

DESCRIPTION OF THE MALE AND IMMATURE STAGES OF *RHINOSEIUS BAKERI* (DUSBÁBEK & CERNY, 1970) (ACARI: MESOSTIGMATA: ASCIDAE)

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ABSTRACT - The male and immature stages of *Rhinoseius bakeri* (Dusbábek & Cerny, 1970) (Acari: Mesostigmata: Ascidae) are described for the first time. The male is represented only by heteromorphic forms. The degree of heteromorphism varies markedly among the specimens. All specimens were found in bromeliad flowers (*Aechmea bracteata* (Swartz) and *Tillandsia utriculata* L.) collected in Nicaragua.

INTRODUCTION

Rhinoseius bakeri (Dusbábek & Cerny, 1970) has been known from 5 females collected only in the nasal cavities of *Chlorostilbon r. ricordii* (Gervais) (Trochilidae) in Cuba. Recently, Mr. Jason Grant collected a series of ascid mites from bromeliad flowers in Nicaragua. This collection contained females, heteromorphic males and immatures (deutonymphs, protonymphs and larvae). The females are not separable from *Rhinoseius bakeri*. This species belongs to the "wetmorei" group which is characterized by the shape of the inseminating apparatus consisting of a long striated adductor canal and a much shorter maturation pouch (Fain, 1992).

In this paper we redescribe the female of *Rhinoseius bakeri* and give the first description of the male and immature stages of this species. The comparison of our specimens with a paratype of *R. bakeri* has revealed that they all belong to the same species. The size of the idiosoma (length x width) in the paratype is 576 x 411. In 4 of our specimens these measurements are: 630 x 390; 600 x 375; 555 x 360; 480 x 310.

All the measurements are taken in micrometers. Nomenclature of the leg setae follows Evans (1963).

Rhinoseius bakeri (Dusbábek & Cerny, 1970) (Figs. 1-17)

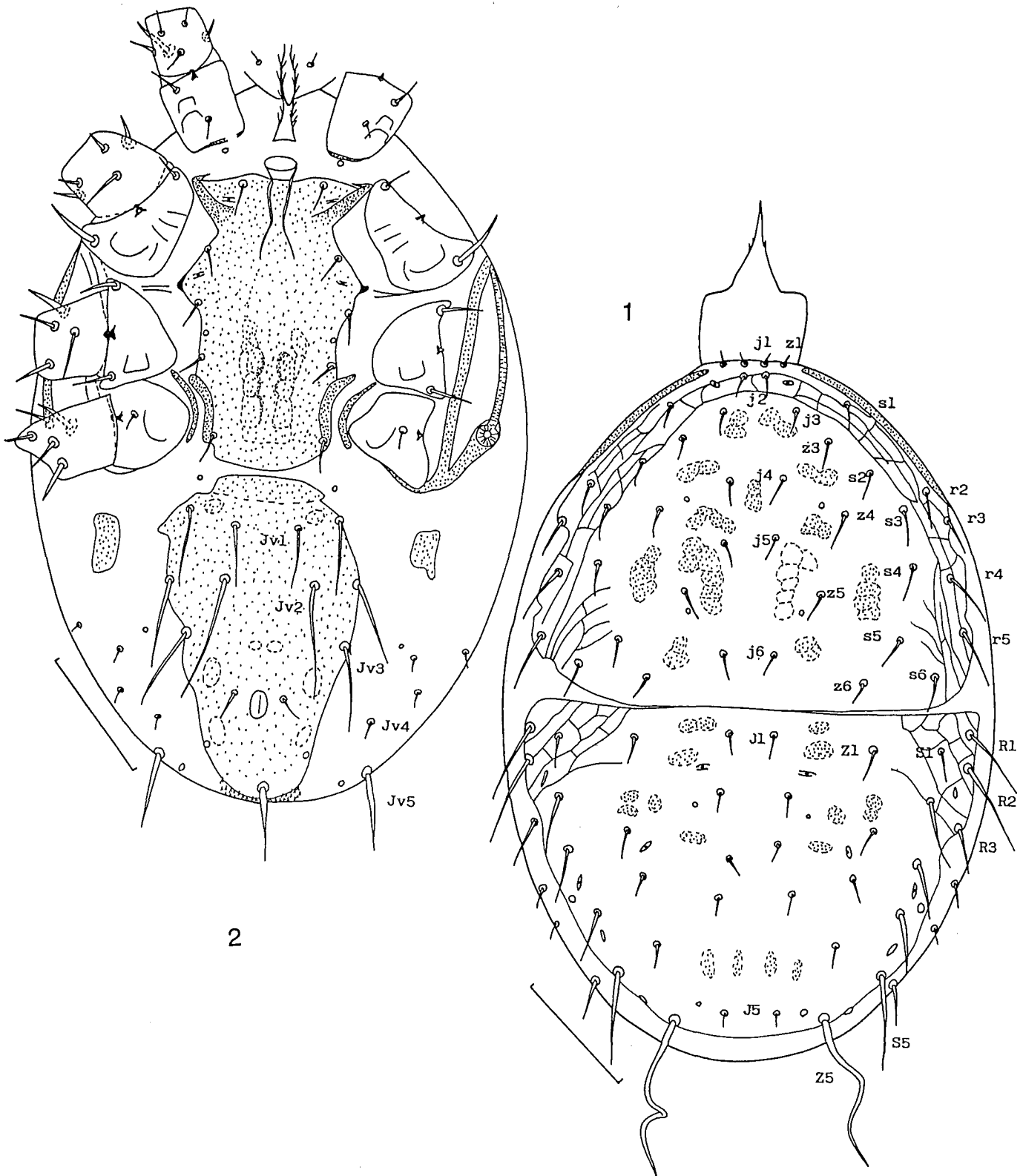
Female (Fig. 7) - Dorsum - Bearing a large entire shield with a complete transverse suture (type C, in Fain, 1992), with a faint pattern of oblique lines mostly con-

