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A Revision of the Neotropical Spider Genus *Zimiromus*, With Notes on *Echemus* (Araneae, Gnaphosidae)

NORMAN I. PLATNICK¹ AND MOHAMMAD U. SHADAB²

ABSTRACT

The 21 known species of *Zimiromus* are diagnosed, described, and assigned to species groups. All but one of the previously known species had been placed in the European genus *Echemus*, the type species of which, *E. ambiguus* Simon, is re-described and newly synonymized with *E. angustifrons* (Westring). The American species assigned to *Echemus* are not congeneric with *E. angustifrons* and belong to at least three different genera. *Echemus medius* Keyserling, *E. lubricus* Simon, *E. tropicalis* Banks, *E. iotus* Banks, *E. banksi* Chickering, and *E. montanus* Chickering are transferred to *Zimiromus*. *Zimiromus banksi* (Chickering) is synonymized with *Z. iotus*

(Banks), and *Z. fragilis* Banks and *Z. montanus* (Chickering) are both synonymized with *Z. tropicalis* (Banks). The male of *Z. medius* (Keyserling) is described for the first time. Seventeen new species are described: *Z. lingua* and *Z. tonina* from Mexico; *Z. malkini* from Nicaragua; *Z. chickeringi* and *Z. aduncus* from Panama; *Z. jamaicensis* from Jamaica; *Z. bimini* from the Bahama Islands; *Z. muchmorei* from the Virgin Islands; *Z. rabago*, *Z. kochalkai*, and *Z. eberhardi* from Colombia; *Z. exlineae*, *Z. penai*, and *Z. brachet* from Ecuador; *Z. circulus* and *Z. piura* from Peru; and *Z. reichardti* from Brazil.

INTRODUCTION

The present paper, the eighth in a series on the spider family Gnaphosidae, is concerned with the little-known Neotropical genus *Zimiromus*. Originally described by Banks (1914), *Zimiromus* has been ignored by all subsequent workers, and most of the described species belonging to the genus have been assigned to *Echemus*. The European type species of *Echemus* is re-described below; it resembles the American forms assigned to the genus only in having a procurved posterior eye row. Study of genitalic characters indicates that none of the

described American species are congeneric with European forms, and that they belong to at least three different genera; some, such as *Echemus pedestris* O. P.-Cambridge, *Echemus pulcher* Keyserling, and *Echemus major* Keyserling, have metatarsal preening combs and genitalia indicating that they belong to the unrelated *Zelotes-Drassyllus* complex.

The American gnaphosids with strongly procurved posterior eye rows can be divided into two groups, the Prodidominae, which lack cheliceral teeth and have smooth tarsal claws, and the

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Echeminae, which have teeth on the tarsal claws and at least on the promargin of the chelicerae. There are apparently three valid echemine genera in the New World. One, for which the correct name is probably *Echemoides* Mello-Leitão, seems to be restricted to temperate South America (including the Andean chain) and is easily distinguished from the others by the presence of false articulations in the tarsi, which are, as a result, usually curled in preserved specimens. *Echemoides* will be revised in a later paper. Of the two other genera, *Zimiromus* may be distinguished from *Scopodes* (revised in Platnick and Shadab, 1976) by the presence of three rather than two promarginal cheliceral teeth, a hooklike median apophysis on the male palp (fig. 5), and, usually, a scape on the female epigynum (fig. 7). So far as is known, *Zimiromus* and *Scopodes* are totally allopatric, with the former genus restricted to the West Indies and tropical areas on the mainland from Chiapas, Mexico, south to southern Brazil, and the latter genus found only from Oaxaca, Mexico, north to the southwestern United States.

In addition to being widespread, *Zimiromus* is also speciose, and it seems likely that there are many species throughout its range that have not yet been collected. Knowledge of the species, except for a few well-collected Central American forms, is still fragmentary, often based on one or only a few specimens and, in a majority of cases, on only one sex. The 21 currently known species can be assigned to three species groups, although it is far from certain that all of these groups are monophyletic. The *tropicalis* group (including *tropicalis*, *lingua*, *chickeringi*, *eberhardi*, *iotus*, *rabago*, *medius*, *kochalkai*, *tonina*, *circulus*, and *malkini*) is probably a monophyletic entity; females of all these species are known and share an apparently autapomorphic character, a striated epigynal scape (fig. 7). All of the known males of the *tropicalis* group have a bifid retrolateral tibial apophysis with a long dorsal prong (fig. 6), and all except *Zimiromus medius* (Keyserling) have a distinct ledge-like distal dilation of the palpal femur (Chickering, 1949, fig. 19). Males of the *lubricus* group (which includes *lubricus*, *reichardti*, *muchmorei*, *aduncus*, and *chickeringi*) have a single short retrolateral tibial apophysis (fig. 42) and females have a distinct

but unstriated epigynal scape (fig. 43), whereas males of the *jamaicensis* group (which includes *jamaicensis*, *bimini*, *penai*, *brachet*, and *piura*) have a single long retrolateral tibial apophysis (fig. 60) and females lack an epigynal scape (fig. 61).

Schmidt (1971) reported on three specimens of *Zimiromus* found in Hamburg, Germany, on bananas shipped from Ecuador, and assigned those specimens to *Echemus medius* Keyserling, a species shown below to be restricted to southeastern Brazil. Unfortunately the specimens themselves have been lost and all that has been available for study are permanent slide mounts of both the male and female genitalia. The palpus has been greatly deformed, as is usual when these complex three-dimensional structures are placed on a slide and smashed by a cover slip; the practice of some European arachnologists of making permanent slides of the male palpi of spiders cannot be too greatly decried. From the slides kindly made available by Mr. Schmidt, it can be determined only that the specimens do not belong to *Z. medius* or to any of the species described below.

The format of the descriptions and standard abbreviations of morphological terms follow those used in Platnick and Shadab (1975). In addition to the collection of the American Museum of Natural History (AMNH), we have used specimens supplied by Dr. Å. Holm of the Zoologiska Institutionen, Uppsala Universitet (ZIUU), Dr. M. Hubert of the Muséum National d'Histoire Naturelle (MNHN), Mr. J. A. Kochalka (JAK), Dr. H. W. Levi of the Museum of Comparative Zoology, Harvard University (MCZ), Dr. A. A. Lise of the Museu Rio-Grandense de Ciências Naturais (MRCN), Dr. W. B. Peck of the Exline-Peck collection (EPC), Dr. H. Reichardt of the Museu de Zoologia da Universidade de São Paulo (MSP), Dr. R. X. Schick, formerly of the California Academy of Sciences (CAS), and Mr. F. R. Wanless of the British Museum (Natural History) (BMNH).

ECHEMUS SIMON

Echemus Simon, 1878, p. 99 (type species by monotypy *Echemus ambiguus* Simon, =*E. angustifrons*). Roewer, 1954, p. 418. Bonnet, 1956, p. 1643.

Boreoechemus Lohmander, 1942, p. 114 (type species by original designation *Drassus angustifrons* Westring). Roewer, 1954, p. 410. First synonymized by Tullgren, 1946, p. 111.

Diagnosis. *Echemus* may be distinguished from all New World Gnaphosidae by the combined presence of a metatarsal preening comb on the posterior legs, a decidedly procurved posterior eye row, and a greatly widened median apophysis on the male palp (fig. 1).

Echemus angustifrons (Westring)

Figures 1-4

Drassus angustifrons Westring, 1861, p. 349 (juvenile holotype from Sweden, may be in Naturhistoriska Riksmuseet, Stockholm, not examined).

Echemus ambiguus Simon, 1878, p. 100, pl. 15, fig. 1 (male holotype from Digne, Alpes-de-Haute, France, in MNHN, examined). Roewer,

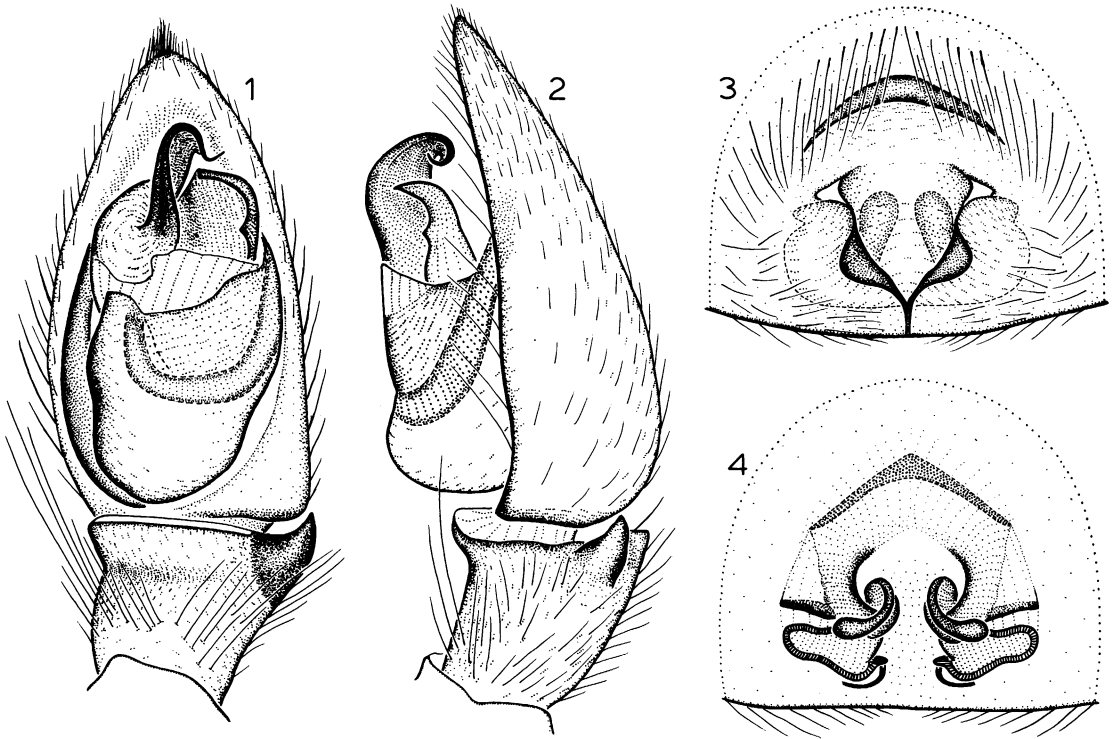
1954, p. 418. Bonnet, 1956, p. 1644. NEW SYNONYMY.

Echemus angustifrons: Simon, 1914, p. 212. Bonnet, 1956, p. 1644.

Boreoechemus angustifrons: Lohmander, 1942, p. 114. Roewer, 1954, p. 410.

Diagnosis. *Echemus angustifrons* may be readily identified by the distinctive genitalia (figs. 1-4).

Male. Total length 5.51 mm. Carapace 2.54 mm. long, 1.91 mm. wide, pale orange, oval, widest between coxae II and III, gradually narrowed anteriorly, with recumbent black and erect clypeal setae. Cephalic area not elevated; thoracic groove longitudinal, long. From above, anterior eye row recurved, posterior row procurved; from front, anterior row procurved, posterior row procurved. AME circular, diurnal; other eyes oval, nocturnal. Eye sizes and interdistances (mm.): AME 0.11, ALE 0.11, PME 0.13, PLE 0.12; AME-AME 0.08, AME-ALE



FIGS. 1-4. *Echemus angustifrons* (Westring). 1. Palp, ventral view. 2. Palp, retrolateral view. 3. Epigynum, ventral view. 4. Vulva, dorsal view.

0.03, PME-PME 0.05, PME-PLE 0.04, ALE-PLE 0.03. MOQ length 0.35 mm., front width 0.29 mm., back width 0.32 mm. Sternum rebordered, with sclerotized extensions to coxae; endites obliquely depressed; labium triangular; chelicerae with one retromarginal and three promarginal teeth. Abdomen brownish gray, with faint anterior scutum. Leg formula 4123; femur II 1.87 mm. long; legs pale yellow with distal segments darkest, with two dentate claws and claw tufts, preening comb on metatarsi III and IV, scopulae on metatarsi and tarsi, and trochanters slightly notched. Leg spination (only surfaces bearing spines listed): femora: I, II d1-1-0, p0-0-1; III d1-1-1, p0-1-1, r0-1-1; IV d1-1-0, p0-1-1, r0-0-1; patellae: III p0-1-0, r0-1-0; IV r0-1-0; tibiae: I v1p-1p-0; II v1p-1p-1p; III d1-0-0, p1-1-1, v2-2-2, r0-1-1; IV p1-1-1, v2-2-2, r1-1-1; metatarsi: I, II v1p-0-0; III p1-2-2, v2-1p-0, r1-1-2; IV p1-2-2, v2-2-0, r1-2-2. Palp with wide median apophysis (fig. 1); retrolateral tibial apophysis short, triangular (fig. 2).

Female. As in male except for the following: Total length 6.37 mm. Carapace 2.84 mm. long, 2.09 mm. wide, light brown. Eye sizes and inter-distances (mm.): AME 0.13, ALE 0.12, PME 0.14, PLE 0.13; AME-AME 0.10, AME-ALE 0.03, PME-PME 0.07, PME-PLE 0.09, ALE-PLE 0.03. MOQ length 0.36 mm., front width 0.36 mm., back width 0.35 mm. Abdomen without scutum. Femur II 2.02 mm. long. Leg spination: femur IV p0-0-1; tibiae: I v0-1p-0; II v0-1p-1p. Epigynum with wide hood and septum (fig. 3). Spermathecae with recurved anterior lobes (fig. 4).

