

## Three new species of rosensteiniid mites (Acari:Rosensteiniidae:Rosensteiniinae) associated with cockroaches (Blattodea)

RYSZARD HAITLINGER\*

**Resumen.** Se describen tres especies nuevas de ácaros del género *Rosensteinia* Oudemans 1923: *R. toddi*, *R. miradorae* y *R. rafi* (Acari:Rosensteiniidae: Rosensteiniinae) colectadas en Blaberidae (Blattodea).

Palabras clave: Acari, Rosensteiniidae, especies nuevas, Blaberidae, Perú.

**Abstract.** Three new species of rosensteiniid mites belonging to the genus *Rosensteinia* Oudemans 1923: *R. toddi*, *R. miradorae* and *R. rafi* collected from cockroaches (Blaberidae) are described.

Key words: Acari, Rosensteiniidae, new species, Blaberidae, Peru.

### Introduction

Only two species belonging to the genus *Rosensteinia* Oudemans 1923 are known. They are associated with cockroaches belonging to the family Blaberidae. Description of the first species, *Rosensteinia sieversi*, was given by Oudemans (1923). This species was obtained from an unknown host in Puerto Catello, Venezuela. Other specimens of this species were obtained from cockroaches of the family Blaberidae found in a crate of bananas shipped allegedly from Ecuador (Samšínak 1977). Later was described the second species *R. hileri* Samšínak. The specimens of this species were obtained from a stock of *Blaberus gigantea* from the Zoological garden of Praha (Czech Republic) (Samšínak 1977).

In this paper three new species of rosensteiniid mites found on large cockroaches (Blaberidae) are described; two of them were obtained in Peru and one was found on cockroaches from private cockroaches-breeding of U. Kunick, Germany (Leipzig).

\*Department of Zoology, Agricultural Academy, 50-205 Wrocław, Cybulskiego 20, Poland.

The type material is deposited in the Museum of Natural History, Wrocław University (MNHU); some of the paratypes are deposited in the author's collection in the Department of Zoology, Agriculture Academy, Wrocław (DZAC).

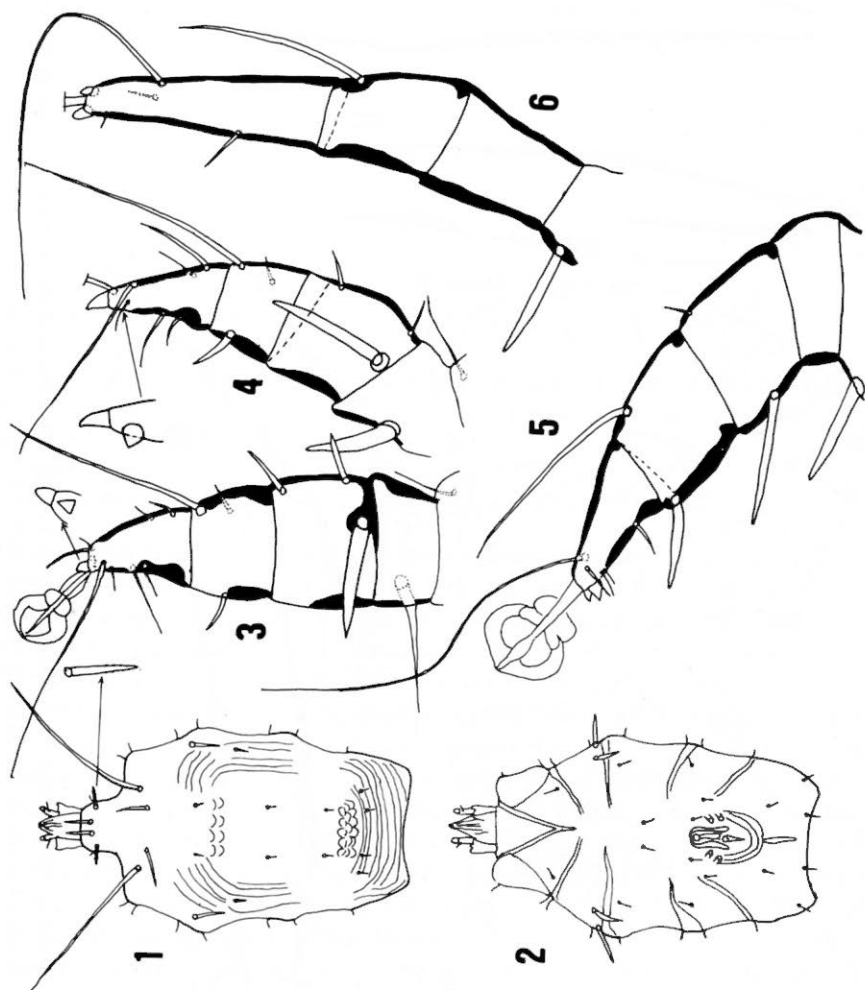
**Family ROSENSTEINIIDAE Cooreman 1950**  
**Subfamily ROSENSTEINIINAE Cooreman 1950**  
**Genus ROSENSTEINIA Oudemans 1923**