finied to the lateral margins of the shield measuring 495 x 310 in the paratype. In 4 specimens it measures: 519 x 327; 518 x 324; 504 x 315; 501 x 300. The other characters are similar in both paratype and our specimens: dorsal shield with 32 pairs of setae (17 + 15) measuring 15 to 22 long, except *jl* (6 long), *z1* and *J5* (10 long). Podonotum with setae *jl* to *j6*, *z1*, *z3* to *z6* *sl* to *s6*; opisthonotum with *J1* to *J5*, *Z1* to *Z5*, *S1* to *S5*. All setae *r* and *R* on soft cuticle. Soft cuticle with 10 pairs of setae. Peritreme extending to setae *z1*. Gnathotectum strongly attenuated and pointed apically.

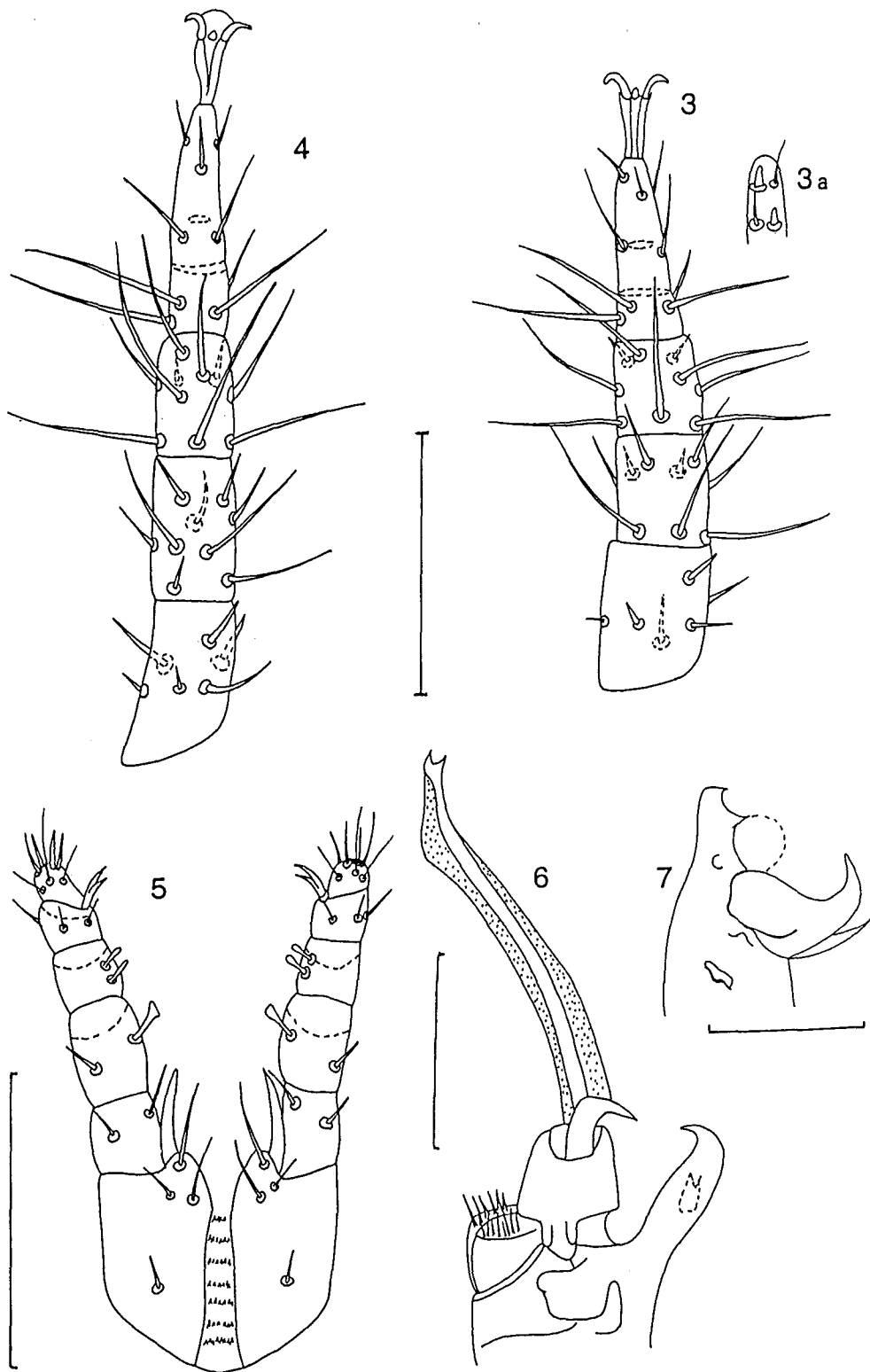
Venter - Sternal shield, in all specimens (including paratype), with 2 anterior well-developed lobes clearly separated in midline. Anal shield 145 to 150 x 95 to 100. Setae *Jv5* 72 to 77 long. Cheliceral digit^s short, fixed digit with a rather strong tooth bearing a rounded membrane, movable digit with a large base, not toothed but with a narrow dorsal process. Inseminating apparatus consisting of a long striated adductor canal and a much shorter maturation pouch (Fain et al., 1977; Fain, 1992).

Male (Figs. 1-6; 8-11) - All males of our collection are heteromorphic. The heteromorphism involves size of the body and of shields, leg length, and chaetotaxy, especially of the idiosoma (*s*, *S*, *r*, *R*, *Z5*, *Jv1* to *Jv5*) and of the legs, mainly legs II to IV.

