

A NEW GENUS AND SPECIES OF PARAMEGISTIDAE (MESOSTIGMATA: TRIGYNASPIDA) ASSOCIATED WITH MILLIPEDES FROM MEXICO

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ACARI, MESOSTIGMATA,
PARAMEGISTIDAE,
MERISTOMEgistus,
DIPLOPODA, MEXICO

SUMMARY: *Meristomegistus vazquezus* n. gen., n. sp. (Mesostigmata: Paramegistidae) associated with *Aceratophallus* sp. (Polydesmida: Rhachodesmidae) is described for the adults. A revised diagnosis for the family Paramegistidae and a key to the genera are provided. This is the first record of millipede associated Paramegistidae in the New World.

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RÉSUMÉ: La stase adulte de *Meristomegistus vazquezus* n. gen., n. sp. (Mesostigmata: Paramegistidae), associé à *Aceratophallus* sp. (Polydesmida: Rhachodesmidae) est décrite. Cette mention est le premier rapport de Paramegistidae associés aux myriapodes diplopodes dans le nouveau monde. Une diagnose révisée de la famille Paramegistidae et une clé des genres sont fournies.

INTRODUCTION

The mesostigmatan trigynaspid mite family Paramegistidae, proposed by TRÄGÅRDH (1946), currently includes 25 described species in five known genera, *Antennomegistus* Berlese, 1904, *Echinomegistus* Berlese, 1904, *Neomegistus* Trägårdh, 1906, *Ophiomegistus* BANKS, 1914, and *Paramegistus* TRÄGÅRDH, 1906. Among these, *Antennomegistus* and *Echinomegistus* species are associated with carabid beetles (BANKS, 1904; BERLESE, 1888, 1892, 1904; HYATT, 1964; KRANTZ, 1978; NICKEL & ELZINGA, 1970), *Ophiomegistus* species are well-known associates of lizards, skinks, and snakes (BANKS, 1914; DOMROW, 1978, 1984, 1987; GOFF, 1979, 1980a; 1980b; GRANT, 1947; GUNTHER, 1942, 1951; VOSS, 1966; WOMERSLEY, 1958), while *Neomegistus* and *Paramegistus* species

have been reported from julid millipedes (TRÄGÅRDH, 1906, 1907, 1948; WOMERSLEY, 1958). Unlike the majority of Mesostigmata, the body in Paramegistidae is somewhat wider than long. Like most adult members of the infraorder Antennophorina, the body of Paramegistidae is well-sclerotized. Little is known about their biology or about the morphology of the immature instars, except for a few comments on *Echinomegistus wheeleri* by NICKEL & ELZINGA (1970) and on *Neomegistus julidicola* by TRÄGÅRDH (1907). A brief summary of biogeography, host associations, and number of described species is given in TABLE 1.

Recently, we could examine some mite-bearing millipedes collected in Southern Mexico. Among the mites collected were specimens that looked very similar to the known members of the family Paramegisti-

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Genus	Distribution	Host	No. of described species
<i>Antennomegistus</i>	Paraguay	carabid beetle	1
<i>Echinomegistus</i>	USA, Nicaragua*, Venezuela	carabid beetle	2
<i>Meristomegistus</i>	Mexico	millipede	1
<i>Neomegistus</i>	S. Africa, Madagascar*	millipede	1
<i>Ophiomegistus</i>	Indo-Australia	squamate	20
<i>Paramegistus</i>	S. Africa	millipede	1

* new records

TABLE 1.— Biogeography, host association, and numbers of described species of Paramegistidae

dae in terms of morphology of the genital structures and the chaetotaxy of the appendages. However, these specimens do not key to Paramegistidae in the family key for Trigynaspida as proposed by KETHLEY (1977). In this key, KETHLEY used fusion of the palp tibiae and tarsi of the adults as one of the diagnostic characters of Paramegistidae. In the new material, however, the palp tibiae and tarsi are distinctly separated, disallowing inclusion in the Paramegistidae. Neither can these specimens be included in KETHLEY's Promegistidae, the proposed sister family of Paramegistidae (KETHLEY, 1977). That family shares the separate palp tibiae and tarsi, but has no sternogynial or presternal (jugular) shields, shields that are present in our material and in all currently known members of the Paramegistidae. In addition, Promegistidae retain only 6 (not 7 as in most Antennophorina) setae on palp genua, a peculiar character shared with *Micromegistus gourlayi* [Parantennulidae] and *Philodana johnstoni* [Philodanidae].

Accordingly, instead of raising a new family, we describe the above specimens as a new genus and species, and provide a revised diagnosis of the family Paramegistidae, allowing inclusion of the newly proposed genus. A key to the genera in the family is provided. This is the first record of Paramegistidae associated with millipedes in the New World.

MATERIALS AND METHODS

Notations for leg chaetotaxy follow EVANS (1963, 1965, & 1969). Mites were mounted in Hoyer's

medium (KRANTZ, 1978). All measurements are in micrometers (μm).

In this description, we adopt a simplified terminology for the structure(s) on the ventral side of the idiosoma located between tritosternum and the sternal shield(s), previously referred to as 'presternal shield(s)' (KETHLEY, 1977; KRANTZ, 1978), 'jugular shield(s)' (KRANTZ, 1978), 'jugularium' (EVANS, 1992), 'tetartosternum' (KETHLEY, 1977), or 'tetratosternum' (HUNTER, 1993). We propose to use presternal shield(s) for all sclerotized plates anterior to the sternal shield(s), that are characterized by the presence of sternal setae *st1* and/or lyrifissures *stp1*. Any small sclerotized platelets appearing in the presternal area, but lacking both setae and lyrifissures, are designated as 'presternal platelets'.

DESCRIPTION

Meristomegistus n. gen.

TYPE SPECIES: *Meristomegistus vazquezus* n. sp.