Material Examined. France: *Alpes-de-Haute*: Digne (MNHN), 1♂ (holotype); *Pyrénées-Orientales*: Canigou (MNHN), 1♀. Sweden: Skaftö (ZIUU), 1♂, 1♀.

Distribution. Western Europe.

Synonymy. No genitalic differences were detected between Swedish specimens and the holotype and other French material of *E. ambiguus*.

ZIMIROMUS BANKS

Zimiromus Banks, 1914, p. 676 (type species by monotypy *Zimiromus fragilis* Banks, =*Z. tropicalis*). Roewer, 1954, p. 355. Bonnet, 1959, p. 4968.

Diagnosis. *Zimiromus* may be distinguished from all other New World Gnaphosidae by the combined presence of a strongly procurved posterior eye row, dentate tarsal claws, tarsi without false articulations, and three promarginal cheliceral teeth. The male palp always bears a hooklike median apophysis (fig. 5) and the female epigynum usually bears a scape (fig. 7).

Description. Total length 2.6-7.2 mm. Carapace oval in dorsal view, widest between coxae II and III, gradually narrowed in front, pale orange with black oval surrounding anterior median eyes, with short recumbent black and long clypeal setae. Cephalic area not elevated; thoracic groove longitudinal. From above, anterior eye row procurved, posterior row strongly procurved. Anterior median eyes circular, diurnal; other eyes oval, nocturnal. Posterior median eyes largest, posterior laterals smallest. Anterior median eyes separated by roughly their diameter, by roughly their radius from anterior laterals. Posterior and lateral eyes separated by roughly their radius. Clypeal height at anterior median eyes greater than their diameter. Chelicerae with three promarginal teeth and usually a retromarginal denticle. Endites short, oblong, with deep oblique depression and median serrula. Labium short, broadly rounded at tip. Sternum lightly rebordered, truncate posteriorly. Leg formula 4123. Tarsi with light scopulae, two dentate claws, and claw tufts. Metatarsal preening comb absent. Trochanters notched. Typical leg spination pattern (only surfaces bearing spines listed): femora: I d1-1-0, p0-0-1; II d1-1-1, p0-0-1; III d1-1-1, p0-1-1, r0-0-1; IV d1-1-1, p0-0-1, r0-0-1; patellae III, IV p0-1-0, r0-1-0; tibiae: I v1r-2-1p; II p0-0-1, v1r-2-1p; III, IV d1-0-0, p0-1-1, v1p-1p-2, r0-1-1; metatarsi: I, II v2-0-0; III p0-2-2, v1p-0-1p, r0-1-2; IV p0-2-2, v1p-1p-1p, r0-2-2. Abdomen light gray with orange anterior scutum in males and two small circular paramedian muscle impressions near middle of length. Six spinnerets, anteriors long, with ventral tubule and two to five spigots. Palp with recurved conductor folded around embolus, and hooklike median apophysis (fig. 5); retrolateral tibial apophysis variable, most often long, bifid (fig. 6); palpal femur of male often with distinct distal dilation. Epigynum usually with scape (fig. 7). Spermathecae usually separated by median ducts (fig. 8).

KEY TO SPECIES OF *ZIMIROMUS*

1. Males 2
Females 13
2. Retrolateral tibial apophysis relatively long
(as in figs. 6, 60) 3
Retrolateral tibial apophysis relatively short
(figs. 42, 46, 50) 11
3. Retrolateral tibial apophysis with distinct
ventral lobe (as in fig. 6) 4
Retrolateral tibial apophysis without distinct
ventral lobe (figs. 60, 64) 10
4. Ventral lobe of retrolateral tibial apophysis
almost as long as dorsal lobe (fig. 30) . . .
. *medius*
Ventral lobe of retrolateral tibial apophysis
much shorter than dorsal lobe (as in fig. 6)
. 5
5. Embolus twisted distally (figs. 17, 21, 25)
. 6
Embolus not twisted distally (figs. 5, 13, 33)
. 8
6. Distal tip of conductor protruding far be-
yond embolus on prolateral side (figs. 17,
25) 7
Distal tip of conductor not protruding far
beyond embolus on prolateral side (fig.
21) *iotus*
7. Ventral lobe of retrolateral tibial apophysis
rounded dorsally (fig. 26) *rabago*
Ventral lobe of retrolateral tibial apophysis
sharply pointed dorsally (fig. 18)
. *eberhardi*
8. Embolus expanded at tip (fig. 5) *tropicalis*
Embolus not expanded at tip (figs. 13, 33)
. 9
9. Conductor with apical cap (fig. 13)
. *chickeringi*
Conductor without apical cap (fig. 33)
. *kochalkai*
10. Embolus protruding beyond conductor
(fig. 63) *bimini*
Embolus not protruding beyond conductor
(fig. 59) *jamaicensis*
11. Retrolateral tibial apophysis rounded dor-
sally (fig. 42) *lubricus*
Retrolateral tibial apophysis sharply pointed
dorsally (figs. 46, 50) 12
12. Conductor relatively wide distally (fig. 49)
. *muchmorei*
Conductor relatively narrow distally (fig. 45)
. *aduncus*
13. Epigynum with a scape (as in figs. 7, 43) . 14
Epigynum without a scape (figs. 55, 57, 61,
65) 28
14. Epigynal scape striated (as in fig. 7) 15
Epigynal scape not striated (figs. 43, 47, 51,
53) 25
15. Epigynal scape with three striations (fig. 11)
. *malkini*
Epigynal scape with more than three
striations 16
16. Spermathecal ducts coiled at base of sper-
mathecae (figs. 16, 20) 17
Spermathecal ducts not coiled at base of
spermathecae 18
17. Epigynal scape widest posteriorly (fig. 19)
. *eberhardi*
Epigynal scape widest anteriorly (fig. 15)
. *chickeringi*
18. Median epigynal ducts relatively narrow (figs.
8, 10) 19
Median epigynal ducts relatively wide (as in
figs. 24, 32, 38) 20
19. Epigynal atrium widest at middle (fig. 7) . . .
. *tropicalis*
Epigynal atrium widest posteriorly (fig. 9) . .
. *lingua*
20. Epigynal scape widest anteriorly (fig. 39) . . .
. *circulus*
Epigynal scape widest at middle or posteriorly
. 21
21. Epigynal atrium much longer than wide (figs.
23, 27, 31) 22
Epigynal atrium as wide as long (figs. 35, 37)
. 24
22. Median epigynal ducts widest anteriorly (fig.
32) *medius*
Median epigynal ducts widest at middle (figs.
24, 28) 23
23. Epigynal hood entire (fig. 23) *iotus*
Epigynal hood broken (fig. 27) *rabago*
24. Epigynal atrium narrowed anteriorly (fig. 37)
. *tonina*
Epigynal atrium not narrowed anteriorly (fig.
35) *kochalkai*
25. Epigynal scape relatively narrow (figs. 43, 47)
. 26
Epigynal scape relatively wide (figs. 51, 53)
. 27
26. Epigynal atrium relatively large (fig. 43) . . .
. *lubricus*
Epigynal atrium relatively small (fig. 47) . . .
. *reichardti*
27. Median epigynal ducts globular at base (fig.
54) *exlineae*
Median epigynal ducts not globular at base
(fig. 52) *muchmorei*
28. Epigynal hood relatively wide (fig. 61)
. *jamaicensis*
Epigynal hood relatively narrow (figs. 55,
57, 65) 29

29. Epigynal ducts coiled (fig. 66) *piura*
Epigynal ducts not coiled (figs. 56, 58) . . . 30
30. Median epigynal ducts relatively wide (fig. 58) *brachet*
Median epigynal ducts relatively narrow (fig. 56) *penai*

Zimiromus tropicalis (Banks), new combination
Figures 5-8

Echemus tropicalis Banks, 1909, p. 197, fig. 36 (female holotype from Chiral Paraíso, Cartago, Costa Rica, in MCZ, examined). Roewer, 1954, p. 421. Bonnet, 1956, p. 1646.

Zimiromus fragilis Banks, 1914, p. 676, figs. 3, 9, 12 (female holotype from Turrialba, Cartago, Costa Rica, in MCZ, examined). Roewer, 1954, p. 355. Bonnet, 1959, p. 4968. NEW SYNONYMY.

Echemus montanus Chickering, 1949, p. 329, figs. 17-19 (male holotype from El Valle, Coclé, Panama, in MCZ, examined). Roewer, 1954, p. 420. NEW SYNONYMY.

Diagnosis. *Zimiromus tropicalis* seems closest to *Z. lingua*; females of both species have long, narrow median epigynal ducts. Males of *Z. lingua* are unknown, but those of *Z. tropicalis* may be recognized by the distally expanded embolus and prolonged conductor (fig. 5); females of *Z. tropicalis* have a much longer epigynal atrium (fig. 7).

Male. Total length 3.35-3.98 mm. Carapace 1.45-1.69 mm. long, 1.22-1.32 mm. wide. Femur II 1.23-1.40 mm. long (four specimens examined). Eye sizes and interdistances (mm.): AME 0.09, ALE 0.09, PME 0.11, PLE 0.10; AME-AME 0.11, AME-ALE 0.04, PME-PME 0.07, PME-PLE 0.05, ALE-PLE 0.05. MOQ length 0.31 mm., front width 0.28 mm., back width 0.30 mm. Embolus expanded at tip, conductor dilated distally, serrate (fig. 5). Retrolateral tibial apophysis bifid, with long dorsal prong (fig. 6). Palpal femur with wide, serrate distal dilation. Leg spination: femur IV d1-1-0, p0-0-0; patellae: III p0-0-0; IV p0-0-0, r0-0-0; tibiae: I v1r-1r-1p; IV d1-0-1.

Female. Total length 4.07-4.29 mm. Carapace 1.80-1.85 mm. long, 1.30-1.47 mm. wide. Femur II 1.33-1.51 mm. long (three specimens examined). Eye sizes and interdistances (mm.): AME 0.10, ALE 0.11, PME 0.10, PLE 0.10; AME-AME 0.12, AME-ALE 0.04, PME-PME 0.12,

PME-PLE 0.06, ALE-PLE 0.05. MOQ length 0.32 mm., front width 0.32 mm., back width 0.32 mm. Epigynal atrium relatively long, with broken anterior hood (fig. 7). Median epigynal ducts long, narrow, coiled around spermathecal ducts anteriorly (fig. 8). Leg spination: femur II d1-1-0.

Material Examined. **Costa Rica:** no specific locality (AMNH), 1♂; **Cartago:** Chiral Paraíso (Biolley and Tristan, MCZ), 1♀; Turrialba (Tristan, MCZ), 1♀, May 23-Aug. 13, 1965 (A. M. Chickering, MCZ), 1♀. **Panama:** *Coclé:* El Valle, July, 1936 (A. M. Chickering, MCZ), 3♂.

Distribution. Costa Rica and Panama.

Synonymy. No genitalic differences were detected between the holotypes of *tropicalis* and *fragilis*. The collection of a male of *montanus* in Costa Rica indicates that that species is probably the male of *tropicalis*.

Zimiromus lingua, new species
Figures 9, 10

Type. Female holotype from pine-oak forest 5 miles west of San Cristóbal de las Casas, latitude 16° 45' N, longitude 92° 41' W, Chiapas, Mexico (August 24, 1966; J. and W. Ivie), deposited in AMNH.

Etymology. The specific name is a noun in apposition from the Latin *lingua* (tongue), referring to the shape of the epigynal scape.

Diagnosis. *Zimiromus lingua* seems closest to *Z. tropicalis* but may be distinguished by the much shorter epigynal atrium (fig. 9).

Male. Unknown.

Female. Total length 6.19, 7.20 mm. Carapace 2.20, 2.41 mm. long, 1.79, 1.98 mm. wide. Femur II 1.69, 1.87 mm. long (two specimens examined). Eye sizes and interdistances (mm.): AME 0.11, ALE 0.10, PME 0.12, PLE 0.09; AME-AME 0.14, AME-ALE 0.07, PME-PME 0.12, PME-PLE 0.12, ALE-PLE 0.08. MOQ length 0.39 mm., front width 0.37 mm., back width 0.37 mm. Epigynal atrium short, widest posteriorly (fig. 9). Median epigynal ducts long, narrow, not coiled around spermathecal ducts (fig. 10). Leg spination: femora: III r0-1-1; IV p0-1-1; tibia IV d1-0-1; metatarsi: III v1p-1r-1p; IV v1p-2-1p.

Material Examined. One female taken with the holotype.

Distribution. Chiapas, Mexico.

***Zimiromus chickeringi*, new species**

Figures 13-16

Echemus iotus (misidentification): Chickering, 1949, p. 327, figs. 14-16 (male "allotype" only).

Types. Male holotype and female paratype from Barro Colorado Island, Panama Canal Zone (July 10, 1950; A. M. Chickering), deposited in MCZ.

