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RHINOSEIUS RAFINSKII, A NEW SPECIES FROM ECUADOR AND VENEZUELA (ACARI, GAMASINA, ASCIDAE)

by

W. MICHERDZINSKI

Zoological Museum, Jagellonian University, Krupnicza 50, 30-060 Kraków, Poland

and

F. S. LUKOSCHUS

Department of Aquatic Ecology, Catholic University Nijmegen, The Netherlands

With 10 text-figures

Abstract

Rhinoseius rafinskii spec. nov. is described and figured in detail with all developmental stages. The species belongs to the group living in flowers and transmitted phoretically in the nasal cavities of hummingbirds in the neotropics.

Introduction

Fain, Hyland & Aitken (1977) have given a systematic review of the ecologically interesting group of gamasine mites which live in flowers, feed on pollen grains and nectar, and are transmitted by hummingbirds. They mention 1 *Lasioseius*, 5 *Proctolaelaps*, and 20 *Rhinoseius* species. These mites often are found in the nasal cavities of hummingbirds. According to the observations of Baker & Yunker (1964), Hunter (1972), and Colwell (1973), they are not stationary phoretics, but they stay only temporarily and occasionally in the respiratory systems of their hosts. Similar behaviour had been noted from South Africa (Ryke, 1964), Australia (Domrow, 1966), and in *Proctolaelaps spencerae*, a phoretic ascid found in the fur of the honey possum in Australia (Domrow, 1979).

In the neotropics, the main part of this ecological group is comprised of representatives of the genus *Rhinoseius* Baker & Yunker, 1964. The latter authors also erected a second genus, *Tropicoseius* Baker & Yunker, 1964, later synonymized with *Rhinoseius* by Lindquist and Evans (1965). However,

there are important morphological differences between these genera, especially as regards the shape of the spermadactyl. Based on its function during insemination, it may be suggested that the differences in spermadactyl shape provide reproductive isolation mechanisms of the lock and key type. The female insemination apparatus has been studied in all known species of *Rhinoseius* by Fain, Hyland & Aitken (1977). There are two basic types: those with and those without a maturation pouch. However there is no correlation between male spermadactyl and female insemination type.

Hunter (1972) first described all developmental stages of two *Rhinoseius* species. Here we will describe a new species. For the dorsal chaetotaxy we follow Lindquist & Evans (1965), for the poroido- and adenotaxy Athias-Henriot (1975), and for the leg chaetotaxy Evans (1963) and Krantz (1978). All measurements are in μ.

Rhinoseius rafinskii spec. nov. (figs. 1-10)

With the characteristics of the genus. The species is dedicated to the collector Dr. J. Rafinski, adjunct in Hoyer's Department of Comparative Anatomy, Jagellonian University, Kraków, Poland.

Male (Holotype). Length 483, width 280. Dorsal shield undivided, not covering all of dorsal surface, with small lateral incisions (fig. 1A). Podosoma with 16 pairs of setiform hairs, lateral setae longer than median; setae z3 and s5 lacking, with three pairs of lateral setae off shield. Length of i1, i2 = 29; i3 = 11; i4 = 20; i6 = 16. — z1, z4 = 25; z2 = 31; z5 = 20; z6 = 21. — s1, s6 = 28; s2 = 20; s3 = 34; s4 = 31. — r3 = 34; r5, r6 = 29. As far as can be observed, 5 pairs of pores are present.

Opisthonotum with 14 pairs of setae, S1 is absent in holotype; with 5 pairs of simple lateral setae outside of shield; setae Z2, J2, J3 and J4 hypertrophied, spinose, inserted close together. Length of J1 = 15, J3 = 57, J4 = 25, J5 = 6. — Z1 = 21, Z2 = 53 and 38, Z3 = 23, Z4 = 25, Z5 = 29. — S2 = 29; S3, S5 = 25; S4 = 20. — R1, R2, R3, R4, R5 = 24-26. With 9 pairs of pores.

Ventral shields less sclerotized than dorsal (fig. 2B); sternogynial shield with the normal 5 pairs of setae; length of St1, St2 = 30, St3 = 34, Mst = 19, Ge = 23; three pairs of pores. Endopodal and peritremal shields not observed, peritremata extend to anterior border of coxae II. With three (holotype) or four pairs of setae on separate ventral shield, lengths 24-34. Anal shield 70 long and 75 broad, length of adanals 25, postanal seta 33. With 5 pairs of setae inserted in opisthogastric integument; in paratypes first setal pair sometimes on ventral shield. Ventral aspect of coxa I with three ranks of tiny spines.

Gnathosoma (fig. 3B) with the normal 4 pairs of ventral setae; lengths: hypostomal setae 23, 32, 13, capitular seta 26. Deutosternum with 9 rows of denticles, tectum anteriorly rounded, corniculi bi-lobed. Palps as in female. Chelicerae compact (fig. 4A, B), each with an edentate digitus mobilis; digitus fixus with two teeth and hyaline membrane. The spermadactyl is 92 long, directed ventrally, terminally with a leaflike appendix, 3.8 times as long as digiti (24).

Leg chaetotaxy quantitatively as in female, legs II (fig. 5B) with distinct hypertrophy of some setae. There are no additional spurs or spines.

