

The Soft-Bodied Goblin Spiders of the New Genus Noonops (Araneae, Oonopidae)

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The soft-bodied goblin spiders of the new genus *Noonops* (Araneae, Oonopidae)

NORMAN I. PLATNICK¹ AND LILY BERNIKER¹

ABSTRACT

A new genus, *Noonops*, is established to contain 23 species of soft-bodied, New World oonopine spiders that differ from those of *Oonops* Templeton and similar genera in having the male palpal bulb fused to the cymbium, and from those of *Wanops* Chamberlin and Ivie and *Oonopoides* Bryant in having shorter legs. Six specific names are transferred from *Oonops* to *Noonops*: *O. floridanus* (Chamberlin and Ivie) from Florida and Georgia (chosen as the type species), *O. gertschi* Chickering from the Bahama Islands (which is placed as a junior synonym of *N. floridanus*), *O. furtivus* Gertsch from Texas and Tamaulipas, *O. sonora* Gertsch and Davis from Arizona, California, Sonora, Baja California, and Baja California Sur, *O. puebla* Gertsch and Davis from Puebla, and *O. chilapensis* Chamberlin and Ivie from Guerrero. Males of *N. sonora* and females of *N. furtivus* are described for the first time; 18 new species are described: *N. ocotillo*, *N. mortero*, *N. joshua*, *N. skinner*, *N. coachella*, and *N. californicus* from Arizona and southern California and *N. willisi*, *N. mesa*, *N. naci*, *N. tarantula*, *N. miraflores*, *N. culiacan*, *N. taxquillo*, *N. chapul*, *N. beattyi*, *N. iviei*, *N. tonila*, and *N. minutus* from Mexico.

INTRODUCTION

Soft-bodied members of the subfamily Oonopinae are widely distributed in the New World, occurring from California east to Florida, Georgia, and the West Indies and south to Chile and Argentina, but have been far less studied than their hard-bodied relatives. Most of the classical work on these species was done by two arachnologists, Willis Gertsch and Arthur Chickering, who each described a wide array of species but assigned them, by default, to the type genus of the family,

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Oonops Templeton. As a result, well over 50 New World species have been placed, in the past, in *Oonops*. Almost 40 years ago, Brignoli (1974: 204) pointed out that “it is anything but certain that these forms are congeneric with the European *Oonops*” and concluded “it is fairly evident that a series of species belonging to different genera have certainly been described as *Oonops*.”

Unfortunately, Brignoli’s recognition that few, if any, of the New World species are actually closely related to the European type species, *Oonops pulcher* Templeton, did little to solve the problem; Gertsch (1977) subsequently assigned even a wider array of species to the genus. More recently, Platnick and Dupérré (2009) provided a detailed redescription of *O. pulcher*, based on topotypical specimens from Scotland, and began the process of breaking up the highly polyphyletic assemblage of New World species residing in *Oonops*, transferring five species to the circum-Caribbean genus *Heteroonops* Dalmas. Subsequently, Grismado and Ramírez (in press) have transferred four other species to a new genus that is widespread from Panama south to Argentina.

In the present paper, we continue this process by recognizing another new genus that occurs in the southern United States and Mexico. Most of the soft-bodied oonopines resemble other spiders in having a male palpal cymbium that is distinct from the palpal bulb itself (although the cymbium in these taxa is often much smaller than in typical spiders). Among the generic names that have been used for New World soft-bodied taxa, this plesiomorphic condition occurs in the type species of *Oonops* (see Platnick and Dupérré, 2009: figs. 38, 39), *Oonopinus* Simon (see Saaristo and Marusik, 2009: figs. 28, 29), *Heteroonops* (see Platnick and Dupérré, 2009: figs. 87, 88), *Birabenella* Grismado (see Grismado, 2010: fig. 33), *Guaraguaonops* Brescovit et al. (see Brescovit et al., 2012a: figs. 20, 21), *Predatoroonops* Brescovit et al. (see Brescovit et al., 2012b: figs. 43–45), and *Neotrops* Grismado and Ramírez (see Grismado and Ramírez, in press: figs. 18B–D).

In the spiders discussed below, however, the male palpal bulb and cymbium are fully fused, as also occurs in many hard-bodied oonopids. The New World type species of *Wanops* Chamberlin and Ivie, and of *Oonopoides* Bryant, also show the fused condition (see Chamberlin and Ivie, 1938: fig. 2; cf. Bryant, 1940: fig. 6, which erroneously shows a distinct seam between the cymbium and bulb—the limits of the cymbium are actually indicated in *Oonopoides* only by the distribution of setae, not by a distinct seam). The species detailed below are clearly not members of either of those two genera. *Wanops* is an eyeless troglobite known only from Yucatán, whereas *Oonopoides* seems to be circum-Caribbean; members of both genera have longer legs than do those of the species assigned here to the new genus *Noonops*, as well as very different male genitalic conformations. Members of *Oonopoides* also seem to have relatively longer spinnerets (Dumitresco and Georgesco, 1983). A few of the males treated below retain some traces of the seam between the cymbium and bulb on one side of the palp (e.g., figs. 158, 167), but the other side is fully fused (e.g., figs. 156, 168).

Not all the North American species that have been assigned to *Oonops* in the past actually belong to *Noonops*, however. Indeed, several other groups seem to be represented, including one in which the palpal bulb and cymbium are not fused (*Oonops chickeringi* Brignoli from Mexico, for example, belongs to this group), one in which the embolus is terminal and whiplike (*Oonops stylifer* Gertsch from Texas is an example of this group, whose members may belong to *Wanops*), a third group, whose members probably belong to *Oonopoides* (*Oonops mitchelli* Gertsch from Mexico is an example of this group), and others (most of whose members are undescribed).

Interestingly, a few males of a different species have been collected in the San Francisco Bay area of California, considerably north of the Californian taxa described below. Surprisingly, the palps of those males do resemble those of true *Oonops* species from Europe, and we presume that these specimens represent an introduced population of one of the several European species that are closely related to *O. pulcher*.

As here limited, *Noonops* is primarily a North American genus, found across the far southern parts of the United States and in most of Mexico; it apparently does not occur in far southern Mexico (Oaxaca, Chiapas, or the Yucatán Peninsula) or in Central America. However, a population of the type species, *N. floridanus* (Chamberlin and Ivie), has been found on South Bimini in the Bahama Islands (where it was originally described under a different name), and a single male specimen that also appears to belong to this species was collected near Belém in northeastern Brazil. We suspect that both the Bahamian and Brazilian records represent human introductions, rather than natural parts of the range of *N. floridanus*, a hypothesis that may be falsified if future work on South American oonopines turns up additional species related to *N. floridanus*; we have been able to examine very few relevant samples from South America.

Although we suspect that the species detailed below form a monophyletic group, the evidence is not strong. The male palps are relatively simple, and (aside from the fusion of the cymbium and bulb) lack obvious specializations like the hyaline conductor found in *Oonopoides* (see Dumitresco and Georgesco, 1983), or the whiplike, terminal embolus found in *Wanops* (see Chamberlin and Ivie, 1938). The embolus varies widely, from a relatively small, simple structure (as in *N. chilapensis*, figs. 307–309) through somewhat wider structures with a few distal modifications (as in *N. furtivus*, figs. 97–105) to wide structures with highly complex tips (as in *N. floridanus*, figs. 37–57). Perhaps the best evidence for monophyly comes from the female genitalia, which have a distinct anterior receptaculum situated just anterior of a transverse sclerotized bar that separates the posterior receptaculum (figs. 95, 110), which typically has a sclerotized anterior portion. Among the other groups of New World oonopines, the female genitalia seem closest to those of *Oonopoides*, but a detailed comparison must await digestions of the full range of *Oonopoides* species, as that group seems to be large and circum-Caribbean in distribution. Interestingly, it appears that at least females of *Noonops furtivus* (Gertsch) may have the same kind of nail-shaped structure on the posterior end of the anterior receptaculum, fitting into a corresponding cone-shaped hole on the anterior end of the posterior receptaculum (fig. 110), that was first documented in hard-bodied oonopids by Burger et al. (2003). A similar system apparently exists in at least *Heteroonops spinimanus* (Simon), as indicated by Platnick and Dupérré (2009) and Burger (2011).

Species-level identification of *Noonops* specimens is not easy. Because of their small size (with total body lengths always under 2 mm and sometimes under 1 mm) and pale coloration, many of the relevant characters simply cannot be seen with ordinary dissecting microscopes. Accurate identifications require scanning electron micrographs of the male palps and endites, and compound microscopy of digested female genitalia; even compound microscopy is inadequate for study of the male palps. As a result, we have had to adopt a geographically based sampling strategy in choosing which specimens to scan or digest, and it is therefore entirely possible that some of the specimens recorded below that have not been scanned or digested are misidentified, and that some of the species recognized below are actually composites of two or more different species, the

differences among which have not yet been detected. Ultimately, however, that is true for all species-level determinations, so we present here simply those hypotheses that have best survived the sampling strategy we have adopted, which has been to study in detail specimens from different localities, whenever potentially informative differences have been detected among them.

As a result, we are unable to present an identification key based on easily observable features; users will need to scan the palps and endites of newly discovered males, and digest the genitalia of newly discovered females, and compare those results to the diagnoses, descriptions, and figures presented below. For males, scans of the endites can help narrow down the range of species to be compared, as the taxa can be assigned to four (at least partly artificial) groups, based on the number of processes present on the anterior portion of the endites. Males can have three processes on each endite (*N. mesa*, *beattyi*), two processes on each endite (*N. floridanus*, *ocotillo*, *sonora*, *skinner*, *coachella*, *californicus*, *naci*, *culiacan*, *chapul*, *puebla*, *iviei*, *minutus*), a single process on each endite (*N. mortero*, *taxquillo*, *chilapensis*, *tonila*), or no processes at all (*N. furtivus*, *joshua*, *willisi*). Two species (*N. tarantula*, *miraflores*) are known only from females, and thus cannot be assigned to any of those groups. For females, digestions of the genitalia can help narrow down the range of species to be compared by focusing first on the shape of the anterior receptaculum, which can be bifid (*N. floridanus*), rounded (*N. furtivus*), rectangular (*N. joshua*, *skinner*, *culiacan*), elongated (*N. sonora*, *mortero*, *californicus*, *tonila*, *minutus*), triangular (*N. ocotillo*, *coachella*, *tarantula*, *miraflores*), or distally widened (*N. mesa*, *naci*, *taxquillo*, *chapul*). These female groupings may be close to monophyletic, but five species are known only from males (*N. willisi*, *puebla*, *beattyi*, *chilapensis*, *iviei*). Within each of the male and female groupings, geography provides the next best clues as to which species should be compared first.

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 sometimes taken from uncoated right male palps; in those cases, the images were flipped for consistency. All measurements are in mm. Species are discussed in geographic order, beginning in Florida and continuing west across the southern United States, and then east to west across the most northern tier of Mexican states, etc. High-resolution versions of the images, a sortable version of the geocoded locality data, and a distribution map for each species 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; in many cases, the website hosts significantly more images for a given species than are presented here. Similarly, the maps made available on the website, via discoverlife.org, are more useful than printed versions would be, as each dot can be associated with the actual specimen data it represents.

COLLECTIONS EXAMINED

AMNH	American Museum of Natural History, New York, NY
CAS	California Academy of Sciences, San Francisco, CA
CDU	Darrell Ubick collection, San Francisco, CA

FMNH	Field Museum of Natural History, Chicago, IL
FSCA	Florida State Collection of Arthropods, Gainesville, FL
MCZ	Museum of Comparative Zoology, Harvard University, Cambridge, MA
UCR	University of California, Riverside, CA

Noonops, new genus

TYPE SPECIES: *Oonops floridanus* (Chamberlin and Ivie).

ETYMOLOGY: The generic name is a contraction of “not *Oonops*” and is masculine in gender.

DIAGNOSIS: Males differ from those of most soft-bodied New World oonopines in having the palpal bulb and cymbium fused, from those of *Wanops* in having a relatively short, subterminal embolus, and from those of *Oonopoides* in lacking a hyaline conductor near the tip of the embolus; females have a distinct anterior receptaculum situated just anterior of a median, often T-shaped sclerotization.

DESCRIPTION: Total length of males 0.80–1.95, of females 1.00–1.95. Carapace, sternum, mouthparts, abdominal scuta, legs yellow, without any pattern, abdomen soft portions white, without pattern. **Cephalothorax:** Carapace elongated hexagonal in dorsal view, anteriorly narrowed to 0.49 times its maximum width or less, pars cephalica strongly elevated in lateral view, anterolateral corners with slightly sclerotized triangular projection, pars thoracica with angular posterolateral corners, without depressions or radiating rows of pits, posterolateral edge without pits, posterior margin not bulging below posterior rim, posterolateral surface without spikes; surface of elevated portion of pars cephalica smooth, at least sometimes with distinct platelets (figs. 1, 58), sides smooth; fovea absent, lateral margin straight, rebordered (figs. 2, 59), without denticles; plumose setae near posterior margin of pars thoracica absent; marginal, nonmarginal pars cephalica, pars thoracica setae light, needlelike, scattered. Clypeus margin slightly rebordered, straight in front view, sloping forward slightly in lateral view, low, ALE separated from edge of carapace by less than their radius (figs. 3, 60), median projection absent; setae light, needlelike. Chilum undivided. Eyes six, well developed, ALE largest, oval, PME squared, PLE oval; posterior eye row recurved from above, procurved from front; ALE separated by their radius to diameter, ALE-PLE separated by less than ALE radius, PME touching throughout most of their length, PLE-PME separated by less than PME radius. Sternum longer than wide, not fused to carapace, surface smooth, without pits or microsculpture but medial portions at least sometimes with fingerprint pattern (figs. 10, 67), median concavity, hair tufts absent, radial furrows between coxae I–II, II–III, III–IV smooth, radial furrow opposite coxae III absent, sickle-shaped structures absent, anterior margin unmodified, posterior margin not extending posteriorly of coxae IV, without posterior hump, anterior corner unmodified, lateral margin without infracoxal grooves, distance between coxae approximately equal, extensions of precoxal triangles absent, lateral margins with rounded extensions between coxae; setae sparse, light, needlelike, densest laterally, originating from surface. Chelicerae slightly divergent, anterior face unmodified (figs. 4, 61); without teeth on promargin or retromargin (figs. 5, 62); fangs without toothlike projections, directed medially, shape normal, without prominent basal process, tip unmodified; setae light,

needlelike, densest medially; paturon inner margin with scattered setae, distal region, posterior surface unmodified, promargin with row of flattened setae, inner margin unmodified, laminate groove absent. Labium rectangular, fused to sternum (figs. 6, 63), anterior margin indented at middle, same as sternum in sclerotization; with six or more setae on anterior margin, subdistal portion with unmodified setae. Endites distally not excavated (figs. 7, 65), anterior portion with zero, one, two, or three processes in males, unmodified in females, posterior portion unmodified, same as sternum in sclerotization; serrula usually present in females (fig. 64), present or absent (fig. 8) in males. Labrum with broad basal plate bearing single modified seta (figs. 9, 66). Female palp without claw (figs. 68, 69); tibia with three trichobothria (fig. 70), patella without prolateral row of ridges, tarsus unmodified, spines present only in *N. chapul*. **Abdomen:** Cylindrical, without long posterior extension, rounded posteriorly, interscutal membrane without rows of small sclerotized platelets. Booklung covers large, ovoid, without setae, anterolateral edge unmodified; posterior spiracles not connected by groove. Pedicel tube short, unmodified, scutopedicel region unmodified, abdomen not extending anterior of pedicel, plumose hairs, matted setae on anterior ventral abdomen in pedicel area, cuticular outgrowths near pedicel all absent. Dorsal scutum absent. Epigastric scutum weakly sclerotized, not surrounding pedicel, not protruding, small lateral sclerites absent, without lateral joints in females. Postepigastric scutum weakly sclerotized, yellow, short, only around epigastric furrow (figs. 11, 71), not fused to epigastric scutum, anterior margin unmodified, without posteriorly directed lateral apodemes. Spinneret scutum, supraanal scutum both absent. Abdominal setae light, needlelike, epigastric area setae not basally thickened; dense patch of setae anterior to spinnerets absent. Colulus present, bearing two setae (figs. 12, 73). Anterior lateral spinnerets (scanned only in *N. floridanus*) bisegmented, basal segment with oblique membranous strip (figs. 13, 74), with one major ampullate gland spigot and three piri-form gland spigots (figs. 14, 75), posterior medians unisegmented, with single spigot in males (fig. 15), two spigots in females (fig. 76), posterior laterals bisegmented, with two spigots in males (fig. 16), four spigots in females (fig. 77). **Legs:** Femur IV not thickened, same size as femora I–III, patella plus tibia I shorter than carapace, tibia I unmodified, tibia IV specialized hairs on ventral apex, ventral scopula absent, metatarsi I, II mesoapical comb absent, metatarsi III, IV weak ventral scopula absent. Leg spines present on tibiae, metatarsi III, IV, sometimes also on femora III, IV, spines longer than segment width but little wider than other setae and thus often difficult to differentiate under light microscopy (figs. 17–21). Tarsi without inferior claw. Superior claws scanned only in *N. floridanus*, males with single row of four or five teeth (figs. 22–29), females with additional medial row of numerous narrow teeth (figs. 83–87). Trichobothrial base wide, ridged (fig. 30). Tarsal organs with three receptors on legs I, II (figs. 31, 32, 78, 79), two on legs III, IV, palps (figs. 33–35, 80–82), distalmost receptor often slightly to deeply bifid. **Genitalia:** Male epigastric region with sperm pore not visible; furrow without Ω -shaped insertions, without specialized setae. Male palp of normal size, not strongly sclerotized, right and left palps mirror images of each other, proximal segments, cymbium yellow; embolus light, prolateral excavation absent; trochanter normal size, unmodified; femur normal size, two or more times as long as trochanter, without posteriorly rounded lateral dilation, attaching to patella basally; patella shorter than femur, not enlarged, without prolateral row of ridges, setae unmodified; tibia with three trichobothria (fig. 36); cymbium ovoid in dorsal view, completely fused with bulb, no seam visible

on at least one side of palp (figs. 37, 38), not extending beyond distal tip of bulb, plumose setae, stout setae, distal patch of setae absent; bulb longer than cymbium, stout, elongated; embolus of varying width, often with basal spur, tip sometimes complex (figs. 39–45). Female genitalia with distinct anterior receptaculum, varying in shape, followed posteriorly by transverse sclerotized bar, then by sclerotized median portion of posterior receptaculum, remainder of posterior receptaculum membranous, with dorsal papillae in at least *N. floridanus* (fig. 72).

DISTRIBUTION: Specimens are known from the southern United States, ranging from California east to Florida and Georgia, and from all parts of Mexico except for the far southern states. Specimens of the type species have also been collected in the Bahama Islands and in northeastern Brazil.

Noonops floridanus (Chamberlin and Ivie), new combination

Figures 1–96

Oonopinus floridanus Chamberlin and Ivie, 1935: 9, figs. 8, 9 (male holotype and female allotype, reportedly from Gainesville, Alachua Co., Florida, in AMNH; examined).

Oonops floridanus: Gertsch, 1936: 9. – Chamberlin and Ivie, 1944: 33. – Chickering, 1969: 156, figs. 33, 34.

Oonops gertschi Chickering, 1971: 211, figs. 26–30 (male holotype from South Bimini, Bahama Islands, in AMNH; examined). **NEW SYNONYMY.**

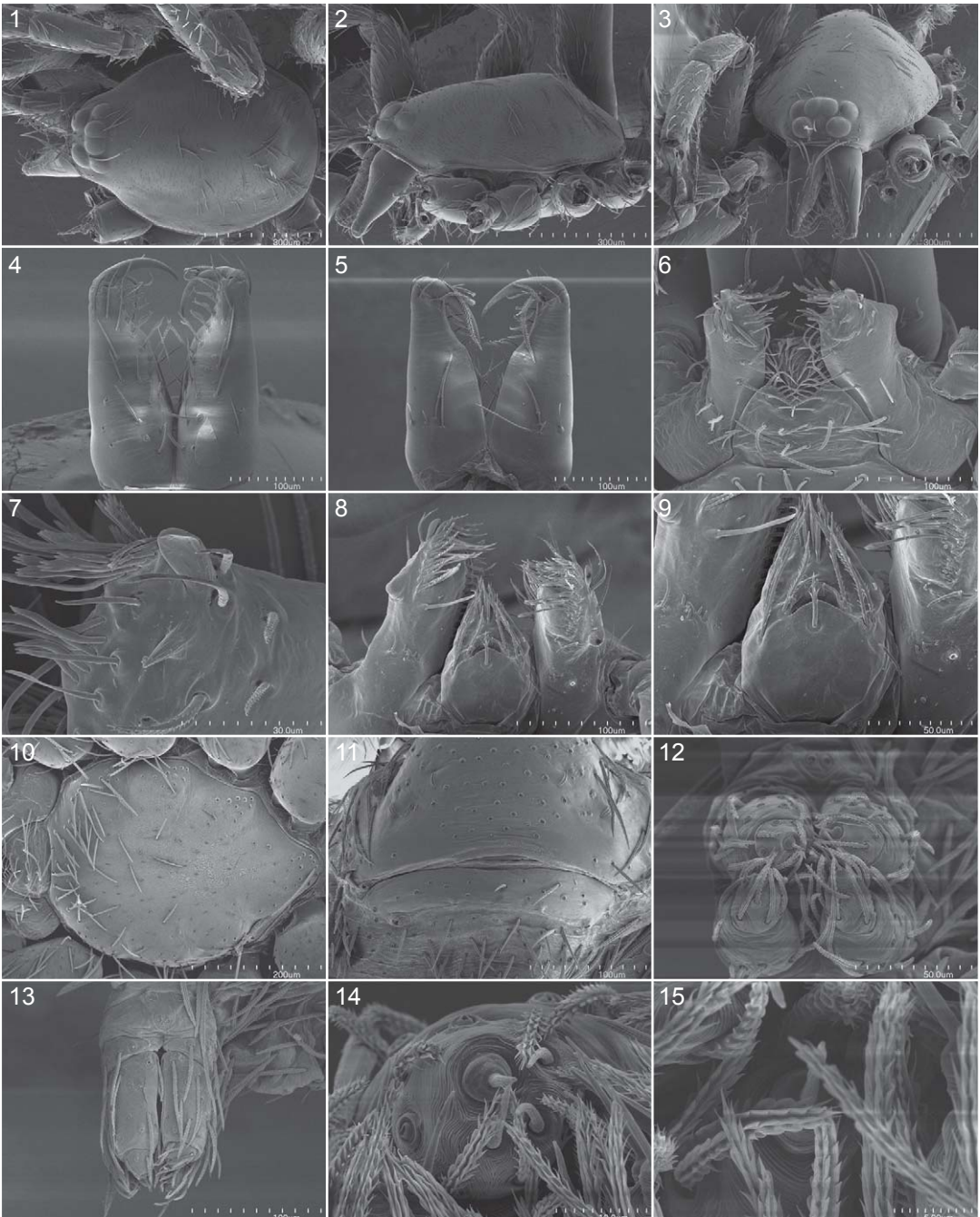
NOTE: Chamberlin and Ivie (1935) reported the type locality as Gainesville (Alachua Co.), but the specimens labeled as the types by those authors were actually taken in Cocoa (Brevard Co.) instead; the species occurs at both localities.

DIAGNOSIS: Males can easily be recognized by the relatively wide embolus with a subterminal rim (figs. 46–57), females by the bifid anterior receptaculum and wide posterior genitalic elements (figs. 88–96).

