

Revision of the Neotropical huntsman spider genus *Vindullus* Simon (Araneae, Sparassidae)

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Abstract. The huntsman spider genus *Vindullus* Simon 1880 (Araneae, Sparassidae) is revised. *Olios gracilipes* Taczanowski 1872 is transferred to the genus and recognized as a senior synonym of the type species, *Vindullus viridans* Simon 1880, for which the former male syntype was designated as a lectotype. *Vindullus kratochvili* Caporiacco 1955 is placed as *incertae sedis* and four new species are described: *Vindullus undulatus* new species, *Vindullus gibbosus* new species, both from Peru and *Vindullus angulatus* new species, from Colombia and Venezuela and *Vindullus concavus* new species from Brazil.

Keywords: Taxonomy, new species, transfer, redescription, South America

As is the case with several genera of the spider family Sparassidae, proposed by Simon between 1880 and 1897, the taxonomic history of the genus *Vindullus* Simon 1880 is quite confusing, even more than that of the recently revised *Macrimus* Simon 1887 (Rheims 2007). *Vindullus* was originally proposed by Simon (1880) to include *V. viridans* Simon, described from Tefé, Amazonas, Brazil. The genus remained monotypic until 1890 when *V. similis* was described from Guatemala by O. Pickard-Cambridge (1890). In 1897 Simon transferred *V. viridans* to *Sparassus* Walckenaer stating that the eye arrangement was not enough to justify the generic status. Nevertheless, he maintained *Vindullus* as a species group within which he described *Sparassus (Vindullus) guttipes* Simon from Natal, Oriental Africa. Pocock (1898) followed Simon's grouping and described *Sparassus (Vindullus) stictopus* from South Africa. Although Simon (1897) transferred the type species *V. viridans* to *Sparassus* and thus synonymized both genera there was no formal transfer of the remaining *Vindullus* species, *V. similis*, which was transferred to *Sparassus* by F.O. Pickard-Cambridge (1900).

A few years later Simon (1903) again transferred *V. viridans*, this time placing it in *Olios* Walckenaer. Once again, nothing was said about the species placed in the *Vindullus* group of *Sparassus*, which were only transferred to *Olios* in 1911 by Petrunkevitch.

The genus was implicitly revalidated by Caporiacco (1955), who described *Vindullus kratochvili* Caporiacco 1955 based on a female from Rancho Grande, Aragua, Venezuela. Once again, nothing was said about either *S. similis*, *S. guttipes*, nor *S. stictopus*, which to date remain in the genus *Olios*. Although these species are clearly not congeneric with the type species of *Olios*, *O. argelasius* (Walckenaer 1805), they cannot, at present, be placed in any other known genus of Sparassidae. None of the three species is congeneric with the type species of *Vindullus*. Thus, until the present study, the genus *Vindullus* was composed of only two species, *V. viridans* and *V. kratochvili* (Platnick 2008).

In this study, a revision of the genus *Vindullus* is presented. The type species, *V. viridans*, is redescribed and *Olios gracilipes* Taczanowski 1872 is transferred to the genus. *Vindullus*

kratochvili Caporiacco 1955 is found not to be congeneric with the type species, *V. gracilipes*, and, thus, is placed as *incertae sedis* until further knowledge on the Neotropical Sparassidae fauna is attained.

METHODS

The material examined belongs to the following institutions (Abbreviation and curator in parenthesis): American Museum of Natural History, New York (AMNH, N.I. Platnick); Instituto Butantan, São Paulo (IBSP, A.D. Brescovit); Museu Paraense Emílio Goeldi, Belém (MPEG, A.B. Bonaldo); Museo de Historia Natural de la Universidad San Marcos, Lima (MUSM, D. Silva); Muséum National d'Histoire naturelle, Paris (NMHN, C. Rollard), Polish Academy of Science, Museum of the Institute of Zoology, Warsaw (MZPW, K.W. Tomaszewska, T. Huflejt); Museu de Zoologia da Universidade de São Paulo, São Paulo (MZSP, R. Pinto da Rocha).

Abbreviations used throughout the text are: ALE = anterior lateral eyes; ALS = anterior lateral spinnerets; AME = anterior median eyes; d = dorsal; p = prolateral; PLE = posterior lateral eyes; PLS = posterior lateral spinnerets; PME = posterior median eyes; PMS = posterior median spinnerets; r = retrolateral; RTA = retrolateral tibial apophysis; v = ventral. Measurements are given in millimeters. The epigynum was dissected and submerged in clove oil to study internal structures. Micrographs were obtained with a JEOL (JSM 840A) scanning electron microscope from the "Laboratório de Microscopia Eletrônica do Departamento de Física Geral do Instituto de Física da Universidade de São Paulo (USP)." Coloration pattern was described based on preserved material.