***Rosensteinia toddi* sp. nov.**  
 (Figs. 1-12)

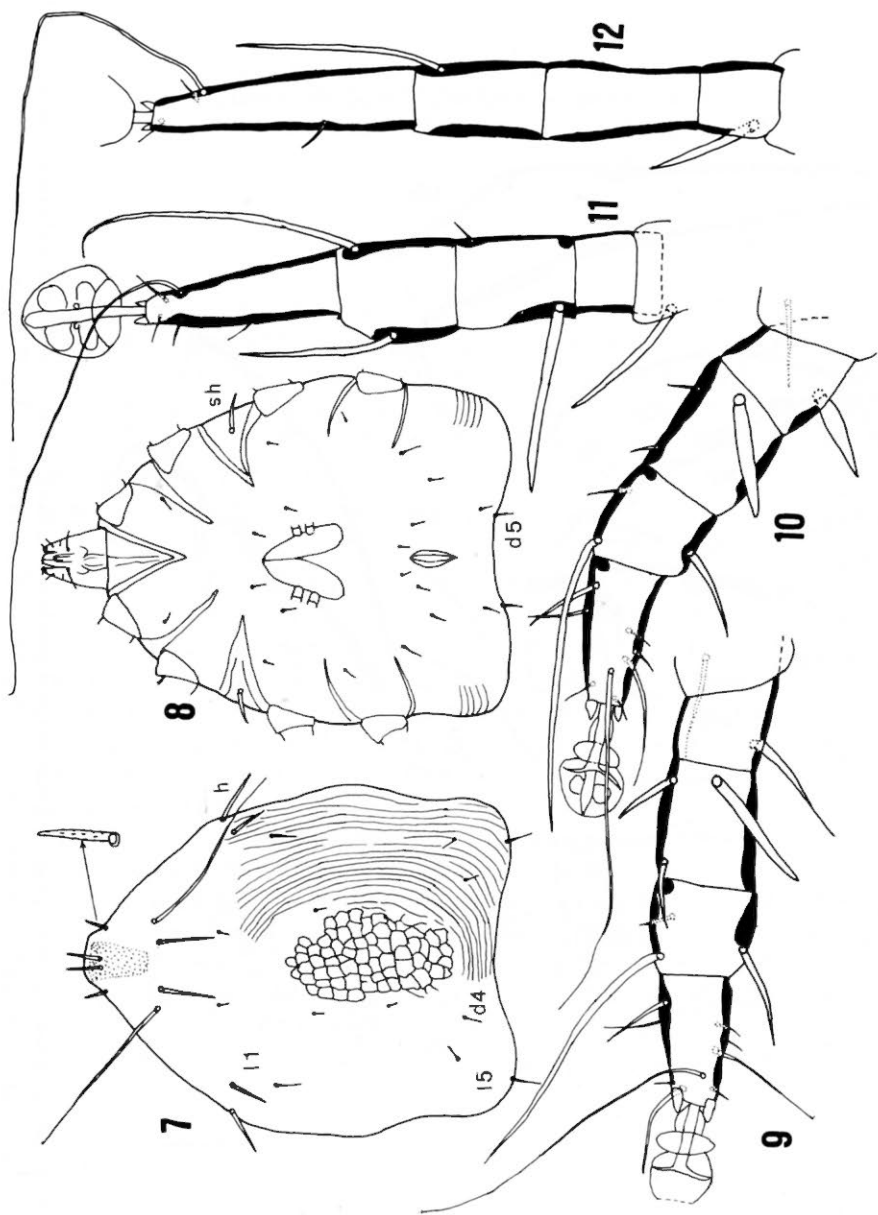
**Diagnosis.** Both sexes of *R. toddi* sp. nov. are most similar to *R. miradorae* sp. nov. and *R. hileri* Samšinak 1977. The males and females of *R. toddi* can be separated from *R. hileri* by shorter idiosoma and differently ornamented dorsal surface; from males of *R. hileri* and *R. miradorae* by all thin setae in the genital region; from females of *R. miradorae* it differs by longer idiosoma, setae vi (56-66 mm to 34-46 mm) and solenidion  $\phi$  on tibia IV (94-106 mm to 42-50  $\mu$ m).

