THE FLOWER MITES OF TRINIDAD III. THE GENUS *RHINOSEIUS* (ACARI: ASCIDAE)

BY

BARRY M. OCONNOR,

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AND

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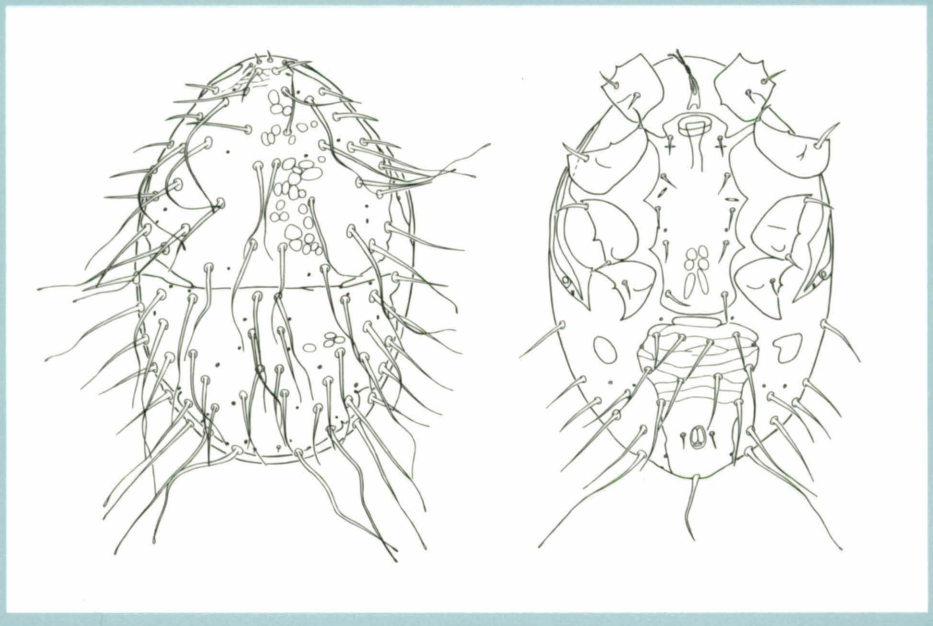

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The Flower Mites of Trinidad III. The Genus *Rhinoseius* (Acari: Ascidae)

by

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ABSTRACT

OConnor, B.M., R.K. Colwell, and S. Naeem. 1996. The Flower Mites of Trinidad III: The Genus Rhinoseius *(Acari: Ascidae). Misc. Publ. Mus. Zool. Univ. Michigan, 184:1-32, 77 figs.* Eight species of mites of the genus *Rhinoseius* occur in flowers and are phoretic in the nares of hummingbirds in Trinidad. Previously named species, *R. trinitatis, R. bisacculatus, R. phoreticus, R. phaethornis* and *R. uniformis* are redescribed and males described or correctly associated for the first time. Two new species, *R. fidelis* and *R. klepticos* are also described. Host plants and hummingbird carriers are given for all Trinidadian species except *R. venezuelensis,* which was not collected during our survey. A key to all Trinidadian species is given.

Key words: bananaquit, *Costus, Heliconia,* hummingbirds, *Pitcairnia, Psychotria.*

CONTENTS

ILLUSTRATIONS

INTRODUCTION

Three genera of mites in the family Ascidae are commonly encountered in flowers in tropical and subtropical regions of the New World. Because most known species disperse through phoretic association with hummingbirds, they have been termed "hummingbird flower mites," although some species have been collected from other bird groups and from Lepidoptera. The ecological interactions between the mites and their host plants, bird carriers, and each other have been the primary focus of our studies (Colwell, 1973, 1979, 1983, 1985, 1986; Colwell and Naeem, 1979, 1993; Dobkin, 1985; Heyneman et al., 1991). This is the third report on the systematics of these flower mites based on studies carried out on the island of Trinidad during the years 1975-1982 by field teams led by one of us (RKC). We have previously reported on the two Trinidadian species belonging to the predatory genus *Lasioseius* (Naeem et al., 1985), and on a diverse nectar and pollen feeding group in the genus *Proctolaelaps* (OConnor et al., 1991). This paper completes the systematic studies on the Trinidad fauna by treating the genus *Rhinoseius*.

The genus *Rhinoseius* is the most diverse of the three ascid genera inhabiting hummingbird-pollinated flowers in the New World, containing at present 34 species. Baker and Yunker (1964) described the first hummingbird flower mites and proposed the genera *Rhinoseius* and *Tropicoseius*. The genus *Tropicoseius* was placed in synonymy with *Rhinoseius* by Lindquist and Evans (1965). Additional species of *Rhinoseius* (*s. lat.*) have been described by Dusbábek and Cerny (1970), Hunter (1972), (Fain et al., 1977a, 1977b), Hyland et al. (1978), Colwell and Naeem, (1979), Fain and Hyland (1980), Micherdzinski and Lukoschus (1980), Ohmer et al. (1991), and Wiese and Fain (1993). Fain et al. (1977b) grouped most of the then known species into two groups, which Fain and Hyland (1980) designated the "*tiptoni*" group and the "*wetmorei*" group. Fain (1992) added an "*ornatus*" group and provided further information on several nominal species and keys to females and males known up to that time.

Species of *Rhinoseius* were first reported from Trinidad by Fain et al. (1977a), who briefly diagnosed two new species, *R. phoreticus* and *R. trinitatis*, from the island. Those authors later (1977b) published additional descriptions and figures of these and other species and reported *R. venezuelensis*, *R. bisacculatus*, and *R. phaethornis* from Trinidad as well. Observations on the ecology, behavior and host associations of *Rhinoseius* species have been given by Colwell (1979, 1986), Colwell and Naeem (1993), Dobkin (1985), and Heyneman et al. (1991). Because completion of our taxonomic studies on the Trinidad flower mites has lagged behind publication of ecological and behavioral studies, some species names which are validated here have previously appeared as *nomina nuda* (Dobkin, 1985; Colwell, 1986).

METHODS AND MATERIALS

Most of our collections were made in the Arima, Guanapo, Aripo, and Oropuche valleys of Trinidad's northern range. A complete description of the habitats from which our collections were made is given in our previous paper (OConnor et al., 1991). In the field, flowers or flower bracts containing mites were removed from host plants and placed in individual collection vials of 70% ethanol. In all, some 15,000 individual mites were collected from 20 host plant species. Because individual flowers/bracts harbor only one species of *Rhinoseius*, males and females collected from the same flower/bract were presumed to be conspecific. Nearly 500 additional specimens were collected from more than 90 hummingbird hosts belonging to 8 species by capturing the birds in mist nets and aspirating the mites from the nares. Birds were identified and released. An individual hummingbird may carry several species of *Rhinoseius* acquired from flowers of different species during a single foraging trip (Colwell, 1986). Thus, sexes cannot be accurately correlated based only on co-occurrence in a single hummingbird. Each collection from a host plant or hummingbird was given a catalog number (e.g. T223, U62, #75) which is listed for each collection under materials examined for each species. Mites were cleared in lactophenol and mounted in Hoyer's medium in the laboratory.

Our specimens were compared with the holotypes of named species in the laboratory of Dr. Alex Fain in Antwerp, Belgium, and the U.S. National Museum of Natural History, Washington (*R. venezuelensis*). It should be noted that in their original paper, the holotypes of species described by Fain et al. (1977a) were stated to have been deposited in the U.S. National Museum of Natural History. Fain (1992) indicated that the holotypes of these species were in the collection of the Institut royal des Sciences Naturelles de Belgique in Brussels.

Types and voucher specimens from our studies are deposited in the following institutions: University of Michigan Museum of Zoology, Ann Arbor, Michigan (UMMZ); U.S. National Museum of Natural History, Washington, D.C. (NMNH); Canadian National Collection of Insects and Arachnids, Centre for Land and Biological Resources, Research, Agriculture Canada, Ottawa, Ontario, Canada (CNC); L'Institut Royal des Sciences Naturelles, Brussels, Belgium (IRSNB); and in the collection of R.K. Colwell (RKC).

In the following descriptions, all measurements are given in micrometers (μm). For new species, measurements are given as follows: holotype, mean (range) (number of specimens measured). For the other sex and for previously described species, measurements are given as mean (range) (number of specimens measured). Unless otherwise indicated, ten individuals of each sex including individuals from all host plants were measured. Setal signatures follow Lindquist and Evans (1965); signatures for dorsal idiosomal glands and lyrifissures follow Johnston and Moraza (1991) (fig. 1).

Rhinoseius Baker and Yunker, 1964

Rhinoseius Baker and Yunker, 1964: 103

Tropicoseius Baker and Yunker, 1964: 104; Lindquist and Evans, 1965: 52

DIAGNOSIS

Rhinoseius (*s. lat.*) may be diagnosed by the following apomorphic character states: both sexes with cheliceral fixed digit without teeth except at apex, movable digit with few or no teeth; dorsal shield lacking setal pair *z3*; male with leg II enlarged, with setae *av* of femur II strongly enlarged and spine-like or knob-like.

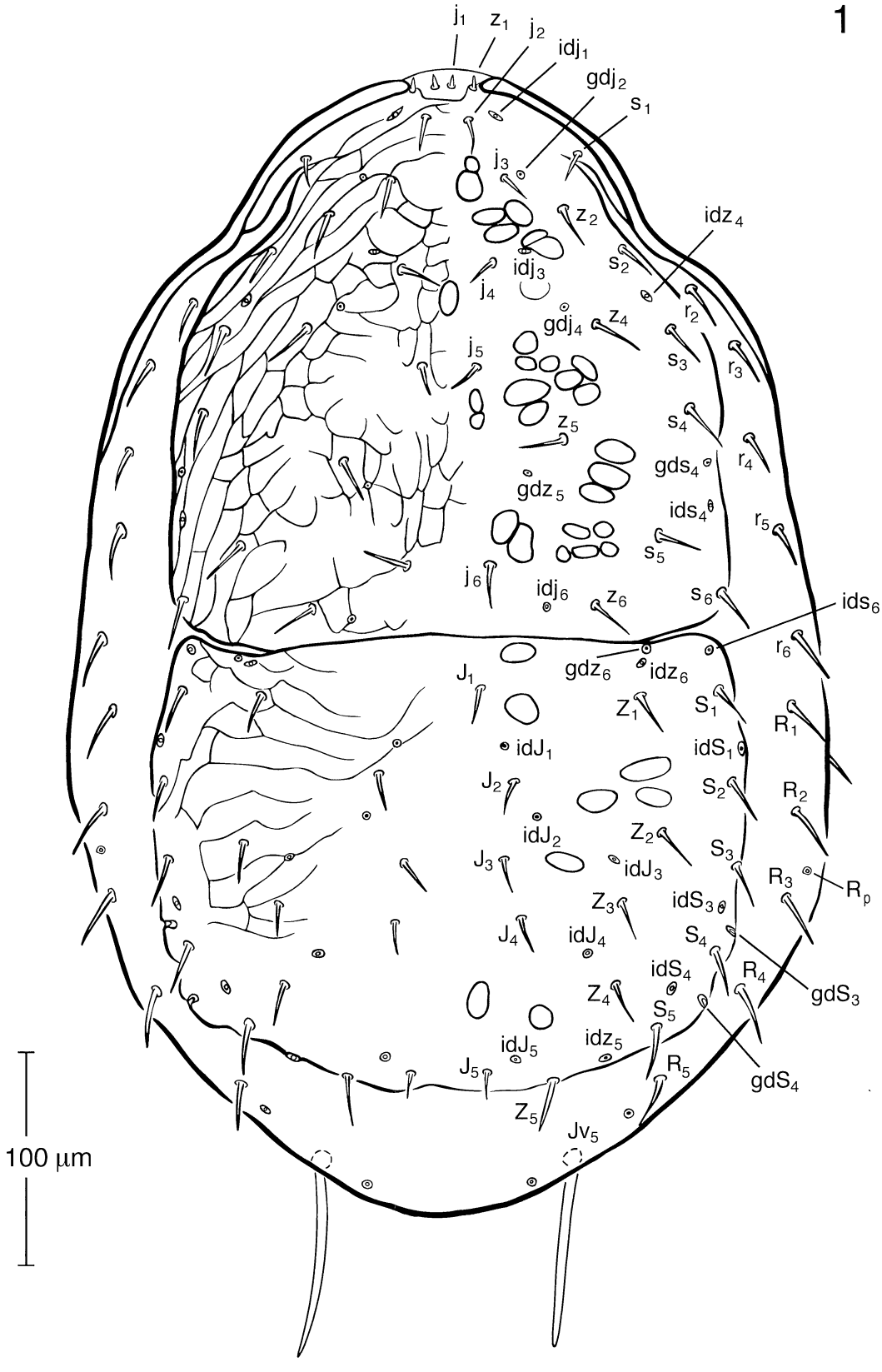


Fig. 1. *Rhinoseius trinitatis* female, body dorsum.

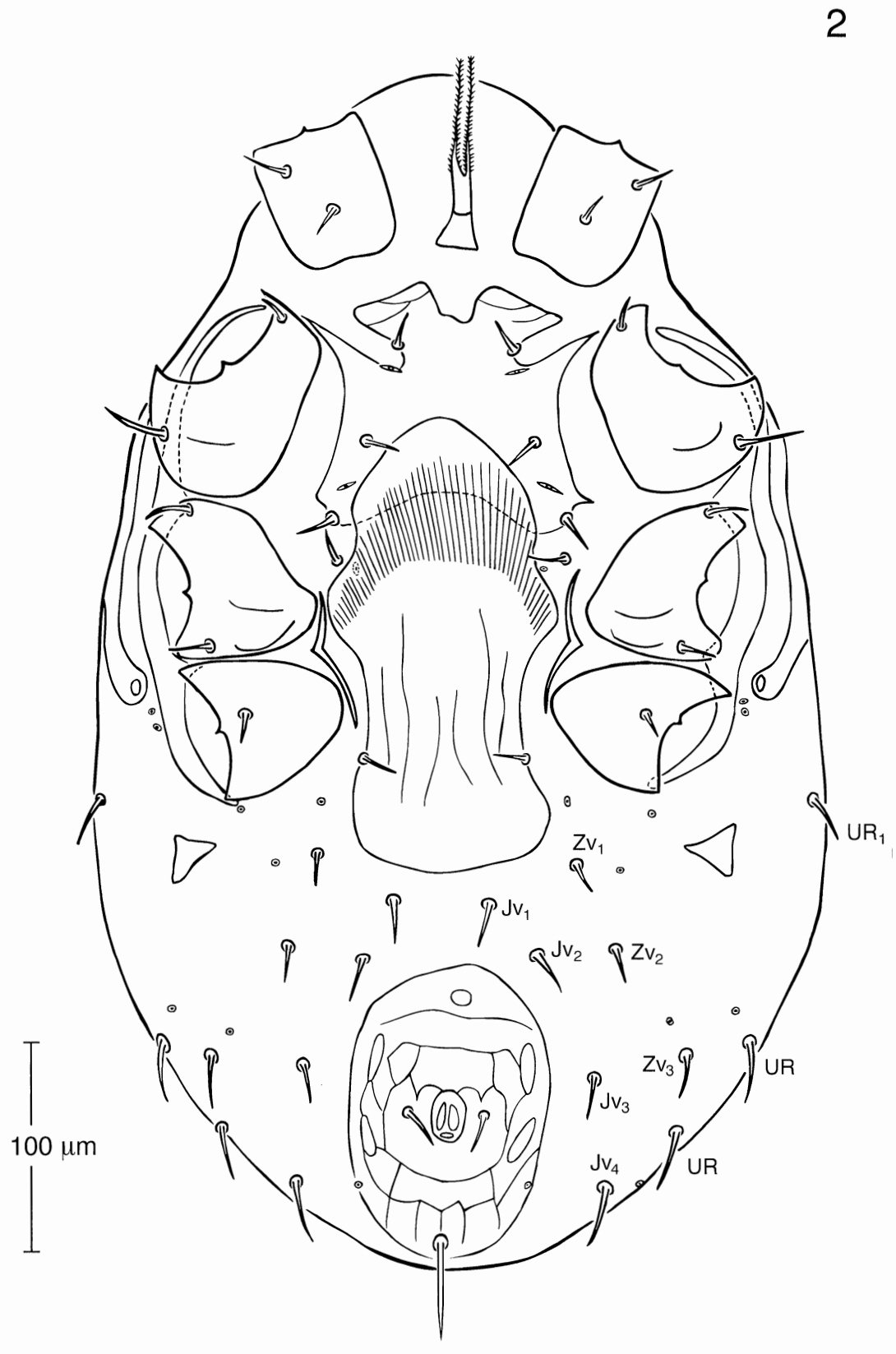
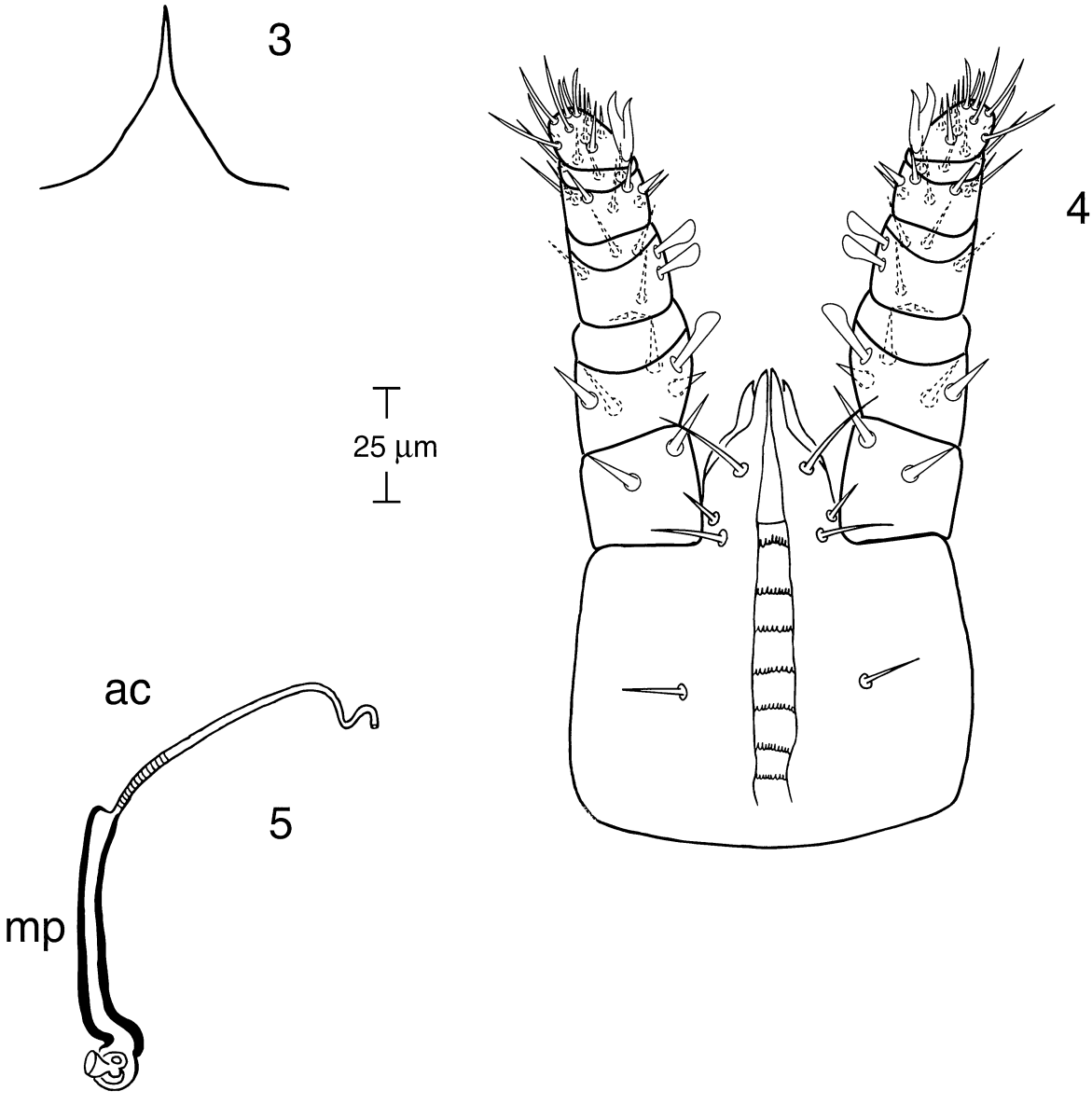


Fig. 2. *Rhinoseius trinitatis* female, body venter.



Figs. 3-5. *Rhinoseius trinitatis* female. 3. tectum. 4. subcapitulum and palps. 5. spermathecal system (ac = adductor canal; mp = maturation pouch).

Rhinoseius species also exhibit the following combination of states, some of which occur elsewhere in the Ascidae: dorsal shield entire but with a pair of lateral incisions (rarely completely divided); female sternal shield with 3 pairs of setae and 2 pairs of pores; female with fourth pair of sternal setae and third pair of pores on soft cuticle; male sternogenital shield with 5 pairs of setae and 3 pairs of pores; both sexes lacking setae *Sv2* (=*Lv2* of some authors); setation of genua I-IV 13-11-9-9, of tibiae I-IV 13-10 or 11-8 or 9-9 or 10.

Rhinoseius is most closely related to the genus *Xanthippe* Naskrecki and Colwell, 1995, sharing the unique separation of the metapodal sclerites from the remainder of the ventrianal shield in the male. Species of *Xanthippe* inhabit the inflorescences of Neotropical palms but do not disperse on hummingbirds (Naskrecki and Colwell, 1995).

