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New species of New World Opilioacaridae (Acari: Parasitiformes) with the description of a new genus from the Caribbean region.

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Abstract

Four new species and one new subspecies of Opilioacaridae are described from Mexico, Cuba, and Panama. The classification of Opilioacaridae is updated with recognition of the genus *Neocarus* as separate from *Opilioacarus*, and by recognition of a new genus, *Caribeacarus*, with three species from the greater Antilles and Panama. A key to the North/ Central American and Caribbean species of Opilioacaridae is provided.

Key words: Opilioacaridae, *Neocarus*, *Caribeacarus*, identification key, Mexico, Caribbean

Introduction

The family Opilioacaridae includes a number of taxa inhabiting a variety of terrestrial habitats, including litter and sites under rocks and logs (Vázquez & Klompen 2002). In terms of life history, they were assumed to be predators (Grandjean 1936), but recent observations seem more consistent with a life style as scavengers and/ or pollen feeders (Klompen 2000; Walter & Proctor 1998). The family exhibits signs of a relict group, combining a geographic distribution that includes the entire tropics and subtropics with a relatively small number of species. For the New World, the first species, *Opilioacarus platensi*s Silvestri was described from Uruguay and Argentina. Subsequent species have been described from the United States (2 species) (Chamberlin & Mulaik 1942), Cuba (2) (Juvara-Bals & Baltac 1977), Venezuela (1) (Lehtinen 1980), Mexico (3) and Nicaragua (1) (Vázquez & Klompen 2002).

Van der Hammen (1966) in a detailed study of *Neocarus texanus* Chamberlin & Mulaik, synonymized *N. arizonensis* Chamberlin & Mulaik with *N. texanus*, and synonymized the genus *Neocarus* Chamberlin & Mulaik with the type genus, *Opilioacarus* With. In later studies, the 9 species known from the New World have been assigned to either the genus *Opilioacarus* or to *Neocarus*. Previously (Klompen 2000; Vázquez & Klompen 2002) we have used a conservative approach, listing *Neocarus* as a subgenus of *Opilioacarus*. Additional material from Mexico, Central America, and the Caribbean provided us with a broader taxon sample to evaluate character state variability among New World Opilioacaridae. Based on this expanded sample, previously suggested diagnostic characters are holding up sufficiently well for us to support resurrection of *Neocarus* at the generic level. In this concept, the genus *Opilioacarus* is restricted to the Mediterranean region of Europe and North Africa.

The goal of this study is to describe an additional 4 species and 1 subspecies of New World Opilioacaridae. Two of these, along with one previously described species, are assigned to a new genus.

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Material and methods

Most material was studied as slide mounted specimens, although some specimens were examined using temporary preparations in cavity slides. Terminology for the palp tarsal sensilla follows Grandjean (1936) as modified by Vázquez and Klompen (2002).

All measurements are in micrometers (μm) and presented in tabular form (Table 1). These measurements are presented with some caveats. They are based on slide-mounted specimens, which means that measurements of soft structures, e.g. total length and total width, are almost certainly distorted (in this case exaggerated). While still of use for comparing individuals considered in this study, cross comparisons with measurements based on fluid preserved specimens are inappropriate. Total width was measured at the level of the spiracles, and shield width at the level of the eyes (the posterior corners of the shield are often difficult to identify). Where multiple specimens could be measured, numbers are presented as average (range). Measurements for females and males are combined unless sexual dimorphism was indicated.

Specimen depository abbreviations: IES: Instituto de Ecologia y Sistemática, Havana; OSAL: Ohio State University Acarology Collection, Columbus; UNAM: Acarology Collection of the Universidad Autónoma de Mexico, Mexico City; UQRoo: Universidad de Quintana Roo, Chetumal.

Instar abbreviations in "Collection information" section: L= larva; PN= protonymph; DN= deutonymph; TN= tritonymph; F= female; M= male.

Taxonomic section

Neocarus Chamberlin & Mulaik 1942

Neocarus Chamberlin & Mulaik 1942: 127; also Lehtinen (1980); Kaiser & Alberti (1991); Alberti & Coons (1999)
Opilioacarus With 1902, synonymy Van der Hammen (1966): 4; also Camin et al. (1958); Van der Hammen (1969, 1970); Juvara-Bals & Baltac (1977); Hoffmann & Vázquez (1986)
Opilioacarus (*Neocarus*) With 1902, Klompen (2000); also Vázquez & Klompen (2002)

Diagnosis: 1. With 2 pairs of eyes and With's organ membranous and discoid (3 pairs of eyes and With's organ biramous and setiform in *Paracarus* Chamberlin & Mulaik and *Siamacarus* Leclerc).

2. Main opisthosomal segments in adults without setae (with numerous setae in *Panchaetes* Naudo, *Salfacarus* Van der Hammen, and *Vanderhammenacarus* Leclerc)

3. Penultimate segment of idiosoma in adults with 3 setae (0 in *Adenacarus* Van der Hammen, *Paracarus*, and *Siamacarus*; 5–7 in *Opilioacarus* With, *Phalangiacarus*, and *Indiacarus* Das & Bastawade).

4. Palp tarsus in adults with 4–5 foliate setae (more than 5 in *Phalangiacarus* Coineau & van der Hammen, *Siamacarus*, *Caribeacarus* n. gen.)

5. Tarsus I sensillum with "crown-like" tip in main group of sensory sensilla (terminal in *Caribeacarus*; condition unclear in most other genera).

Additional characters (focused on differences with *Caribeacarus*). Palp trochanter in adults generally with 5 or less setae (generally more than 5 in *Caribeacarus*). Modified palp tarsal seta in male (type *sm3* of Vázquez & Klompen (2002)) present (some *Neocarus* only) (absent in *Caribeacarus*). Sternitogenital region between the sternal and genital verrucae with 4–8 pairs of stout, ribbed setae (3–4 pairs in *Caribeacarus*).

Species included:

Neocarus texanus Chamberlin & Mulaik 1942. Type species (= *N. arizonensis* Chamberlin & Mulaik 1942; synonymy Van der Hammen (1966): 4)

N. platensis (Silvestri 1905)

N. orghidani (Juvara-Bals & Baltac 1977)

N. ojastii Lehtinen 1980

N. bajacalifornicus (Vázquez & Klompen 2002)

N. bajacalifornicus chamelaensis Vázquez & Klompen n. subsp.
N. nicaraguensis (Vázquez & Klompen 2002)
N. nohbecanus (Vázquez & Klompen 2002)
N. siankaanensis (Vázquez & Klompen 2002)
N. calakmulensis Vázquez & Klompen **n. sp.**
N. veracruzensis Vázquez & Klompen **n. sp.**

Note. The combination in the adults of 3 setae on the penultimate segment of the idiosoma, 4–5 foliate setae on the palp tarsus, and sensillum with "crown-like" tip in main group of tarsus I sensilla, unites all of these species. However, it is not entirely clear whether these states are derived or primitive. This character polarity problem requires a complete phylogenetic analysis of the family, a procedure beyond the scope of this study.

***Neocarus calakmulensis* Vázquez & Klompen n. sp.**
(Figs. 1–19)

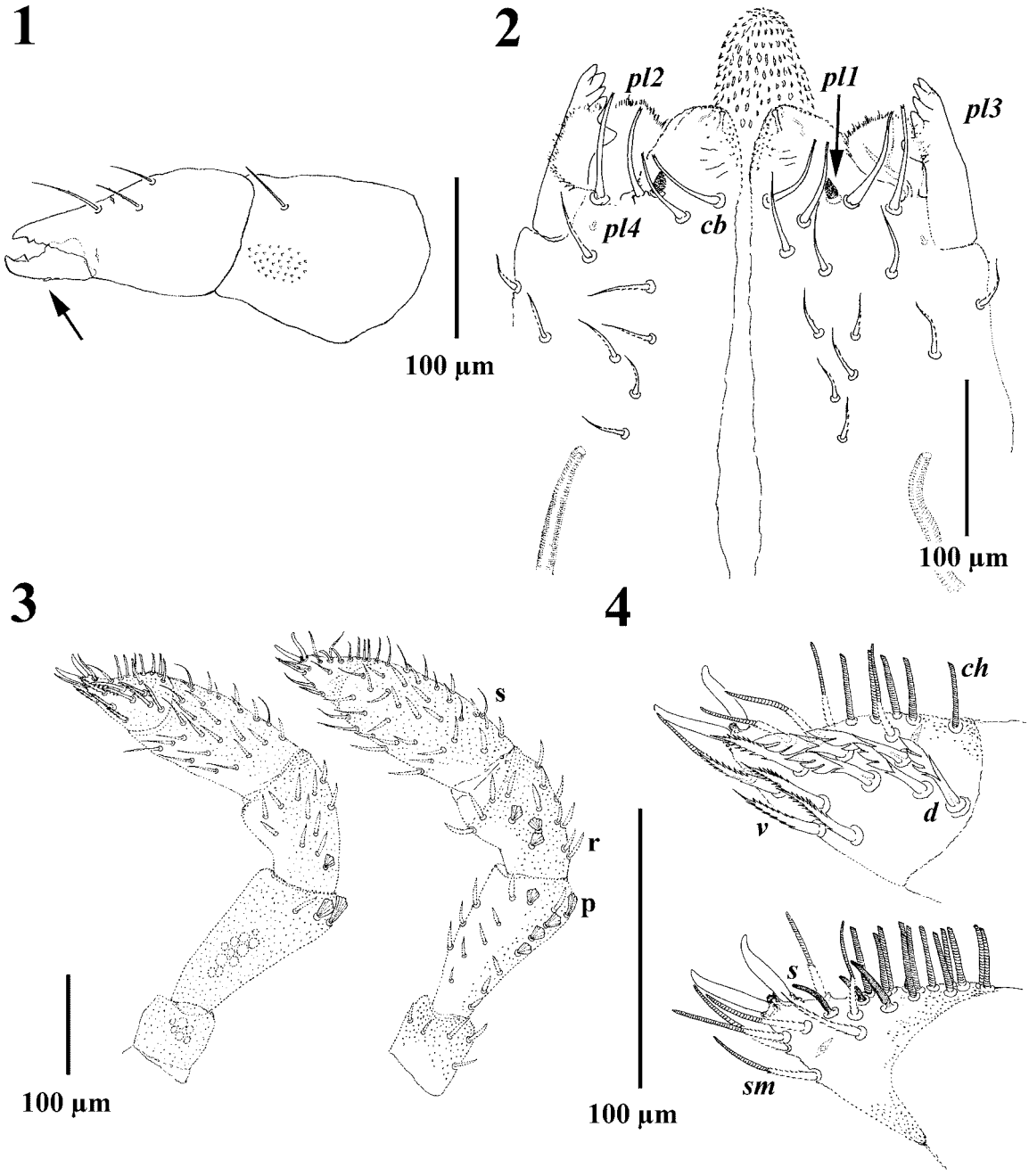
Diagnosis. Palp tarsus with 5 pairs of foliate setae (4 in *N. orghidani* and *N. nohbecanus*). Area between sternal and genital verrucae with 0–1 pairs of long, tapering setae (1–2 pairs in all other *Neocarus* spp.). Female with 2 setae in pregenital area, male with stout, blunt setae in genital area. Ovipositor without terminal setae.

Description. Based on observations on 5 females, 4 males, 5 tritonymphs, 3 deutonymphs, 5 protonymphs, 1 larva.

Gnathosoma. Chelicera (Fig. 1). Basal segment without setae in larva, protonymphs, and most deutonymphs. One seta present in one deutonymph, and in all tritonymphs and adults, fixed digit with 3 setae in all instars. Some setae lightly barbed, more obviously so in later instars. Dorsal and antiaxial lyrifissure well developed in nymphs and adults, unclear in larva. Fixed digit with 1 tooth, movable digit with 1–2 teeth and a well developed terminal hook in nymphs and adults, digits poorly developed in larva. Movable digit with 1 small denticle on ventral margin in nymphs and adults, none observed in larva.

Subcapitulum (Figs. 2, 5–8). All 4 pairs of paralabial setae present in adults: *pl1* small, conical; With's organ (*pl2*) membranous, discoid; rutellum (*pl3*) with 1 row of 5 teeth, inserted dorso-laterally; *pl4* small but distinct, inserted dorsal on subcapitulum. In addition, 4 circumbuccal (*cb*), and 8–10 median and subcapitular (*vm* (in part), *lvm*, *ldm*, *vp*, *lvp*) setae. No sexual dimorphism observed. Larva, proto-, deuto-, and tritonymphs similar, but *pl4* minute in early instars, only 2 *cb* setae in larva, and number of median and subcapitular setae smaller, 0, 2, 3, and 5–6, respectively. Lateral lips in all instars with distinct canals in all instars (*dl1* and/or *dl2* of Grandjean (1936)).