**Male, holotype** (Figs. 1-6). Idiosoma elongated with varied dorsal ornamentation as in Fig. 1. This ornamentation not covers the whole dorsal surface (without its anterior part). Setae vi, ve, sci, sce and l1 are thicker than the remaining dorsal setae. Setae vi a little longer than setae ve that are slightly barbed. Setae l1 are at least twice longer than l2. The remaining ones are very short. The longest setae sce are more than 200  $\mu$ m long. Propodosomal shield present. Venter: Epimera I, V-shaped; all ventral setae thin and short, excluding two pairs of thick setae h and sh. Setae h are somewhat longer than setae sh. Genital region with a pair of setae gm; setae ga and gp are distinctly shifted from this region (Fig. 2). The anal region with two pairs of setae a1 and a2. Near posterior margin of opisthosoma short setae d3 and l5. Anal opening placed near posterior margin of opisthosoma. Legs. Tarsi I, II subequal in length, tarsi III are a little longer, tarsi IV are about twice longer than tarsi I, II (Figs. 3-6). All tarsi bear two distal thick spines. Each tarsus with a membranous large pretarsus. Solenidion  $\phi$  on tibiae I-IV all relatively long; II always the longest (Table 1). Tibia II bears relatively long and thick ventral seta. Trochanters (I-IV) 1-1-1-0; Femora (I-IV) 1-1-0-1; Genua (I-IV) 3-3-2-0; Tibiae (I-IV) 3 (with solenidion)-3-2-1; Tarsi (I-IV) 10 (with solenidion and two distal spines)-10-7-6. Ventral or medial seta mG on each genu is long and thick. Setae vF on Fe II and Fe IV are thick.

**Female** (Figs. 7-12). Idiosoma longer than wide. Dorsal surface of idiosoma with propodosomal shield, well developed, punctate. Most of surface of idiosoma ornamented as in Fig. 7. Setae vi and ve enlarged; setae ve barbed. Setae sci, sce, sh, l1, l2 a little longer (Table 2). Posterior margin of idiosoma slightly concave. Venter (Fig. 8): All ventral setae short and thin. Setae gp shifted to postero-lateral part of



Figs. 1-6. *Rosensteinia toddi* sp. nov., male. 1, idiosoma and gnathosoma, dorsal view; 2, idiosoma and gnathosoma, ventral view; 3, leg I, trochanter-tarsus; 4, leg II, trochanter-tarsus; 5, leg III, trochanter-tarsus; 6, leg IV, femur-tarsus.



Figs. 7-12. *Rosensternia toddi* sp. nov., female. 7, idiosoma, dorsal view; 8, idiosoma and gnathosoma, ventral view; 9, leg I, trochanter-tarsus; 10, leg II, trochanter-tarsus; 11, leg III, trochanter-tarsus; 12, leg IV, femur-tarsus.

idiosoma, placed near level of bases of setae al. In genital region two pairs of setae; in anal region three pairs of setae. Setae a1 and d5 placed near posterior margin of idiosoma. Anal opening relatively far from posterior margin of idiosoma. Epimera I, V-shaped. Gnathosoma short with two hypostomata. Legs I-IV similar to legs in males but legs III are distinctly longer; thick seta mG on genu III longer.

*Specimens examined.* Holotype male, ~30 km east from Puerto Maldonado, at river Madre de Dios, 12°31' S, 68°50' W; on large cockroaches (Blaberidae: *Blaberus* sp.); deposited in MNHWU. Paratypes: 7 <<, 10 >>, same data as in holotype, 2 <<, 5 >> in author's collection (DZAC).

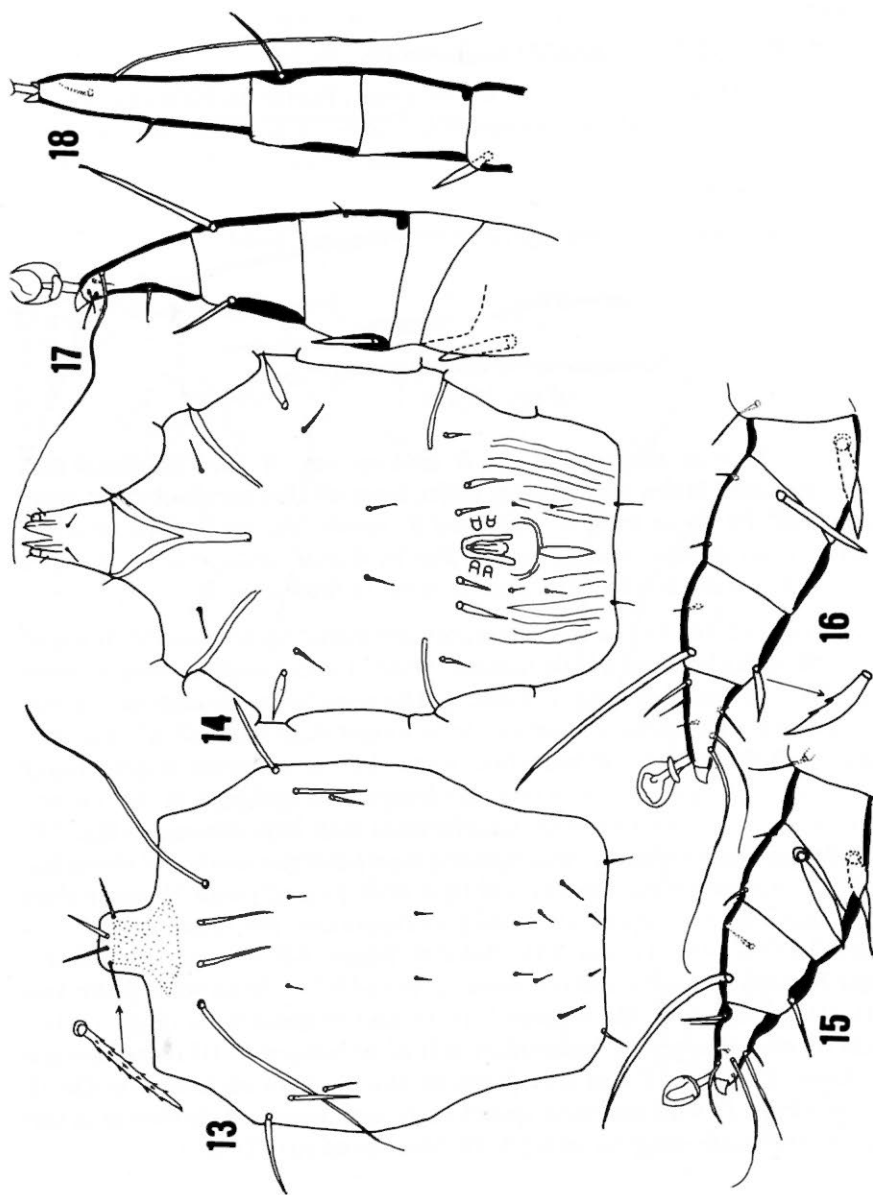
*Etymology.* The name of the species derives from the name Todd.