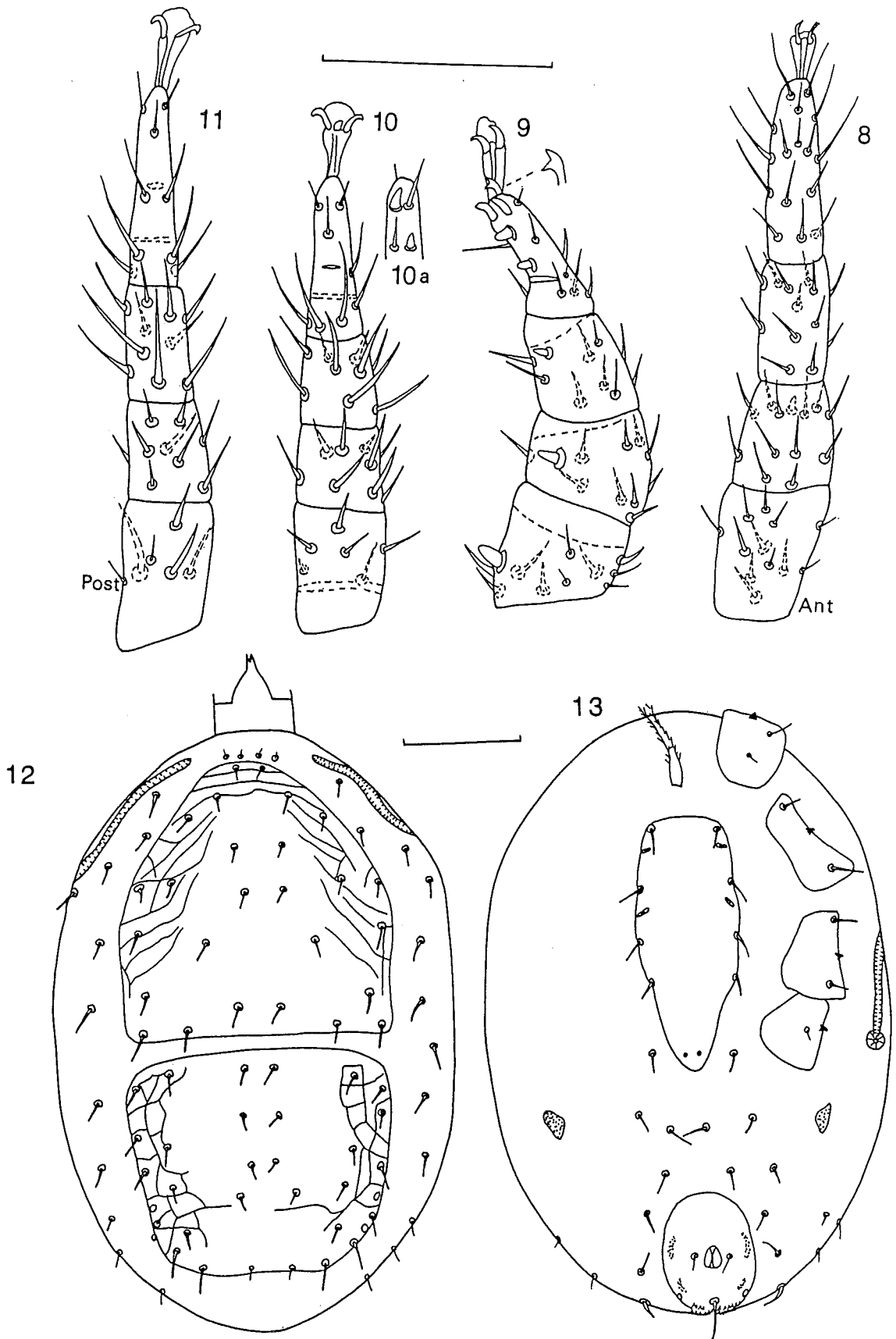
The degree of heteromorphism varies markedly in the different males (Table 2). Heteromorphism is more marked in specimens from *Tillandsia* than in those from *Aechmea*. In the male of our collection with the least clearly expressed heteromorphy (male # 1) all setae are distinctly longer than in the females. It appears, therefore, that there are no true homeomorphic males in our collec-