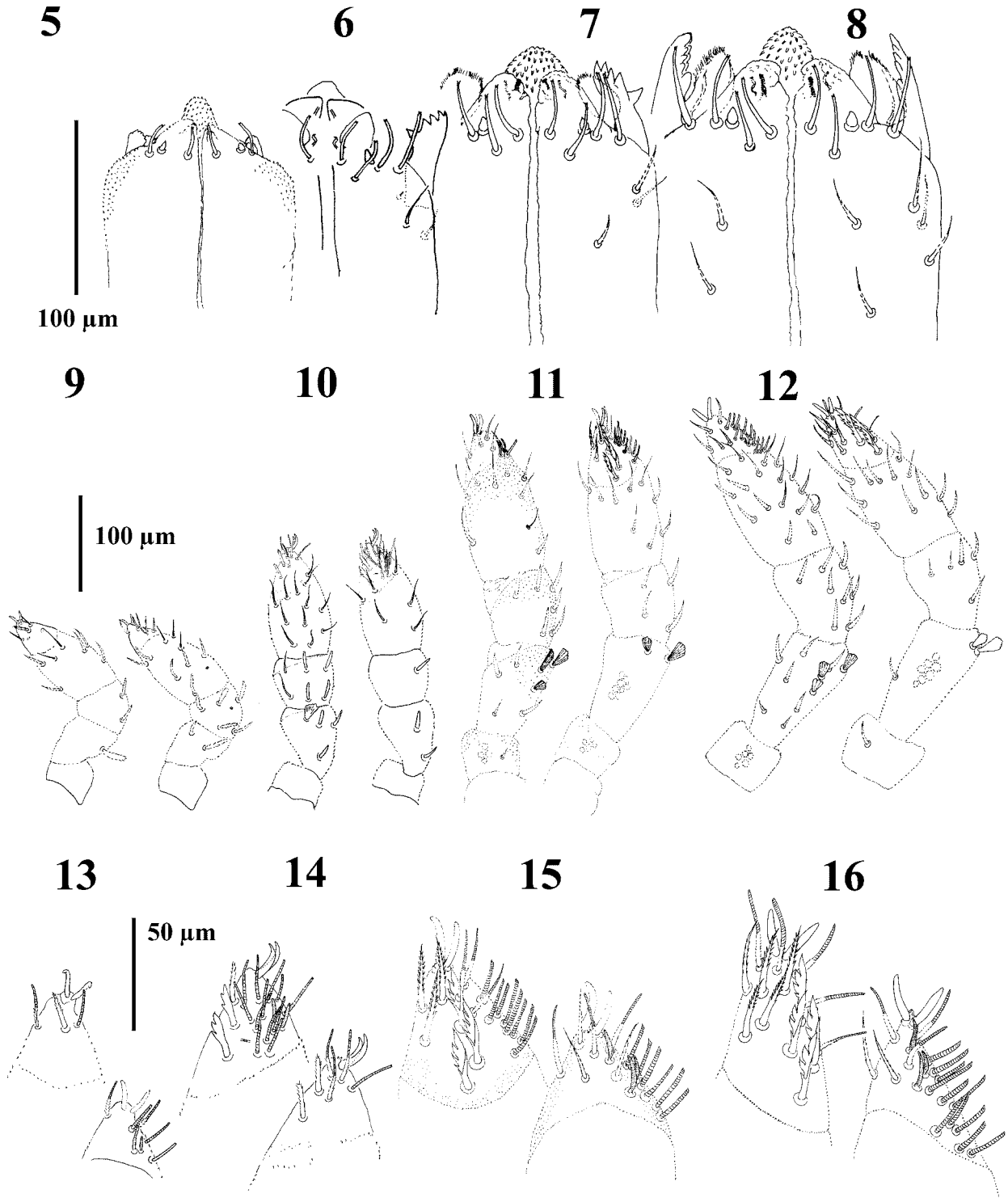
Palp. Adults (Figs. 3–4). Trochanter with 2 to 5 ribbed, tapering setae (= r-type) setae; femur with 6–8 papilliform (= p-type) and 9–18 (most 10–12) r-type setae (detail of structure of r and p-type setae in Fig. 39); genu with 2–5 p and 17–34 (most 21–29) r setae. Tibia and tarsus partially fused. Tibia with 8 smooth (= s type) and 51 r-type setae. Palp tarsus with lyrifissures $i\pi$ and $i\alpha$. Setation includes 3 *s*, 5 *d*, 6 *v*, 17 *ch*, and 10–11 *sm* setae. Pretarsus in shape of a pair of well developed sessile claws. No distinct sexual differentiation observed; males generally with fewer trochanteral setae, but ranges overlapping. Palp setation immatures (Figs. 9–16). Trochanter: larva and protonymph 0; deutonymph 1; tritonymph 2 (rarely 3); femur: larva 6 r-type setae; protonymph 5 r and 1 p-type seta(e); deutonymph 5–6 r plus 2–3 p; tritonymph 7–10 r plus 4 (rarely 5) p; genu: larva and protonymph 7 r; deutonymph 7–8 r; tritonymph 12–15 r plus 0–2 p. Tarsus of larva and protonymph with 2, deuto- and tritonymph with 3 *s* setae; larva, proto-, deuto-, and tritonymphs with, respectively, 0, 2, 3, and 4 *d* setae. Setation of tibiae as well as the number of tarsal *v*, *ch*, and *sm* setae not scored for immatures.



FIGURES 1–4. *Neocarus calakmulensis* **n. sp.**, adult. 1, Chelicera, female (OSAL0007616); 2, Subcapitulum, female (OSAL0007619); 3, Palp, dorsal (left) and ventral (right) view, female (OSAL0007619); 4, Palp tarsus, dorsal (top) and ventral (bottom) view, female (OSAL0007619). Arrow in A: ventral denticles. Abbreviations. Fig. 2: *pl2* = With's organ, *pl3* = rutellum, *cb* = circumbuccal setae. Fig. 3, setal types: p = papillate; r = simple; s = smooth.

Idiosoma. Color. Dark blue and violet stripes on both body and legs. Body often with brownish background reflecting ingested food.

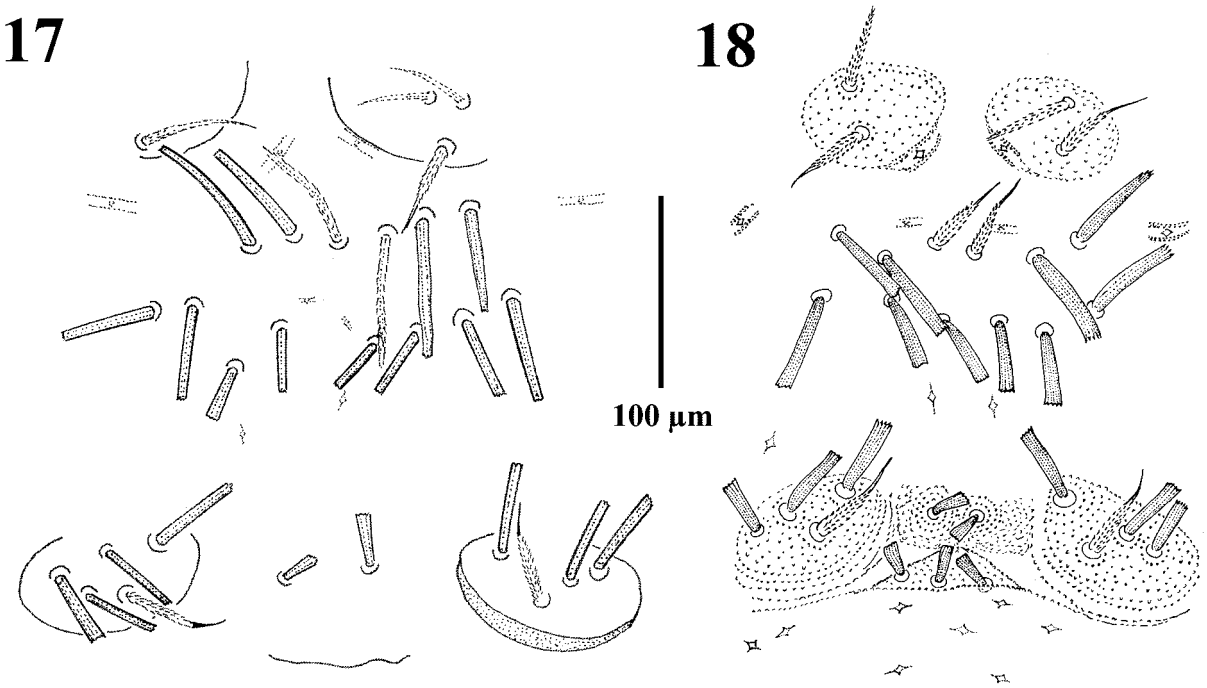
Dorsum. Anterior dorsal shield in adults with two pairs of eyes, and 59–100 stout, ribbed setae; lyrifissures absent. Larva, proto-, deuto-, and tritonymphs similar, with, respectively, 32, 28–32, 39–46, and 58–70 shield setae. Dorsal idiosoma between the shield and the preanal segment without setae, but with numerous lyrifissures arranged in transverse rows. Preanal segment with 1 dorsal and 2 ventral setae; anal plates in adults each with 6–9 (usually 7–8) stout, ribbed setae. Anal plates of larva, proto-, deuto-, and tritonymphs each with, respectively, 2, 2, 4–6, and 6–8 setae.



FIGURES 5–16. *Neocarus calakmulensis* **n. sp.**, immatures. 5–8, Subcapitulum; 9–12, Palp, dorsal (left) and ventral (right) view; 13–16, Palp tarsus, dorsal (top) and ventral (bottom) view. 5, 9, 13, Larva (OSAL0007586); 6, 10, 14, Protonymph (OSAL0007591); 7, 11, 15, Deutonymph (OSAL7594; 7596); 8, 12, 16, Tritonymph (OSAL7605).

Sternitogenital region (Figs. 17–18). Sternal verrucae in adults each with 1 long, barbed and tapering and 1–3 smaller setae. Remaining sternal area with 0–1 pairs of long, tapering setae, 5–7 pairs of stout, ribbed setae, and 3 pairs of lyrifissures (two pairs very large, the third smaller; all different in shape and size from "standard" opisthosomal lyrifissures). Pregenital capsules each with 1 long tapering and 3–4 (rarely 5) stout,

ribbed setae. Pregenital and genital areas in male with, respectively, 2–6 and 3–8 short stout, ribbed setae. Pregenital area in female with 2 (rarely 3) short, stout ribbed setae; genital area without setae. Immatures, larva, proto-, deuto-, and tritonymph, with respectively, 0, 0, 1, and 2 smaller setae on sternal verrucae, and 0, 0, 1–2, and 2–3 stout ribbed setae on the genital verrucae. None of the immatures carried setae in the pregenital or genital region. Ovipositor (Fig. 19) simple, without terminal setae, but with a single pair of gland-like structures. Number of lobes could not be determined as the ovipositor in all specimens examined was invaginated.



FIGURES 17–18. *Neocarus calakmulensis* **n. sp.**, sternitogenital region. 17, Female (OSAL0007818); 18, Male (OSAL0007622).

Legs. Legs relatively long. Ratio of legs I to idiosoma approximately 2.5, legs IV to idiosoma about 2.1. No obvious sexual dimorphism observed. Tarsi I without distinct acrotarsus but, starting with protonymph, with a distinct basitarsus. Broad sensillum with "crown-like" tip (Fig. 1S in Vázquez and Klompen (2003)) in main sensillar field. Pretarsi I with well developed sessile claws; without setae. Tarsi II in nymphs and adults each with a distinct dorsal bifurcate seta and two smooth sensilla, the basal (shorter) one of which resembling a solenidion (both sensilla inserted on acrotarsus in tritonymphs and adults). Pretarsi II–IV each with two pairs of setae and a pair of claws. Acrotarsus on tarsi II–III appears in tritonymphs and adult, on tarsi IV in deutonymph. Distinct divided trochanter on legs IV first observed in deutonymph, on legs III in tritonymph.