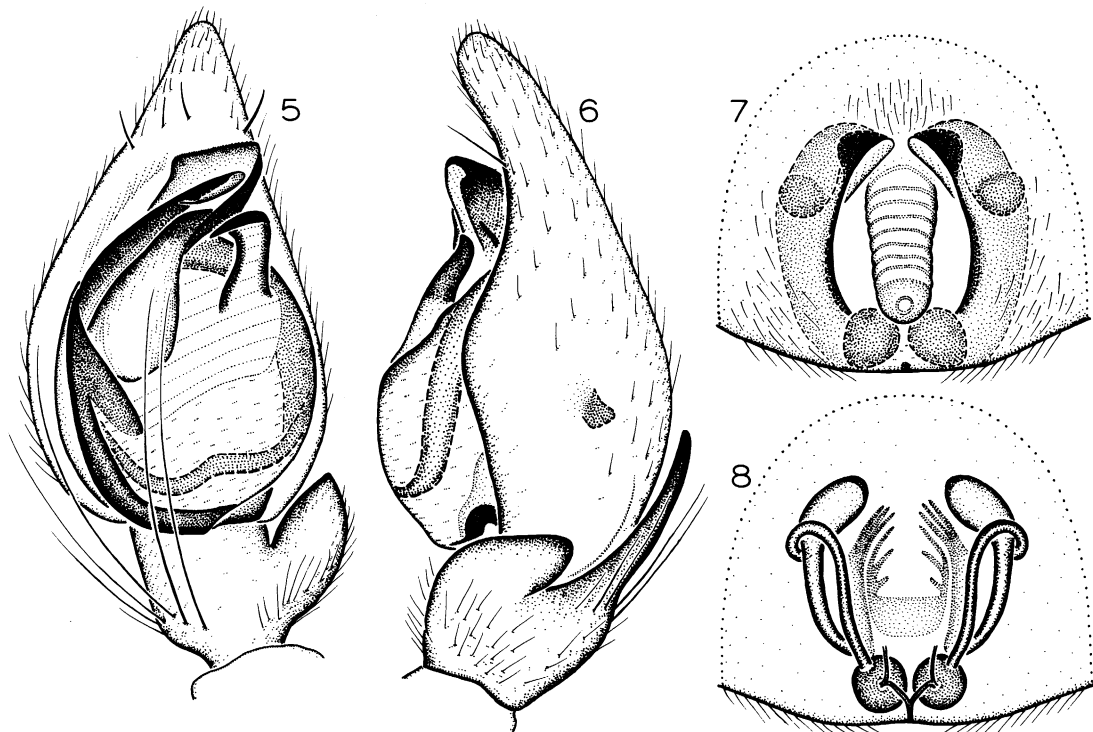
Etymology. The specific name is a patronym in honor of the collector of the type specimens.

Diagnosis. *Zimiromus chickeringi* seems closest to *Z. eberhardi*; females of both species have spermathecal ducts that coil below the base of the spermatheca. Males of the former species may be distinguished by the larger, untwisted embolus (fig. 13), females by the epigynal scape being equal in width throughout its length (fig. 15).

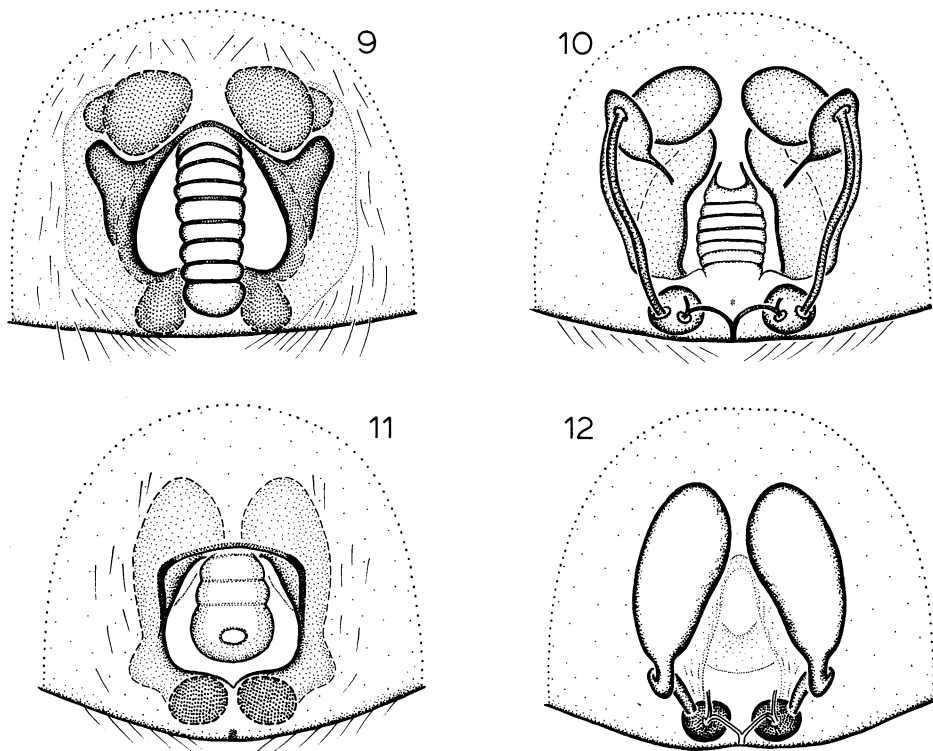
Male. Total length 3.76 ± 0.22 mm. Carapace

1.57 ± 0.07 mm. long, 1.24 ± 0.07 mm. wide. Femur II 1.37 ± 0.07 mm. long (23 specimens examined). Eye sizes and interdistances (mm.): AME 0.10, ALE 0.10, PME 0.13, PLE 0.10; AME-AME 0.11, AME-ALE 0.05, PME-PME 0.06, PME-PLE 0.05, ALE-PLE 0.04. MOQ length 0.31 mm., front width 0.31 mm., back width 0.32 mm. Palp with long, untwisted embolus and capped conductor (fig. 13). Retrolateral tibial apophysis with sharply pointed ventral lobe (fig. 14). Palpal femur with apical retrolateral ledge bearing ventral denticles and dorsal teeth. Leg spination: femur I d1-1-1; tibiae: I v1r-1r-1p; IV d1-0-1.

Female. Total length 4.37 ± 0.54 mm. Carapace 1.69 ± 0.09 mm. long, 1.34 ± 0.07 mm. wide. Femur II 1.42 ± 0.07 mm. long (38 specimens examined). Eye sizes and interdistances (mm.): AME 0.09, ALE 0.09, PME 0.10, PLE 0.09; AME-AME 0.12, AME-ALE 0.04, PME-PME 0.11, PME-PLE 0.06, ALE-PLE 0.04. MOQ



FIGS. 5-8. *Zimiromus tropicalis* (Banks). 5. Palp, ventral view. 6. Palp, retrolateral view. 7. Epigynum, ventral view. 8. Vulva, dorsal view.



FIGS. 9-12. 9, 10. *Zimiromus lingua*, new species. 9. Epigynum, ventral view. 10. Vulva, dorsal view. 11, 12. *Z. malkini*, new species. 11. Epigynum, ventral view. 12. Vulva, dorsal view.

length 0.27 mm., front width 0.30 mm., back width 0.30 mm. Epigynal scape uniform in width (fig. 15). Spermathecal ducts coiled below base of spermatheca (fig. 16). Leg spination: femur I d1-1-1; tibiae: I v1r-1r-1p; IV d1-0-1; metatarsi: III p0-1-2; IV p1-2-2, r1-2-2.

Material Examined. Panama: Canal Zone: Barro Colorado Island, numerous collections, May-July, 1934-1964 (A. M. Chickering, J. Zetek, MCZ), 22♂, 36♀; Forest Preserve, July, 1939 (A. M. Chickering, MCZ), 1♀, Jan. 8, 1958 (A. M. Chickering, MCZ), 1♂; Madden Dam Forest, Aug. 8, 1936 (A. M. Chickering, MCZ), 1♀.

Distribution. Panama Canal Zone.

***Zimiromus eberhardi*, new species**

Figures 17-20

Types. Male holotype from Cali, Valle del Cauca, Colombia (September 10, 1969; W. Eber-

hard), deposited in MCZ, and female paratype from 4 miles west of Guaduas, Cundinamarca, Colombia (March 15, 1965; E. I. Schlinger, E. S. Ross), deposited in CAS.

Etymology. The specific name is a patronym in honor of the collector of the holotype.

Diagnosis. *Zimiromus eberhardi* seems closest to *Z. chickeringi* but may be distinguished by the smaller, twisted embolus (fig. 17) and the epigynal scape being wider posteriorly than anteriorly (fig. 19).

Male. Total length 4.32 mm. Carapace 1.67 mm. long, 1.33 mm. wide. Femur II 1.51 mm. long (holotype). Eyes teratological, irregularly arranged, those of right side widely separated. Palp with small twisted embolus and conductor with recurved tip (fig. 17). Retrolateral tibial apophysis with sharply pointed ventral lobe (fig. 18). Palpal femur with long distal ledge bearing distinct dorsal tooth. Leg spination: femur I d1-1-1; tibiae I, II v1r-1r-1p.

Female. Total length 5.47 mm. Carapace 1.91 mm. long, 1.49 mm. wide. Femur II 1.66 mm. long (paratype). Eye sizes and interdistances (mm.): AME 0.11, ALE 0.11, PME 0.12, PLE 0.08; AME-AME 0.12, AME-ALE 0.05, PME-PME 0.12, PME-PLE 0.07, ALE-PLE 0.06. MOQ length 0.33 mm., front width 0.34 mm., back width 0.36 mm. Epigynal scape widest posteriorly, sides of atrium sinuous (fig. 19). Spermathecal ducts coiled below base of spermatheca (fig. 20). Leg spination: femora: I d1-1-1; III r0-1-1; IV p0-1-1; tibiae: I, II v2-2-1p; IV d1-0-1; metatarsi: III v1p-1r-1p; IV v1p-2-1p.

Material Examined. Only the types.

Distribution. Western Colombia.

Zimiromus iotus (Banks), new combination

Figures 21-24

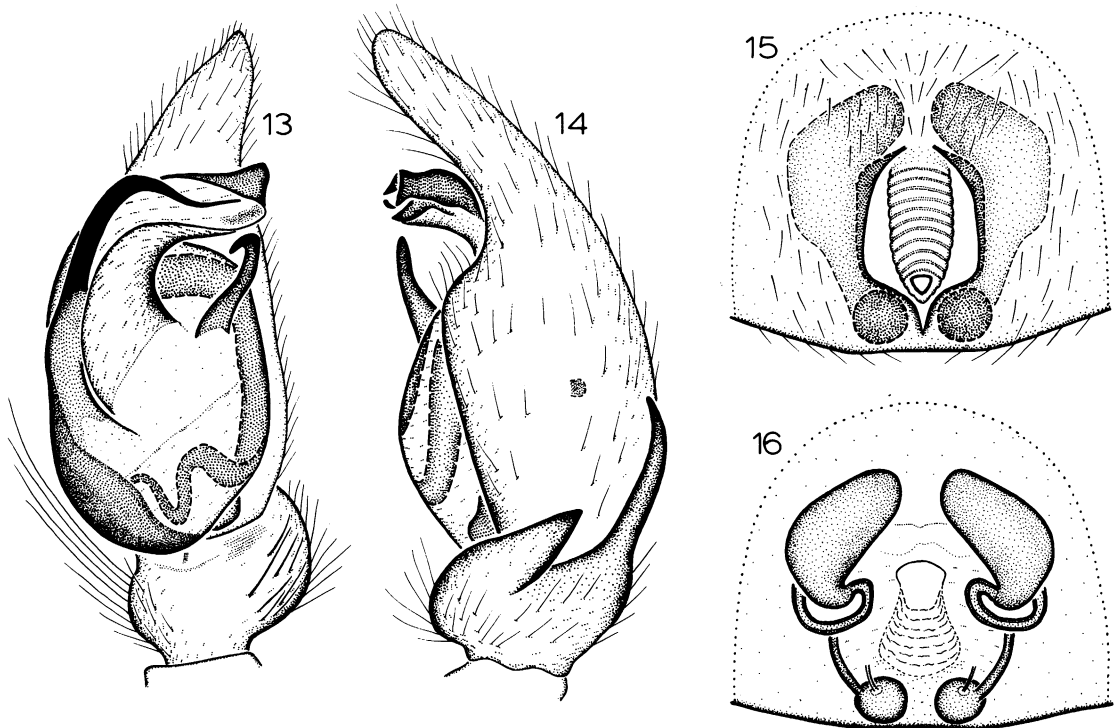
Echemus iotus Banks, 1929, p. 57, pl. 4, fig. 58 (female holotype from Las Sabanas, Coclé, Panama, in MCZ, examined). Chickering,

1949, p. 327 (female only). Roewer, 1954, p. 420. Bonnet, 1956, p. 1644.