Paratypes and variability. Average length 463 (433-483), width 283 (271-300) (n = 10). Variability mainly in the central hypertrophic spine group and in number and length of lateral setae. In paratype 3822 (fig. 1B) (Ecuador, volcano Cotopaxi) setae J4 are thicker and longer than in the holotype. In paratype 3880 from Ecuador, Laguna Grande de Mojanda

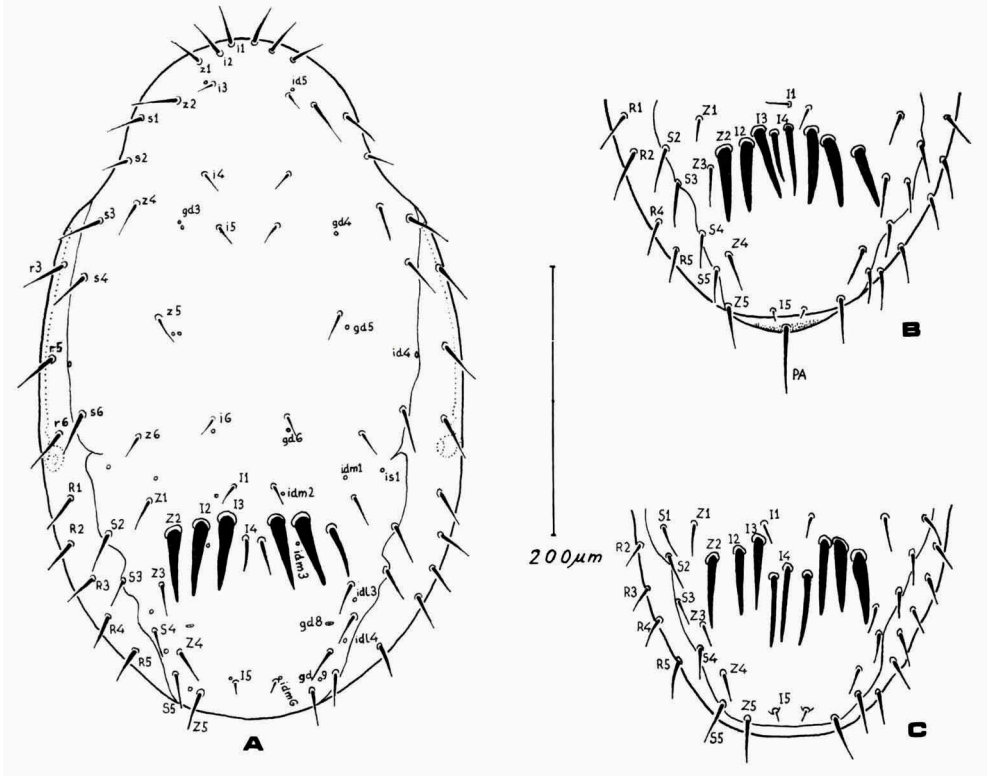

Fig. 1. *Rhinoseius rafinskii* spec. nov., dorsum of male; A, holotype; B, paratype Ecuador, volcano Cotopaxi; C, paratype Ecuador, Laguna Grande de Mojanda.

(fig. 1C), an additional spine occurs in the region of setae J4, and setae S1 are present. Lengths of setae: i1 = 26-33; i2 = 26-31; z2 = 31-34; s1 = 15-26; s2 = 23-34; s3 = 26-33; s6 = 25-30; r3, r5 = 26-36; r6 = 25-39; S1 = 23; S2 = 23-28; S3 = 19-29; S4 = 18-24; R1, R2, R3, R4, R5 = 19-36.

One or two pairs of opisthogastric setae may be inserted on the ventral shield, thus increasing ventral shield setal count to 4-5 pairs. The number of lateral setae on the opisthogaster varies from 4-6 pairs.

Female. Length 552 (450-633), width 339 (267-400) (n = 10). Dorsal shield undivided, with deep lateral incisions (fig. 6A, B). Podonotum with only 14 pairs of setae, s1 and s2 are situated in soft lateral region, z3 and s5 absent. With 4-6 pairs of lateral setae inserted off of shield, 1-2 pairs sometimes lacking on one or both sides; length of i1 = 23-29; i2 = 18-28; i3 = 13-16; i4, i5 = 11-15; i6 = 10-13. — z1 = 15-23, z2 = 18-32, z4 = 19-26,

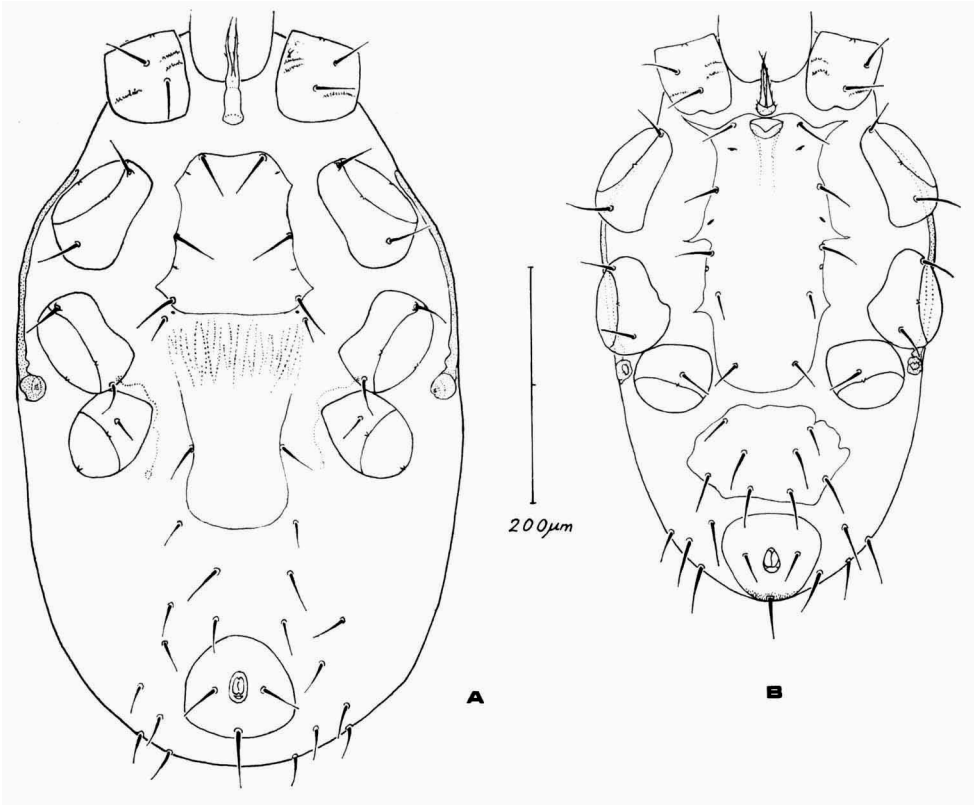

Fig. 2. *Rhinoseius rafinskii* spec. nov.; A, venter of female; B, venter of male.