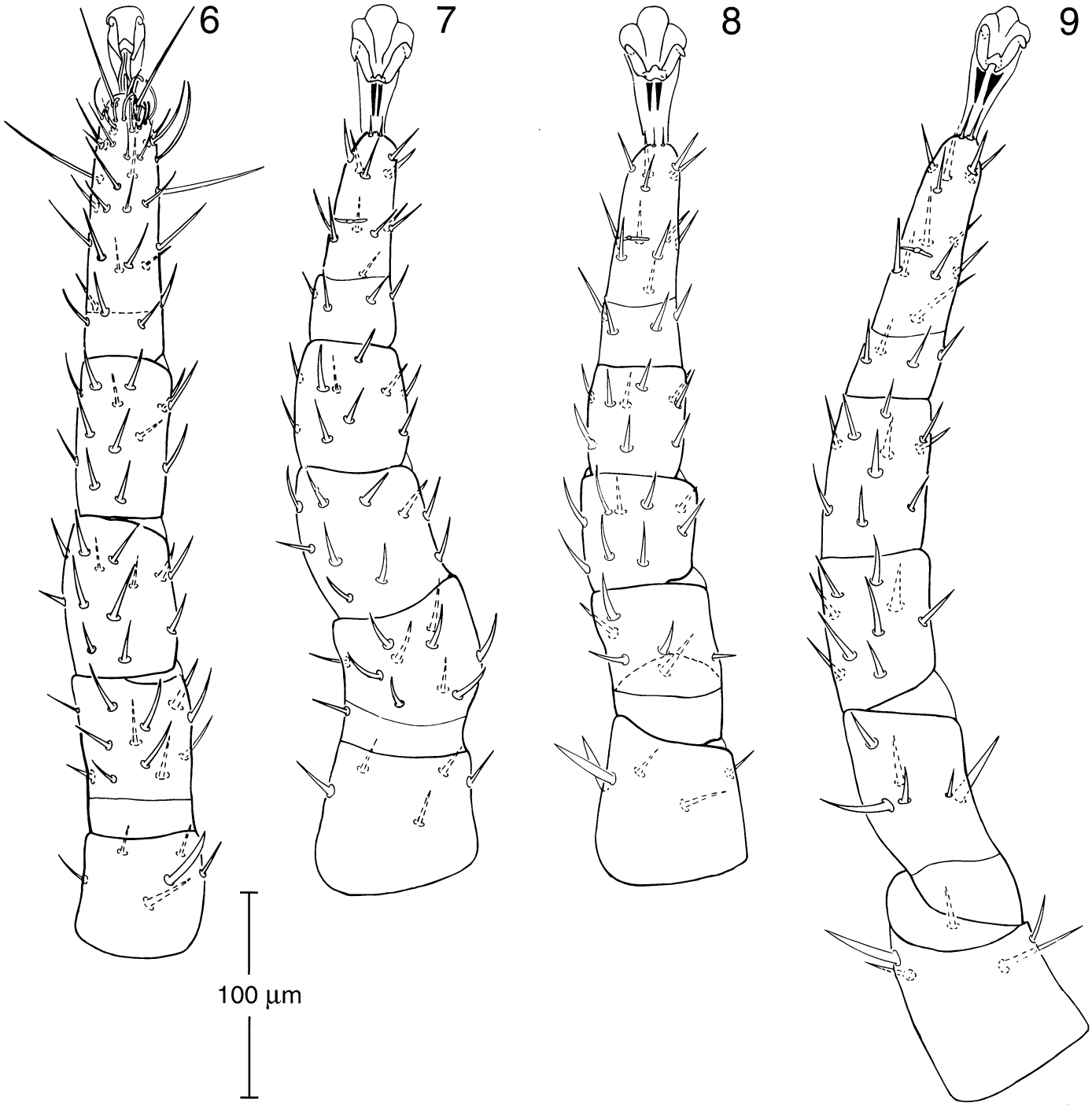
SPECIES ACCOUNTS

Rhinoseius trinitatis Fain, Hyland and Aitken, 1977

Rhinoseius trinitatis Fain, Hyland and Aitken, 1977a: 186

Rhinoseius trinitatis Fain, Hyland and Aitken, 1977b: 149. (figs. 1-17).

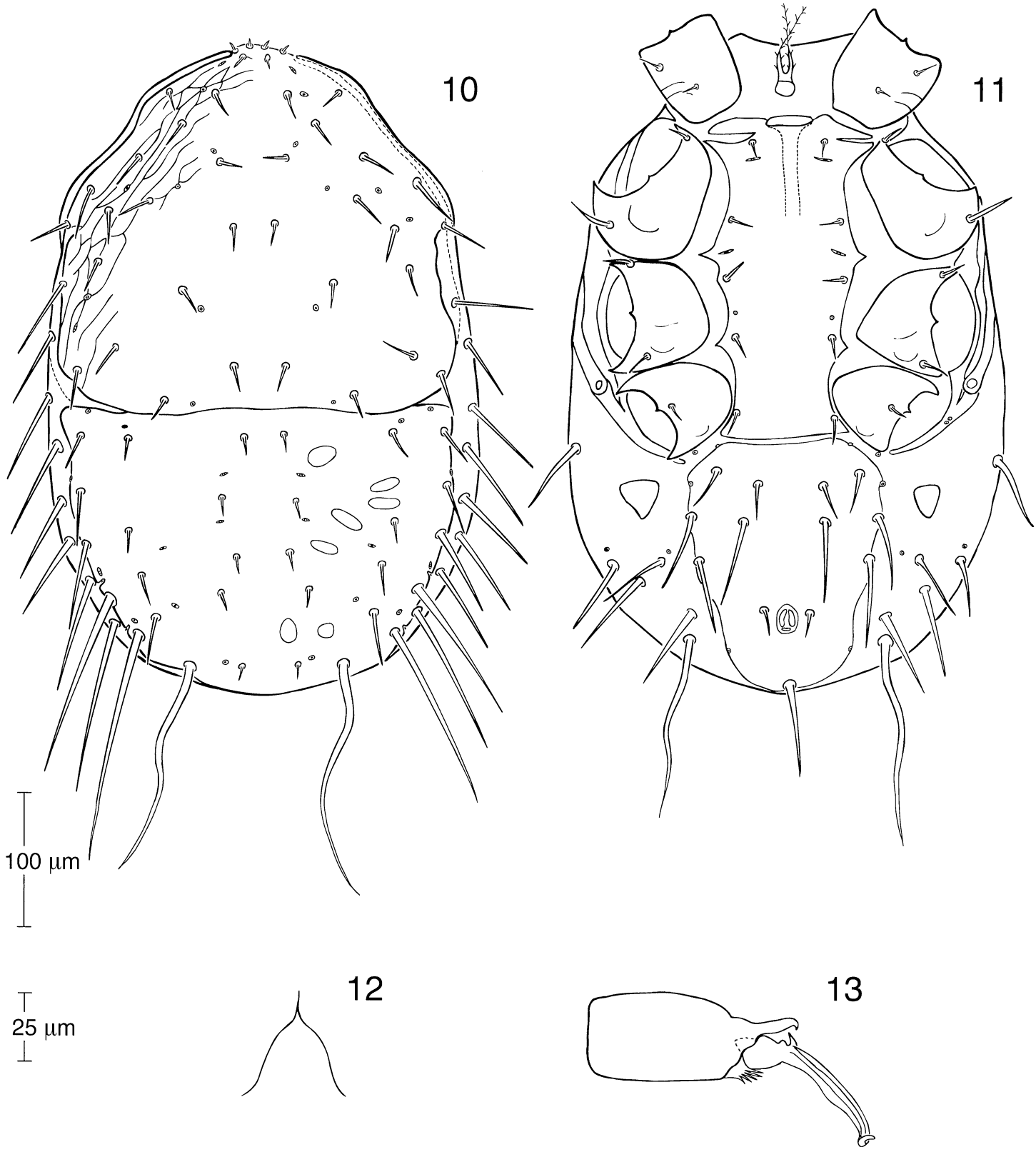
This species was briefly diagnosed from the holotype female collected from the nares of *Glaucis hirsuta* (Gmelin) from "Trinidad" (Fain et al., 1977a). Fain et al. (1977b) provided additional measurements of the holotype, gave the type locality as "Ravine Sable Trace, Vega de Oropouche, Trinidad", and mentioned an additional 8 female paratypes from the same locality from *G. hirsuta* and *Phaethornis guy* (Lesson). The species has never been fully described or figured. We give here a complete description of the female and describe the male for the



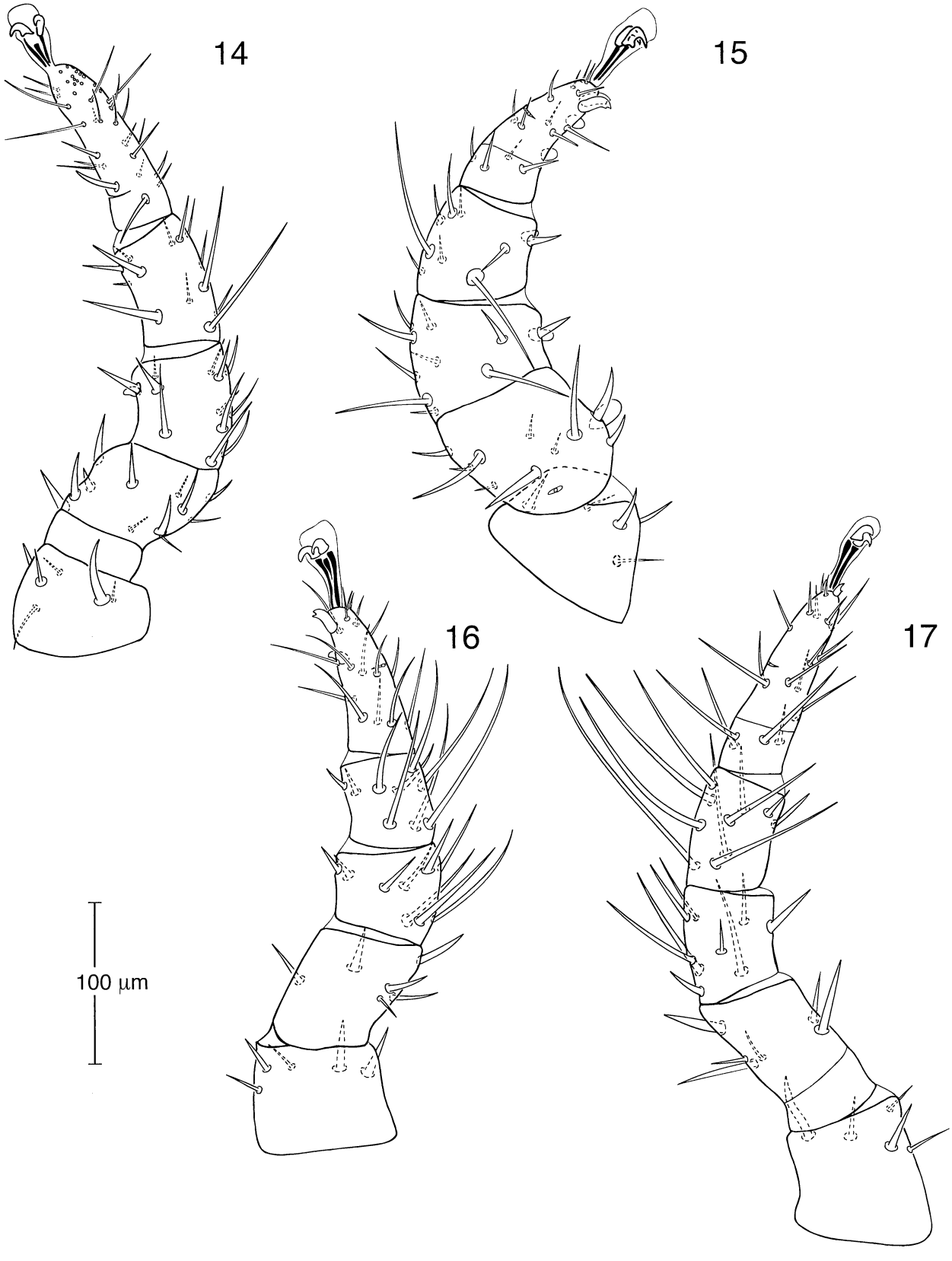
Figs. 6-9. *Rhinoseius trinitatis* female. 6. leg I, dorsal view, left side is anterior. 7. leg II, posteriodorsal view. 8. leg III, dorsal view. 9. leg IV, dorsal view.

first time. Our specimens were compared with the holotype.

Female (figs. 1-9). Dorsum (fig. 1): dorsal shield length 503 (491-521), width between setae *s6* and *S1* 256 (240-269) (n=10), with lateral incisions; transverse suture complete between setae *s6* and *S1*; with reticulate surface pattern over central area of dorsal shield, becoming lineate laterally and indistinct over muscle attachments, lineate pattern restricted to lateral regions on posterior half of shield. Dorsal shield with 31 pairs of smooth, simple setae; setae *j1* off shield in membranous incision between tips of peritremes; 5 pairs of anterior marginal setae *r2-r6* and 5 pairs of posterior marginal setae (*R1-R5*) on soft cuticle laterad of shield; 3 pairs of submarginal (*UR*) setae on soft cuticle posteriad of coxae IV. Setae *j1*, *z1*, minute (5-10), much shorter than other dorsal setae; setae *s1*, *j2-5* (17-20) and *J5* (10-12) somewhat shorter than other dorsal setae; all other dorsal shield setae of about equal length (21-23), marginal and submarginal setae slightly longer than shield setae (27-30). Gland pores, proprioceptors, and muscle attachments arranged as indicated



Figs. 10-13. *Rhinoseius trinitatis* male. 10. body dorsum. 11. body venter. 12. tectum. 13. chelicera, lateral view.



Figs. 14-17. *Rhinoseius trinitatis* male. 14. leg I, anteriolateral view. 15. leg II, posteriolateral view. 16. leg III, anteriolateral view. 17. leg IV, posteriolateral view.

in fig. 1.

Venter (fig. 2): tritosternum normal in shape with trapezoidal base and with slender, tapering pilose laciniae. Sternal shield with faint linear ornamentation present in presternal area anterior to first sternal setae. Sternal shield with posterior margin slightly concave laterally, posterolateral corners rounded; anterolateral corners (below setae *st1*) of shield emarginated. Well developed endopodal sclerites present mesad of coxae III-IV. Genital shield concave laterally, slightly widened behind genital setae, with weak linear ornamentation; 1 pair of short genital setae on edges of shield, paragenital setae lacking. One pair of triangular metapodal plates present. Anal shield elliptical, longer than wide, reticulate pattern well developed; postanal seta slender, about twice as long as para-anal setae. Eight pairs of ventral setae (*Jv1-5, Zv1-3*) on soft cuticle of opisthogaster, *Jv4* slightly longer than more anterior setae, *Jv5* stout and about 3 times longer than *Jv4*. Peritreme extending anteriodorsally to base of seta *z1*. Spermathecal duct (fig. 5) consisting of an adductor canal (about 75 long) and a sclerotized maturation pouch (about 66 long).

Gnathosoma with tectum triangular, tapering to a fine point (fig. 3). Deutosternum with 7 transverse rows of denticles; all rows connected; no rows widened. Three pairs of rostral setae simple, slender, external posterior pair shorter than inner pairs; capitular setae slender, simple, similar in length to longer rostral setae. Corniculi somewhat convergent and slightly sinuate; internal malae extending to tip of corniculi (fig. 4). Fixed digit of chelicera with 2 subapical teeth, movable digit lacking teeth. Palpi (fig. 4) similar to those of other Ascidae, setation of trochanter, femur, genu, tibia and tarsus 2-5-6-14-15 (note that not all palptarsal setae illustrated on fig. 4; some tiny, presumably chemosensory setae not figured due to size constraints).

Legs I-IV (figs. 6-9) (including pretarsi) respectively 84, 73, 75 and 93 percent of dorsal shield length. Pretarsi well developed. Coxae I with 2-4 faint lines laterally and medially; coxae II and III each with a pronounced convex boss; coxae IV unornamented. All leg setae short and setiform except specialized sensory group apically on tarsus I; genua I-IV with 13-11-9-9 setae, tibiae I-IV with 13-11-9-10 setae.

Male (figs. 10-17). Dorsal shield (fig. 10) length 497 (486-521), width between setae *s6* and *S1* 293 (281-310) (n=10); linear ornamentation restricted to lateral regions of anterior half of shield, rarely faint lines visible on anteriolateral margins of posterior half of shield. All setae of *j-J, z-Z* and *s-S* series on shield, marginal seta *r2* always on shield, *r3* on or off shield, other marginal setae (*r-R*) consistently off shield on lateral soft cuticle. Three pairs of submarginal (*UR*) setae on lateral soft cuticle. Setae *j1, z1* and *j2* minute, other *j, z* and *s* series setae on anterior half of shield and *J* series and anterior *Z* series setae on posterior half of shield relatively short (12-19). Marginal setae (*r-R*) distinctly longer, lengths increasing posteriorly (*R5* 4 times longer than *r2*). Setae of *Z* series on posterior half of shield increasing slightly posteriorly (*Z4* approximately twice the length of *Z1*), but *Z5* very long and thick (approximately 9 times the length of *Z1*); setae of *S* series increasing gradually posteriorly (setae *S2, S3, S4* and *S5*, 1.5, 2.5, 3.9, 5.0 times the length of *S1* respectively).

Venter (fig. 11) with sternogenital and ventrianal shields smooth or with few faint lines; sternogenital shield with 5 pairs of relatively short setae, paragenital setae absent. Metapodal plates triangular as in female. Ventrianal shield with 5 pairs of ventral setae in addition to circumanal setae. Setae *Jv1* and *Zv1* about one-half length of *Jv2, Jv3, Jv4, Zv2, Zv3* and *Zv4*; *Jv5* very long and stout, about 5.7 times the length of *Jv1*.

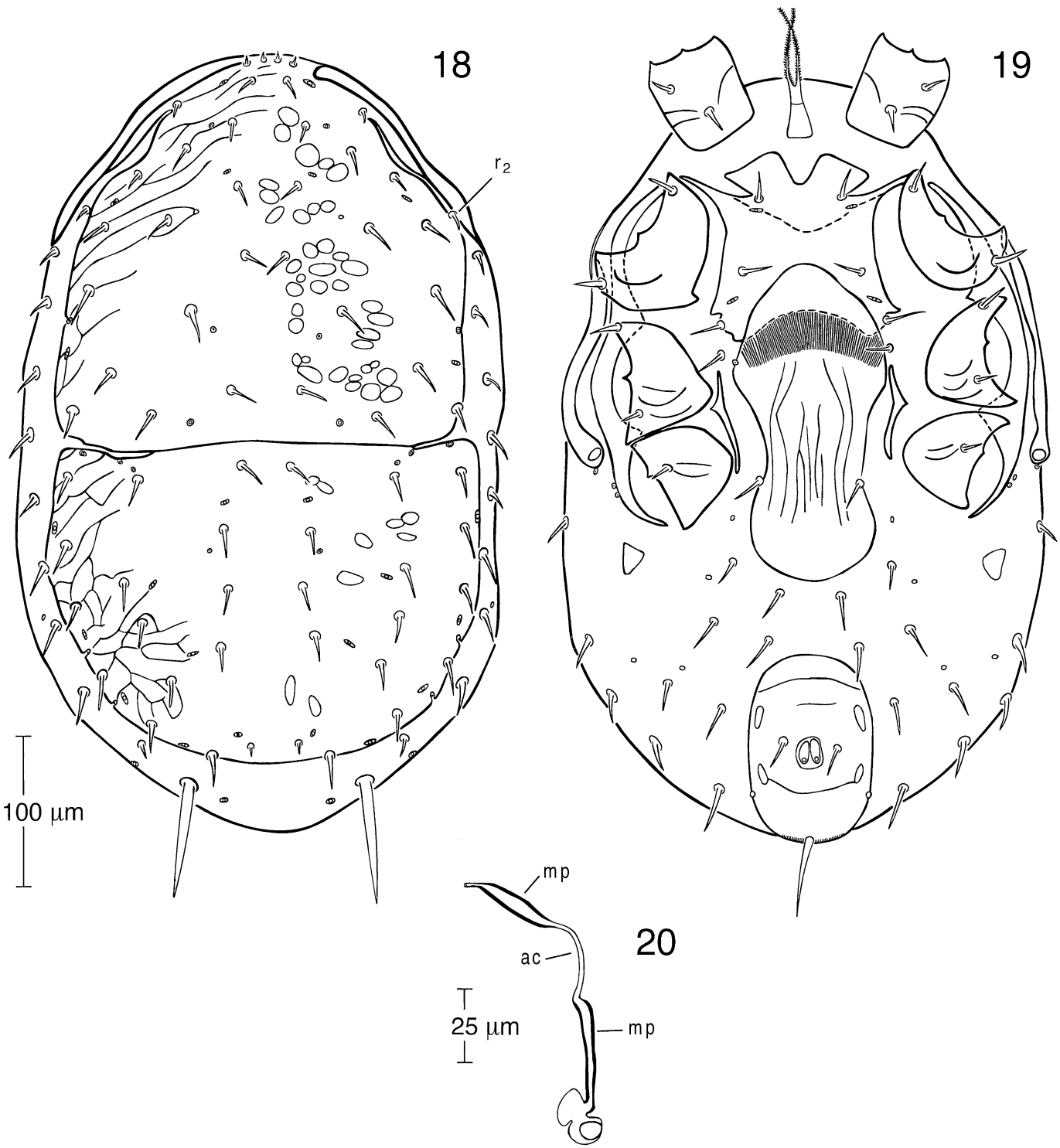
Gnathosoma with tectum more narrowly rounded apically and steeply sided basally than on female (fig. 12). Palps generally similar to female except dorsal setae of genu, especially *d3*, shorter and more spinelike. Cheliceral digits edentate but strongly hooked apically; spermatodactyl 48-50 long, straight, with a tiny, apical, hooked projection (fig. 13). Corniculi more slender, widely spread basally and convergent distally than on female; other features of gnathosoma as on female.

Legs (figs. 14-17) strongly divergent from female form. Leg I somewhat thicker than in female, with numerous setae stouter than homologues on female; stouter setae include: *d* and *pv1* of trochanter and *pd2, pl1, pl2, v1-3* of femur; *av2* of genu a short, hooked spine; most other setae distinctly thicker and longer than in female, including most setae of genu and especially posterior setae of tibia, particularly *pd2, pd3* and *pl2*. Leg II much stouter than in female, strongly incurved ventrally between femur and tarsus; femur with seta *avl* very stout and rounded, *pv1* and *pv2* stout spines, *pd1, pd2* and *pl1* elongate, stout spines; genu with seta *avl* stout and rounded, *pd2* and *pl2* elongate, *pv1, pd1* and *ad2* stouter than in female; tibia with *av1* stout and rounded, *pl2* and *pd2* elongate, *pd1* and *pl1* shorter but still longer than in female; tarsus with setae *avl* and *pvl* stout and claw-like, *av2* and *mv* stout and rounded, *pv2* elongate, other setae as in female. Leg III stouter than in female but not as stout as leg II; femur with *ad1, ad2, pd1* and *al1* stout spines, longer than in female; genu with *ad2, pd2* and *al2* very long, *ad1, pd1, al1* and *pl1* shorter but still longer than in female; tibia with *ad1, al2, pd1, pd2* and *pl2* elongate, *al1* and *pl1* elongate to a lesser degree; tarsus with *pv1* stout, bifid and clawlike, *av2* a hooked spine, *av1, pv2, pl2, al2* and *mv* elongate. Leg IV similar in size and shape to that of female; femur with *ad1, ad2* and *v1* elongate spines; genu with *ad1, ad2, pd1, pd2, pd3, al1, al2* and *av1* elongate spines; tibia with all setae except *av1* and *pv1* very long, *av1* a stout spine longer than in female; tarsus with most setae longer than female homologues, especially more basal setae, but *pv1* stout, bifid, clawlike.

