sp. nov.).

Diagnosis

Rodeenberryus sargi resembles *R. spock* gen. et sp. nov., *R. mccoys* gen. et sp. nov. and *R. pelegrina* by having invaginations in the margins of the clypeus (Fig. 12D), but can be distinguished by its smaller size and by having a few adesmatic joints occupying only the last third of the tarsi and the last third of the metatarsi (Fig. 12H); females can be distinguished by the epigastric furrow having a median invagination and rounded laterals (Figs 11E, 12F).

Material examined

Holotype

GUATEMALA • ♀; F. Sarg leg.; examined by photographs and drawings; USNM.

Other material

GUATEMALA • 1 ♀; Yaxun; 11 Jul. 2006; C. Viquez leg.; INBIO • 6 ♀♀, 4 immature spec.; Petén, Cerro Cahuí; 250 m a.s.l.; “17.00225704N, 89.71661333W” [17°00′08.1″ N, 89°42′59.8″ W]; 22 May 2009; MiniWinkler ex sifted leaf litter; MCZ 89596.

Description

Male

Unknown.

Female (holotype, Fig. 13)
Described by F. O. Pickard-Cambridge (1899: 44).

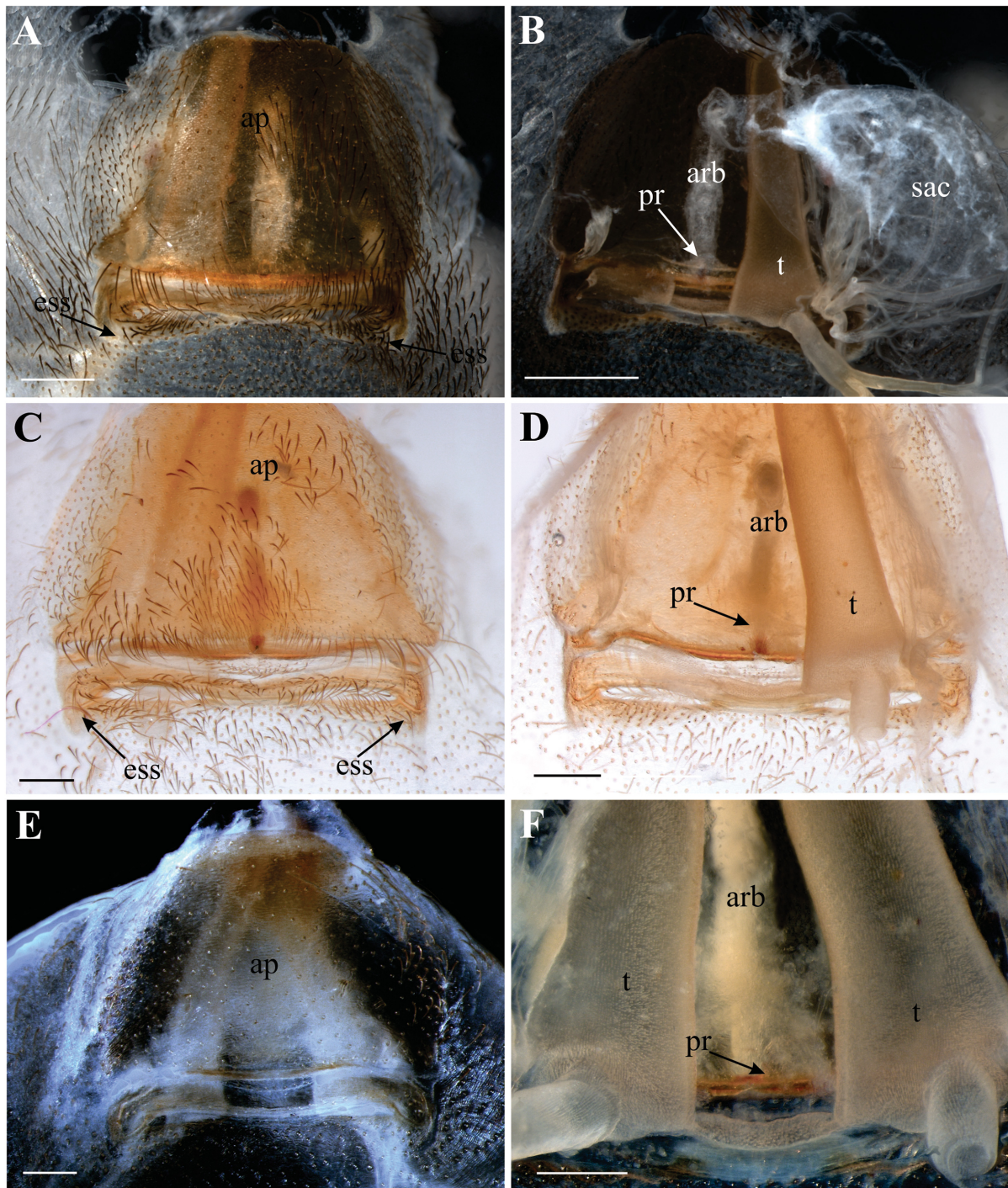


Fig. 11. Female genitalia. **A–B.** *Roddenberryus kirk* gen. et sp. nov., ♀ (INBIO 4407645). **A.** External genital area, ventral view. **B.** Internal genitalia, dorsal view. **C–D.** *Roddenberryus spock* gen. et sp. nov., ♀, paratype (CNAN). **C.** External genital area, ventral view. **D.** Internal genitalia, dorsal view. **E–F.** *Roddenberryus sargi* (Pickard-Cambridge, 1899) gen. nov., ♀ (INBIO). **E.** External genital area, ventral view. **F.** Internal genitalia, dorsal view. Scale bars: A–B = 0.5 mm; C–F = 0.2 mm.