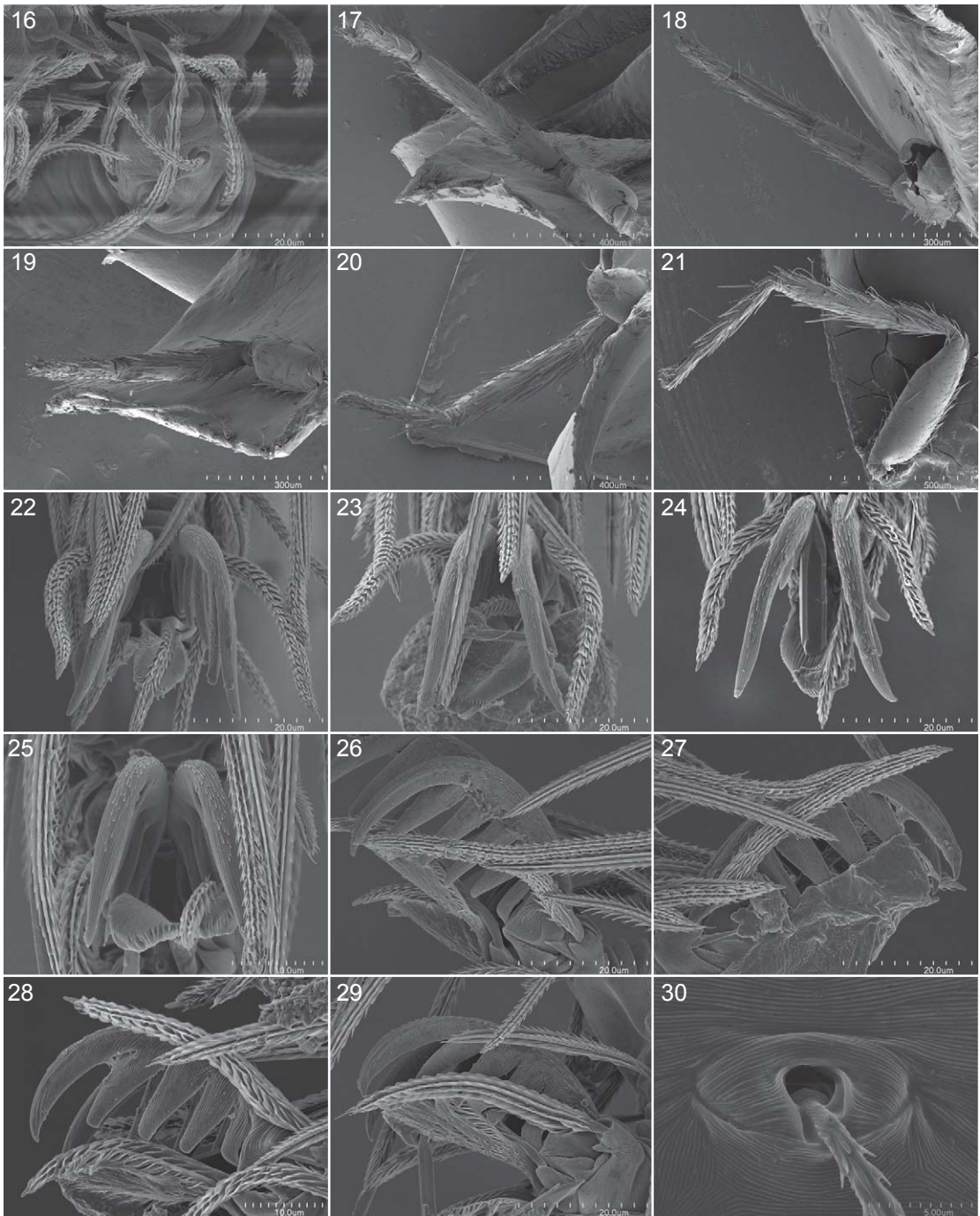
MALE (PBI_OON 37991, figs. 1–57): Total length 1.47. Anterior portion of endites with two projections, distal one lobe shaped, directed anteromedially, proximal one sharp, posteromedially directed; serrula absent. Leg spination: tibiae: III d1-0-0, p1-1-0, v1p-1p-2, r0-1-0; IV d1-1-0, p1-1-1, v0-2-2, r0-1-1; metatarsi: III d1-0-0, v1p-0-0, r0-1-2; IV d1-0-0, p1-2-2, v1p-0-2; r1-1-2. Embolus wide throughout its length, with ledgelike tip.

FEMALE (PBI_OON 37991, figs. 58–96): Total length 1.61. Leg spination: tibiae: III d1-0-0, p1-1-0, v0-1p-2, r0-1-1; IV d1-1-0, p1-1-1, v0-1p-1p, r1-1-2; metatarsi: III d0-1-0, v1p-0-2, r0-1-1; IV d1-0-0, p1-1-2, v2-0-2, r1-1-1. Anterior receptaculum distally bifid; posterior receptaculum with anterior, W-shaped sclerotization.

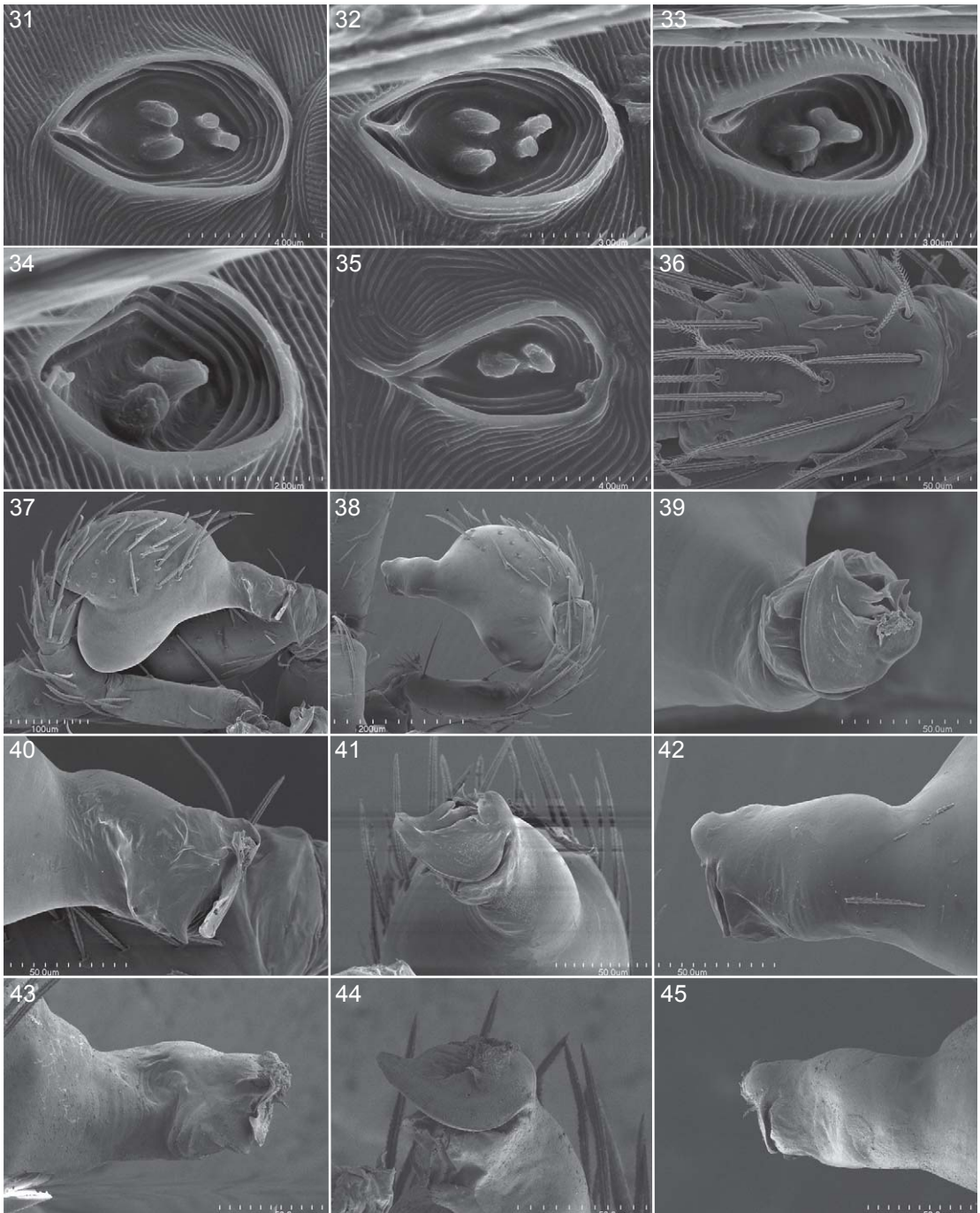
MATERIAL EXAMINED: UNITED STATES: **Florida:** *Alachua Co.:* no specific locality, Mar. 6, 1935 (H. Wallace, AMNH PBI_OON 1759), 1 ♀; Gainesville, Mar. 8, 1927 (W. Barrows, AMNH PBI_OON 1760, 1763), 1 ♂, 5 ♀, Mar. 8, 1935 (W. Barrows, AMNH PBI_OON 26734), 1 ♂, Feb. 10, 1942 (W. Ivie, AMNH PBI_OON 26730), 1 ♂, 3 ♀; 8 mi W Gainesville, Mar. 28, 1957 (R. Forster, W. Gertsch, AMNH PBI_OON 1754), 8 ♂, 10 ♀; 10 mi W Gainesville, Feb. 14, 1942 (W. Ivie, AMNH PBI_OON 26729), 1 ♂; 0.6 mi S junction Highways 20 and S-234, Apr. 22, 1976, sifting slash pine litter near pond (D. Richman, FSCA PBI_OON 1921), 1 ♀; Newnans Lake, June 13, 1935 (W. Ivie, AMNH PBI_OON 1104, 1105, 1147, 1762, 26731, 26737), 16 ♂, 31 ♀, Mar. 19, 1938 (W. Gertsch, AMNH PBI_OON 1765), 6 ♂, 6 ♀, Feb. 12, 1942 (W. Ivie, AMNH PBI_OON 1106, 26728), 6 ♂, 6 ♀, Mar. 28, 1957 (W. Gertsch, R. Forster, AMNH



FIGURES 1–15. *Noonops floridanus* (Chamberlin and Ivie), male. 1. Carapace, dorsal view. 2. Same, lateral view. 3. Same, anterior view. 4. Chelicerae, anterior view. 5. Same, posterior view. 6. Labium and endites, ventral view. 7. Tip of endite, ventral view. 8. Labrum and endites, dorsal view. 9. Labrum, dorsal view. 10. Sternum, ventral view. 11. Epigastric region, ventral view. 12. Spinnerets, apical view. 13. Anterior lateral spinnerets, ventral view. 14. Same, apical view. 15. Posterior median spinneret, apical view.



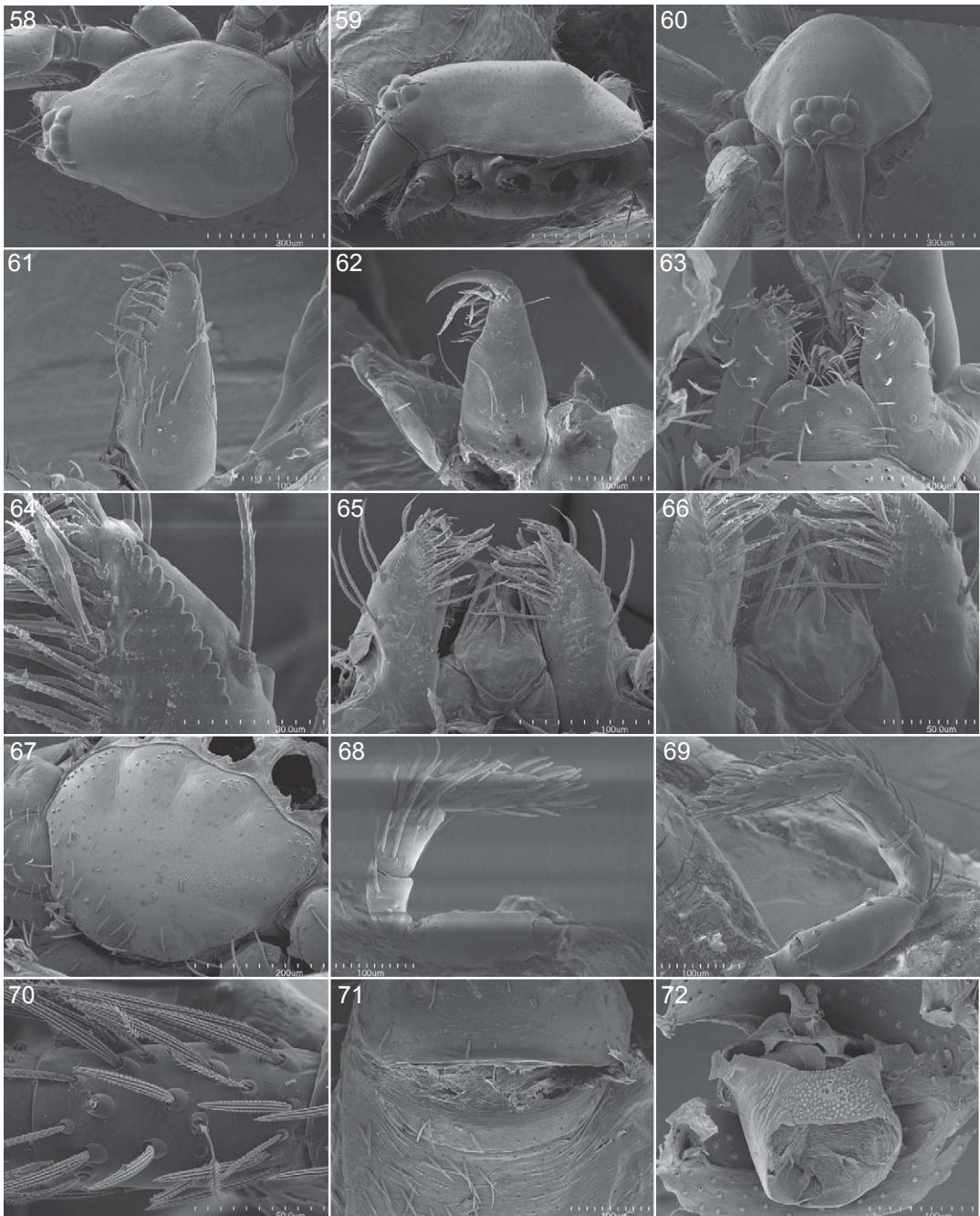
FIGURES 16–30. *Noonops floridanus* (Chamberlin and Ivie), male. **16.** Posterior lateral spinneret, apical view. **17.** Leg I, ventral view. **18.** Same, leg II. **19.** Same, leg III. **20.** Same, leg IV. **21.** Leg IV, retrolateral view. **22.** Claws of leg I, apical view. **23.** Same, leg II. **24.** Same, leg III. **25.** Same, leg IV. **26.** Claws of leg I, lateral view. **27.** Same, leg II. **28.** Same, leg III. **29.** Same, leg IV. **30.** Trichobothrial base from metatarsus II, dorsal view.



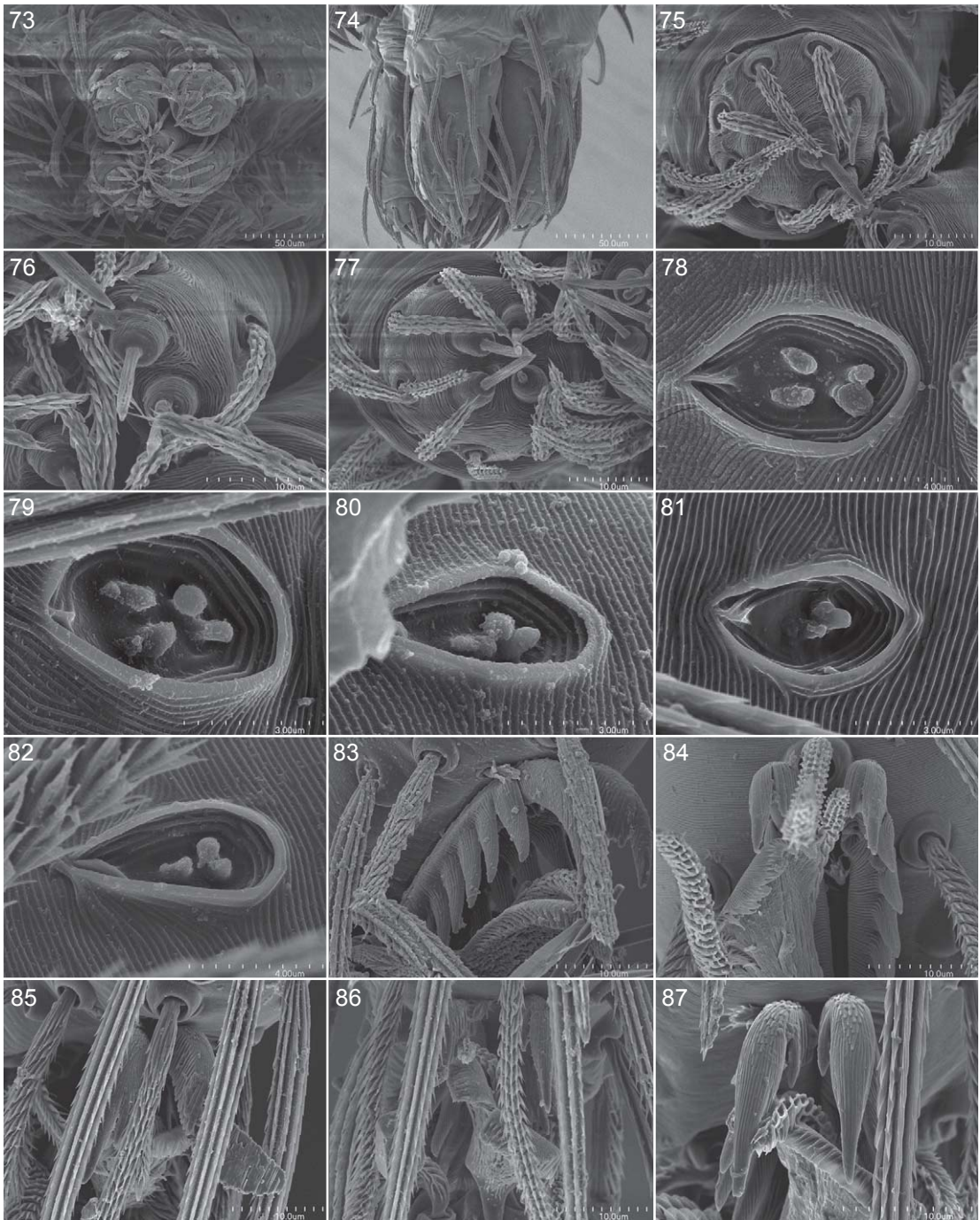
FIGURES 31–45. *Noonops floridanus* (Chamberlin and Ivie), male, specimens from Florida (31–42) and Bimini (43–45). 31. Tarsal organ from leg I, dorsal view. 32. Same, leg II. 33. Same, leg III. 34. Same, leg IV. 35. Same, palp. 36. Palpal tibia, dorsal view. 37. Left palp, prolateral view. 38. Same, retrolateral view. 39. Left embolus, anterior view. 40, 43. Same, prolateral view. 41, 44. Same, ventral view. 42, 45. Same, retrolateral view.



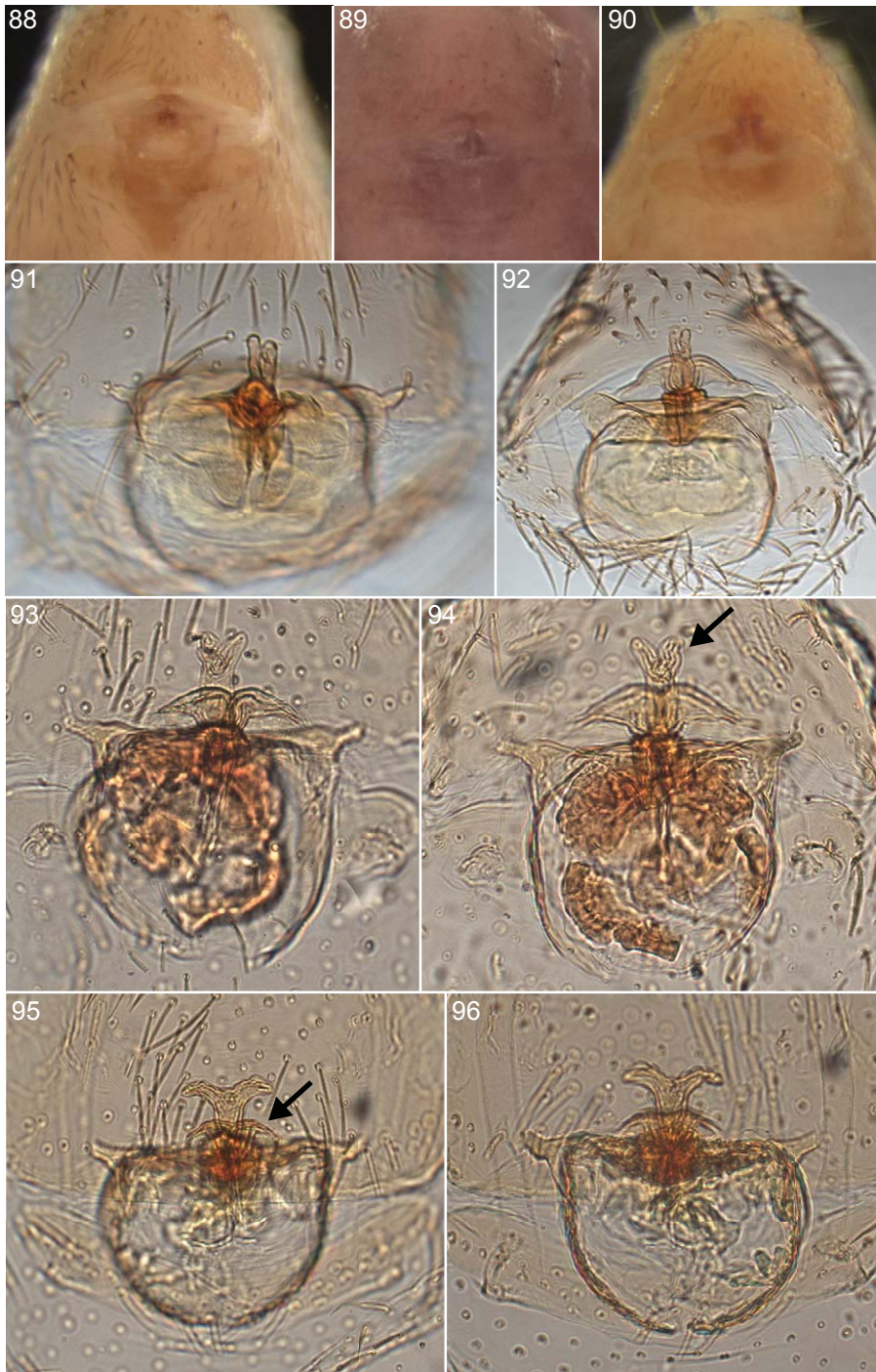
FIGURES 46–57. *Noonops floridanus* (Chamberlin and Ivie), male, specimens from Florida (46–54) and Brazil (55–57). 46, 49. Left palp, prolateral view. 47, 50. Same, ventral view. 48, 51. Same, retrolateral view. 52, 55. Left embolus, prolateral view. 53, 56. Same, ventral view (arrow to subterminal rim of embolus). 54, 57. Same, retrolateral view.



FIGURES 58–72. *Noonops floridanus* (Chamberlin and Ivie), female. 58. Carapace, dorsal view. 59. Same, lateral view. 60. Same, anterior view. 61. Chelicerae, anterior view. 62. Same, posterior view. 63. Labium and endites, ventral view. 64. Serrula, dorsal view. 65. Labrum and endites, dorsal view. 66. Labrum, dorsal view. 67. Sternum, ventral view. 68. Palp, proximal view. 69. Same, retrolateral view. 70. Palpal tibia, dorsal view. 71. Epigastric region, ventral view. 72. Internal genitalia, dorsal view.