TAXONOMY

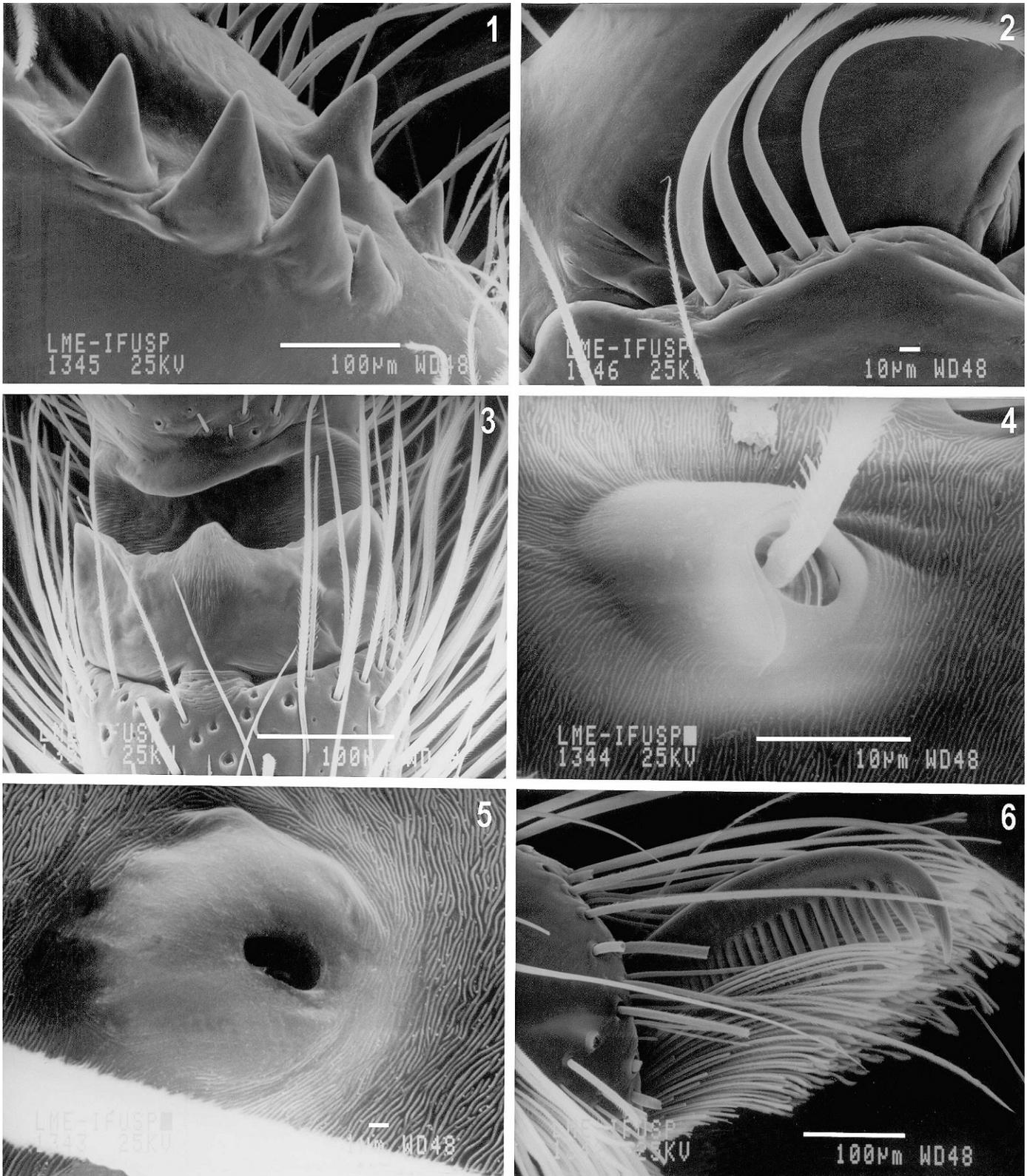
Family Sparassidae Bertkau 1872

Genus *Vindullus* Simon 1880

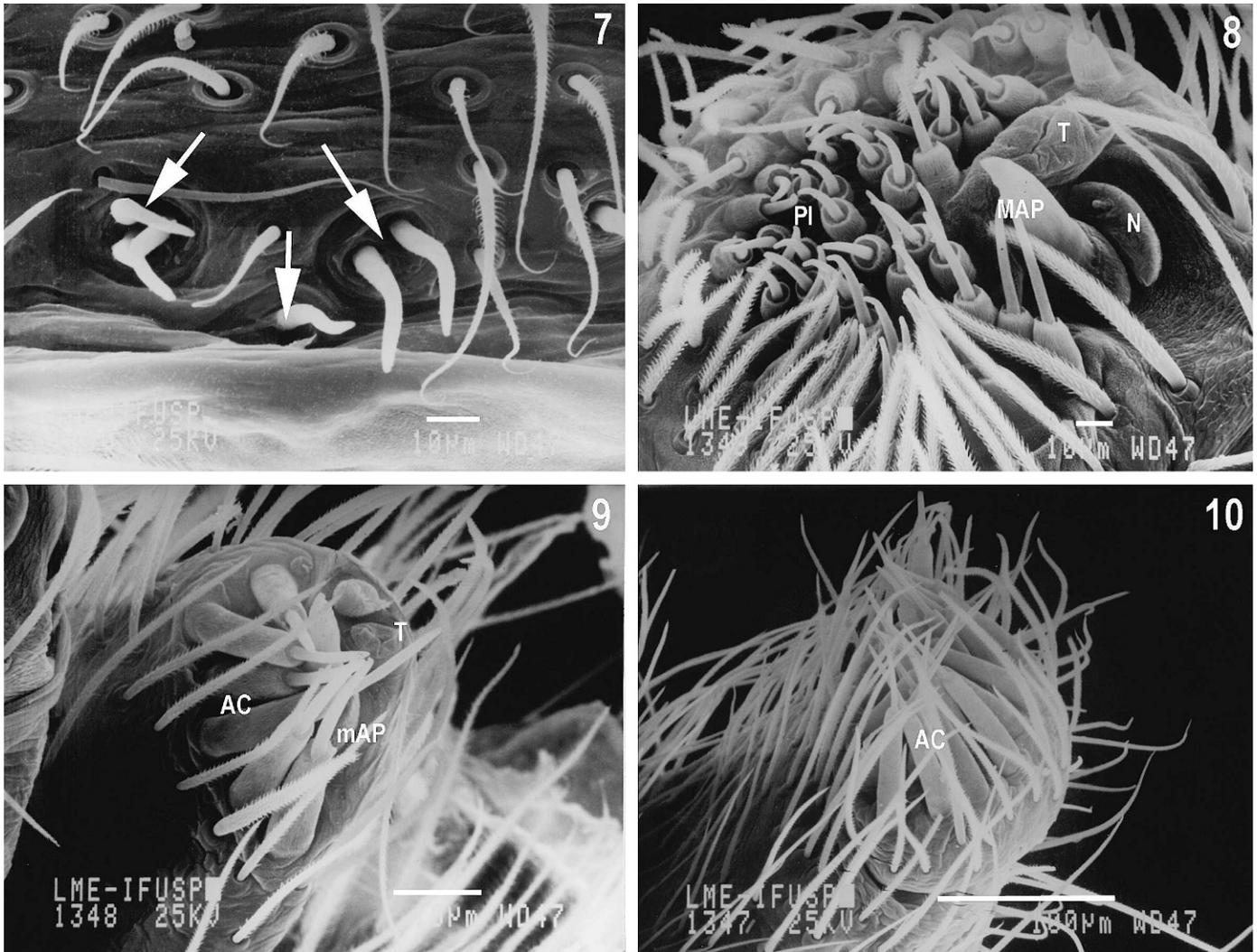
Vindullus Simon 1880:288; Caporiacco 1955:404; Platnick 2008.

Sparassus Walckenaer: Simon 1897:46 (in part).

Olios Walckenaer: Simon 1903:1025; Bonnet 1959:4797.



Figures 1–6.—*Vindullus angulatus* new species, male. 1. Cheliceral teeth, ventral view; 2. Chelicera, strong setae at base of fang, ventral view; 3. Distal metatarsus I, trilobate membrane, dorsal view; 4. Tarsus I, trichobothria, dorsal view; 5. Distal tarsus I, tarsal organ, dorsal view; 6. Distal tarsus I, claws, prolateral view.



Figures 7–10.—*Vindullus angulatus* new species, male opisthosoma. 7. Epiandrous spigots, ventral view; 8. Anterior lateral spinnerets; 9. Anterior median spinnerets; 10. Posterior lateral spinnerets. AC = aciniform gland spigots; mAP = minor ampullate gland spigot; MAP = major ampullate gland spigot; N = nubin; PI = piriform gland spigots; T = tartipore.