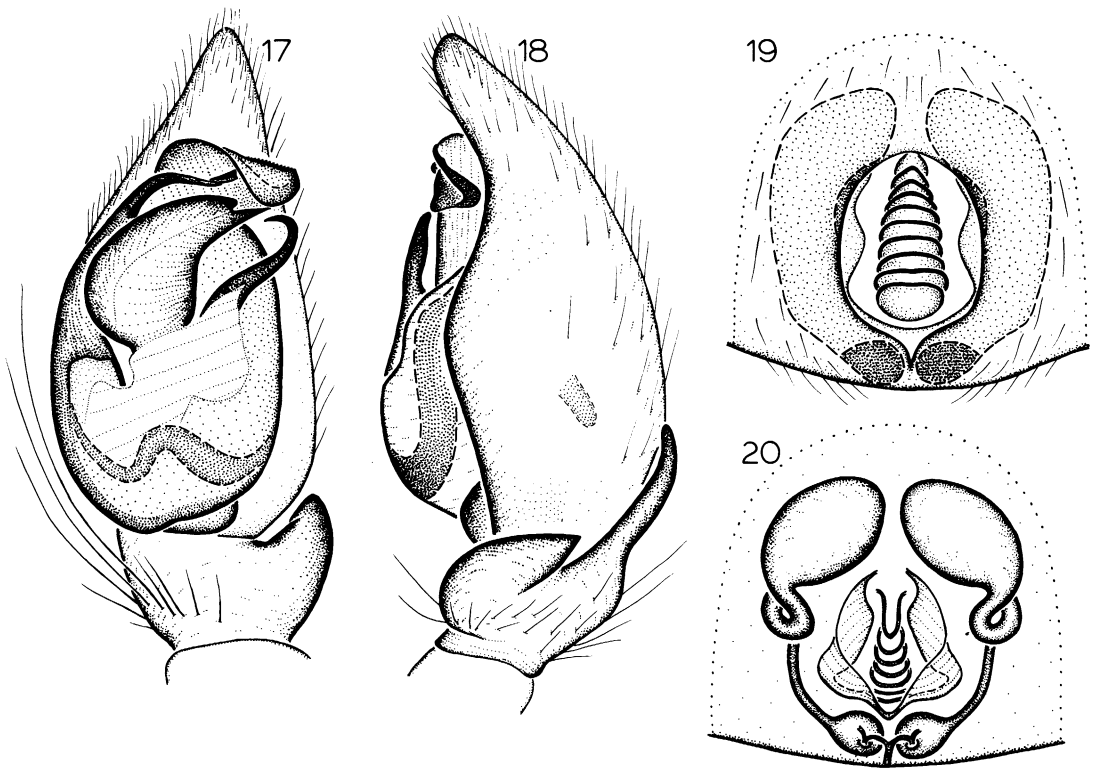
Echemus banksi Chickering, 1949, p. 326, figs. 11-13 (male holotype from Fort Sherman, Panama Canal Zone, in MCZ, examined). Roewer, 1954, p. 420. NEW SYNONYMY.

Diagnosis. *Zimiromus iotus* seems closest to *Z. rabago*; females of both species have extremely wide median epigynal ducts. Males of the former species may be distinguished by the teeth on the palpal conductor (fig. 21), females by the unbroken epigynal hood (fig. 23).

Male. Total length 3.71 ± 0.39 mm. Carapace 1.59 ± 0.08 mm. long, 1.24 ± 0.07 mm. wide. Femur II 1.36 ± 0.08 mm. long (20 specimens examined). Eye sizes and interdistances (mm.): AME 0.10, ALE 0.10, PME 0.14, PLE 0.08; AME-AME 0.09, AME-ALE 0.04, PME-PME 0.04, PME-PLE 0.05, ALE-PLE 0.03. MOQ length 0.31 mm., front width 0.29 mm., back width 0.32 mm. Palpal conductor bearing numerous long teeth (fig. 21). Retrolateral tibial



FIGS. 13-16. *Zimiromus chickeringi*, new species. 13. Palp, ventral view. 14. Palp, retrolateral view. 15. Epigynum, ventral view. 16. Vulva, dorsal view.



FIGS. 17-20. *Zimiromus eberhardi*, new species. 17. Palp, ventral view. 18. Palp, retrolateral view. 19. Epigynum, ventral view. 20. Vulva, dorsal view.

apophysis with short dorsal prong widely separated from ventral prong (fig. 22). Palpal femur with distal retrolateral rounded ledge bearing long tooth dorsally. Leg spination: patellae: III r0-0-0; IV p0-0-0, r0-0-0; tibiae: I v0-1r-1p; II vlr-1r-1p.

Female. Total length 4.41 ± 0.51 mm. Carapace 1.73 ± 0.08 mm. long, 1.32 ± 0.05 mm. wide. Femur II 1.38 ± 0.07 mm. long (26 specimens examined). Eye sizes and interdistances (mm.): AME 0.09, ALE 0.11, PME 0.11, PLE 0.07; AME-AME 0.12, AME-ALE 0.04, PME-PME 0.09, PME-PLE 0.06, ALE-PLE 0.03. MOQ length 0.29 mm., front width 0.30 mm., back width 0.31 mm. Epigynal scape sinuous, hood entire (fig. 23). Median epigynal ducts extremely wide (fig. 24). Leg spination: femur I d1-1-1; tibia I vlr-1r-1p.

Material Examined. Unless otherwise noted, all specimens were collected by A. M. Chickering

and deposited in MCZ. Panama: Canal Zone: Balboa, Aug., 1936, 1♂; Barro Colorado Island, July, 1936, 1♂; Aug., 1939, 3♀; Aug. 16, 1950, 1♂; July 20, 1954, 2♀; Chiva Road, July 23, 1954, 1♂, 1♀; Corozal, Dec. 23, 1957, 1♂; Diablo, Dec. 19, 1957, 1♀; Experimental Gardens, July 11, 1954, 1♂, 1♀; July 14, 1954, 1♂; Farfan, Jan. 9, 1958, 1♂; Forest Preserve, Dec. 24, 1957, 1♂, 1♀; Feb. 28, 1958, 1♀; Fort Randolph, Aug., 1936, 1♂; Fort Sherman, Aug., 1939, 3♂, 7♀; France Field, Aug., 1939, 1♂; Gatún, Feb. 27, 1958, 1♀; Madden Dam Region, July 17, 1954, 1♂; Pedro Miguel, Aug. 23, 1954, 1♀; Summit, July, 1950, 2♂; Aug. 16, 1950, 2♀; Aug. 17, 1954, 1♂; Summit Gardens, July 12, 1954, 1♂; July 13, 1954, 1♂, 1♀; Aug. 19, 1954, 1♀; May 13, 1964, 1♀. Coclé: Las Sabanas (N. Banks, MCZ), 1♀. Panamá: El Cermeño, Feb., 1940 (J. Zetek, MCZ), 1♀.

Distribution. Panama.

Synonymy. Several simultaneous collections of both sexes indicate that *banksi* is the male of *iotus*.

***Zimiromus rabago*, new species**

Figures 25-28

Types. Male holotype beaten from dry banana leaves at San Sebastián de Rábago, elevation 2000 m., Sierra Nevada de Santa Marta, Magdalena, Colombia (April 11-14, 1968; B. Malkin), and female paratype taken from banana trees between San Pablo and San Pedro, elevation 2200 feet, Sierra Nevada de Santa Marta, Magdalena, Colombia (May 13, 1975; J. A. Kochalka), deposited in AMNH.

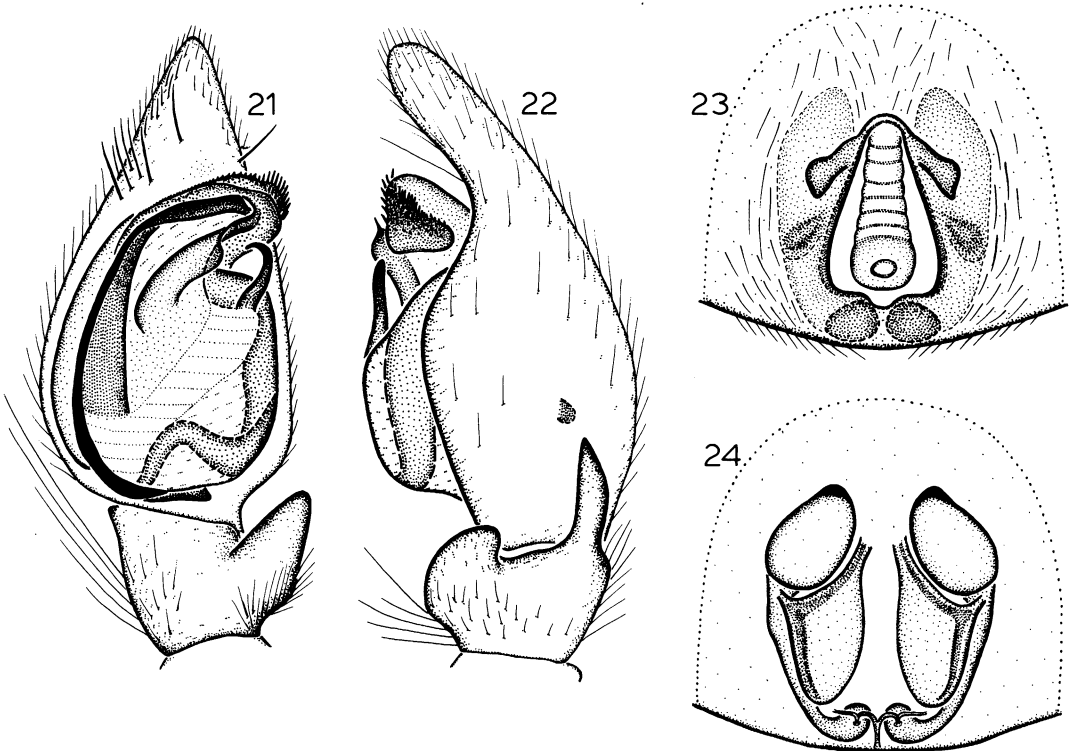
Etymology. The specific name is a noun in apposition taken from the type locality.

Diagnosis. *Zimiromus rabago* seems closest to *Z. iotus* but may be distinguished by the lack of

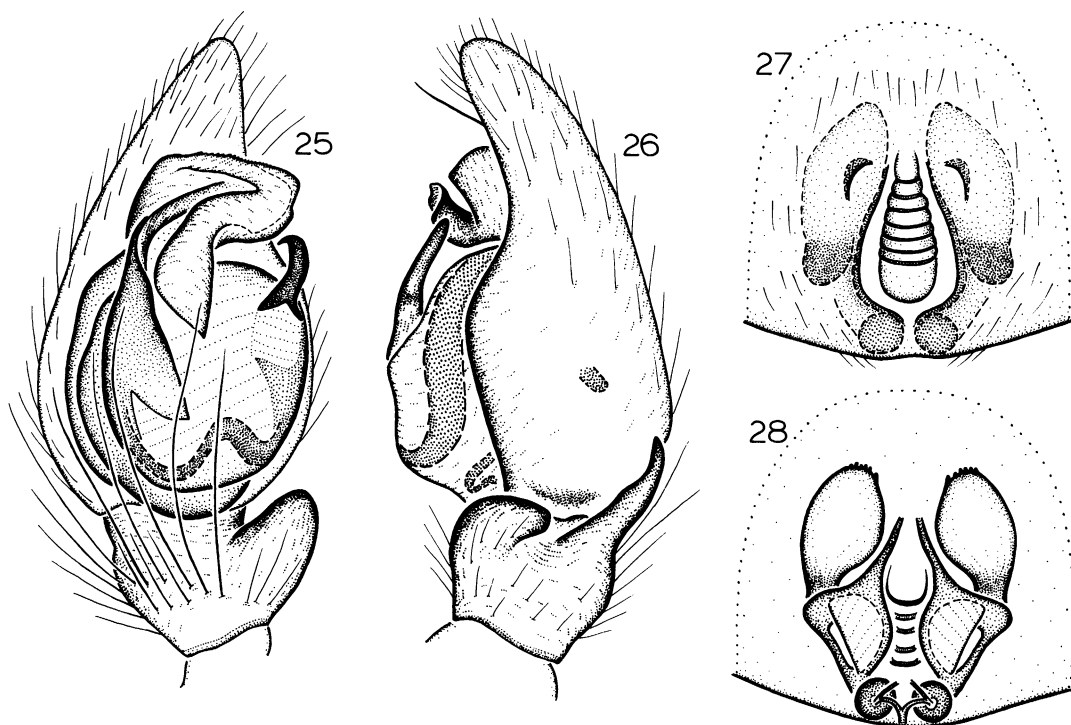
long teeth on the palpal conductor (fig. 25) and the broken epigynal hood (fig. 27).

Male. Total length 3.74-4.36 mm. Carapace 1.69-1.81 mm. long, 1.38-1.45 mm. wide. Femur II 1.30-1.51 mm. long (three specimens examined). Eye sizes and interdistances (mm.): AME 0.10, ALE 0.11, PME 0.13, PLE 0.10; AME-AME 0.12, AME-ALE 0.05, PME-PME 0.09, PME-PLE 0.06, ALE-PLE 0.05. MOQ length 0.33 mm., front width 0.33 mm., back width 0.36 mm. Palpal conductor with serrate distal edge but without long teeth (fig. 25). Retrolateral tibial apophysis with sinuous dorsal prong (fig. 26). Palpal femur with large serrate distal retrolateral ledge bearing dorsal lobe. Leg spination: tibiae: II v1r-1p-1p; IV d1-0-1; metatarsi: III v1p-1r-1p; IV v1p-2-1p.