MATERIAL EXAMINED. The following specimens were collected from flowers of *Heliconia hirsuta* L. f. (Heliconiaceae): TRINIDAD: 1/2 mi uphill from Br C6 9 Blanchisseuse Rd., 15 February 1979, R.K. Colwell et al. (#T223) (figured specimen and 3 other females, figured specimen and 2 other males); Arima Valley, 10 mi. N. Arima, Andrews Trace, 1 August 1975, R.K. Colwell (#T5) (12 females, 42 males, 2 deutonymphs); same locality, 15 February 1976, R.K. Colwell (#U62) (1 female); Arima Valley, 8 mi. N. Arima, La Laja Trace, 4 August 1975, R. K. Colwell (#T10) (11 females, 12 males, 9 deutonymphs, 11 protonymphs, 4 larvae); same locality, 19 February 1976, R. K. Colwell (#U61) (1 female); same locality, March 1979, D.S. Dobkin (#75) (8 females, 2 males), (#80) (4 females, 3 deutonymphs, 3 protonymphs), (#117) (1 female, 5 males, 3 deutonymphs, 1 protonymph), (#T278) (6 females, 2 males).

The following specimens were collected from flowers of *Heliconia bihai* (L.) L. (Heliconiaceae): TRINIDAD: Arima Valley, 10 mi. N. Arima, Andrews Trace, 27 December 1973, R. K. Colwell (#T56) (6 females, 1 deutonymph).

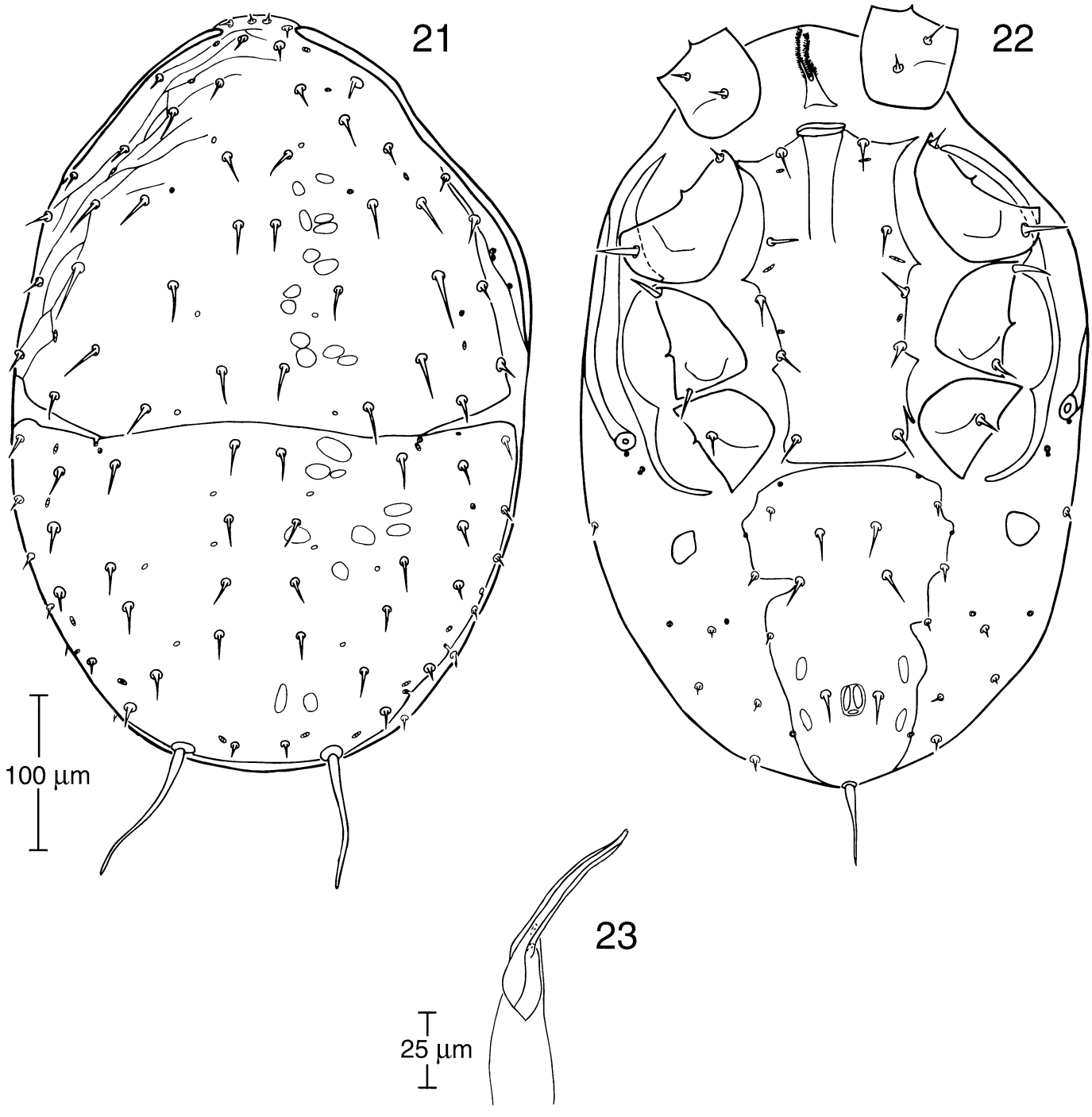
Records from hummingbirds follow: ex *Glaucis hirsuta*: Arima



Figs. 18-20. *Rhinoseius bisacculatus* female. 18. body dorsum. 19. body venter. 20. spermathecal system (ac = adductor canal; mp = maturation pouch).

Valley, Simla Research Station, 18 February 1976, R.K. Colwell (#U42) (1 female); Arima Valley, ridge trail 200 m E Simla, 18 February 1976, R. K. Colwell (#'s U23, U24, U25, U26) (total of 7 females); Arima Valley, La Laja Trace, 10 mi N Arima, S. Naeem and D.S. Dobkin (#T586) (1 female); Arima Valley, lower La Laja Trace, 8 mi N Arima, 24 February 1976, R.K. Colwell (#U30) (1 female, 1 male); Guanapo Valley, Guanapo Trail, 25 February 1979, R.K. Colwell, et al. (#T358) (2 females).

Ex *Phaethornis guy*: Arima Valley, Andrews trace, 2 August 1975, R.K. Colwell (#T18) (1 female); same locality, 21 February 1976, R.K. Colwell (#U20) (4 females); Arima Valley, La Laja Trace, 10 mi N Arima, 10 August 1975, R.K. Colwell (#T38) (1 female); same locality, 17 March 1980, S. Naeem (#T589) (1 female, 1 male); Arima Valley, lower La Laja Trace, 8 mi N Arima,



Figs. 21-23. *Rhinoseius bisacculatus* male. 21. body dorsum. 22. body venter. 23. chelicera, ventral view.

23 February 1976, R.K. Colwell (#U19) (1 female).

Ex *Phaethornis longuemareus* (Lesson): Arima Valley, La Laja Trace, 10 mi N Arima, 11 August 1975, R.K. Colwell (#T33) (1 female); Arima Valley, lower La Laja Trace, 8 mi N Arima, 23 February 1976, R.K. Colwell (#U21) (3 females).

Rhinoseius bisacculatus Fain, Hyland and Aitken, 1977

Rhinoseius bisacculatus Fain, Hyland and Aitken, 1977a: 185

Rhinoseius bisacculatus Fain, Hyland and Aitken, 1977b: 138. figs. 18-27.

This species was briefly diagnosed from the holotype female collected from the nares of *Glaucis hirsuta* from Belem, Brazil (Fain et al., 1977a). Fain et al. (1977b) redescribed and figured the holotype and noted two additional paratype females from the type locality. They also reported the species from Trinidad on the basis of two females collected from the nares of *Phaethornis guy* from "Vega de Oropouche, Trinidad." We give here a complete description of the female and describe the male for the first time. Our specimens were compared with the holotype.

Female (figs. 18-20). Dorsum (fig. 18)Dorsal shield length

480-491, width between setae *s6* and *S1* 287 wide (n=2), with lateral incisions extending a variable distance to or somewhat beyond the level of seta Z1; transverse suture complete; in the two specimens examined, lineate to reticulate pattern restricted to lateral regions of anterior and posterior halves of shield. Dorsal shield with 32 pairs of smooth, simple setae; 5 pairs of anterior marginal setae *r2-r6* and 5 pairs of posterior marginal (*R*) setae on soft cuticle laterad of shield; 4 pairs of submarginal (*UR*) setae on soft cuticle posteriad of coxae IV. Setae *j1, z1, s1, s2, J5* much shorter than other dorsal setae, less than half as long as seta *j4*. All other dorsal setae of about equal length, approximately 20 . Gland pores, proprioceptors, and muscle attachments arranged as indicated in fig. 18 .

Venter (fig. 19). Tritosternum normal in shape with trapezoidal base and with slender, tapering pilose laciniae. Sternal shield without obvious pattern; Sternal shield with posterior margin slightly concave laterally, posterolateral corners irregular; anterolateral corners (at level of setae *st1*) of shield emarginated. Well developed endopodal sclerites present mesad of coxae III-IV. Genital shield concave laterally, slightly widened behind genital setae, with distinct linear ornamentation; 1 pair of short genital setae on edges of shield, paragenital setae lacking. One pair of triangular metapodal plates present. Anal shield elliptical, longer than wide, with indistinct lineate pattern; postanal seta slender, about twice as long as para-anal setae. Eight pairs of posteroventral setae (*Jv1-5, Zv1-3*) on soft cuticle of opisthogaster, *Jv4* slightly longer than more anterior setae, *Jv5* stout and about 2.5 times longer than *Jv4*. Peritreme extending anteriad to a point varying from the level of *j3* to the base of seta *z1*. Spermathecal duct (fig. 20) uniquely formed, with two sclerotized maturation pouches, a narrow proximal pouch (42-46) and a slightly wider distal pouch (26-28), connected by a narrow adductor canal (32-35 long).

Fixed digit of chelicera with 2 subapical teeth, movable digit lacking teeth. Tectum triangular, tapering to a fine point. Deutosternum with 7 transverse rows of denticles; all rows connected; no rows widened but first two rows with fewer teeth than more posterior rows. Three pairs of rostral setae simple, slender, external posterior rostrals distinctly shorter than inner pairs; capitular setae slender, simple, similar in length to longer rostral setae. Corniculi somewhat convergent and slightly sinuate; internal malae extending to tip of corniculi.

Legs I-IV (including pretarsi) respectively 83, 70, 73 and 88 percent of dorsal shield length. Pretarsi well developed. Coxae I with 2 faint lines laterally and medially; coxae II, III and IV each with a pronounced convex boss; coxae III-IV also with 1 or 2 lines. All leg setae short and setiform to spine-like except specialized sensory group apically on tarsus I; genua I-IV with 13-11-9-9 setae, tibiae I-IV with 13-11-9-10 setae.

Male (figs. 21-27). The following description is based on a single male specimen. Dorsal shield (fig. 21) length 503, width between setae *s6* and *S1* 333; linear ornamentation restricted to lateral regions of anterior half of shield. All setae of *j-J, z-Z* and *s-S* series on shield, all marginal seta on shield except *R5*. One pair of submarginal (UR) setae on lateral soft cuticle. Setae *j1, z1, j2, J5, S4* and *S5*, and all marginal setae minute, less than 11 long; most other dorsal setae relatively short (12-22 long); setae *s4* (40), and *s5* (31) somewhat longer, seta *Z5* stout and 108 long.

Venter (fig. 22) with sternogenital and ventrianal shields smooth; sternogenital shield with 5 pairs of relatively short setae, paragenital setae absent. Metapodal plates ovoid to subquadrate. Ventrianal shield with 5 pairs of ventral setae on shield in addition to circumanal setae. Setae *Jv1* and *Jv2* two to three times length of other ventral setae (20 vs. 7-9 long). Paraanal setae 18 long, postanal seta 62 long.

Gnathosoma with tectum more narrowly rounded apically and steeply sided basally than on female Palps generally similar to female except dorsal setae of genu, especially *d3*, shorter and more spine like. Chelicerae (fig. 23) not easily visible on only specimen, number of teeth uncertain; spermatodactyl 48 long, somewhat curved and without subapical projection. Corniculi more slender, widely spread basally and convergent distally than on female; other features of gnathosoma not easily observed.

Legs (figs. 24-27) more similar to female form than in other *Rhinoseius* species. Leg I as in female except with some setae only slightly longer than homologues on female; seta *av2* of genu a short, hooked spine. Leg II much stouter than on female, incurved ventrally between femur and tarsus; femur with seta *avl* very stout and rounded, *pv1* and *pv2* stout spines, *pd1, pd2* and *pl1* spinelike, with *pl1* distinctly longer; genu with seta *av1* stout and rounded, *pd2* and *pl2* somewhat elongate; tibia with *av1* stout and rounded, *pd1* and *pd2* somewhat elongate; tarsus with setae *av1* and *pv1* stout and claw-like, *av2* and *mv* stout and rounded. Leg III generally similar to female, but most setae somewhat longer and thicker, tarsus with *pv1* stout and clawlike, *av2* a stout, rounded spine. Leg IV similar in size and shape to that of female, most setae somewhat longer and stouter, especially seta *mv* of tarsus.

MATERIAL EXAMINED. The following specimens were collected from flowers of *Costus scaber* Ruiz and Pavón (Costaceae): TRINIDAD: Arima Valley, 4 mi. N. Arima, Ridge trail above Simla research station, 12 August 1975, R.K. Colwell et al. (#T59) (1 female, 1 male - figured specimens); Arima Valley, 10 mi. N. Arima, Andrews Trace, 1 August 1975, R.K. Colwell (#T7) (1 female).

Records from hummingbirds follow: ex *Glaucis hirsuta*: TRINIDAD: Arima Valley, Simla Quarry, 21 July 1975, R.K. Colwell (#T52) (2 females); Arima Valley, La Laja Trace, 10 mi N Arima, 11 August 1975, R.K. Colwell (#T44) (2 females); same locality, 26 February 1979, R.K. Colwell et al. (#T360) (1 female); Arima Valley, ridge trail 200 m E Simla, 22 July 1975, R.K. Colwell (#T47) (1 female), (#T49) (1 female); same locality, 18 February 1976, R.K. Colwell (#U22) (3 females); Arima Valley, Simla, 18 February 1976, R.K. Colwell (#U39) (1 female), (#U40) (1 female), (#U41) (1 female).

Ex *Phaethornis guy*: Arima Valley, La Laja Trace, 10 mi N Arima, 10 August 1975, R.K. Colwell (#T38) (1 female).

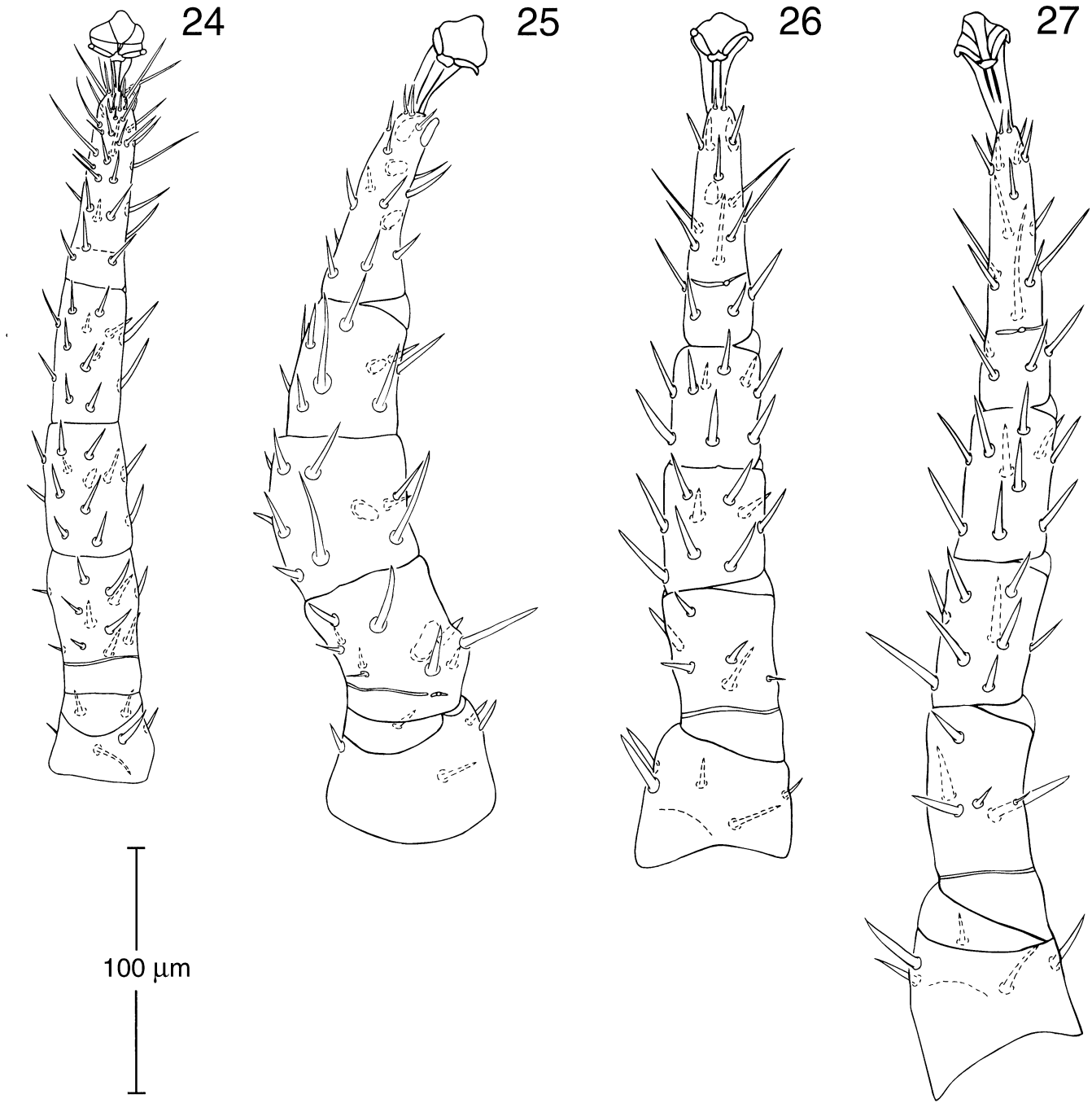
DISCUSSION. Our female specimens differ from the type series in having less extensive reticulation on the dorsal shield. This character, however, is quite variable in other species, and these collections are here considered to be conspecific.

Rhinoseius phoreticus Fain, Hyland and Aitken, 1977

Rhinoseius phoreticus Fain, Hyland and Aitken, 1977a: 186

Rhinoseius phoreticus Fain, Hyland and Aitken, 1977b: 143 (figs. 28-37)

This species was briefly diagnosed from the holotype female collected from the nares of *Amazilia tobaci* (Gmelin) from

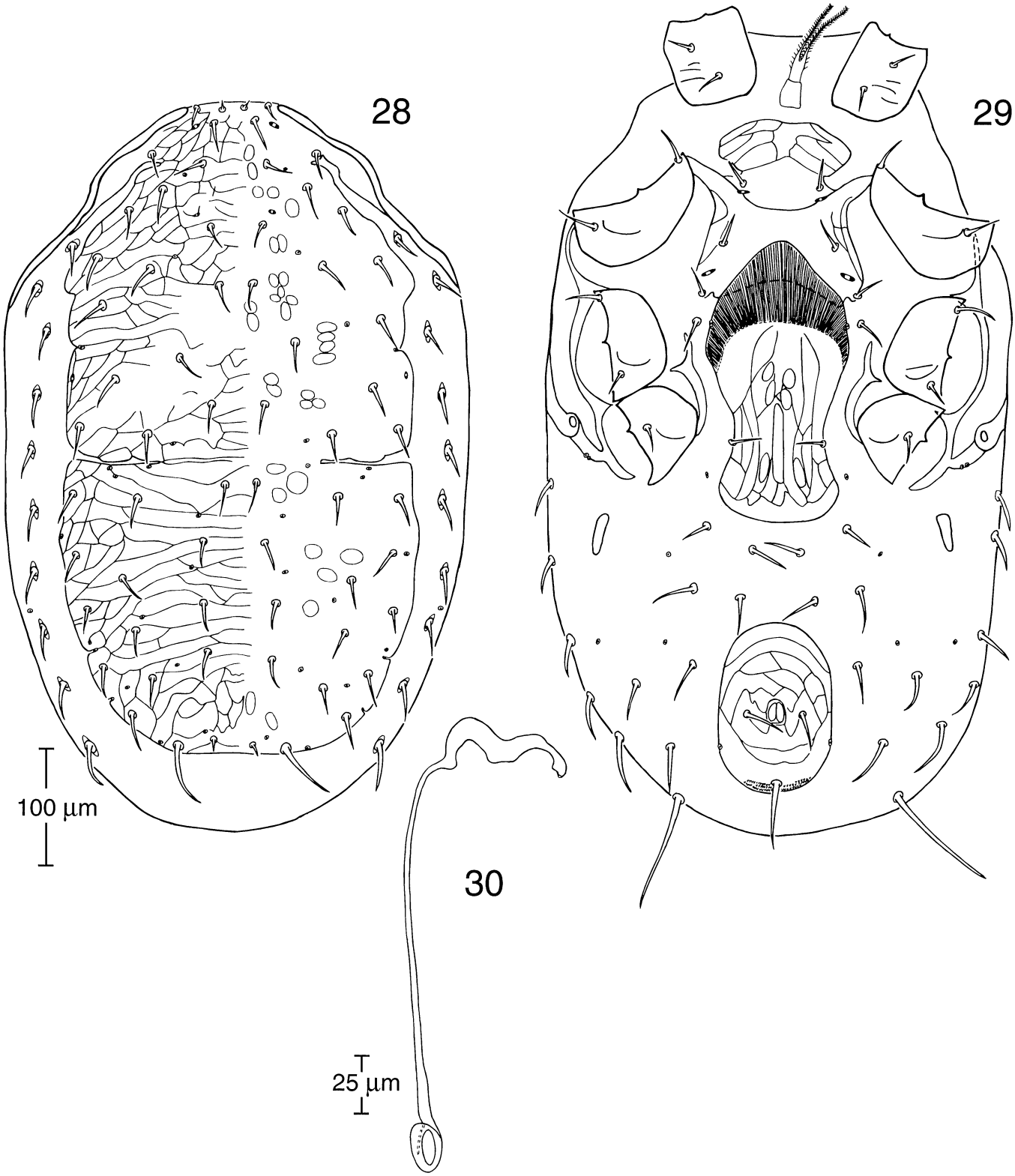


Figs. 24-27. *Rhinoseius bisacculatus* male. 24. leg I, dorsal view. 25. leg II, posteriodorsal view. 26. leg III, dorsal view. 27. leg IV, dorsal view.