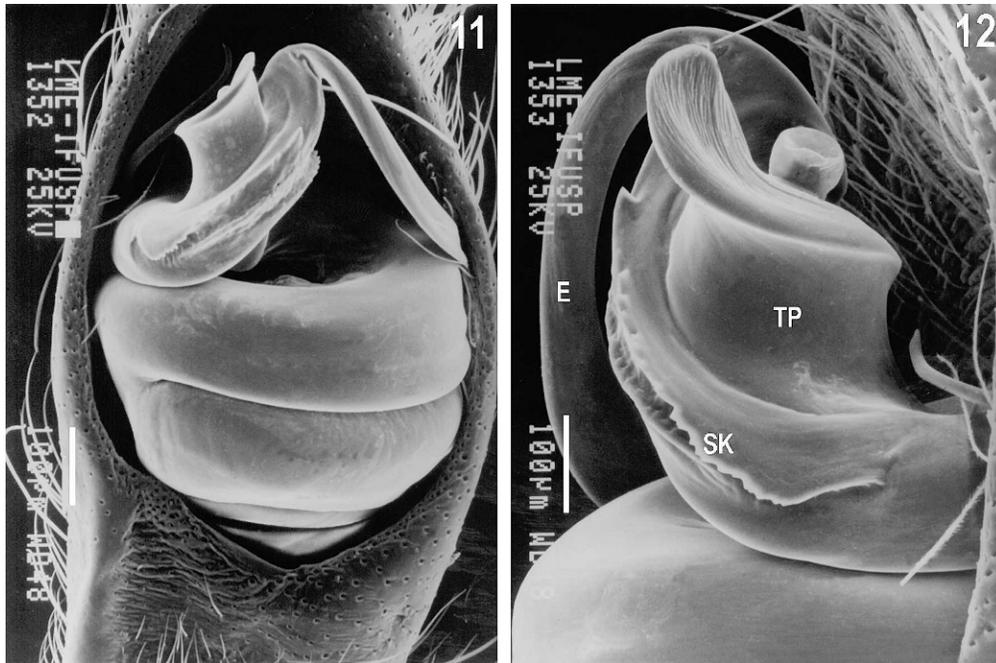
Type species.—*Vindullus gracilipes* Tackzanowski 1872.

Relationships.—Evidence for the placement of *Vindullus* in Sparassinae includes the presence of only two promarginal teeth in the chelicerae, absence of intermarginal denticles, median hook of trilobate membrane as large as or slightly larger than lateral projections and a short-toothed female palpal claw (Jäger 1998). Within Sparassinae the genus seems to be closest to *Macrinus* Simon and *Nolavia* Kammerer with whom they share the presence of only two pairs of ventral spines on tibiae I–IV, the tegulum slightly spiraled perpendicularly to the main palpal axis, towards the tip of the cymbium (Figs. 16, 19, 22, 25, 31; Rheims 2007:figs. 22, 28, 34) and the female epigynum with simple, rounded lateral lobes partially covering the median septum (Fig. 28; Rheims 2007:figs. 24, 30, 36).

Diagnosis.—Species of the genus *Vindullus* are distinguished from the remaining Sparassinae genera by the presence of a distal laminar, triangular projection, bent at the tip and bearing a small hyaline protuberance (Figs. 12, 25, 31) and a serrated keel at the base of a filiform embolus, curved

prolaterally dorsad, running a semicircle behind tegulum, appearing retrolaterally and pointing ventrad in the male palp (Figs. 16, 19, 22, 25, 31) and by the combination of a strongly sclerotized medium septum with a posterior, blind shaped atrium in the female epigynum (Figs. 27) and a strongly sclerotized duct system in the female vulva (Fig. 28).

Description.—Total length (males and females) 6.0–11.8. Prosoma as long as wide. Cephalic region slightly higher than thoracic region, gradually flattened posteriorly. Fovea conspicuous on posterior third of prosoma. Eyes arranged in two rows, the anterior recurved, AME similarly sized as ALE and farther apart from each other than from ALE. Posterior row straight, PME smaller than PLE and equidistant (Figs. 13, 14). Clypeus low, equal or slightly less than AME diameter. Chelicerae longer than wide with two promarginal teeth, the basal smaller and four or five retromarginal teeth, three subequal and most basal smaller (Fig. 1). Intermarginal denticles absent. Internal keel with 4–5 strong setae arranged in a row (Fig. 2). Labium rebordered, slightly wider than long. Endites longer than wide, slightly convergent, with dense



Figures 11, 12.—*Vindullus angulatus* new species, male. 10. Right palp, ventral view; 11. Left palp, retrolateral view. E = embolus; SK = serrated keel; TP = distal triangular projection.

scopulae on internal margin. Serrula with a single row of denticles. Sternum as long as wide, slightly projected between coxae IV. Legs laterigrade (2143). Leg spination in males: femora I–III: p1-1-1; d0-1-1; r1-1-1; femur IV: p1-1-1; d0-1-1; r 0-0-1; tibiae I–IV: p1-0-1; d0-0-1; r1-0-1; v2-2-0; metatarsi I–IV: p1-1-0; r1-1-0; v2-2-0. Leg spination in females as in males except femora II–IV: p0; r0-0-1; tibiae I–IV d0. Metatarsi I–IV with trilobate membrane with median hook slightly more developed than laterals (Fig. 3). Tarsi and distal half of metatarsi scopulate. Tarsal organ capsulate with oval opening, located dorsally at distal end of tarsi (Fig. 5). Trichobothria present on dorsal tibiae, metatarsi and tarsi, arranged in two parallel rows that converge into a single file on proximal half of tarsi and metatarsi. Trichobothrium with dorsal plate with few transverse grooves projected over a smooth basal plate (Fig. 4). Tarsi with pair of pectinate claws with 15 to 20 teeth and claw tufts (Fig. 6). Female pedipalp with single pectinate claw with 7–9 short and slightly curved teeth. Opisthosoma oval, longer than wide. Males with three or more clusters of epiandrous spigots (Fig. 7). Six spinnerets: ALS contiguous, conical and bi-segmented. Basal segment slightly elongate and cylindrical. Distal segment short and truncated with one major ampullate gland spigot, nubbin, tartipore and more than 20 piriform gland spigots (Fig. 8). AMS conical and short with one minor ampullate gland spigot, tartipore and approximately ten aciniform gland spigots (Fig. 9). PLS conical and bi-segmented. Basal segment slightly elongate. Distal segment short and truncated with 15–20 aciniform gland spigots (Fig. 10).

Palp: tibia short, slightly longer than half cymbium length, with one prolateral, one retrolateral and one dorsal strong spine. RTA short, not reaching alveolus, and conical (Figs. 17, 20, 23, 26, 32). Cymbium with strong dorsal scopula and rounded median alveolus. Tegulum slightly spiraled perpen-

dicularly to the main palpal axis, towards the tip of the cymbium, with distal laminar, triangular projection, bent at the tip and bearing a small hyaline protuberance and a serrated keel at the base of a filiform embolus, curved prolaterally dorsad, running a semicircle behind tegulum, appearing retrolaterally and pointing ventrad in the male palp (Figs. 11, 12, 16, 19, 22, 25, 31). Conductor absent.

Epigynum: epigynal field divided into a pair of simple, rounded lateral lobes and a strongly sclerotized, heart-shaped medium septum, with a posterior blind ended atrium and pair of anterior copulatory openings (Fig. 27). Internally with strongly sclerotized duct system. Copulatory duct medially curved, bearing an anterior seminal receptacle. Spermathecae with a small cylindrical head and a larger, rounded base, from which emerges a long, medially twisted fertilization duct pointing laterad (Figs. 28, 29).