Female. Total length 4.97, 5.69 mm. Carapace 1.87, 1.91 mm. long, 1.50, 1.55 mm. wide. Femur II 1.55, 1.62 mm. long (two specimens



FIGS. 21-24. *Zimiromus iotus* (Banks). 21. Palp, ventral view. 22. Palp, retrolateral view. 23. Epigynum, ventral view. 24. Vulva, dorsal view.



FIGS. 25-28. *Zimiromus rabago*, new species. 25. Palp, ventral view. 26. Palp, retrolateral view. 27. Epigynum, ventral view. 28. Vulva, dorsal view.

examined). Eye sizes and interdistances (mm.): AME 0.10, ALE 0.11, PME 0.13, PLE 0.09; AME-AME 0.12, AME-ALE 0.04, PME-PME 0.09, PME-PLE 0.05, ALE-PLE 0.04. MOQ length 0.35 mm., front width 0.32 mm., back width 0.34 mm. Epigynal hood broken into two lateral sections (fig. 27). Median epigynal ducts extremely wide (fig. 28). Leg spination: femur I d1-1-1; patella IV p0-0-0; tibia IV d1-0-1; metatarsus III v1p-1r-1p.

Material Examined. Two males taken with the holotype (AMNH) and one female taken in a cocoon in leafy vegetation 1 m. off ground in poorly developed mangrove forest at Tasajera, elevation 2-5 feet, Magdalena, Colombia, Feb. 1, 1974 (J. A. Kochalka, JAK).

Distribution. Northern Colombia.

Zimiromus medius (Keyserling)
new combination
Figures 29-32

Echemus medius Keyserling, 1891, p. 33, pl. 1,

fig. 12 (female holotype from Fazenda Sergio Potta de Castro, Rio de Janeiro, Brazil, in BMNH, examined). Roewer, 1954, p. 420. Bonnet, 1956, p. 1645.

Diagnosis. *Zimiromus medius* seems closest to *Z. kochalkai*; females of both species have wide, semicircular median epigynal ducts. Males of the former species may be distinguished by the long ventral lobe of the retrolateral tibial apophysis (fig. 30), females by the much wider epigynal scape (fig. 31).

Male. Total length 4.00 mm. Carapace 1.76 mm. long, 1.30 mm. wide. Femur II 1.44 mm. long (one specimen examined). Eye sizes and interdistances (mm.): AME 0.09, ALE 0.10, PME 0.12, PLE 0.08; AME-AME 0.11, AME-ALE 0.05, PME-PME 0.08, PME-PLE 0.06, ALE-PLE 0.05. MOQ length 0.28 mm., front width 0.29 mm., back width 0.32 mm. Palp with narrow conductor and long median apophysis (fig. 29). Ventral lobe of retrolateral tibial apophysis nearly as long as dorsal lobe (fig. 30). Palpal femur without distal dilation. Leg spination:

femora: II d1-1-0; III r0-1-1; IV p0-1-1; metatarsi: III v1p-1r-1p; IV v1p-2-1p.

Female. Total length 4.81-6.63 mm. Carapace 1.73-2.09 mm. long, 1.43-1.60 mm. wide. Femur II 1.39-1.69 mm. long (three specimens examined). Eye sizes and interdistances (mm.): AME 0.10, ALE 0.10, PME 0.12, PLE 0.08; AME-AME 0.13, AME-ALE 0.08, PME-PME 0.15, PME-PLE 0.11, ALE-PLE 0.09. MOQ length 0.25 mm., front width 0.33 mm., back width 0.39 mm. Epigynal scape widened, nearly filling atrium (fig. 31). Median epigynal ducts wide, semicircular (fig. 32). Leg spination: femur III r0-1-1; metatarsi: III v1p-1r-1p; IV p1-2-2, v1p-2-1p.

Material Examined. **Brazil:** Minas Gerais: Diamantina, Jan.-Mar., 1945 (E. Cohn, AMNH), 1♂. Rio de Janeiro: Fazenda Sergio Potta de Castro (Göldi, BMNH), 1♀ (holotype). Rio Grande do Sul: Guaíba, Jan. 3, 1974 (A. Lise, MRCN), 1♀. São Paulo: Serra da Bocaina, Nov.,

1968, elevation 1960 m. (M. Alvarenga, AMNH), 1♀.

Distribution. Southern Brazil.

***Zimiromus kochalkai*, new species**

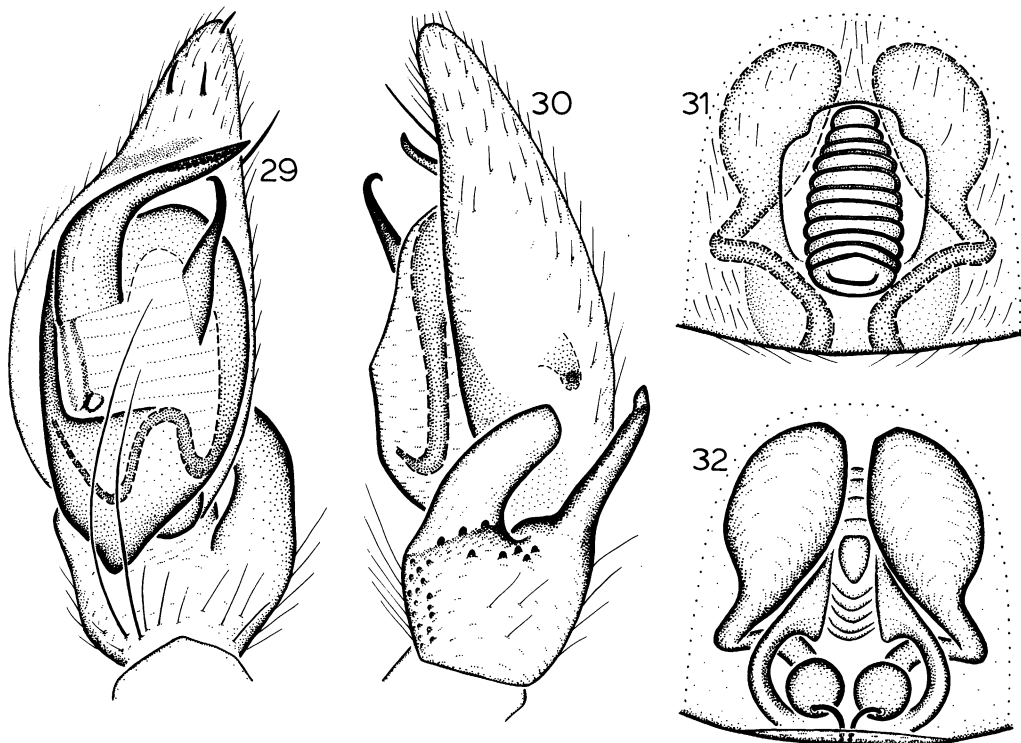
Figures 33-36

Types. Male holotype and female paratype from epiphytic bromeliads at Villa Leonor, Serranía Nueva Granada, elevation 1311 m., Sierra Nevada de Santa Marta, Magdalena, Colombia (April 24, 1975; J. A. Kochalka), deposited in AMNH courtesy of Mr. Kochalka.

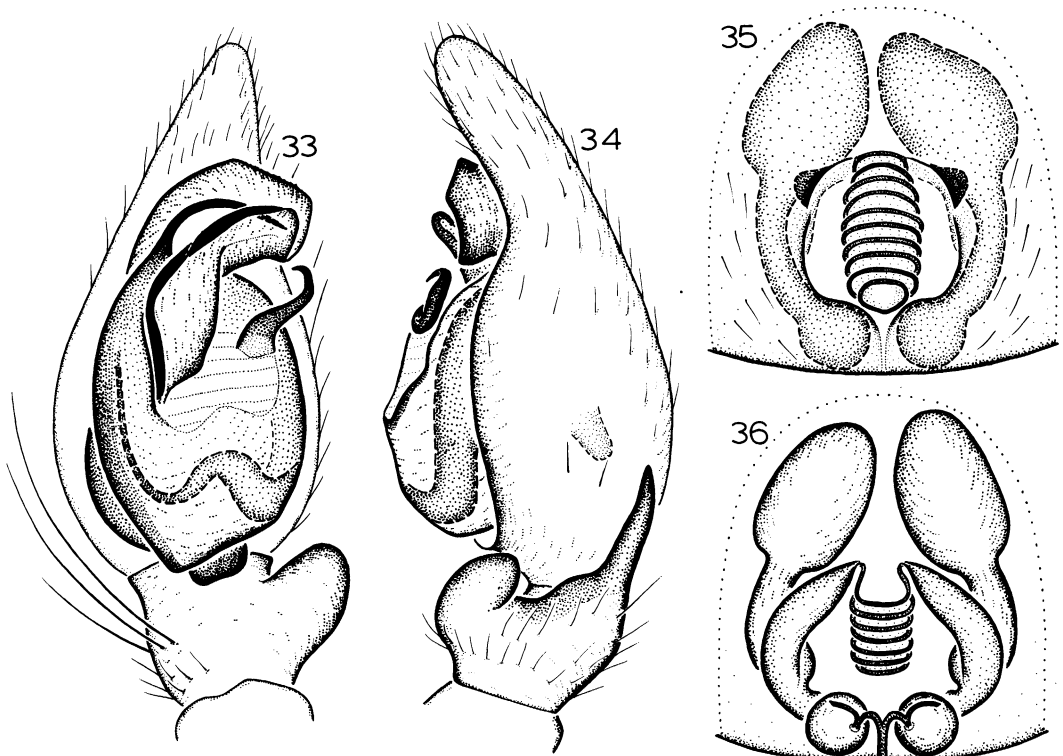
Etymology. The specific name is a patronym in honor of the collector of the type specimens.

Diagnosis. *Zimiromus kochalkai* seems closest to *Z. medius* but may be distinguished by the short ventral lobe of the retrolateral tibial apophysis (fig. 34) and the narrower epigynal scape (fig. 35).

Male. Total length 3.35 mm. Carapace 1.48



FIGS. 29-32. *Zimiromus medius* (Keyserling). 29. Palp, ventral view. 30. Palp, retrolateral view. 31. Epigynum, ventral view. 32. Vulva, dorsal view.



FIGS. 33-36. *Zimiromus kochalkai*, new species. 33. Palp, ventral view. 34. Palp, retrolateral view. 35. Epigynum, ventral view. 36. Vulva, dorsal view.

mm. long, 1.12 mm. wide. Femur II 1.22 mm. long (holotype). Eye sizes and interdistances (mm.): AME 0.11, ALE 0.10, PME 0.13, PLE 0.09; AME-AME 0.09, AME-ALE 0.02, PME-PME 0.07, PME-PLE 0.04, ALE-PLE 0.02. MOQ length 0.33 mm., front width 0.30 mm., back width 0.32 mm. Embolus abruptly narrowed at point of curvature (fig. 33). Ventral lobe of retrolateral tibial apophysis much shorter than dorsal lobe (fig. 34). Palpal femur with ledge-like distal dilation bearing two teeth. Leg spination: femur I d1-1-1; tibiae: I, II v1r-1r-1p; III v0-1p-2; IV d0-0-0.

Female. Total length 4.38-5.08 mm. Carapace 1.73-1.80 mm. long, 1.33-1.42 mm. wide. Femur II 1.37-1.55 mm. long (three specimens examined). Eye sizes and interdistances (mm.): AME 0.12, ALE 0.10, PME 0.12, PLE 0.09; AME-AME 0.09, AME-ALE 0.03, PME-PME 0.09, PME-PLE 0.04, ALE-PLE 0.03. MOQ length 0.30

mm., front width 0.33 mm., back width 0.34 mm. Epigynal scape not greatly widened, not filling atrium (fig. 35). Median epigynal ducts wide, semicircular (fig. 36). Leg spination: femora: I d1-1-1; III p0-0-1; tibia I v0-1r-1p.

Material Examined. One female taken with the type specimens (JAK) and one female taken under rocks between San Pablo and San Pedro, elevation 2200 feet, Sierra Nevada de Santa Marta, May 13, 1975 (J. A. Kochalka, JAK).

Distribution. Known only from the Sierra Nevada de Santa Marta, Colombia.

Zimiromus tonina, new species

Figures 37, 38

Type. Female holotype from Tonina, 15 km. east of Ocosingo, elevation 920 m., Chiapas, Mexico (June 28, 1950; C. and M. Goodnight, L. J. Stannard), deposited in AMNH.

Etymology. The specific name is a noun in apposition from the type locality.

Diagnosis. *Zimiromus tonina* seems closest to *Z. circulus*; both have translucent median epigynal ducts. Females of the former species may be distinguished by the much longer epigynal scape (fig. 37).

Male. Unknown.