***Rosensteinia miradorae* sp. nov.**

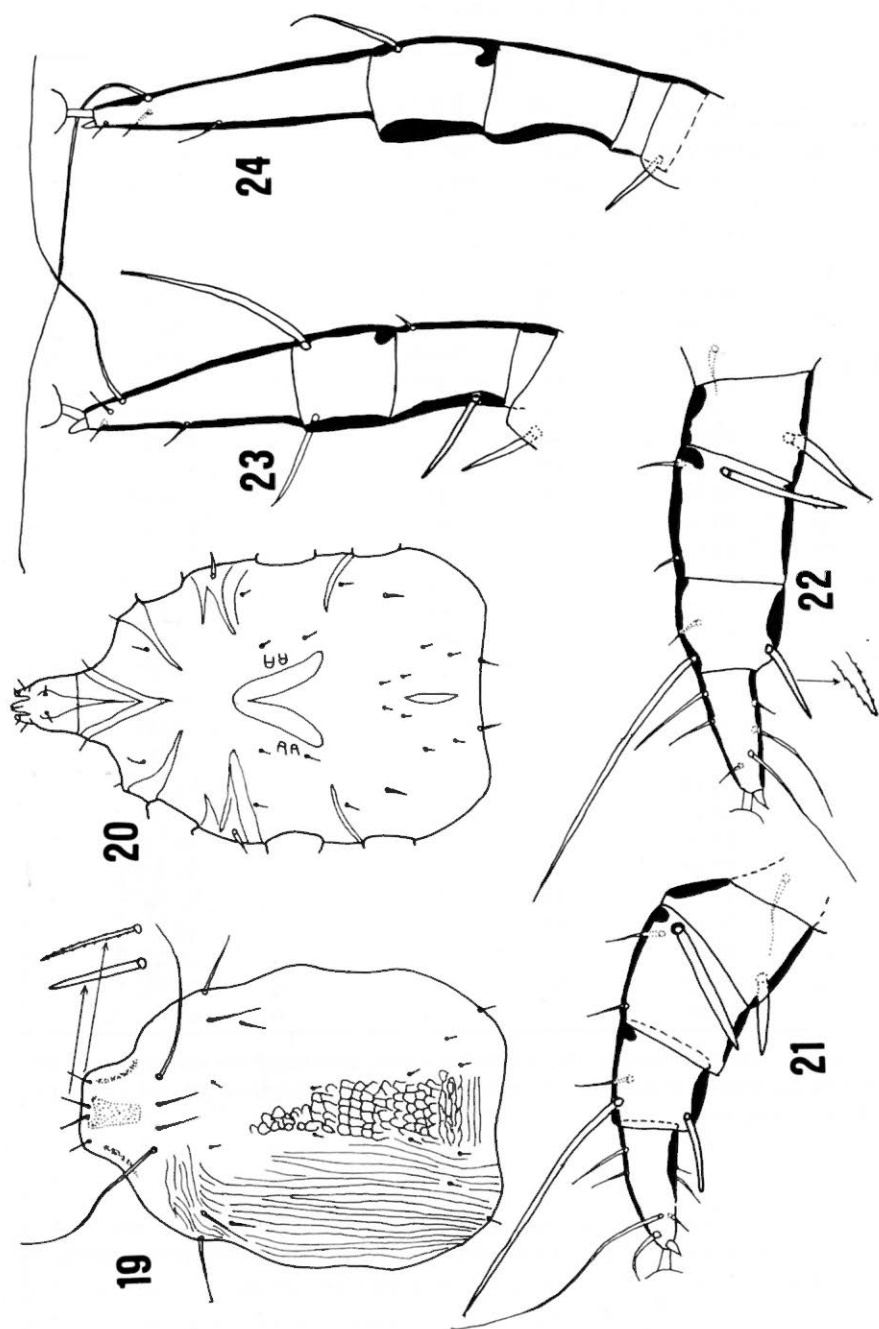
(Figs. 13-22)

*Diagnosis.* *R. miradorae* sp. nov. is similar to *R. toddi* sp. nov., *R. hileri* Samšinak and *R. sieversi* Oudemans. Males and females differ from all this species by distinctly shorter length of the body; from *R. hileri* and *R. sieversi* also by barbed setae ve. Females differ from *R. hileri* and *R. sieversi* also by dorsal ornament; from males and females of *R. sieversi* by distinctly shorter setae l2 than setae l1.