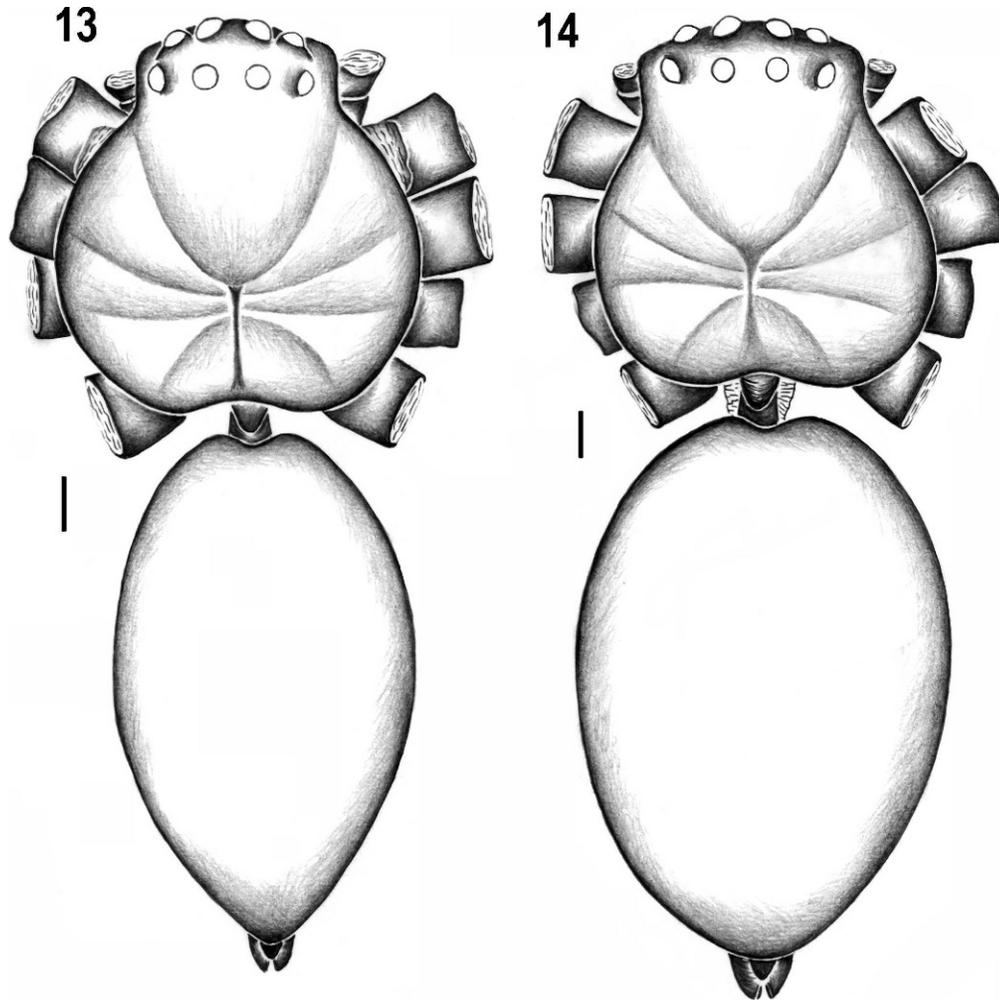
Distribution.—Known from northern South America (Colombia, Venezuela, Peru and northern Brazil).

Composition.—*Vindullus gracilipes* (Taczanowski) new combination, *Vindullus undulatus* new species, *Vindullus gibbosus* new species, *Vindullus angulatus* new species and *Vindullus concavus* new species.

Incertae sedis.—*Vindullus kratochvilli* Caporiacco 1955:406, fig. 58 (Male holotype from Rancho Grande, Aragua, Venezuela, deposited in MUCV 844, examined); Platnick 2008.

Vindullus gracilipes (Taczanowski 1872) new combination
Figs. 15–17

Olios gracilipes Taczanowski 1872:77 (Two male syntypes from French Guiana, Department de la Guyane, Cayenne [04°55'60"N; 52°19'60"W], R. Yelski leg., W.C. Taczanowski det., MZPW, examined). Mello-Leitão 1918:48, fig. 24; Platnick 2008.



Figures 13, 14.—*Vindullus angulatus* new species. 13. Male, habitus, dorsal view; 14. Female habitus, dorsal view. Scale lines: 0.5 mm.

Sparassus gracilipes: Keyserling 1880:241, pl.7, fig. 30.

Vindullus viridans Simon 1880:288 (Male, female and juvenile syntypes from Brazil, Amazonas, Tefé [03°22'S; 64°42'W], MNHN 1122, examined. Male lectotype herewith designated; female paralectotype does not belong to *Vindullus*). Capor-iacco 1955:406; Platnick 2008. New synonymy.

Sparassus viridans: Simon 1897:36.

Olios viridans: Simon 1897:36. Petrunkevitch 1911:503; Mello-Leitão 1918:43; Bonnet 1958:3182.

Diagnosis.—Males of *V. gracilipes* Taczanowski 1872 are distinguished from those of the remaining species of the genus by the male palp with small distal area of the tegulum, only half as wide as the median area (Fig. 16), and by the RTA very slender and straight in retrolateral view (Fig. 17).

Description.—Male (MNHN 1122). Coloration: prosoma, chelicerae and legs pale orange; sternum pale yellow with darker margins; labium and endites pale orange, distally yellow; opisthosoma pale yellow. Total length 11.7. Prosoma 4.7 long, 4.2 wide. Opisthosoma 6.4 long, 3.6 wide. Eye diameters and interdistances: AME 0.44, ALE 0.32, PME 0.26, PLE 0.30, AME–AME 0.24, AME–ALE 0.04, PME–PME 0.38, PME–PLE 0.34, AME–PME 0.20, ALE–PLE 0.18. Leg measurements: I: absent; II: femur 9.2, patella 2.7, tibia

10.3, metatarsus 10.6, tarsus 2.2, total 35.0; III: 7.3, 2.1, 6.8, 6.8, 1.7, 24.7; IV: 8.3, 2.1, 7.6, 8.6, 1.9, 28.5. Spination follows the generic pattern. Palp: tibia with one prolateral, one retrolateral and one dorsal strong spine. RTA short, conical, slightly curved prolaterally at tip in ventral view and straight in retrolateral view. Subtegulum visible in ventral view (Fig. 16). Tegulum with small distal area. Distal triangular projection medially bent, with tip pointing ventrad in retrolateral view (Fig. 17). Conductor absent.