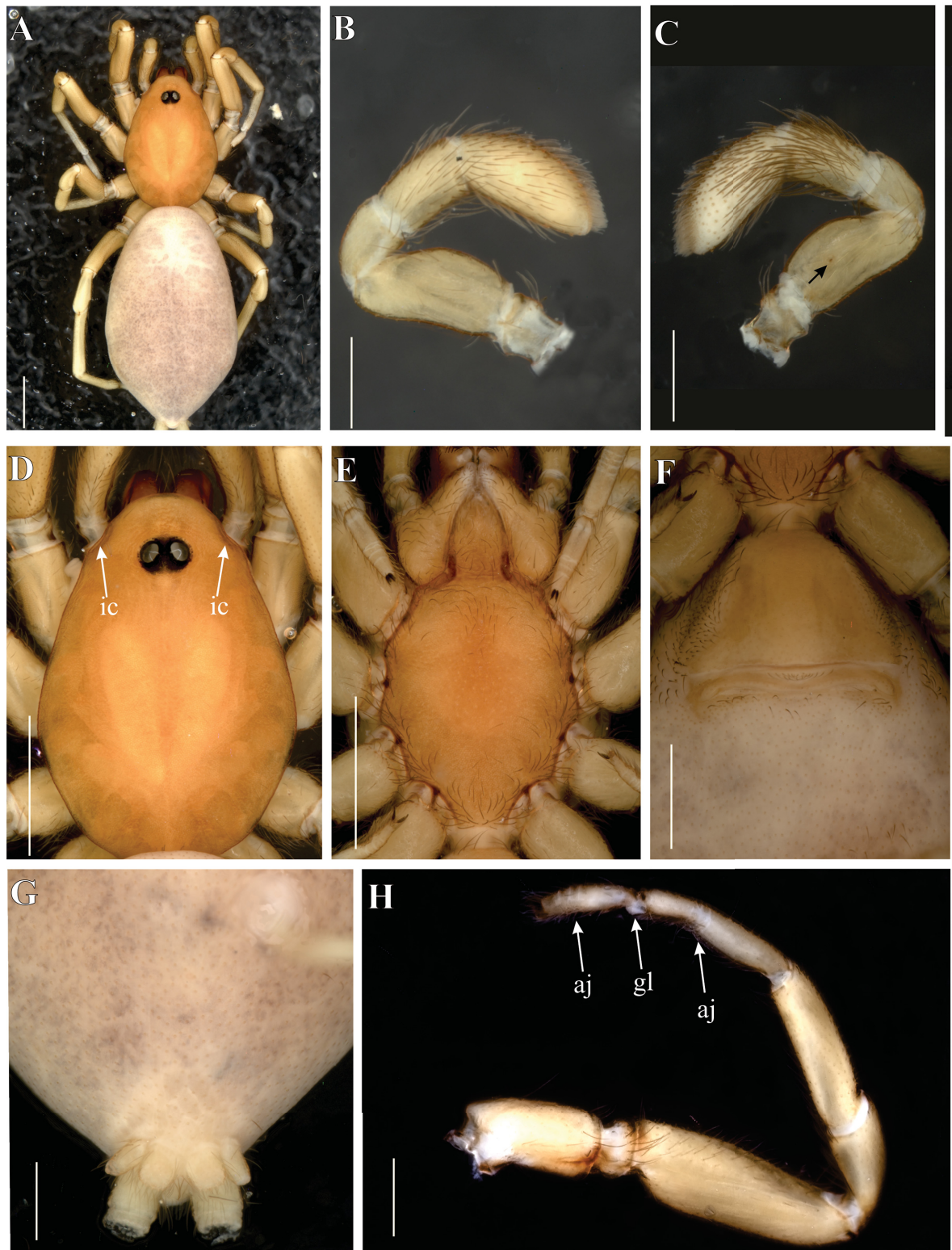


Fig. 12. *Roddenberryus sargi* (Pickard-Cambridge, 1899) gen. nov., ♀ (INBIO). A. Habitus, dorsal view. B. Right palp, retrolateral view. C. Right palp, prolateral view, black arrow showing prolateral pick. D. Habitus, ventral view. E. Cephalothorax, ventral view. F. External genital area, ventral view. G. Spinnerets, ventral view. H. Left leg I, prolateral view. Scale bars: A, D–F = 1.0 mm; B–C, G–H = 0.5 mm.

Female (INBIO, Fig. 12A–H)

Carapace pale orange, with invaginations on clypeal margin (Fig. 12D). Chelicerae dark red; palps, endites, labium, sternum and legs pale orange (Fig. 12A); coxae and trochanters lighter (Fig. 12E).