DIAGNOSIS: Palp tibiae and tarsi distinctly separated (FIG. 5). Pilus dentilis on fixed cheliceral digit absent. Presternal shields weakly fused or paired. Idiosomal venter with distinctive, stylus-like setae. Female: sternal shields paired; sternogynial shields subtriangular, weakly-separated; mesogynial shield squared, fused posteriorly with ventrianal shield (FIG. 2). Male: eugenital setae present.

ETYMOLOGY: Reflecting the characteristic feature of clear articulation of the palp tibiae and tarsi.

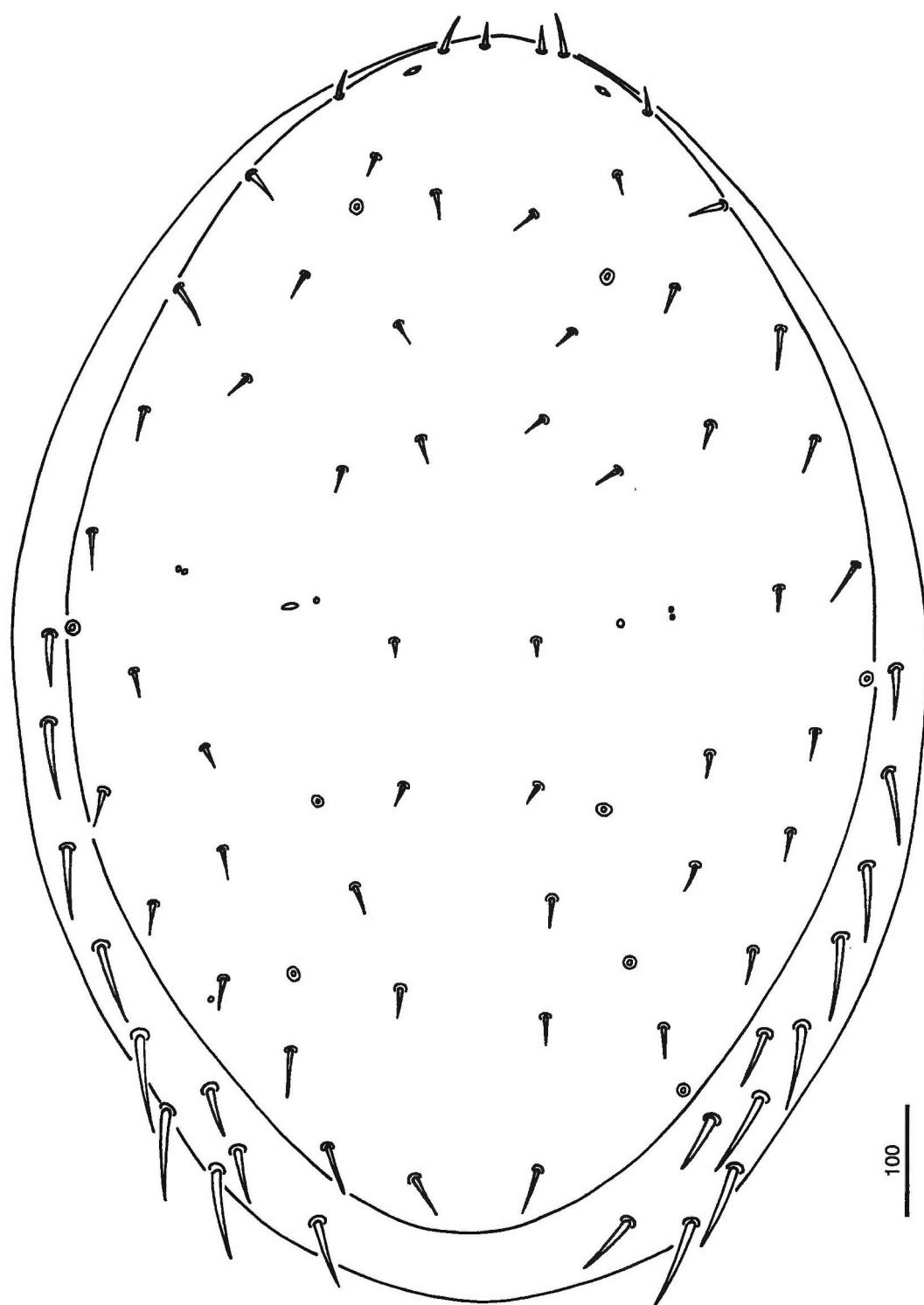


FIG. 1. — *Meristomegistus vazquezus* n. sp., female, idiosoma, dorsum.