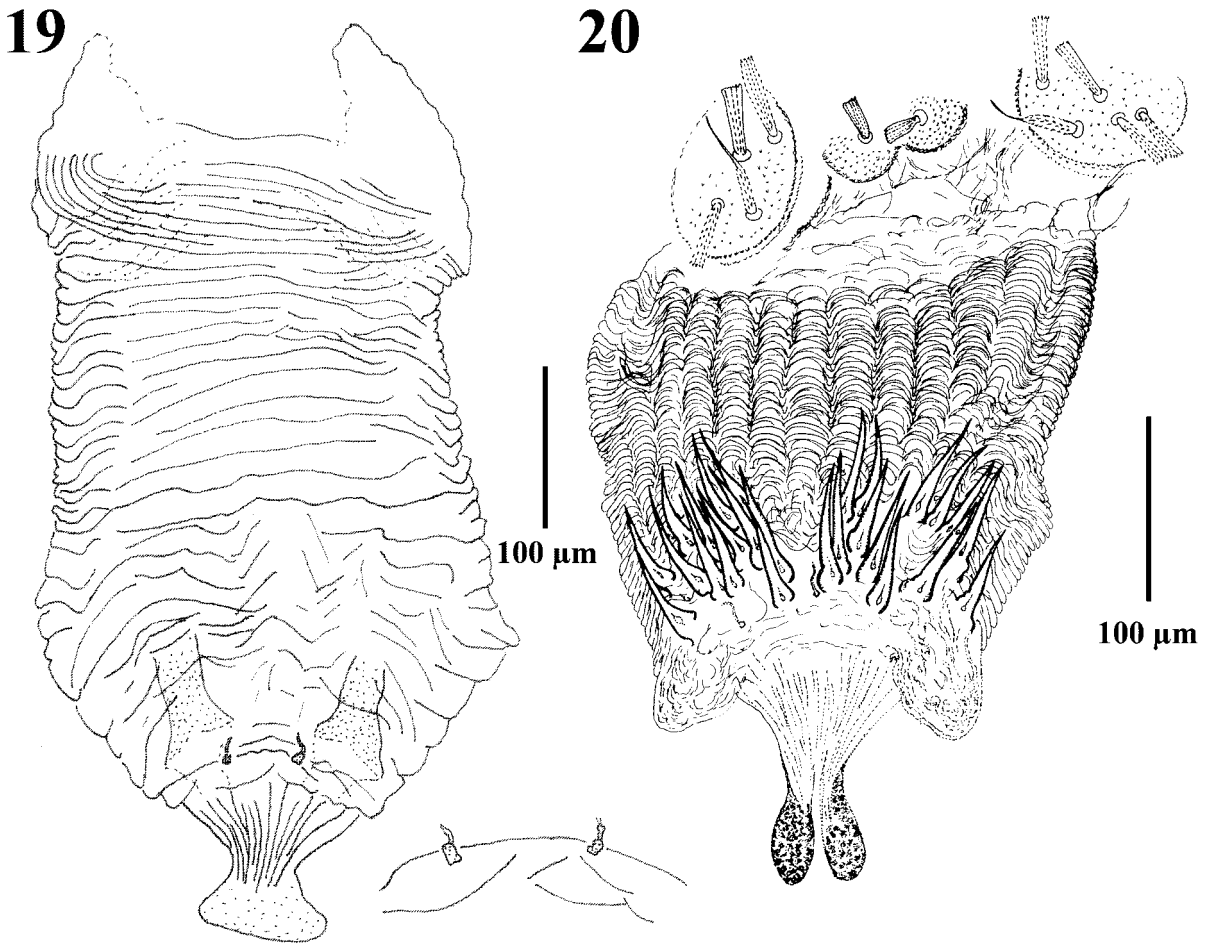
Collection information. Multiple specimen numbers refer to multiple slides representing a single, dissected, individual. Holotype female (OSAL0007618–7620), MEXICO: Campeche, Calakmul Biosphere Res. (18°6'30"N 89°48'W), zona nucleo, km34, high tropical forest, coll. Vázquez, M., 16 Jun 2005, ex litter between stones, coll. no. AL013456. Paratypes (all from Calakmul Biosphere Res. and collected by M. Vázquez). Same collection data as holotype, PN (OSAL0007592), M (OSAL0007628–07629); same locality, 7 Feb 2001, ex litter & bark with moss, AL013285: DN (OSAL0007595); 7 Feb 2001, ex litter on stones, AL013287: PN (OSAL0007587); 7 Feb 2001, ex litter, AL013288, TN (OSAL0007599); 10 Jul 2001, ex decomposing bark, AL013283: PN (OSAL0007588), DN (OSAL0007594), F (OSAL0007611–7612); 2 Jul 2002, ex unknown, AL013289: PN (OSAL0007591), PN (OSAL0007593), F (OSAL0007613–7614), F (OSAL0007615–7616); 20 Jun 2003, ex detritus on tree trunk, AL013300: TN (OSAL0007606); 20 Aug

2003, ex litter on tree trunk; high tropical forest, AL013284: TN (OSAL0007608), M (OSAL0007623); 1 Oct 2003, ex litter, AL013286: DN (OSAL0007598); Bel-Ha, medium high tropical forest, 5 Jul 2005, ex litter on slope, AL013282: L (OSAL0007586), TN (OSAL0007600–7601), TN (OSAL0007602–7603), TN (OSAL0007604–7605), M (OSAL0007627); restoration area, medium high tropical forest, km34, 17 Jan 2002, ex litter on slope; AL013293: TN (OSAL0007610); same locality, 20 Aug 2003, ex litter on tree trunk nr. seaside lagoon, AL013292: PN (OSAL0007590), TN (OSAL0007597), TN (OSAL0007607); 20 Aug 2003, ex detritus on decomposing bark, AL013294: PN (OSAL0007589), DN (OSAL0007596), TN (OSAL0007609), F (OSAL0007617), M (OSAL0007624); high tropical forest, 17 Jan 2002, ex litter under and between stones, AL013295: M (OSAL0007621–7622); same locality, 7 Oct 2003, ex litter on stones, AL013297: M (OSAL0007625–7626).

Additional material (non-paratype): MEXICO: Quintana Roo, La Union, Cenote Cocodrilo Dorado, 17°54'N 88°53'W, coll. Vázquez, M., 7 Mar 2002, ex slope cenote; very humid medium high tropical forest, AL013276: PN (OSAL0007631); same locality and collector, 21 Nov 2002, AL013277: TN (OSAL0007633); 6 Nov 2001 ex litter slope cenote, AL013278: DN (OSAL0007632), M (OSAL0007634), F (OSAL0007635), F (OSAL0007636–7637), M (OSAL0007638–7639), M (OSAL0007640).

Deposition of types. Holotype female (slides OSAL0007618–7620) and one paratype male (slides OSAL0007621–7622) at UNAM. Other paratypes at OSAL, UQROO.

Etymology. The specific name is derived from the primary collection locality, the Calakmul Biosphere Reserve.



FIGURES 19–20. Ovipositor. 19, *Neocarus calakmulensis* **n. sp.** (OSAL0007618), inset detail gland-like structures; 20, *N. bajacalifornicus chamelaensis* n. subsp. (OSAL0007672).

***Neocarus bajacalifornicus chamelaensis* Vázquez & Klompen n. subsp.**
(Figs. 20–26)

Diagnosis: Ovipositor with a number of long, terminal setae (shared with *N. bajacalifornicus* and *N. nohbecanus*). Palp tarsus with 5 pairs of foliate setae (4 in *N. orghidani* and *N. nohbecanus*). Pregenital region female with 2 short stout and ribbed setae (none in *N. nohbecanus*). Overall the new material is highly similar to *N. bajacalifornicus*. The new specimens differ by shorter stout, ribbed type setae in the sternal region (quite long in *N. bajacalifornicus*), and a slightly different ratio of leg I length to body length: 2.1 in the new material vs. 1.8–1.9 in *N. bajacalifornicus*. At this point we cannot evaluate whether these differences represent geographical variation within one species or small differences between separate species. For the time being we propose listing the new material as a subspecies of *N. bajacalifornicus* based on the small morphological differences and the geographical separation.

Description. Based on observations on 6 females, 6 males, 9 tritonymphs, 6 deutonymphs, 6 protonymphs, 2 larvae (larvae in poor condition).

Gnathosoma. Chelicera (Fig. 21). Basal segment in protonymph without setae; 1 seta (one male with 2 on one chelicera) added in deutonymph. Fixed digit with 3 setae in all instars. All setae smooth, rarely lightly barbed. Dorsal and antiaxial lyrifissure well developed. Fixed digit with 1 tooth, movable digit with 1 or 2 (second one may appear as a ridge rather than a tooth) and a well developed terminal hook. Movable digit with 1 distinct denticle on ventral surface, rarely with a small second one. Cheliceral digits in larva poorly developed and without teeth; digits in nymphs as in adults.

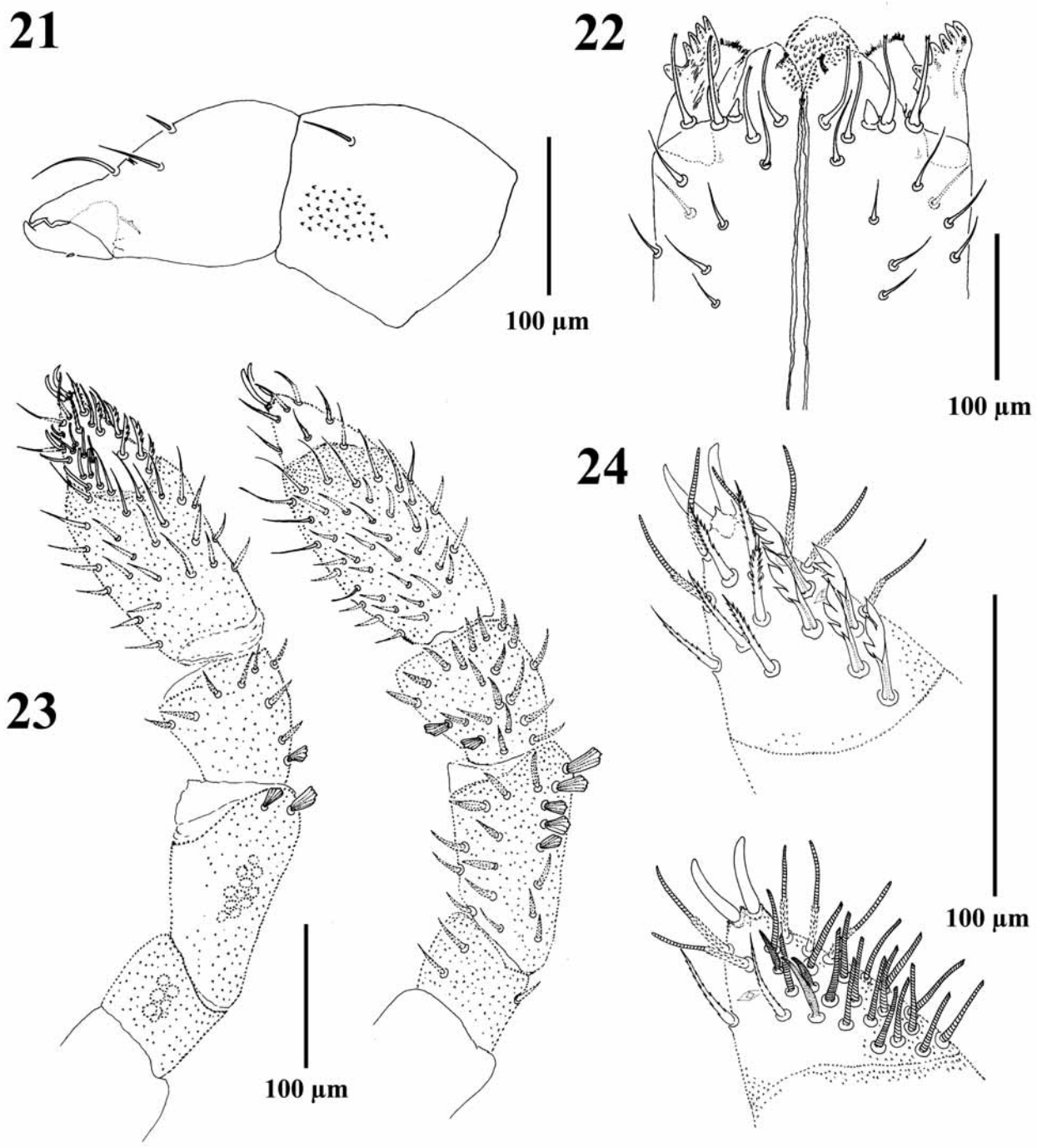
Subcapitulum (Fig. 22). All 4 pairs of paralabial setae present in adults: *pl1* small, conical; With's organ (*pl2*) membranous, discoid; rutella (*pl3*) with 1 row of 5 teeth, inserted dorso-laterally; *pl4* very small, inserted dorsal on subcapitulum. In addition, 4 circumbuccal (*cb*), and 6–10 median and subcapitular (*vm* (in part), *lvm*, *ldm*, *vp*, *lvp*) setae. Sexual dimorphism indistinct. Lateral lips with distinct canals. Larva with only 2 circumbuccal setae, With's organ reduced to a membranous cone, and rutella reduced to large lobes without distinct teeth. Larva, proto-, deuto-, and tritonymphs with, respectively, 0, 2, 2–3, and 5–6 median and subcapitular setae.