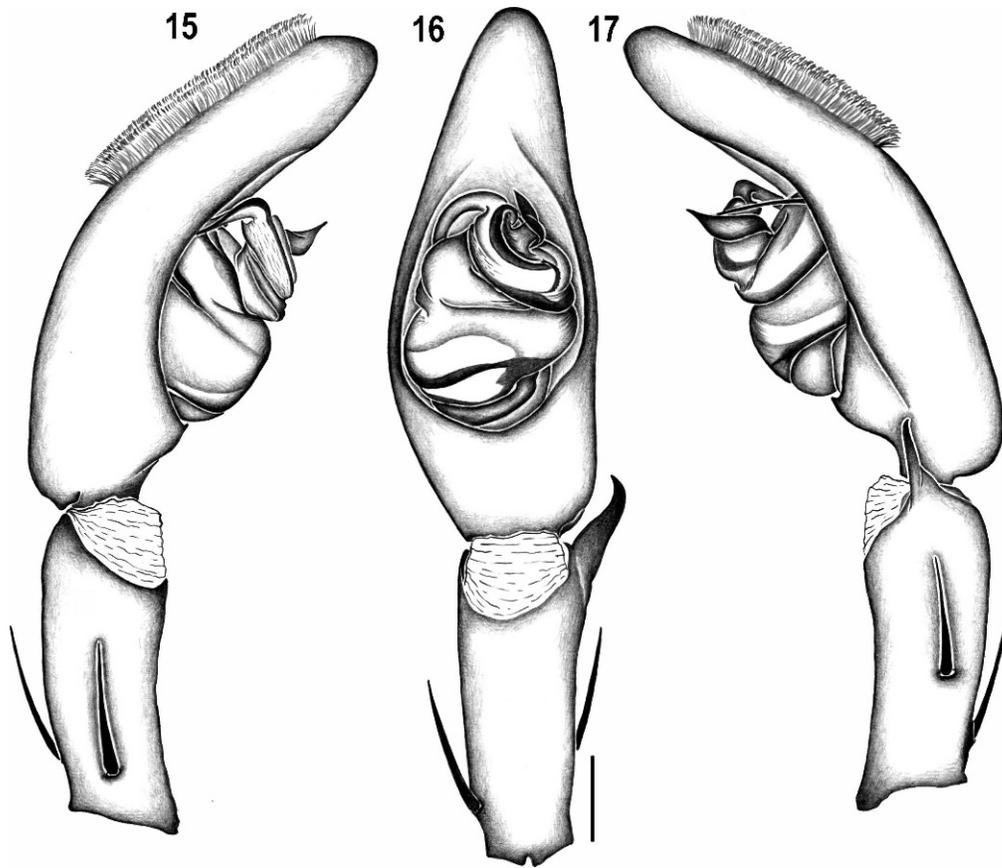
Female unknown.

Distribution.—French Guiana (Cayenne; type locality), Brazil, (Amazonas: Tefé) (Fig. 33).

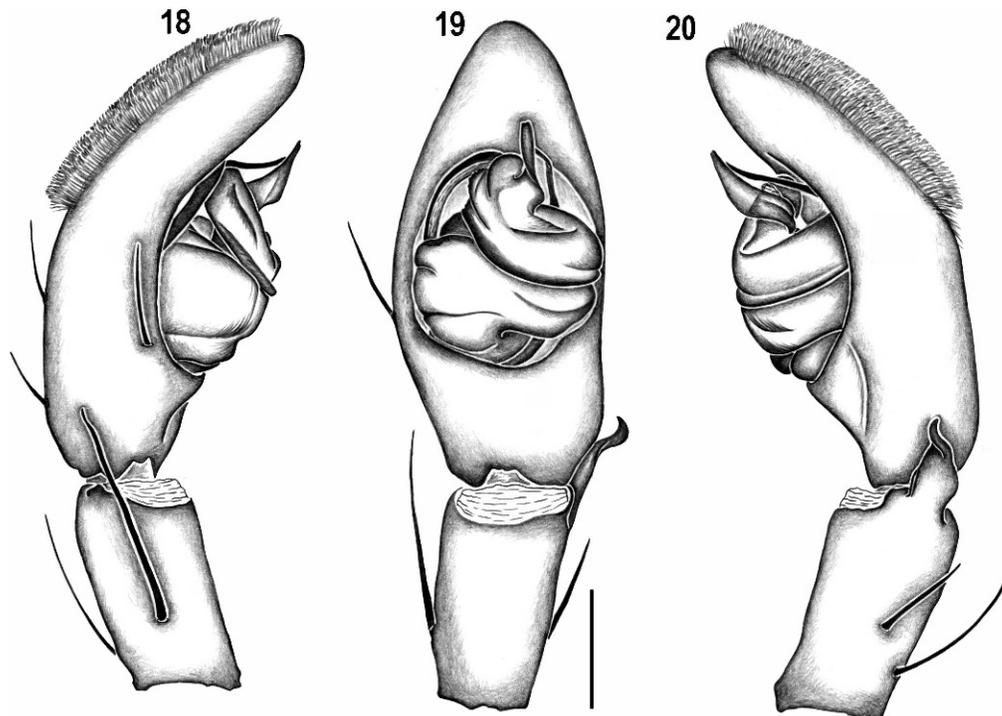
Vindullus undulatus new species

Figs. 18–20

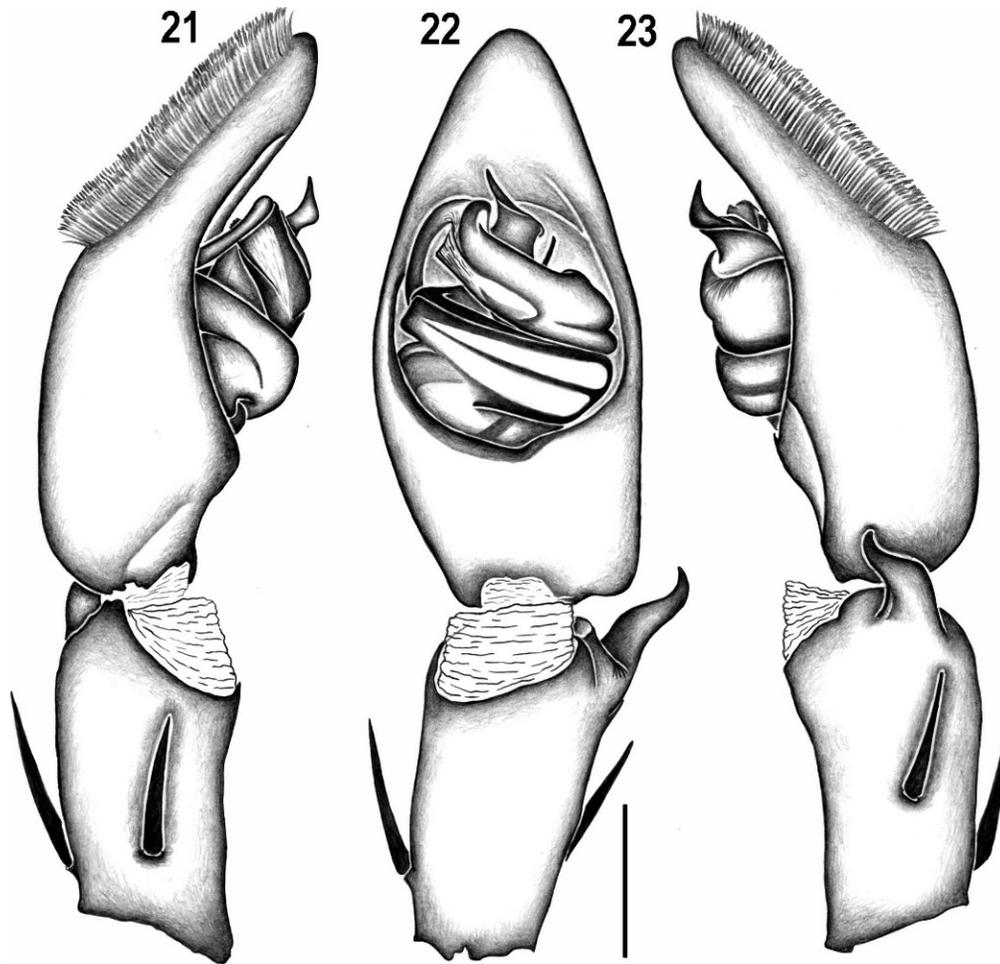
Type material.—Male holotype from Colombia, Cesar, Valledupar [10°28'37"N; 73°15'02"W], 22–24 May 1968, B. Malkin leg., deposited in AMNH. Paratypes: 4 males, 1 juvenile, 15 July 1968, (AMNH); 1 male, 1–3 September 1968 (AMNH); 1 male, 1 juvenile, 4–9 June 1968 (AMNH); 1 male, 15 July 1968 (IBSP 63813); all with the same locality and collector as holotype. 1 male, Venezuela, Bolivar, Puente Cocuizas, 70 km W. Bolivar [03°07'20"N; 62°32'59"W], 19 June–3 July 1987, S. & J. Peck leg. (AMNH).