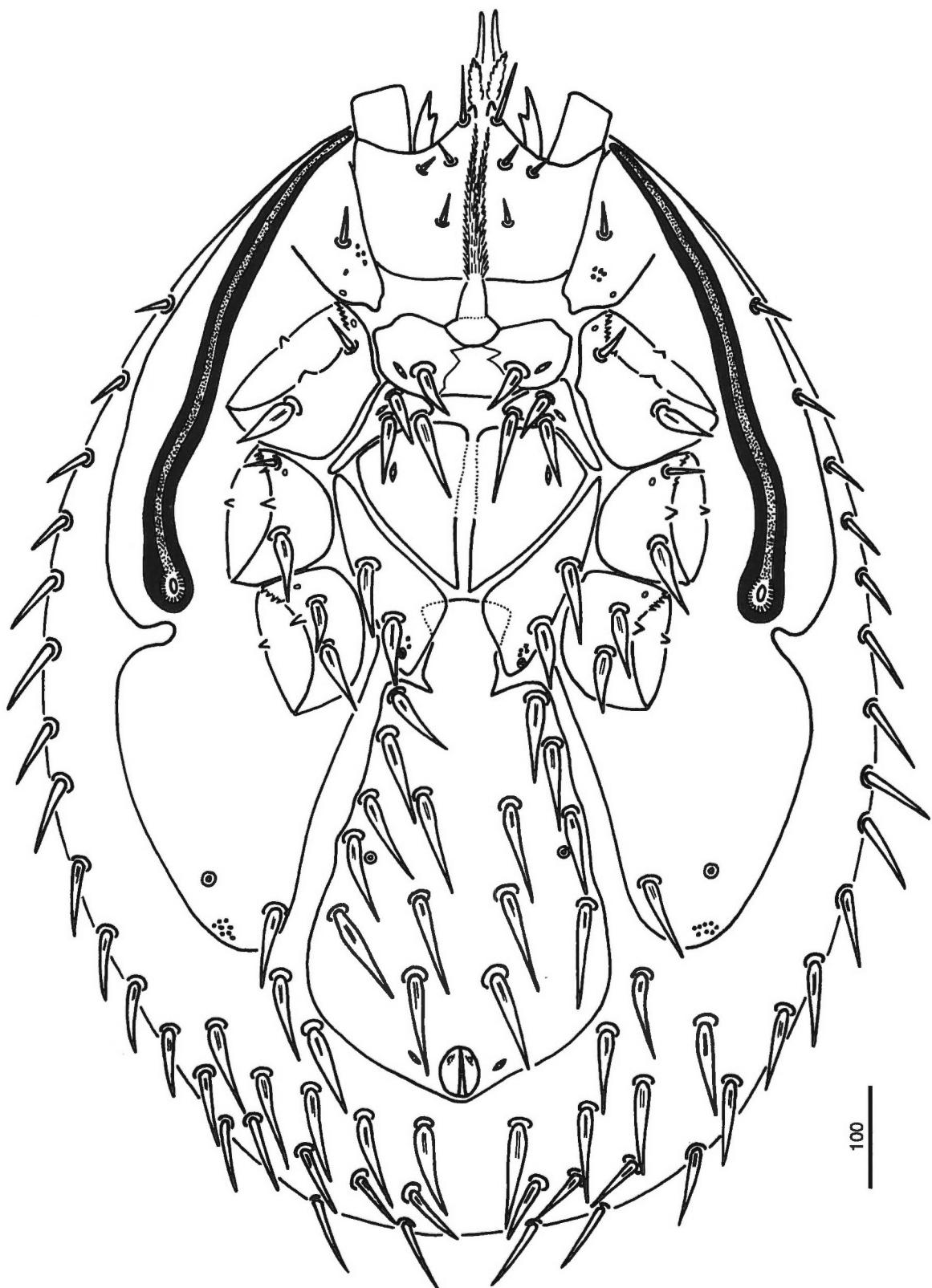


FIG. 2. — *Meristomegistus vazquezus* n. sp., female, idiosoma, venter.

'*Meristo*' in Greek means separation, and a suffix, '*megistus*', derived from a Latin word of '*megistanes*', means magnate. Genus name is masculine in gender.

Meristomegistus vazquezus n. sp.
(Figs. 1-16)

DIAGNOSIS: Same as for genus.

FEMALE (Figs. 1-12). Body oval; idiosoma 829 long, 608 wide at middle (at the line between coxae IV). Body margin with 16 pairs of strong, smooth spinous setae of 19-61 long.

Idiosoma. Dorsum (FIG. 1). Covered by an unornamented holodorsal shield bearing numerous small setae of similar size (ca. 25 long). Venter (FIG. 2). Tritosternal base ellipsoid, arising from anteromedian area of presternal shields; two barbed laciniae (108), reaching almost to the base of corniculi. Presternal shields unornamented, weakly coalesced medially, each bearing 1 smooth, stylus-like seta *st1* (42) plus 1 sternal lyrifissure (*stp1*). Paired sternal shields unornamented, small, more or less triangular, each with 3 smooth, stylus-like setae, *st2*, *st3*, and *st4* (40-74), plus 1 lyrifissure (*stp2*). Paired sternogynial shields weakly sclerotized, each bearing 1 sternal lyrifissure (*stp3*). Paired latigynial shields right-angled triangular, slightly covering mesogynial shield; each shield with 1 glandular pore plus 2-4 minute glandular poroids along with 2 smooth, stylus-like setae of similar size (57). Mesogynial shield square-shaped, fused posteriorly with ventrianal shield. Ventral and anal shield fused to form ventrianal shield. Ventrianal shield pyriform, with 15 setae. Anal opening located in distal end of ventrianal shield, bearing 2 anal valves, each with a small lyrifissure; adanal, postanal, and euanal setae absent. Postanal cribrum absent, but paired lyrifissure present. Metapodal shields broad, fused with exopodal and peritrematal shields; notch present near stigmatal opening; 1 smooth, stylus-like seta, 1 glandular pore, along with 8 minute glandular poroids located in distal end of each metapodal shield. Stigmatal opening between coxae III and IV. Peritremes long, reaching almost to the anterior end of idiosoma.

Gnathosoma (Figs. 3-4). Gnathotectum more or less pentagonal, with anteromedian spade-shaped

projection bearing obscure dorsomedian keel; anterolateral margin smooth. Ventrally all 4 pairs of gnathosomal setae smooth. Hypostomal setae *hs1* longer than any other hypostomal setae. Corniculi not strong, more or less membranous, distinctly bifurcate. Deutosternal groove with 3-4 rows of minute denticles.