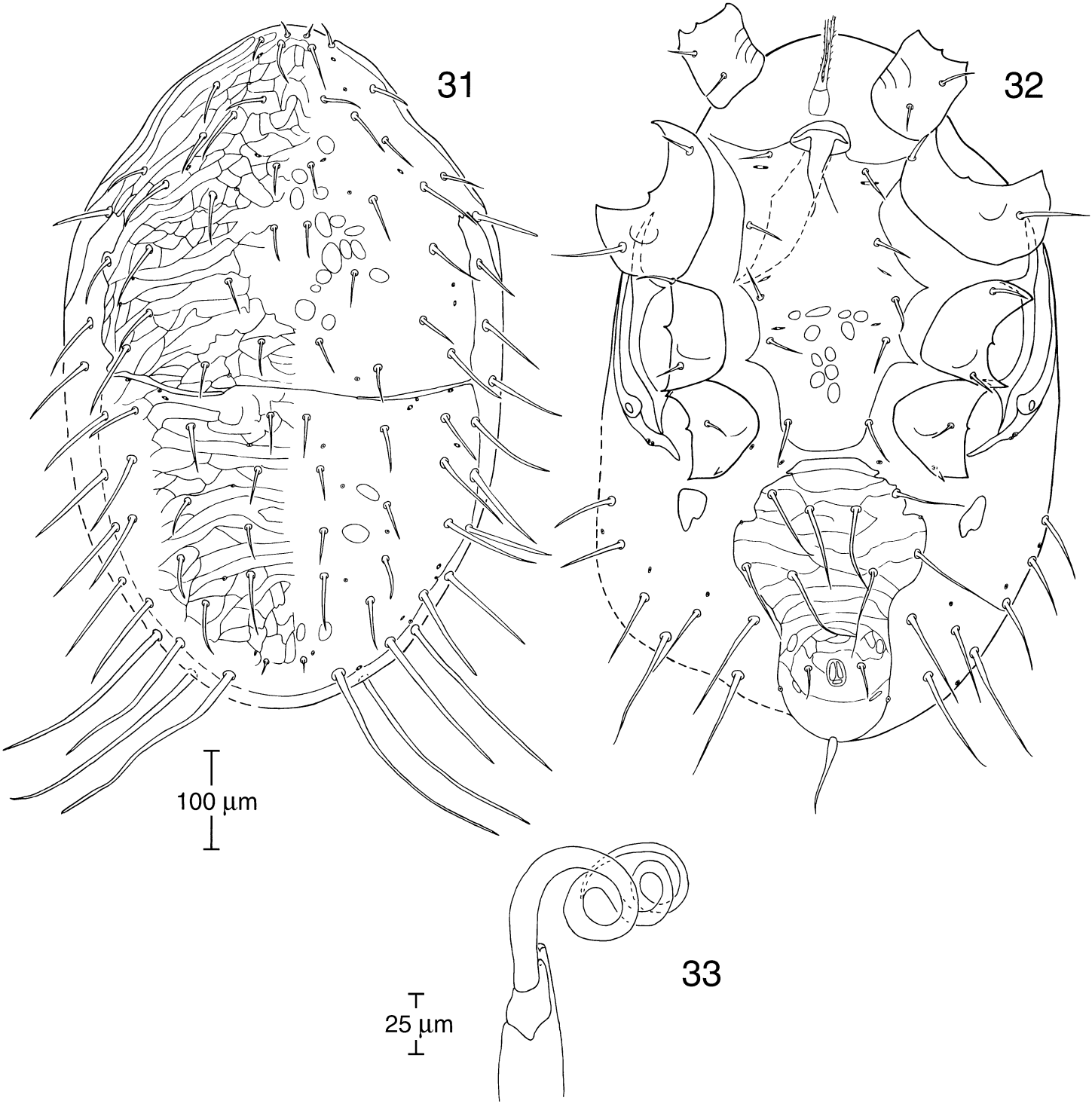
"Tumpuna Road, Trinidad" (Fain et al., 1977a). Fain et al. (1977b) provided a more complete description of the holotype, the only known specimen. We give here a complete description of the female and describe the male for the first time. Our specimens were compared with the holotype.

Female (figs. 28-30). Dorsum (fig. 28): dorsal shield length 586 (562-608), width between setae *s6* and *S1* 307 (287-333); lateral incisions extending medially somewhat beyond level of setae *Z1;* transverse suture distinct or indistinct; linear surface pattern over most of dorsal shield, becoming reticulate medially, indistinct over muscle attachments. Dorsal shield with 32 pairs of smooth, simple setae; 5 pairs of anterior marginal setae *r2-r6* and 5 pairs of posterior marginal (*R*) setae on soft cuticle laterad of shield, all marginal setae borne on small platelets; 5 pairs of submarginal (*UR*) setae on soft cuticle posteriad of coxae IV. Setae *j1* and *J5* minute, much shorter than other dorsal setae; setae *z1* somewhat longer (15); all other dorsal setae of about equal length (22-33) except *Z5* stout and 55 long. Gland pores, proprioceptors, and muscle attachments arranged as indicated in fig. 28.

Venter (fig. 29): tritosternum normal in shape with trapezoidal base and with slender, tapering pilose laciniae. Presternal area distinctly lineate, with few lines also present on lateral margins of sternal shield. Posterior margin of shield notched later-



Figs. 28-30. *Rhinoseius phoreticus* female. 28. body dorsum. 29. body venter. 30. spermathecal system.



Figs. 31-33. *Rhinoseius phoreticus* male. 31. body dorsum. 32. body venter. 33. chelicera, ventral view.

ally, anterolateral corners (at level of setae *st1*) of shield emarginated. Well developed endopodal sclerites present mesad of coxae III-IV Genital shield with concave lateral margins, distinctly widened behind genital setae, with well developed reticulate ornamentation; 1 pair of genital setae on edges of shield, paragenital setae lacking. One pair of elongate metapodal plates present. Anal shield elliptical, longer than wide, with sides almost parallel, reticulate ornamentation well developed; postanal seta slender (60-65 long) about twice as long as para-anal setae. Eight pairs of posteroventral setae (*Jv1-5*, *Zv1-3*) on soft cuticle of opisthogaster, *Jv4* slightly longer than more anterior setae, *Jv5* stout and about 2.5 times longer than *Jv4*. Peritreme extending anteriodorsally to base of seta *z1*; peritrematal shield narrowly fused to exopodal shield posteriorly. Spermathecal duct (fig. 30) a simple tube (228 long) with an expanded portion immediately inside external opening.

Fixed digit of chelicera with 2 subapical teeth, movable digit lacking teeth. Palps with two dorsal setae of femur distinctly barbed. Tectum narrow, tapering to a fine point, with or without a few small, setiform processes laterally. Deutosterum with 7 transverse rows of denticles; all rows connected; no rows widened but first two rows having fewer teeth than more posterior rows. Three pairs of rostral setae simple, slender, external posterior pair shorter than inner pairs, internal posterior rostrals 3 times longer than external; capitular setae slender, simple, about half the length of internal posterior rostral setae. Corniculi somewhat convergent and slightly sinuate; internal malae extending to tip of corniculi.

Legs I-IV (including pretarsi) respectively 76, 63, 63, and 82 percent of dorsal shield length. Pretarsi well developed. Coxae I with 3-4 distinct lines on anterior and posterior faces; coxae II, III and IV each with a pronounced convex boss; coxae III-IV also with 1 or 2 lines. Distal ventral edges of femur, genu and tibia III-IV and distal dorsal edge of trochanter IV each with a row of denticles. Most leg setae short and setiform to spine-like except these strongly barbed: *d* of trochanter I, *al* of trochanters III-IV, *ad1*, *pd1*, *pl2* and *v2* of femur I, *ad1*, *pd1* and *pl2* of femur II, *ad1* of femur III, *ad1* and *ad2* of femur IV; genua I-IV with 13-11-9-9 setae, tibiae I-IV with 13-11-9-10 setae.

Male (figs. 31-37). Dorsal shield (fig. 31) length of two specimens 629-661, width between setae *s6* and *S1* 392-404; figured specimen damaged posterio-laterally; linear ornamentation covering most of shield except very weakly developed between and behind setae *j5*, becoming reticulate medially. All setae of *j-J*, *z-Z* and *s-S* series on shield, anterior marginal setae *r2* and *r3* on shield, *r4*, *r5* and *r6* off shield, posterior marginal setae *R1*, *R2* and *R3* on shield, *R4* and *R5* off shield on lateral soft cuticle. 4 pairs of submarginal (*UR*) setae on lateral soft cuticle. Setae *j1* and *J5* short (11 long), most other setae of *j-J* and *z-Z* series (except *z2*, *J4* and *Z4-5*) and anterior setae *s1*, *s2* and *s5* 33-45 long; setae *z2*, *s3-4*, *J4* , *Z4* and *S1* 50-55 long; setae *s2*, *s6* 66 and 72 respectively. Setae of posterior *S* series increasing in length from anterior to posterior, *S1-S5* lengths 64, 84, 99, 106, 207 respectively. Marginal setae generally increasing in length from anterior to posterior except *r4* shorter than *r3* and *R3* and *R4* slightly shorter than *R2*, lengths of anterior marginals *r2-r6* 44, 59, 48, 66, 77 ; posterior marginals *R1-R5*, 90, 97, 86, 95, 194 ; *Z5* longest of all dorsal setae, 253.

Venter (fig. 32) with sternogenital shield smooth and ventrianal shields distinctly lineate; sternogenital shield with 5 pairs of relatively short setae, paragenital setae absent. Metapodal plates irregularly shaped, wider than in female. Ventrianal shield with 4 pairs of ventral setae on shield in addition to circumanal setae. All ventral setae long and tapering, lengths 77-110 , except *Jv5* very long (227). Para-anal and postanal setal lengths 33 and 79 respectively.

Gnathosoma with tectum very different from female, broadly rounded with 6 apical teeth. Palps generally similar to female including barbed dorsal setae of genu. Cheliceral digits edentate but strongly hooked apically; spermatodactyl (fig. 33) very different from other *Rhinoseius* species, 346 long in figured specimen, thickened basally but attenuating distally and strongly coiled. Corniculi more slender than on female.

Legs (figs. 34-37) I, III and IV generally similar to female form with similar pattern of barbed and smooth setae. Leg II much stouter than on female, strongly incurved ventrally between femur and tarsus, with modified spine-like setae similar to most other *Rhinoseius* males. Leg IV similar to female except tarsus bearing 7 elongate, whip-like setae in basal half.

MATERIAL EXAMINED. The following specimens were collected from flowers of *Pitcairnia integrifolia* Ker-Gawl. (Bromeliaceae): TRINIDAD: Andrews Trace, 1 August 1975, R.K. Colwell (#T9) (1 female, 1 male); Maracas Bay, 29 August 1980, D.S. Dobkin (#T825) (1 female, 1 male); same date (#T828) (2 females, 1 deutonymph); same data (#T829) (5 females); same data (#T830) (4 females, 2 deutonymphs); same data (#T831) (7 females).

Records from hummingbirds follow: ex *Amazilia chionopectus* (Gould): TRINIDAD: Arima Valley, Textel Road Andrews Trace, 14 March 1979, R.K. Colwell et al. (#T352) (1 female).

Ex *Amazilia tobaci*: Arima Valley, ridge trail 200 m E Simla, R.K. Colwell et al. (#T348) (1 female).

Ex *Anthracothorax nigricollis* (Vieillot): Arima Valley, Textel Road, 28 February 1979, R.K. Colwell et al. (#T353) (1 female).

Ex *Chrysolampis mosquitus* (L.): Arima Valley, Simla Quarry, 21 July 1975, R.K. Colwell (#T23) (1 female).

Ex *Chlorestes notatus* (Reichenbach): Arima Valley, ridge trail 200 m E of Simla, 4 March 1979, R.k. Colwell et al. (#T356) (1 female); Guanapo Valley, Las Lapas Trace, 13 March 1979, R.K. Colwell et al. (#T355) (1 female).

Ex *Glaucis hirsuta*: Arima Valley, ridge trail 200 m E Simla, 18 February 1979, R.K. Colwell (#U40) (1 female); La Laja Trace, 26 February 1979, R.K. Colwell et al. (#T360) (1 female), (#T362) (1 female); Guanapo Trail, 25 February 1979, R.K. Colwell et al. (#T358) (1 female).

DISCUSSION. The figure of the holotype of this species given in Fain et al. (1977b) does not illustrate all of the barbed setae of the trochanters and femora. We have examined the holotype and verified that the pattern of barbed setae is identical to that exhibited by our specimens described above.

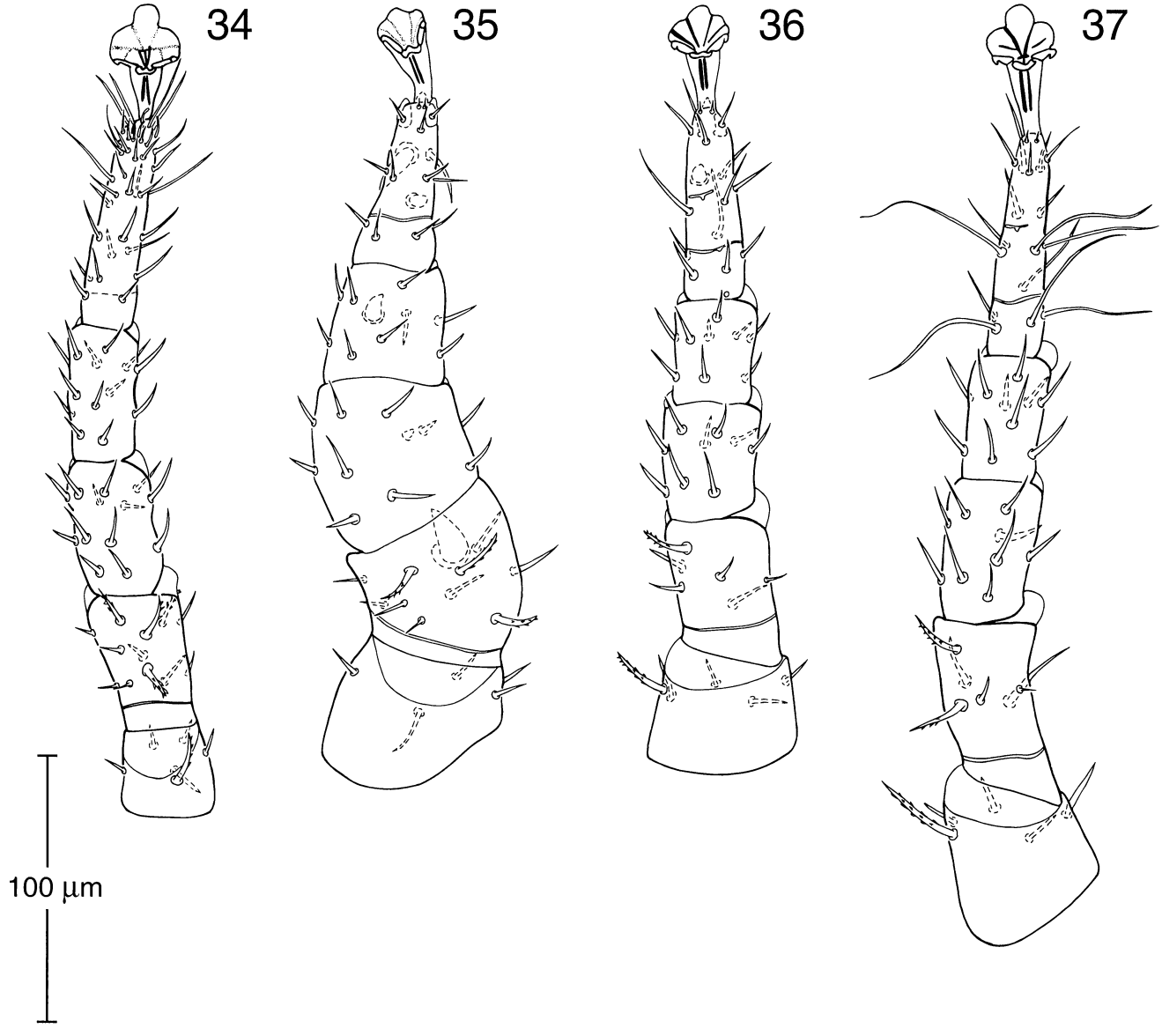
Rhinoseius venezuelensis (Baker and Yunker, 1964)

Tropicoseius venezuelensis Baker and Yunker, 1964: 106

Rhinoseius venezuelensis: Fain, Hyland and Aitken, 1977b: 138

This species was originally described from flowers of an unidentified *Heliconia* originating in Venezuela and intercepted in plant quarantine in New York, and additional specimens from *Heliconia* sp. and the nares of *Phaethornis superciliosus* (L.) from Panama (Baker and Yunker, 1964). Fain et al. (1977b) recorded this species from Brazil from the nares of *Glaucis hirsuta* and *P. superciliosus*, and from the following bird hosts and localities in Trinidad: *Glaucis hirsuta* (Cumuto Road and Fort Read), *Phaethornis guy* (Mayaro), *Amazilia chionopectus* (Ravine Sable Trace, Vega de Oropouche), and *Coereba flaveola* (L.) (Mayaro). The last record, from the bananaquit (family Emberizidae) constitutes one of the few records to date of Neotropical flower mites phoretic on birds other than hummingbirds.

This species was completely described and figured by Baker and Yunker (1964). The species is easily recognized in the female by the form of the spermathecal system in which the maturation pouch is considerably longer than the adductor canal. Males are similar to those of *R. trinitatis* and *R. klepticos* n. sp. in having the spermatodactyl hooked apically. They differ from those of *R. trinitatis* in having the posterior marginal (*R*) setae



Figs. 34-37. *Rhinoseius phoreticus* male. 34. leg I, dorsal view. 35. leg II, dorsal view. 36. leg III, dorsal view. 37. leg IV, dorsal view.

on the dorsal shield. Males of *R. venezuelensis* and *R. klepticos* cannot be reliably separated in the absence of associated females.

MATERIAL EXAMINED: 1 female from the nares of *Glaucis hirsuta*, Esperanza Estate, Vega de Oropouche, 15 December 1959, T.H.G. Aitken (#3740), provided by Dr. Fain. We have compared this specimen with the holotype in the NMNH and concur with the previous authors that it is conspecific. We did not recover this species from any of the plant hosts or birds we sampled.

Rhinoseius phaethornis Fain, Hyland and Aitken, 1977

Rhinoseius phaethornis Fain, Hyland and Aitken, 1977a: 186

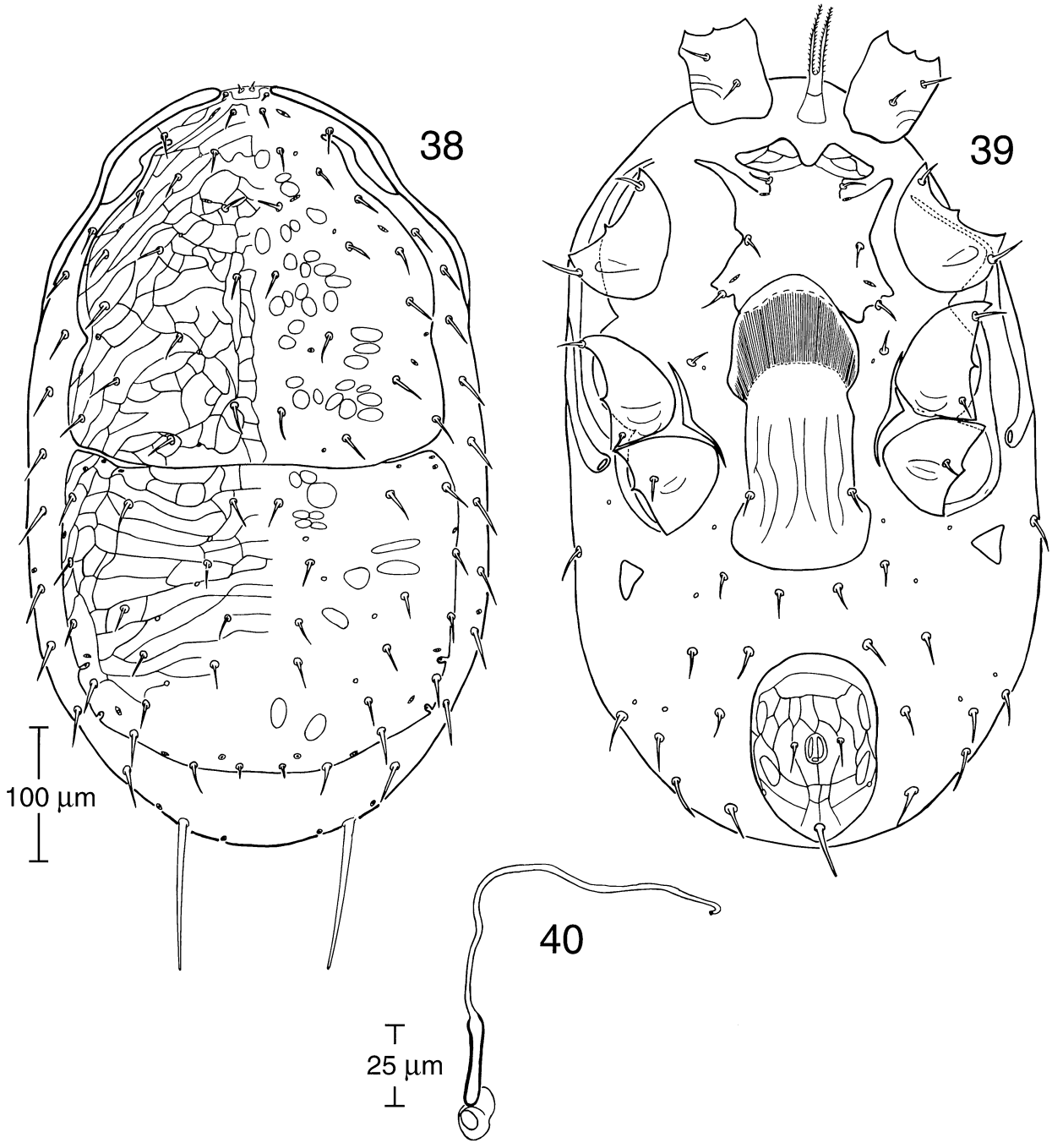
Rhinoseius phaethornis Fain, Hyland and Aitken, 1977b: 145

Rhinoseius spinosus Colwell, 1986: 408 (NOMEN NUDUM)

figs. 38-47.