*Male, holotype* (Figs. 13-18). Dorsal surface without ornament. Setae vi and ve subequal in length; setae ve barbed and a little thinner. Setae l1 about twice as long as setae l2. Setae h and l1 subequal in length (Table 1). The remaining dorsal setae, except sci and sce, very short but setae l4 and l5 a little longer than setae d3-d5 (Fig. 13). Propodosomal shield present. Venter: three pairs of setae in genital region; outer setae longer than inner pair but both pairs are longer and thicker than the remaining setae in genital and anal regions. Gnathosoma with hypostomata (Fig. 14). Genital apparatus relatively short. Anal opening near posterior margin of idiosoma. Leg I with the shortest tarsus; tarsi II and III a little longer, tarsus IV more than twice longer than tarsus I (Figs 15-18, Table 1). Chaetotaxy: Trochanters (I-IV) 1-1-1-0; Femora (I-IV) 1-1-0-1; Genua (I-IV) 3-3-2-0; Tibiae (I-IV) 3 (with solenidion)-3-2-1; Tarsi 10 (with solenidia and two distal spines)-10-7-5. Stout setae placed on tibiae I, II, III, genuae I, II, III, femora I, II, IV and trochanter III (Figs. 15-18). Ventral seta on tibia II serrated. Solenidion  $\phi$  II is the longest;  $\phi$  III is the shortest (Table 1). Genu I with thick seta mG distinctly thicker than such seta on Ge II. Distal part of tarsi I-IV with two stout spines each; with long and thin setae in this part of tarsus, especially long on tarsi III, IV. Measurements (Table 1).



Figs. 13-18. *Rosensteinia miradora* sp. nov., male. 13, idiosoma, dorsal view; 14, idiosoma and gnathosoma, ventral view; 15, leg I, trochanter-tarsus; 16, leg II, trochanter-tarsus; 17, leg III, trochanter-tarsus; 18, leg IV, femur-tarsus.



Figs. 19-24. *Rosensteinia miradorae* sp. nov., female. 19, idiosoma, dorsal view; 20, idiosoma and gnathosoma, ventral view; 21, leg I, trochanter-tarsus; 22, leg II, trochanter-tarsus; 23, leg III, trochanter-tarsus; 24, leg IV, trochanter-tarsus.

**Table 1.** Metric data of the males of *Rosensteinia toddi* sp. nov. (1), *R. miradorae* sp. nov. (2) and *R. rafi* sp. nov. (3). H - holotype, P - paratypes

	1		2		3	
	H	P n=9	H	P n=4	H	P n=3
IL	514	482-591	387	387-489	457	416-457
IW	330	304-343	286	286-355	305	254-305
sci	-	52-72	50	46-52	52	48-54
sce	-	240-270	~190	210	~214	190-232
vi	44	40-48	30	28-30	40	36-40
ve	30	20-34	28	28-34	22	22-24
h	62	52-64	58	56-60	26	24-30
sh	40	36-46	38	34-38	36	36-42
d1	-	10-14	12	12	18	18-20
d2	-	10	14	12-14	30	26-36
d3	-	12-14	14	12-16	24	20-24
d4	16	12-18	12	10-12	-	12-16
d5	30	16-30	18	18	-	12-14
l1	50	40-50	50	50-52	54	52-56
l2	22	14-22	24	20-30	40	34-40
l4	16	14-20	20	14-20	-	16
l5	22	18-22	18	18-20	-	14
Ta I	44	40-46	36	36-42	40	34-42
Ta II	58	50-64	44	44-50	38	36-42
Ta III	72	60-72	58	58-64	48	48-50
Ta IV	132	106-132	96	96-106	94	92-96
φ I	116	102-116	90	86-92	~92	84-92
φ II	130	114-130	104	104-114	~94	84-94
φ III	112	100-114	70	70-76	~20	20-32
φ IV	94	80-98	~40	40-44	26	26-32
mG I	62	52-64	48	46-50	40	40-44
mG II	62	52-62	48	48-50	32	32-38
mG III	66	56-66	32	32-40	30	30-34
vF IV	52	48-52	30	32-34	-	26-28
AG	96	88-102	60	60-70	70	64-72
GL	86	74-86	70	70	60	60-68

Abbreviations. IL - idiosoma length, IW - idiosoma width, φ - solenidion on tibiae I-IV, mG - ventral or median seta on genu I-III, vF - seta on femur, AG - length of genital apparatus, GL - length of gnathosoma.