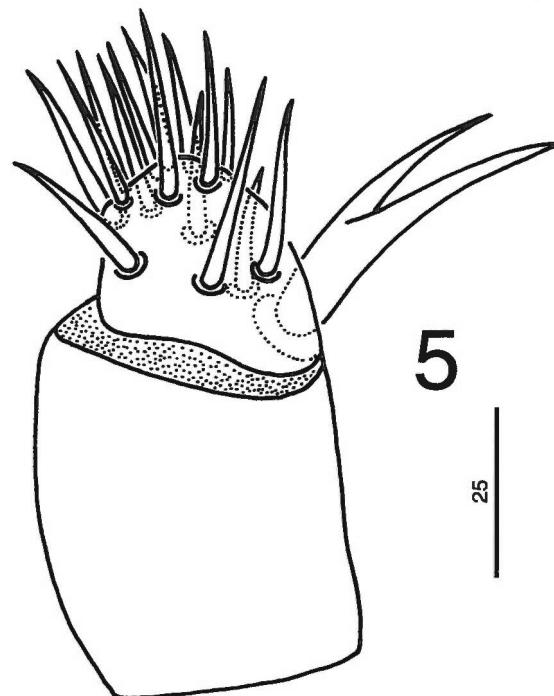
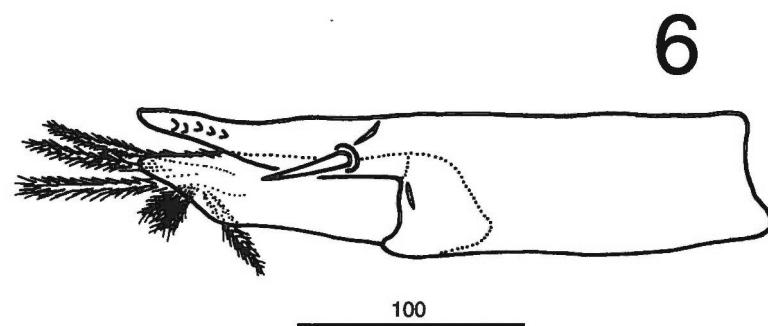
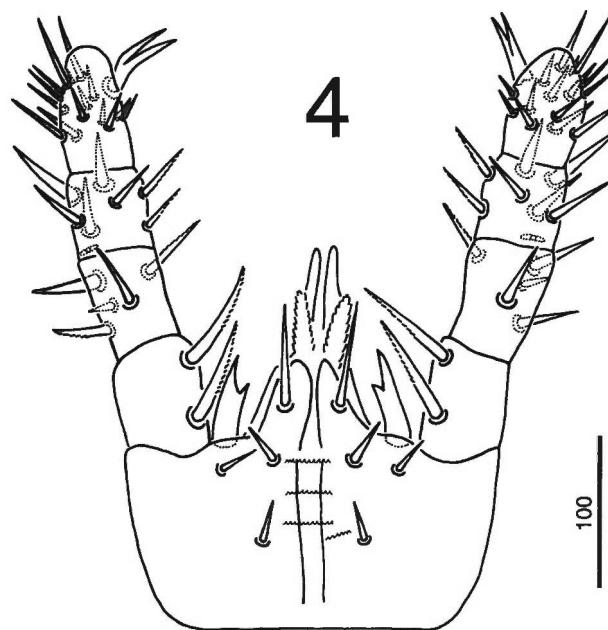
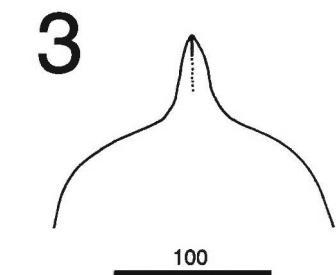
Palpi (Figs. 4-5). Trochanters 57 long, without a distinct apophysis, each with 2 setae; femora 57 long, each with 5 setae; genua 38 long, each with 7 setae, dorso-proximal lyrifissure present; tibiae 29 long, each with 15 setae; tarsi 23 long, each with 15 setae. Palp tibiae and tarsi clearly articulated (FIG. 5). Palptarsal claw (apotele) 2-tined.

Chelicerae (FIG. 6). Chelate. Movable digit edentate, fixed digit with row of 5 small distal teeth. Excrescences hyaline; medial filament thickened and finely plumose. Cheliceral seta on middle of fixed digit antiaxial. Two dorsal lyrifissures present at base of fixed digit. Pilus dentilis on fixed digit absent.