z5 = 13-23, z6 = 9-16. — s1 = 18-33, s2 = 19-28, s3 = 22-30, s4 = 23-30, s6 = 20-25. — r2 = 20-29, r3 = 19-34, r5 = 16-28, r6 = 19-30. There are 8 pairs of pores.

Opisthonotum with 14-15 pairs of setae (S1 only rarely present); with 6-10 pairs of lateral setae off the shield; length of J1 = 10-12, J2 = 10-14,

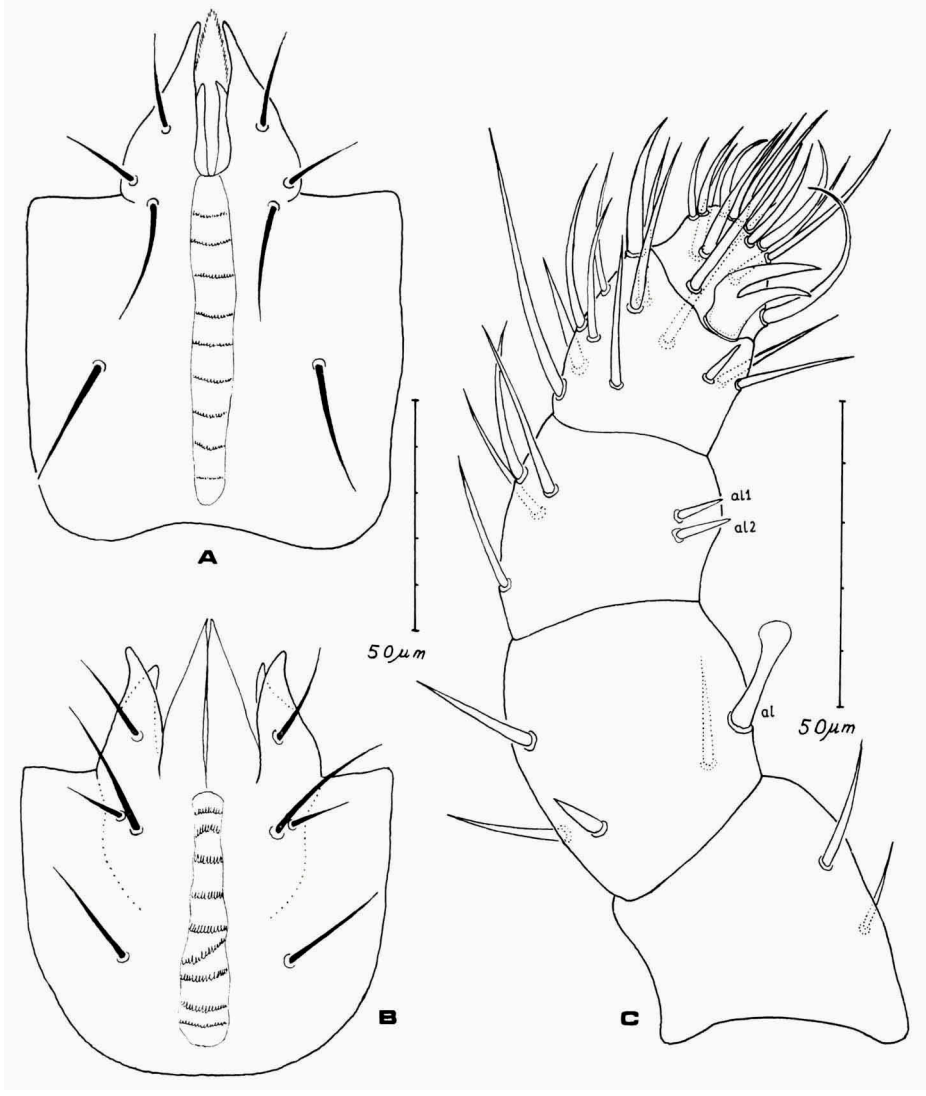

Fig. 3. *Rhinoseius rafinskii* spec. nov.; A, gnathosoma of female ventrally; B, gnathosoma of male; C, pedipalp of female.

J3 = 8-14, J4 = 13-18, J5 = 4-7. — Z1, Z2 = 10-15; Z3 = 17-20; Z4 = 15-20; Z5 = 15-25. — S1 = 20; S2, S3 = 15-21; S4 = 14-20; S5 = 18-21. — R1 = 16-30; R2, R4 = 11-19; R3 = 11-16; R5 = 10-16; R6 = 11-18; R7 = 21-23. With 11 pairs of opisthonotal pores.