*Female* (Figs. 19-24). Dorsal surface ornamented as in Fig. 19. Dorsal setae as in males but posterior setae arranged a little differently. Venter: all ventral setae short and arranged as in figure 20. Chaetotaxy on legs I-IV similar to chaetotaxy in males but with the following differences: medial thick seta mG on genu I thinner, ventral seta on Ti II bilaterally serrated (Fig. 22). Ventral setae vF on Fe II and pR



on Tr III thinner than such setae in males. Chaetotaxy: Ta I 9 (with solenidia and two distal spines), Ta II 9, Ta III 6, Ta III 6. Measurements (Table 2).

*Specimens examined.* Holotype male, from private cockroaches breeding of Uwe Kunick from Leipzig (Germany), 3.III.1990, from *Blaberus* sp. (Blattoidea: Blaberidae); leg. U. Kunick; deposited in MNHWU. Paratypes: 3 <<, 5 >>, the same data as in holotype, 1 <, 4 >> in author's collection (DZAC).

*Etymology.* The name of the species derives from the name *Miradora*.

**Table 2.** Metric data of the females of *Rosensteinia toddi* sp. nov. (1), *R. miradorae* sp. nov. (2) and *R. rafi* sp. nov. (3).

	1 n=15	2 n=9	3 n=6
IL	647-704	495-571	540-628
IW	476-615	355-476	289-368
sci	66-74	54-62	54-62
sce	276-294	220-256	208-232
vi	56-66	36-46	46-50
ve	30-46	30-36	26-38
h	66-82	68-80	26-32
sh	52-56	32-36	40-50
d1	14-16	14-16	18-26
d2	14-16	14-16	36-42
d3	14-16	10-16	26-30
d4	18-20	12-16	18-20
d5	26-32	18-22	14-16
l1	60-70	56-70	52-60
l2	22-34	20-30	28-40
l4	16-22	20-22	18-20
l5	24-30	20-22	12-16
Ta I	64-70	52-60	46-50
Ta II	66-74	50-56	48-52
Ta III	90-102	78-82	64-68
Ta IV	120-132	102-106	94-100
φ I	124-142	102-118	90-96
φ II	134-148	114-124	90-100
φ III	120-136	76-84	34-36
φ IV	94-106	42-50	30-40
mG I	64-72	52-58	44-52
mG II	60-68	50-58	32-40
mG III	66-86	30-40	28-34
vF IV	50-62	26-34	30-32
GL	84-92	82-90	68-80

***Rosenstenia rafi* sp. nov.**  
(Figs. 25-36)

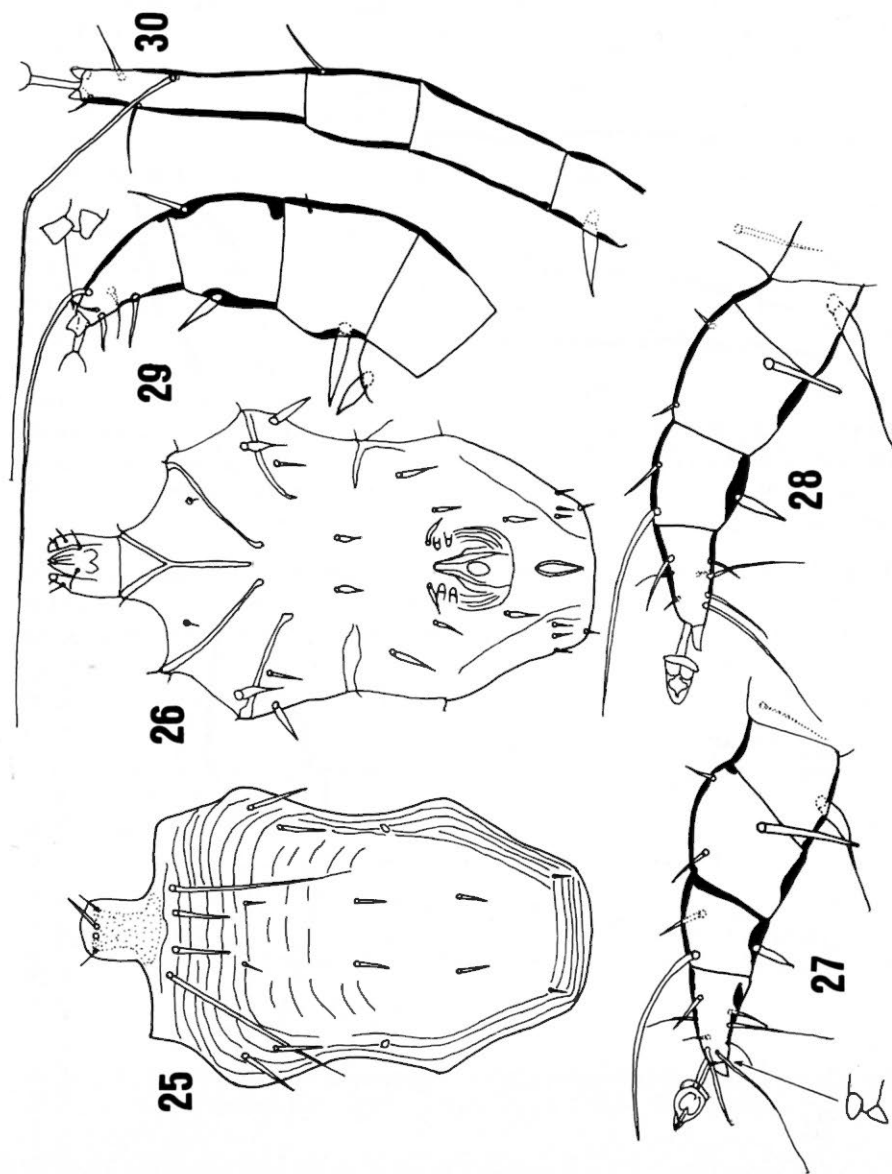
**Diagnosis.** Differs from the three other species of the genus in: almost all ventral setae enlarged; setae d2 and d3 longer and thicker than setae d1. Females also differ by especially long setae on tarsi III and IV.