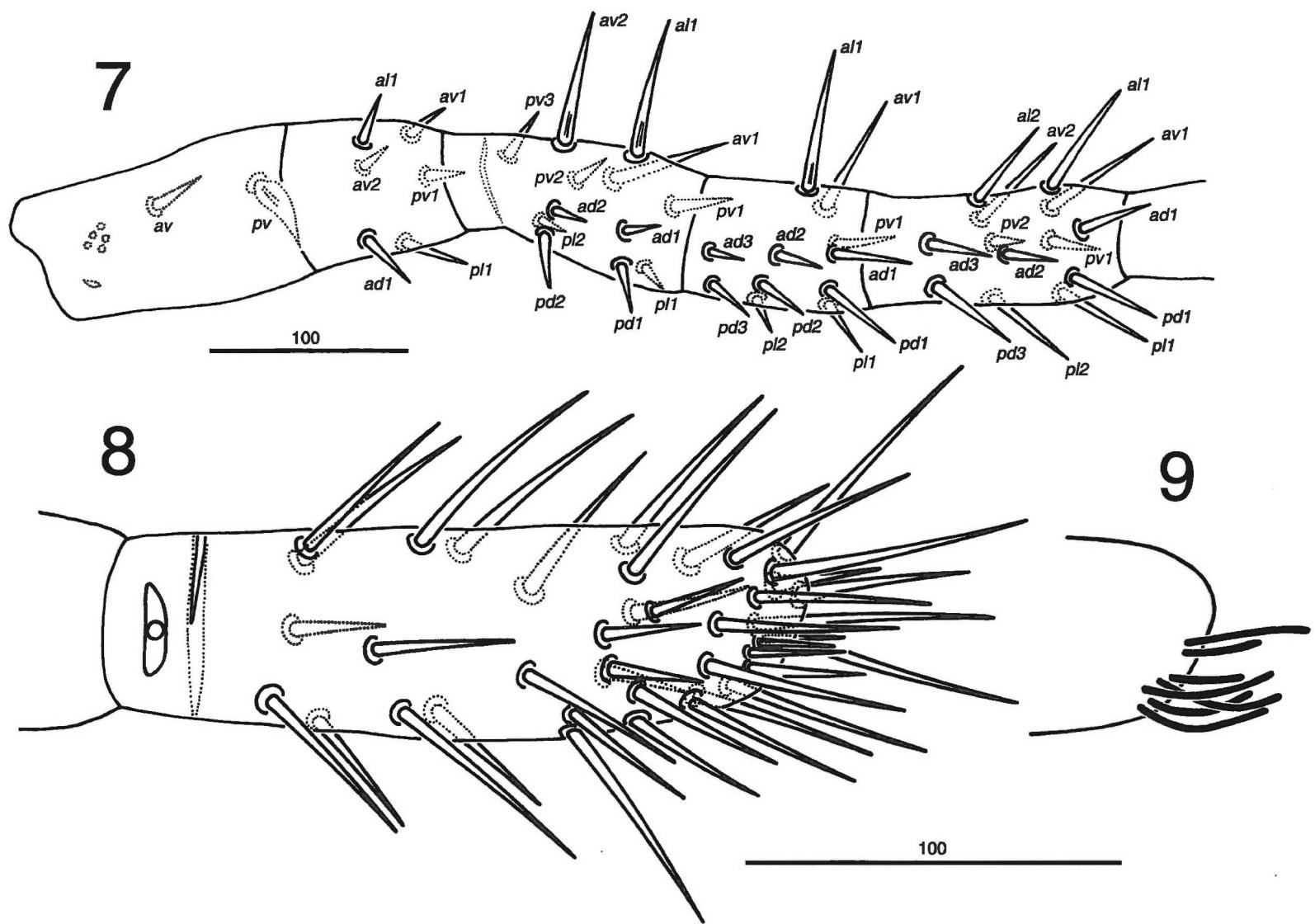
Legs (Figs. 7-12). Leg chaetotaxy of coxae, trochanters, femora, genua, tibiae, and tarsi of legs I-IV as in TABLE 2. Setal notations as figured. Coxae I-IV each with lyriform pore in anterior proximal position (FIG. 2). Coxal base II-IV with rows of minute comb-like denticles. Base of femora I-IV with circumsegmental fissure. Tarsi I without claw or ambulacrum, with 7 lobe-like blunt-end sensilla at distal end (FIG. 9). Tarsi II-IV each with paired claws and a fan-like ambulacrum. Tarsi II-III each with ventral intercalary sclerite in circumsegmental fissure with no setae. Tarsi IV with setae *av4* and *pv4* on ventral intercalary sclerite in circumsegmental fissure.

MALE (Figs. 13-16). Body shape and size same as female.

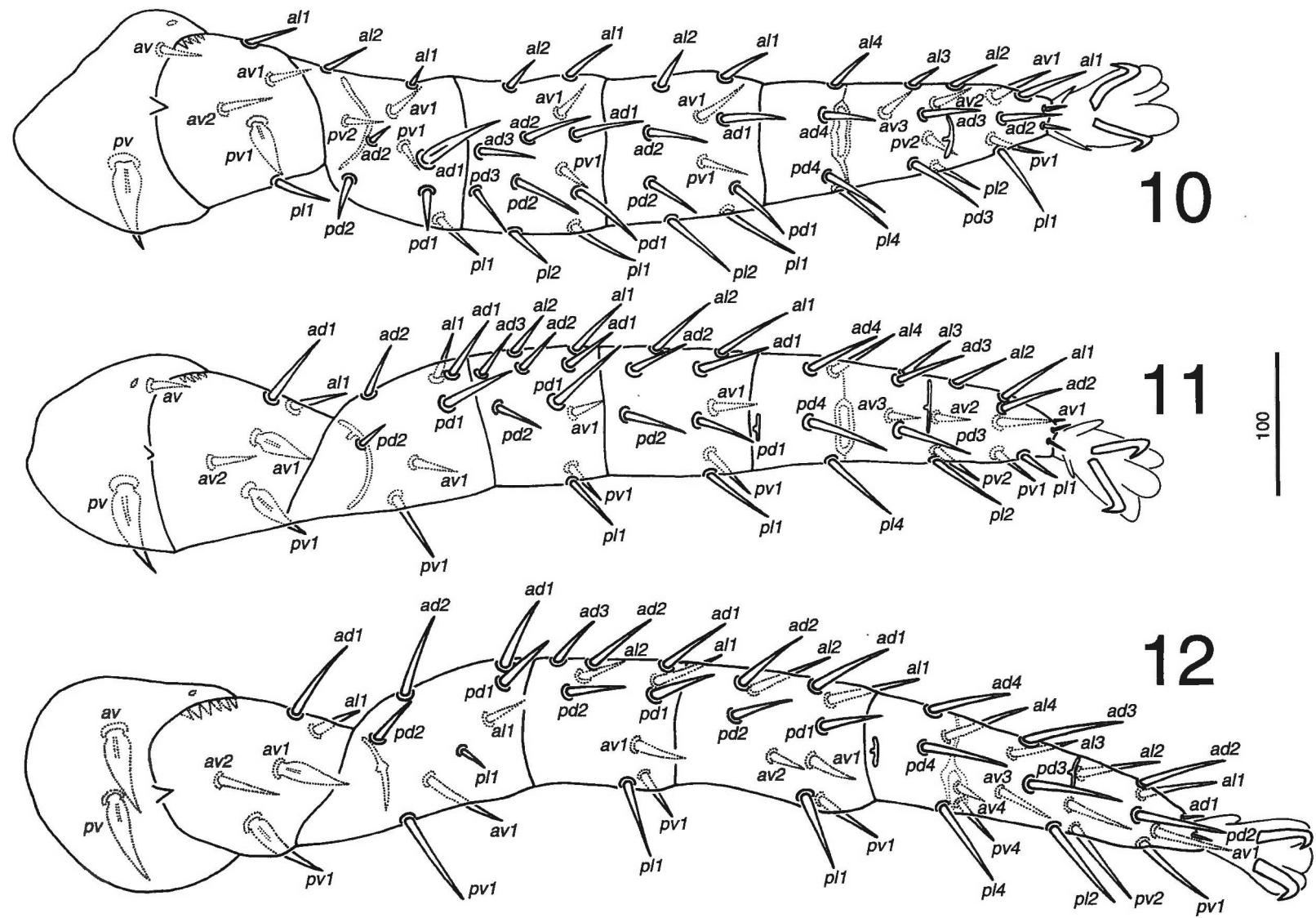
Idiosoma. Dorsum (FIG. 13). Similar to female but with additional lateral opisthosomal setae on the shield (possibly *UR* series). Venter (FIG. 14). Presternal shield separated from fused holoventral shield. Genital opening between coxae III and IV, more or less ellipsoid, covered by 2 valves; anterior valve with paired smooth eugenital setae (11) at laterobasal margin. Sternal and ventrianal region separated by notch postero-laterally to genital opening. Ventrianal region with 19 smooth, stylus-like setae plus paired glandular pores. Metapodal shield broad, each with 1-2 setae and 1 glandular pore. 5-8 minute glandular