Palp (Figs. 23–24). Trochanter in adults with 3 (rarely 4) ribbed, tapering (r-type) setae; femur with 7–8 papilliform (p-type) and 11–15 r-type setae; genu with 2–5 (usually 4) p and 20–28 r setae. Tibia and tarsus partially fused. Tibia with approximately 8 smooth and 55 r setae. Palp tarsus with lyrifissures $i\pi$ and $i\alpha$. Setation including 5 *d* (leaf-like), 8 *v*, 3 *s*, 16 *ch*, and 9 *sm* setae. Pretarsus in shape of well developed pair of sessile claws. Sexual differentiation absent. Palp setation in immatures similar to that in *N. calakmulensis*. Larvae and protonymphs lack setae on the trochanter, most deutonymphs add a single seta, the tritonymphs carry 2–3. Femoral addition sequence for papilliform setae in proto-, deuto- and tritonymphs is 1, 2, and 6; on the genu both proto- and deutonymphs lack papilliform setae, the tritonymphs add 1–3. Addition sequence of *d* setae on the tarsus as in *N. calakmulensis*: larva: 0, protonymph: 2, deutonymph: 3; tritonymph: 4.

Idiosoma. Dorsum. Anterior dorsal shield with two pairs of eyes, female and male with, respectively, 116–126 and 102–106 stout, ribbed setae. Lyrifissures absent. Nymphs with, respectively, 30–34, 66–69, and 74–92 shield setae. Dorsal idiosoma between shield and the preanal segment without setae, but with numerous lyrifissures arranged in transverse rows. Preanal segment with 1 dorsal and 2 ventral setae; anal plates in adults with 8–11 stout, ribbed setae (females generally have slightly more than males). Anal plates of the larvae, proto-, deuto-, and tritonymphs with, respectively, 2, 2, 3–4, and 7–8 setae.

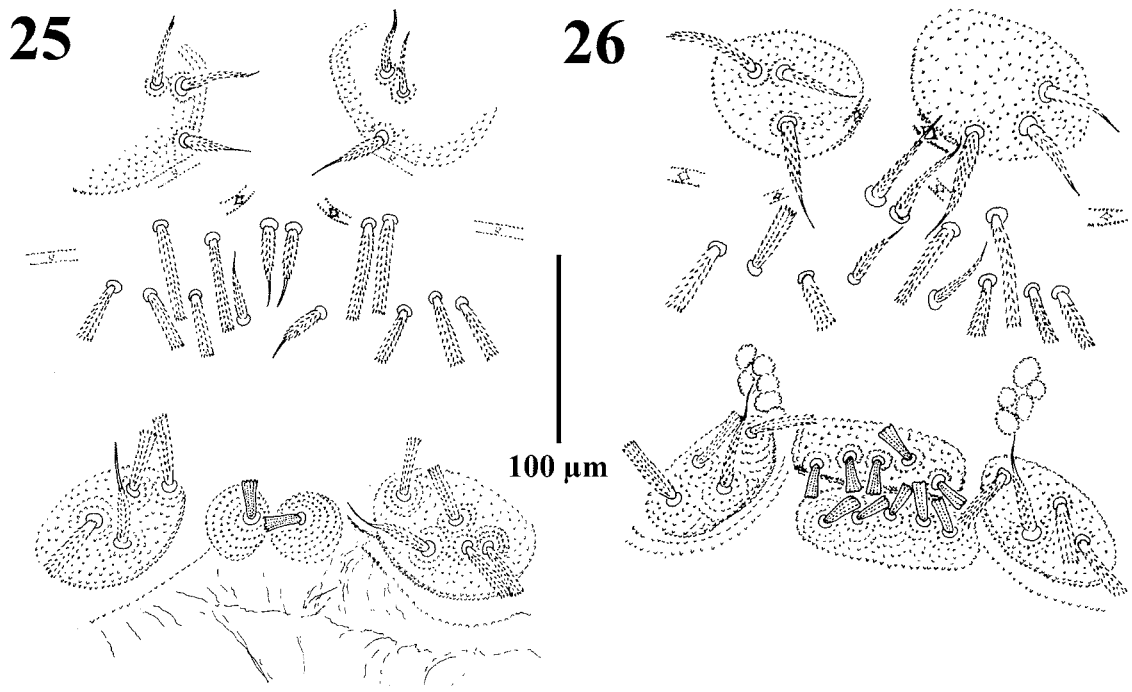
Sternitogenital region (Figs. 25–26). Sternal verrucae each with 1 long, barbed tapering and 2–3 (rarely 1 or 4) smaller setae. Remaining sternal area with 2 pairs of long, tapering setae, 4–7 (usually 5–6) pairs of stout, ribbed setae, and 2 pairs of large, distinct, and 1 pair of slightly smaller lyrifissures; all different in shape and size from "standard" opisthosomal lyrifissures. Pregenital capsules each with 1 long tapering and 3 stout, ribbed setae. Pregenital and genital areas in male with, respectively, 4–5 and 4–6 short, stout ribbed setae. Pregenital area in female with 2–3 stout, ribbed setae; genital area without setae. Addition sequence of sternitogenital setae in larva, proto-, deuto-, and tritonymphs as in *N. calakmulensis*. Ovipositor (Fig. 20) with

14–26 distinct, long and smooth terminal setae, lacking distinct glands or small non-terminal setae. Number of lobes could not be determined as the ovipositor in all specimens examined was invaginated.



FIGURES 21–24. *Neocarus bajacalifornicus chamelaensis* n. subsp., male (OSAL0007698). 21, Chelicera; 22, Subcapitulum; 23, Palp, dorsal (left) and ventral (right) view; 24, Palp tarsus, dorsal (top) and ventral (bottom) view.

Legs. Ratio of legs I to idiosoma approximately 2.1; legs IV to idiosoma about 1.5. No obvious sexual dimorphism observed. Tarsus I each with distinct basitarsus, but lacking distinct acrotarsus. Broad sensillum with "crown-like" tip in main sensillar field. Pretarsi with well developed sessile claws; without setae. Tarsi II with a distinct dorsal bifurcate seta and two smooth sensilla, as in *N. calakmulensis*. Pretarsi II–IV each with two pairs of setae and a pair of claws. Sequence of appearance of the basitarsus on legs I, the acrotarsi on legs II–IV and the divided trochanter of legs III–IV as in *N. calakmulensis*.



FIGURES 25–26. *Neocarus bajacalifornicus chamelaensis* n. subsp., sternitogenital region. 25, Female (OSAL0007672); 26, Male (OSAL0007690).

Collection information. Multiple specimen numbers refer to multiple slides representing a single, dissected, individual. Holotype female (OSAL0007672), MEXICO: Jalisco, Chamela, Estacion de Biologia de Chamela (19°32'N, 105°85'W), valley #4, coll. Rodriguez, A. & Gomez, A., 24 Jul 2001, ex soil, coll. no. AL13303. Paratypes (all from Estacion de Biologia de Chamela). Same collection data as holotype, M (OSAL0007684–7685), M (OSAL0007686, 7687), M (OSAL0007688, 7689), M (OSAL0007693, 7695), M (OSAL0007696), TN (OSAL0007682); same locality and collectors, 16 Feb 1992, ex soil, AL013302: M/TN (OSAL0007700); 16 Feb 1992, ex litter, AL13304: F (OSAL0007683); 22 Sep 1991, ex litter, AL13301: M (OSAL0007701); 12 Jun 1992, ex soil, AL13389: TN (OSAL0007673), TN (OSAL0007674); 13 Dec 2001, ex litter, AL013388: F (OSAL0007671); 24 Aug 2002, ex soil, AL013314: M (OSAL0007690), M (OSAL0007694). Valley #1, deciduous tropical forest, coll. Rodriguez, A. & Gomez, A., 22 Sep 1991, ex soil, coll. code AL013307: M (OSAL0007691), M (OSAL0007699); same locality and collectors, 14 Mar 1992, ex soil, AL13306: M (OSAL0007692), M (OSAL0007702), TN (OSAL0007665), TN (OSAL0007666), TN (OSAL0007667), TN (OSAL0007668); 13 Jun 1992, sample 241, extracted without light, ex soil sample, AL13224: M (OSAL0007704–7705), TN (OSAL0007706) , DN (OSAL0007664) , DN (OSAL0007663), DN (OSAL0007658), DN (OSAL0007659), PN (OSAL0007662); 13 Feb 2001, ex litter, AL13387: TN (OSAL0007669, 7670). Valley 2, coll. Rodriguez, A. & Gomez, A., 20 May 2002, ex litter, AL013390: L (OSAL0007649); (PN) (OSAL0007652); same locality and collectors, 18 Aug 2002, ex litter, AL13391: L (OSAL0007648); PN (OSAL0007653). Medium high temperate forest, coll. Mateos, E., 28 Oct 1992, ex litter, AL013308: M (OSAL0007697, 7698), M (OSAL0007703), F (OSAL0007675), F (OSAL0007676), F (OSAL0007677), F (OSAL0007678), F (OSAL0007679–7681), DN (OSAL0007660), DN (OSAL0007661) , (DN) (OSAL0007657), PN (OSAL0007654), PN (OSAL0007655), PN (OSAL0007656).

Deposition of types. Holotype female (slide OSAL0007672) and one paratype male (slides OSAL0007697–7698) at UNAM. Other paratypes at OSAL, UQROO.

Etymology. The subspecific name is derived from the primary collection locality, the Estacion de Biologia de Chamela.

***Neocarus veracruzensis* Vázquez & Klompen n. sp.**
(Figs. 27–33)

Diagnosis. Palp tarsus with 5 pairs of foliate setae (4 in *N. orghidani* and *N. nohbecanus*). Sternal area between sternal and genital verrucae with 2 (rarely 1) pairs of long, tapering setae (0–1 in *N. calakmulensis*). Female with 2 setae in pregenital area, male with stout, blunt setae in genital area. Ovipositor without terminal setae. This species is similar to *N. nicaraguensis*, but can be differentiated by smaller numbers of setae on the sternal verrucae (2–3 vs. 4–6), and relatively small numbers of *ch* and *sm* setae on the palp tarsus (13 and 5 vs. 18–22 and 6–11).

Description. Based on observations on 8 females, 3 males, 3 tritonymphs. Other immatures unknown.

Gnathosoma. Chelicera (Fig. 27). Basal segment with 1, fixed digit with 3 setae. Some setae very lightly barbed. Dorsal and antiaxial lyrifissure well developed. Fixed digit with 1 tooth, movable digit with 1–2 teeth and a well developed terminal hook. Movable digit with 1–2 (rarely 3) denticles on ventral surface.

Subcapitulum (Fig. 28). All 4 pairs of paralabial setae present: *pl1* small, conical; With's organ (*pl2*) membranous; rutella (*pl3*) with 1 row of 5 teeth, inserted dorso-laterally; *pl4* very small, inserted dorsal on subcapitulum. In addition, 4 circumbuccal (*cb*), and 7–11 median and subcapitular (*vm* (in part), *lvm*, *ldm*, *vp*, *lvp*) setae. Distinct sexual dimorphism absent. Lateral lips with distinct canals.

Palp (Figs. 29–30). Trochanter with 3–5 ribbed, tapering (r-type) setae; femur with 7–8 papilliform (p-type) and 12–17 r setae; genu with 4–10 (low in some females) p and 17–31 r setae. Tibia and tarsus partially fused. Tibia with about 4 smooth and 65 r setae. Palp tarsus with lyrifissures $i\pi$ and $i\alpha$. Setation including 5 *d* (leaf-like), 7 *v*, 3 *s*, 13 *ch*, and 5 *sm* setae. Pretarsus in shape of well developed pair of sessile claws. Sexual differentiation absent

Idiosoma. Color. Violet blue with the usual banding pattern. Color observed on alcohol preserved specimens.

Dorsum. Relatively large species. Anterior dorsal shield with two pairs of eyes, and 108–126 stout, ribbed setae; lyrifissures absent. Dorsal idiosoma between the shield and the preanal segment without setae, but with numerous lyrifissures arranged in transverse rows. Preanal segment with 1 dorsal and 2 ventral setae. Anal plates in adults with 7–10 (14 in one TN). stout, ribbed setae.