**Male, holotype** (Figs. 25-30). Body elongated, dorsal surface ornamented as in Fig. 25. All dorsal setae a little enlarged, except setae l4. Setae vi about twice longer than setae ve, both smooth. Setae l1 somewhat longer than setae l2. Setae d2 distinctly longer than setae d1 (Table 1). Propodosomal shield present, punctate. Venter: setae sh and h enlarged. Setae cx I thin, setae cx II, cx III, ga, gm, gp, enlarged. Genital apparatus as in figure 26. Anal opening near posterior margin of idiosoma. Epimera I, Y-shaped. Gnathosoma with thin hypostomata. Legs: I-IV with tarsi bearing two distal stout spines each. Pretarsi with relatively narrow membrane on distal end. Chaetotaxy: Trochanters (I-IV) 1-1-1-0; Femora (I-IV) 1-1-0-1; Genua (I-IV) 3-3-2-0; Tibiae (I-IV) 3 (with solenidion)-3-2-1; Tarsi (I-IV) 10 (including solenidia and two distal spines)-10-7-6 (Figs. 27-30). Solenidion  $\phi$  on tibiae I and II are subequal in length; both setae distinctly longer than solenidia  $\phi$  on tibiae III and IV (Table 1). Ventral and medial setae on tibiae I, II, III, genuae I, II, III, femora I, II, IV and trochanters III thick. Metric data (Table 1).

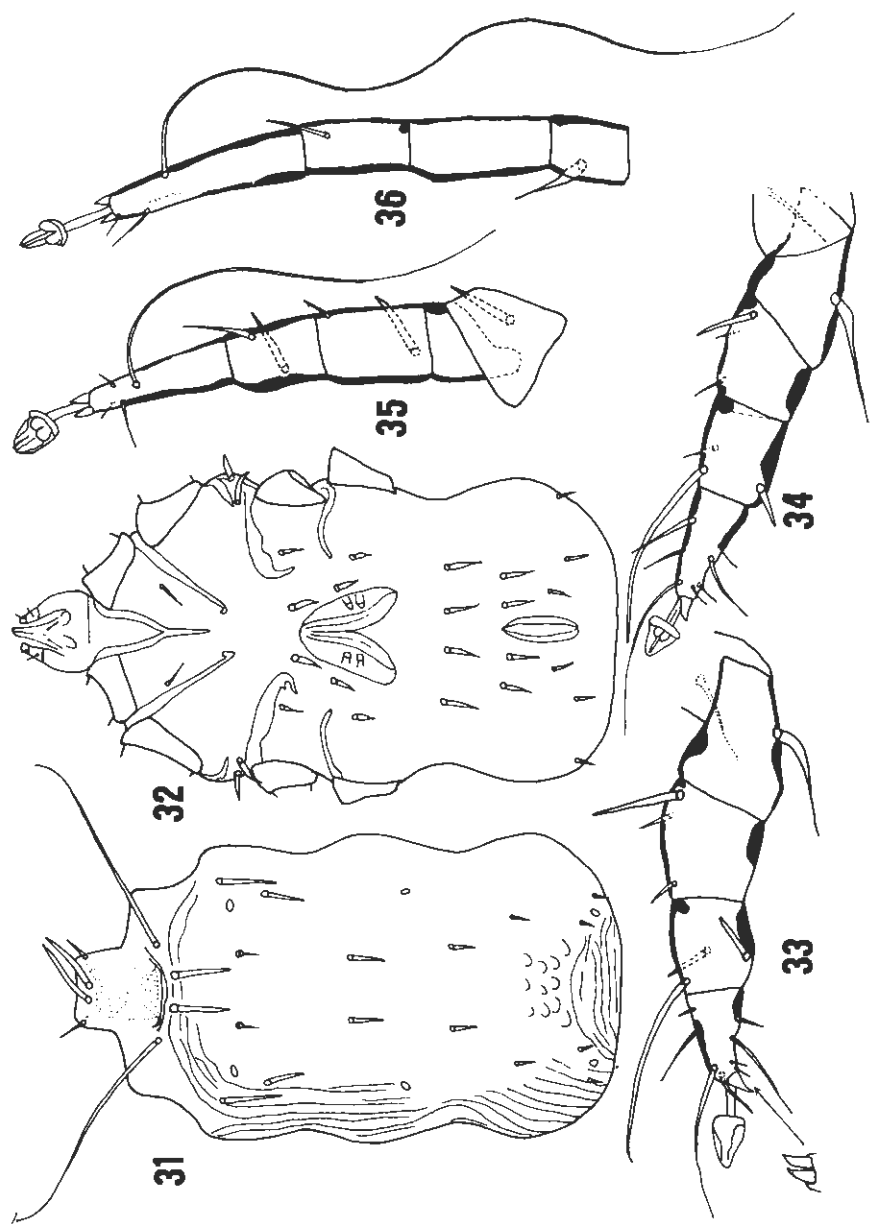
**Female** (Figs. 31-36). Body longer than wide ornamented as in figure 31. Propodosomal shield present, punctate. Setae ve thin, distinctly shorter than thicker setae vi. Setae l1 longer than setae l2; setae d1 thin and shorter than thicker setae d2. Setae l3, d5 and l4 very short. Posterior margin of idiosoma almost straight (or slightly convex). With small pits at base of l1 and between bases of d4 and l5. Venter: epimera I, Y-shaped. All ventral setae excluding cx I and l4 are less or more enlarged. In genital region setae ga, gm: beyond this region with seven pairs of setae (in anal region three pairs of setae) arranged as in figure 32. Legs: I, II (Figs. 33-34) similar to such legs in males but legs III thinner and their tarsi are longer. Tarsi III, IV each with one very long seta. Chaetotaxy as in males, except Ta II 9, Ta III 6 (Figs. 34-35). Metric data (Table 2).