FIGS. 3-6.—*Meristomegistus vazquezus* n. sp., female, gnathosoma. 3. Gnathotectum; 4. Ventral view (palp tarsal setae are eliminated); 5. Palp tibia and tarsus, dorsal view; 6. Chelicera.



FIGS. 7-9.—*Meristomegistus vazquezus* n. sp., female, leg I, dorsal view. 7. Overview; 8. Tarsus I; 9. Tarsus I, distal blunt-end sensilla.



Figs. 10-12. — *Meristomegistus vazquezus* n. sp., female, legs II-IV, dorsal view. 10. Leg II; 11. Leg III; 12. Leg IV.

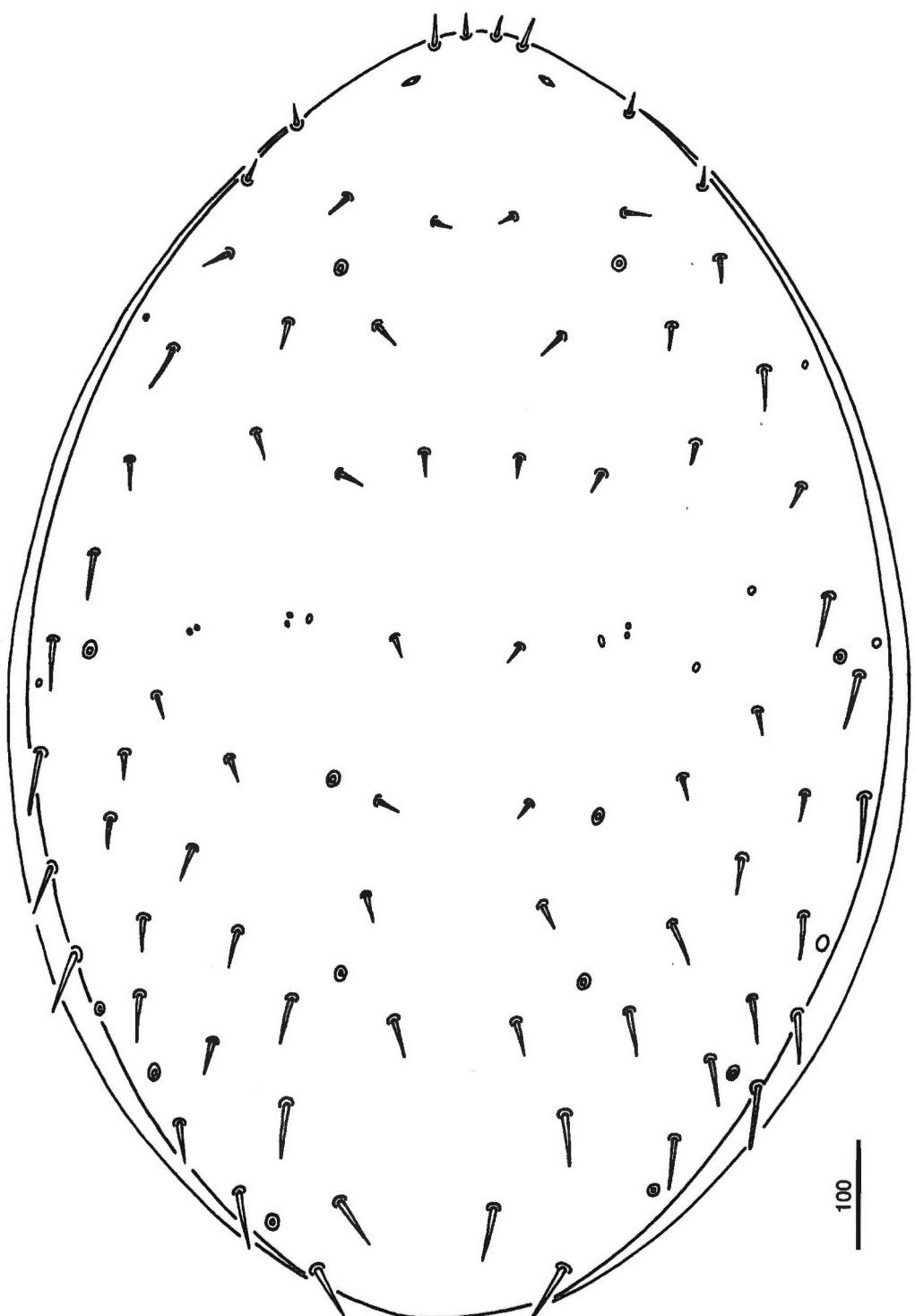


FIG. 13. — *Meristomegistus vazquezus* n. sp., male, idiosoma, dorsum.