Female. Total length 4.17 mm. Carapace 1.69 mm. long, 1.33 mm. wide. Femur II 1.33 mm. long (holotype). Eye sizes and interdistances (mm.): AME 0.09, ALE 0.11, PME 0.14, PLE 0.09; AME-AME 0.12, AME-ALE 0.05, PME-PME 0.06, PME-PLE 0.05, ALE-PLE 0.04. MOQ length 0.30 mm., front width 0.29 mm., back width 0.34 mm. Epigynal scape long, narrow (fig. 37). Median epigynal ducts flattened, translucent (fig. 38). Leg spination: femur II d1-1-0; tibiae: I v0-1r-1p; II p0-0-0, v1r-1r-1p; IV d1-0-1; metatarsi: III v1p-1r-1p; IV v1p-2-1p.

Material Examined. Only the holotype.

Distribution. Chiapas, Mexico.

***Zimiromus circulus*, new species**

Figures 39, 40

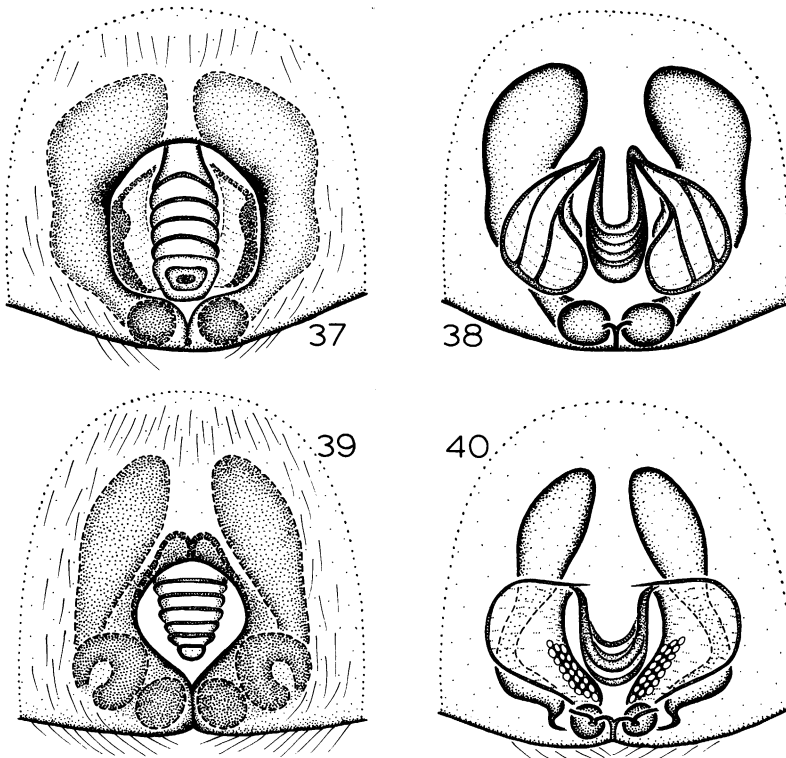
Type. Female holotype from uncertain locality in Peru, locality label reads (questionably) "Mirialirani, Cam del Pechis," probably a trail near Río Pichis, Pasco (July 9, 1920; no collector), deposited in AMNH.

Etymology. The specific name is from the Latin *circulus* (circle), referring to the circle formed by the eye arrangement.

Diagnosis. *Zimiromus circulus* seems closest to *Z. tonina* but may be distinguished by the much shorter epigynal scape (fig. 39).

Male. Unknown.

Female. Total length 5.33 mm. Carapace 2.21 mm. long, 1.71 mm. wide. Femur II 1.78 mm.



FIGS. 37-40. 37, 38. *Zimiromus tonina*, new species. 37. Epigynum, ventral view. 38. Vulva, dorsal view. 39, 40. *Z. circulus*, new species. 39. Epigynum, ventral view. 40. Vulva, dorsal view.

long (holotype). Eye sizes and interdistances (mm.): AME 0.13, ALE 0.12, PME 0.13, PLE 0.11; AME-AME 0.13, AME-ALE 0.05, PME-PME 0.14, PME-PLE 0.09, ALE-PLE 0.06. MOQ length 0.41 mm., front width 0.39 mm., back width 0.41 mm. Epigynal scape short, widest anteriorly (fig. 39). Median epigynal ducts flattened, translucent (fig. 40). Leg spination: femora: I d1-1-1; III r0-1-1; IV p0-1-1; patella IV p0-0-0; tibia I v2-2-1p; metatarsi: III v1p-1r-1p; IV p1-2-2, v1p-2-1p, r1-2-2.

Material Examined. Only the holotype.

Distribution. Peru.

Zimiromus malkini, new species

Figures 11, 12

Type. Female holotype from Musawas, Waspuk River, Zelaya, Nicaragua (October 10-31, 1955; B. Malkin), deposited in AMNH.

Etymology. The specific name is a patronym in honor of the collector of the type specimen.

Diagnosis. *Zimiromus malkini* is a distinctive species easily recognized by the presence of only three striations on the epigynal scape (fig. 11).

Male. Unknown.

Female. Total length 4.10 mm. Carapace 1.89 mm. long, 1.57 mm. wide. Femur II 1.61 mm. long (holotype). Eye sizes and interdistances (mm.): AME 0.11, ALE 0.10, PME 0.12, PLE 0.09; AME-AME 0.12, AME-ALE 0.05, PME-PME 0.09, PME-PLE 0.09, ALE-PLE 0.06. MOQ length 0.39 mm., front width 0.34 mm., back width 0.32 mm. Epigynal scape short, with only three striations (fig. 11). Median epigynal ducts and spermathecal ducts greatly reduced (fig. 12). Leg spination: femora: I d1-1-1; III r0-1-1; patella IV p0-0-0; metatarsi: III v1p-1r-1p; IV p0-3-2, v1p-0-1p, r0-1-2.

Material Examined. Only the holotype.

Distribution. Nicaragua.

Zimiromus lubricus (Simon), new combination

Figures 41-44

Echemus lubricus Simon, 1892, p. 456, figs. 28, 29 (two male and two female syntypes from Colonia Tovar, Aragua, Venezuela, in MNHN, examined). Roewer, 1954, p. 420. Bonnet, 1956, p. 1645.

Diagnosis. *Zimiromus lubricus* seems closest to *Z. reichardti*; females of both species have

relatively small, unstriated epigynal scapes. Males of the former species may be recognized by the single short, rounded retrolateral tibial apophysis (fig. 42), females by the wider epigynal atrium (fig. 43).

Male. Total length 3.82-4.07 mm. Carapace 1.48-1.73 mm. long, 1.19-1.32 mm. wide. Femur II 1.30-1.33 mm. long (three specimens examined). Eye sizes and interdistances (mm.): AME 0.10, ALE 0.11, PME 0.11, PLE 0.09; AME-AME 0.12, AME-ALE 0.04, PME-PME 0.09, PME-PLE 0.05, ALE-PLE 0.03. MOQ length 0.25 mm., front width 0.31 mm., back width 0.30 mm. Palpal conductor relatively narrow, median apophysis relatively long (fig. 41). Retrolateral tibial apophysis entire, short, rounded (fig. 42). Palpal femur with serrate distal dilation most distinct ventrally. Leg spination: femur I d1-1-1; tibiae: I v1r-1r-1p; IV d1-0-1; metatarsus III v1r-1r-1p.

Female. Total length 4.10-5.51 mm. Carapace 1.56-2.05 mm. long, 1.33-1.58 mm. wide. Femur II 1.19-1.55 mm. long (four specimens examined). Eye sizes and interdistances (mm.): AME 0.10, ALE 0.11, PME 0.11, PLE 0.09; AME-AME 0.12, AME-ALE 0.05, PME-PME 0.12, PME-PLE 0.07, ALE-PLE 0.05. MOQ length 0.33 mm., front width 0.31 mm., back width 0.33 mm. Epigynal scape unstriated, small, in large atrium (fig. 43). Median epigynal ducts squared (fig. 44). Leg spination: femur I d1-1-1.

Material Examined. **Trinidad:** Simla, Apr. 11, 1964 (A. M. Chickering, MCZ), 1♀. **Venezuela:** *Aragua:* Colonia Tovar (E. Simon, MNHN), 2♂, 2♀ (syntypes); Rancho Grande, near Maracay, July 27, 1946 (W. Beebe, AMNH), 1♀; Sept. 5, 1946 (W. Beebe, AMNH), 1♂.

Distribution. Northern Venezuela and Trinidad.

Zimiromus reichardti, new species

Figures 47, 48

Type. Female holotype from Benjamin Constant, Amazonas, Brazil (September 22, 1962; K. Lenko), deposited in MSP.

Etymology. The specific name is a patronym in honor of the late Dr. Hans Reichardt, who made the type specimen available for study.

Diagnosis. *Zimiromus reichardti* seems closest to *Z. lubricus* but may be distinguished by the much smaller epigynal atrium (fig. 47).

Male. Unknown.

Female. Total length 5.18 mm. Carapace 1.80 mm. long, 1.30 mm. wide. Femur II 1.44 mm. long (holotype). Eye sizes and interdistances (mm.): AME 0.11, ALE 0.09, PME 0.13, PLE 0.12; AME-AME 0.10, AME-ALE 0.03, PME-PME 0.07, PME-PLE 0.06, ALE-PLE 0.04. MOQ length 0.34 mm., front width 0.32 mm., back width 0.32 mm. Epigynal scape unstriated, small, in small atrium (fig. 47). Medial epigynal ducts oblique (fig. 48). Leg spination: femora: I d1-1-1; IV p0-1-1, r0-1-1; tibiae: I v2-2-1p; II v1r-1r-1p; IV d1-0-1.

Material Examined. Only the holotype.

Distribution. Amazonas, Brazil.

***Zimioromus muchmorei*, new species**

Figures 49-52

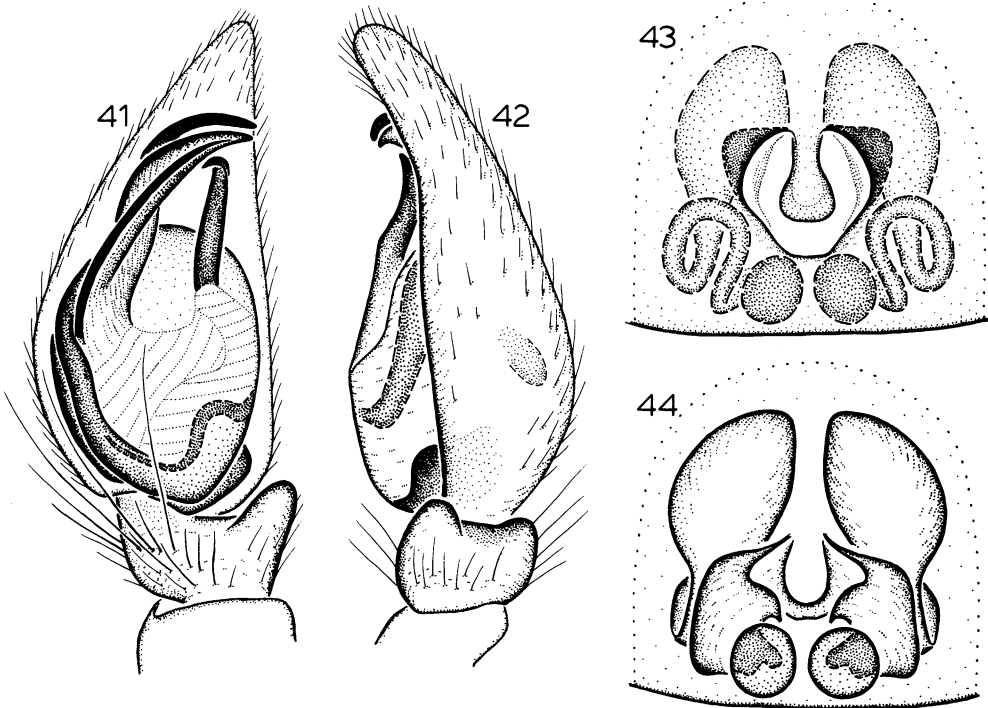
Types. Male holotype and female paratype from Berlese sample of litter under century plant at Coral Bay, St. John, United States Virgin

Islands (July 22, 1975; W. B. Muchmore), deposited in AMNH.

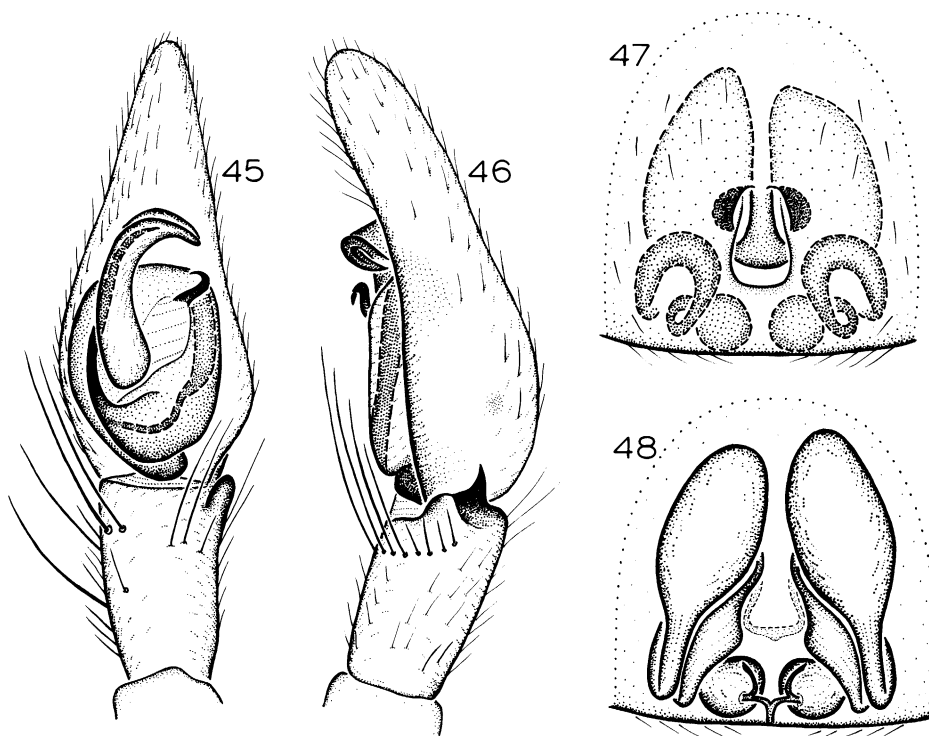
Etymology. The specific name is a patronym in honor of the collector of the type specimens.