This species was briefly diagnosed from the holotype female collected from the nares of *Phaethornis superciliosus* from Brazil (Fain et al., 1977a). Fain et al. (1977b) provided a more complete description and figures of the female and described and figured an "allotype" male (hereafter referred to as "specimen A"). They also designated numerous female paratypes and one additional male paratype (hereafter referred to as "specimen B") from the same host as the "allotype". The following new records of the species were given from hummingbird hosts in Brazil: *Phaethornis superciliosus, Glaucis hirsuta, Campylopterus largipennis* (Boddaert), *Chlorestes notatus* and *Thalurania furcata* (Gmelin); and Trinidad: *Phaethornis longuemareus* (Ravine Sable Trace, Vega de Oropouche; Cumuto Road) and *G. hirsuta* ("Cumuto"). We here redescribe the female and describe the male which we have positively associated with the female in the same host plants.

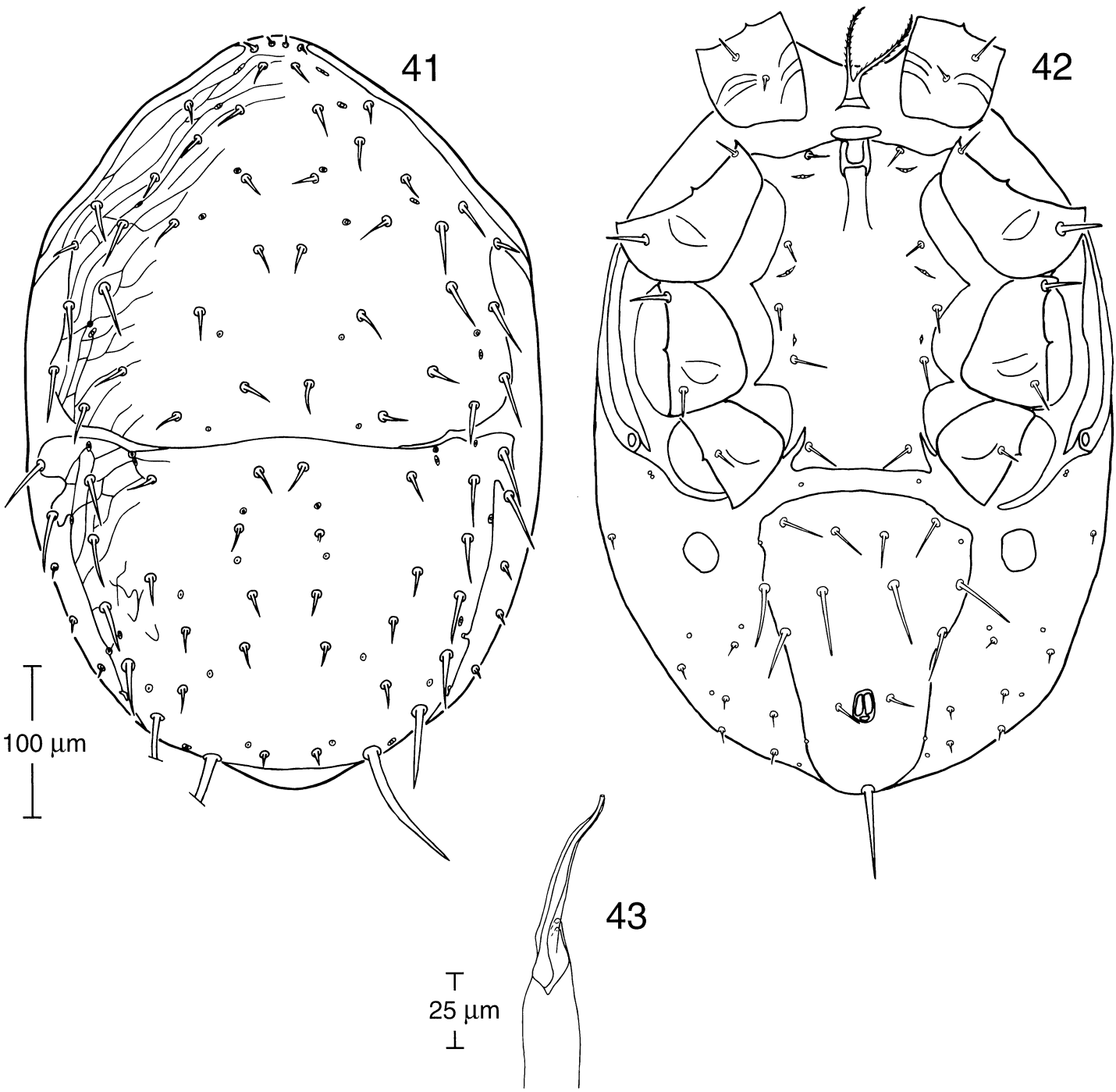
Female (figs. 38-40). Dorsum (fig. 38): dorsal shield (fig. 38) length 499 (491-509), width between setae *s6* and *S1* 278 (240-298) (n=10), with lateral incisions between setae *s6* and *S1*, extending to or mesad of level of seta *Z1*; transverse suture complete between setae *s6* and *S1*; with reticulate surface pattern over most of dorsal shield, becoming indistinct over muscle at-



Figs. 38-40. *Rhinoseius phaethornis* female. 38. body dorsum. 39. body venter. 40. spermathecal system.

tachments and apparently absent from posterior quarter of posterior half of shield. Dorsal shield with 31 pairs of smooth, simple setae; setae *j1* off shield in membranous incision between tips of peritremes; 5 pairs of anterior marginal setae *r2-r6* and 5 pairs of posterior marginal setae (*R1-5*) on soft cuticle laterad of shield; 3 pairs of submarginal (*UR*) setae on soft cuticle posteriad of coxae IV. Setae *j1*, *z1*, minute, much shorter than other dorsal setae; setae *J5* somewhat shorter than other dorsal setae; all other dorsal setae of about equal length (17-22). Gland pores, proprioceptors, and muscle attachments arranged as indicated in Fg. 38.

Venter (fig. 39): tritosternum normal in shape with trapezoidal base and with slender, tapering pilose laciniae. Sternal shield with reticulations confined to presternal area anterior to first sternal setae. Sternal shield with posterior margin concave laterally; posterolateral corners incised; anterolateral corners (below setae *st1*) of shield emarginated. Well developed endopodal sclerites present mesad of coxae III-IV Genital shield parallel sided to concave laterally, distinctly widened behind genital setae, with weak linear ornamentation; 1 pair of short genital setae on edges of shield, paragenital setae lacking. One pair of triangular metapodal plates present. Anal shield elliptical, longer than wide, reticulate ornamentation well developed; postanal seta slender, about twice as long as para-anal setae. Eight pairs



Figs. 41-43. *Rhinoseius phaethornis* male. 41. body dorsum. 42. body venter. 43. chelicera, ventral view.

of ventral setae (*Jv1-5, Zv1-3*) on opisthosomal venter, *Jv4* slightly longer than more anterior setae, *Jv5* stout and about 3 times longer than *Jv4*. Peritreme extending anteriodorsally to base of seta *z1*. Spermathecal duct (fig. 40) consisting of an adductor canal (about 132 long) and a sclerotized maturation pouch which is bent in almost a right angle with the proximal portion being about 13 long and the distal portion 26 long.

Fixed digit of chelicera with 2 subapical teeth, movable digit lacking teeth. Tectum triangular, tapering to a fine point, with teeth along lateral margins. Deutosterum with 7 transverse rows of denticles; all rows connected; no rows widened. Three pairs of rostral setae simple, slender, external posterior pair about half the length of others; capitular setae slender, simple. Corniculi somewhat convergent and slightly sinuate; internal malae extending to tip of corniculi.

Legs I-IV (including pretarsi) respectively 76, 66, 67 and 80 percent of dorsal shield length. Pretarsi well developed. Coxae I with 2-4 faint lines laterally; coxae II and III each with a pronounced convex boss and 1 or 2 additional curved lineations; coxae IV with a less pronounced boss. All leg setae short and

setiform except specialized sensory group apically on tarsus I; genua I-IV with 13-11-9-9 setae, tibiae I-IV with 13-11-9-10 setae.

Male (figs. 41-47). Dorsal shield (fig. 41) length 487 (462-509), width between setae *s6* and *S1* 319 (304-328) (n=8); linear ornamentation restricted to lateral regions of dorsal shield. All setae of *j-J, z-Z* and *s-S* series on shield, 4 pairs of marginal setae (*r2-5*) on anterior half of shield, 2 pairs of marginal setae (*r6, R1*) on lateral extensions of posterior half of shield, 3 additional pairs of marginal setae off shield on lateral soft cuticle. 3 pairs of submarginal (*UR*) setae on lateral soft cuticle. Setae *j1* and *z1* minute, other *j-J* and *z-Z* (except *Z5*) setae and *s1-2* and *s5* relatively short (10-22 long); other *s-S* setae longer (26-37 long) with *S5* 52 long. Lengths of marginal setae of paratype (specimen "B") as follows: *r2*-24, *r3*-15, *r4*-40, *r5*-35, *r6* (on posterior shield)-37, *R1*-40, *R2*-11, *R3-5*-7; seta *Z5* very stout and 86 long.

Venter (fig. 42) with pre-endopodal plates absent. Sternogenital shield unornamented, with 5 pairs of setae increasing in length from anterior to posterior, paragenital setae absent. Posterior endopodal plates partially fused with sternogenital shield. Metapodal plates subquadrate. Ventrianal shield smooth, with 5 pairs of ventral setae in addition to circumanal setae, *Jv2* and *Zv2* about twice as long as *Jv1* and *Zv1* (42 vs. 20 respectively); 3 pairs of setae (*Zv3, Jv4, Jv5*) on soft cuticle laterad of shield. Postanal seta 55 long.

Gnathosoma with tectum broad, distal terminus sharply tapered, edges smooth. Palp genu with anterodorsal seta unmodified. Chelicerae (fig. 43) with digits strongly hooked but edentate, with spermatodactyl 62 long, sinuous in distal half, without apical projection. Corniculi slender, widely spread basally and convergent distally.

Legs (figs. 44-47) similar to other *Rhinoseius* males, lengths in paratype specimen: I-367, II-281, III-310, IV-374 . Leg I with numerous setae enlarged; these setae include *ad1-2, pd1* and *v1-3* of femur, and seta *av2* and *pv1* of genu; most other setae longer than in female especially posterior dorsal and lateral setae. Leg II stout, strongly incurved ventrally between femur and tarsus; femur with seta *av1* very stout and rounded, *pv1* and *pv2* short, stout spines, *pd1, pd2* and *pl1* somewhat elongate, stout spines; genu with seta *av1* very small, but stout and rounded, *pd1, pd2* and *pl2* somewhat elongate; tibia with *av1* stout and rounded, *pl2* and *pd2* elongate; tarsus with setae *av1* and *pv1* stout and claw-like, *av2* and *mv* stout and rounded, *pv2* elongate. Leg III genu with *ad2, pd2* and *al2* long, but not as long as segment length, tibia with *ad1, al2, pd1, pd2* and *pl2* elongate, about equal to segment length, *al1* and *pl1* shorter; tarsus with *pv1* stout, *av2* a small, hooked spine, *av1, pv2, pl2, al2* and *mv* elongate. Leg IV femur with *ad1, ad2* and *v1* stout, *pd1* and *pl1* are microsetae; genu with *ad2* and *al2* elongate but shorter than segment length, other setae stout; tibia with all setae except *av1* and *pv1* long, *al2, ad2, pd2* and *pl2* approximately equal to segment length; tarsus with most setae longer than female homologues, especially more basal setae.

MATERIAL EXAMINED. 1 female and 1 male on the same slide; slide labeled "*Rhinoseius phaethornis* Fain, Hyland & Aitken, ♀, ♂ par.", "Nasal mites; Hôte: *Phaethornis longuemareus* n° 3727; Loc. Ravine Sable Trace, Vega del Oropóuche - Trinidad; Aitken coll., 8.XII.59"; the following specimens all collected from flower bracts of *Heliconia psittacorum* L. (Heliconiaceae): TRINIDAD: Waller Field, 11 March 1980, D.S. Dobkin (#T537) (12 females, 8 males); same locality and collector, 8 March 1980 (#T564) (4 females); 20 March 1980 (#80) (1 female), (#82) (1 male).

Records from hummingbirds follow: ex *Amazilia tobaci*: TRINIDAD: Arima Valley, lower La Laja Trace, 8 mi N Arima, 24 February 1976, R.K. Colwell (#U15) (1 female); Arima Valley, ridge trail 100 m E Simla, 4 March 1979, R.K. Colwell et al. (#T349) (1 female).

Ex *Chlorestes notatus*: Arima Valley, lower La Laja Trace, 8 mi N Arima, 23 February 1976, R.K. Colwell (#U7) (1 female).

Ex *Chrysolampis mosquitus*: Waller Field, no date, P. Feinsinger (#WB/B: W8) (1 male).

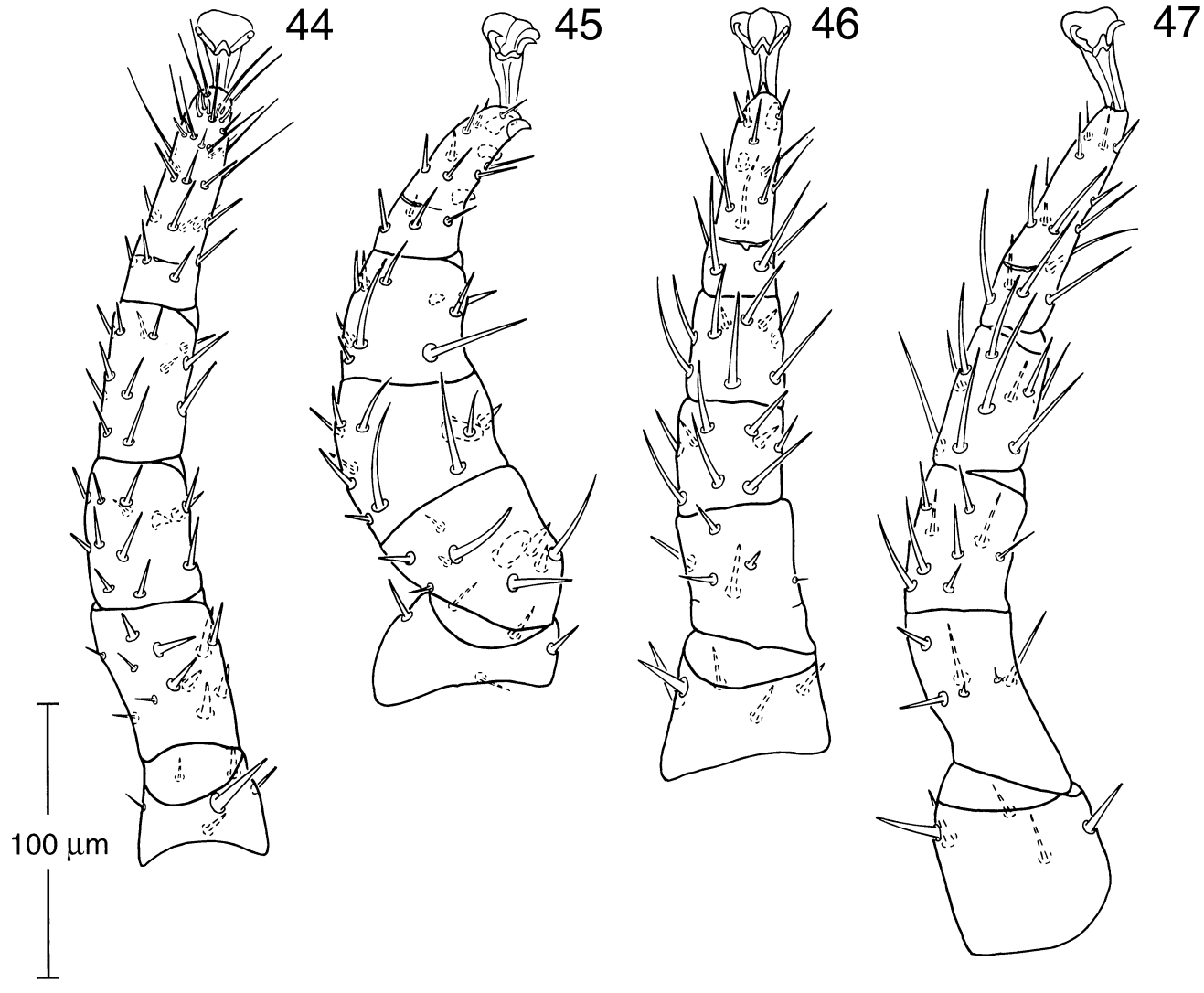
Ex *Glaucis hirsuta*: Arima Valley, Simla Quarry, 21 July 1975, R.K. Colwell (#T52) (1 female).

Ex *Phaethornis guy*: Arima Valley, Andrews Trace, 30 December 1973, R.K. Colwell (#T36) (3 females); Arima Valey, La Laja Trace, 17 March 1980, S. Naeem and D.S. Dobkin (#T589) (1 female).

DISCUSSION. Through the courtesy of Dr. Fain, we have examined one slide containing a female and male collected from *Phaethornis longuemareus* from Trinidad and labeled as paratypes of *R. phaethornis*. We believe that these specimens are from the same bird host as the "allotype," although there is one discrepancy in the data. All of the collection data on the slide agrees with those given in the original text except the host number which is listed as "no. 3729" in the text but is listed as "no. 3727" on the slide. However, in the same paper (pp. 129, 149), Fain et al. ascribe the host number "3729" to *Glaucis hirsuta* collected at the same locality and date. This suggests that the number "3729" associated with *P. longuemareus* in the listing under *R. phaethornis* in the text is a typographical error, and that the male examined is in fact the paratype indicated in the text (specimen B).

Specimens collected from flower bracts of *Heliconia psittacorum* during our studies agree in all respects with the females of *R. phaethornis*. Males collected in the flowers with the females are similar to the male paratype (specimen B) examined, but differ in significant details of the dorsal, ventral, and leg setation from the "allotype" (specimen A). There are two possible interpretations of this situation. First, it should be noted that both males originally ascribed to *R. phaethornis* were associated with females of that species only through collection from the same bird host. This evidence for conspecificity is much weaker than if the mites had been collected from a host plant. In our experience, it is not uncommon for an individual hummingbird to harbor multiple species of flower mites (up to 5), while plant hosts typically harbor only one *Rhinoseius* species (Colwell, 1986). Given that there are no unique morphological characters shared with the female, collection from the same bird host is not conclusive evidence that either male is conspecific with the female of *R. phaethornis*.

It is possible that the two male types are conspecific with each other, the species thus exhibiting polymorphism. Polymorphism in dorsal setal lengths is known for males of *R. colwelli* and *R. epoecus* (Hunter, 1972; Colwell and Naeem, 1979). However, in both cases, the variation is apparently continuous and the relative lengths of the dorsal setae to each other are similar (i.e. the allometric effects of body size are identical for all setae). There is also no indication of variation in the leg setation in the previously described species. In the present case, the two male types are of similar body size; the dorsal setae (except *Z5*) are of a relatively uniform size in specimen A, but in specimen B and our specimens, some setae in the *s-S* and *r-R* series are distinctly



Figs. 44-47. *Rhinoseius phaethornis* male. 44. leg I, dorsal view. 45. leg II, posteriodorsal view. 46. leg III, dorsal view. 47. leg IV, posteriodorsal view.

enlarged. Ventrally, in specimen A, setae *Jv1* and *Zv2* are equal in length to *Jv2* and *Zv2*, while in specimen B and our specimens, *Jv2* and *Zv2* are distinctly longer. Although not all details of the leg setation are given in the description of specimen A, distinct differences in setal lengths are noted on leg II which was completely figured, with some setae of specimen B and our specimens being much longer than on specimen A.

Based on our host plant collections in which females of *R. phaethornis* were always associated with males of form "B", we regard this male type as the undisputed male of the species. The identity of the described "allotype" remains questionable. The description and figures most closely resemble the previously undescribed male of *R. bisacculatus* described above, especially in regard to the dorsal and ventral setation. This species was collected at the same locality as specimen A (Fain et al., 1977b, p. 140). However, in *R. bisacculatus*, some setae of the legs are enlarged, a condition not mentioned in the description nor illustrated for leg II of specimen A. For the present, we regard the specific status of this specimen as uncertain.

Rhinoseius uniformis Fain, Hyland and Aitken, 1977

Rhinoseius uniformis Fain, Hyland and Aitken, 1977a: 185.