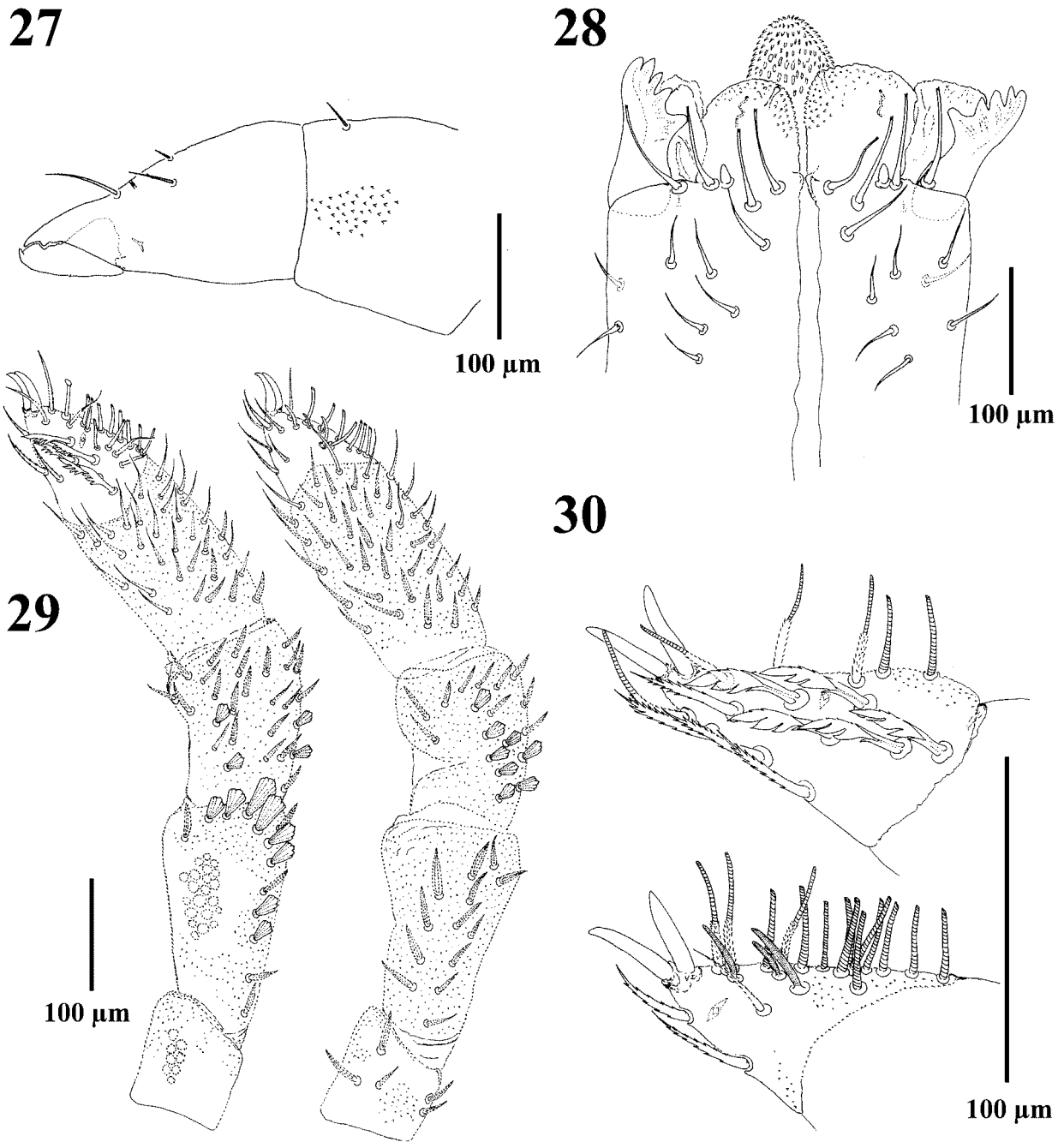
Sternitogenital region (Figs. 31–32). Sternal verrucae each with 1 long, barbed tapering and 1–2 smaller setae. Remaining sternal area with 4–6 pairs of stout, ribbed, 2 pairs of long tapering setae, and 2 pairs of large, distinct and 1 pair of smaller lyrifissures; all different in shape and size from "standard" opisthosomal lyrifissures. Pregenital capsules each with 1 long tapering and 3–4 stout ribbed setae. Pregenital area in male with a combination of 6–8 short stout ribbed and 0–1 small smooth setae, genital area with 6–8 short stout ribbed setae. Pregenital area in female with 2 short stout ribbed setae; genital area without setae. Ovipositor (Figs. 32–33) terminating in three lobes. Without long, terminal, or short non-terminal setae. Generally with limited distinguishing features.

Legs. Ratio of legs I to idiosoma about 2.2; for legs IV to idiosoma 1.8. No obvious sexual differentiation. Tarsus I without an acrotarsus but with a large, distinct basitarsus. Broad sensillum with "crown-like" tip in main sensillar field. Pretarsi with well developed sessile claws; without setae. Tarsi II with a distinct dorsal bifurcate seta and two smooth sensilla, as in *N. calakmulensi*s. Pretarsi II–IV each with two pairs of setae and a pair of claws. Adults and tritonymphs with a distinct acrotarsus on legs II–IV and divided trochanters on legs III–IV.

Collection information. Multiple specimen numbers refer to multiple slides representing a single, dissected, individual. Holotype female (OSAL0007719, 7721), MEXICO: Veracruz, El Morro de La Mancha, coll. Vazquez, I, 25 Feb 1995, ex dune sand, coll. no. AL013279. Paratypes. Same collection data as holotype, TN (OSAL0007708), TN (OSAL0007707), TN (OSAL0007709–7710), F (OSAL0007711–7712), F (OSAL0007713–7715), F (OSAL0007716–7718), F (OSAL0007720), F (OSAL0007722), F (OSAL0007723), F (OSAL0007724), M (OSAL0007725), M (OSAL0007726), M (OSAL0007727).

Deposition of types. Holotype female (slides OSAL0007719, 7721) and one paratype male (slide OSAL0007725) at UNAM. Other paratypes at OSAL, UQROO.

Etymology. The specific name is derived from the state of Veracruz, in which these specimens were collected.



FIGURES 27–30. *Neocarus veracruzensis* **n. sp.**, adult 27, Chelicera, male (OSAL0007727); 28, Subcapitulum, female (OSAL0007718); 29, Palp, female, dorsal (left) and ventral (right) view (OSAL0007719); 30, Palp tarsus, female, dorsal (top) and ventral (bottom) view (OSAL0007719).

***Caribeacarus* Vázquez & Klompen n. gen.**

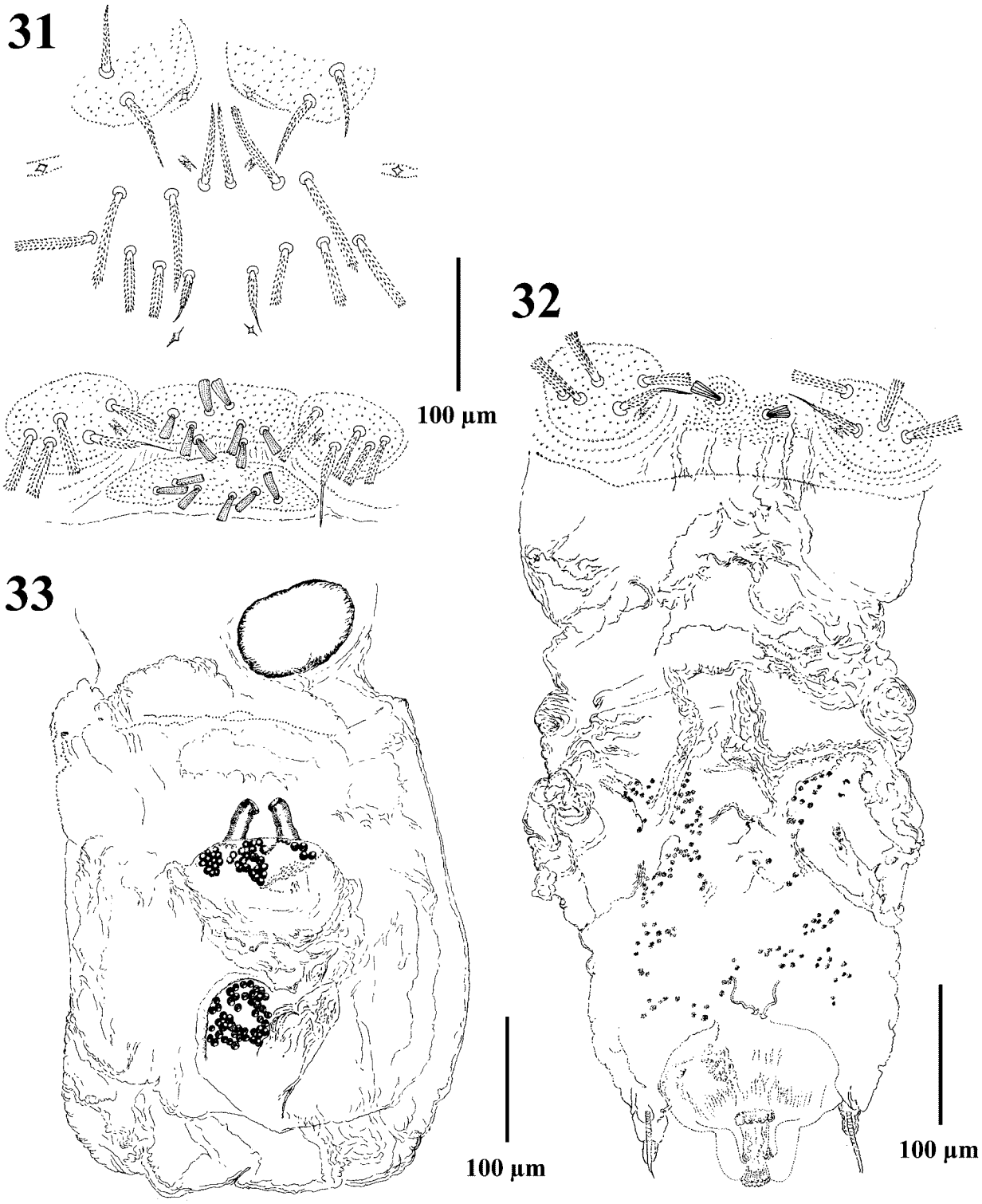
Diagnosis:

1. With 2 pairs of eyes and With's organ membranous and discoid (3 pairs of eyes and With's organ biramous and setiform in *Paracarus* and *Siamacarus*).

2. Main opisthosomal segments in adults without setae (with numerous setae in *Panchaetes*, *Salfacarus*, and *Vanderhammenacarus*)

3. Penultimate segment of idiosoma with 3 setae (shared with *Neocarus*; either 0 or 5 or more in all other genera)

4. Palp tarsus with 7–12 foliate setae (Figs. 44–45) (shared with *Phalangiacarus* and *Siamacarus*)



FIGURES 31–33. *Neocarus veracruzensis* **n. sp.** 31, Sternitogenital region male (OSAL0007725) ; 32, invaginated ovipositor (OSAL0007722); 33, evaginated ovipositor (OSAL0007717).

5. Tarsus I sensillum with "crown-like" tip distant from main group of sensory sensilla (Figs. 54–55) (in main group in *Neocarus* (Fig. 56)). Condition unknown in *C. panamensis*.

Additional characters. Basal segment of chelicera in male usually with more than 1 setae (Fig. 34) (shared with *Siamacarus dalgeri* Leclerc (2–5 setae) and *Indiacarus* (2 setae)); male *C. panamensis* **n. sp.** with 1 seta. Palp trochanter in the adult with 5–8 setae (5 or less in *Neocarus*). Sternitogenital region between the sternal and genital verrucae with relatively few setae, including 3–4 pairs of stout ribbed setae (usually 4–8 pairs of stout, ribbed setae in *Neocarus*). N.B. our current understanding of variation in this group is poor, so these characters need to be re-examined when more material becomes available.

Species included:

Caribeacarus armasi **n. sp.** Type species

C. vanderhammeni (Juvara-Bals & Baltac 1977), new status

C. panamensis **n. sp.**

Note. The combination in the adults of 3 setae on the penultimate segment of the idiosoma, large numbers of foliate setae on the palp tarsus, and the terminal position of the "crown-like" tip sensillum of tarsi I, appears to provide good support for monophyly of *Caribeacarus*.

***Caribeacarus armasi* Vázquez & Klompen n. sp.**
(Figs. 34–39, 42–44, 46–48, 50–51, 53–55)

Diagnosis. Male with 4–6 setae on fixed digit of chelicera. Palp in adults with 8 leaf-like setae (9 in *C. panamensis*; 10 (female) or 12 (male) in *C. vanderhammeni*). Number of subcapitular setae in female and males subequal (male with distinctly more setae (21) than female (15) in *C. vanderhammeni*). Pregenital and genital setae in the male blunt (pregenital blunt, genital pointed in *C. vanderhammen*i; both pregenital and genital pointed in *C. panamensis*). Female with a pair of small seta-like structures on the ovipositor (absent in *C. vanderhammeni* and *C. panamensis*).