Diagnosis. *Zimioromus muchmorei* seems closest to *Z. aduncus*; males of both species have short, sharply pointed retrolateral tibial apophyses. Males of the former species may be recognized by their wide conductors (fig. 49), females by their wide spermathecae (fig. 52).

Male. Total length 3.36 ± 0.21 mm. Carapace 1.48 ± 0.08 mm. long, 1.14 ± 0.08 mm. wide. Femur II 1.14 ± 0.08 mm. long (13 specimens examined). Eye sizes and interdistances (mm.): AME 0.07, ALE 0.09, PME 0.10, PLE 0.08; AME-AME 0.06, AME-ALE 0.03, PME-PME 0.05, PME-PLE 0.03, ALE-PLE 0.03. MOQ length 0.23 mm., front width 0.20 mm., back width 0.25 mm. Palpal conductor with wide pro-lateral lip (fig. 49). Retrolateral tibial apophysis short, sharply pointed (fig. 50). Palpal femur without distal dilation. Leg spination: femora: II



FIGS. 41-44. *Zimioromus lubricus* (Simon). 41. Palp, ventral view. 42. Palp, retrolateral view. 43. Epigynum, ventral view. 44. Vulva, dorsal view.



FIGS. 45-48. 45, 46. *Zimiromus aduncus*, new species. 45. Palp, ventral view. 46. Palp, retrolateral view. 47, 48. *Z. reichardti*, new species. 47. Epigynum, ventral view. 48. Vulva, dorsal view.

d1-1-0; III r0-1-1; IV p0-1-1; tibiae: I v1p-2-1p; IV d1-0-1, p1-1-1, v1p-2-2; metatarsi: III p1-2-2, v1p-1r-1p, r1-1-2; IV p1-2-2, v2-2-1p, r1-2-2.

Female. Total length 3.73-4.75 mm. Carapace 1.55-1.80 mm. long, 1.19-1.45 mm. wide. Femur II 1.14-1.40 mm. long (nine specimens examined). Eye sizes and interdistances (mm.): AME 0.06, ALE 0.11, PME 0.11, PLE 0.09; AME-AME 0.11, AME-ALE 0.04, PME-PME 0.06, PME-PLE 0.05, ALE-PLE 0.05. MOQ length 0.28 mm., front width 0.24 mm., back width 0.28 mm. Epigynal scape unstriated, relatively large (fig. 51). Spermathecae greatly widened, tubular (fig. 52). Leg spination: femora: II d1-1-0; III r0-1-1; IV p0-1-1; tibiae: I v1p-2-1p; II p0-0-0; III, IV p1-1-1, v1p-2-2; metatarsi: II v2-1p-0; III p1-2-2, v2-1r-1p, r1-1-2; IV p1-2-2, v2-2-1p, r1-2-2.

Material Examined. **United States Virgin Islands**: *Norman Island*: no specific locality, May

26, 1966 (AMNH), 1♀. *St. John*: no specific locality, July 21-27, 1966 (A. M. Chickering, MCZ), 9♂, 1♀; Annaberg Ruins, Mar. 5, 1961 (A. M. Chickering, MCZ), 1♂; Centerline Road, 4 mi. from Cruz Bay, Mar. 4, 1964 (A. M. Chickering, MCZ), 1♀; Cinnamon Bay, Mar. 2, 1964 (A. M. Chickering, MCZ), 2♀; Coral Bay, July 22, 1975 (W. B. Muchmore, AMNH), 1♂, 1♀ (types); Cruz Bay, Mar. 7, 1964 (A. M. Chickering, MCZ), 2♂, 1♀. *St. Thomas*: Hassel's Island, Feb. 20, 1964 (A. M. Chickering, MCZ), 2♀.

Distribution. Virgin Islands.

Zimiromus aduncus, new species

Figures 45, 46

Type. Male holotype from Fort Clayton, Panama Canal Zone (January 31, 1958; A. M. Chickering), deposited in MCZ.

Etymology. The specific name is from the

Latin *aduncus* (crooked), referring to the shape of the palpal conductor.

Diagnosis. *Zimiromus aduncus* seems closest to *Z. muchmorei* but may be easily distinguished by the narrow, recurved palpal conductor (fig. 45).

Male. Total length 4.07 mm. Carapace 1.91 mm. long, 1.51 mm. wide. Femur II 1.62 mm. long (holotype). Eye sizes and interdistances (mm.): AME 0.12, ALE 0.13, PME 0.14, PLE 0.13; AME-AME 0.09, AME-ALE 0.05, PME-PME 0.08, PME-PLE 0.05, ALE-PLE 0.04. MOQ length 0.34 mm., front width 0.32 mm., back width 0.37 mm. Palpal conductor narrow, recurved (fig. 45). Retrolateral tibial apophysis short, sharply pointed (fig. 46). Palpal femur lacking distal dilation. Leg spination: femora: II d1-1-0, p0-1-1; III r0-1-1; IV p0-1-1; patellae III, IV r0-0-0; tibiae: I v0-0-0; II p0-0-0, v0-0-0; metatarsi: I, II v1p-0-0; III v1p-2-1p; IV p1-1-2, v1p-2-1p, r1-2-2.

Female. Unknown.

Material Examined. Only the holotype.

Distribution. Panama Canal Zone.

***Zimiromus exlineae*, new species**

Figures 53, 54

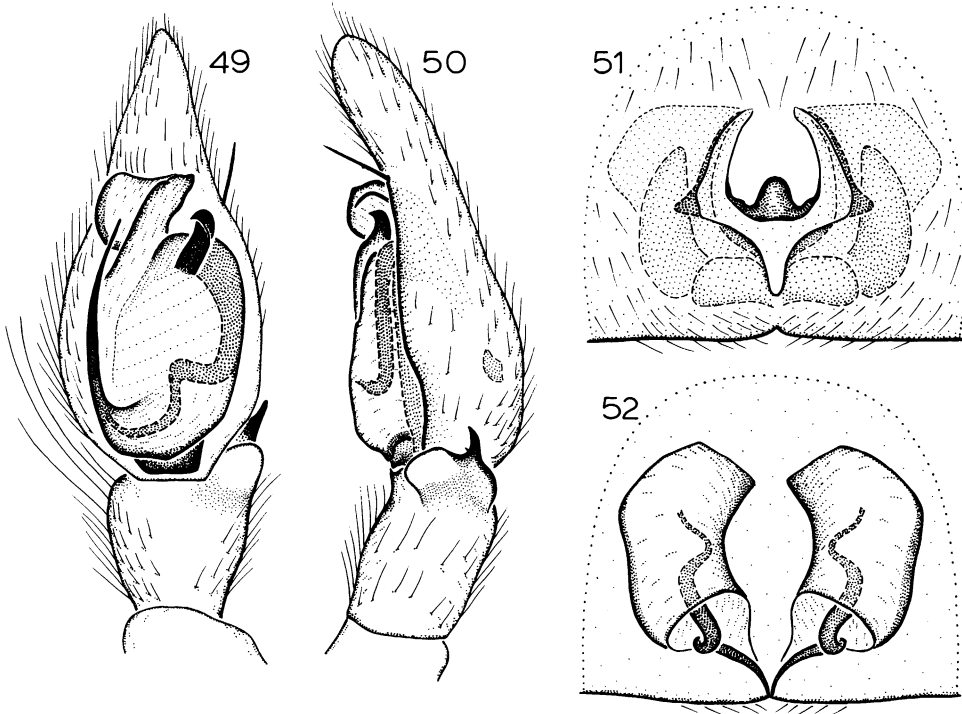
Type. Female holotype from Baños, Tunurahua, Ecuador (May 7, 1942; H. Exline), deposited in AMNH courtesy of Dr. W. B. Peck.

Etymology. The specific name is a patronym in honor of the collector of the holotype.

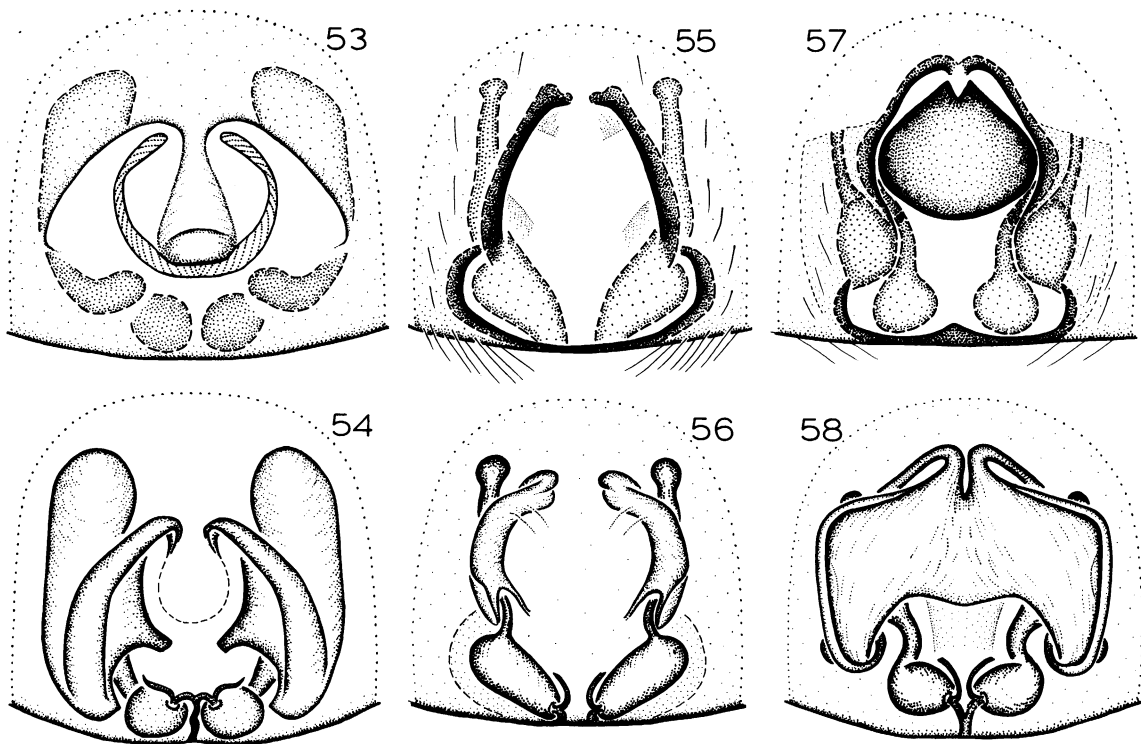
Diagnosis. *Zimiromus exlineae* is a distinctive species easily recognized by the large, unstriated epigynal scape and long median epigynal ducts (figs. 53, 54).

Male. Unknown.

Female. Total length 5.11 mm. Carapace 1.62 mm. long, 1.42 mm. wide. Femur II 1.44 mm. long (holotype). Eye sizes and interdistances (mm.): AME 0.09, ALE 0.09, PME 0.10, PLE



FIGS. 49-52. *Zimiromus muchmorei*, new species. 49. Palp, ventral view. 50. Palp, retrolateral view. 51. Epigynum, ventral view. 52. Vulva, dorsal view.



FIGS. 53-58. 53, 54. *Zimiromus exlineae*, new species. 55, 56. *Z. penai*, new species. 57, 58. *Z. brachet*, new species. 53, 55, 57. Epigyna, ventral views. 54, 56, 58. Vulvae, dorsal views.

0.07; AME-AME 0.12, AME-ALE 0.05, PME-PME 0.12, PME-PLE 0.08, ALE-PLE 0.05. MOQ length 0.30 mm., front width 0.30 mm., back width 0.32 mm. Epigynum relatively wide, with large scape (fig. 53). Spermathecae relatively long, with long, oblique median epigynal ducts (fig. 54). Leg spination: femur II d1-1-0; tibia I v2-2-1p.

Material Examined. Only the holotype.

Distribution. Ecuador.

Zimiromus jamaicensis, new species

Figures 59-62

Types. Male holotype and female paratype from Fairway Avenue, St. Andrew Parish, Jamaica (November 18, 1963; A. M. Chickering), deposited in MCZ.

Etymology. The specific name is derived from the type locality.