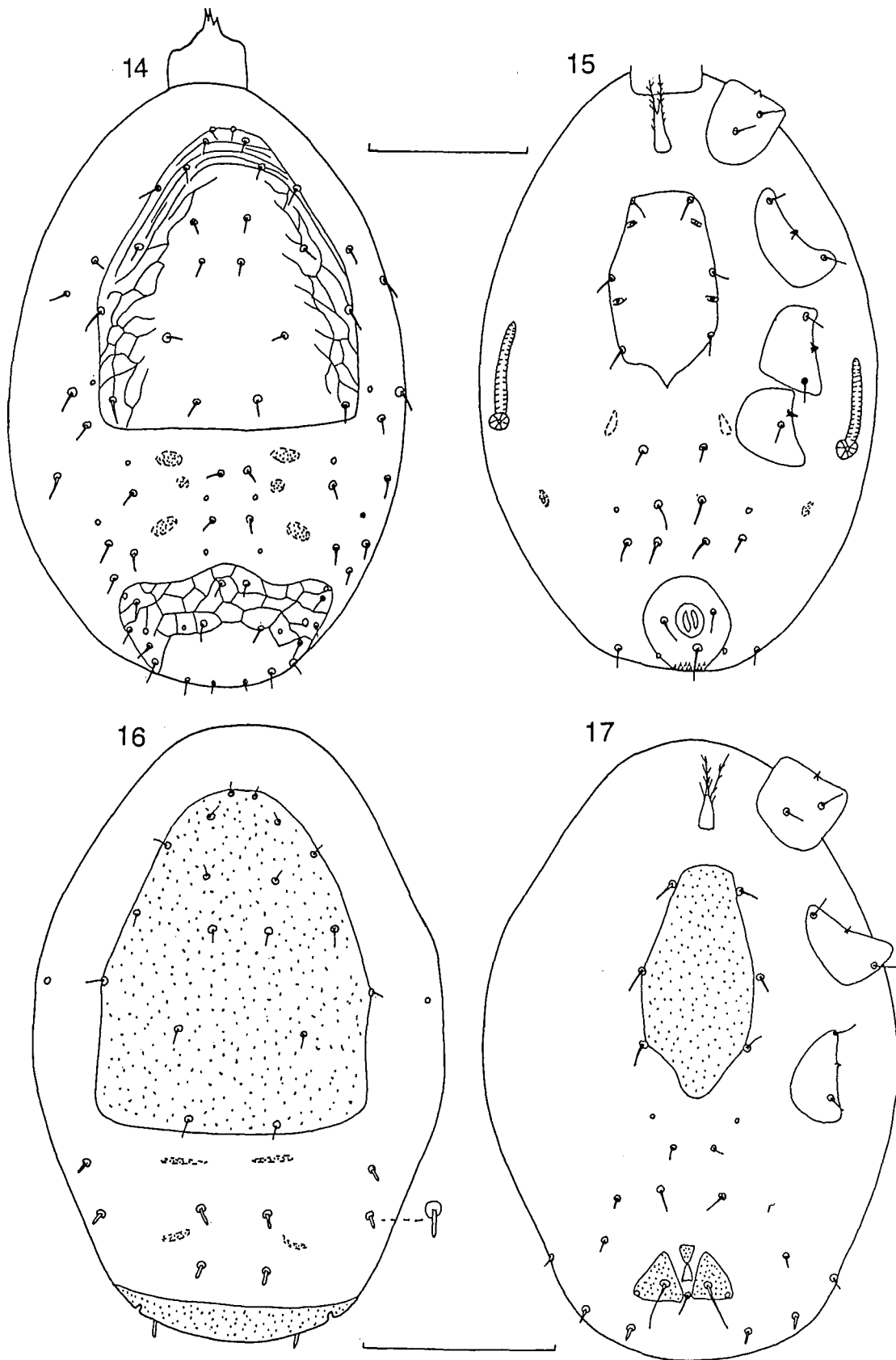
Figs. 1-2. *Rhinoseius bakeri* (Male # 5) - 1. dorsal view, 2. ventral view. Scale line 100 μ m.



Figs. 3-7. *Rhinoseius bakeri* (Male # 5) - Four terminal segments of legs III (3) and IV (4) in dorsal view; apical third of tarsus III in ventral view (3a); gnathosoma in ventral view (5); cheliceral digits (6). Female: cheliceral digits (7). Scale lines 100 μ m (Figs. 3 to 5) and 25 μ m (Figs. 6-7).



Figs. 8-11. *Rhinoseius bakeri* (Male # 1) - Four terminal segments of legs I (8), II (9), III (10), IV (11) in dorsal or lateral view. Apical third of tarsus III in ventral view (10a). Scale lines 100 μ m. Figs. 12-13. *Rhinoseius bakeri*. - Deutonymph in dorsal (12) and ventral view (13).



Figs. 14-15. *Rhinoseius bakeri* - Protonymph in dorsal (14) and ventral view (15). Scale lines 100 μ m. Figs. 16-17. *Rhinoseius bakeri* - Larva in dorsal (16) and ventral view (17). Scale line 100 μ m.