Venter with poorly sclerotized shields (fig. 2A). Sternal shield 140 long,

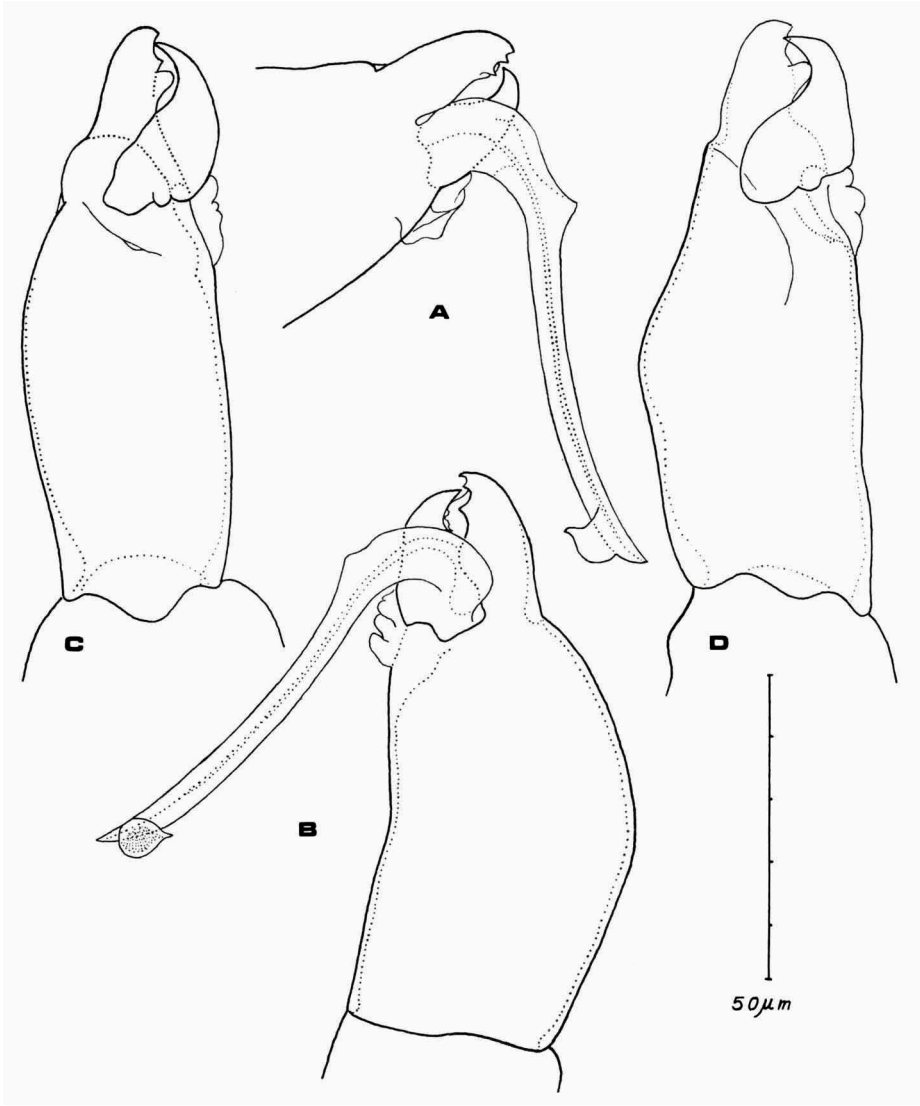

Fig. 4. *Rhinoseius rafinskii* spec. nov.; A, B, chelicerae of males; C, D, chelicerae of females.

greatest width 135; St1 = 55, St2 = 38, St3 = 40. Metasternal setae short (20), near posterior border of shield. Peritremata extend to anterior borders of coxae II, peritremal shields not observable. Insemination apparatus comprising coiled paired adductor canals which open on the posterior borders of