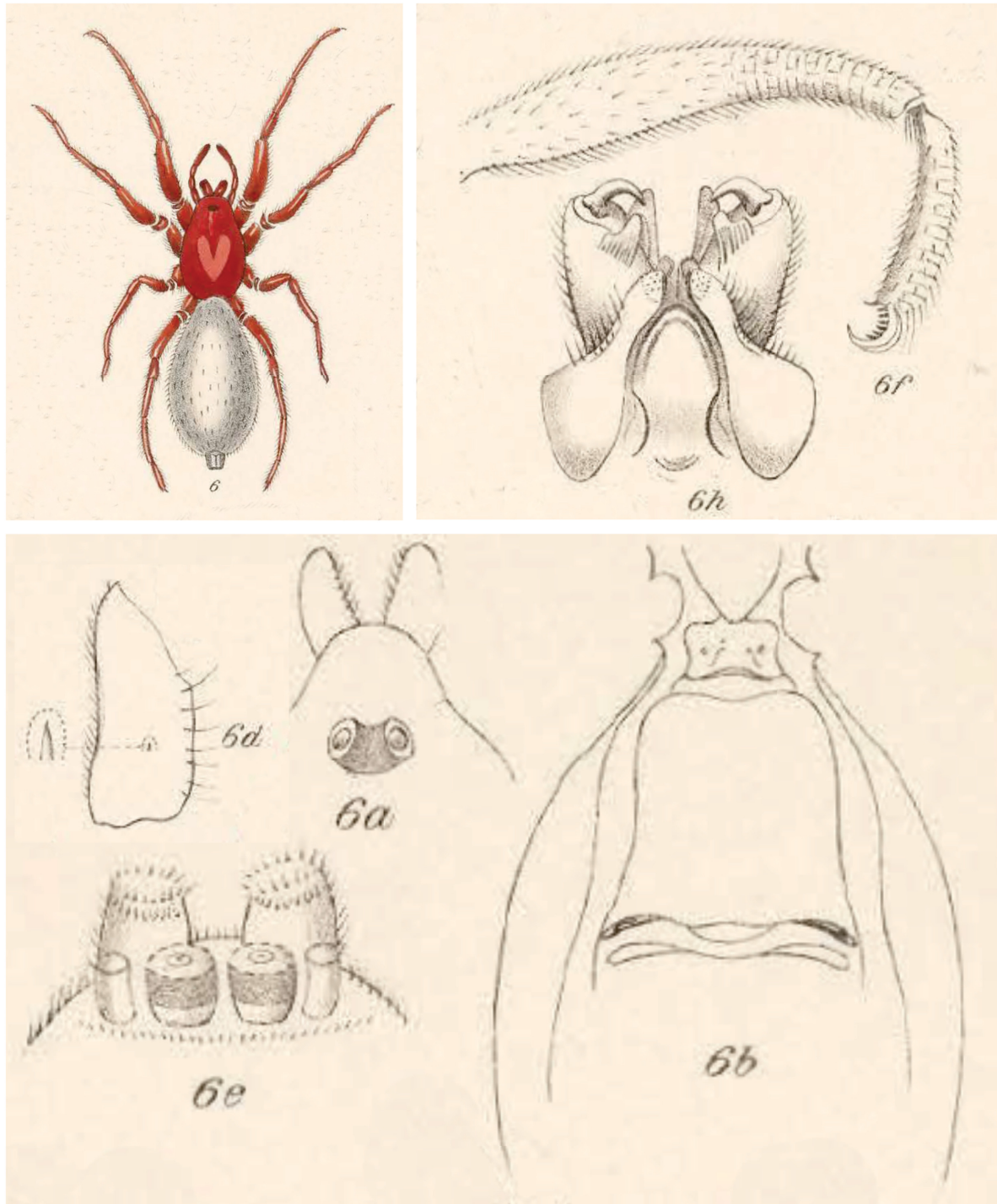


Fig. 13. Drawings by Pickard-Cambridge (1899) of *Roddenberryus sargi* (Pickard-Cambridge, 1899) comb. nov. 6. Habitus, dorsal view. 6a. Cephalic area, eyes, and mandibles, dorsal view. 6b. Abdomen and external genital area, ventral view. 6d. Femur of palpus, showing stridulatory pick, prolateral view. 6e. Spinnerets, ventral view. 6f. Leg I, metatarsus and tarsus, retrolateral view. 6h. Mouthparts and mandibles, ventral view.

Abdomen pale gray, without dorsal pattern. Anal tubercle and spinnerets lighter than abdomen (Fig. 12G). Total length 12.1. Carapace 6.8 long, 5.1 wide. Sternum 7.5 long, 4.5 wide. Leg measurements: I: 6.5; II: 6.4; III: 5.9; IV: 6.9. External genital area with weakly sclerotized anterior and posterior plate, epigastric furrow with median invagination and laterals rounded (Figs 11E, 12F). Internal genitalia with transversal posterior receptacle with median concave projection on distal margin, laterals of posterior receptacle rounded; behind posterior receptacle a presumed membranous uterus externus (Fig. 11F); anteromedian receptacle formed by tube-shaped membranous base and sac-like membranous structure (Fig. 11F).

Distribution

Known only from Peten and Yaxun in Guatemala (Fig. 15).

Roddenberryus pelegrina (Bryant, 1940) gen. et comb. nov.