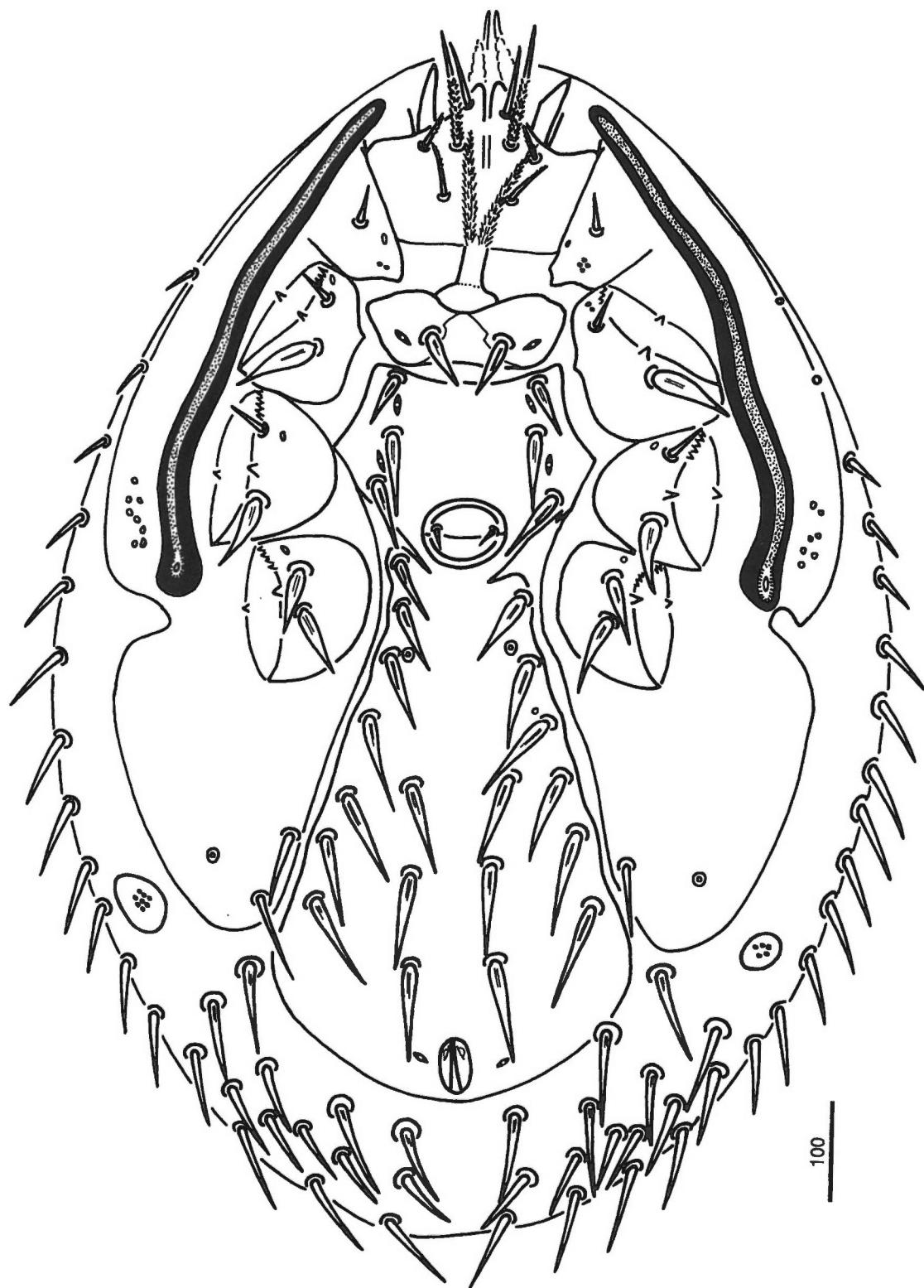


FIG. 14. — *Meristomegistus vazquezus* n. sp., male, idiosoma, venter.

Segment	I	II	III	IV
Coxa	2	2	2	2
Trochanter	6	5	5	5
	(1, 1/2, 0/1, 1)	(1, 0/2, 0/1, 1)	(1, 1/2, 0/1, 0)	(1, 1/2, 0/1, 0)
Femur	12	10	7	8
	(1, 2/2, 2/3, 2)	(2, 2/1, 2/2, 1)	(1, 2/1, 2/1, 0)	(1, 2/1, 2/1, 1)
Genu	11	12	10	10
	(1, 3/1, 3/1, 2)	(2, 3/1, 3/1, 2)	(2, 3/1, 2/1, 1)	(2, 3/1, 2/1, 1)
Tibia	13	10	9	10
	(2, 3/2, 2/2, 2)	(2, 2/1, 2/1, 2)	(2, 2/1, 2/1, 1)	(2, 2/2, 2/1, 1)
Tarsus	48	19	19	21
	(4, 4/3, 3/2, 3)	(4, 4/3, 3/2, 3)	(4, 4/4, 4/3, 2)	(4, 4/4, 4/3, 2)

TABLE 2. — Leg chaetotaxy of *Meristomegistus vazquezus* n. sp.

poroids on free small circular platelets posterolateral to metapodal shields, instead of on the distal end of metapodal shields (as in female).