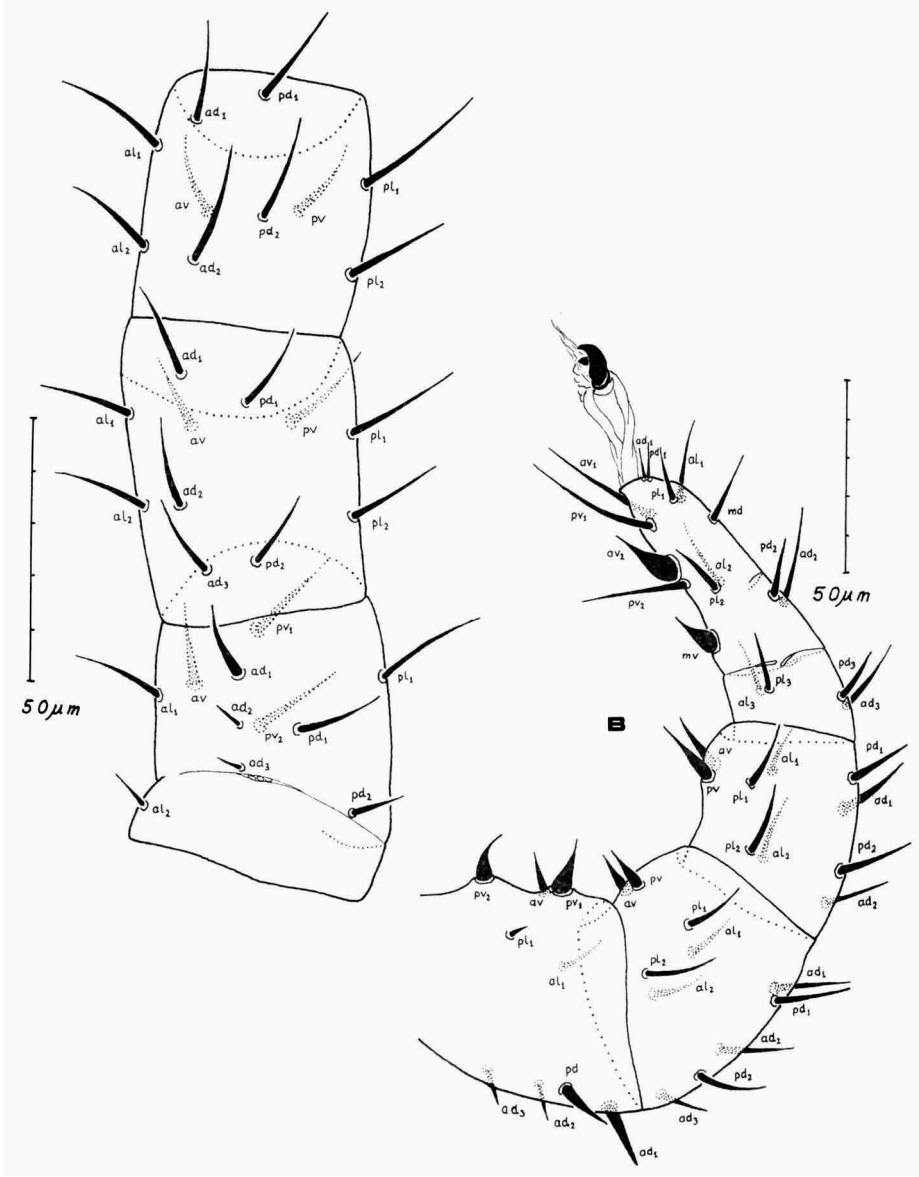

Fig. 5. *Rhinoseius rafinskii* spec. nov.; A, femur, genu and tibia of leg II of female; B, femur, genu, tibia and tarsus of leg II of male.

coxae III, without distinct maturation pouch. Anal shield 82 long and 91 broad, adanal setae 31, postanal seta 47. Opisthogaster with 7-10 pairs of setae. Ventral side of coxa I with three ranks of denticles.

Gnathosoma (fig. 3A) without special characteristics, tectum with rounded anterior border, lengths of hypostomal setae 20, 28, 18, capitular setae 28. Deutosternum as in male, with 9 rows of denticles. Pedipalp (fig. 3C) with large two-tined apotele, al of palpfemur spatulate, al1 and al2 of genu spine-like. Chelicerae with second segment 65 long, digiti 28 long, digitus mobilis edentate, digitus fixus with one tooth and hyaline process (fig. 4C, D). Legs with simple smooth setae. Tarsus I apically as in fig. 7B, leg IV as in fig. 7A, leg II as in fig. 5A. Chaetotaxy of legs is given in table 1.

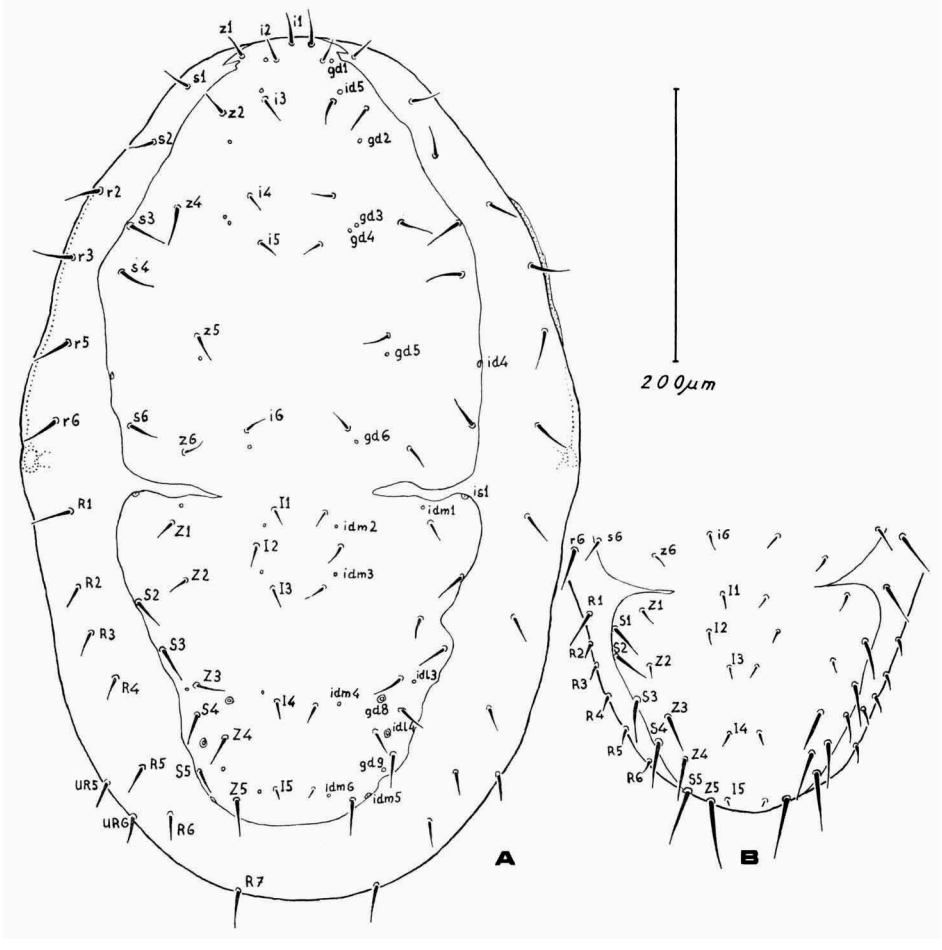

Fig. 6. *Rhinoseius rafinskii* spec. nov.; A, dorsum of allotype; B, female paratype.

TABLE I

Chaetotaxy of legs in *Rhinoseius rafinskii* spec. nov. (Setae on tarsi I could not be counted with certainty.)