Figs 14A–C, 15

Caponina pelegrina Bryant, 1940: 272.

Diagnosis

Roddenberryus pelegrina resembles *R. spock* gen. et sp. nov., *R. mccoys* gen. et sp. nov. and *R. sargi* gen. nov. by having invaginations in the margins of the clypeus (Fig. 14A), but can be distinguished by having a dense tuft of black setae on the apical part of the tibia (Fig. 14A).

Type material

Holotype

CUBA • ♀; Santiago de las Vegas; N. Banks leg.; MCZ 22577. (The holotype was examined and photographed in 2002 by the first author; further attempts to examine this specimen were unsuccessful.)

Description

Male

Unknown.

Female (holotype, Fig. 14A–C)

Described by Bryant (1940: 272). New data and emendations are as follows: Carapace pale orange, with invaginations on clypeal margin (Fig. 14A). Chelicerae orange (Fig. 14C); palps, endites, labium, sternum and legs pale orange (Fig. 14A–B); coxae and trochanters lighter (Fig. 14B). Abdomen pale gray, without dorsal pattern (Fig. 14A). Anal tubercle and spinnerets lighter than abdomen. Total length 5.4. Carapace 2.4 long, 1.5 wide. Sternum 1.6 long, 1.2 wide. Leg measurements unavailable. External genital area with weakly sclerotized anterior and posterior plate, straight epigastric furrow (Fig. 14B). Internal genitalia not studied.