Diagnosis. *Zimiromus jamaicensis* seems closest to *Z. bimini*; males of both species have

single, long retrolateral tibial apophyses. Males of the former species may be recognized by the shorter embolus (fig. 59), females by the wide epigynal hood (fig. 61).

Male. Total length 2.63 mm. Carapace 1.09 mm. long, 0.83 mm. wide. Femur II 0.83 mm. long (holotype). Eye sizes and interdistances (mm.): AME 0.08, ALE 0.09, PME 0.11, PLE 0.07; AME-AME 0.05, AME-ALE 0.02, PME-PME 0.03, PME-PLE 0.02; ALE-PLE 0.02. MOQ length 0.21 mm., front width 0.21 mm., back width 0.25 mm. Palpal conductor extremely narrow, longer than embolus (fig. 59). Retrolateral tibial apophysis relatively long (fig. 60). Palpal femur lacking distal dilation. Leg spination: femora II, III d1-1-0; patella IV p0-0-0, r0-0-0; tibiae: I v0-0-1p; II p0-0-0, v0-0-1p; IV d0-0-0, p1-1-1; metatarsi: I v0-0-0; II v1p-0-0.

Female. Total length 4.00-4.43 mm. Carapace 1.46-1.57 mm. long, 1.09-1.20 mm. wide. Femur II 1.02-1.22 mm. long (three specimens examined). Eye sizes and interdistances (mm.): AME

0.08, ALE 0.10, PME 0.11, PLE 0.07; AME-AME 0.06, AME-ALE 0.03, PME-PME 0.05, PME-PLE 0.03, ALE-PLE 0.03. MOQ length 0.25 mm., front width 0.22 mm., back width 0.27 mm. Epigynal hood extremely wide (fig. 61). Spermathecae relatively small; median epigynal ducts enlarged, tubular (fig. 62). Leg spination: femur II d1-1-0; patellae: III r0-0-0; IV p0-0-0, r0-0-0; tibiae: I v0-0-1p; II v0-1p-1p; IV p1-1-1; metatarsi: I v1p-0-0; III v1p-1r-1p; IV p1-2-2, v1p-2-1p, r1-2-2.

Material Examined. The type specimens and two females from 14 mi. E of Kingston, St. Andrew Par., Jamaica, Nov. 19, 1963 (A. M. Chickering, MCZ).

Distribution. Jamaica.

***Zimiromus bimini*, new species**

Figures 63, 64

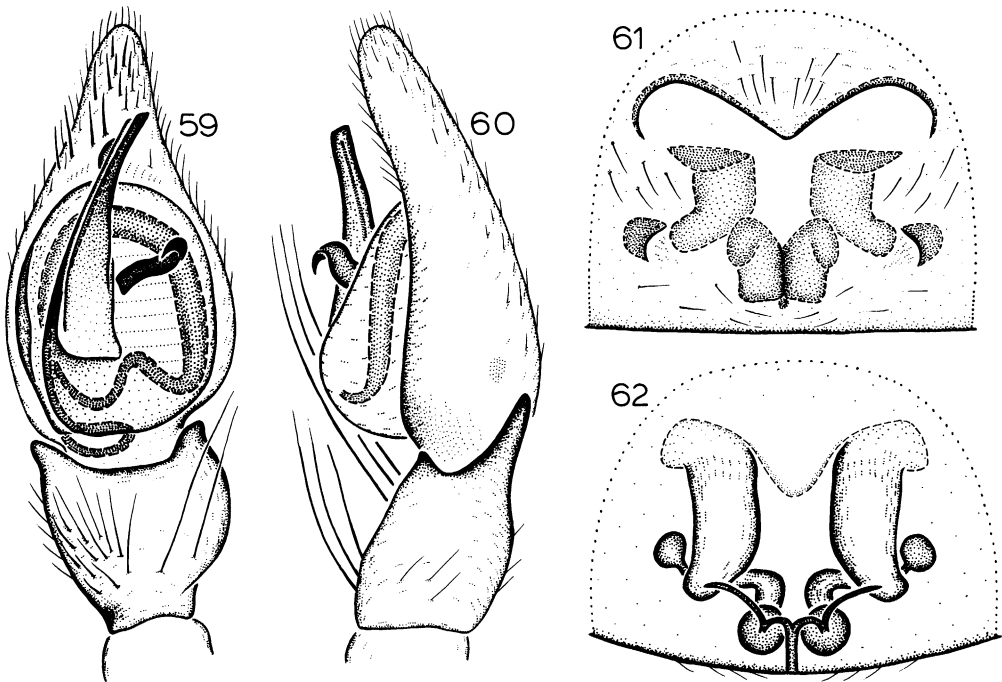
Type. Male holotype from South Bimini, Bahama Islands (May, 1951; W. J. Gertsch, M. A. Cazier), deposited in AMNH.

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

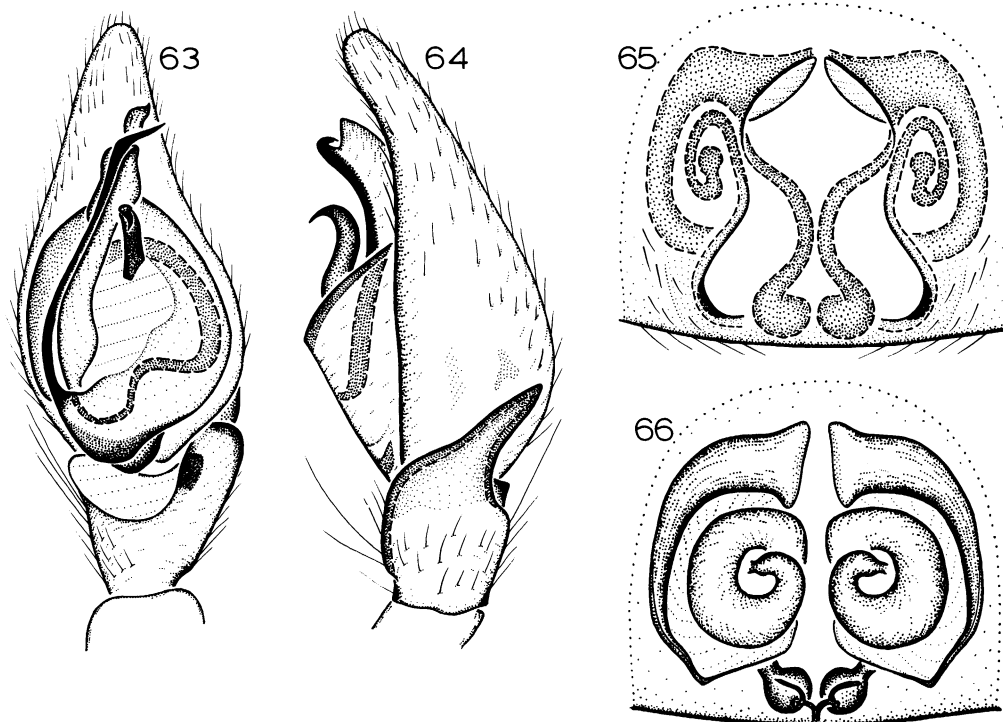
Diagnosis. *Zimiromus bimini* seems closest to *Z. jamaicensis* but may be distinguished by the longer embolus, which protrudes beyond the palpal conductor (fig. 63).

Male. Total length 2.63, 2.73 mm. Carapace 1.14, 1.23 mm. long, 0.89, 0.95 mm. wide. Femur II 0.86, 0.97 mm. long (two specimens examined). Eye sizes and interdistances (mm.): AME 0.07, ALE 0.09, PME 0.12, PLE 0.09; AME-AME 0.07, AME-ALE 0.02, PME-PME 0.02, PME-PLE 0.02, ALE-PLE 0.01. MOQ length 0.22 mm., front width 0.21 mm., back width 0.27 mm. Embolus protruding beyond tip of conductor (fig. 63). Retrolateral tibial apophysis entire, long, directed dorsally (fig. 64). Palpal femur lacking distal dilation. Leg spination: femora: II d1-1-0, p0-0-0; III d1-1-0, p0-0-1; IV d1-1-0; patellae: III r0-0-0; IV p0-0-0, r0-0-0; tibiae: I v0-0-0; II p0-0-0, v0-0-0; metatarsi: I, II v0-0-0; III p0-1-2; IV v1p-2-1p.

Female. Unknown.



FIGS. 59-62. *Zimiromus jamaicensis*, new species. 59. Palp, ventral view. 60. Palp, retrolateral view. 61. Epigynum, ventral view. 62. Vulva, dorsal view.



FIGS. 63-66. 63, 64. *Zimiromus bimini*, new species. 63. Palp, ventral view. 64. Palp, retrolateral view. 65, 66. *Z. piura*, new species. 65. Epigynum, ventral view. 66. Vulva, dorsal view.

Material Examined. Only the holotype.

Distribution. Bahama Islands.

***Zimiromus penai*, new species**

Figures 55, 56

Type. Female holotype from Nieves, Río León, elevation 2200 m., Loja, Ecuador (March, 1975; L. Peña), deposited in MCZ.

Etymology. The specific name is a patronym in honor of the collector of the holotype.

Diagnosis. *Zimiromus penai* seems closest to *Z. brachet*; in both species the epigynal hood is triangular. Females of the former species may be recognized by the narrow median epigynal ducts (fig. 56).

Male. Unknown.

Female. Total length 4.76 mm. Carapace 1.98 mm. long, 1.58 mm. wide. Femur II 1.48 mm. long (holotype). Eye sizes and interdistances (mm.): AME 0.09, ALE 0.10, PME 0.10, PLE 0.08; AME-AME 0.10, AME-ALE 0.04, PME-

PME 0.08, PME-PLE 0.10, ALE-PLE 0.06. MOQ length 0.32 mm., front width 0.28 mm., back width 0.28 mm. Epigynal hood triangular, scape absent (fig. 55). Median epigynal ducts narrow (fig. 56). Leg spination: femora: II d1-1-0, p0-1-1, r0-1-1; III r0-1-1; tibiae: I v2-2-1p; II p0-0-0, v2-2-1p; III v2-2-2; IV d1-0-1, p1-1-1, v2-2-2; metatarsi: III v2-1r-1p; IV p1-2-2, v2-2-1p, r1-2-2.

Material Examined. Only the holotype.

Distribution. Ecuador.

***Zimiromus brachet*, new species**

Figures 57, 58

Type. Female holotype from Guayaquil, Guayas, Ecuador (February, 1943; H. Exline, D. Frizzell, O. Haught), deposited in AMNH courtesy of Dr. W. B. Peck.

Etymology. The specific name is an arbitrary combination of letters.

Diagnosis. *Zimiromus brachet* seems closest to

Z. penai but may be distinguished by the much wider median epigynal ducts (fig. 58).

Male. Unknown.

Female. Total length 5.18 mm. Carapace 2.16 mm. long, 1.55 mm. wide. Femur II 1.51 mm. long (holotype). Eye sizes and interdistances (mm.): AME 0.10, ALE 0.11, PME 0.12, PLE 0.09; AME-AME 0.11, AME-ALE 0.03, PME-PME 0.07, PME-PLE 0.07, ALE-PLE 0.04. MOQ length 0.27 mm., front width 0.31 mm., back width 0.31 mm. Epigynal hood triangular; atrium with large anterior depression (fig. 57). Median epigynal ducts enormously widened, fused (fig. 58). Leg spination: femora: II d1-1-0, p0-1-1, r0-1-0; III r0-1-1; tibiae: I v2-2-1p; III p1-1-1; IV d1-0-1, p1-1-1, v2-2-2; metatarsi: II v2-1p-0; III v2-1r-1p; IV p1-2-2, v2-2-1p, r1-2-2.

Material Examined. Only the holotype.

Distribution. Ecuador.

Zimiromus piura, new species

Figures 65, 66

Type. Female holotype from 2.5 miles east of Hacienda Meolles, Piura, Peru (January 13, 1939; H. Exline, D. Frizzell), deposited in AMNH courtesy of Dr. W. B. Peck.

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

Diagnosis. *Zimiromus piura* is a distinctive species easily recognized by the coiled epigynal ducts (fig. 66).

Male. Unknown.

Female. Total length 4.94, 6.18 mm. Carapace 2.03, 2.17 mm. long, 1.64, 1.74 mm. wide. Femur II 1.83, 1.94 mm. long (two specimens examined). Eye sizes and interdistances (mm.): AME 0.10, ALE 0.11, PME 0.11, PLE 0.07; AME-AME 0.12, AME-ALE 0.05, PME-PME 0.10, PME-PLE 0.10, ALE-PLE 0.07. MOQ length 0.33 mm., front width 0.32 mm., back width 0.32 mm. Outline of epigynal atrium sinuous (fig. 65). Epigynal ducts coiled (fig. 66). Leg spination: femora: I d1-1-1; III r0-1-1; IV p0-1-1; tibiae: I v2-2-1p; II p0-0-0; IV d1-0-1, p1-1-1, v1p-2-2; metatarsi: I v1p-0-0; III v2-1r-1p; IV p1-2-2, v2-2-1p, r1-2-2.

Material Examined. The holotype and one female from Quebrada de Pariñas, Piura, Peru, Dec., 1938 (H. Exline, D. Frizzell; EPC).

Distribution. Peru.

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