FIGURES 73–87. *Noonops floridanus* (Chamberlin and Ivie), female. 73. Spinnerets, apical view. 74. Anterior lateral spinnerets, ventral view. 75. Same, apical view. 76. Posterior median spinneret, apical view. 77. Posterior lateral spinneret, apical view. 78. Tarsal organ from leg I, dorsal view. 79. Same, leg II. 80. Same, leg III. 81. Same, leg IV. 82. Same, palp. 83. Claws of leg I, lateral view. 84. Claws of leg I, apical view. 85. Same, leg II. 86. Same, leg III. 87. Same, leg IV.



FIGURES 88–96. *Noonops floridanus* (Chamberlin and Ivie), female, specimens from Florida (88, 91, 92), Georgia (89, 93, 94), and Bimini (90, 95, 96). 88–90. Epigastric area, ventral view. 91, 93, 95. Digested genitalia, ventral view (arrow to transverse sclerotized bar). 92, 94, 96. Same, dorsal views (arrow to bifid anterior receptaculum).

PBI_OON 1758, 37326), 21 ♂, 24 ♀, Dec. 21, 1962 (W. Ivie, AMNH PBI_OON 37980), 7 ♂, 10 ♀; San Felasco State Park, Sept. 24, 2007, leaf litter (X. Wang, AMNH PBI_OON 31067), 3 ♂, 4 ♀, May 1, 2008, leaf litter (X. Wang, AMNH PBI_OON 31068), 2 ♀. *Bay Co.*: St. Andrews State Park, Panama City Beach, Mar. 27, 1964 (J. Beatty, AMNH PBI_OON 38498), 1 ♀. *Brevard Co.*: Cocoa, Feb. 23, 1925 (W. Barrows, AMNH PBI_OON 49928), 1 ♂, 1 ♀ (holotype, allotype), same (AMNH PBI_OON 1148), 3 ♀ (paratypes). *Broward Co.*: Deerfield Beach, Feb. 1, 1959, under pine (H. Denmark, FSCA PBI_OON 21241), 2 ♀, July 17, 1959, pine debris (H. Denmark, AMNH PBI_OON 37986), 1 ♀. *Dade Co.*: Junk Hammock, Everglades National Park, Mar. 24, 1960 (R. Baranowski, FSCA PBI_OON 1922), 1 ♂; Royal Palm Hammock, Everglades National Park, July 28–Nov. 15, 1985, malaise-flight intercept trap, hardwood hammock forest (S., J. Peck, AMNH PBI_OON 37994), 1 ♂. *Hernando Co.*: Annattalaga Hammock, 7 mi NW Brooksville, Apr. 6, 1966, oak-maple upland (W. Suter, FMNH 34783, 71728, PBI_OON 10500, 43496), 7 ♂, 8 ♀. *Highlands Co.*: Archbold Biological Station, Apr. 1956, Berlese, pine, oak litter (C. Hoff, AMNH PBI_OON 37979, 37987), 1 ♂, 3 ♀, Apr. 12, 1956, Berlese, bamboo litter (C. Hoff, AMNH PBI_OON 37978), 2 ♀, Dec. 19, 1962 (W. Ivie, AMNH PBI_OON 37973), 2 ♂, 4 ♀, June 29, 1978, sandy scrub, elev. 20 m (F., J. Murphy, AMNH PBI_OON 36760), 1 ♂; Fisheating Creek, 2 mi W Venus, Apr. 4, 1966, Berlese, edge of Cyprus swamp (W. Suter, FMNH 34798, PBI_OON 10515), 2 ♀; Hammock State Park, Apr. 1956 (C. Hoff, AMNH PBI_OON 37989), 1 ♀; Highlands Hammock, near Sebring, Mar. 24, 1938 (W. Gertsch, AMNH PBI_OON 1756), 1 ♂, 2 ♀; Highlands Hammock State Park, N boundary, along county road, Apr. 6, 1966, Berlese, forest floor litter (J. Wagner, FMNH 34802, PBI_OON 10519), 1 ♀; Lake Annie, Childs, Apr. 4, 1966, lake edge debris (W. Suter, FMNH 34801, PBI_OON 10518), 2 ♂, 1 ♀; Lake Jackson, Sebring, Feb. 20, 1982, uprooting dead bunch grass (G. Edwards, FSCA PBI_OON 21243), 1 ♂; Parker Islands, Apr. 8, 1966 (W. Suter, FMNH 71719, PBI_OON 43487), 1 ♂; Sebring, Mar. 7, 1939 (F. Lutz, AMNH PBI_OON 1755), 1 ♂, 4 ♀; Sebring Airport, Feb. 19–20, 1982, fossil dune pine litter (G. Edwards, FSCA PBI_OON 21247), 3 ♂, 5 ♀; 45 mi N Lake Placid on Route 27, Jan. 3, 1970 (F. Schmeler, MCZ 72971, PBI_OON 28128), 1 ♂. *Lake Co.*: no specific locality, Mar. 1, 1959 (H. Denmark, AMNH PBI_OON 1757), 1 ♂, 1 ♀; ca 0.5 mi N junction US 441 and FL 19A, Oct. 30, 1959, pine litter (H. Denmark, FSCA PBI_OON 21242), 3 ♂, 1 ♀. *Leon Co.*: Tall Timbers Research Station, June 21, 1968, pitfall (W. Baker, AMNH PBI_OON 38491), 1 ♀, Aug. 19–26, 1968, pitfalls (W. Baker, AMNH PBI_OON 38487, 38506, 38519), 2 ♂, 1 ♀. *Manatee Co.*: Myakka River State Park, Dec. 26, 1963 (W., J. Ivie, AMNH PBI_OON 37339), 1 ♂. *Marion Co.*: Ocala National Forest, Nov. 26, 1972, R. Kaplan (FMNH 34811, 71605, PBI_OON 10528, 10904), 6 ♂, 6 ♀. *Martin Co.*: Jonathan Dickinson State Park, Feb. 1, 1959, pine litter (H. Denmark, FSCA PBI_OON 27625), 1 ♂, 1 ♀, July 17, 1959, pine litter (H. Denmark, FSCA PBI_OON 21248), 1 ♂, 1 ♀, Dec. 12, 1962 (W. Ivie, AMNH PBI_OON 37984), 1 ♂, 1 ♀; Stuart, Mar. 17, 1939 (F. Lutz, AMNH PBI_OON 1097), 1 ♀; 8 mi NNW Stuart, Dec. 12, 1962 (W. Ivie, AMNH PBI_OON 37983), 2 ♀. *Monroe Co.*: Bahia Honda Key, Dec. 13, 1986, beach ridge forest litter (S. Peck, Klimaszewski, AMNH PBI_OON 37351), 10 ♂, 14 ♀; Big Pine Key, July 1–3, 1978, pig dung trap (L. Strange, FSCA PBI_OON 21245), 1 ♀; Big Pine Key, E end, Dec. 13, 1962 (W. Ivie, AMNH PBI_OON 38001), 1 ♂, 1 ♀; Big Pine Key, off Key Deer Boulevard, Nov. 8, 2007, buttonwood sign hammock (P. Sierwald, FMNH 34832, PBI_OON 10549), 1 ♂, 3 ♀; Big Pine Key, Jack Watson Nature Trail, off Key Deer Boulevard, Nov. 13, 2007, sifting (P. Sierwald, FMNH PBI_OON 10690), 1 ♂, 1 ♀; Big Torch Key, N end, Nov. 7, 1984, hardwood hammock litter (S., J. Peck, AMNH PBI_OON 38000), 1 ♂, 1 ♀; Botanical Garden, Stock Island, Nov. 19, 1985, hammock leaf litter (S., J. Peck, AMNH PBI_OON 37997), 4 ♂, 3 ♀, Dec. 17, 1986, leaf litter (S. Peck, Klimaszewski, AMNH PBI_OON 37990), 3 ♂, 1 ♀; Key Largo, Aug. 8, 1971, Berlese (S. Peck, AMNH PBI_OON 21133), 3 ♀, same, Berlese, hardwood litter (S. Peck, FMNH 34821, PBI_OON 10538), 1 ♂; Little Torch Key, John J. Pescatello Torchwood Hammock, Nov. 7, 2007 (P. Sierwald, FMNH PBI_OON 10496, 10510), 2 ♂; Long Key State Recreation Area, July 31, 1981, leaf litter, xeric scrub (D. Ubick, CDU PBI_OON 35674), 1 ♂; Marathon, Vaca Key, Nov. 6, 1984, hammock litter (S., J. Peck, AMNH PBI_OON 37988), 1 ♂, Sept. 1, 1986, Berlese, leaf litter, hammock forest (S., J. Peck, AMNH PBI_OON 21125), 2 ♀; No Name Key, Aug. 5, 1972, Berlese, hardwood litter (S. Peck, AMNH PBI_OON 21135), 2 ♂, 1 ♀, Aug. 7, 1972, Berlese, palm-hardwood

litter (S. Peck, AMNH PBI_OON 31175), 1 ♂, 2 ♀, Nov. 6, 1984, leaf-log litter, hardwood hammock (S., J. Peck, AMNH PBI_OON 1099), 1 ♀, Dec. 13, 1986, hammock litter (S. Peck, Klimaszewski, AMNH PBI_OON 37967), 1 ♀; Pennekamp Reef State Park, Key Largo, Nov. 2, 1984, leaf-log litter, hardwood hammock (S., J. Peck, AMNH PBI_OON 37996), 2 ♂, 1 ♀, July 31, 1985, Berlese, leaf litter, hammock forest (S., J. Peck, AMNH PBI_OON 37998), 1 ♂, 4 ♀, Dec. 10, 1986, hardwood hammock forest litter (S. Peck, Klimaszewski, AMNH PBI_OON 49932), 1 ♀; Sugarloaf Key, Nov. 3, 1984, Berlese, hammock litter (S., J. Peck, AMNH PBI_OON 37999), 5 ♂, 6 ♀; Aug. 29, 1986, Berlese, leaf litter, hammock forest (S., J. Peck, AMNH PBI_OON 37353), 1 ♀, Aug. 29–Dec. 14, 1986, malaise-flight intercept trap, hammock forest (S., J. Peck, AMNH PBI_OON 37995), 1 ♀; Watsons Hammock, Big Pine Key, Aug. 4, 1971, Berlese (S. Peck, AMNH PBI_OON 21132), 4 ♂, 1 ♀, Nov. 4, 1984, Berlese, hammock forest litter (S., J. Peck, AMNH PBI_OON 37974), 1 ♀, June 3–Dec. 13, 1986, malaise-flight intercept trap, hammock forest (S., J. Peck, AMNH PBI_OON 21126, 37992), 4 ♂, Dec. 11, 1986, forest litter (S. Peck, Klimaszewski, AMNH PBI_OON 37354), 1 ♂, 2 ♀, Dec. 14, 1986, hammock leaf litter (S. Peck, Klimaszewski, AMNH PBI_OON 37991), 10 ♂, 10 ♀. *Orange Co.*: 2 mi SSW Christmas, Dec. 11, 1962 (W. Ivie, AMNH PBI_OON 1057), 2 ♂; 3 mi NW Maitland, Dec. 10, 1962 (W. Ivie, AMNH PBI_OON 1102), 2 ♂. *Palm Beach Co.*: Lantana, July 17, 1959, pine litter (H. Denmark, FSCA PBI_OON 1929), 5 ♂, 5 ♀, Oct. 29, 1959, pine litter (H. Denmark, FSCA PBI_OON 1928), 1 ♂. *Polk Co.*: no specific locality, June 28, 1935 (H. Wallace, AMNH PBI_OON 1761), 1 ♀; Lake Alfred, Sept. 4, 1969, pitfall, citrus (M. Muma, FSCA PBI_OON 1925), 1 ♂; Lake Alfred, Route S-17, Apr. 17–May 12, 1969, pitfalls, flat pineland (K. Stone, FSCA PBI_OON 1926, 21271), 5 ♂; N Lake Alfred, Mar. 31, 1969, pitfalls, flat pineland (K. Stone, CDU PBI_OON 35675), 1 ♂, 1 ♀, Aug. 7, 1969–Aug. 19, 1970, pitfalls, flat pineland (M. Muma, H. Greene, FSCA PBI_OON 1927, 21239, 21255, 21256, 21262, 21266), 6 ♂, 2 ♀, Oct. 1, 1969, pitfalls, flat pineland (K. Stone, FSCA PBI_OON 1931), 1 ♂, 1 ♀, Oct. 2, 1969, pitfalls, pine flatwood (M. Muma, FSCA PBI_OON 21274), 2 ♂, 1 ♀, July 8, 1970, pitfall, flat pineland (H. Greene, FSCA PBI_OON 21240), 1 ♀; N Lake Alfred, Route S-17, Oct. 7, 1968, pitfalls, flat pineland (M. Muma, H. Greene, FSCA PBI_OON 21264), 2 ♀; Waverly, July 2, 1969, pitfalls, sand pine (M. Muma, FSCA PBI_OON 21265), 1 ♂, 1 ♀; Winter Haven, Feb. 18–Oct. 10, 1968–1970, pitfall, sand pine dune (M. Muma, H. Greene, K. Stone, FSCA PBI_OON 1920, 1924, 1930, 1932, 21244, 21249–21254, 21257–21261, 21263, 21267, 21269, 21270, 21272, 21273, 21275–21277), 16 ♂, 26 ♀. *Saint Johns Co.*: Saint Augustine, 1933 (W. Ivie, AMNH PBI_OON 26726), 1 ♀; Saint Johns, River, Apr. 11, 1938 (AMNH PBI_OON 21019), 1 ♀; U.S. Route 1, 29 mi S Jacksonville, Mar. 25, 1949 (AMNH PBI_OON 1764), 1 ♂, 2 ♀. *Saint Lucie Co.*: no specific locality, from fig (E. Thompson, K. Hibbard, FSCA PBI_OON 1919), 1 ♀; near Fort Pierce, Oct. 4, 1985 (K. Hibbard, E. Thompson, FSCA PBI_OON 1923), 2 ♂. *Seminole Co.*: 3 mi N Longwood, Aug. 23, 1965, Berlese, oak-palmetto-pine swamp (W. Suter, FMNH 34788, PBI_OON 10505), 1 ♀. *Volusia Co.*: 2 mi SW Enterprise, July 31, 1965, Berlese, oak forest (W. Suter, FMNH 71723, PBI_OON 43491), 1 ♂; 2 mi S Orange City, Dec. 9, 1962 (W. Ivie, AMNH PBI_OON 1096), 5 ♂, 6 ♀. **Georgia**: *Chatham Co.*: 3 mi SE Savannah, Apr. 4, 1943 (W. Ivie, AMNH PBI_OON 26736), 1 ♀, Apr. 14, 1943 (W. Ivie, AMNH PBI_OON 37068), 2 ♀. **WEST INDIES**: **Bahama Islands**: *South Bimini*: no specific locality, May 1951 (W. Gertsch, M. Cazier, AMNH PBI_OON 49929), 1 ♂ (holotype), same (AMNH PBI_OON 49930), 1 ♂ (paratype), same (AMNH PBI_OON 49933–49938, 49589), 7 ♂, 8 ♀, June 1951 (M. Cazier, C., P. Vaurie, AMNH PBI_OON 1720, 49931), 5 ♂, 4 ♀, Apr. 10–14, 1952 (E. Mayr, AMNH PBI_OON 1747), 1 ♀. **SOUTH AMERICA**: **Brazil**: *Pará*: Ipean Campo, 5 km E Belém, May 2, 1974 (R. Schuh, AMNH PBI_OON 21024), 1 ♂.

DISTRIBUTION: Florida and Georgia; probably introduced into the Bahama Islands and Brazil (cf. figs. 55–57).

SYNONYMY: Given that Chickering (1969) studied Florida specimens of this distinctive species, it is odd that he later (1971) described specimens from the Bahamas, as *Oonops gertschi*, without even mentioning their obvious similarities. We have detected no significant, geographically consistent differences between the mainland and Bahamian populations (cf. figs. 43–45, 90, 95, 96, and other images available on the PBI website).

Noonops furtivus (Gertsch), new combination

Figures 97–110

Oonops furtivus Gertsch, 1936: 6, figs. 19–21 (male holotype from Edinburg, Hidalgo Co., Texas, in AMNH; examined). – Gertsch and Davis, 1942: 3.

DIAGNOSIS: Males resemble those of *N. willisi* but the palpal bulb is smaller and the opening of the embolus is oriented transversely (figs. 97–105); females have a rounded anterior receptaculum and posterior wide ducts (figs. 109, 110). Males and females have not been collected together, and could be mismatched.

MALE (PBI_OON 49939, figs. 97–107): Total length 1.39. Anterior portion of endites without processes; serrula present. Leg spination: tibiae: III d1-0-0, p0-0-1, v1p-1p-2, r0-1-1; IV d1-0-0, p1-0-1, v1p-0-2, r0-0-1; metatarsi: III v1p-1p-0, r0-1-0; IV d1-0-0, p0-2-1, v1p-0-2, r1-0-2. Embolus distally widened, with apical protrusion.

FEMALE (PBI_OON 1593, figs. 108–110): Total length 1.61. Leg spination: tibiae: III p0-1-1, v0-0-2; IV p0-1-0, v1p-1p-2, r1-1-1; metatarsi: III v1p-0-0, r0-0-1; IV p1-1-0, v1p-0-2, r0-1-0. Anterior receptaculum rounded; posterior receptaculum with wide ducts.

MATERIAL EXAMINED: UNITED STATES: **Texas:** *Caldwell Co.:* 4 mi N Lockhart, Apr. 13, 1963 (W. Gertsch, W. Ivie, AMNH PBI_OON 1593), 4 ♀; Lockhart State Park, Apr. 13, 1963 (W. Gertsch, W. Ivie, AMNH PBI_OON 1590), 1 ♀. *Cameron Co.:* no specific locality, Jan.–Mar. 1936 (L. Davis, AMNH PBI_OON 1744), 1 ♂, Sept. 1936 (L. Davis, AMNH PBI_OON 1580), 1 ♂; most southern palm grove, Apr. 1941 (A., L. Davis, AMNH PBI_OON 1582), 1 ♀. *Hidalgo Co.:* Edinburg, June 1935 (S. Mulaik, AMNH PBI_OON 1745), 2 ♂ (paratypes), Sept. 24, 1938 (O. Mulaik, AMNH PBI_OON 1591), 1 ♂; 7 mi E Edinburg, Feb. 17, 1935, sifting in dry irrigation ditch (S. Mulaik, AMNH PBI_OON 49939), 1 ♂ (holotype). MEXICO: **Tamaulipas:** Villagrán, Dec. 4, 1943 (F. Bonet, AMNH PBI_OON 31171), 1 ♂.

DISTRIBUTION: Texas and Tamaulipas.

Noonops ocotillo, new species

Figures 111–137

TYPE: Female holotype from Ocotillo, Maricopa County, Arizona (Apr. 26, 1961; W. Gertsch), deposited in AMNH (PBI_OON 1060).

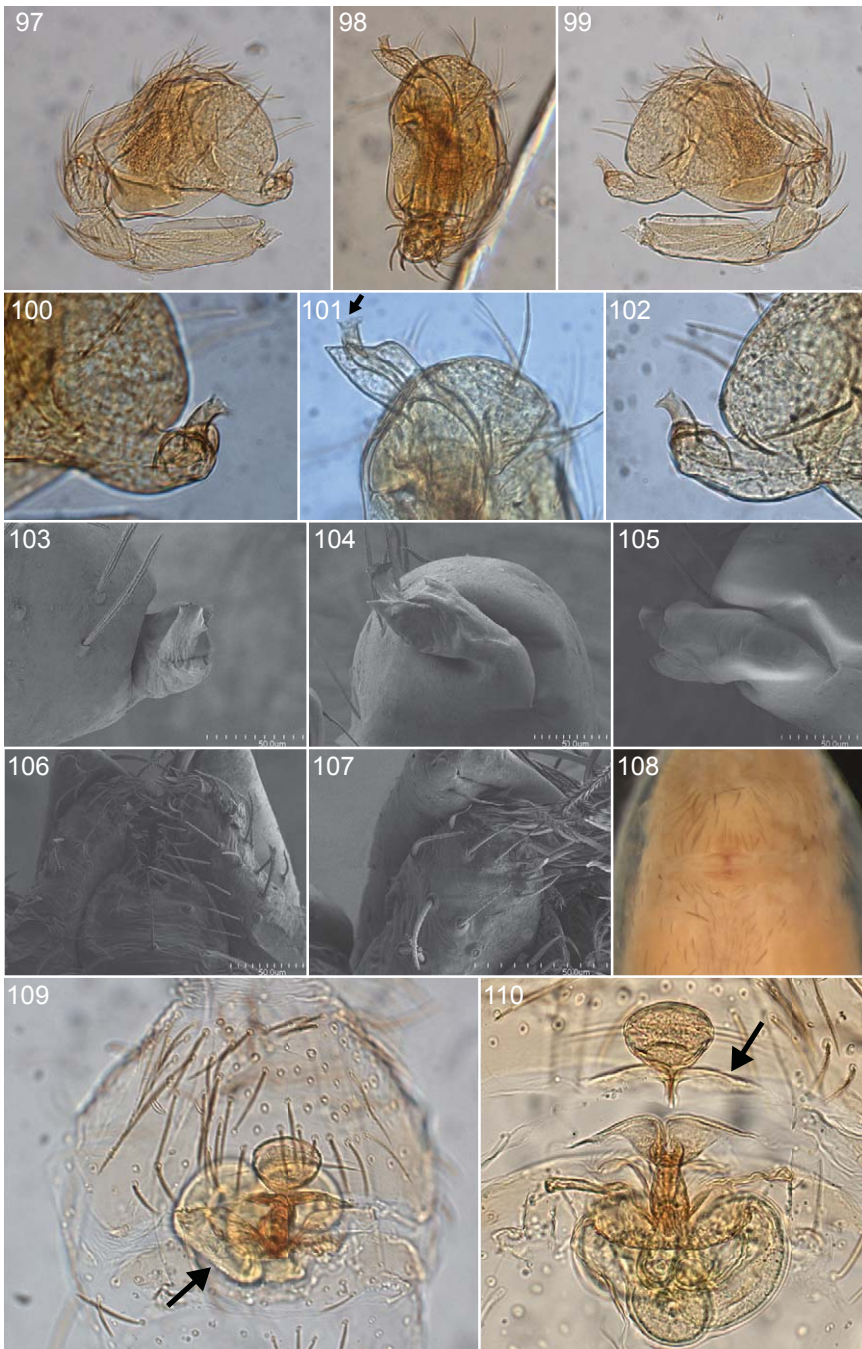
ETYMOLOGY: The specific name is a noun in apposition taken from the type locality.

DIAGNOSIS: Males have a long, narrow embolus, with a basal projection and the apical portion sharply bent (figs. 111–118, 120–124); females resemble those of *N. tarantula* in having the anterior portion of the genitalia arched, but have the posterior elements much more elaborated, with a pair of distinct lobes (figs. 126–137).

MALE (PBI_OON 2938, figs. 111–125): Total length 1.28. Anterior portion of endites with two processes, both pointed, directed posteriorly; serrula absent. Leg spination: femora III, IV d1-0-0; tibiae: III p1-0-1, v0-0-2; IV p1-0-1, v0-1p-2, r0-1-0; metatarsi: III v0-0-2; IV p0-0-1, v0-1p-0. Embolus with long, narrow basal projection; apical portion abruptly narrowed, bent; tip broad.