	LEG I	LEG II	LEG III	LEG IV
adult and deutonymph				
trochanter	1 $\frac{0}{2}$ $\frac{1}{1}$ 1 (6)	1 $\frac{0}{2}$ $\frac{0}{1}$ 1 (5)	1 $\frac{1}{2}$ $\frac{0}{1}$ 0 (5)	1 $\frac{1}{2}$ $\frac{0}{1}$ 0 (5)
femur	2 $\frac{3}{1}$ $\frac{2}{2}$ 2 (12)	2 $\frac{3}{1}$ $\frac{2}{2}$ 1 (11)	1 $\frac{2}{1}$ $\frac{1}{0}$ 1 (6)	0 $\frac{2}{1}$ $\frac{1}{1}$ 1 (6)
genu	2 $\frac{3}{2}$ $\frac{3}{1}$ 2 (13)	2 $\frac{3}{1}$ $\frac{2}{1}$ 2 (11)	2 $\frac{2}{1}$ $\frac{2}{1}$ 1 (9)	2 $\frac{2}{1}$ $\frac{3}{0}$ 1 (9)
tibia	2 $\frac{3}{2}$ $\frac{3}{1}$ 2 (13)	2 $\frac{2}{1}$ $\frac{2}{1}$ 2 (10)	2 $\frac{1}{1}$ $\frac{2}{1}$ 1 (8)	2 $\frac{1}{1}$ $\frac{3}{1}$ 1 (9)
tarsus	-	3 $\frac{3}{2}$ $\frac{1}{1}$ $\frac{3}{2}$ 3 (18)	like II	like II
protonymph				
trochanter	1 $\frac{0}{2}$ $\frac{0}{0}$ 1 (4)	1 $\frac{0}{2}$ $\frac{0}{0}$ 1 (4)	1 $\frac{1}{1}$ $\frac{0}{1}$ 0 (4)	1 $\frac{1}{2}$ $\frac{0}{0}$ 0 (4)
femur	2 $\frac{2}{1}$ $\frac{2}{1}$ 2 (10)	1 $\frac{2}{1}$ $\frac{2}{1}$ 1 (8)	1 $\frac{2}{1}$ $\frac{1}{0}$ 0 (5)	0 $\frac{2}{1}$ $\frac{1}{0}$ 0 (4)
genu	1 $\frac{2}{1}$ $\frac{2}{1}$ 1 (8)	1 $\frac{2}{0}$ $\frac{2}{0}$ 1 (6)	1 $\frac{2}{0}$ $\frac{2}{0}$ 1 (6)	0 $\frac{2}{1}$ $\frac{2}{0}$ 0 (5)
tibia	1 $\frac{2}{1}$ $\frac{2}{1}$ 1 (8)	1 $\frac{1}{1}$ $\frac{2}{1}$ 1 (7)	1 $\frac{1}{1}$ $\frac{2}{1}$ 1 (7)	1 $\frac{1}{1}$ $\frac{2}{1}$ 1 (7)
tarsus	-	3 $\frac{2}{2}$ $\frac{1}{0}$ $\frac{2}{2}$ 3 (15)	like II	like II
larva				
trochanter	1 $\frac{0}{2}$ $\frac{0}{0}$ 1 (4)	1 $\frac{0}{2}$ $\frac{0}{0}$ 1 (4)	1 $\frac{1}{1}$ $\frac{0}{1}$ 0 (4)	-
femur	2 $\frac{2}{1}$ $\frac{2}{1}$ 2 (10)	1 $\frac{2}{1}$ $\frac{2}{1}$ 0 (7)	1 $\frac{2}{1}$ $\frac{1}{0}$ 0 (5)	-
genu	1 $\frac{2}{1}$ $\frac{2}{1}$ 1 (8)	1 $\frac{2}{0}$ $\frac{2}{0}$ 1 (6)	1 $\frac{2}{0}$ $\frac{2}{0}$ 1 (6)	-
tibia	1 $\frac{2}{1}$ $\frac{2}{1}$ 1 (8)	1 $\frac{1}{1}$ $\frac{2}{1}$ 1 (7)	1 $\frac{1}{1}$ $\frac{2}{1}$ 1 (7)	-
tarsus	-	3 $\frac{2}{2}$ $\frac{2}{2}$ 3 (14)	like II	-

Variability is present in position and number of lateral setae, i.e. z1 may be out of shield, in one case s2 is lacking, and the number of R- and UR-setae is variable. This type of variation occurs in many genera and species however, and can be regarded as normal. More interesting is paratype No. 3818 (fig. 6B) from volcano Cotopaxi, Ecuador, which has distinctly longer and stronger lateral shield setae than does the allotype; length of Z3 = 28;

Fig. 7. *Rhinoseius rafinskii* spec. nov., female; A, leg IV; B, tarsus I apically.

Z4 = 31; Z5 = 45 and 39. — S1, S2 = 26; S3 = 19 and 30; S4 = 33; S5 = 39.

Deuteronymph. Length 452 (433-467), width 302 (300-305) (n = 5). Dorsal shield (fig. 8A, B) divided. Podonotum with 16 pairs of setae, z3 and s5 absent; with 3-4 pairs of lateral setae inserted off shield; length of i1 = 31-32; i2 = 31-38; i3, i4 = 13-18; i5, i6 = 10-13. — z1 = 26-30, z2 = 36-40, z4 = 25-33, z5 = 14, z6 = 15-26. — s1 = 28-35, s2 = 35-36, s3 = 33-40, s4 = 35-38, s6 = 35-48. — r2 = 31-47, r3 = 36-45, r5 = 28-30, r6 = 42-44. Pores not observed. Opisthonotum with 14 pairs of setae, S1 absent in all preparations. With 5-6 pairs of setae lateral of shield; length of J1 = 36-38, J2 = 38-52, J3 = 30-54, J4 = 48, J5 = 4-5. — Z1 = 44; Z2 = 43-55; Z3 = 47-50; Z4, Z5 = 44-49. — S2, S3, S4 = 43-53; S5 = 39-48. — R1 = 40; R2 = 30-34; R3, R4, R5 = 32-34. Pores not observed.

Ventral shields (fig. 8C) weekly sclerotized. Sternogenital shield with the usual 5 pairs of setae; St1 = 29, St2 = 26, St3 = 28, Mst = 11, Ge = 13. Peritremata extend to anterior borders of coxae II. Ventrianal shield with 7-9 pairs of setae + anal seta. Coxa I with 3 rows of denticles.