Figures 15-17.—*Vindullus gracilipes* (Taczanowski), male, left palp. 15. Prolateral view; 16. Ventral view; 17. Retrolateral view. Scale line: 0.5 mm.



Figures 18-20.—*Vindullus undulatus* new species, male, left palp. 18. Prolateral view; 19. Ventral view; 20. Retrolateral view. Scale line: 0.5 mm.



Figures 21–23.—*Vindullus gibbosus* new species, male, left palp. 21. Prolateral view; 22. Ventral view; 23. Retrolateral view. Scale line: 0.5 mm.

Etymology.—The species name is derived from the Latin noun “unda” meaning “wave,” referring to the undulated dorsal margin of the RTA in a retrolateral view; adjective.

Diagnosis.—Males of *Vindullus undulatus* new species resemble those of *Vindullus gibbosus* new species by male palp with distal area of the tegulum almost as wide as median area and by RTA with a wide base and narrow tip curved ventrad (Figs. 19, 20, 22, 23). They are distinguished by the RTA abruptly narrowed at tip (Fig. 20) and by the triangular projection very large and wide (Figs. 19, 20).

Description.—Male (AMNH). Coloration: prosoma orange, eye borders black; chelicerae orange, slightly darker than dorsal prosoma; labium brown, distally cream colored; endites cream colored, slightly darker at base; sternum orange with darker margins; legs and pedipalps orange; opisthosoma dorsally cream colored, faintly mottled light brown; spinnerets slightly darker than opisthosoma. Total length 6.5. Prosoma 2.9 long, 2.6 wide. Opisthosoma 3.5 long, 2.1 wide. Eye diameters and interdistances: AME 0.24, ALE 0.20, PME 0.18, PLE 0.20, AME–AME 0.16, AME–ALE 0.04, PME–PME 0.26, PME–PLE 0.22, AME–PME 0.22, ALE–PLE 0.14. Leg measurements: I: femur 3.6, patella 1.5, tibia 3.7, metatarsus 4.0, tarsus 1.1, total 13.9; II: 4.3, 1.7, 4.3, 4.6, 1.2, 16.1; III: 3.2, 1.2, 2.7, 2.8, 1.0, 10.9; IV: 3.7, 1.2, 3.2, 3.7,

1.1, 12.9. Spination follows the generic pattern. Palp: tibia with one prolateral, one retrolateral and one dorsal strong spine. RTA short, conical, wide at base and abruptly pointed at tip. Subtegulum visible in ventral view (Fig. 19). Tegulum with wide distal area. Distal triangular projection medially bent, with tip pointing towards tip of cymbium in retrolateral view (Fig. 20). Conductor absent.

Variation.—Nine males: total length 6.0–7.9; prosoma 2.8–3.6; femur I 3.6–5.6.

Female unknown.

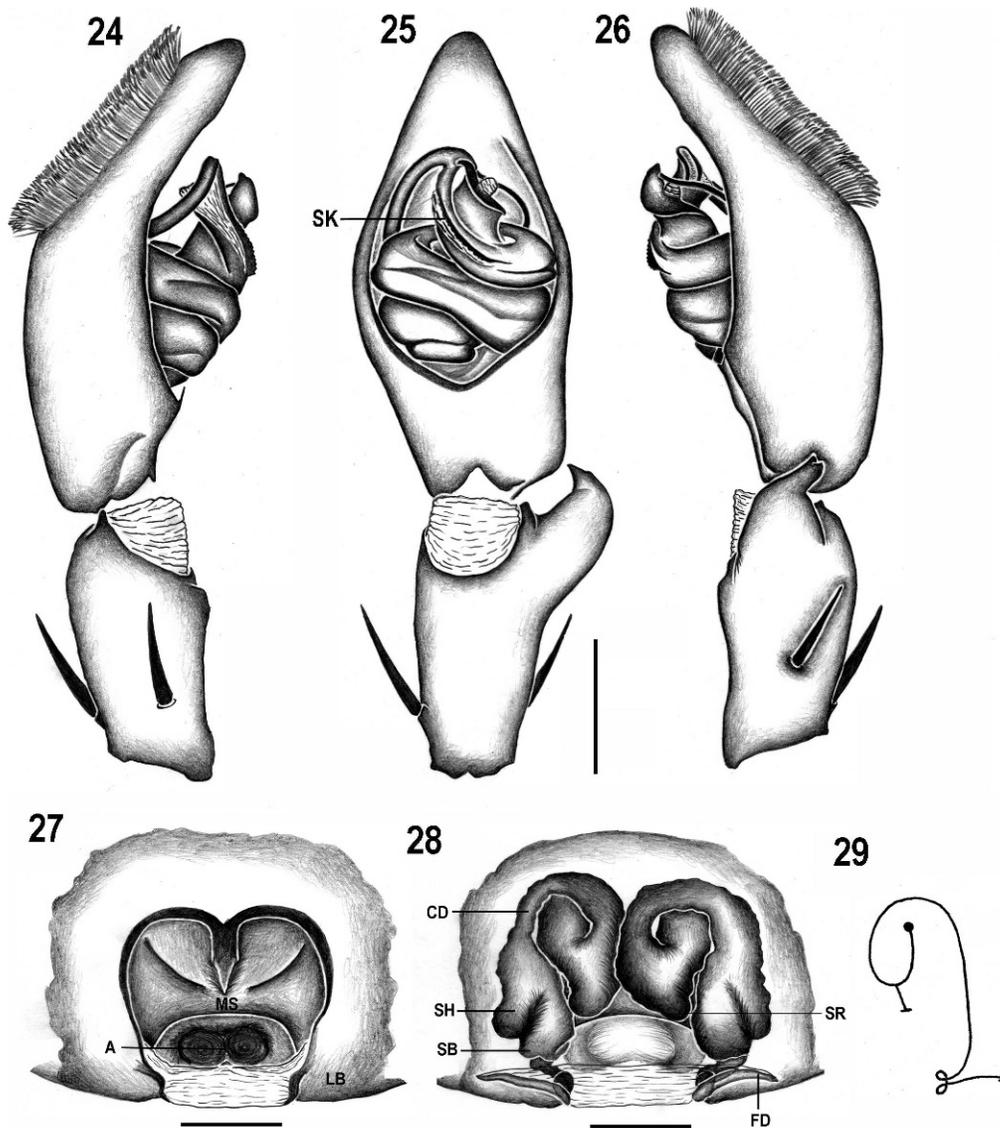
Distribution.—Northern South America: Colombia and Venezuela (Fig. 33).