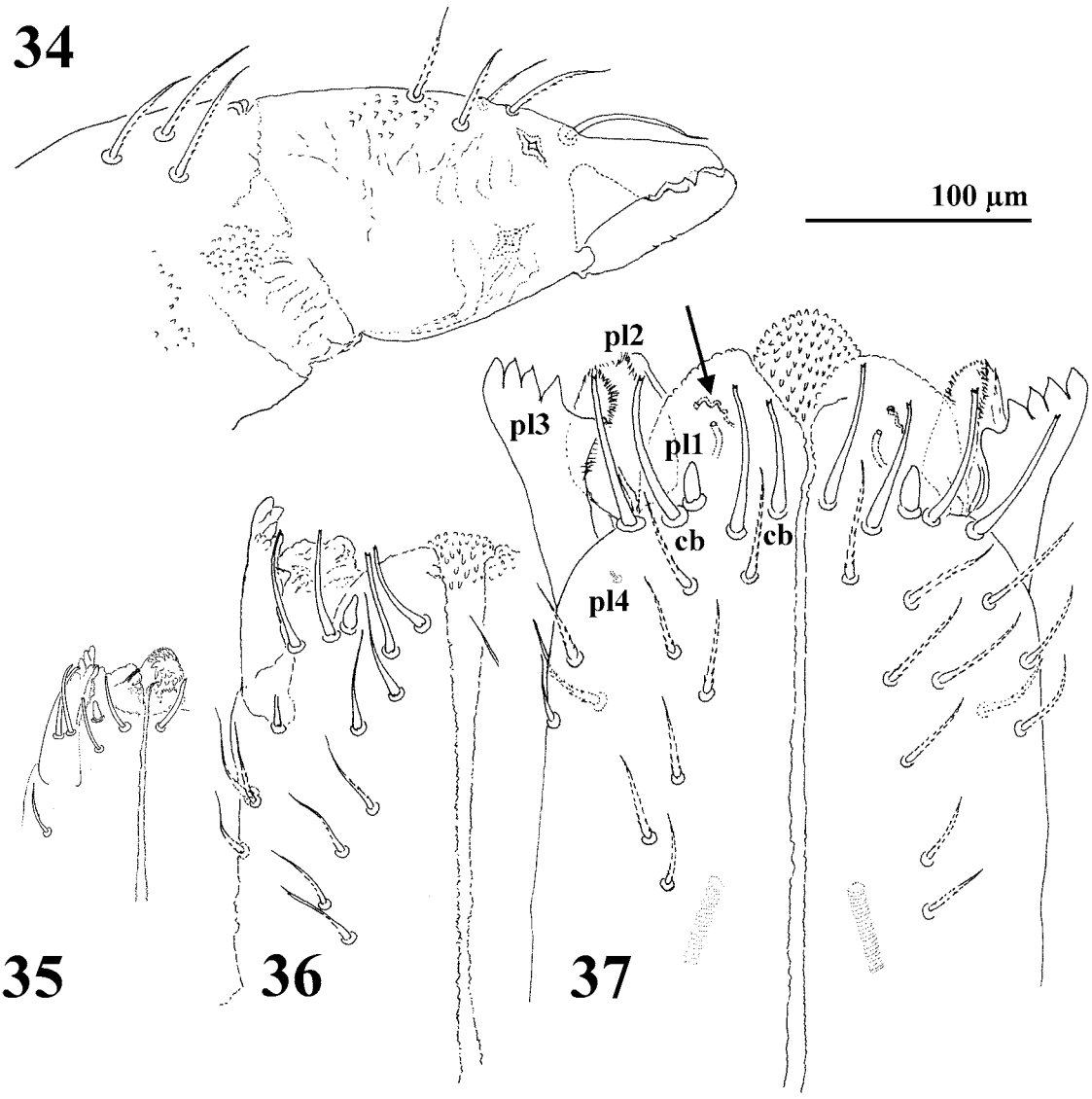
Description. Based on observations on 8 females, 11 males, 6 tritonymphs, 1 deutonymph, 2 protonymphs. Larva unknown.

Gnathosoma. Chelicera (Fig. 34). Basal segment in protonymph without setae, deuto- and tritonymphs and females with 1 seta, males with 2–5 setae; fixed digit with 3 setae in most nymphs and females (one TN (OSAL0003093) with 4 setae on right chelicera, 3 on left), male with 4–6 setae on fixed digit. Some setae lightly barbed. Dorsal and antiaxial lyrifissure generally well developed. Movable digit with 2 teeth and a terminal hook, fixed digit with one well developed tooth and two ridges in addition to terminal hook. Movable digit with at most one small denticle on ventral surface in female and nymphs, 0–2 minute denticles in male.

Subcapitulum (Figs. 35–37). Adults with 4 pairs of paralabial setae: *pl1* small conical; With's organ (*pl2*) membranous; rutella (*pl3*) each with 1 row of 5 teeth, inserted dorso-laterally; *pl4* very small, inserted dorsal on subcapitulum. In addition, 4 circumbuccal (*cb*), and 9–13 median and subcapitular setae (includes *vm* [in part], *lvm*, *ldm*, *vp*, and *lvp* setae). Sexual dimorphism indistinct or absent. States similar in immatures, but proto-, deuto-, and tritonymphs (Figs. 35–36), with, respectively, 1, 4, and 5–8 median and subcapitular setae. Lateral lips with distinct canals (*dl1* and/or *dl2* (Grandjean, 1936); Fig. 37: arrow).

Palp (Figs. 38–39, 42–44). Trochanter in adults with 5–7 ribbed, tapering (r-type) setae; femur with 7–14 papilliform (p-type), and 9–18 r setae; genu with 1–6 p setae, and about 24–31 r setae in the female, 32–48 in the male. Number of p setae on femur quite variable among individuals (compare Fig. 38 with 39), but always relatively high. Tibia with 24–30 thin, smooth (s-type) and 46–49 r setae. No lyrifissure observed on either genu or femur. Tibia and genu with a few dorsal or antero-dorsal small glands. Palp tarsus with lyrifissures $i\pi$ and $i\alpha$ and a small basal gland in all instars examined. Setation in adult including 3 *s*, 8 *d* (leaf-like), and, usually, 8 *v*, 25 *ch*, and 9 *sm* setae (no *sm3* type setae (Vázquez & Klompen 2002)). Pretarsus in the shape of a pair of well developed sessile claws. Sexual differentiation indistinct or absent. Palp trochanter in immatures

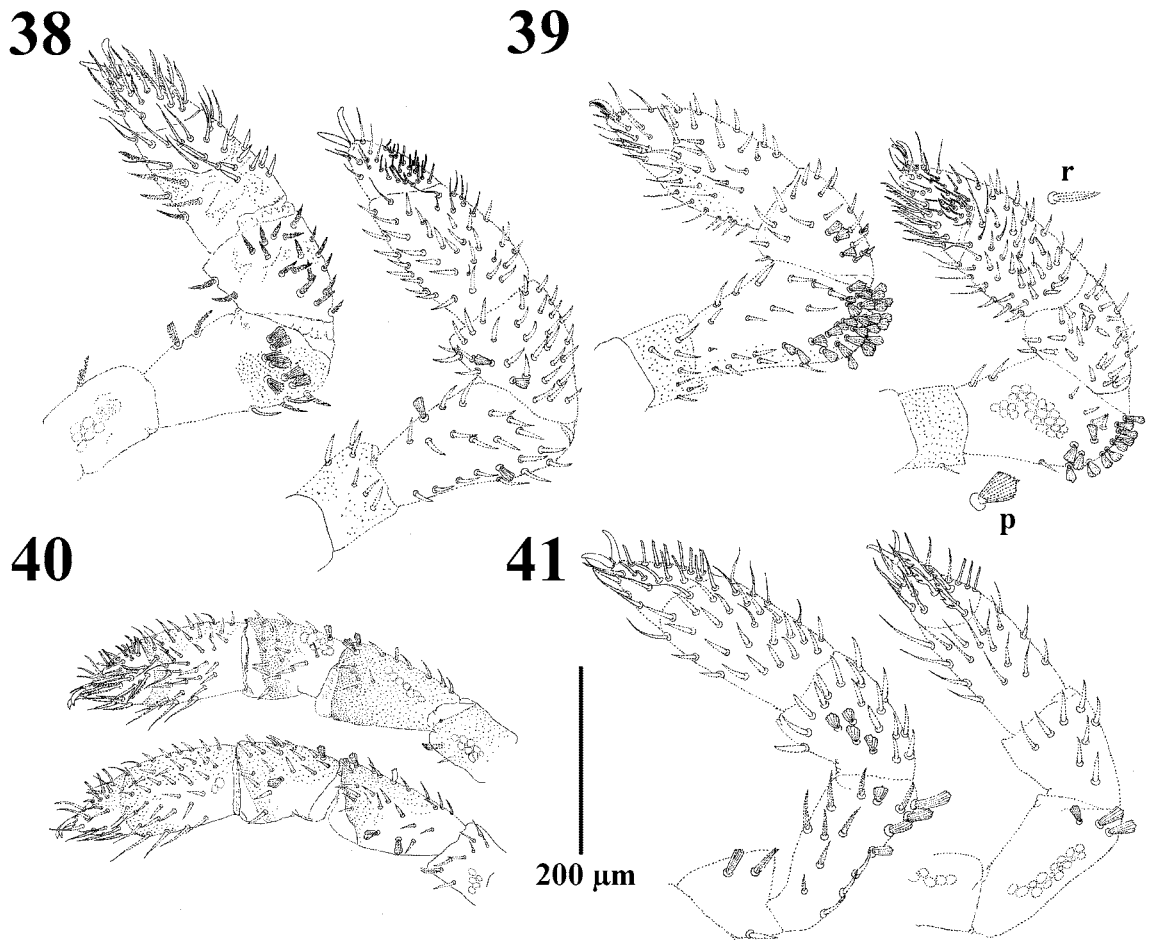
with 0 setae in the protonymph, 1 in the deutonymph, and 2–5 in the tritonymph. Femur and genu with, respectively, 0 and 0, 1 and 0, and 4–8 and 1–3 p setae in the proto-, deuto-, and tritonymphs. Number of r setae on the femur and genu of the nymphs 5, 5, 5–9 and 7, 7, 11–19, respectively. The number of *v, ch*, and *sm* setae on the tarsus is variable both among and within instars; number of *d* setae in the proto-, deuto-, and tritonymphs is, respectively 2, 4 and 6 (Figs. 42–43).



FIGURES 34–37. *Caribeacarus armasi* **n. sp.**, gnathosoma. 34, Chelicera male, axial view (OSAL0007930); 35–37, Subcapitulum, ventral view. 35, Protonymph (OSAL8084); 36, Tritonymph (OSAL0008091); 37, Female (OSAL0008101). Arrow: canal in lateral lips.

Idiosoma. Color. Generally blue and purple with the usual banding pattern on the legs and idiosoma. This assessment is based on specimens stored in alcohol, and colors might be distorted.

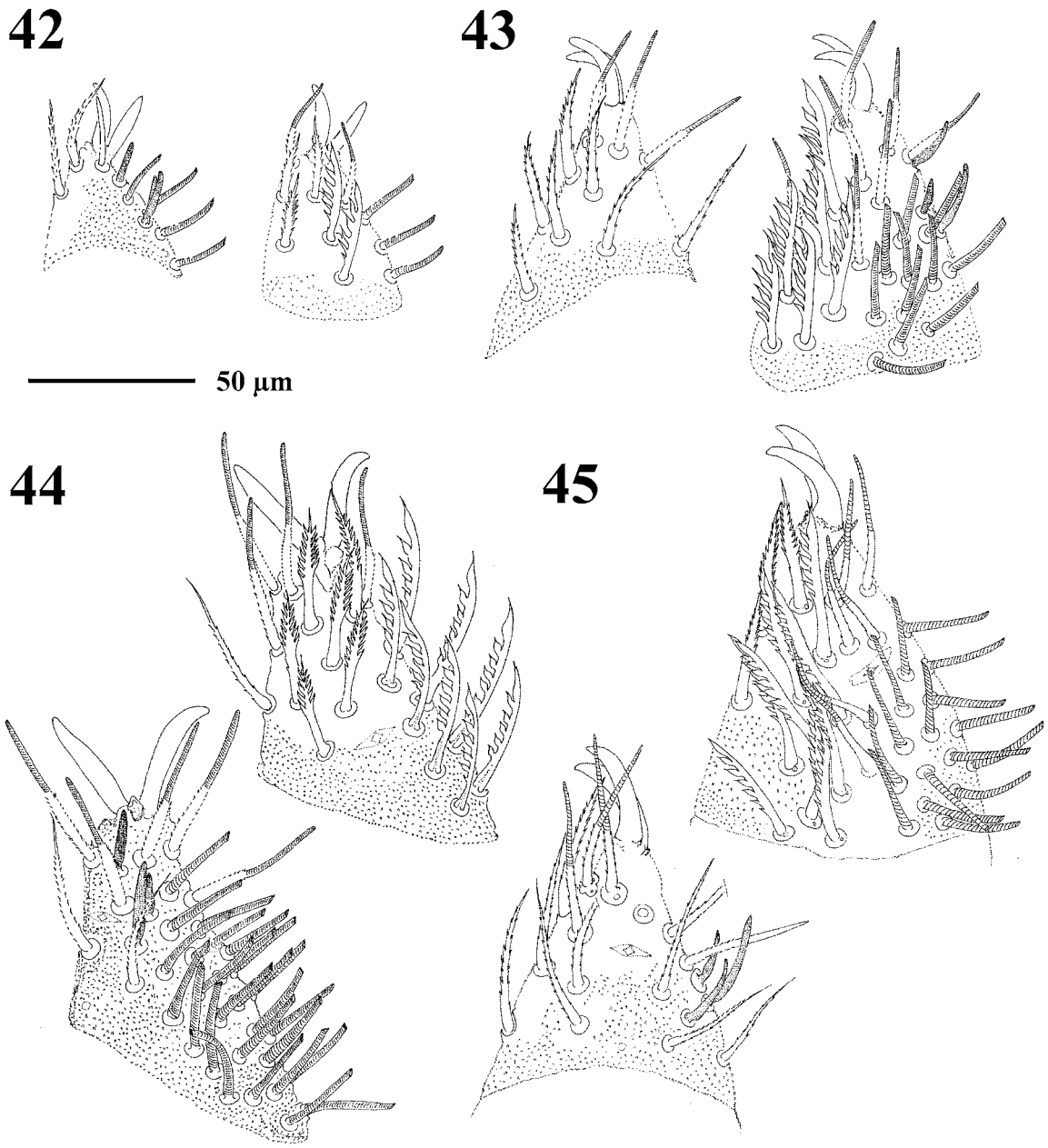
Dorsum. Anterior dorsal shield in adults with two pairs of eyes, and 108 (96–120) stout, ribbed setae. Numbers of setae for proto- and tritonymphs 27–28 and 64–83, respectively (condition could not be scored in the deutonymph). Lyrifissures absent. Dorsal idiosoma between anterior shield and preanal segment without setae, but with numerous lyrifissures arranged in transverse rows. Preanal segment with 1 dorsal and 2 ventral setae; anal valves in adults with 5–7 stout, ribbed setae. Anal valves in proto-, deuto-, and tritonymphs with, respectively, 2, 4–5, and 5–6 stout ribbed setae.