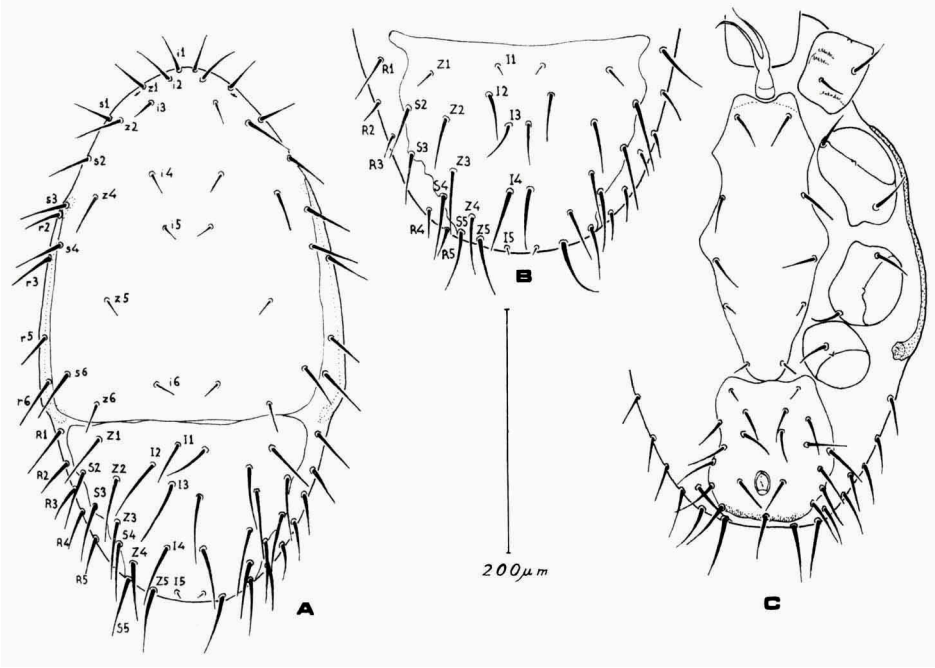

Fig. 8. *Rhinoseius rafinskii* spec. nov., deutonymph; A, dorsum; B, opisthonotum of paratype; C, venter.

Variability. In one specimen from the volcano Cotopaxi, Ecuador (fig. 8B), some setae of opisthonotum are distinctly shorter: J1 = 9; Z1 = 16; R2 = 23; R3 = 19; R4, R5 = 21 (sexual dimorphism?).

Prononymph. Length 383 (380-385) width 233 (225-250) (n = 5). Pronotum (fig. 9A) with 10 pairs of setae, s4 situated on soft integument, z3 lacking. With four pairs of setae lateral of shield; length of i1 = 28; i2 = 24; i3 = 19; i4, i6 = 15; i5 = 13. — z2 = 38, z4 = 26, z5 = 17. — s4, s6 = 27, 26. — r2 = 26, r3 = 30, r6 = 29.

Opisthosoma with 15 pairs of setae, 8 of them on pygidial shield; length of J1 = 36-38, J2 = 38-52, J3 = 30-54, J4 = 48, J5 = 4-5. Z1 = 44; Z3 = 28; Z5 = 37. — S2 = 27, S3 = 25, S4 = 34, S5 = 26. — R1 = 25 and 18. Pores have not been observed.

Ventral shields (fig. 9B) weekly sclerotized, anal shield 58 long and 40 broad; lengths of adanal setae 31, postanal seta 48. Opisthogaster with 5 pairs of setae. Ventral side of coxa I with only one row of denticles.

Gnathosoma without species-specific characters, chelicerae similar to those of female, but smaller and less sclerotized. Chaetotaxy of legs as in table 1.

Larva. Length 367 (363-372), width 233 (230-240) (n = 5). Podonotum (fig. 10A) with 9 pairs of setae, 5 pairs on opisthosoma, 3 of them on

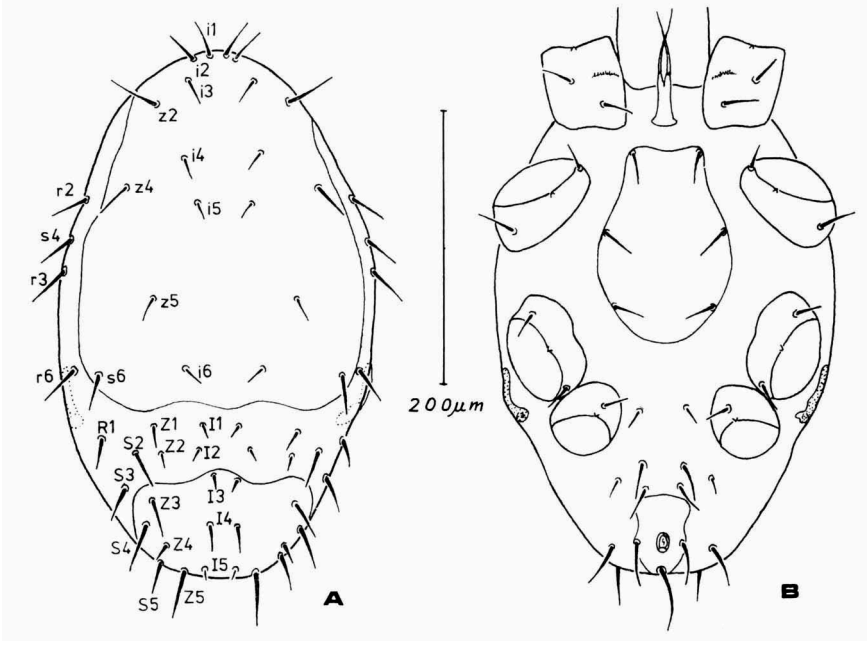

Fig. 9. *Rhinoseius rafinskii* spec. nov., protonymph; A, dorsum; B, venter.

pygidial shield; length of i1 = 28; i3, i4, i5, i6 = 10-14; J5 = 3. — z2 = 29, z4 = 22-24, z5 = 20, Z3 = 17, Z4 = 15-18. — s4 = 34-36, s6 = 17, S3 = 16. Pores have not been seen.