Table 1. Chaetotaxy of legs in the female of *Rhinoseius bakeri*.

	Leg I	Leg II	Leg III	Leg IV
Basitarsi	3	4	4	4
Tibiae	$2 - \frac{3-3}{3} - 2$ (13)	$2 - \frac{2}{1}, \frac{2}{1} - 2$ (10)	$2 - \frac{3}{1-1} - 2$ (9)	$2 - \frac{1}{1}, \frac{3}{1} - 2$ (10)
Genua	$2 - \frac{3-3}{3} - 2$ (13)	$2 - \frac{3}{1}, \frac{2}{1} - 2$ (11)	$2 - \frac{2}{1}, \frac{2}{1} - 1$ (9)	$2 - \frac{2-3}{1} - 1$ (9)
Femora	$2 - \frac{3}{2}, \frac{2}{2} - 1$ (12)	$2 - \frac{3}{1}, \frac{2}{2} - 1$ (11)	$0 - \frac{2}{1}, \frac{1}{1} - 1$ (6)	$0 - \frac{2}{1}, \frac{1}{1} - 1$ (6)
Trochanters	$1 - \frac{1}{3} - 1$ (6)	$1 - \frac{0}{3} - 1$ (5)	$1 - \frac{0}{3} - 1$ (5)	$1 - \frac{1}{3} - 0$ (5)

Table 2. Length of some setae in the males of *Rhinoseius bakeri* (in μm).