FEMALE (PBI_OON 1060, figs. 126–137): Total length 1.44. Leg spination: tibiae: III p1-0-1, v0-1p-2, r0-0-1; IV p1-0-0, v0-1p-2, r1-0-0; metatarsi: III v1p-0-0; IV p0-0-1, v0-1p-0. Anterior receptaculum triangular; posterior receptaculum with pair of anterior lobes.

OTHER MATERIAL EXAMINED: UNITED STATES: **California:** *Riverside Co.:* Coachella Valley, W side of Snow Creek Road off Highway 111, 33.9095°N, 116.6729°W, Apr. 28, 2004, creosote bush scrub on stable



FIGURES 97–110. *Noonops furtivus* (Gertsch), male (97–107) and female (108–110). **97.** Left palp, prolateral view. **98.** Same, ventral view. **99.** Same, retrolateral view. **100, 103.** Left embolus, prolateral view. **101, 104.** Same, ventral view (arrow to transverse embolar opening). **102, 105.** Same, retrolateral view. **106.** Mouthparts, ventral view. **107.** Tip of endites, same. **108, 109.** Genitalia, ventral view (arrow to wide ducts of posterior receptaculum). **110.** Same, dorsal view (arrow to transverse sclerotized bar).

sand dune system, elev. 1185 ft (T. Prentice, CAS 39724, PBI_OON 2938), 2♂, 1♀; Coachella Valley, W side of Snow Creek Road off Highway 111, 33.9096°N, 116.6733°W, Apr. 28, 2004, creosote bush scrub on stable sand dune system, elev. 1190 ft (T. Prentice, CAS 39725, PBI_OON 2927), 1♂; Coachella Valley, W side of Snow Creek Road off Highway 111, 33.9104°N, 116.6757°W, Apr. 28, 2004, creosote bush scrub on stable sand dune system, elev. 1195 ft (T. Prentice, CAS 39915, PBI_OON 2949), 2♀; Coachella Valley, W side of Snow Creek Road off Highway 111, 33.9104°N, 116.6783°W, Apr. 28, 2004, creosote bush scrub on stable sand dune system, elev. 1200 ft (T. Prentice, CAS 39723, PBI_OON 2939), 1♀; Coachella Valley Preserve, 33.7739°N, 116.3259°W, Apr. 9, 2004, sand dune system, elev. 140 ft (T. Prentice, CAS 39716, 39720, PBI_OON 2933, 2947), 2♀. *San Diego Co.*: Anza-Borrego Desert State Park, W boundary at S-22, Apr. 17, 1981, under granite float (D. Ubick, CDU PBI_OON 3666), 1♀; Mountain Springs, near Desert View Tower, Mar. 29, 1960 (W. Gertsch, W. Ivie, R. Schrammel, AMNH PBI_OON 1600), 1♂, 1♀.

DISTRIBUTION: Arizona and southern California.

Noonops sonora (Gertsch and Davis), new combination

Figures 138–152

Oonops sonora Gertsch and Davis, 1942: 6, fig. 14 (female holotype from Guaymas, Sonora, Mexico, in AMNH; examined).

DIAGNOSIS: Males have a semicircular, recurved lobe at the tip of the embolus (figs. 138–142); females have an elongated anterior receptaculum and a rounded median sclerotization (figs. 144–152).

MALE (PBI_OON 3617, figs. 138–143): Total length 1.17. Anterior portion of endites with two processes, both pointed, directed posteriorly; serrula absent. Leg spination: tibiae: III v0-0-1p; IV v0-0-2; metatarsi: III v1r-1r-0; IV v0-0-1r. Embolus tip with semicircular, recurved lobe.

FEMALE (PBI_OON 1741, figs. 144–152): Total length 1.45. Leg spination: tibiae: III v0-0-1p; IV p0-1-1, v0-1p-2, r1-0-0; metatarsi: III v0-0-1p; IV v0-1p-2. Anterior receptaculum elongated, narrow; posterior receptaculum with rounded anterior sclerotization.

MATERIAL EXAMINED: UNITED STATES: **Arizona**: *Pima Co.*: Magee Road, Tucson, Oct. 30, 1960, *Neotoma* nests (A. Aschwanden, AMNH PBI_OON 38516), 1♀. **California**: *Los Angeles Co.*: Pearblossom to Valyermo, Apr. 19, 1960 (W. Gertsch, W. Ivie, R. Schrammel, AMNH PBI_OON 1597), 1♀; Santa Monica, Dec. 19, 1933 (W. Ivie, AMNH PBI_OON 1746), 1♂, 1♀. MEXICO: **Baja California**: 1.5 mi NW Cataviña, Dec. 29, 1981, under small boulders (D. Ubick, CDU PBI_OON 3617), 3♂, 1♀. **Baja California Sur**: 4 mi S Santa Rosalía, Jan. 8, among fine soil, boulders (V. Roth CAS 25889, PBI_OON 2403), 1♀. **Sonora**: Guaymas, June 16, 1939 (L. Davis, AMNH PBI_OON 1741), 1♀ (holotype).

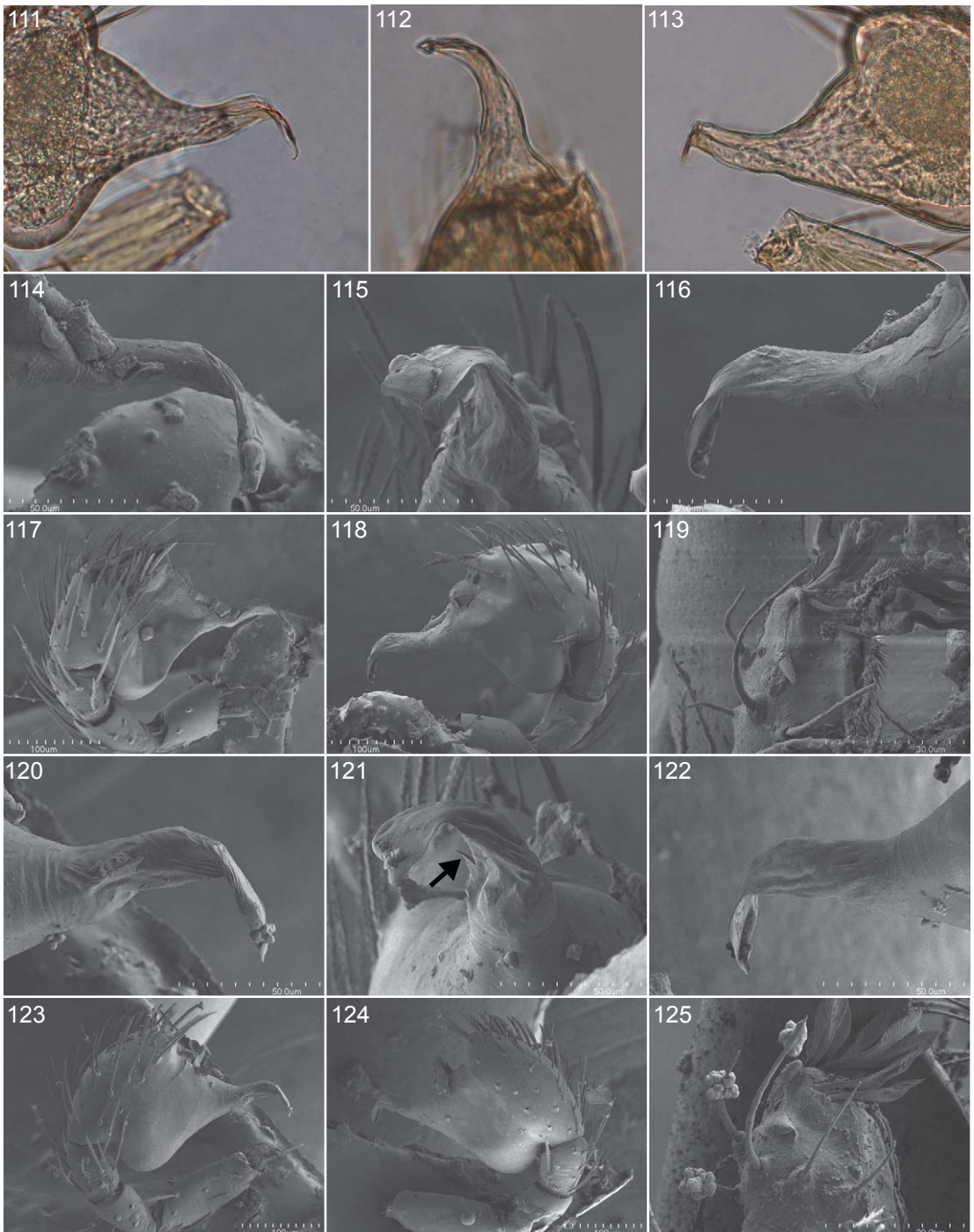
DISTRIBUTION: Apparently relatively widespread in the southwestern United States (Arizona and southern California) and the adjacent parts of Mexico (Sonora, Baja California, and Baja California Sur).

Noonops mortero, new species

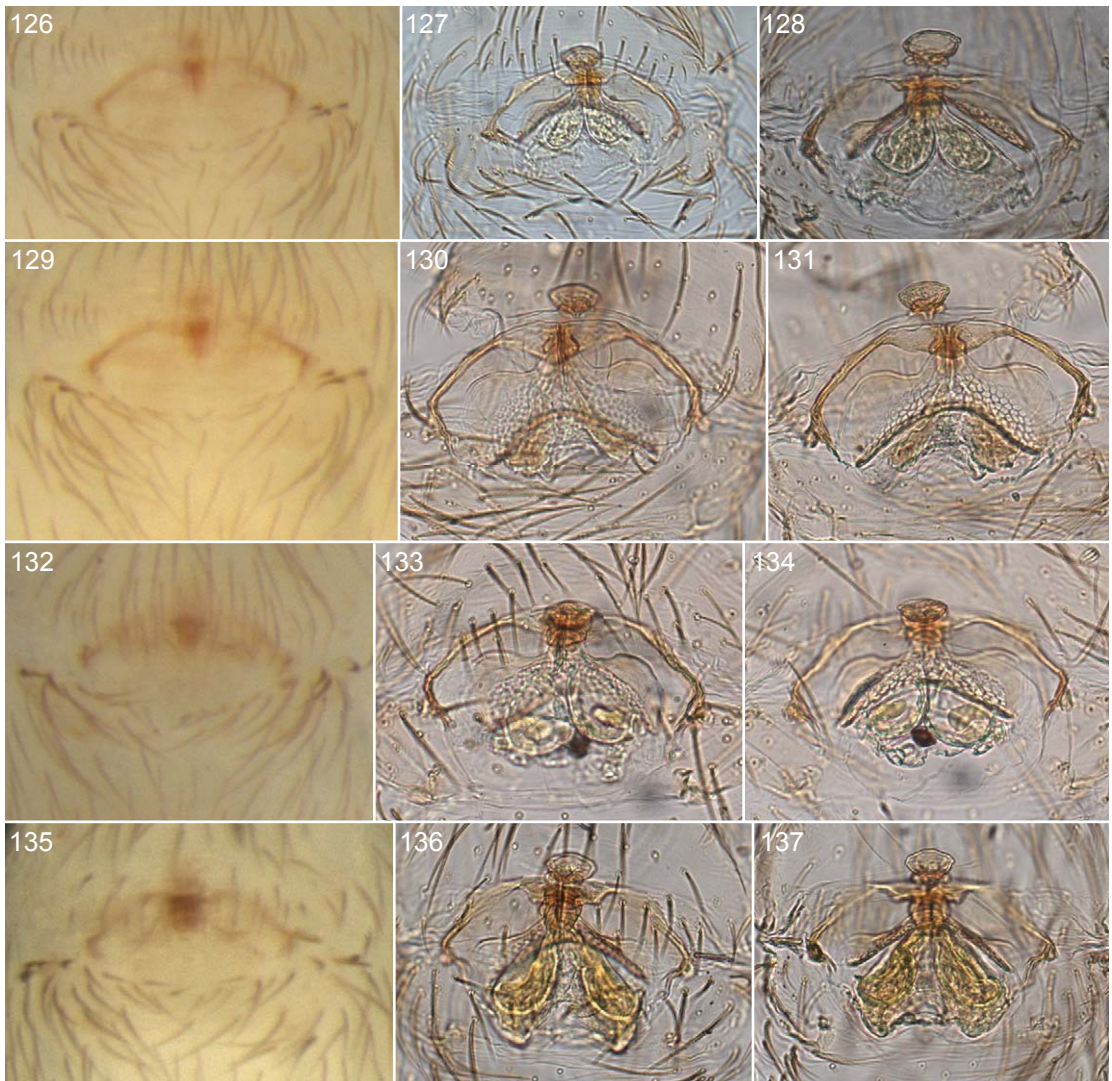
Figures 153–163

TYPES: Male holotype, female allotype, and female paratype taken under rocks and thatch in a palm grove at Mortero Palms, south of Dos Cabezas, Anza-Borrego Desert State Park, San Diego, California (Mar. 26, 1991; D. Ubick), deposited in CAS (PBI_OON 35676).

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



FIGURES 111–125. *Noonops ocotillo*, new species, males from Riverside (111–119) and San Diego (120–125) Counties. **111, 114, 120.** Left embolus, prolateral view. **112, 115, 121.** Same, ventral view (arrow to basal projection on embolus). **113, 116, 122.** Same, retrolateral view. **117, 123.** Left palp, prolateral view. **118, 124.** Same, retrolateral view. **119, 125.** Tip of endite, ventral view.

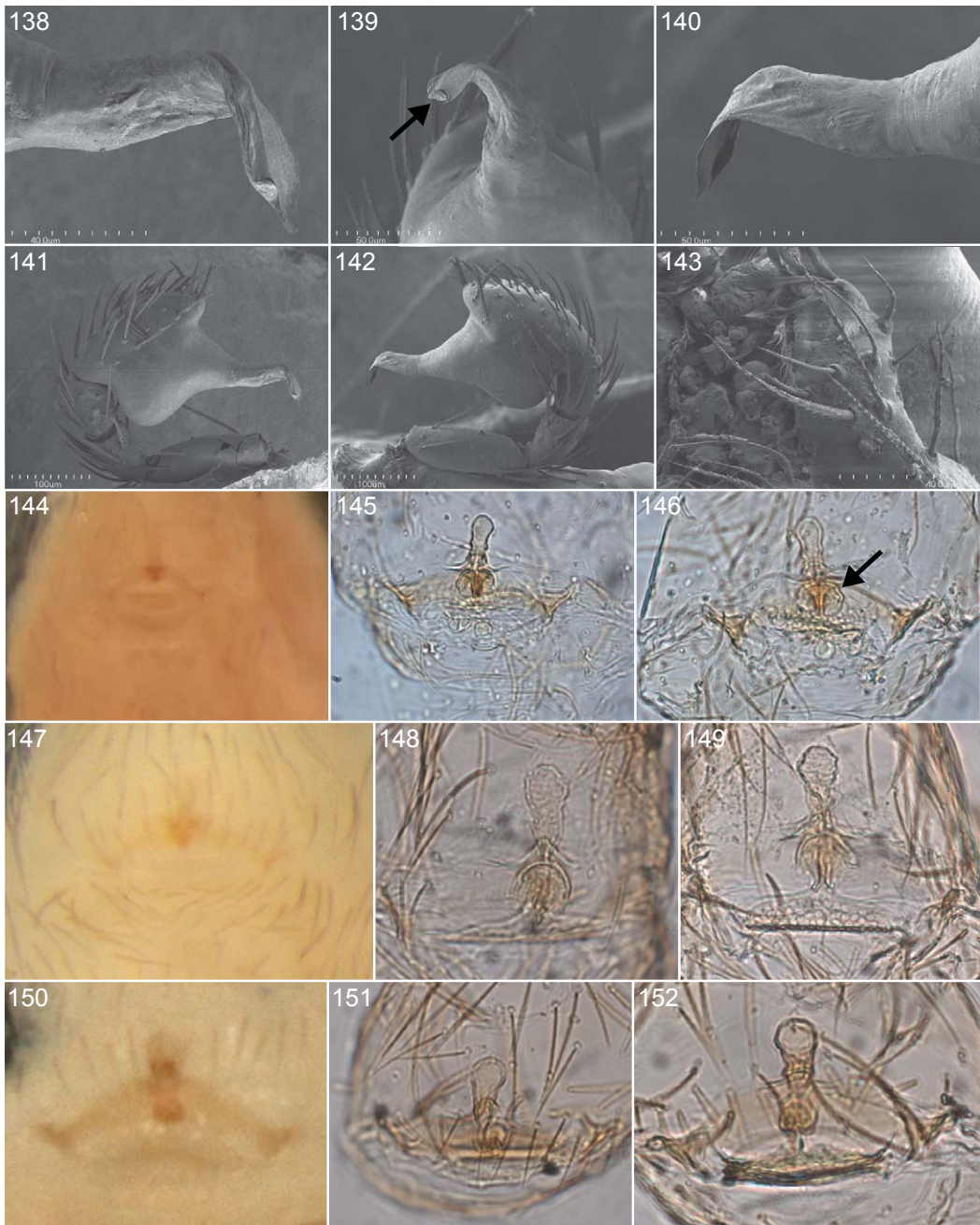


FIGURES 126–137. *Noonops ocotillo*, new species females from Arizona (126–128), San Diego County (129–131), and Riverside County (132–134, Snow Creek Road; 135–137, Coachella Valley Preserve). **126, 127, 129, 130, 132, 133, 135, 136.** Genitalia, ventral view. **128, 131, 134, 137.** Same, dorsal view.

DIAGNOSIS: Males can easily be recognized by the enlarged, sharply bent basal process on the embolus (figs. 153–158), females by the long anterior receptaculum set on a strongly arched base (figs. 162, 163).

MALE (PBI_OON 35676, figs. 153–160): Total length 1.39. Anterior portion of endites with single anterior process situated distally, directed anteriorly; serrula absent. Leg spination (leg III missing): tibia IV v0-0-2; metatarsus IV v0-0-2. Embolus with basal process greatly elongated.

FEMALE (PBI_OON 35676, figs. 161–163): Total length 1.72. Leg spination: tibiae: III v0-0-1p; IV v0-0-2; metatarsi: III v0-0-1r; IV v0-0-2. Anterior receptaculum elongated, situated anterior of wide, recurved sclerotization.



FIGURES 138–152. *Noonops sonora* (Gertsch and Davis), male from Baja California (138–143) and females from Sonora (144–146), Baja California (147–149), and Baja California Sur (150–152). **138.** Left embolus, prolateral view. **139.** Same, ventral view (arrow to recurved lobe on embolus tip). **140.** Same, retrolateral view. **141.** Left palp, prolateral view. **142.** Same, retrolateral view. **143.** Tip of endite, ventral view. **144, 145, 147, 148, 150, 151.** Genitalia, ventral view. **146, 149, 152.** Same, dorsal view (arrow to rounded median sclerotization).

OTHER MATERIAL EXAMINED: One female taken in a *Neotoma* rodent nest on Magee Road, Tucson, Pima Co., Arizona, Nov. 10, 1960 (A. Aschwenden, AMNH PBI_OON 38489) was damaged during digestion, but may belong to this species, as it also seems to have an elongated anterior receptaculum but not more posteriorly situated, heavily sclerotized median elements. However, another damaged female taken in the same habitat has those median sclerotized elements and seems to belong to *N. sonora* instead, and thus possibly the median elements were simply lost during preparation of specimen 38489.

DISTRIBUTION: San Diego Co., California (possibly east to Pima Co., Arizona).

***Noonops joshua*, new species**

Figures 164–178

TYPES: Male holotype, female allotype, and female paratype taken at an elevation of 3465 feet at the west entrance to Joshua Tree National Monument, 34°05'52.0"N, 116°15'53"W, San Bernardino Co., California (Apr. 24–27, 2007; T. Prentice), deposited in CAS (39730, PBI_OON 2953).

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

DIAGNOSIS: Males can be recognized by the relatively narrow embolus with an expanded tip (figs. 164–168), and the absence of processes on the anterior portion of the endites (fig. 169); females have a squared anterior receptaculum situated anteriorly of a rectangular median sclerotization (figs. 170–178).

MALE (PBI_OON 2955, figs. 164–169): Total length 1.01. Anterior portion of endites without processes; serrula absent. Leg spination: femur III d1-0-0; tibiae: III v0-1p-1p; IV p1-0-1, v0-1p-2, r1-0-1; metatarsi: III v0-0-2, r0-0-1; IV p0-0-1, v0-1p-1p. Embolus relatively narrow, with expanded tip.

FEMALE (PBI_OON 2953, figs. 170–178): Total length 1.17. Leg spination: femora III, IV d1-0-0; tibiae: III v0-0-2; IV p1-0-1, v0-0-2, r1-0-1; metatarsi: III v0-1p-2, r0-0-1; IV p0-0-1, v0-1p-2, r0-0-1. Anterior receptaculum squared; median sclerotization relatively long, rectangular.

OTHER MATERIAL EXAMINED: UNITED STATES: **California:** *Riverside Co.:* Cactus City, 10 mi W Chiriaco Summit, Mar. 23, 2000, pitfall, elev. 1800 ft (R. Vetter, UCR PBI_OON 35703), 1 ♀; Cactus City, 11 mi W Chiriaco Summit, Mar. 20, 2001, elev. 400 m (R. Vetter, UCR PBI_OON 35702), 1 ♀; 0.5 mi S Carrizo Road turnoff on Highway 74, Dec. 17, 2000, sumac leaf duff, elev. 3600 ft (R. Vetter, UCR PBI_OON 35701), 3 ♀. *San Bernardino Co.:* Joshua Tree National Monument, W entrance, 34°06'01.8"N, 116°15'49"W, Apr. 24–27, 2007, elev. 3490 ft (T. Prentice, CAS 39729, PBI_OON 2952), 1 ♀; Joshua Tree National Monument, W entrance, 34°06'01.8"N, 116°15'53"W, Apr. 24–27, 2007, elev. 3490 ft (T. Prentice, CAS 39728, PBI_OON 2955), 1 ♂; Zzyzx, 10 mi S Baker, May 27–29, 1995, under rocks and boards (D. Ubick, W. Savary, CDU PBI_OON 35678), 1 ♂.