Vindullus gibbosus new species
Figs. 21–23

Type material.—Holotype male from Peru, *San Martín*, Ekin, E. Tarapoto [06°30'05"S; 76°21'56"W], 9–21 March 1947, F. Woytkowski leg. (AMNH).

Etymology.—The species name is derived from the Latin noun “gibbus” meaning “hump,” referring to the hump at the dorsal margin of the RTA in a retrolateral view; adjective.

Diagnosis.—Males of *Vindullus gibbosus* new species resemble those of *Vindullus undulatus* new species by the distal area of the tegulum almost as wide as the median area and by RTA



Figures 24–29.—*Vindullus angulatus* new species. 24–26. Male, left palp. 24. Prolateral view; 25. Ventral view; 26. Retrolateral view. 27–29. Female. 27. Epigynum, ventral view; 28. Epigynum, dorsal view; 29. Schematic course of internal duct system, dorsal view. A = atrium; CD = copulatory duct; FD = fertilization duct; LB = lateral lobe; MS = median septum; SB = spermathecae base; SH = spermathecae head; SR = seminal receptacle. Scale lines: 0.5 mm.

with a wide base and narrow tip curved ventrad (Figs. 19, 20, 22, 23). They are distinguished by the RTA gently curved ventrally and gradually pointed (Fig. 22) and the smaller triangular projection with a narrower tip (Figs. 21, 22).

Description.—Male (holotype). Coloration: prosoma orange, slightly darker along fovea and striae; chelicerae orange with faint longitudinal brown stripe; labium dark orange, distally lighter; endites pale orange, distally cream colored; sternum orange with darker margins; legs and pedipalps orange; opisthosoma brownish gray, faintly variegated cream colored. Total length 9.0. Prosoma 4.3 long, 4.3 wide. Opisthosoma 4.7 long, 3.3 wide. Eye diameters and interdistances: AME 0.34, ALE 0.36, PME 0.24, PLE 0.26, AME–AME 0.22, AME–ALE 0.08, PME–PME 0.38, PME–PLE 0.38, AME–PME 0.28, ALE–PLE 0.20. Leg measurements: I: femur 6.8, patella 2.4, tibia 7.3, metatarsus 7.6, tarsus

2.0, total 26.1; II: 7.6, 2.5, 8.2, 8.5, 2.0, 28.8; III: 5.5, 1.8, 4.9, 5.0, 1.4, 18.6; IV: 6.2, 2.0, 5.6, 6.1, 1.5, 21.4. Spination follows the generic pattern. Palp: tibia with one prolateral, one retrolateral and one dorsal strong spine. RTA short, conical, wide at base and abruptly pointed at tip. Subtegulum visible in ventral view (Fig. 22). Tegulum with wide distal area. Distal triangular projection medially bent, with tip pointing towards tip of cymbium in retrolateral view (Fig. 23). Conductor absent.

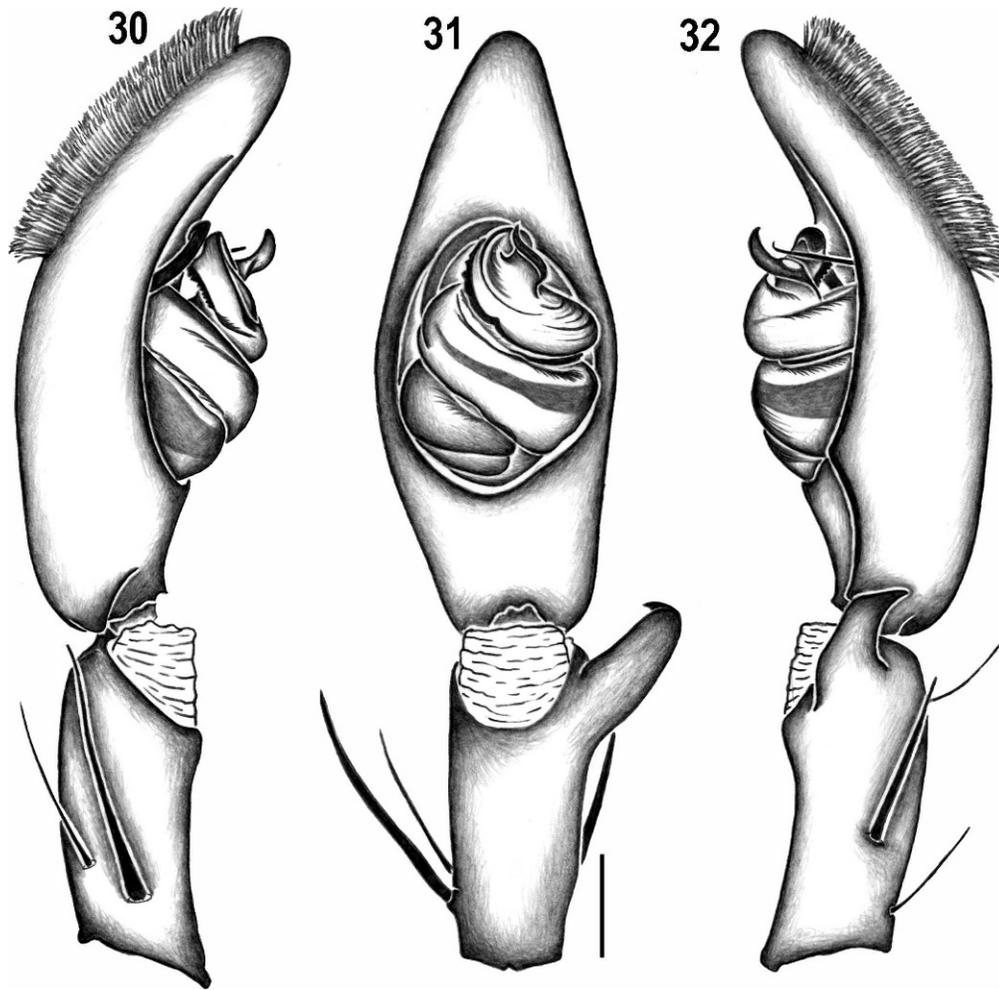
Female unknown.