Distribution

Known only from the type locality in Cuba (Fig. 15).

Discussion

The descriptions of new species and genera in Caponiidae have been based primarily in male specimens, because most of the diagnostic characteristics came from the male palpal morphology. However, female specimens from the new genus *Roddenberryus* have unusual characteristics for a caponiid, and even species can be differentiated only with females. At first glance, members of this genus could be recognized



Fig. 14. *Roddenberryus pelegrina* (Bryant, 1940) gen. nov., ♀, holotype (MCZ 22577). **A.** Habitus, dorsal view, white arrow showing invagination on clypeus margin, black arrows showing a dense tuft of black setae on apical part of tibia. **B.** Habitus, ventral view. **C.** Mouthparts and palps, ventral view. Scale bars: 1.0 mm. Photos taken by A. Sánchez-Ruiz at AMNH in 2002.

as belonging to a large group of nopine genera, characterized by a narrowly ovate carapace and a flattened pars thoracica (*Aamunops*, *Nops* MacLeay, 1839, *Orthonops* Chamberlin, 1924, *Medionops* Sánchez-Ruiz & Brescovit, 2017 and *Nopsides* Chamberlin, 1924; see Sánchez-Ruiz & Brescovit 2018: fig. 77 and Galán-Sánchez & Álvarez-Padilla 2022: fig. 81). However, the presence of adesmatic metatarsal joints in *Roddenberryus* gen. nov. complicates this assessment, since this character is also shared by members of *Tarsonops* and *Cubanops* Sánchez-Ruiz, Platnick & Dupérré, 2010, which have a broad, almost subcircular carapace and an elevated pars thoracica. These three genera also share the presence of an anteromedian receptaculum in the female internal genitalia. Thus, members of *Roddenberryus*, sharing characteristics with representatives of both groups of nopines, may be of great importance to unveiling the relationships among nopine genera.

Despite the narrowly ovate carapace, *Roddenberryus* shares with *Tarsonops* the tarsi and metatarsi cracked with several adesmatic joints intertwined on the cuticle, as well as the unusual respiratory system with a single tracheal trunk on posterior spiracles. These are the only two nopines with this combination of characters. The other nopines with metatarsal adesmatic joints are *Cubanops* and *Aamunops*, but representatives of those genera have only a few closely spaced ademastic joints on the lower half of metatarsi IV, which make this segment appear to be divided (Sánchez-Ruiz *et al.* 2010: fig. 131). On the other hand, the respiratory system of nopines usually has two tracheal trunks protruding from the posterior spiracles (Sánchez-Ruiz & Brescovit 2017: fig. 4J–L) rather than just a single tracheal trunk, as occurs in *Tarsonops* and *Roddenberryus*. Therefore, at least two primary lineages (*Tarsonops* and *Roddenberryus*) in the assemblage of Nopinae are defined by basic differences in the metatarsal cuticle continuity on all legs and the internal respiratory system. Considering this, we could assume that members of *Roddenberryus* would be much closer to the group that includes *Tarsonops* (broad,