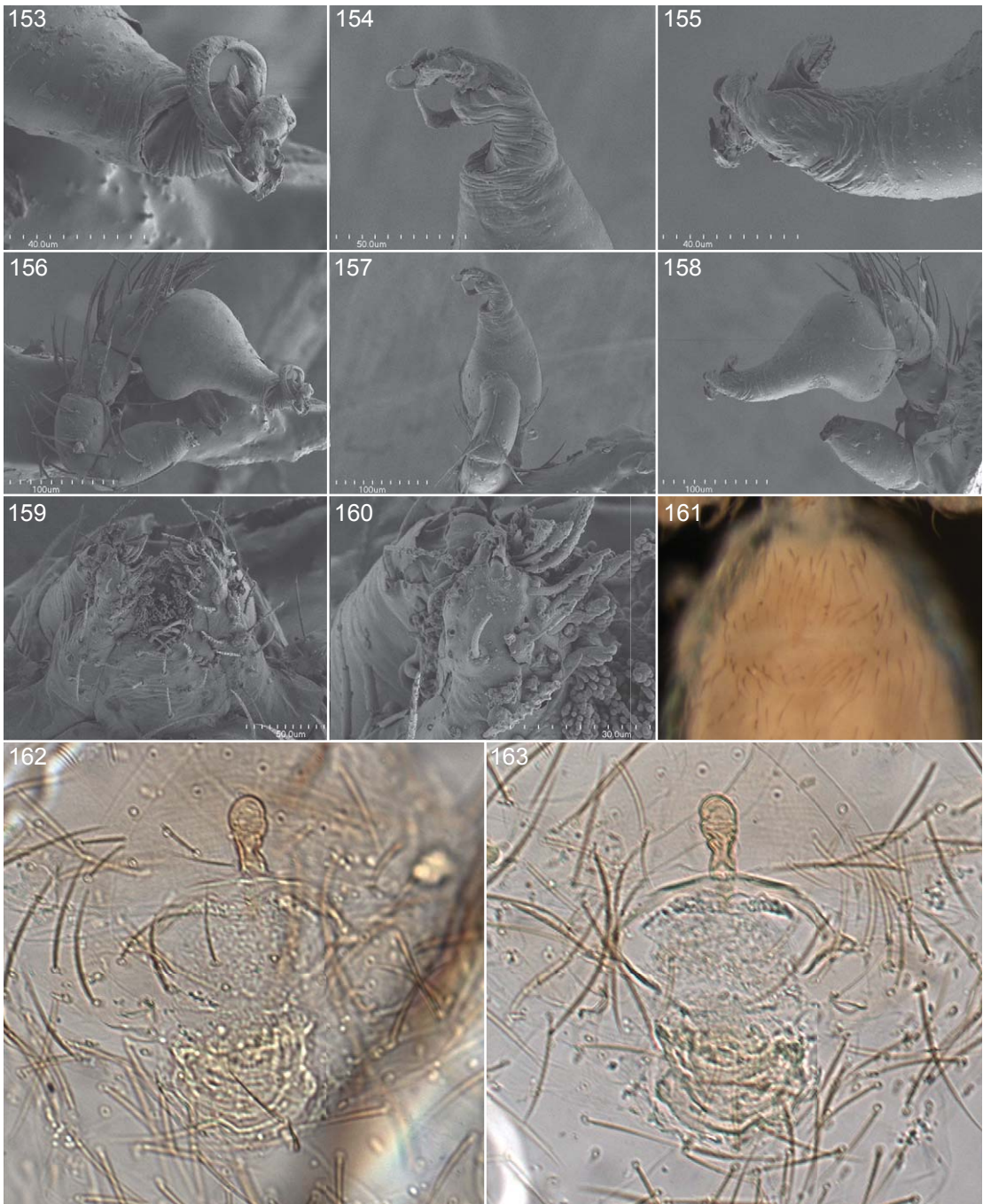
DISTRIBUTION: Riverside and San Bernardino Counties, California.

***Noonops skinner*, new species**

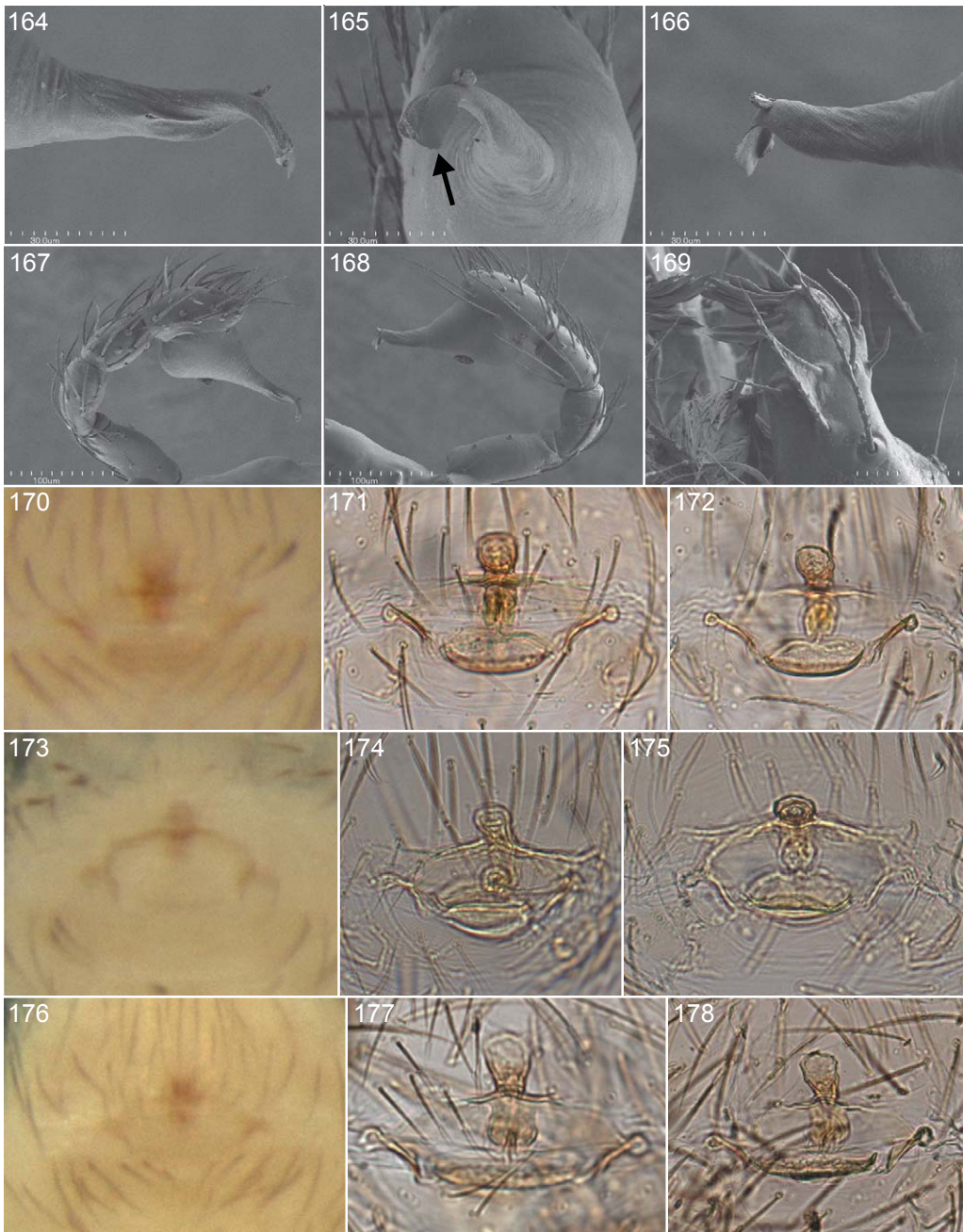
Figures 179–193

TYPE: Male holotype and female allotype taken from ground litter in coastal sage scrub at an elevation of 1540 feet at Lake Skinner, 33°35'31"N, 117°02'25"W, Riverside Co., California (Dec. 20, 1998; T. Prentice), deposited in CAS (39914, PBI_OON 2957).

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



FIGURES 153–163. *Noonops mortero*, new species, male (153–160) and female (161–163). **153.** Left embolus, prolateral view. **154.** Same, ventral view. **155.** Same, retrolateral view. **156.** Left palp, prolateral view. **157.** Same, ventral view. **158.** Same, retrolateral view. **159.** Mouthparts, ventral view. **160.** Tip of endite, same. **161, 162.** Genitalia, ventral view. **163.** Same, dorsal view.



FIGURES 164–178. *Noonops joshua*, new species, male from San Bernardino County (164–169), female from same locality (170–172), and females from Riverside County (Carrizo Road, 173–175; Cactus City 176–178). **164.** Left embolus, prolateral view. **165.** Same, ventral view (arrow to expanded embolus tip). **166.** Same, retrolateral view. **167.** Left palp, prolateral view. **168.** Same, retrolateral view. **169.** Tip of endite, ventral view. **170, 171, 173, 174, 176, 177.** Genitalia, ventral view. **172, 175, 178.** Same, dorsal view.

DIAGNOSIS: Males can be recognized by the sharply pointed lateral expansion on the tip of the embolus (figs. 179–186), females by the wide median genitalic sclerotization, which is wider than the anterior receptaculum (figs. 188–193).

MALE (PBI_OON 2956, figs. 179–187): Total length 1.10. Anterior portion of endites with two processes, both pointed, directed posteriorly; serrula absent. Leg spination: femora: III d0-1-1; IV d0-0-1; tibia IV p1-0-1, v0-0-2, r1-0-0; metatarsi: III v0-0-1p; IV p0-0-1, v0-0-2. Embolus distally long, narrow, tip with sharply pointed lateral expansion.

FEMALE (PBI_OON 2957, figs. 188–193): Total length 1.36. Leg spination: femora: III d1-0-1; IV d1-0-0; tibiae: III v0-0-1p; IV p0-0-1, v0-1p-2; metatarsi: III v1p-0-2; IV p1-0-1, v0-0-2, r1-0-1. Anterior receptaculum squared, narrower than median sclerotization.

OTHER MATERIAL EXAMINED: UNITED STATES: **California:** *Riverside Co.:* Lake Skinner, 33°35'31"N, 117°02'25"W, Dec. 1–20, 1998, ground litter in coastal sage scrub, elev. 1540 ft (T. Prentice, CAS 39726, 39727, 39917, 39918, 39920, PBI_OON 2954, 2956, 2958–2960), 6♂, 4♀.

DISTRIBUTION: Known only from Lake Skinner, Riverside Co., California.

Noonops coachella, new species

Figures 194–204

TYPE: Male holotype taken on a sand dune system at an elevation of 150 ft in the Coachella Valley Preserve, 33.7882°N, 116.3039°W, Riverside County, California (May 1–2, 2003; T. Prentice), deposited in CAS (39927, PBI_OON 2935).

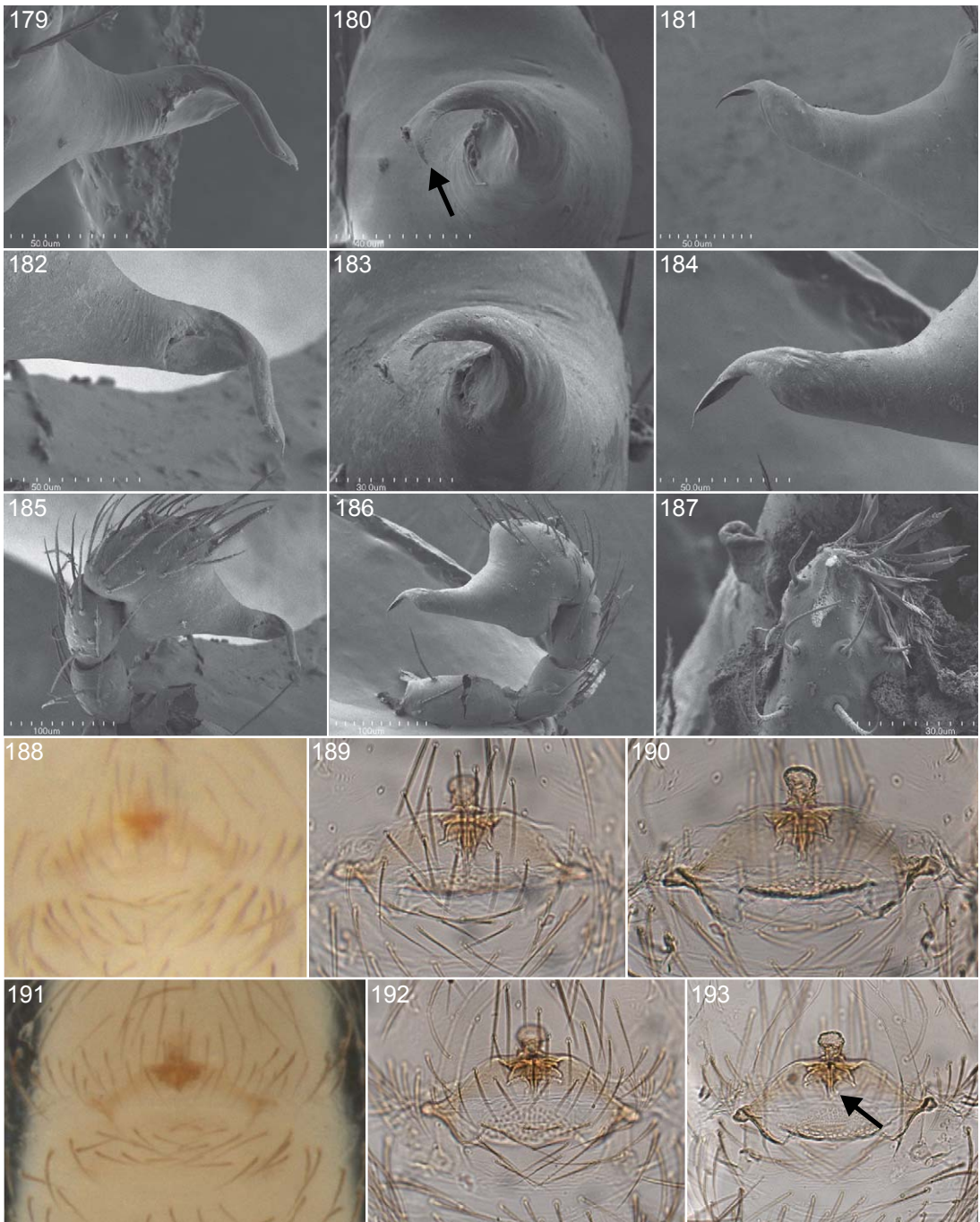
ETYMOLOGY: The specific name refers to type locality.

DIAGNOSIS: Males can be recognized by the relatively narrow embolus, the tip of which extends further on the retrolateral side than on the prolateral side (figs. 194–199); females resemble those of *N. tarantula* but have a distinctively sinuous sclerotized posterior genitalic ridge (figs. 203, 204).

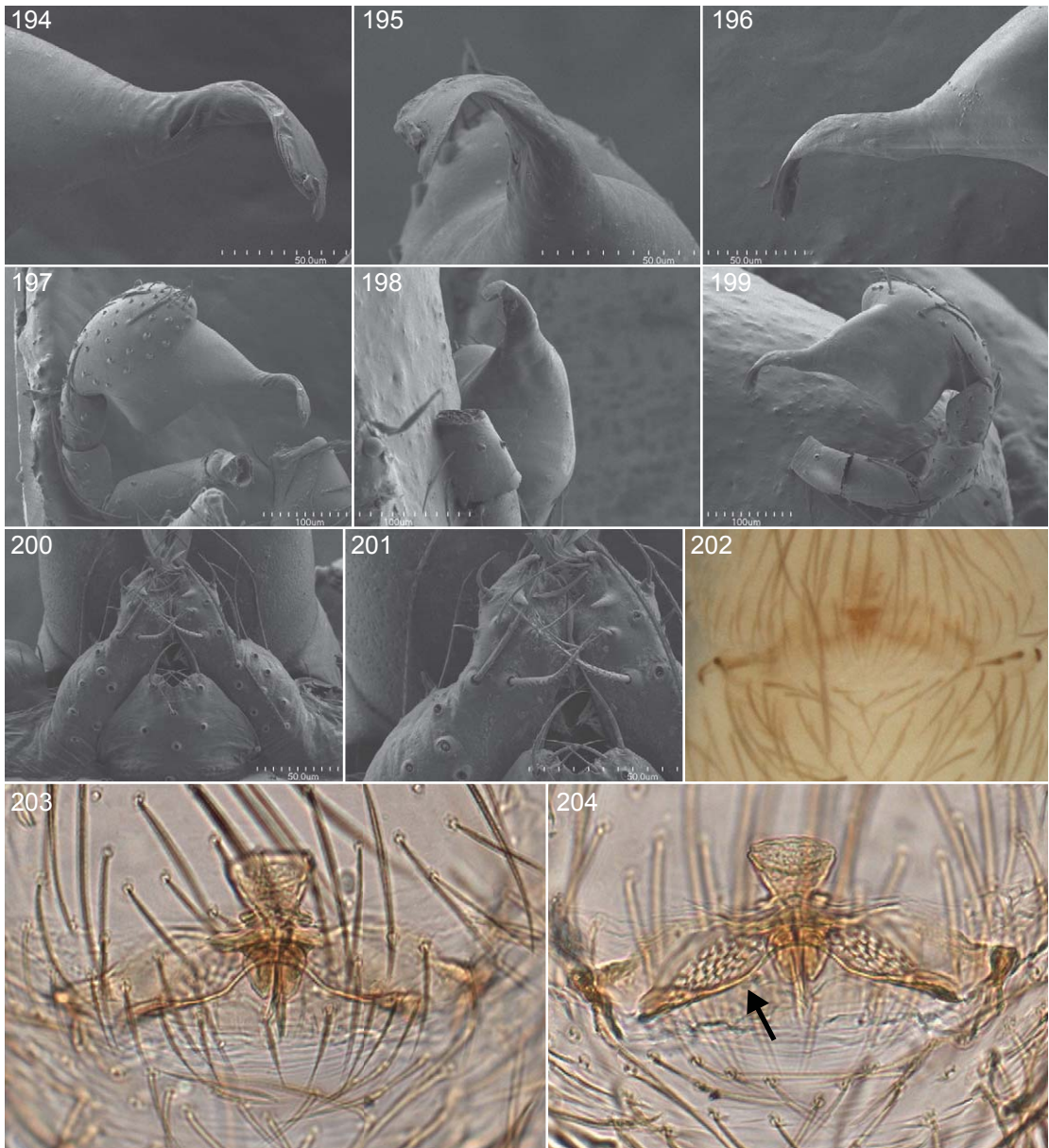
MALE (PBI_OON 2943, figs. 194–201): Total length 1.25. Anterior portion of endites with two processes, distal process blunt, directed anteriorly, proximal process pointed, directed posteromedially; serrula absent. Leg spination: tibiae: III p0-1-0, v1p-0-2, r0-1-0; IV p0-1-0, v0-0-1p, r0-1-0; metatarsi: III v0-1p-0; IV v0-1p-2, r0-1-0. Embolus relatively narrow, tip prolonged on retrolateral side.

FEMALE (PBI_OON 2944, figs. 202–204): Total length 1.52. Leg spination: tibiae: III p1-0-1, v0-0-2, r0-0-1; IV p0-1-0, v0-1r-1p, r0-1-0; metatarsi: III v0-0-1p; IV p1-0-0, v0-1p-2, r1-0-0. Anterior receptaculum triangular, situated anterior to W-shaped ridge.

OTHER MATERIAL EXAMINED: UNITED STATES: **California:** *Riverside Co.:* Coachella Valley Preserve, 33.7730°N, 116.3260°W, Apr. 9, 2004, sand dune system, elev. 140 ft (T. Prentice, CAS 39923, PBI_OON 2937), 1♂; Coachella Valley Preserve, 33.7735°N, 116.3086°W, Apr. 6, 2004, sand dune system, elev. 120 ft (T. Prentice, CAS 39922, PBI_OON 2941), 2♂; Coachella Valley Preserve, 33.7735°N, 116.3103°W, Apr. 8, 2004, sand dune system, elev. 120 ft (T. Prentice, CAS 39924, PBI_OON 2940), 1♂; Coachella Valley Preserve, 33.7748°N, 116.3261°W, Apr. 9, 2004, sand dune system, elev. 140 ft (T. Prentice, CAS 39925, PBI_OON 2928), 1♂; Coachella Valley Preserve, 33.77487°N, 116.3103°W, Apr. 8–July 8, 2004, sand dune system, elev. 120 ft (T. Prentice, CAS 39719, 39721, PBI_OON 2942, 2951), 1♂, 1♀; Coachella Valley Preserve, 33.7830°N, 116.3022°W, Apr. 14, 2004, sand dune system, elev. 135 ft (T. Prentice, CAS 39919, PBI_OON 2946), 1♀; Coachella Valley Preserve, 33.7830°N, 116.3028°W, Apr. 14,



FIGURES 179–193. *Noonops skinner*, new species, male (179–187) and female (188–193). **179, 182.** Left embolus, prolateral view. **180, 183.** Same, ventral view (arrow to lateral expansion on embolus tip). **181, 184.** Same, retrolateral view. **185.** Left palp, prolateral view. **186.** Same, retrolateral view. **187.** Tip of endite, ventral view. **188, 189, 191, 192.** Genitalia, ventral view. **190, 193.** Same, dorsal view (arrow to wide median sclerotization).



FIGURES 194–204. *Noonops coachella*, new species, male (194–201) and female (202–204). **194.** Left embolus, prolateral view. **195.** Same, ventral view. **196.** Same, retrolateral view. **197.** Left palp, prolateral view. **198.** Same, ventral view. **199.** Same, retrolateral view. **200.** Mouthparts, ventral view. **201.** Tip of endites, same. **202, 203.** Genitalia, ventral view. **204.** Same, dorsal view (arrow to sinuous posterior ridge).

2004, sand dune system, elev. 135 ft (T. Prentice, CAS 39718, PBI_OON 2932), 1 ♀; Coachella Valley Preserve, 33.7846°N, 116.3159°W, Apr. 11, 2004, sand dune system, elev. 145 ft (T. Prentice, CAS 39931, PBI_OON 2943), 1 ♂; Coachella Valley Preserve, 33.7852°N, 116.3011°W, Apr. 14, 2004, sand dune system, elev. 135 ft (T. Prentice, CAS 39928, PBI_OON 2936), 2 ♂; Coachella Valley Preserve, 33.7852°N, 116.3014°W, Apr. 14, 2004, sand dune system, elev. 135 ft (T. Prentice, CAS 39926, PBI_OON 2934), 1 ♀;

Coachella Valley Preserve, 33.7866°N, 116.3075°W, Apr. 13, 2004, sand dune system, elev. 150 ft (T. Prentice, CAS 39913, 39930, PBI_OON 2931, 2945), 2 ♀; Coachella Valley Preserve, 33.7882°N, 116.3027°W, May 1–2, 2003, sand dune system, elev. 150 ft (T. Prentice, CAS 39717, PBI_OON 2944), 1 ♀; Coachella Valley Preserve, 33.8014°N, 116.3445°W, Apr. 9, 2004, sand dune system, elev. 190 ft (T. Prentice, CAS 39929, PBI_OON 2950), 1 ♂; Coachella Valley Preserve, 33.8016°N, 116.3480°W, May 21–22, 2003, sand dune system, elev. 190 ft (T. Prentice, CAS 39921, PBI_OON 2948), 1 ♀.

DISTRIBUTION: Known only from a sand dune system at Coachella Valley Preserve, Riverside Co., California; *N. californicus* also occurs in the Preserve (albeit in a palm grove in a riparian area), and it is possible that some of the unscanned and undigested specimens listed above actually belong to that species instead.

Noonops californicus, new species

Figures 205–219

TYPE: Male holotype taken under a rock in a rat midden in a ravine at an elevation of 3600 feet in Deep Canyon, 0.5 miles south of Pinyon Crest turnoff, Santa Rosa Mountains, Riverside Co., California (Apr. 16, 1974; W. Icenogle), deposited in AMNH (PBI_OON 1599).

ETYMOLOGY: The specific name refers to type locality.

DIAGNOSIS: This species resembles *N. sonora*, but males have a shorter embolus tip (figs. 205–214) and females have the anterior margin of the postepigastric scutum heavily sclerotized (figs. 218, 219).

MALE (PBI_OON 1599, figs. 205–216): Total length 0.99. Anterior portion of endites with two processes, both short, blunt, directed medially; serrula absent. Leg spination: tibiae: III v0-0-1p; IV p1-0-0, v0-0-1p; metatarsi: III v0-0-2, r1-0-0; IV p0-1-0, v0-0-2, r0-1-0. Embolus tip relatively short, narrow, basal portion long, ridged.

FEMALE (PBI_OON 1598, figs. 217–219): Total length 1.30. Leg spination (leg III missing): tibia IV p1-0-0, v0-1p-2; metatarsus IV p0-1-1, v0-0-2, r0-0-1. Anterior receptaculum relatively long, narrow.