Distribution.—Known only from the type locality (Fig. 33).

Vindullus angulatus new species

Figs. 1–12; 24–29

Type material.—Holotype male from Peru, Loreto, Cocha Shinguito [05°08'S; 74°45'W], May–June 1990, T. Erwin & D.



Figures 30–32.—*Vindullus concavus* new species, male, left palp. 30. Prolateral view; 31. Ventral view; 32. Retrolateral view. Scale line: 0.5 mm.

Silva leg. (MUSM). Paratypes: 1 male, 1 female, same collection data as holotype (MUSM); 1 male, same collection data as holotype (IBSP 80705).

Etymology.—The species name is derived from the Latin adjective “angulatus, -a, -um,” meaning “angled,” referring to the almost right-angled indentation at the dorsal margin of the RTA in a retrolateral view (Fig. 29); adjective.

Diagnosis.—The males of *Vindullus angulatus* new species resemble those of *Vindullus concavus* new species by the RTA very wide and curved dorsally (Fig. 26, cf. Fig. 32) and by the very long and strong serrated keel at the base of the embolus in the male palp (Fig. 25, cf. Fig. 31). They are distinguished by the RTA abruptly bent dorsally and with a bifid tip (Fig. 26). The females are distinguished by the combination of a strongly sclerotized medium septum with a posterior, blind shaped atrium in the female epigynum (Fig. 27) and a strongly sclerotized internal duct system in the female vulva (Fig. 28).

Description.—Male (holotype). Coloration: dorsal shield of prosoma orange; chelicerae, legs, and pedipalps slightly lighter than dorsal prosoma; labium and endites pale orange, distally cream colored; sternum pale yellow with darker margins; opisthosoma brownish gray. Total length 9.3. Prosoma 3.7

long, 3.4 wide. Opisthosoma: 5.2 long, 2.8 wide. Eye diameters and interdistances: AME 0.30, ALE 0.28, PME 0.22, PLE 0.26, AME–AME 0.20, AME–ALE 0.06, PME–PME 0.28, PME–PLE 0.26, AME–PME 0.24, ALE–PLE 0.16. Leg measurements: I: femur 6.2, patella 2.0, tibia 6.6, metatarsus 7.2, tarsus 1.7, total 23.7; II: 7.1, 2.0, 7.4, 7.9, 1.7, 26.1; III: 4.9, 1.6, 4.5, 4.5, 1.3, 16.8; IV: 5.6, 1.7, 5.2, 5.7, 1.3, 19.5. Leg spination follows the generic pattern. Palp: tibia with one prolateral, one retrolateral and one dorsal strong spine. RTA short, conical, wide at base, dorsally curved and bifid at tip (Fig. 26). Subtegulum visible in ventral view (Fig. 25). Tegulum with wide distal area and strong serrated projection at embolus base. Distal triangular projection medially bent, with tip pointing towards tip of cymbium in retrolateral view (Fig. 26). Conductor absent.

Female (paratype). Coloration as in male. Total length 11.8. Prosoma 4.3 long, 4.3 wide. Opisthosoma 7.2 long, 5.0 wide. Eye diameters and interdistances: AME 0.34, ALE 0.36, PME 0.24, PLE 0.32, AME–AME 0.30, AME–ALE 0.06, PME–PME 0.40, PME–PLE 0.44, AME–PME 0.30, ALE–PLE 0.24. Leg measurements: I: femur 5.6, patella 2.2, tibia 5.4, metatarsus 5.7, tarsus 1.5, total 20.4;



Figure 33.—Distribution map showing records of *Vindullus* spp.

II: 6.3, 2.4, 6.0, 6.1, 1.5, 22.3; III: 4.5, 1.8, 3.8, 3.7, 1.3, 15.1; IV: 5.1, 1.9, 4.5, 4.6, 1.2, 17.3. Spination follows the generic pattern. Epigynum: epigynal field divided into a pair of simple, rounded lateral borders and a strongly sclerotized, heart-shaped medium septum, with a posterior blind ended atrium and pair of anterior copulatory openings (Fig. 27). Internally with strongly sclerotized duct

system. Copulatory duct medially curved, bearing an anterior seminal receptacle. Spermathecae with a small cylindrical head and a larger, rounded base, from which emerges a long, medially twisted fertilization duct pointing laterad (Figs. 28–29).

Variation.—Three males: total length 8.6–9.3; prosoma 3.5–4.0; femur I 6.0–6.8.

Distribution.—Known only from the type locality (Fig.33).

Vindullus concavus new species
Figs. 30–32

Type material.—Male holotype from Brazil, *Pará*, Rio Tocantins (west bank) Acampamento Barragem, 20 June 1984, H.A. Nteto leg., deposited in MPEG.

Etymology.—The species name is derived from the Latin adjective “*concavus*, -a, -um” meaning “arched inward,” referring to the concave dorsal margin of the RTA in a retrolateral view; adjective.

Diagnosis.—The males of *Vindullus concavus* new species resemble those of *Vindullus angulatus* new species by RTA very wide and curved dorsally (Fig. 32, cf. Fig. 26) and by very long and strong serrated keel at the base of the embolus in the male palp (Fig. 31, cf. Fig. 25). They are distinguished by the gently curved RTA with a pointed tip (Fig. 32).

Description.—Male (MPEG). Coloration: prosoma orange, slightly darker at cephalic area and along fovea; chelicerae, legs, and pedipalps orange; sternum pale yellow with slightly darker margins; labium and endites pale yellow; opisthosoma whitish gray with conspicuous, cream colored cardiac impression. Total length 9.2. Prosoma 3.9 long, 3.5 wide. Opisthosoma 5.1 long, 3.1 wide. Eye diameters and interdistances: AME 0.34, ALE 0.28, PME 0.24, PLE 0.28, AME–AME 0.22, AME–ALE 0.02, PME–PME 0.28, PME–PLE 0.26, AME–PME 0.30, ALE–PLE 0.18. Leg measurements and interdistances: I: absent; II: femur 8.5, patella 2.5, tibia 8.7, metatarsus 9.7, tarsus 2.0, total 31.4; III: 6.1, 2.0, 5.5, 5.9, 1.5, 21.0; IV: 6.9, 2.0, 6.3, 7.2, 1.6, 24.0. Leg spination follows the generic pattern. Palp: tibia with one prolateral, one retrolateral and one dorsal strong spine. RTA short, conical, wide at base, and dorsally curved (Fig. 31). Subtegulum visible in ventral view (Fig. 31). Tegulum with wide distal area and strong serrated projection at embolus base (Fig. 30). Distal triangular projection medially bent, with tip pointing towards tip of cymbium in retrolateral view (Fig. 32). Conductor absent.

Female unknown.

Distribution.—Only known from the type locality (Fig. 33).

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