Venter (fig. 10B) without observable sclerotized shields, with 9 pairs of setae and a postanal seta. Length of caudal setae: lateral 44, median 27. Coxa I without row of denticles. Chaetotaxy of legs as in table 1.

Differential diagnosis. — Of the 20 hitherto known species of the genus *Rhinoseius*, females of 18 species have peritremata which extend at least to z1, and setae i1 and z1 are very short. These characters are distinctly different in the new species. Only in *R. rafinskii* spec. nov., *R. richardsoni* Hunter 1972, and *R. tiptoni* Baker & Yunker, 1964, do the peritremata extend only as far as coxae II. *R. richardsoni* has distinct spurs on coxae IV, and z1 and J3 are lacking. In *R. tiptoni* the anal shield is two times longer than broad, and setae i1 and z1 are very short; s2, s3, s4 and r2 are distinctly shorter than in the new species.

The males of *R. rafinskii* differ clearly from the males of most of the known species of *Rhinoseius* in that *R. rafinskii* has a dorsal group of hypertrophied setae (fig. 1). Only in *R. richardsoni* and in *R. panamensis* Fain, Hyland & Aitken, 1977, is there a similar group of dorsal spines. In these

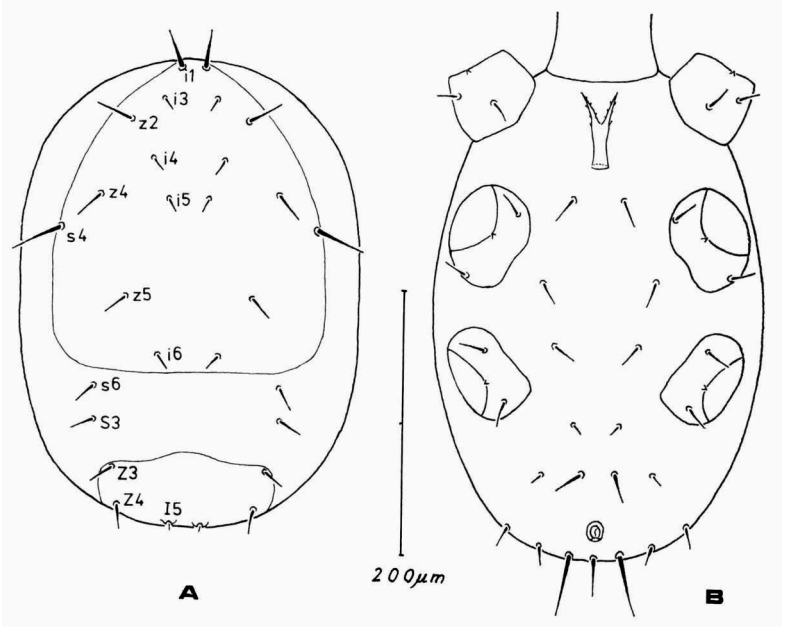

Fig. 10. *Rhinoseius rafinskii* spec. nov., larva; A, dorsum; B, venter.

species, however, the caudal setae of the idiosoma are spinelike and J3 and J4 are lacking.

Developmental stages are known only in *R. richardsoni* and in *R. colwelli* Hunter, 1972. Their deutonymphs are distinctive in that they have an anal rather than a ventro-anal shield, broadly separated from a sterno-genital shield. In *R. richardsoni*, the setae of opisthonotum are much shorter than those of *R. rafinskii*, and z1 and J3 are lacking. In *R. colwelli*, the median setae of the podonotum are much longer, and i1 and z1 distinctly shorter.

Protonymphs of *R. richardsoni* differ from that of *R. rafinskii* in that the pygidial shield has only 5 pairs of setae, and J3 and J4 are absent. Protonymphs of *R. colwelli* differ in having a broad anal shield and long median setae on the podonotum.

Larvae of both *R. richardsoni* and *R. colwelli* have pygidial shields with only two pairs of setae. In *R. richardsoni*, i1, z2 and s4 are distinctly shorter than shown in fig. 10A, while in *R. colwelli* two additional pairs of short setae (J1 and J2) are present between podonotum and pygidium.

Locality. In flowers, buds and leaves of *Vaccinium corymbosum* (L.), volcano Cotopaxi, ca. 4000 m above sea level, 24.X.1975: 6 ♂, 9 ♀, 1 DN, 1 PN, 1 L (Holotype ♂, allotype ♀, figured deutonymph and protonymph). In flowers of a *Puya* species on the shore of Laguna Grande de Mojanda, Ecuador, 29.X.1975: 11 ♂, 32♀, 1 DN, 6 PN, 8 L (figured larva). In the red umbels of an unidentified Liliaceae in the *Podocarpus* forest of Reservate La Carbonera, near San Eusebio, Cordillera de Mérida, Venezuela, 2.X.1975. All collected by J. Rafinski.

Disposition of types. Holotype, allotype and figured specimens in Rijksmuseum van Natuurlijke Historie, Leiden. Paratypes in: U.S. National Museum of Natural History, Washington, D.C.; Department of Entomology, Oregon State University, Corvallis, Oregon; Institut de Médicine Tropical, Prince Léopold, Antwerpen; The Acarology Laboratory, Ohio State University, Columbus, Ohio; Field Museum of Natural History, Chicago, Ill.; Department of Zoology, University of Rhode Island, Kingston, R.I.; British Museum (Natural History), London; and in collections of authors.

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