OTHER MATERIAL EXAMINED: UNITED STATES: **California:** *Riverside Co:* Deep Canyon, 0.5 mi S Pinyon Crest turnoff, Santa Rosa Mountains, Apr. 19, 1975, plant and rat litter in ravine, elev. 3600 ft (W. Icenogle, AMNH PBI_OON 1598), 1 ♀; Coachella Valley Preserve, McCallum Grove, 33°50'50.5"N, 116°18'44.3"W, Aug. 8, 2003, palm grove in riparian area, elev. 635 ft (D. Hutchinson, CAS 39722, PBI_OON 2929), 2 ♀. *San Diego Co.:* Mountain Palm Canyon, Anza-Borrego Desert State Park, Mar. 26, 1991, under granite in palm grove (D. Ubick, CDU PBI_OON 35677), 1 ♂.

DISTRIBUTION: Riverside and San Diego Counties, California.

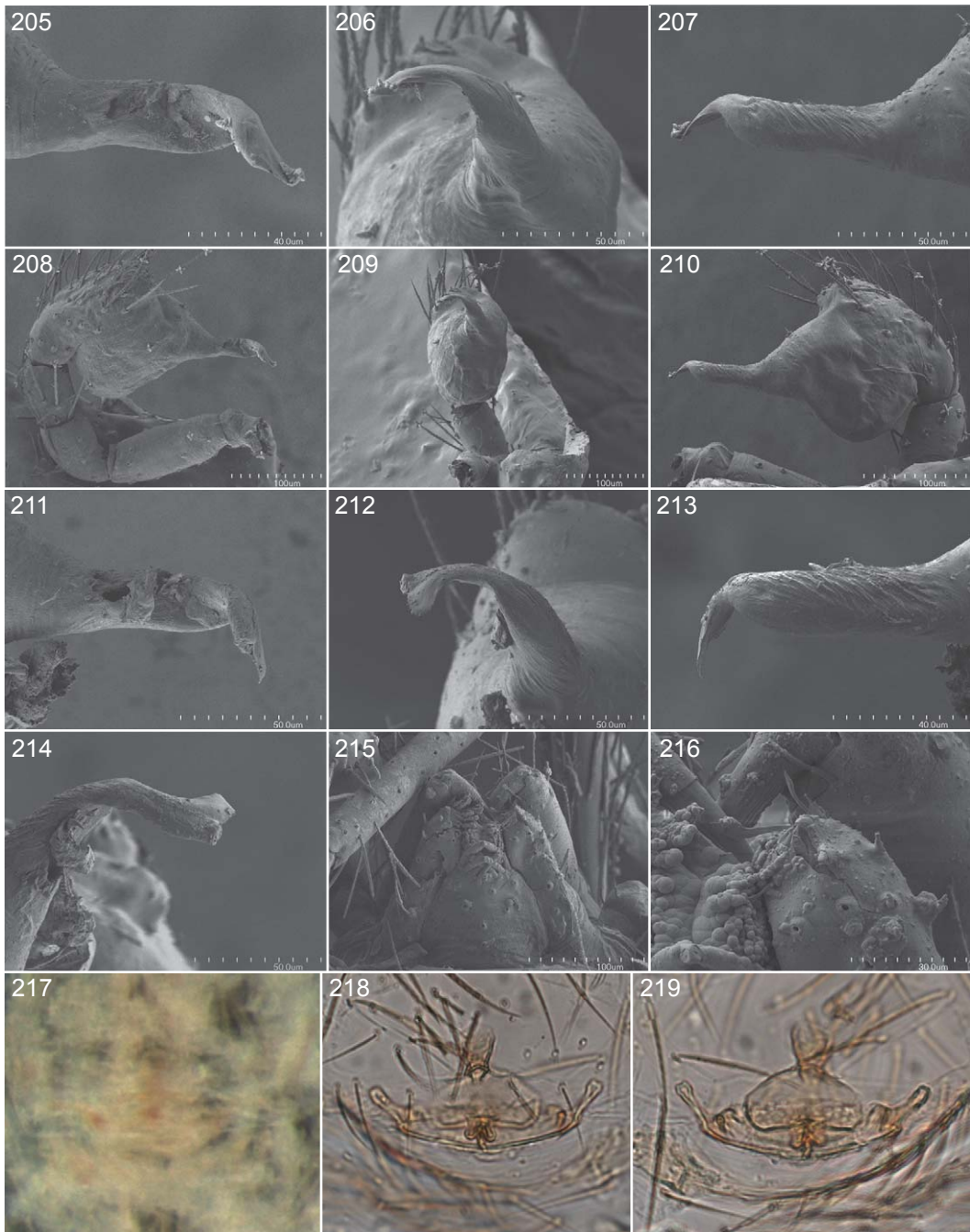
Noonops willisi, new species

Figures 220–224

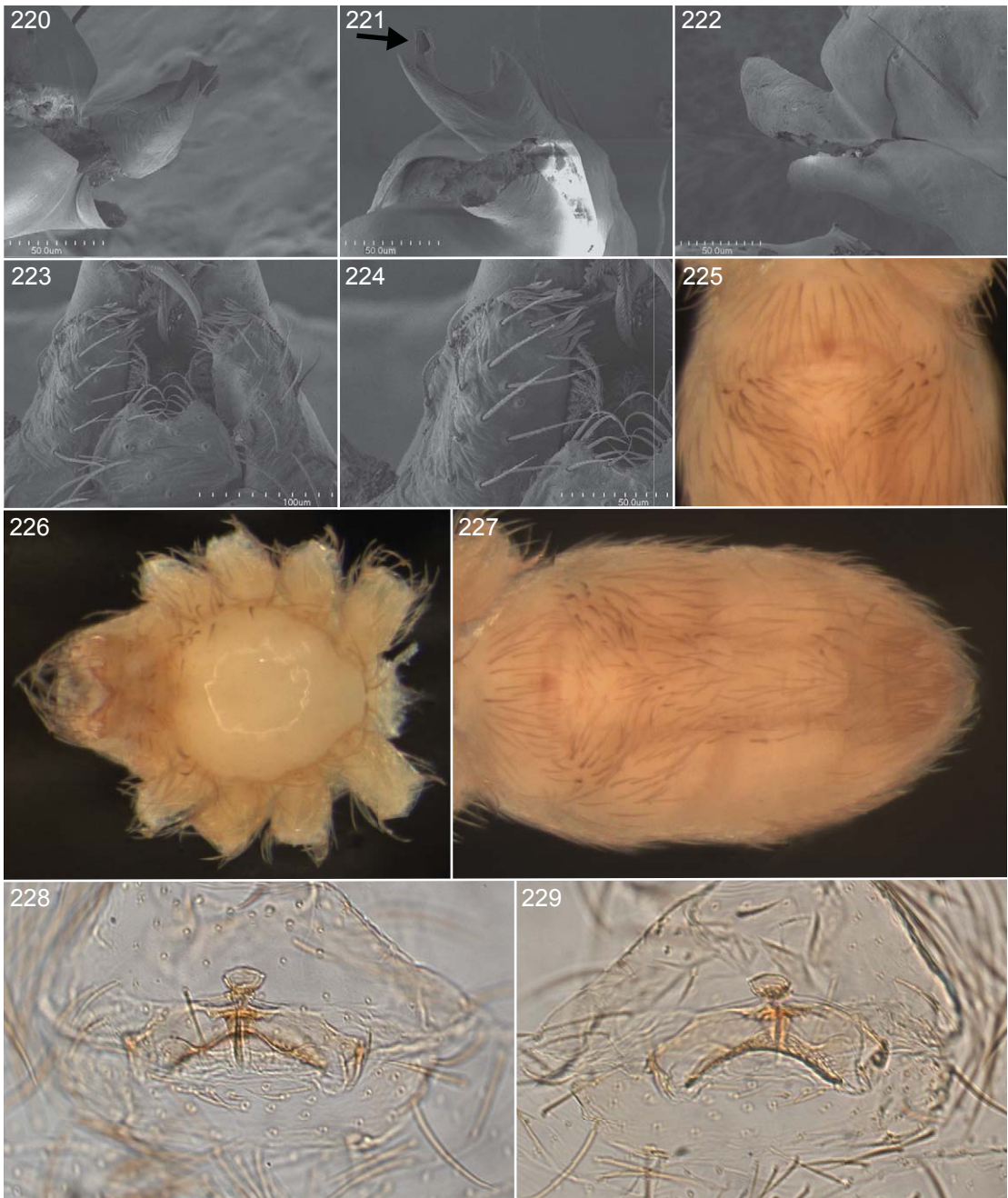
TYPE: Male holotype taken W of Reynosa, near the Texas border, Tamaulipas, Mexico (Nov. 28, 1937; L. Davis, B. Brown), deposited in AMNH (PBI_OON 1740).

ETYMOLOGY: The specific name is a patronym in honor of Willis Gertsch, who first recognized the species as new.

DIAGNOSIS: Males have a distinctively enlarged palpal bulb; the embolus resembles that of *N. furtivus* but has the opening oriented longitudinally rather than transversely (figs. 220–222).



FIGURES 205–219. *Noonops californicus*, new species, males from Riverside (205–210) and San Diego (211–216) Counties, and female from Riverside County (217–219). **205, 211.** Left embolus, prolateral view. **206, 212.** Same, ventral view. **207, 213.** Same, retrolateral view. **208.** Left palp, prolateral view. **209.** Same, ventral view. **210.** Same, retrolateral view. **214.** Left embolus, dorsal view. **215.** Mouthparts, ventral view. **216.** Tip of endite, same. **217, 218.** Genitalia, ventral view. **219.** Same, dorsal view.



FIGURES 220–229. *Noonops willisi*, new species, male (220–224) and *N. tarantula*, new species, female (225–229). 220. Left embolus, prolateral view. 221. Same, ventral view (arrow to longitudinal embolar opening). 222. Same, retrolateral view. 223. Mouthparts, ventral view. 224. Tip of endites, same. 225, 228. Genitalia, ventral view. 226. Sternum, ventral view. 227. Abdomen, ventral view. 229. Genitalia, dorsal view.

MALE (PBI_OON 1740, figs. 220–224):. Total length 1.41. Anterior portion of endites without processes; serrula present. Leg spination (leg III missing): tibia IV p1-0-0, v1p-2-2, r0-0-1; metatarsus IV p1-2-2, v0-2-2, r1-1-2. Embolus opening situated on short prong, longitudinally oriented.

FEMALE: Unknown.

OTHER MATERIAL EXAMINED: None.

DISTRIBUTION: Tamaulipas.

Noonops mesa, new species

Figures 230–240

TYPES: Male holotype and female allotype taken near the summit of Llera Mesa, 23°23'N, 98°59'W, Tamaulipas, Mexico (Apr. 16, 1963; W. Gertsch, W. Ivie), deposited in AMNH (PBI_OON 1727).

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

DIAGNOSIS: Males resemble those of *N. naci* but have a longer projection on the base of the embolus (figs. 230–235); females also resemble those of *N. naci* but have a much wider anterior receptaculum (figs. 239, 240).

MALE (PBI_OON 1727, figs. 230–237): Total length 1.41. Anterior portion of endites with three processes, all pointed, directed posteriorly; serrula absent. Leg spination: tibiae: III v0-1p-0; IV p0-0-1, v1p-0-0; metatarsi III, IV v1p-0-0. Embolar base with distinct, narrow spur; tip rounded.

FEMALE (PBI_OON 1727, figs. 238–240): Total length 1.94. Leg spination: femora: III d1-0-1; IV d1-0-1, p0-0-1; tibiae: III v0-1p-0; IV d1-0-0, p0-0-1, v1p-1r-2, r0-0-1; metatarsi: III v1p-0-0; IV d1-0-0, p0-0-1, v1p-0-1p. Anterior receptaculum widened anteriorly to about three times width of median duct; anterior membrane angular, posterior sclerotization V-shaped.

OTHER MATERIAL EXAMINED: MEXICO: **Tamaulipas**: Gómez Farías, Mar. 13, 1972, roadcut (J. Cooke, AMNH PBI_OON 1723), 1 ♂; Sierra de El Abra, Gómez Farías, Feb. 15, 1970, under stones in limestone roadcut at night (J. Cooke, AMNH PBI_OON 1711), 1 ♂.

DISTRIBUTION: Tamaulipas.

Noonops naci, new species

Figures 241–251

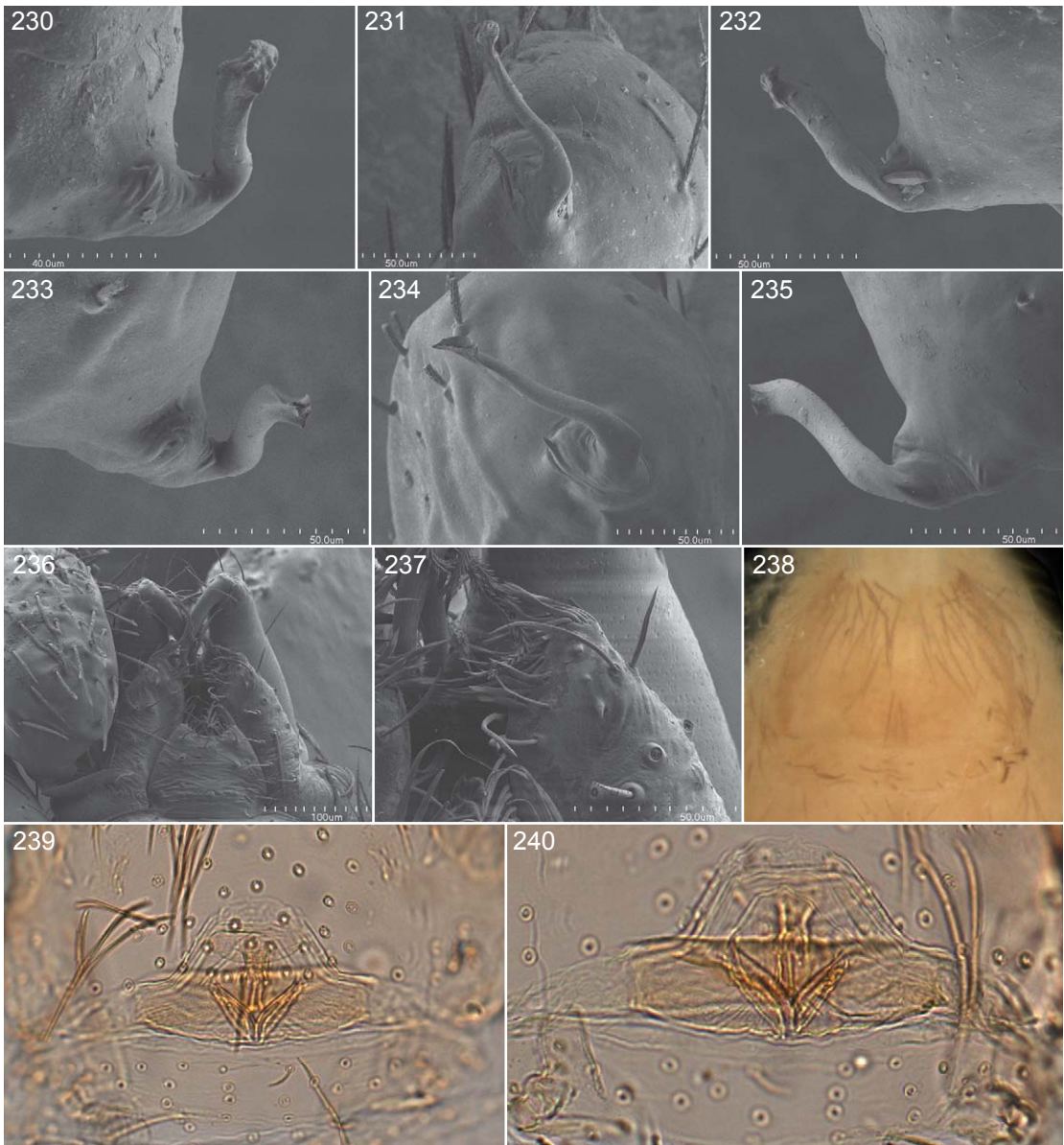
TYPES: Male holotype and female allotype taken at Arroyo de Nacimiento del Río Frío, Tamaulipas, Mexico (Mar. 15, 1972; J. Cooke), deposited in AMNH (PBI_OON 1712).

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

DIAGNOSIS: Males resemble those of *N. mesa* but have a shorter projection on the base of the embolus (figs. 241–246); females also resemble those of *N. mesa* but have a narrower anterior receptaculum (figs. 250, 251).

MALE (PBI_OON 37344, figs. 241–248): Total length 1.33. Anterior portion of endites with two processes, both pointed, distal process short, directed laterally, proximal process longer, directed posteriorly; serrula absent. Leg spination: femur IV d1-0-0; tibiae: III p0-1-0, v0-0-1p; IV v0-1r-2; metatarsi: III v1p-0-1p; IV p1-0-1, v0-1r-2, r1-0-1. Embolar base with ridges but without distinct spur, tip angular.

FEMALE (PBI_OON 1712, figs. 249–251): Total length 1.12. Leg spination: tibiae: III v0-1p-1p; IV p0-1-0, v1p-0-2; metatarsi: III v0-1p-1p; IV p1-0-0, v0-0-2, r1-0-1. Anterior

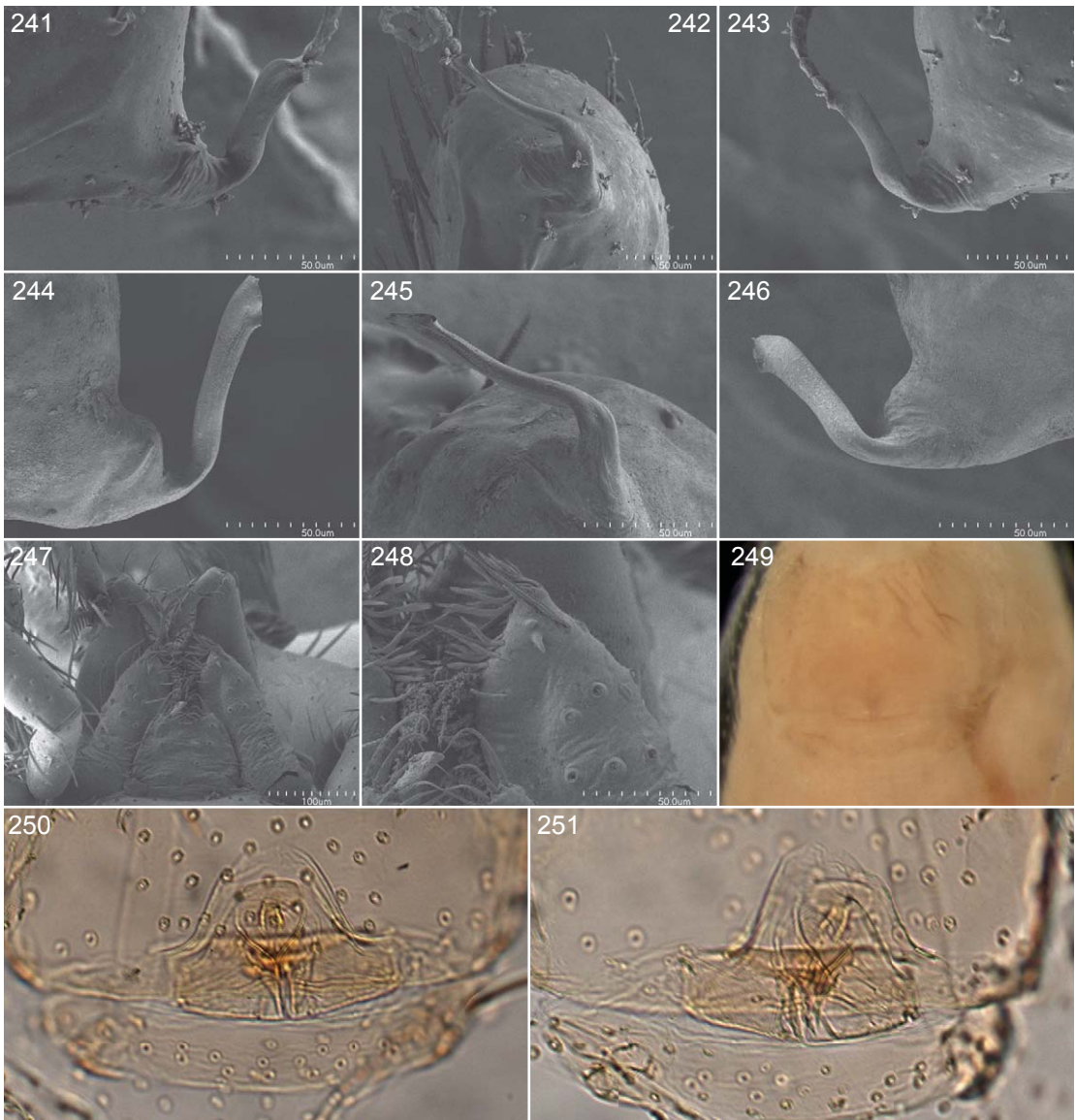


FIGURES 230–240. *Noonops mesa*, new species, male (230–237) and female (238–240). **230, 233.** Left embolus, prolateral view. **231, 234.** Same, ventral view. **232, 235.** Same, retrolateral view. **236.** Mouthparts, ventral view. **237.** Tip of endite, same. **238, 239.** Genitalia, ventral view. **240.** Same, dorsal view.

receptaculum relatively narrow; anterior membrane narrow, triangular but with broad apex, posterior sclerotization narrow.

OTHER MATERIAL EXAMINED: MEXICO: **San Luis Potosí:** 20 mi S Valles, Apr. 14, 1946 (A., L. Davis, AMNH PBI_OON 1722), 1 ♂. **Tamaulipas:** 6 mi S Victoria, 23°39'N, 99°05'W, Apr. 16, 1963 (W. Gertsch, W. Ivie, AMNH PBI_OON 37344), 1 ♂.

DISTRIBUTION: Tamaulipas and San Luis Potosí.



FIGURES 241–251. *Noonops naci*, new species, males from Tamaulipas (241–243, 247, 248) and San Luis Potosí (244–246) and female (249–251). **241, 244.** Left embolus, prolateral view. **242, 245.** Same, ventral view. **243, 246.** Same, retrolateral view. **247.** Mouthparts, ventral view. **248.** Tip of endite, same. **249, 250.** Genitalia, ventral view. **251.** Same, dorsal view.

***Noonops tarantula*, new species**

Figures 225–229

TYPE: Female holotype taken at a depth of 1 foot in a tarantula burrow at a site 16 miles east of San Luis, Sonora, Mexico (Nov. 29, 1959; V. Roth, Peterson, Jaeger), deposited in AMNH (PBI_OON 1668).

ETYMOLOGY: The specific name is a noun in apposition referring to the habitat in which the type specimen was collected.

DIAGNOSIS: Females resemble those of *N. ocotillo* but have much smaller posterior genitalic elements (figs. 228, 229).

MALE: Unknown.

FEMALE (PBI_OON 1668, figs. 225–229): Total length 1.48. Leg spination (leg III missing): tibia IV p0-0-1, v0-0-2, r0-0-1; metatarsus IV p1-0-1, v1p-1p-0, r1-0-1. Anterior receptaculum short, oval, situated anterior of wide arch; posterior receptaculum with anterior, T-shaped sclerotization.

OTHER MATERIAL EXAMINED: None.

DISTRIBUTION: Sonora.

Noonops miraflores, new species

Figures 260–262

TYPE: Female holotype taken under a rock in a thorn forest 2 miles northwest of Miraflores, Baja California Sur, Mexico (Jan. 12, 1982; D. Ubick), deposited in CAS (PBI_OON 3616).

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

DIAGNOSIS: Females can be recognized by the short, anteriorly widened anterior receptaculum situated anteriorly of a T-shaped sclerotization (figs. 261, 262).

MALE: Unknown.

FEMALE (PBI_OON 3616, figs. 260–262): Total length 1.45. Leg spination: tibiae: III v1p-1p-1p; IV p1-0-0, v0-1p-2; metatarsi: III v0-0-1p; IV p0-1-1, v0-0-1p. Anterior receptaculum triangular; T-shaped sclerotization strong.