FIGURES 38–41. Palp morphology. 38, *Caribeacarus armasi* **n. sp.**, male (OSAL0008105); 39, *C. armasi*, male (OSAL0007922); 40, *C. panamensis* **n. sp.**, male (OSAL0007885); 41, *Neocarus siankaanensis* Vázquez & Klompen, female (OSAL0000565).

Sternitogenital region (Figs. 46–48, 50–51, 53). Sternal verrucae in tritonymphs and adults with 2 long, barbed, tapering setae (only 1 in protonymph). Remaining sternal area with 1 pair of long tapering and 3 pairs of stout ribbed setae, plus 2 pairs of large and 1 pair of small lyrifissures; all different in shape and size from "standard" opisthosomal lyrifissures. Only 1 pair of stout ribbed setae in protonymph (Fig. 46). Pregenital capsules each with 1 long tapering and 3 stout ribbed setae in adults. Immatures with varying numbers of stout ribbed setae, 0 in protonymph, 2–3 in tritonymph (deutonymph could not be scored). Pregenital and genital areas in male with, respectively, 2 and 5 short, stout, ribbed setae (Fig. 48). Pregenital area in female without setae; genital area with 5 short, stout, ribbed setae (Fig. 50). Pregenital and genital areas without setae in protonymph, genital area with 4 short, stout, ribbed setae in tritonymph. Ovipositor terminating in three lobes; without long terminal setae; but with 1 pair of small seta-like structures inserted median (not terminal) (arrows in Figs 50–51). Male glands include one small and one very large pair (Fig. 53).

Legs. Ratio of legs I to idiosoma about 2.1; legs IV to idiosoma 1.4. No obvious sexual differentiation in leg length. Tarsus I without an acrotarsus but with a large, distinct basitarsus. Broad sensillum with "crown-like" tip (Fig. 1S in Vázquez & Klompen 2002) distal to main sensillar field in all instars (Figs. 54–55). Pretarsi I with well developed sessile claws; without setae. Legs II with dorsal bifurcate seta and two smooth sensilla resembling solenidia (as in *N. calakmulensis)*. Pretarsi with two pairs of setae and a pair of claws. Acrotarsus of leg IV first appears in deutonymph, acrotarsi of legs II–III appear in tritonymph. Divided trochanters of legs III–IV present in tritonymph; trochanter III in deutonymph undivided, condition of trochanter IV in that instar could not be studied.

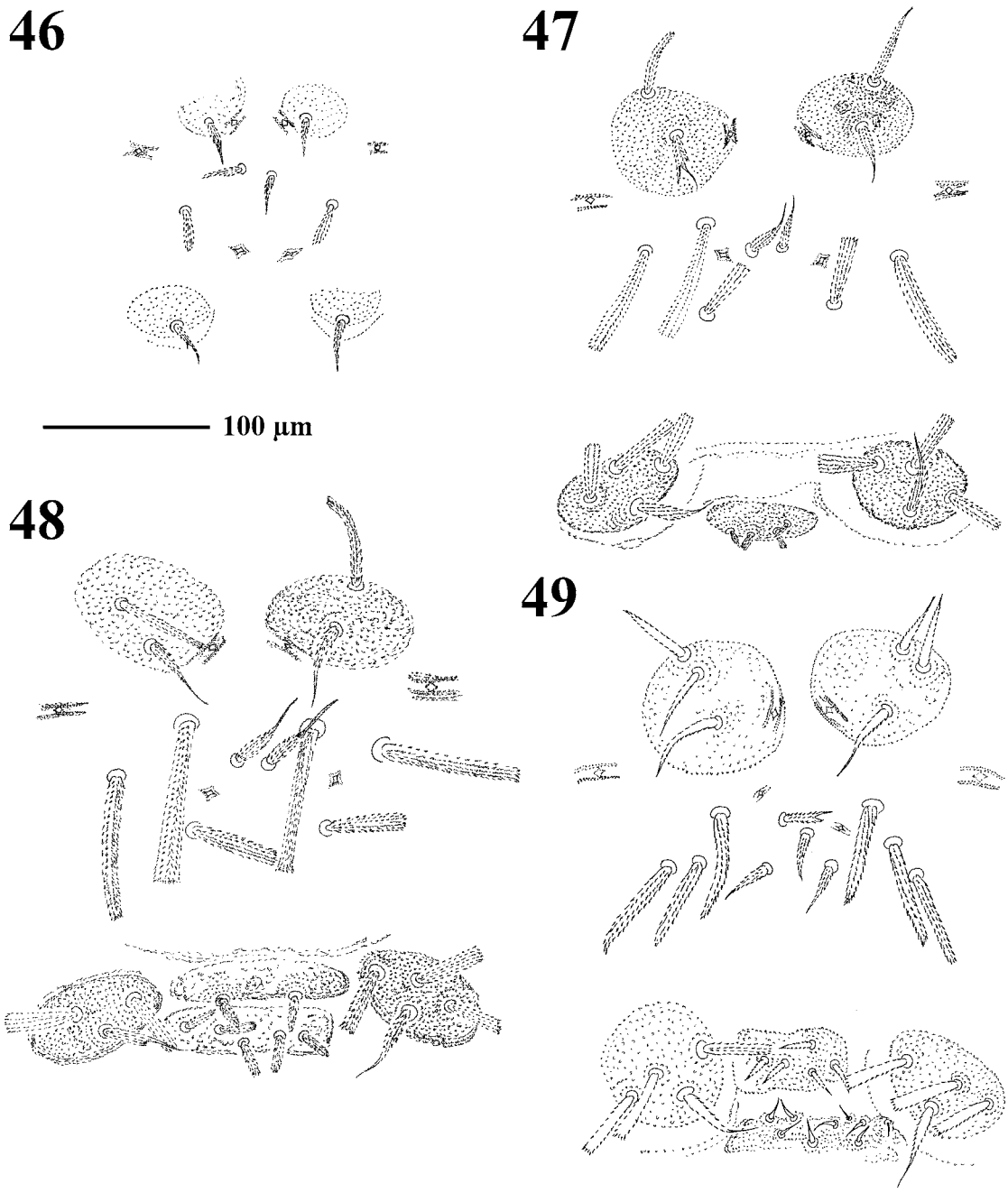


FIGURES 42–45. Palp tarsus. 42–44, *Caribeacarus armasi* **n. sp.**; 45, *C. panamensis* **n. sp.** 42, Protonymph (OSAL8084); 43, Tritonymph (OSAL0008093); 44, Male (OSAL0007932); 45, Male (OSAL0007885)

Collection information. Multiple specimen numbers refer to multiple slides representing a single, dissected, individual. Holotype female (OSAL0007916, 8112, 8113), CUBA: La Habana prov., Cojimar, 6km NE of, Boca de Cojimar, 23°09'57"N 082°17'35"W, coll. Prieto, D., 17 Jun 2004, ex dry litter microphyll pine forest, coll. no. AL013312. Paratypes. Same collection data as holotype, M (OSAL0007931–7932), (M) (OSAL0007933), TN (OSAL0008093), TN (OSAL0008091, 8092), TN (OSAL0008088, 8089), DN (OSAL0008090); same locality and collector, 12 Jun 2003, ex humid litter microphyll pine forest, AL013268: M (OSAL0007936); TN/F (OSAL0007934); same locality and collector, 10 Jun 2004, ex dry litter microphyll pine forest, AL013267: M (OSAL0007930, 7935, 7938), (M) (OSAL0007939); F (OSAL0008086) , TN (OSAL0007937), TN (OSAL0008087), PN (OSAL0008084), PN (OSAL0008085); CUBA: Matanzas prov., Bahia de Matanzas, Rio Bacunayagua estuary, 400m E rock formation, elev. 7m, 23°02'N 081°30'W, coll. de Armas, L.F., 17 Mar 2003, ex litter; close to beach, collection code AL013271: F (OSAL0008101–8103);

same locality and collector, 23 Feb 2004, ex under rocks, AL013313: F (OSAL0008094–8096, 8104); same locality and collector, 29 Feb 2004, ex under stones, AL013272: M (OSAL0008110–8111), M (OSA0008108–8109), M (OSAL0008105–8107), M (OSAL0008106), F (OSAL0008097–8100); CUBA: Holguin prov., Loma Alta, 4km NE of, Velazco, 20°56'N 075°52'W, coll. Prieto, D., 20 Jan 2004, ex litter, AL013270: M (OSAL0007921–7924), F (OSAL0007917–7918), F (OSAL0007919–07920); CUBA: La Coca reserve, close to La Habana, coll. Prieto, D., 16 Feb 2004, ex litter, AL013274: M (OSAL0007928–7929); CUBA: Bacu, coll. Prieto, D., 18 Aug 2004, ex litter, AL013273: F (OSAL0008083).

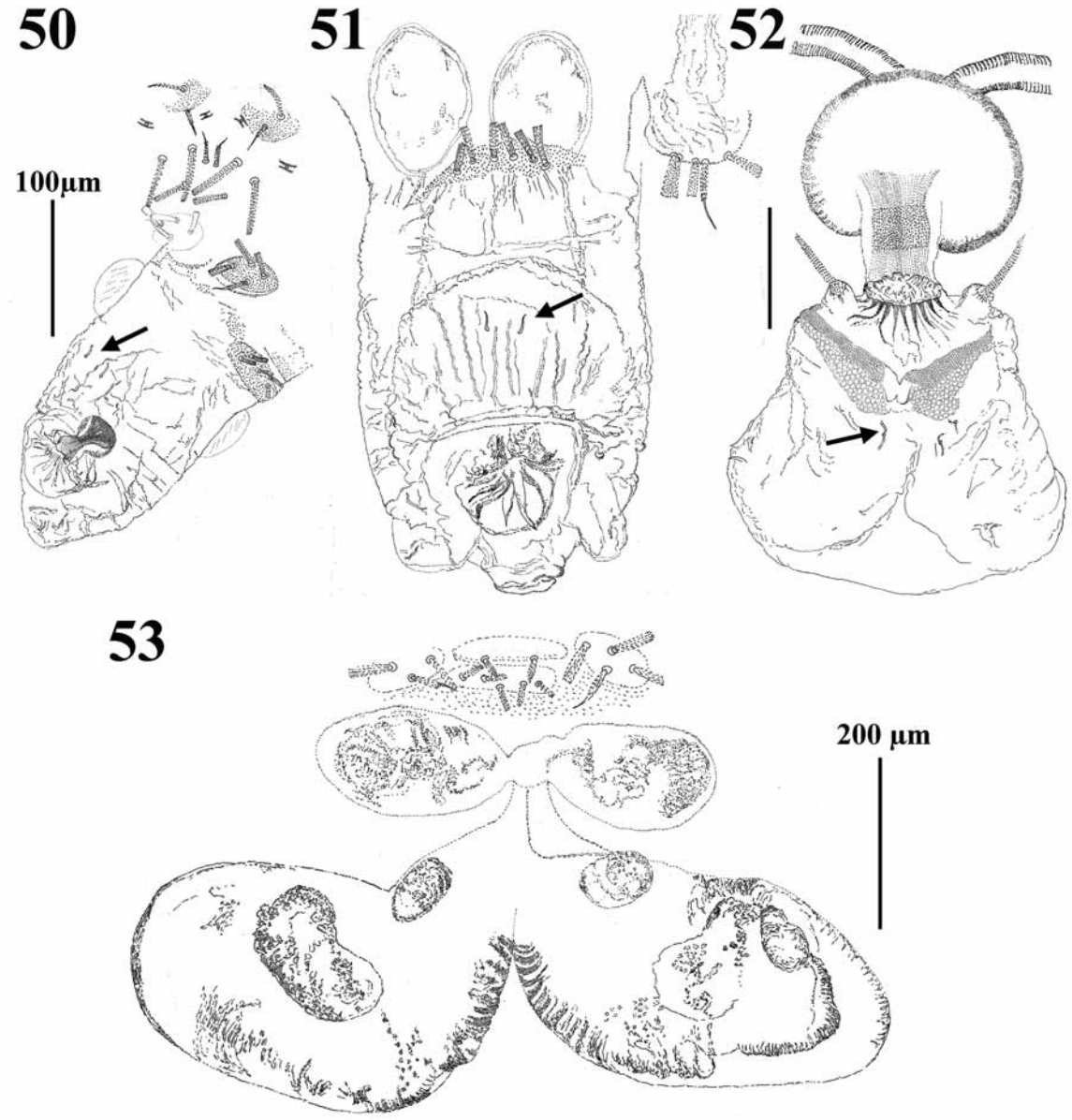
Additional material (not paratypes). DOMINICAN REPUBLIC, coll. de Armas, L.F., 23 Mar 2003, ex shrub and xerophylic vegetation, semi-desert area, AL013269: M (OSAL0007940–7941), M (OSAL0007943), TN (OSAL0007942).