**Specimens examined.** Holotype male, ~ 30 km east from Puerto Maldonado, at river Madre de Dios, in primeval forest, 28.X.1996; on large cockroach (*Blaberidae*: ?*Blabera* sp.), leg. R. Haitlinger; deposited in MNHWU. Paratypes: 2 <<, 5 >>, same data as holotype, 1 <, 1 > in author's collection (DZAC).

**Etymology.** The name of the species derives from the name Raf.



Figs. 25-30. *Rosensteinia rafi* sp. nov., male. 25, idiosoma, dorsal view; 26, idiosoma and gnathosoma, ventral view; 27, leg I, trochanter-tarsus; 28, leg II, trochanter-tarsus; 29, leg III, trochanter-tarsus; 30, leg IV, femur-tarsus.



Figs. 31-36. *Rosensteinia rafi* sp. nov., female. 31, idiosoma, dorsal view; 32, idiosoma and gnathosoma, ventral view; 33, leg I, trochanter-tarsus; 34, leg II, trochanter-tarsus; 35, leg III, trochanter-tarsus; 36, leg IV, femur-tarsus.

Key to the species of *Rosensteinia* Oudemans 1923

## Males

1. Setae l1 and l2 subequal in length ..... 2.  
     Setae l1 about twice as long as setae l2 ..... 3.
2. Setae cx IV, ga and setae in genital region enlarged; idiosoma less than 550 mm long .....  
     ..... *R. rafi* sp. nov.  
     Setae cx IV, ga, gp thin; idiosoma more than 600 mm lo .....  
     ..... *R. sieversi* Oudemans 1923
3. Idiosoma more than 600 mm long, width of idiosoma over 400 mm .....  
     ..... *R. hileri* Samšinak 1977  
     Idiosoma less than 600 mm long, width of idiosoma less than 370 mm ..... 4.
4. In genital region two pairs of enlarged setae, solenidion SoTi IV below 60 mm long .....  
     ..... *R. miradorae* sp. nov.  
     In genital region all setae thin, solenidion SoTi IV over 75 mm long .....  
     ..... *R. toddi* sp. nov.

## Females

1. All setae in genital and anal regions enlarged, setae d1 distinctly shorter than setae d2 .....  
     ..... *R. rafi* sp. nov.  
     Setae in genital and anal regions thin, setae d1 and d2 subequal in length ..... 2.
2. Setae l1 and l2 subequal in length; remaining dorsal setae (except sce) subequal in length .....  
     ..... *R. sieversi* Oudemans 1923  
     Setae l1 about twice as long as setae l2; setae of series d at least twice or thrice shorter than setae l1 ..... 3.
3. Idiosoma more than 900 mm long ..... *R. hileri* Samšinak 1977  
     Idiosoma less than 750 mm long ..... 4.
4. Idiosoma more than 600 mm long, length of setae vi over 50 mm, length of tarsi IV over 110 mm, length of j IV over 80 mm ..... *R. toddi* sp. nov.  
     Idiosoma less than 600 mm long, length of setae vi less than 50 mm, length of tarsi IV less than 110 mm, length of j IV less than 60 mm ..... *R. miradorae* sp. nov.

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