OTHER MATERIAL EXAMINED: MEXICO: **Baja California Sur**: 1 mi W Agua Caliente, near Miraflores, Mar. 1, 1987, under rock (D. Ubick, CDU PBI_OON 49583), 1 ♀.

DISTRIBUTION: Baja California Sur.

Noonops culiacan, new species

Figures 263–274

TYPES: Male holotype and female allotype taken 6 miles south of Culiacán, Sinaloa, Mexico (July 22, 1954; W. Gertsch), deposited in AMNH (PBI_OON 1850).

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

DIAGNOSIS: Males resemble those of *N. californicus* but have a serrate embolar tip (figs. 263–267); females have a short, wide posterior receptaculum (figs. 273, 274).

MALE (PBI_OON 37341, figs. 263–270): Total length 0.95. Anterior portion of endites with two processes, distal process lobe shaped, directed anteriorly, proximal process pointed, directed laterally; serrula absent. Leg spination: tibiae: III v0-0-2; IV p1-0-0, v0-0-1p, r1-0-0; metatarsi: III v0-0-2, r0-1-0; IV p1-0-1, v1p-0-1p, r1-0-1. Embolus tip narrowed, with dorsal ridge.

FEMALE (PBI_OON 37341, figs. 271–274): Total length 1.03. Leg spination: tibiae: III v0-0-1p; IV v1p-0-2; metatarsi: III v0-0-2, r0-1-0; IV p1-0-1, v1p-0-1p, r1-0-1. Anterior receptaculum on short stalk, followed posteriorly by wide transverse sclerotization; anterior sclerotization of posterior receptaculum short.

OTHER MATERIAL EXAMINED: MEXICO: **Sinaloa**: 6 mi S Culiacán, July 22, 1954 (W. Gertsch, AMNH PBI_OON 37341), 5 ♂, 3 ♀; 40 mi S Culiacán, July 22, 1954 (W. Gertsch, AMNH PBI_OON 1634), 1 ♂.

DISTRIBUTION: Sinaloa.

Noonops taxquillo, new species

Figures 275–289

TYPES: Male holotype, female allotype, and one female and four male paratypes taken at Taxquillo (Tzindejeh), Río Tula, 20°33'N, 99°19'W, Hidalgo, Mexico (Aug. 20, 1964; J., W. Ivie), deposited in AMNH (PBI_OON 1726).

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

DIAGNOSIS: Males resemble those of *N. mesa* but have a wider embolar tip (figs. 275–277); females have a distinctively flower-shaped anterior receptaculum (figs. 281–289).

MALE (PBI_OON 1726, figs. 275–280): Total length 1.53. Anterior portion of endites with single, small, posteriorly directed projection; serrula present. Leg spination: tibiae: III p0-0-1, v1p-0-2; IV p1-0-1, v0-1r-2, r1-0-1; metatarsi: III v0-1p-2; IV p0-1-1, v0-0-2, r0-0-1. Embolar base with narrow spur, tip angular.

FEMALE (PBI_OON 1726, figs. 281–289): Total length 1.89. Leg spination: femur IV d1-0-0; tibiae: III v0-0-2; IV p1-0-1, v1p-1r-2, r1-0-1; metatarsi: III v0-1p-2, r1-1-0; IV p1-0-0, v0-0-2, r1-0-1. Anterior receptaculum flower-shaped; anterior membrane absent, posterior sclerotization splayed to near base.

OTHER MATERIAL EXAMINED: MEXICO: **Hidalgo:** Taxquillo (Tzindejeh), Río Tula, 20°33'N, 99°19'W, July 29, 1966 (J., W. Ivie, AMNH PBI_OON 1721), 2♂, 2♀. **San Luis Potosí:** 3.5 mi NE Ciudad del Maíz, 22°26'N, 99°35'W, Feb. 16, 1984, oak country (V., B. Roth, CAS 25895, PBI_OON 2409), 1♀; Tamazunchale, Apr. 19, 1963 (W. Gertsch, W. Ivie, AMNH PBI_OON 37343), 1♀.

DISTRIBUTION: San Luis Potosí and Hidalgo.

Noonops chapul, new species

Figures 290–300

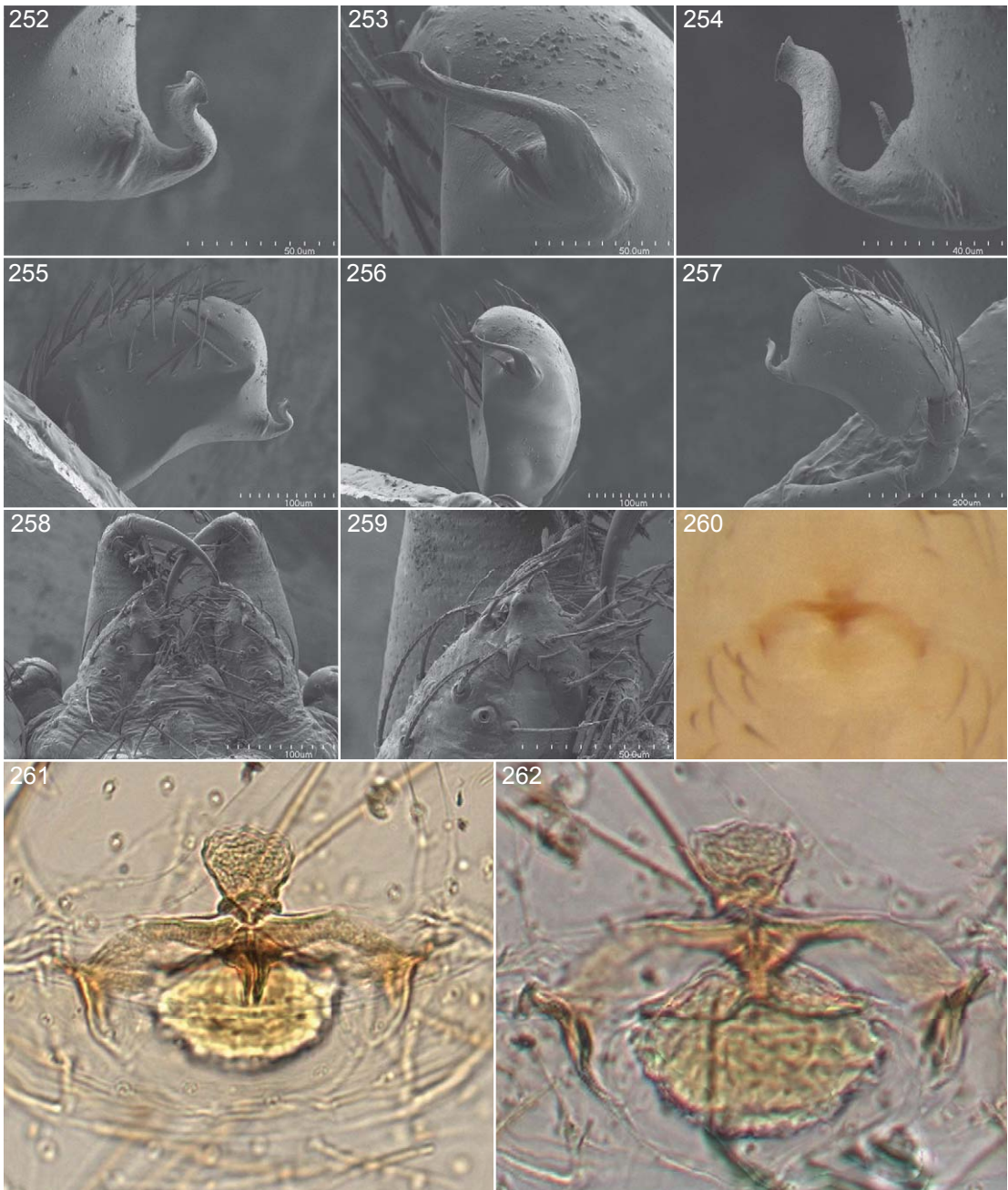
TYPES: Male holotype, female allotype, and female paratype taken 2 miles north of Chapulhuacán, 21°11'N, 98°57'W, Hidalgo, Mexico (Aug. 18, 1964; J., W. Ivie), deposited in AMNH (PBI_OON 37982).

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

DIAGNOSIS: Males resemble those of *N. taxquillo* but have a smaller projection on the base of the embolus (figs. 290–295); females resemble those of *N. mesa* but have smaller lateral sclerites at the base of the anterior receptaculum (figs. 299, 300). Both sexes have spines on the prolateral surface of the palpal patella and tibia (fig. 293) that resemble those found in the species of *Heteroonops* Dalmas.

MALE (PBI_OON 37982, figs. 290–297). Total length 1.36. Anterior portion of endites with two processes, both pointed, directed posteriorly; serrula present. Leg spination: femur III d0-1-1; tibiae: III p1-0-1, v0-1p-2, r1-0-1; IV p0-1-0, v1p-0-2, r0-1-0; metatarsi: III v0-1p-2, r0-0-1; IV d1-0-0, p1-0-0, v0-1p-2, r1-0-1. Embolar base with short, sharp projection, tip angular.

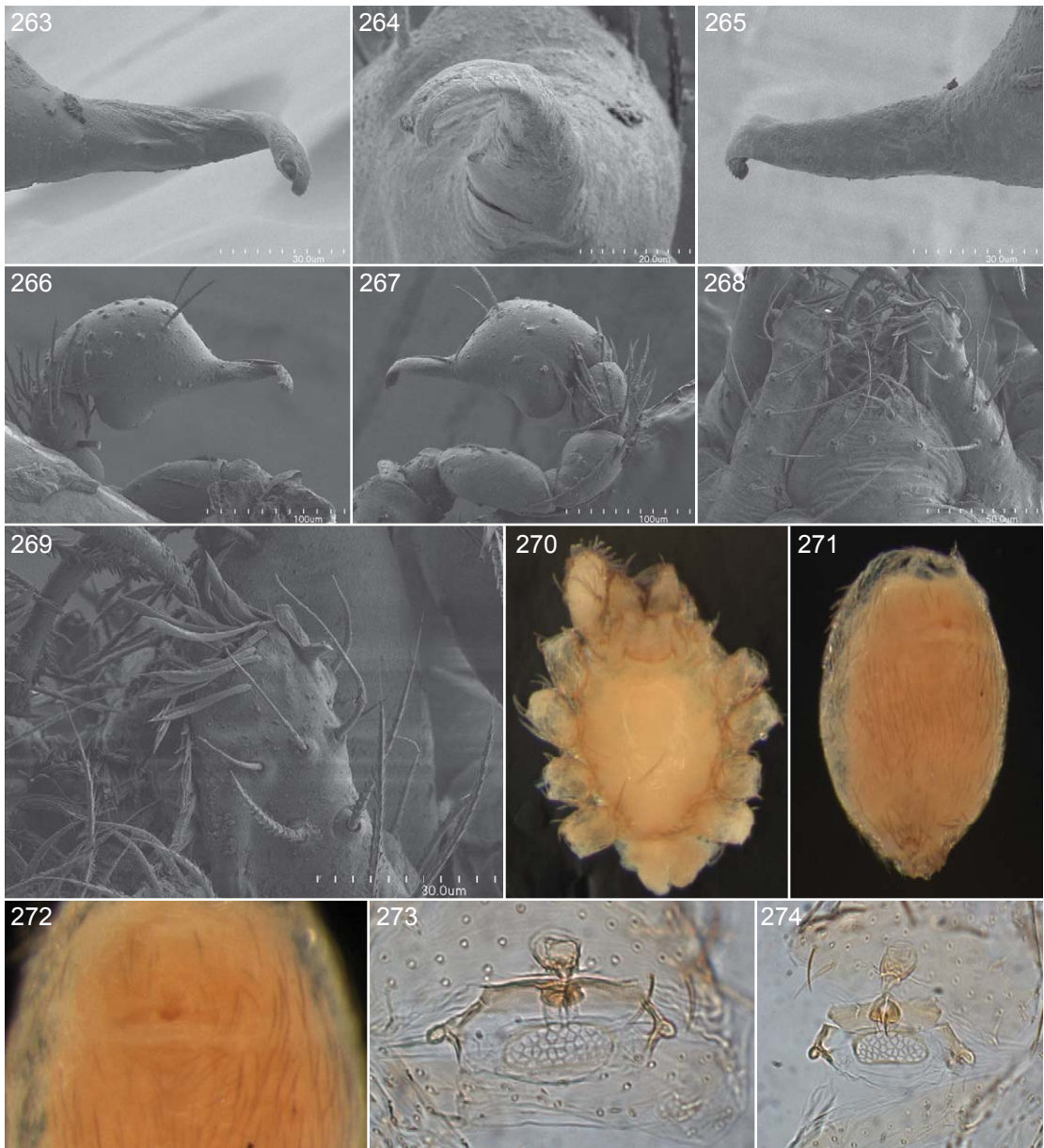
FEMALE (PBI_OON 37982, figs. 298–300). Total length 1.56. Female palp with spines: patella p1-1-0; tibia p1-1-1. Leg spination: femora III, IV d1-0-1; tibiae: III d0-1-0, p1-0-0, v0-1p-2, r1-0-0; IV d0-0-1, p0-0-1, v1p-1p-2, r1-0-1; metatarsi: III v0-1p-2, r1-0-1; IV d1-0-1, p1-0-1, v0-1p-2, r1-0-1. Anterior membrane angular, anterior receptaculum greatly widened at tip, posterior sclerotization Y-shaped.



FIGURES 252–262. *Noonops puebla*, new species, male (252–259) and *N. miraflores*, new species, female (260–262). 252. Left embolus, prolateral view. 253. Same, ventral view. 254. Same, retrolateral view. 255. Left palp, prolateral view. 256. Same, ventral view. 257. Same, retrolateral view. 258. Mouthparts, ventral view. 259. Tip of endite, same. 260, 261. Genitalia, ventral view. 262. Same, dorsal view.

OTHER MATERIAL EXAMINED: MEXICO: **Hidalgo**: 5 mi N Encarnación, 20°55'N, 99°12'W, July 28, 1966, elev. 6000 ft (J., W. Ivie, AMNH PBI_OON 1709, 1724), 8♂.

DISTRIBUTION: Hidalgo.



FIGURES 263–274. *Noonops culiacan*, new species, male (263–270) and female (271–274). **263.** Left embolus, prolateral view. **264.** Same, ventral view. **265.** Same, retrolateral view. **266.** Left palp, prolateral view. **267.** Same, retrolateral view. **268.** Mouthparts, ventral view. **269.** Tip of endite, same. **270.** Sternum, same. **271.** Abdomen, same. **272, 273.** Genitalia, ventral view. **274.** Same, dorsal view.

Noonops puebla (Gertsch and Davis), new combination

Figures 252–259

Oonops puebla Gertsch and Davis, 1942: 3, figs. 7, 8 (male holotype from Tlacotepec, Puebla Mexico, in AMNH; examined).

DIAGNOSIS: Males resemble those of *N. taxquillo* but have a much longer spur on the wide embolar base (figs. 252–257).

MALE (PBI_OON 21087, figs. 252–259): Total length 1.38. Anterior portion of endites with two processes, both pointed, directed posteriorly; serrula absent. Leg spination unknown (legs III, IV missing). Embolus with long, strong basal spur.

FEMALE: Unknown.

MATERIAL EXAMINED: MEXICO: **Puebla**: 7 mi S Tlacotepec, June 24, 1936 (A., L. Davis, AMNH PBI_OON 21087), 1 ♂ (holotype).

DISTRIBUTION: Puebla.

Noonops beattyi, new species

Figures 301–306

TYPE: Male holotype taken 3 miles northeast of Zacatepec, Puebla, Mexico (June 30, 1963; J. Beatty), deposited in AMNH (PBI_OON 38518).

ETYMOLOGY: The specific name is a patronym in honor of the late Joe Beatty, collector of the holotype and dedicated arachnologist.

DIAGNOSIS: The male palp resembles that of *N. puebla* but lacks a basal spur on the embolus (figs. 301–303).

MALE (PBI_OON 38518, figs. 301–306): Total length 1.58. Anterior portion of endites with three processes, distalmost process short, others long, pointed, directed posteriorly; serrula absent. Leg spination: femur IV d1-0-0; tibiae: III v1r-1r-0; IV p0-1-1, v1p-0-0; metatarsi: III v1p-0-2, r1-0-1; IV p1-0-1, v1p-0-0; r1-0-0. Embolus strongly bent just beyond base, tip expanded, curled.

FEMALE: Unknown.

OTHER MATERIAL EXAMINED: None.

DISTRIBUTION: Puebla.

Noonops chilapensis (Chamberlin and Ivie), new combination

Figures 307–312

Oonops chilapensis Chamberlin and Ivie, 1936: 8, figs. 1, 2 (male holotype from Chilapa, Guerrero, Mexico, in AMNH; examined).

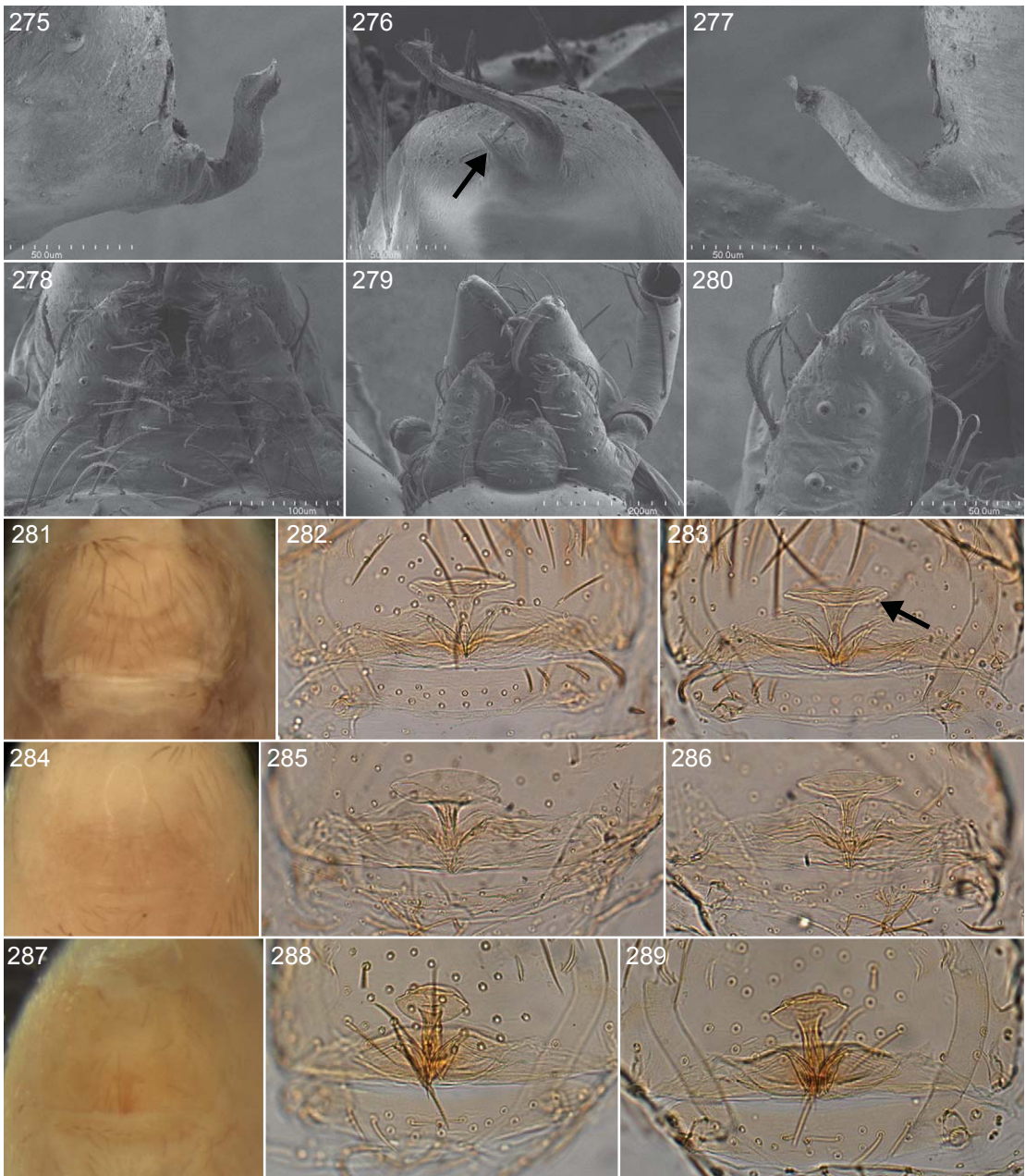
Diagnosis: Males can be recognized by the wide embolar base, which is abruptly narrowed at about one-fifth the embolar length (figs. 307–309).

MALE (PBI_OON 1640, figs. 307–312): Total length 1.91. Eyes teratological, with left anterior and left posterior lateral far removed from other four eyes. Anterior portion of endites with single short, blunt process situated almost at tip of endite; serrula present. Leg spination: tibiae: III p1-0-1, v1p-0-2; IV p1-0-0, v2-0-2, r1-0-0; metatarsi: III v0-0-1p, r1-0-0; IV p1-0-0, v0-1p-1p, r1-0-0. Embolus wide at base, abruptly narrowed at about one-fifth its length.

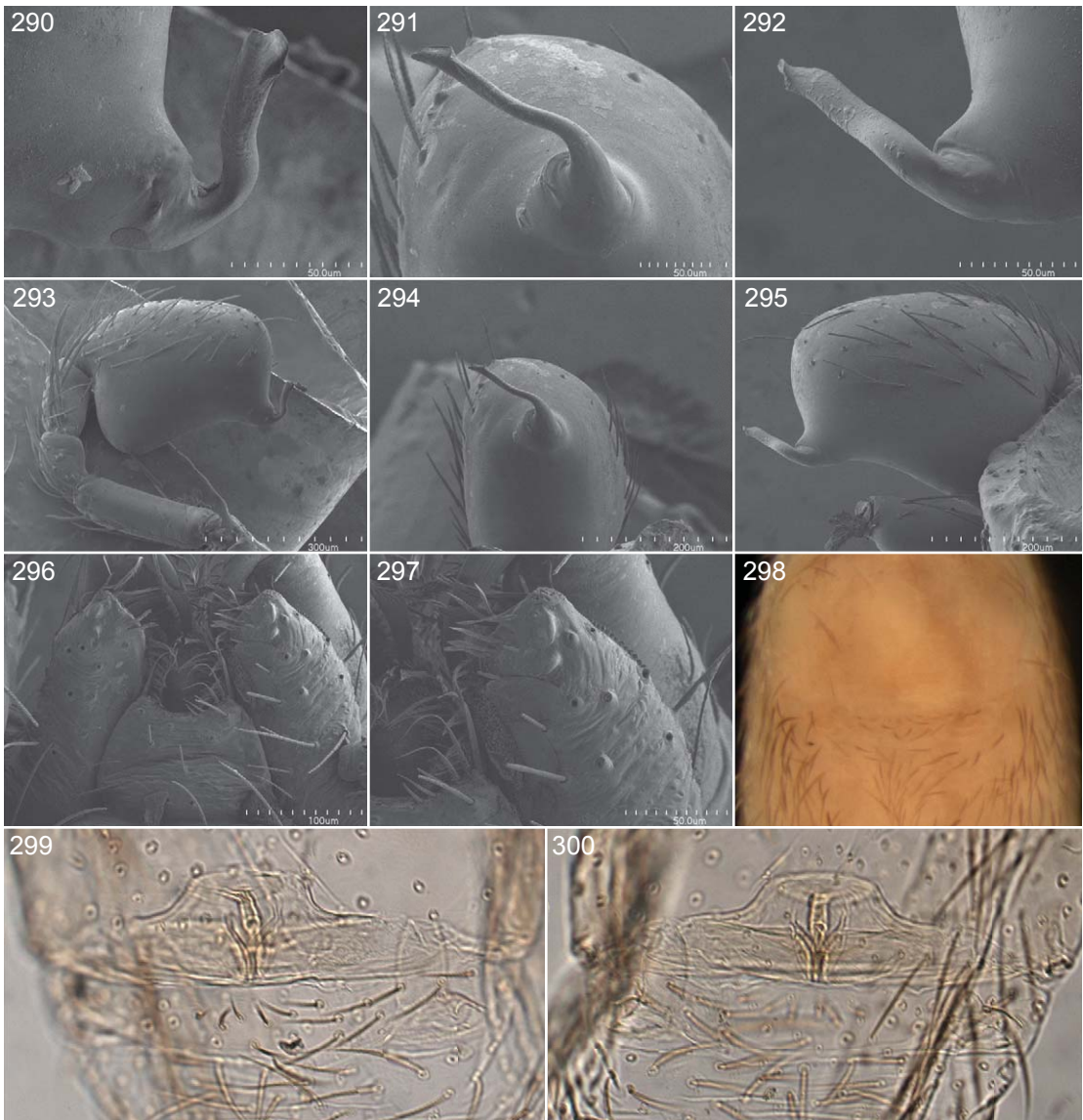
FEMALE: Unknown

MATERIAL EXAMINED: MEXICO: **Guerrero**: Chilapa, 1935 (AMNH PBI_OON 1640), 1 ♂ (holotype).