	From <i>Aechmea</i> 1.				From <i>Tillandsia</i> 2.		
	δ No. 1	δ No. 2	δ No. 3	δ No. 4	δ No. 5	δ No. 6	δ No. 7
<i>Idiosoma</i>							
Jv1	27	30	40	45	46	45	48
Jv2	25	56	60	64	80	75	78
Jv3	39	39	45	63	63	69	63
Jv4	15	12	18	12	15	15	20
Jv5	60	72	70	75	60	51-65	94
j2 to j6	16	15-21	15-16	15-21	18-21	18-20	20-25
r2 and r3	18-21	21	37-34	36-30	33-25	45-29	38-30
r4 and r5	26	25-27	39-36	45	48	48-58	42-45
R1 and R2	30	34-39	45-48	48	60	66-63	58-64
R3	15	18	15	21	30	23	21
Z5	123	125	120	125-150	130-140	138	165
S1	18	21	21	27	27	30	27
S3-S4	29-33	35-42	36-39	36-51	42-45	44-45	45-52
S5	57	72	66	78	75	78	93
<i>Legs</i>							
<i>Tarsus III</i>							
Longest seta	30	30	60	52	50	60	60
<i>Tibia III</i>							
Length	36	33	36	42	42	45	45
Longest seta	36	36	60	65	72	75	80
<i>Genu III</i>							
Length	36	36	36	41	42	44	43
Longest seta	22	24	36	66	51	60	75
<i>Tarsus IV</i>							
Longest seta	30	35	54	63	57	69	64
<i>Tibia IV</i>							
Length	48	45	45	51	51	54	57
Longest seta	42	23	63	73	63	76	78
<i>Genua IV</i>							
Length	45	45	45	51	51	54	54
Longest seta	24	24	33	48	48	60	72

tion. Measurements (Table 2): length and width of idiosoma and of dorsal shield in 4 males: 400 x 339 and 471 x 300 (male # 1); 495 x 321 and 460 x 288 (male # 2); 570 x 405 and 534 x 345 (male # 6); 561 x 415 and 530 x 350 (male # 7).

Dorsum - Dorsal shield with a complete suture (type C of Fain, 1992) and pattern of lines in lateral areas of podonotal part of shield and in anterior corners of opisthonotal part of shield. Chaetotaxy of dorsal shield as in female but with, in addition, setae *r2*, *r3*, *r4* and *r5*, *R1* and *R2*. Setae *R3* always shorter than *R1* and *R2*, situated on soft cuticle, exceptionally on shield. Setae *Z5* very long and strong, often spiral.

Venter - Sternogenital shield relatively wide, with sclerotized areas in anterolateral corners and in median part at level of coxae IV, bearing 5 pairs of setae, 2 pairs of lyrifissures and one pair of small rounded pores. Ventroanal shield very close to sternogenital shield, bearing 5 pairs of long setae. Anus in posterior half, surrounded by 3 anal setae. Soft cuticle of opisthogaster with 6 pairs of short setae, except for thick and long *Jv5* (Table 2). Metapodal shields longer than wide.

Gnathosoma -Deutosternum with 7 rows of 8-10 denticles. Internal setae of femur and genu spatulate.

Chelicerae - Fixed and movable digits strongly curved at apex; spermatodactyl 60 long, forming 2 curves.

Chaetotaxy of legs -Legs II thicker than other legs and bearing thick blunt spines or spurs in addition to normally produced setae; modified setae present on tarsus (2 preapicoventral spurs and 2 ventral blunt spines) and on tibia, genu and femur (each with a blunt spine). Tarsus III with 2 ventral blunt spines located in its apical half. Coxae I without denticles. Number of setae on legs as in female. Due to the characteristics of legs I and III in the male, absence of denticles on coxae I, pointed gnathotectum and the chaetotaxy of the legs in both sexes, *R. bakeri* belongs to the "wetmorei" group.