FIGURES 46–49. Sternitogenital region. 46–48, *Caribeacarus armasi* **n. sp.**; 49, *C. panamensis* **n. sp.** 46, Protonymph (OSAL0008084); 47, Tritonymph (OSAL0008092); 48, Male (OSAL0007931); 49, Male (OSAL0007884).

Deposition of types. Holotype female (slide numbers OSAL0007916, 8113, 8112), and one paratype male (slides OSAL0007931–7932), deposited at IES. Other paratypes at OSAL, UQROO.

Etymology. The species is named in honor of Dr. Luis F. de Armas, who collected much of the material for this species.



FIGURES 50–53. Genital structures. 50–52, Ovipositor. 50. *Caribeacarus armasi* **n. sp.**, lateral view, evaginated (OSAL0008098); 51, *C. armasi*, frontal view, invaginated (OSAL0008104); 52, *C. panamensis*, invaginated (OSAL0007883). 53. Internal gland structure male *Caribeacarus armas*i (OSAL0008111). Arrows in 50–52: seta-like or unknown structures.

***Caribeacarus panamensis* Vázquez & Klompen n. sp.**
(Figs. 40, 45, 49, 52)

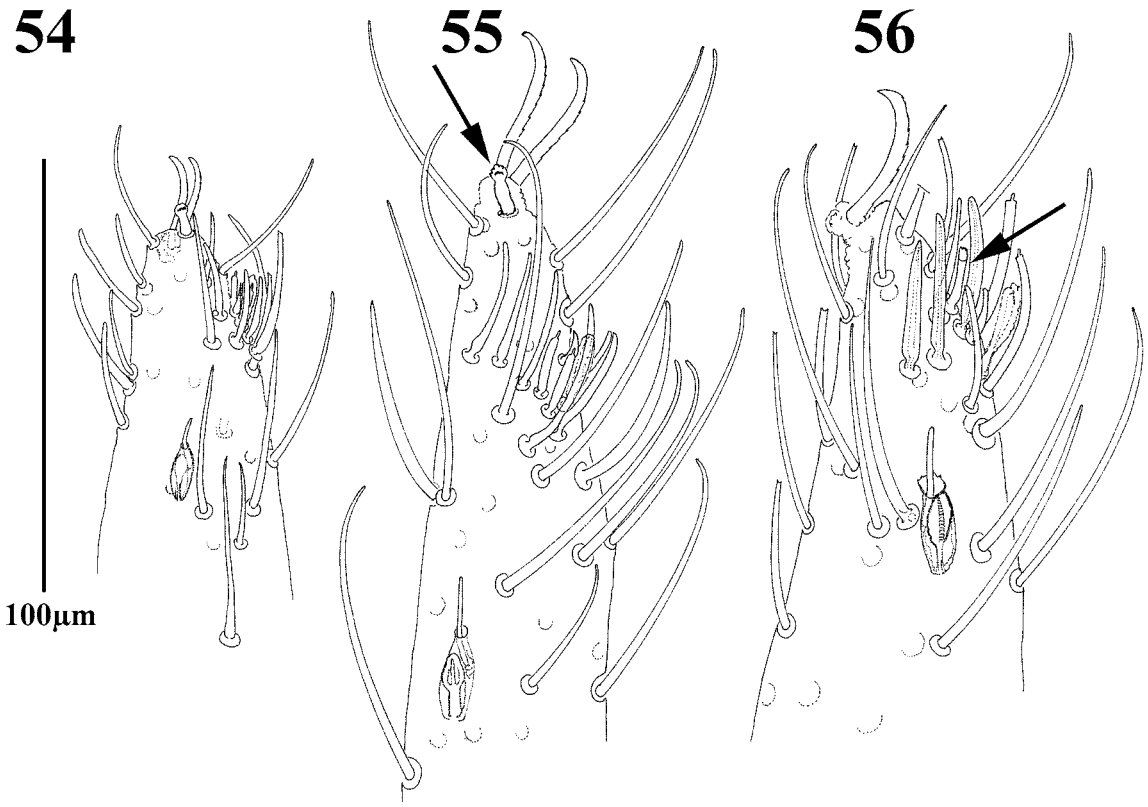
Diagnosis. Male with only 1 seta on cheliceral basis and 3 on fixed digit (more in *C. armasi* and *C. vanderhammeni*). Palp in adults with 9 leaf-like setae (8 in *C. panamensis*, 10 (female) or 12 (male) in *C. vanderhammeni*). Number of subcapitular setae in female less than in male (subequal in *C. armasi*). Note: the

importance of this character should be re-evaluated when more specimens become available. Pregenital and genital setae in the male pointed (pregenital blunt, genital pointed in *C. vanderhammeni*; both pregenital and genital blunt in *C. armasi*).

Description. Known for a single female and a single male. Immatures unknown.

Gnathosoma. Chelicera. Basal segment with 1, fixed digit with 3 setae. One seta on fixed digit lightly barbed. Dorsal and antiaxial lyrifissure well developed. Fixed digit with 1 tooth, movable digit with 1–2 teeth and a well developed terminal hook. Movable digit with at most 1 very small denticle on ventral surface.

Subcapitulum. All 4 pairs of paralabial setae present: *pl1* small conical; With's organ (*pl2*) membranous, discoid with a weakly developed forked core; rutella (*pl3*) with 1 row of teeth, inserted dorso-laterally; *pl4* small spine, inserted dorsal on subcapitulum. In addition, 4–5 circumbuccal (*cb*), and 9 (female) or 12–13 (male) median and subcapitular setae. Lateral lips with distinct canals.



FIGURES 54–56. Tarsus leg I. 54, *Caribeacarus armasi* **n. sp.**, protonymph (OSAL0008084); 55, *C. armasi female* (OSAL0008102); 56, *Neocarus siankaanensis*, female (OSAL000565). Arrows in 55–56: sensillum with "crown-like" tip.

Palp (Figs. 40, 45). Trochanter with 5–8 ribbed, tapering (r-type) setae; femur with 5 papilliform (p-type) and 13–23 r setae; genu with 2–3 p and 22–34 r setae (male generally with more setae than female). Tibia with approximately 17 smooth and 63 r setae. Palp tarsus with lyrifissures $i\pi$ and $i\alpha$; setation including 3 *s*, 9 *d* (leaf-like), 14 *v*, 15 *ch*, and 9 *sm* setae. Pretarsus in shape of well developed pair of sessile claws. Sexual differentiation not observed.

Idiosoma. Color a combination of blue and green. This assessment is based on specimens stored in alcohol, and colors might be distorted.

Dorsum. Anterior dorsal shield with two pairs of eyes and 91–102 stout, ribbed setae; lyrifissures absent. Dorsal idiosoma between anterior shield and preanal segment without setae, but with numerous lyrifissures arranged in transverse rows. Preanal segment with 1 dorsal and 2 ventral setae. Anal plates with 7–9 stout ribbed setae.

Sternitogenital region (Fig. 49). Sternal verrucae with 3 long, barbed, tapering setae. Remaining sternal area with 3 or 4 pairs of stout ribbed, and 2 pairs of long tapering setae, and 2 pair of large and 1 pair of small lyrifissures; all different in shape and size from "standard" opisthosomal lyrifissures. Pregenital capsules each with 1 long tapering and 3 stout ribbed setae. Pregenital and genital areas in male with, respectively, 5 barbed and pointed, and 9 small, smooth setae. Pregenital area in female without setae, genital areas with 5 smooth setae. Ovipositor in only available female retracted; without long terminal setae; with 2 pairs of very small structures (setae or gland ducts?) inserted median on ovipositor (structure unclear, not short seta-like structures as in *C. armasi*) (Fig. 52, arrow). Male with 1–2 pairs of large "glands".

Legs. Only one leg II and one leg III could be studied. All other legs absent or damaged in both specimens. Legs II with dorsal bifurcate seta and two smooth sensilla resembling solenidia. Pretarsi with two pairs of setae and a pair of claws. In the absence of legs I, the condition of the "crown-like" sensillum on tarsus I (terminal or in the main sensillar field) could not be assessed.

Collection information. Multiple specimen numbers refer to multiple slides representing a single, dissected, individual. Holotype female (OSAL0007883), PANAMA: Panama, Pueblo Nuevo Cave, 9°3'60"N 78°45'0"W, coll. Reeves, W.K., 16 Jun 1999, ex cave, coll. no. AL005839. Paratype male (OSAL0007884–7885), same collection data as holotype.

Deposition of types. Holotype female (OSAL0007883) and paratype male (OSAL0007884–7885) deposited at OSAL.

Etymology. The species is names after the country in which the specimens were collected.

Discussion

The current study brings the total number of species known from North and Central America to 11, suggesting the need for a species level key. We restrict this key to North and Central America, because (1) the descriptions of the two described South American species, *N. ojastii* Lehtinen and *N. platensis* (Silvestri), are incomplete, and (2) multiple unpublished records from a range of localities in Brazil suggest a considerable number of new species in that area. At this point it seems more useful to delay generating keys for South American species until some of the new material has been described.

1 Number of foliate setae on palp tarsus of adults greater than 7 ..... *Caribeacarus* 2
- Number of foliate setae on palp tarsus of adults no more than 5 ..... *Neocarus* 4
2 Basal segment of chelicera in male with one seta ..... *Caribeacarus panamensis*
- Basal segment of chelicera in male with 2 or more setae 3
3 Palp tarsus in adults with 8 foliate setae; pregenital and genital setae in male stout, blunt ..... *Caribeacarus armasi*
- Palp tarsus in adults with 10–12 setae; pregenital setae in male stout, blunt; genital setae fine, pointed ..... *Caribeacarus vanderhammeni*
4 Number of foliate setae on palp tarsus of adults 5; palp tarsus in male without *sm3* type setae 5
- Number of foliate setae on palp tarsus of adults 4; palp tarsus in male with 1–3 *sm3* type setae 11
5 Female ovipositor without terminal setae 6
- Female ovipositor with terminal setae 10
6 Female without setae in pregenital region ..... *Neocarus siankaanensis*
- Female with at least 2 short stout setae in pregenital region 7
7 Genital setae in male fine, pointed ..... *Neocarus texanus*
- Genital setae in male stout, blunt 8
8 Sternal region of adults between sternal and genital verrucae without pointed setae or, more rarely, with 1 pair ..... *Neocarus calakmulensis*
- Sternal region usually with two, rarely with one, pairs of pointed setae 9
9 Sternal verrucae with 4–6 setae; large number of *ch* (18–22) and *sm* (6–11) setae on palp tarsus ..... *Neocarus nicaraguensis*
- Sternal verrucae with 2–3 setae; relatively small number of *ch* (13) and *sm* (5) setae on palp tarsus ..... *Neocarus veracruzensis*

10 Setae in sternal region long, ratio of legs I to idiosoma 1.8–1.9 ..... *Neocarus bajacalifornicus b.*
- Setae in sternal region shorter (Figs. 25–26), ratio of legs I to idiosoma 2.1 ..... *Neocarus bajacalifornicus chamelaensis*
11 Female ovipositor without terminal setae ..... *Neocarus orghidani*
- Female ovipositor with terminal setae ..... *Neocarus nohbecanus*

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