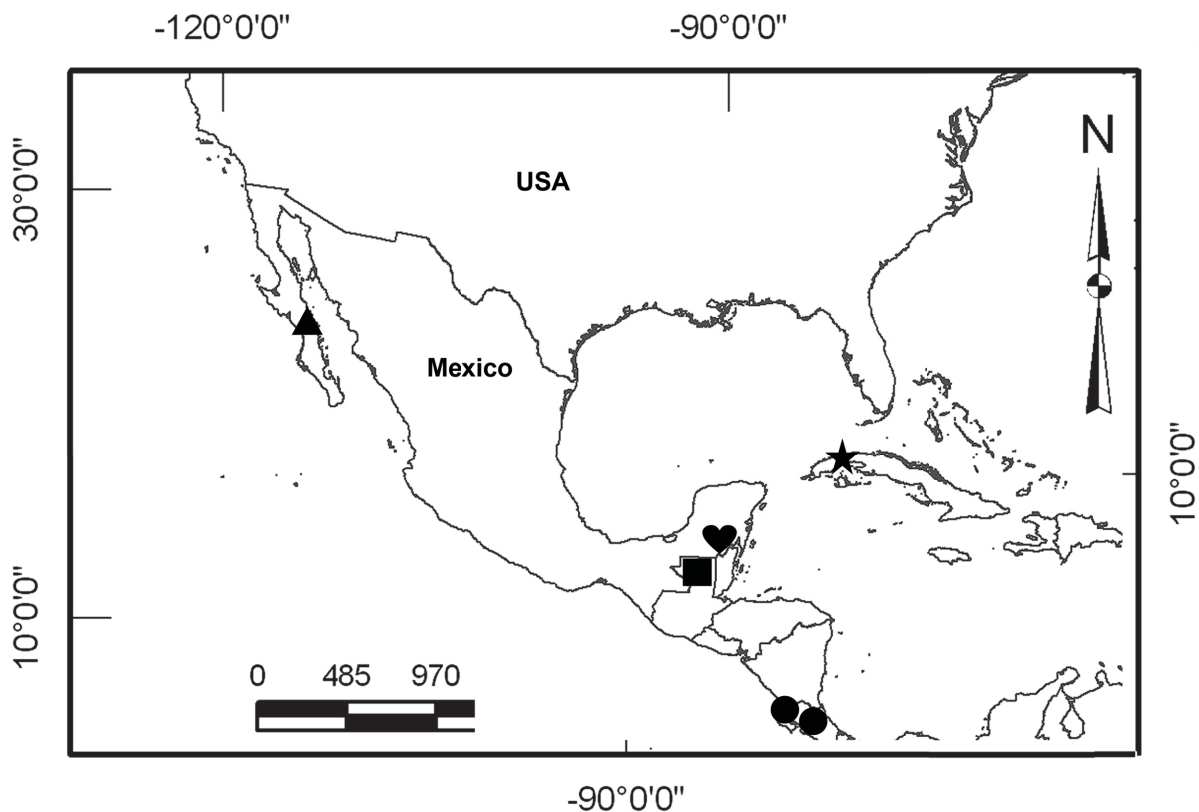


Fig. 15. Distribution map of *Roddenberryus kirk* gen. et sp. nov. (circles), *R. mccoys* gen. et sp. nov. (triangle), *R. spock* gen. et sp. nov. (heart), *R. sargi* (Pickard-Cambridge, 1899) comb. nov. (square) and *R. pelegrina* (Bryant, 1940) comb. nov. (star).

subcircular carapace and elevated pars thoracica) than to the group with a narrowly ovate carapace and flattened pars thoracica.

Another unusual characteristic among nopines is the presence of an anteromedian receptacle in the female internal genitalia. The only nopines possessing an anteromedian receptacle are *Roddenberryus*, *Tarsonops* and *Aamunops*; they generally resemble those shown by the non-nopine genera *Tisentnops*, *Caponia*, *Diploglena* Purcell, 1904 and *Carajas* (Brescovit & Sánchez-Ruiz 2016; Haddad 2015; Dippenaar-Schoeman *et al.* 2020). This structure is composed of a membranous duct (base) leading to an oval membranous sac-like structure. All other nopines do not have an anteromedian receptacle, and the internal genitalia are limited to the presence of a transverse, sclerotized posterior receptacle and a presumed uterus externus (Sánchez-Ruiz & Brescovit 2017, 2018).

Roddenberryus is readily recognized by four characteristics exclusive among nopines. Representatives of this new genus have a triangular, very short, scaly gladius, which sets them apart from most nopines with a short-sword gladius (Sánchez-Ruiz & Brescovit 2018: fig. 211). This structure is morphologically constant within the nopines, and only in *Tarsonops* is this structure shown as a large, wide, semicircular shape (see Sánchez-Ruiz & Brescovit 2015: fig. 50). Additionally, the new genus presents strongly projected tarsal organ margins and a strong distal serrula, consisting of interspersed multiple tooth rows. In all other nopines, the tarsal organ is exposed, roundish, with the marginal ring only slightly pronounced, and the serrula consists of a single tooth row (Sánchez-Ruiz & Brescovit 2018: figs 21c, 22e). The conformation of the endites and labium are also unique for species of *Roddenberryus*; the endites have an accentuated finger-shaped forward projection and the labium is triangular and projected. Indeed, endites and labium shape in Nopinae are quite remarkable, since each genus apparently has a unique combination.

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