Deutonymph (Figs. 12-13) - Dorsum- With 2 separate shields bearing same pattern of lines as in adults. Length and width of idiosoma in 2 specimens 504 x 345 and 510 x 335 respectively. Maximum length and width of podonotal shields 204 x 225 and 230 x 218, of opisthonotal shields 180 x 219 and 189 x 210. Anterior shield with 12 pairs of setae. Setae *j1* and *z1* on soft cuticle. Posterior shield with 15 pairs of setae. Soft cuticle with 13 pairs of setae. Peritreme ending between *s1* and *z1*. Gnathotectum with a narrow bifid apex.

Venter - Sternogenital shield with 4 pairs of setae and 2 pairs of lyrifissures. Anal shield ellipsoidal, 96 long and 66 wide, postanal seta distinctly longer than paranal setae. Soft cuticle with 12 pairs of setae.

Protonymph (Figs. 14-15) - Idiosoma in one of our specimens measures 380 long and 260 wide.

Dorsum - With 2 shields, a podonotal shield 180 long and 165 wide bearing 11 pairs of setae and a pattern

of striae as in male, with a pygidial shield located in posterior half of opisthonotum (60 long and 135 wide), bearing 8 pairs of short setae, 3 pairs of pores and, in its anterior half, a poorly distinct network of striae. Soft cuticle with 11 pairs of setae. Peritreme short, extending anteriorly to level of posterior half of coxae III. Gnathotectum as in deutonymph.

Venter - Sternogenital shield with 3 pairs of setae and 2 pairs of lyrifissures. Soft cuticle with 5 pairs of setae. Anal shield subcircular.

Larva (Figs. 16-17) - Length and width of idiosoma 315 x 220.

Dorsum - With a large podonotal shield (182 long and 135 wide) without striae and bearing 9 pairs of small setae. Posterior part of dorsum with a short punctate marginal shield 25 long and 114 wide bearing one pair of small cylindrical setae. With 2 pairs of small platelets and 4 pairs of short cylindrical setae between shields. Stigma and peritreme not observed.

Venter - Sternogenital shield with 3 pairs of thin short marginal setae. Anal shield curiously divided into 3 platelets - one small anteromedian element without seta and 2 larger flanking triangular elements each bearing a large seta. With a small posteromedian seta present posterior to anterior platelet. Soft cuticle with 7 pairs of setae of which 2 posterior pairs cylindrical.

Specimens examined - All mites of our collection were found in the flowers of two species of Bromeliaceae in Nicaragua, by Mr. Jason Grant. The following material collected from the flowers has been mounted and examined:

1. From *Aechmea bracteata*, from Karatá, South of Puerto Cabezas, Nicaragua, March 1994: 10 females, 5 males, 4 deutonymphs and 2 protonymphs.

2. From *Tillandsia utriculata*, with the same data: 22 females, 15 males, 8 deutonymphs, 7 protonymphs, 10 larvae.

Twelve females, 10 males, 4 deutonymphs, 3 protonymphs and 4 larvae have been deposited in the National Museum of Natural History, Washington, D.C. One male and one female have been deposited in The Natural History Museum, London, and in the Institute of Parasitology, Academy of Sciences, Prague. Other material is in the Institut royal des Sciences naturelles de Belgique.

Remarks - Hunter (1972) was the first to describe the nymphs and larva in the genus *Rhinoseius*. He also noted the presence of both homeomorphic and heteromorphic males in 2 new species of *Rhinoseius* (*R. richardsoni* and *R. colwelli*) that he described from Costa Rica.

Heteromorphism of the male has also been observed in other species of *Rhinoseius* and is probably a general phenomenon in this genus. Costa (1965) synonymized the mesotigmatic mite *Coprolaelaps caputmedusae* Berlese under the genus *Neopodocinum* Oudemans. In his study on *N. caputmedusae*, this species was found to be poly-

morphic, comprising two forms of deutonymphs and three forms of males. Heteromorphism is also known in other families and orders of mites, e.g. *Dermatophagoides* spp. (Pyroglyphidae, Astigmata) (Fain & Bronswijk, 1973) and *Cheyletus* spp. (Cheyletidae, Prostigmata) (Hughes, 1961).

Regev (1974) has shown that heteromorphism in *Cheyletus malaccensis* Oudemans is not a heritable character as such but occurs during the ontogenic development of the mite after the ecdysis from the deutonymph.

The factor inducing heteromorphism is not known but one may surmise that it is due to a hormone normally secreted by the mite which becomes active when it is produced in large quantities such as when the mite population is overcrowded.

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