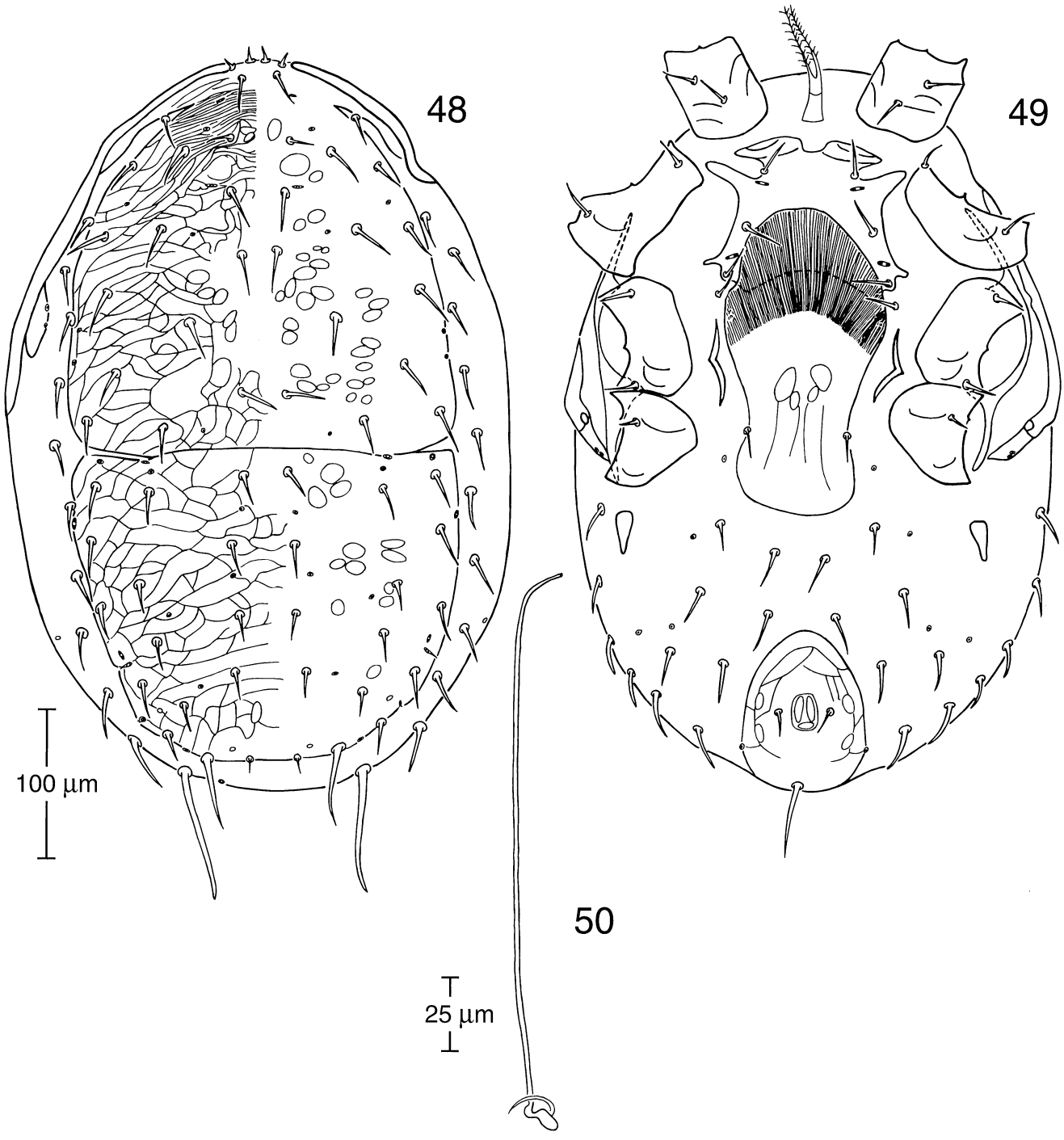
Rhinoseius uniformis Fain, Hyland and Aitken, 1977b: 143

Rhinoseius hirsutus Colwell, 1986: 408 (NOMEN NUDUM)

figs. 48-57.

This species was briefly diagnosed from the holotype female collected from the nares of *Phaethornis superciliosus* from Brazil (Fain, et al., 1977a). Fain et al. (1977b) redescribed and figured the female, giving the type-locality as Mosqueiro Ferry, Marituba, Pará, Brazil, and noting two additional paratype females, one from *Glaucis hirsuta*. We give here a complete description of the female and describe the male for the first time.

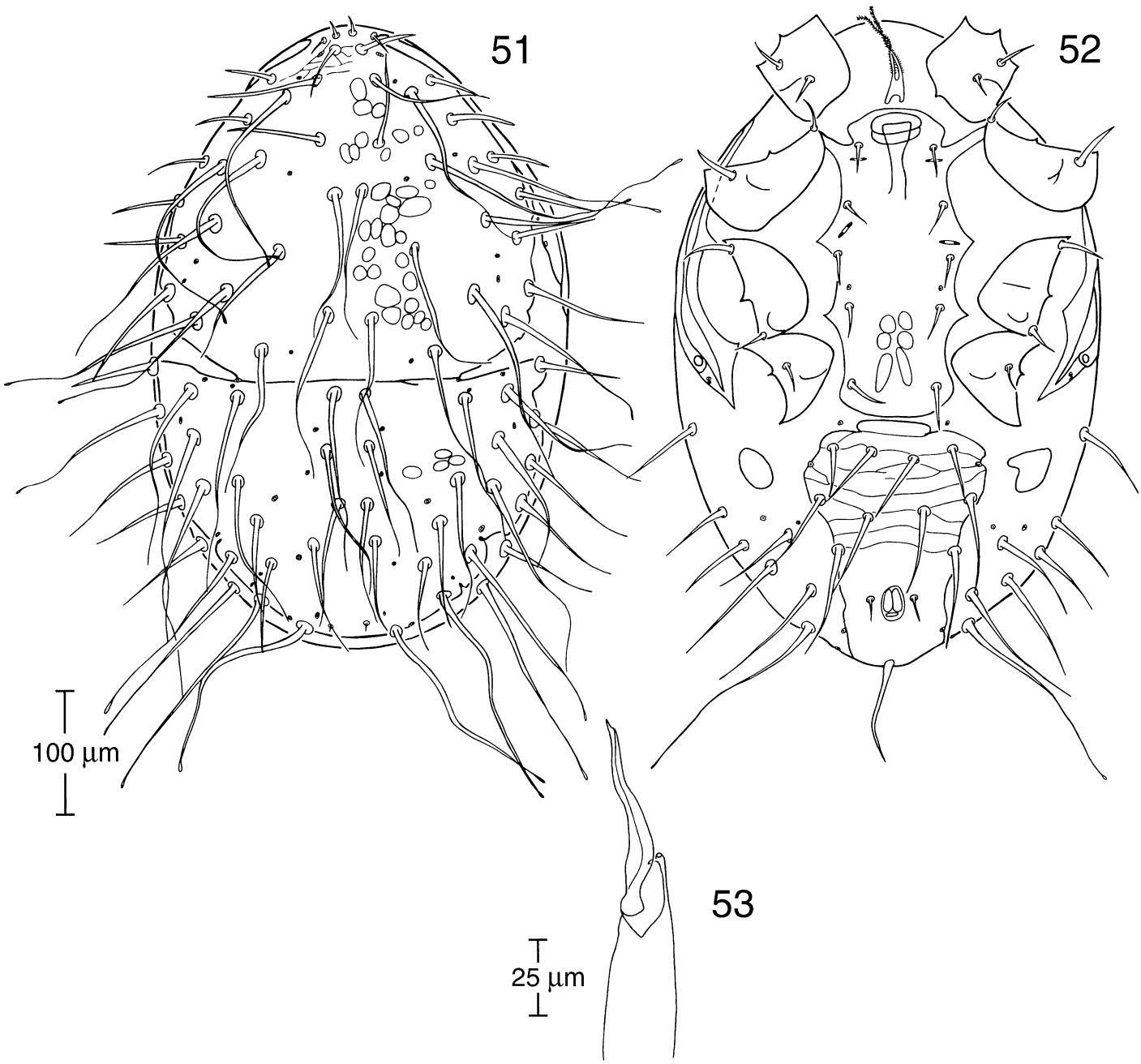
Female (figs. 48-50). Dorsum (fig. 48): dorsal shield length 508 (491-562), width between setae *s6* and *S1* 279 (263-293) (n=10), with lateral incisions between setae *s6* and *S1*; transverse suture complete between setae *s6* and *S1*; with reticulate to scale-like surface pattern over most of dorsal shield except in region bounded by setae *j2*, *j3*, *z2* and *s1* where pattern consists of closely spaced transverse lines. Dorsal shield with 32 pairs of smooth,



Figs. 48-50. *Rhinoseius uniformis* female. 48. body dorsum. 49. body venter. 50. spermathecal system.

simple setae; setae *z3* absent; 5 pairs of anterior marginal setae *r2-r6* and 5 pairs of posterior marginal setae (*R1-R5*) on soft cuticle laterad of shield; 5 pairs of submarginal (*UR*) setae on soft cuticle posteriad of coxae IV. Setae *j1*, *z1* (6-8) much shorter than other dorsal setae; most other dorsal setae (except *z5*) similar in length (18-30) becoming slightly shorter posteriorly and medially; setae *z5* stout, about twice the length of other dorsal shield setae. Gland pores, proprioceptors, and muscle attachments arranged as indicated in fig. 48.

Venter (fig. 49): tritosternum normal in shape with trapezoidal base and with slender, tapering pilose laciniae. Sternal shield with weak linear ornamentation present in presternal area anterior to first sternal setae. Sternal shield with posterior margin concave laterally, posterolateral corners rounded; anterolateral corners (below setae *st1*) of shield emarginated. Well developed endopodal sclerites present mesad of coxae III-IV Genital shield concave laterally, distinctly widened behind genital setae, with weak linear ornamentation; 1 pair of short genital setae on edges of shield, paragenital setae lacking. One pair of triangular metapodal plates present. Anal shield elliptical, longer than



Figs. 51-53. *Rhinoseius uniformis* male. 51. body dorsum. 52. body venter. 53. chelicera, ventrolateral view.

wide, reticulate pattern well developed; postanal seta slender, almost three times as long as para-anal setae. Eight pairs of ventral setae (*Jv1-5*, *Zv1-3*) on soft cuticle of opisthogaster, *Zv1* slightly shorter than more posterior setae, *Jv5* stout and about 2.75 times longer than *Jv4*. Peritreme extending anteriodorsally to base of seta *z1*. Spermathecal duct (fig. 50) consisting only of a very long adductor canal (about 130 long) without a sclerotized maturation pouch.

Fixed digit of chelicera with 2 subapical teeth, movable digit lacking teeth. Tectum triangular, tapering to a fine point. Deutosterum with 7 transverse rows of denticles; all rows connected; no rows widened. Three pairs of rostral setae simple, slender, posterior internal seta longest (40), anterior seta 20, posterior external seta 8; capitular setae slender, simple, about 16. Corniculi somewhat convergent; internal malae extending to tip of corniculi.

Legs I-IV (including pretarsi) respectively 82, 80, 80 and 99 percent of dorsal shield length. Pretarsi well developed. Coxae I with 2-4 faint lines laterally and medially; coxae II with one pronounced ventral boss; coxae III with two pronounced convex bosses in the posterior ventral region; coxae IV with two weak ventral bosses. All leg setae short and setiform except specialized sensory group apically on tarsus and the following setae of the trochanters and femora which are distinctly barbed: TrI, *pd1*; FeI, *pd1-2*; FeII, *ad1*, *pd1-2*; FeIII-IV, *ad1*; genua I-IV with 13-11-9-9 setae, tibiae I-IV with 13-11-9-10 setae.

Male (figs. 51-57). Dorsal shield (fig. 51) length 494 (468-527), width between setae *s6* and *S1* 307 (263-345) (n=9); linear

ornamentation visible only in far anterior region of shield. All setae of *j-J, z-Z* and *s-S* series on shield, marginal seta *r2-5* on anterior portion of shield, *r6* and *R1-3* on posterior half of shield, other marginal setae (*R4-5*) off shield on lateral soft cuticle. 4 pairs of submarginal (*UR*) setae on lateral soft cuticle. Setae *j1, z1* and *J5* minute; *j2, s1, r2, r3, r4* and *r5* more or less spine-like, increasing in length from anterior to posterior, *r6* also spinelike but shorter than *r5*. Other setae in *j-J, z-Z* and *s-S* series very long and filiform, *Z3* and *Z4* somewhat shorter than other posterior shield setae. Posterior marginal setae *R1-4* similar in form and length to *Z3, R5* very long, similar to *S5*. Some setae with blunt or spatulate tips apparent in some preparations. The latter may be an artifact of the preparation. Lengths of dorsal idiosomal setae showing allometric effects of body size; lengths in smallest and largest male (both collected from the same flower) as follows: *j1*, 9-13; *j2*, 24-48; *j3*, 97-103; *j4*, 51-81; *j5*, 99-139; *j6*, 99-150; *z1*, 11-20; *z2*, 110-169; *z4*, 128-183; *z5*, 81-121; *z6*, 66-128; *s1*, 22-44; *s2*, 24-55; *s3*, 114-165; *s4*, 147-191; *s5*, 121-187; *s6*, 139-191; *r2*, 44-55; *r3*, 55-66; *r4*, 53-73; *r5*, 79-110; *r6*, 62-73; *J1*, 106-161; *J2*, 84-132; *J3*, 70-117; *J4*, 59-103; *J5*, 7 (no variation); *Z1*, 143-169; *Z2*, 73-130; *Z3*, 57-88; *Z4*, 46-81; *Z5*, 132-198; *S1*, 110-154; *S2*, 132-194; *S3*, 128-187; *S4*, 128-178; *S5*, 154-205; *R1*, 99-167; *R2*, 68-114; *R3*, 73-95; *R4*, 55-88; *R5*, 110-191.

Venter (fig. 52) with sternogenital shield smooth; ventrianal shield with transverse striations, sternogenital shield with 5 pairs of relatively short setae, paragenital setae absent. Metapodal plates triangular to rounded in shape. Ventrianal shield with 5 pairs of ventral setae in addition to circumanal setae. Setae *Zv1* shorter than other ventrianal setae but still reaching base of *Zv2*; other ventrianal and submarginal setae relatively long, spine-like to filiform; *Jv5* very long and filiform.

Gnathosoma with tectum more narrowly rounded apically and steeply sided basally than on female. Palps generally similar to female. Chelicerae (fig. 53) with digits edentate but strongly hooked apically; spermatodactyl 66 long, somewhat sinuous and tapering to a fine point. Corniculi more slender, widely spread basally and convergent distally than on female; other features of gnathosoma as on female.

Legs (figs. 54-57) strongly divergent from female form. Leg I somewhat thicker than in female with some setae longer and stouter than homologues on female; these setae include *pd1-3* of the genu and *pd2-3* of tibia; trochanter and femur with barbed setae as in female. Leg II stouter than leg II of female, incurved ventrally between femur and tarsus; femur with seta *av1* very stout and rounded, *pv1* and *pv2* stout spines, *ad1, pd1, pd2* and *pl1* elongate, stout spines, *ad1, pd1* and *pd2* barbed as in female; genu with seta *avl* stout and rounded, other setae except *al1-2* longer and stouter than in female; tibia with *av1* stout and rounded, *pd1-2* and *pl2* elongate; tarsus with setae *av1* and *pv1* stout and claw-like, *av2* and *mv* stout and rounded, other setae as in female. Leg III stouter than in female but not as stout as leg II; femur with *ad1, ad2,* and *pd1* stout spines, longer than in female; genu with *ad1, ad2, pd1, pd2* and *al2* very long, *al1* shorter but still longer than in female; tibia with *ad1, al2, pd1, pd2* and *pl2* very elongate, *al1* and *pl1* elongate to a lesser degree; tarsus with *pv1* stout and clawlike, *av2* a stout spine, *pl3* longer than in female, other setae similar to female form or shorter. Leg IV similar in size and shape to that of female; femur with *ad1, ad2, v1* and *v2* elongate spines; genu with *ad1, ad2, pd1, pd2* elongate spines, longer than the segment, *pd3, al1, al2* and *av1* shorter but still distinctly longer than in female; tibia with all setae except *av1* and *pv1* very long, *ad2* longest seta on the leg; tarsus with *pl3* elongate, most other setae similar to or slightly longer than female homologues.

MATERIAL EXAMINED. The following specimens were collected from flowers of *Psychotria poeppigiana* Muell. Arg. (Rubiaceae): TRINIDAD: Arima Valley, La Laja Trace, 8 mi N. Arima, 10 August 1975, R.K. Colwell (#T73) (4 females, 8 males, 13 deutonymphs, 9 protonymphs, 1 larva); Lower La Laja road, 23 February 1976, R. K. Colwell (#U49) (3 females, 1 male, 3 deutonymphs, 2 protonymphs, 3 larvae); Arima Valley, Temple Village, Cricket Pitch, 16 February 1979, R.K. Colwell et al. (#T217) (2 females, 1 male).

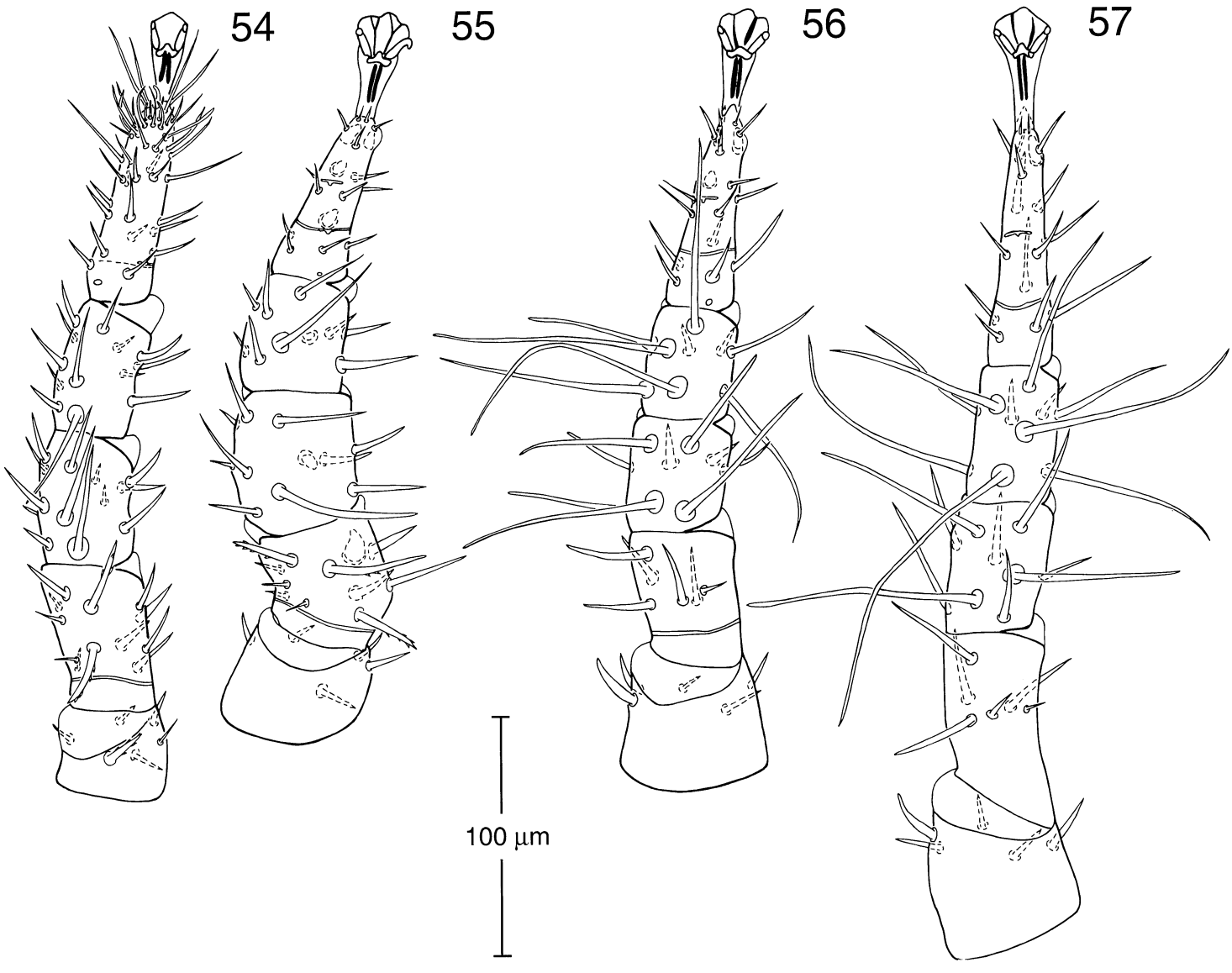
Records from hummingbirds follow: ex *Amazilia tobaci*: TRINIDAD: Arima Valley, Simla Quarry, 15 February 1976, R.K. Colwell (#U11) (2 females); Arima Valley, lower La Laja Trace, 8 mi N Arima, 13 February 1976, R.K. Colwell (#U13) (3 females).

Rhinoseius fidelis NEW SPECIES

Rhinoseius fidelis Colwell, 1986 (NOMEN NUDUM) (figs. 58-67).

Female (figs. 58-60). Dorsum (fig. 58): dorsal shield length 550, 556 (527-562), width between setae *s6* and *S1* 316, 315 (304-322) (n=10), with lateral incisions between setae *s6* and *S1* extending to or beyond level of setae *Z1*; transverse suture complete between setae *s6* and *S1*; with lineate to slightly reticulate surface pattern over most of dorsal shield, becoming indistinct over muscle attachments and posterior region of posterior shield. Dorsal shield with 33 pairs of smooth, simple setae; setae *j1* and *r2* on shield; 4 pairs of anterior marginal setae (*r3-r6*) and 5 pairs of posterior marginal setae (*R1-5*) on lateral membrane; 3 pairs of submarginal (*UR*) setae on soft cuticle posteriad of coxae IV. Setae *j1, z1,* and *J5* minute (8-12), much shorter than other dorsal setae; setae *s1, j2-5* (17-18) somewhat shorter than other central dorsal setae (22-24); other dorsal setae of *s-S* and *r-R* series about 1.5 times longer than setae of *j-J* and *z-Z* series (33-36). Gland pores, proprioceptors, and muscle attachments arranged as indicated in fig. 58.

Venter (fig. 59): tritosternum normal in shape with trapezoidal base and with slender, tapering pilose laciniae. Sternal shield with linear ornamentation present in presternal area anterior to first sternal setae. Sternal shield with posterior margin not concave laterally, posterolateral corners rounded; anterolateral corners (laterad of setae *st1*) of shield only slightly emarginated. Well developed endopodal sclerites present mesad of coxae III-IV Genital shield concave laterally, widened behind genital setae, with weak linear ornamentation; 1 pair of short genital setae on edges of shield, paragenital setae lacking. One pair of triangular to subquadrate metapodal plates posterior to coxae IV. Anal shield elliptical, longer than wide, ornamentation well developed; postanal seta slender, at least twice as long as paraanal setae. Eight pairs of ventral setae (*Jv1-5, Zv1-3*) on soft cuticle of opisthogaster, *Jv4* longer than more anterior setae, *Jv5* stout and about twice as long as *Jv4*. Peritreme extending anteriodorsally almost to base of seta *z1*. Spermathecal duct (fig. 60) consisting of an adductor canal (about 130 long) and a sclerotized maturation pouch having a distinct right-angle bend; short arm of maturation pouch (toward ovary) about 15-17 long,



Figs. 54-57. *Rhinoseius uniformis* male. 54. leg I, posteriodorsal view. 55. leg II, posteriodorsal view. 56. leg III, dorsal view. 57. leg IV, dorsal view.