Gnathosoma (Figs. 15-16). Gnathotectum triangular, without anteromedian spade-shaped projection; dorsomedian keel obscure. Setae *hs2* longer (93) than any other hypostomal setae, barbed up to the middle but smooth at distal end; much longer than in the female. Corniculi not bifurcate, not strong, more or less membranous.

Palpi and Chelicerae: As in female.

Legs: Chaetotaxy as in female.

IMMATURES: Unknown.

ETYMOLOGY: This species is named in honor of the collector, Dr. MA. MAGDALENA VÁZQUEZ, Universidad de Quintana Roo, Mexico.

TYPES: A holotype female (OSAL 000387) and an allotype male (OSAL 000388) deposited in Universidad Nacional Autónoma de Mexico (UNAM), Mexico City, Mexico. Two paratype females in alcohol (OSAL 000389, 000390) deposited in the Acarology Laboratory (OSAL), Ohio State University, Columbus, Ohio, U.S.A.

TYPE DATA: MEXICO: Quintana Roo, Noh-Bec, 19°7'24"N, 88°20'20"W, high tropical forest, coll. M. VÁZQUEZ, 4 Sep. 1997, ex *Aceratophallus* n.sp. (Diplopoda: Polydesmida: Rhachodesmidae), coll. no. AL5565. Host millipede in collection of Dr. Richard L. HOFFMAN, Virginia Museum of Natural

History, Martinsville, Virginia, USA, labelled «CMK 97-1005-1, mites removed».

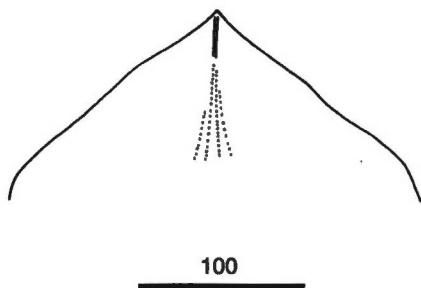
DISCUSSION

According to KETHLEY (1977), the mite family Paramegistidae have two major diagnostic characters: 'paired sternogynial shields' and 'fused palp tibiae and tarsi'. The latter character is applicable only to the genera *Antennomegistus*, *Echinomegistus*, *Neomegistus*, and *Ophiomegistus*, but not to *Paramegistus*, because *Paramegistus* retains a weak separation of the palp tibiae and tarsi. We thus propose a revised diagnosis of the family Paramegistidae as follows:

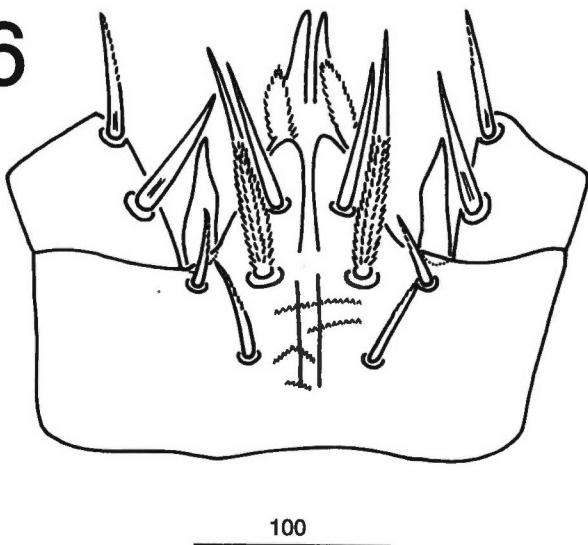
Oval, flattened mites with minute dorsal setae and distinctly larger stylus-like, spinous, or foliate ventrianal setae. Presternal shield always present. Sternal shield paired or two shields connected by narrow bridge. Sternogynial shields, bearing *stp3*, paired. Mesogynial shield free from or fused to large ventrianal shield; latigynial shields generally well-developed. Palp tibia and tarsus fused or rarely separated; chelicerae edentate, movable digit with filamentous or more or less dendritic excrescences. Corniculi membranous, often with sclerotized tip. Male eugenital setae often present.

The new mite genus shares with *Paramegistus* the partial or complete separation of the palp tibiae and tarsi. It differs from *Paramegistus* by the structure of the mesogynial shield. In female *Paramegistus* (i.e., *P. confrater*) the mesogynial shield is completely free

15



16



FIGS. 15-16.—*Meristomegistus vazquezus* n. sp., male, gnathosoma. 15. Gnathotectum; 16. Ventral view.

from the ventrianal shield, a character shared with *Antennomegistus* and *Echinomegistus*. In contrast, in the new genus, the mesogynial shield is completely fused posteriorly with the ventrianal shield. This character state is shared with the paramegistid genera *Neomegistus* and *Ophiomegistus*.

A KEY TO THE GENERA OF THE FAMILY PARAMEGISTIDAE
(BASED ON FEMALE)

1. Palp tibiae and tarsi fused..... 2
- 1'. Palp tibiae and tarsi not fused; associated with millipedes 5
2. Mesogynial shield free, not fused with ventrianal shield; associated with carabid beetles 3
- 2'. Mesogynial shield fused with ventrianal shield; associated with millipedes or squamate reptiles 4
3. Latigynial shields paired, free, not fused with ventrianal shield *Antennomegistus*
- 3'. Latigynial shield fused with ventrianal shield posteriorly *Echinomegistus*
4. Latigynial shields with numerous setae, each shield at least with 3 setae (usually with 5 to 30 setae); posterior end of metapodal element with short stout subulate setae; associated with squamates *Ophiomegistus*

- 4'. Latigynial shields without numerous setae, each shield bearing 2 setae; posterior end of metapodal element without short stout subulate setae; associated with millipedes..... *Neomegistus*
5. Mesogynial shield free from ventrianal shield..... *Paramegistus*
- 5'. Mesogynial shield fused posteriorly with ventrianal shield; idiosoma longer than wide *Meristomegistus*

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