DISTRIBUTION: Guerrero.



FIGURES 275–289. *Noonops taxquillo*, males from Hidalgo (275–280) and females from Hidalgo (281–286) and San Luis Potosí (287–289). **275.** Left embolus, prolateral view. **276.** Same, ventral view (arrow to spur at base of embolus). **277.** Same, retrolateral view. **278, 279.** Mouthparts, ventral view. **280.** Tip of endites, same. **281, 282, 284, 285, 287, 288.** Genitalia, ventral view. **283, 286, 289.** Same, dorsal view (arrow to flower-shaped anterior receptaculum).



FIGURES 290–300. *Noonops chapul*, new species, male (290–297) and female (298–300). **290.** Left embolus, prolateral view. **291.** Same, ventral view. **292.** Same, retrolateral view. **293.** Left palp, prolateral view. **294.** Same, ventral view. **295.** Same, retrolateral view. **296.** Mouthparts, ventral view. **297.** Tip of endite, same. **298,** **299.** Genitalia, ventral view. **300.** Same, dorsal view.

Noonops iviei, new species

Figures 313–323

TYPE: Male holotype taken 12 miles east of Manzanillo, 19°01'N, 104°10'W, Colima, Mexico (May 11, 1963; W. Gertsch, W. Ivie), deposited in AMNH (PBI_OON 1470).

ETYMOLOGY: The specific name is a patronym in honor of Wilton Ivie, one of the collectors of the type and many other oonopids.

DIAGNOSIS: Males resemble those of *N. puebla* but have a smaller embolar base and an embolus that is straight for most of its length (figs. 313–318); the endites have a distinctive lateral projection (figs. 322, 323).

MALE (PBI_OON 1470, figs. 313–323): Total length 1.03. Anterior portion of endites with two processes, each highly modified; one process projects far beyond lateral edge of endite, other process with greatly enlarged base; serrula absent. Leg spination: tibiae: III v0-0-2; IV v0-0-1p; metatarsi: III v0-0-1p; IV v0-1p-0. Embolus sharply bent at base, then straight for remainder of length, tip sharply pointed.

FEMALE: Unknown.

OTHER MATERIAL EXAMINED: MEXICO: **Jalisco:** El Tecuán road, km 5.7 from Ruta 200, Municipio La Huerta, 19°19.61'N, 104°54.71'W, Sept. 12, 1999, Berlese, leaf and log litter, tropical subdeciduous forest in ravine, elev. 40 m (A. Newton, M. Thayer, FMNH 56286, PBI_OON 10725), 1 ♂.

DISTRIBUTION: Jalisco and Colima.

Noonops tonila, new species

Figures 324–335

TYPES: Male holotype, female allotype, and three male paratypes taken 2 miles south of Tonila, Colima, Mexico (Aug. 28, 1965; W. Gertsch, Hastings), deposited in AMNH (PBI_OON 31158).

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

DIAGNOSIS: Males resemble those of *N. minutus* but have a greatly elongated spur on the base of the embolus (figs. 324–326, 330–332); females also resemble those of *N. minutus* but have a narrower posterior receptaculum (figs. 334, 335).

MALE (PBI_OON 31158, figs. 324–332): Total length 0.84. Anterior portion of endites with single, ventrally directed process; serrula absent. Leg spination: femur: IV d1-0-0; tibiae: III p0-1-0, v0-0-2, r0-1-0; IV p1-0-0, v0-0-2; metatarsi: III v0-0-1p; IV p0-0-1, v0-0-2, r0-0-1. Spur at base of embolus greatly elongated.

FEMALE (PBI_OON 31158, figs. 333–335): Total length 1.04. Leg spination (leg IV missing): tibia III v0-0-2; metatarsus III v0-0-1p. Anterior receptaculum elongated; median sclerotization rounded.

OTHER MATERIAL EXAMINED: MEXICO: **Colima:** 10 mi S Colima, Aug. 1, 1954 (W. Gertsch, AMNH PBI_OON 31152), 1 ♂. **Michoacán:** Zamora, Aug. 1, 1956 (W. Gertsch, V. Roth, AMNH PBI_OON 31148), 1 ♂.

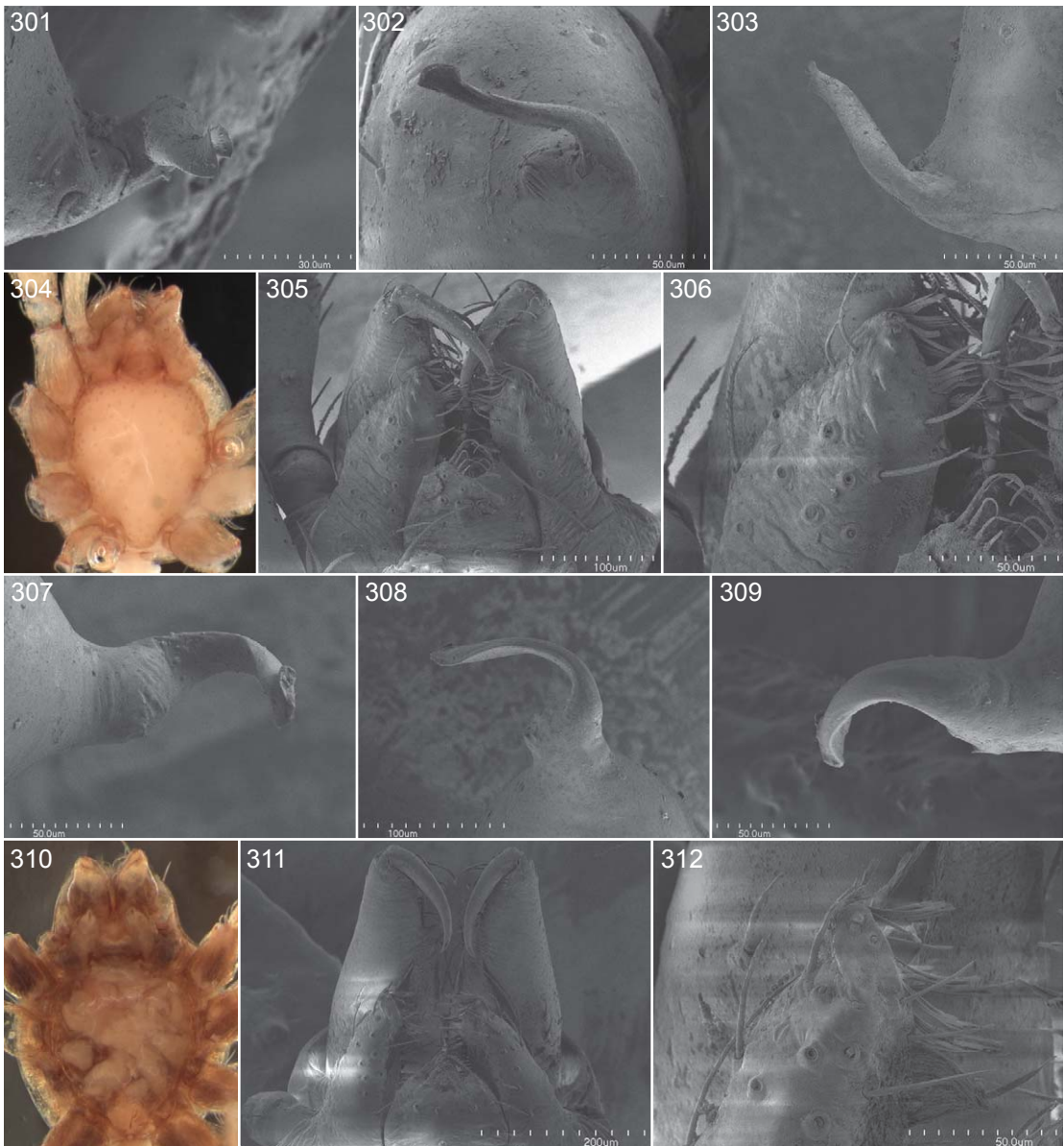
DISTRIBUTION: Colima and Michoacán.

Noonops minutus, new species

Figures 336–346

TYPES: Male holotype and female allotype taken 12 mi S of Cuernavaca, 18°45'N, 99°15'W, Morelos, Mexico (May 3, 1963; W. Gertsch, W. Ivie), deposited in AMNH (PBI_OON 37317).

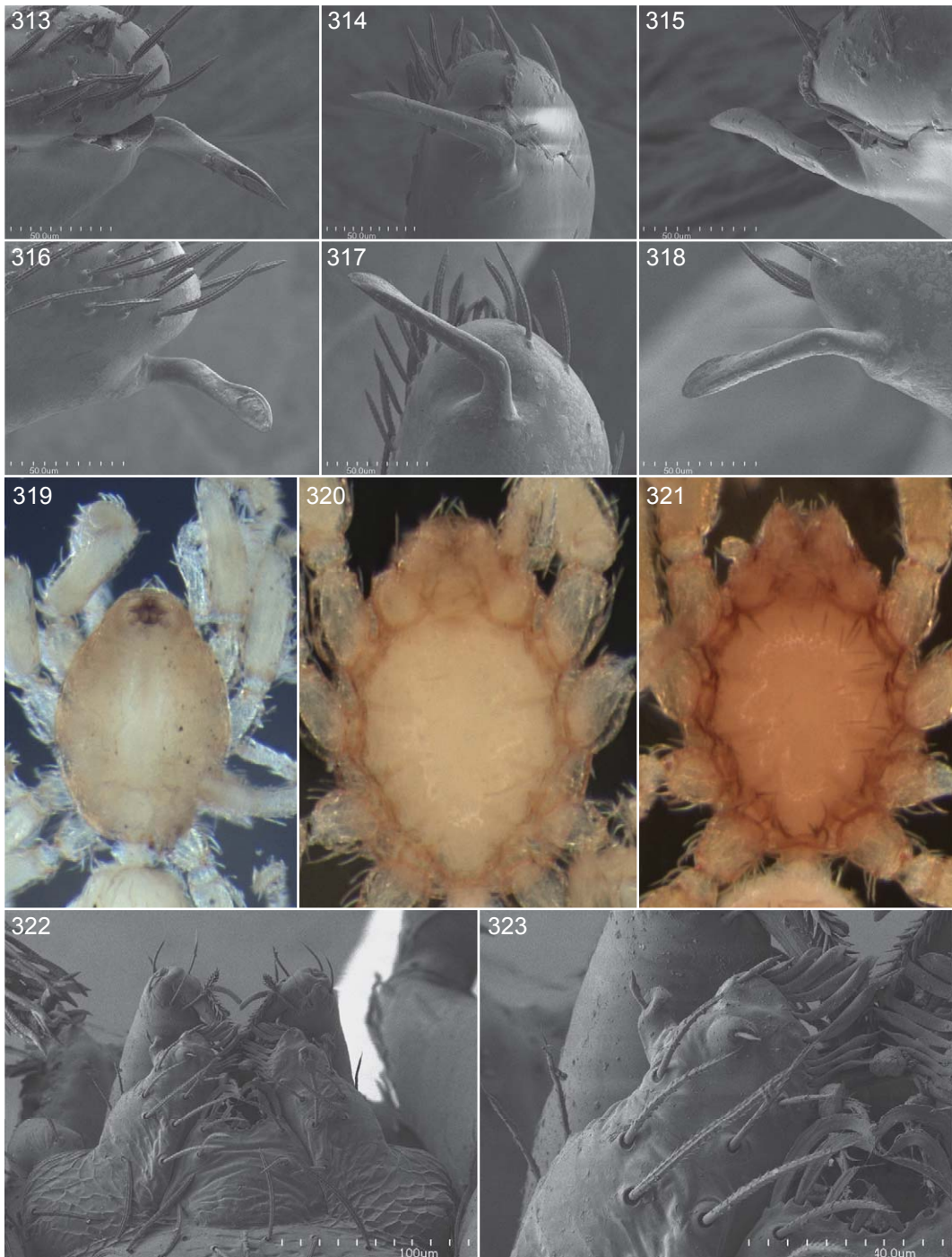
ETYMOLOGY: The specific name refers to the remarkably small size of this species.



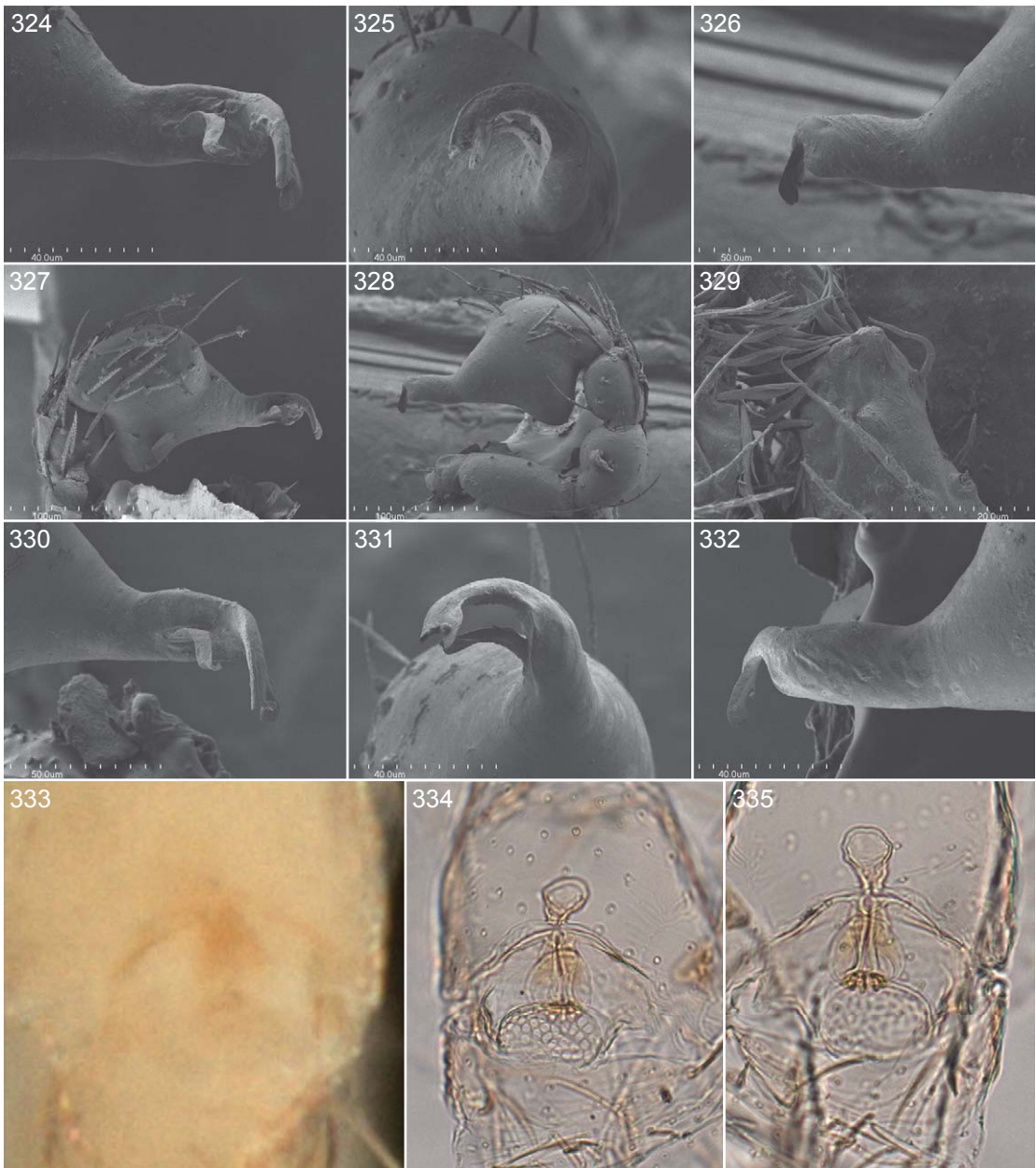
FIGURES 301–312. *Noonops beattyi*, new species, male (301–306) and *N. chilapensis* (Chamberlin and Ivie), male (307–312). **301, 307.** Left embolus, prolateral view. **302, 308.** Same, ventral view. **303, 309.** Same, retro-lateral view. **304, 310.** Sternum, ventral view. **305, 311.** Mouthparts, same. **306, 312.** Tip of endite, same.

DIAGNOSIS: Males of this minute species can be recognized by their distinctively shaped embolus (figs. 336–340), females by the rounded anterior receptaculum and rounded median sclerotization (figs. 345, 346).

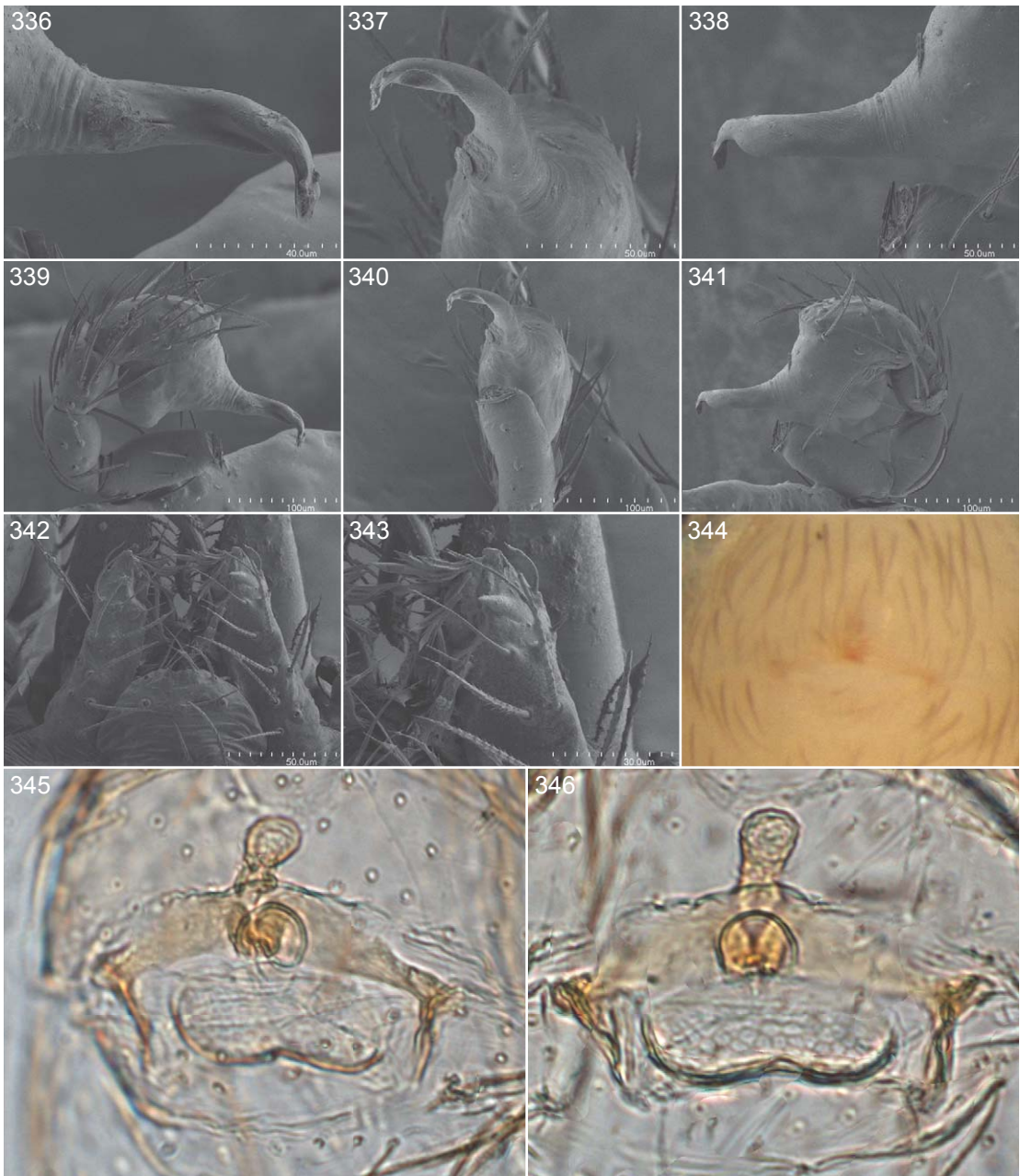
MALE (PBI_OON 1827, figs. 336–343): Total length 0.84. Anterior portion of endites with two processes, anterior process lobe-shaped, posterior process pointed, directed medially; ser-



FIGURES 313–323. *Noonops iviei*, new species, males from Colima (313–315, 319, 320) and Jalisco (316–318, 321–323). 313, 316. Left embolus, prolateral view. 314, 317. Same, ventral view. 315, 318. Same, retrolateral view. 319. Carapace, dorsal view. 320, 321. Sternum, ventral view. 322. Mouthparts, ventral view. 323. Tip of endite, same.



FIGURES 324–335. *Noonops tonila*, new species, males from Colima (324–329) and Michoacán (330–332) and female from Colima (333–335). **324, 330.** Left embolus, prolateral view. **325, 331.** Same, ventral view. **326, 332.** Same, retrolateral view. **327.** Left palp, prolateral view. **328.** Same, retrolateral view. **329.** Tip of endite, ventral view. **333, 334.** Genitalia, ventral view. **335.** Same, dorsal view.



FIGURES 336–346. *Noonops minutus*, new species, male (336–343) and female (344–346). 336. Left embolus, prolateral view. 337. Same, ventral view. 338. Same, retrolateral view. 339. Left palp, prolateral view. 340. Same, ventral view. 341. Same, retrolateral view. 342. Mouthparts, ventral view. 343. Tip of endite, same. 344, 345. Genitalia, ventral view. 346. Same, dorsal view.

rula absent. Leg spination: tibiae: III p0-0-1, r0-0-1; IV v0-0-1r, r0-1-0; metatarsi: III v0-0-2; IV p1-0-1, v0-0-2, r1-0-1. Embolus evenly curved, tip with blunt ventral extension.

FEMALE (PBI_OON 37317, figs. 344–346): Total length 1.06. Leg spination: tibiae III, IV v0-0-1p; metatarsi: III v0-0-2; IV p1-0-1, v0-0-1p, r1-0-0. Anterior receptaculum rounded; posterior receptaculum with rounded anterior sclerotization.

OTHER MATERIAL EXAMINED: MEXICO: **Morelos**: 12 mi S Cuernavaca, 18°45'N, 99°15'W, May 3, 1963 (W. Gertsch, W. Ivie, AMNH PBI_OON 1827), 2♂, 1♀.

DISTRIBUTION: Morelos.

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