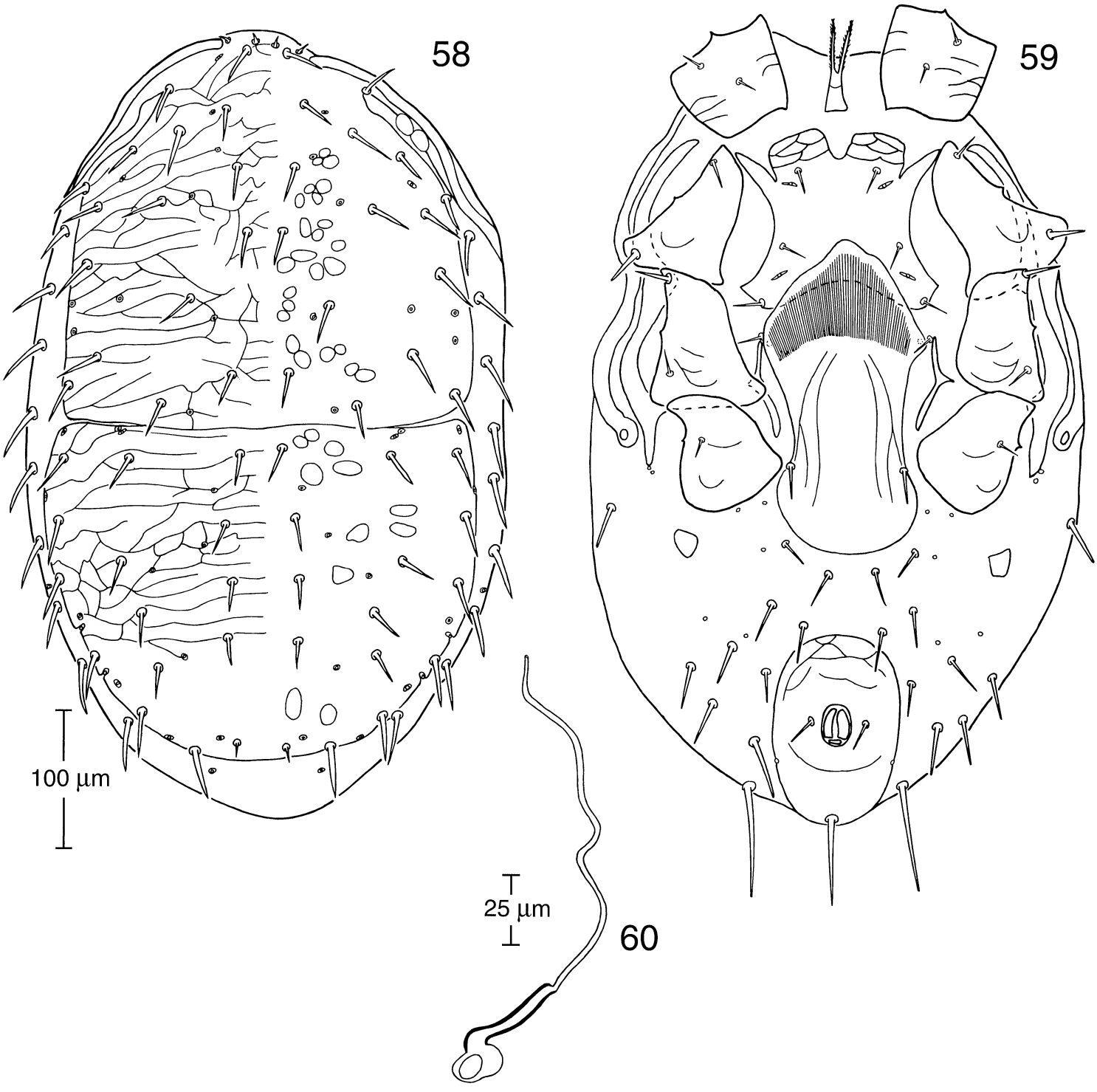
more distal arm about 30-35 long.

Fixed digit of chelicera with 2 subapical teeth, movable digit lacking teeth. Tectum triangular, tapering to a fine point. Deutosterum with 7 transverse rows of denticles; all rows connected; no rows widened. Three pairs of rostral setae simple, slender, external posterior pair somewhat shorter than inner pairs; capitular setae slender, simple. Corniculi somewhat convergent; internal malae extending to tip of corniculi.

Legs I-IV (including pretarsi) respectively 84, 71, 79 and 90 percent of dorsal shield length. Pretarsi well developed. Coxae I with 2-4 faint lines laterally and medially; coxae II and III each with a pronounced convex boss; coxae IV with a less developed boss. All leg setae short and setiform except specialized sensory group apically on tarsus I; genua I-IV with 13-11-9-9 setae, tibiae I-IV with 13-11-9-10 setae.

Male (figs. 61-67) Dorsal shield (fig. 61) length 573 (527-603), width between setae *s6* and *S1* 375 (322-398) (n=10); shield generally smooth, without linear ornamentation or if ornamentation present, then restricted to anteriormost portion of shield. All setae of *j-J, z-Z* and *s-S* series on shield, 4 pairs of marginal setae (*r2-5*) on anterior half of shield, posterior half of shield with anterior 4 pairs of marginal setae on shield (*r6, R1-3*), 2 additional pairs of marginal setae (*R4-5*) on lateral soft cuticle. 3 pairs of submarginal (*UR*) setae on lateral soft cuticle. Setae of *j* series on anterior half of shield increasing in length from anterior to posterior, lengths of *j1-j6*: 12, 26, 29, 31, 33, 35 ; lengths of posterior *J* series reversing pattern, lengths of *J1-J5*: 35, 31, 29, 26, 13 ; setae of *z-Z* series showing similar pattern but *z2* and *z4* longest (except *Z5*), lengths of *z1-z6* (note *z3* absent): 20, 44, 44, 37, 35 ; lengths of *Z1-Z5*: 35, 33, 26, 28, 101 ; setae of *s-S* series longer and stouter, lengths of *s1-s6*: 31, 39, 66, 59, 44, 56, lengths of *S1-S5*: 59, 62, 55, 59, 74 . Marginal setae (*r2-R1*) long and stout, more posterior *R* setae shorter and thinner, lengths of *r2-r6*: 59, 53, 68, 73, 77 ; lengths of *R1-R5*: 66, 40, 26, 24, 29.

Venter (fig. 62) with sternogenital and ventrianal shields

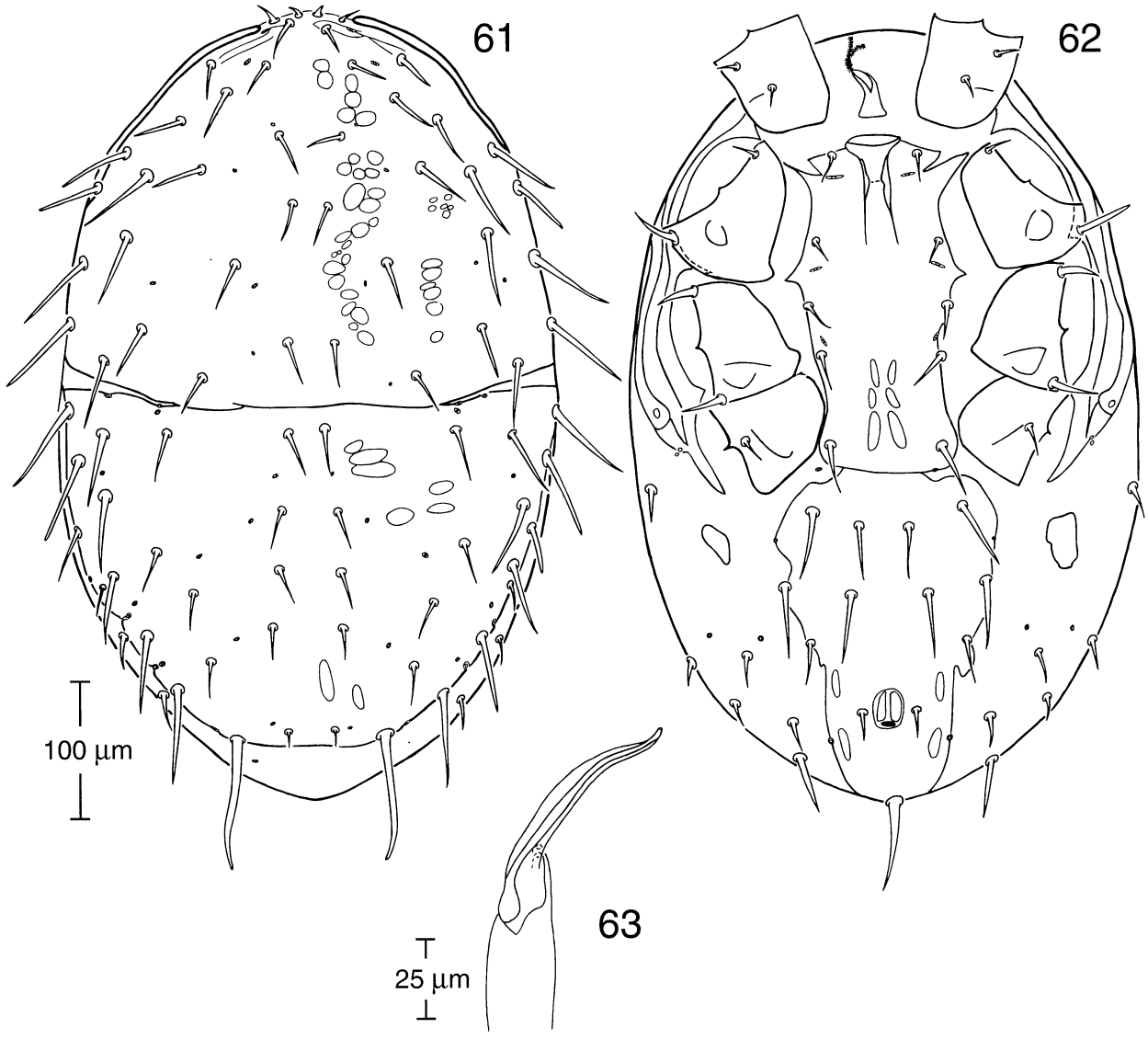


Figs. 58-60. *Rhinoseius fidelis* female. 58. body dorsum. 59. body venter. 60. spermathecal system.

smooth; sternogenital shield with 5 pairs of setae increasing in length from anterior to posterior, paragenital setae absent. Metapodal plates irregularly shaped. Ventrianal shield with 5 pairs of ventral setae in addition to circumanal setae. Setae *Jv2*, *Zv1* and Zv2 equal in length (53), other setae shorter, lengths: *Jv1*-40, *Jv4*-22, *Jv5*-44, *Zv3*-23 .

Gnathosoma with tectum more narrowly rounded apically and steeply sided basally than on female Palps generally similar to female. Chelicerae (fig. 63) with digits edentate but strongly hooked apically; spermatodactyl 62-66 long, somewhat curved distally. Corniculi more slender, widely spread basally and convergent distally than on female; other features of gnathosoma as on female.

Legs (figs. 64-67) strongly divergent from female form. Leg I somewhat thicker than in female with most setae stouter than homologues on female; these setae include *d* of trochanter, *pd1*,



Figs. 61-63. *Rhinoseius fidelis* male. 61. body dorsum. 62. body venter. 63. chelicera, ventral view.

pd2, *pl1*, *pl2*, *v1-3* of femur (*v2* a short, rounded spine); genu with dorsal and posterior lateral setae thicker than in female, seta *av2* a short, hooked spine; tibia similarly with posterior dorsal and especially posterior lateral setae thickened, *pl* setae also much longer than in female; tarsus with some basal setae thicker than in female. Leg II much stouter than onf female, strongly incurved ventrally between femur and tarsus; femur with seta *avl* very stout and rounded, *ad1*, *pv1* and *pv2* stout spines, *pd1*, *pd2* and *pl1* elongate, stout spines; genu with seta *av1* stout and rounded, *ad2*, *pd1*, *pd2* and *pl2* elongate, *pv1*, and other anterior dorsal setae stouter than in female; tibia with *av1* small, but stout and rounded, *pl2* and *pd2* elongate, *pd1* and *pl1* shorter but still longer and stouter than in female; tarsus with setae *av1* and *pv1* stout and claw-like, *av2* and *mv* stout and rounded, *pv2* longer than in female, other setae as in female. Leg III stouter than in female but not as stout as leg II; femur with *ad1*, *ad2*, *pd1*, *al1* and *v* stout spines, longer than in female; genu with *ad2*, *pd2* and *al2* almost as long as segment, *ad1*, *pd1*, *al1* and *pl1* shorter but still longer than in female; tibia with *al2*, *pd2* and *pl2* approximately equal to segment length, *al1*, *ad1*, *pd1* and *pl1* elongate to a lesser degree, approximately as long as segment width; tarsus with *pv1* stout and clawlike, *av2* a stout, hooked spine, *av1*, *pv2*, *pl2*, *al2* and *mv* elongate. Leg IV similar in size and shape to that of female; femur with *al1*, *ad1*, *ad2* and *v1* elongate spines, *pd1* and *pl1* very short; genu with all setae stout spines, longer than in female, especially *al2*, *ad2* and *pd2*; tibia with all setae except *av1* and *pv1* longer and stouter than in female, especially *al1*, *al2*, *ad2*, *pd2*, *pl1* and *pl2*; tarsus with most setae longer than female homologues, especially more basal setae.

ETYMOLOGY. The specific name "*fidelis*" is from the Latin meaning "faithful", referring to the relatively strong host plant specificity exhibited by *Rhinoseius* species in general.

MATERIAL EXAMINED. All examined specimens are designated as belonging to the type series and were collected from flowers of *Costus arabicus* Aubl. (Costaceae) as follows: TRINIDAD: Arima Valley, 8 mi. N. Arima, La Laja Plantation, 20 August 1980, D.S. Dobkin (#30) (Holotype and 19 paratype fe-

males, 7 males, 6 deutonymphs, 13 protonymphs, 2 larvae); same collection data (#29) (79 females, 147 males, 93 deutonymphs, 47 protonymphs, 10 larvae); same collection information, (#31) (26 females, 18 males, 6 deutonymphs); same locality, La Laja Trace, 8 August 1975, R. K. Colwell (#T72) (2 females, 1 male); Arima Valley, Blanchicheusse Rd, mile 7, 23 February 1976, R. K. Colwell (#U51) (1 female, 6 males).

We did not recover this species from any hummingbirds examined.

SPECIMEN DEPOSITION. Holotype and paratypes in UMMZ, paratypes in NMNH, CNC, IRSNB, RKC.

DISCUSSION. Adults of this species are very similar to *Rhinoseius mathewsoni* Hyland, Fain & Moorhouse, 1978, which was described from hummingbird hosts in Mexico and later reported from Colombia (Ohmer et. al., 1991). *Rhinoseius fidelis* shares with that species the form of the female spermathecal system in which the maturation pouch is bent in a right angle, and the general pattern of enlarged setae on the male dorsum. *Rhinoseius fidelis* differs from *R. mathewsoni* in both sexes in the distinctly larger body size; measurements of *R. mathewsoni* given in the original description fall well below those of the smallest specimens of *R. fidelis*. Females of *R. fidelis* are distinguished by the greater length of dorsal setae in the *s-S* and *r-R* series compared with setae in the *j-J* and *z-Z* series; these setae are described as being of generally "uniform length" in *R. mathewsoni*. Females of *R. fidelis* are also possibly distinguished by the well developed pattern of dorsal shield ornamentation which was described as "nearly absent" in *R. mathewsoni*. We have, however, found this characteristic to be quite variable within other species.

Males of *R. fidelis* may be distinguished from those of *R. mathewsoni* by the consistent presence of seta *Zv3* on the ventrianal shield (off the shield in *R. mathewsoni*), and the length and shape of seta *Jv5* which is distinctly stouter and at least twice as long as *Jv4* (both setae short and setiform in *R. mathewsoni*).

Rhinoseius klepticos NEW SPECIES

Rhinoseius klepticos Colwell, 1986: 408 (NOMEN NUDUM) (figs. 68-77).

Female (figs. 68-70). Dorsum (fig. 68): dorsal shield length 556, 577 (556-585), width between setae *s6* and *S1* 269, 293 (269-310) (n=7), with lateral incisions between setae *s6* and *S1* extending mesad of sestae *Z1*; transverse suture complete; with lineate pattern over most of dorsal shield, slightly reticulate laterally and scalelike medially on anterior half of shield, becoming indistinct over muscle attachments. Dorsal shield with 32 pairs of smooth, simple setae; 5 pairs of anterior marginal setae *r2-r6* and 5 pairs of posterior marginal setae (*R1-5*) on soft cuticle laterad of shield; 3 pairs of submarginal (*UR*) setae on soft cuticle posteriad of coxae IV. Setae *j1*, *z1*, and *J5* minute (4-5), much shorter than other dorsal setae; setae *s3-6* and *S1-4* (29-32) slightly but distinctly longer than more central dorsal shield setae (22-25). Gland pores, proprioceptors, and muscle attachments arranged as indicated in fig. 68.

Venter (fig. 69): tritosternum normal in shape with trapezoidal base and with slender, tapering pilose laciniae. Sternal shield with faint linear ornamentation present in presternal area anterior to first sternal setae. Sternal shield with posterior margin indented laterally, anterolateral corners of shield only slightly emarginated (at level of setae *st1*). Well developed endopodal sclerites present mesad of coxae III-IV Genital shield concave laterally, slightly widened behind genital setae, with weak linear linear ornamentation; 1 pair of short genital setae on edges of shield, paragenital setae lacking. One pair of triangular metapodal plates present. Anal shield elliptical, about 1.7 times longer than wide, reticulate pattern distinct; postanal seta slender, 3-4 times longer than para-anal setae. Eight pairs of ventral setae (*Jv1-5*, *Zv1-3*) on opisthosomal venter, *Jv4* distinctly longer than more anterior setae, about twice as long as *Jv4*, *Jv5* (illustrated in dorsal view, fig. 68) stout and about twice the length of *Jv4*. Peritreme extending anteriodorsally to base of seta *z1*; peritrematal shield weakly fused to exopodal sclerites posteriorly. Spermathecal duct (fig. 70) consisting of an adductor canal (about 62 long) and a sclerotized maturation pouch (about 88 long).

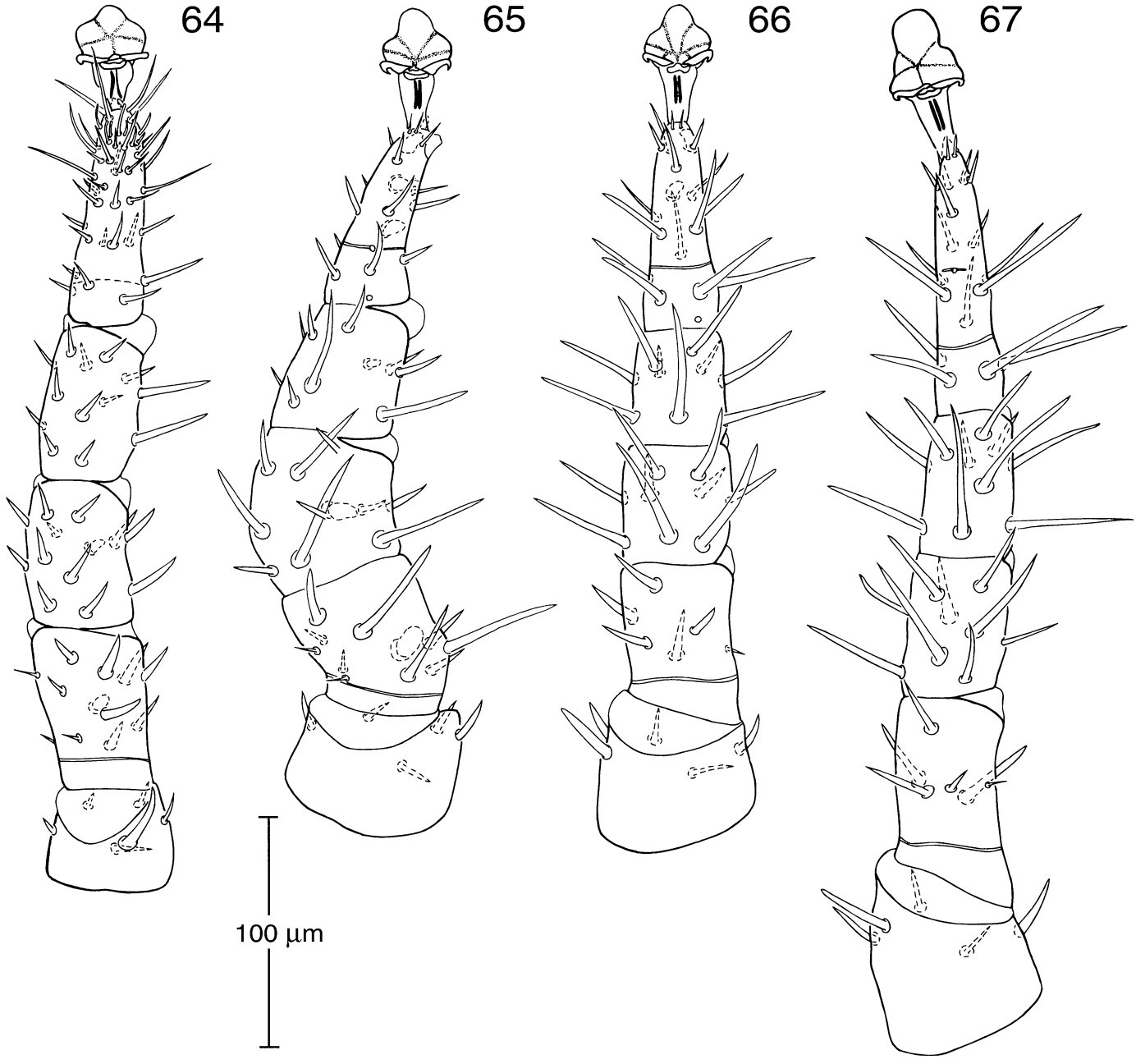
Fixed digit of chelicera with 2 subapical teeth, movable digit lacking teeth. Tectum triangular, tapering to a fine point. Deutosterum with 7 transverse rows of denticles; all rows connected; no rows widened. Three pairs of rostral setae simple, slender, approximately equal in length; capitular setae slender, simple. Corniculi somewhat convergent and slightly sinuate; internal malae extending to tip of corniculi.

Legs I-IV (including pretarsi) respectively 84, 79, 81 and 98 percent of dorsal shield length. Pretarsi well developed. Coxae I with 2 faint lines laterally and medially; coxae II with 1-2 and III with 2-3 pronounced convex bosses; coxae IV with two bosses. All leg setae short and setiform to slightly spinelike, except basal ventral and lateral tarsal setae somewhat longer, and specialized sensory group apically on tarsus I; genua I-IV with 13-11-9-9 setae, tibiae I-IV with 13-11-9-10 setae.

Male (figs. 71-77). Dorsal shield (fig. 71) length 562, width 316; linear ornamentation restricted to lateral regions of anterior half of shield. All setae of *j-J*, *z-Z*, *s-S*, and *r-R* series on shield (*r2* present), *r6* on anteriolateral corners of posterior half of shield. 3 pairs of submarginal (*UR*) setae on lateral soft cuticle. Most setae setiform except *Z5*, most *s-S* setae and all *r-R* and *UR* setae which are thicker and spinelike. Setae *j1*, *z1* and *J5* minute, other *j*, *z* and anterior *s* series setae on anterior half of shield and *J* series and *Z* series (except *Z5*) setae on posterior half of shield relatively short. Posterior *s*, all *S* and all marginal setae (*r-R*) distinctly longer, lengths increasing toward mid body. Lengths of setae as follows: *j1*-6; *j2*-37; *j3*-24; *j4*-26; *j5*-26; *j6*-30; *z1*-6; *z2*-42; *z4*-44; *z5*-35; *z6*-29; *s1*-37; *s2*-40; *s3*-70; *s4*-90; *s5*-44; *s6*-66; *r2* asymmetrical, lengths 59 and 81; *r3*-42; *r4*-68; *r5*-77; *r6*-90; *J1*-26; *J2*-24; *J3*-22; *J4*-18; *J5*-8; *Z1*-33; *Z2*-29; *Z3*-29; *Z4*-26; *Z5*-92; *S1*-75; *S2*-92; *S3*-73; *S4*-75; *S5*-77; *R1*-95; *R2*-81; *R3*-70; *R4*-66; *R5*-68.

Venter (fig. 72) with sternogenital and ventrianal shields smooth; sternogenital shield with 5 pairs of relatively short setae, paragenital setae absent. Metapodal plates quadrangular to ovoid. Ventrianal shield with 5 pairs of ventral setae in addition to circumanal setae, lengths of setae as follows: *Jv1*-33; *Jv2*-64; *Jv3*-51; *Jv4*-59; *Jv5*-70; *Zv1*-40; *Zv2*-59; *Zv3*-62; *UR* setae each 62. *Jv4-5* and *UR* setae thicker than others; postanal seta 3 times longer than para-anal setae.

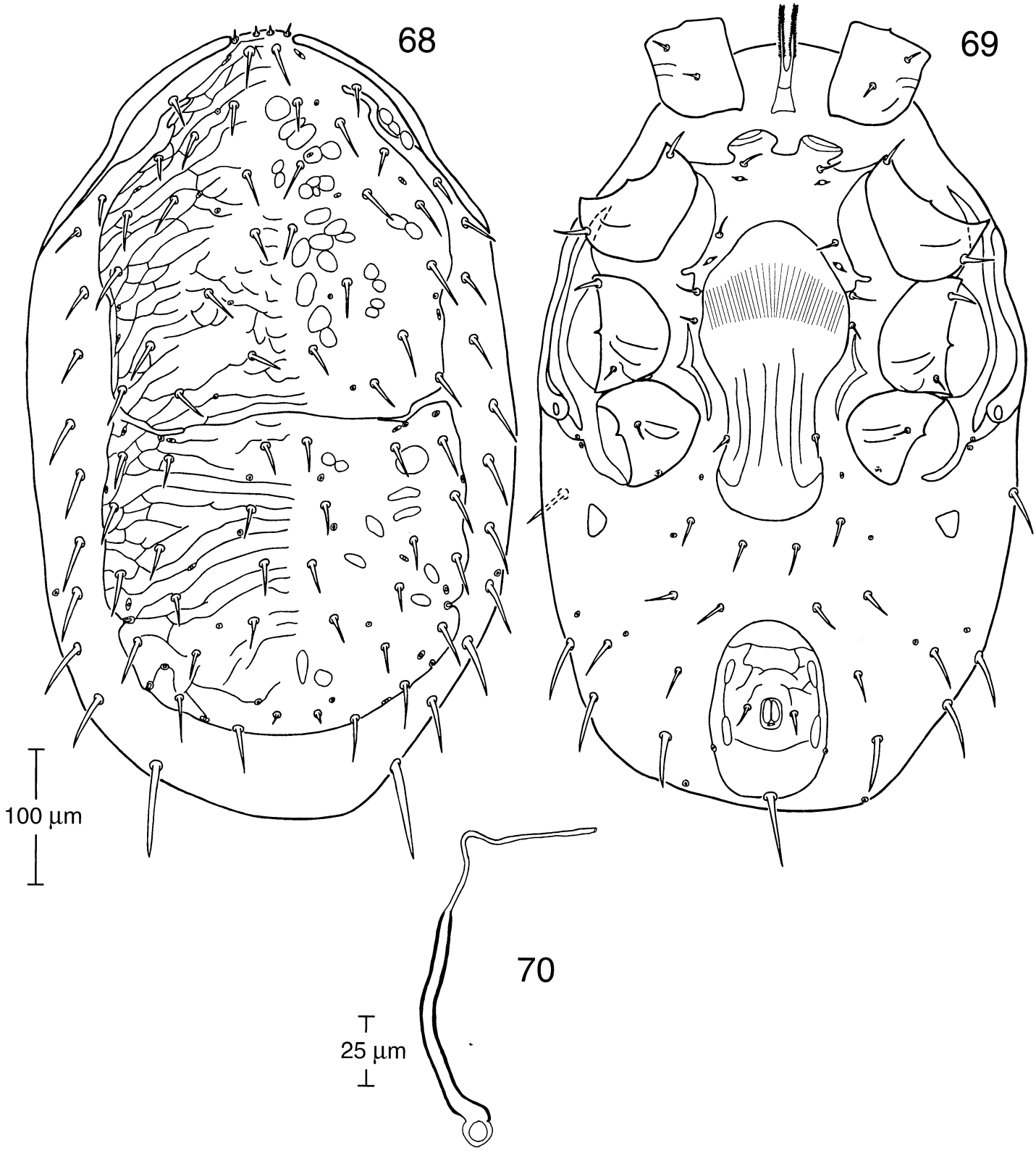
Gnathosoma with tectum more narrowly rounded apically and steeply sided basally than on female. Palps generally similar to female except dorsal setae of genu, especially *d3*, shorter and more spine like. Chelicerae (fig. 73) with digits edentate but strongly hooked apically; spermatodactyl 73 long, straight, with a tiny, apical, hooked projection. Corniculi more slender, widely spread basally and convergent distally than on female; other fea-



Figs. 64-67. *Rhinoseius fidelis* male. 64. leg I, dorsal view. 65. leg II, posteriodorsal view. 66. leg III, dorsal view. 67. leg IV, dorsal view.

tures of gnathosoma as on female.

Legs (figs. 74-77) strongly divergent from female form. Leg I somewhat thicker than in female with numerous setae longer and stouter than homologues on female; setae include *d* of trochanter distinctly thicker than on female; seta *av2* of genu a short, blunt spine, most other dorsal and lateral genual setae distinctly thicker and/or longer than in female; posterior dorsal and lateral setae of tibia, particularly *pd2, pd3* longer than on female; posterior dorsal and lateral setae of basal whorl of tarsus longer and stouter than on female. Leg II stouter than on female, incurved ventrally between femur and tarsus; femur with seta *av1* very stout and rounded, *pv1* and *pv2* stout spines, *pd1* and *pl1* elongate, stout spines, *pd2* stouter than on female; genu with seta *av1* stout and rounded, *pd1-2* and *pl2* elongate, other setae stouter than on female; tibia with *av1* rounded, *pd1-2* and *pl2* very elongate; tarsus with setae *av1* and *pv1* stout and clawlike, *av2* and *mv* stout and rounded, other setae as in female. Leg III slightly stouter than in female but not as stout as leg II; femur with more anterior setae stout stouter than on female; genu with *ad2, pd2* and *al2* elongate, *ad1, pd1, al1* and *pl1* stouter than in female; tibia with *ad1, al2, pd2* and *pl2* elongate, other dorsal and lateral setae elongate to a lesser degree; tarsus with *pv1* stout and clawlike, *av2* a rounded spine, most other setae longer than in female. Leg IV similar in size and shape to that of female; femur with *ad1, ad2, v1* and *v2* stouter than in female; genu with *ad2, pd2,* and *al2* elongate spines, other setae

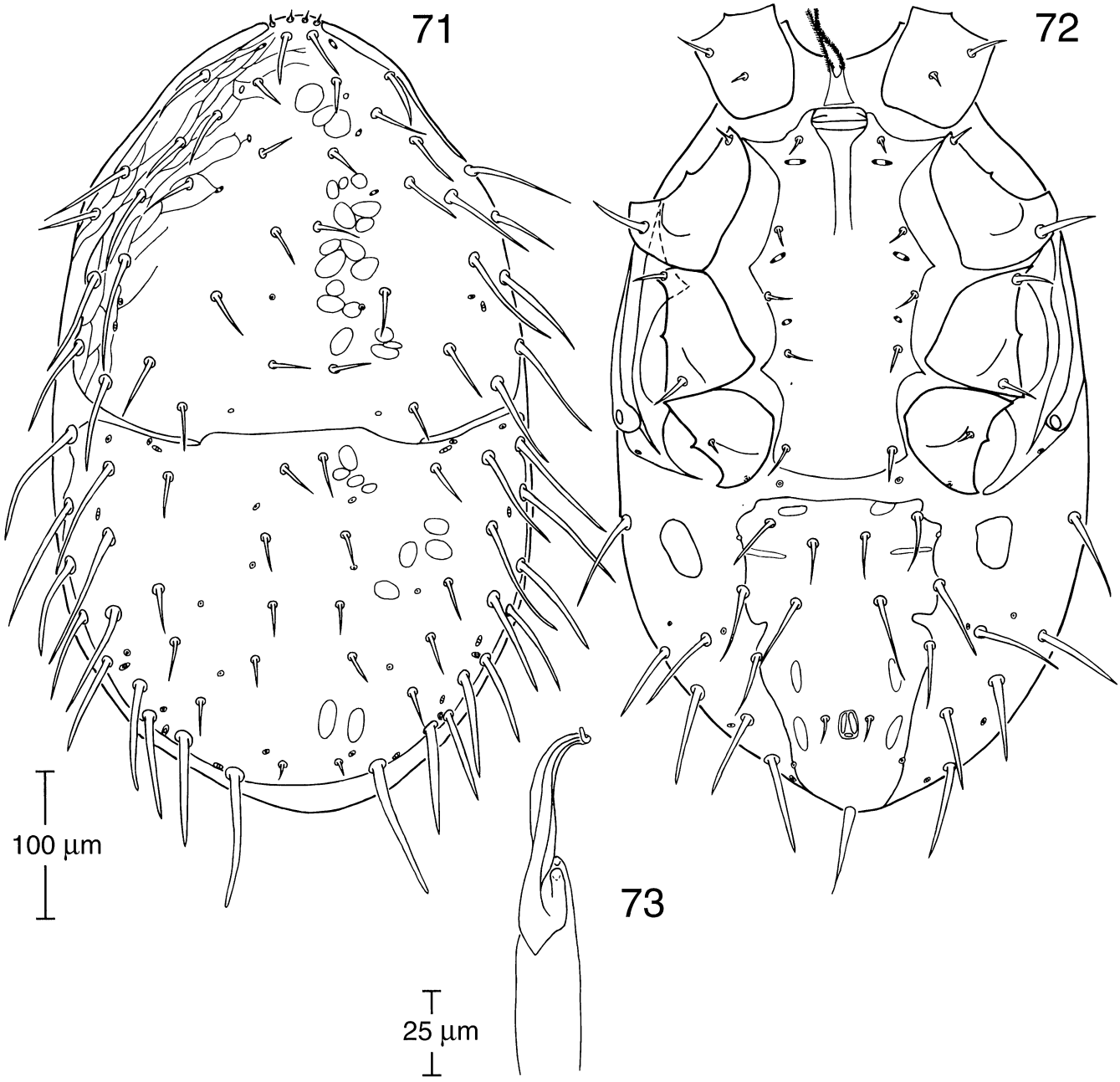


Figs. 68-70. *Rhinoseius klepticos* female. 68. body dorsum. 69. body venter. 70. spermathecal system.

longer than in female; tibia with all setae except *av1* and *pv1* very long; tarsus with most setae stouter and somewhat longer than female homologues, especially more basal setae.

ETYMOLOGY: The specific name is derived from the Greek "κλεπτικοσ" = thievish, referring to the habit of *Rhinoseius* mites of stealing pollen.

MATERIAL EXAMINED. The following specimens were collected from flowers of *Heliconia spathocincinata* Aristeguieta (Heliconiaceae): TRINIDAD: Arima Valley, ridge trail above Simla Research Station, 4 mi N. Arima, 3 August 1975, R.K.



Figs. 71-73. *Rhinoseius klepticos* male. 71. body dorsum. 72. body venter. 73. chelicera, ventral view.

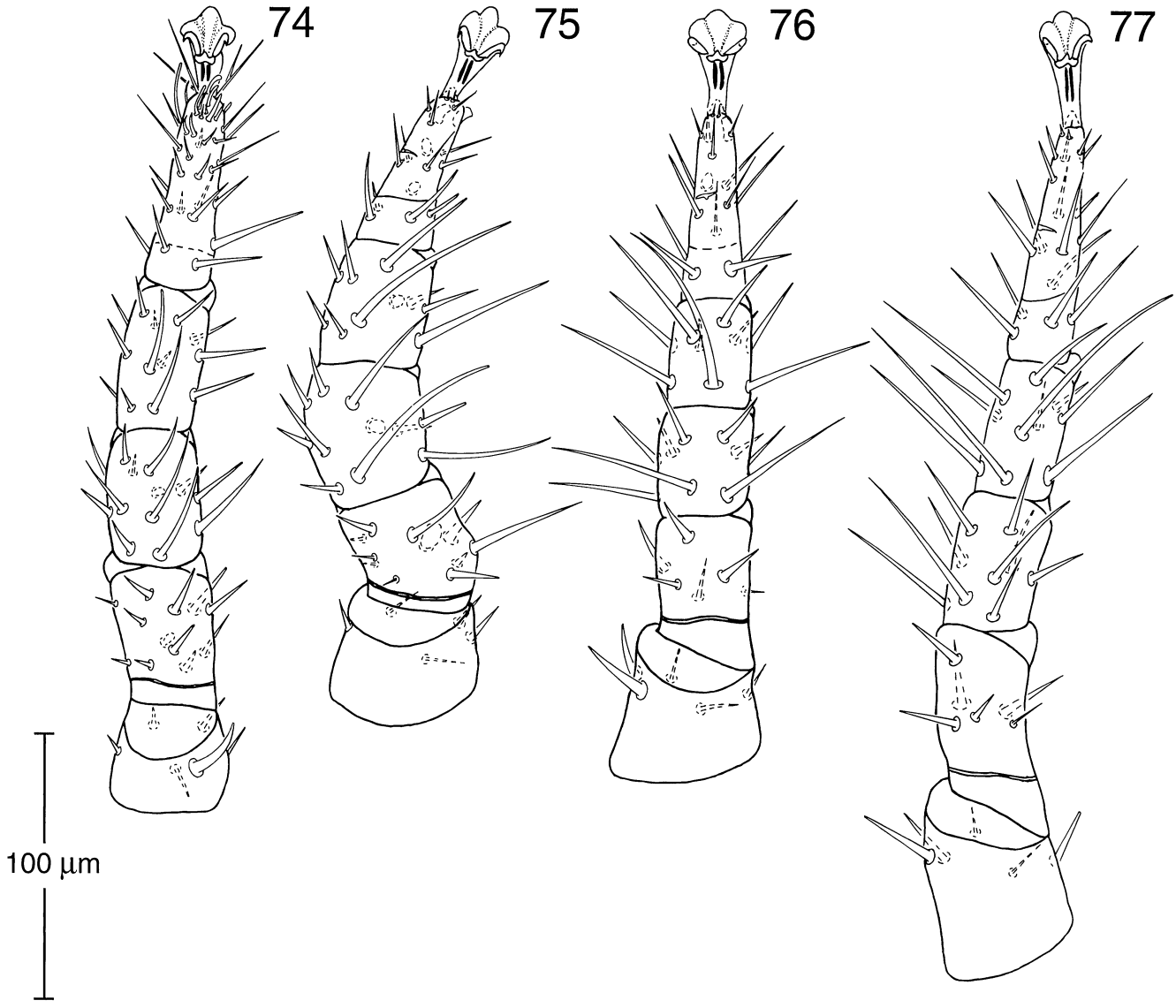
Colwell (#T58) (holotype and 31 paratype females, figured male and 4 additional paratype males); Arima Valley, Andrews Trace, 10 mi N Arima, 27 December 1973, R.K. Colwell (#T3) (2 paratype females, 1 paratype male, 4 paratype deutonymphs, 3 paratype protonymphs, 8 paratype larvae); Arima Valley, Davis Home Road near Temple Village, 11 March 1980, D. S. Dobkin (#T534) (2 paratype females); Waller Field, 25 August 1980, D.S. Dobkin (#64) (1 paratype female), (#67) (1 paratype female), (#70) (1 paratype female, 4 paratype deutonymphs, 4 paratype protonymphs).

The following specimens were collected from flowers of *Heliconia bihai* (Heliconiaceae): Arima Valley, 4 mi. N. Arima, Simla Research Station, 11 August 1975, R. K. Colwell (#T54) (1 female, 1 male).

Records from hummingbirds follow: ex *Amazilia tobaci*: TRINIDAD: Arima Valley, Simla Quarry, 21 August 1975, R.K. Colwell (#T42) (1 female).

Ex *Glaucis hirsuta*: Arima Valley, ridge trail 200 m E Simla, 18 February 1976, R.K. Colwell (#U36) (2 females); Arima Valley, Simla Quarry, 21 July 1975, R.K. Colwell (#T52) (4 females); same locality, 24 July 1975, R.K. Colwell (#T51) (1 female); same locality, 20 February 1976, R.K. Colwell (#U44) (1 female).

DISCUSSION. Adults of *Rhinoseius klepticos* are most similar to *R. trinitatis*, notably sharing the unique form of the male spermatodactyl with a hooked apex. The new species may be distinguished in the female by the longer maturation pouch of the spermathecal system (88 in *R. klepticos* as compared with 66 in *R. trinitatis*), the relatively longer *S* and *R* series of posterior



Figs. 74-77. *Rhinoseius klepticos* male. 74. leg I, dorsal view. 75. leg II, dorsal view. 76. leg III, dorsal view. 77. leg IV, posteriodorsal view.

dorsal setae as compared with the *J* series, the form of ventral seta *Jv4* which is distinctly longer and stouter than *Jv1-3*, and the relatively shorter seta *Jv5*. Males of *R. klepticos* can be distinguished from those of *R. trinitatis* by the pattern of dorsal setae, posterior ventral setae and form of the legs as follows. In *R. klepticos*, all posterior marginal setae are on the dorsal shield, while in *R. trinitatis*, all are positioned on membranous cuticle laterad of the shield. In *R. klepticos*, dorsal setae *s3* through *S5* and *r4* through *R5* are generally similar in length, with the setae nearer midbody (*r6, R1, S1, S2*) being the longest. In contrast, in *R. trinitatis*, these lateral setae generally increase in length from anterior to posterior, with the longest setae being the most posterior (*S4, S5, R7*). Ventrally, seta *Jv5* is similar in length to the postanal seta in *R. klepticos*, while it is approximately twice as long in *R. trinitatis*. Finally, the legs III-IV of *R. klepticos* are more slender than those of *R. trinitatis*

SPECIMEN DEPOSITION. Holotype and paratypes in UMMZ, paratypes in NMNH, CNC, IRSNB, RKC.

KEY TO THE SPECIES OF *RHINOSEIUS* OCCURRING IN TRINIDAD

1. Some dorsal setae of leg trochanters and femora distinctly barbed; female spermathecal duct simple, without sclerotized maturation pouch ..... 2.

   All setae of leg trochanters and femora simple, unbarbed; female spermathecal duct with sclerotized maturation pouch near internal terminus ..... 3.

2. Female with dense pattern of striae between setae *j2, j3, z2* and *s1*; male with most dorsal setae in *j-J, z-Z* and *s-S* series long and whiplike; male spermatodactyl less than 2.5 times longer than movable chelicerал digit ..... *R. uniformis.*

   Female without dense pattern of striae between setae *j2, j3, z2* and *s1*; male with most dorsal shield setae short; male spermatodactyl long, at least 10 times the length of movable digit ..... *R. phoreticus.*

3. Female spermathecal system with maturation pouch longer than adductor canal; male with seta *r5* longer than *r6*..... *R. venezuelensis*

   Female spermathecal system with maturation pouch shorter than adductor canal or with two separate maturation pouches; male with seta *r5* shorter than *r6* ..... 4.

4. Female spermathecal system with two distinct maturation pouches; male without enlarged dorsal setae (except *Z5*), all posterior marginal (*R*) setae minute, shorter than seta *J1*, ventral setae *Zv1-2* distinctly shorter than *Jv1-2* ..... *R. bisacculatus*

   Female spermathecal system with only one maturation pouch; male with some enlarged dorsal setae besides *Z5*, posterior marginal setae *R1-2* enlarged, longer than seta *J1*, ventral setae *Zv1-2* similar in length or longer than *Jv1-2* ..... 5.

5. Female spermatheca with maturation pouch greater than 60µm in length; male with ventral setae *Jv4* and *Zv3* distinctly shorter than *Jv1-2* and *Zv1-2*, spermatodactyl strongly recurved apically ..... 6.

   Female spermatheca with maturation pouch less than 55 µm in length; male with ventral setae *Jv4* and *Zv3* similar in length or longer than *Jv1-2* and *Zv1-2*, spermatodactyl straight apically ..... 7.

6. Female with ventral seta *Jv4* distinctly longer and stouter than *Jv1-3*, *Zv3* distinctly longer and stouter than *Zv1-2*, *Jv5* about twice as long as *Jv4*; male with posterior marginal setae on shield, setae *S1* through *S5* subequal ..... *R. klepticos.*

   Female with ventral setae *Jv1-4* similar in form and length and *Zv1-3* similar in form and length, *Jv5* about three times longer than *Jv4*; male with posterior marginal setae off shield on membranous cuticle, setae of *S* series increasing in length posteriorly, *S5* at least three times longer than *S1* ..... *R. trinitatis.*

7. Female with postanal seta short, similar in length to *Jv4*, approximately one-fourth length of anal shield, maturation pouch length approximately 40µm; posterior two *UR* setae equal in length and thicker than *Jv1-3* and *Zv1-3*; male with posterior marginal setae *R1-2* approximately 3 times longer than *R3*, setae *R3-4* off shield on soft cuticle, ventral seta *Jv5* minute, shorter than anal setae .... *R. phaethornis*

   Female with postanal seta distinctly longer than *Jv4* and approximately one-half length of anal shield, maturation pouch length approximately 50µm; *Jv4* and posterior two *UR* setae unequal in length, *Jv4* thicker than *Jv1-3* and *Zv1-3*; male with setae *R1-2* approximately 1.5 times longer than *R3*, setae *R3-4* on shield; ventral seta *Jv5* distinctly longer than anal setae ..... *R. fidelis.*

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