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Notes on the flower mites of the genus *Rhinoseius* BAKER and YUNKER, 1964 (Acari: Ascidae), phoretic in the nares of hummingbirds with a key to the known species

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Résumé

L'auteur discute de la valeur des caractères morphologiques utilisés dans la systématique des acariens du genre *Rhinoseius* BAKER et YUNKER, 1964 (Mesositimata, Ascidae) et il donne une clé des espèces de ce genre.
Mots-clé: Systématique. Acariens genre *Rhinoseius* vivant dans fleurs et phorétiques dans fosses nasales Colibris.

Summary

Some morphological characters of mites of genus *Rhinoseius* BAKER and YUNKER, 1964 (Mesostigmata: Ascidae) are discussed and a key to the known species is proposed.
Key-words: Systematics. Flower mites of genus *Rhinoseius* phoretic in nares of Hummingbirds.

Introduction

Review of the literature on flower mites

BAKER and YUNKER (1964) were the first to draw attention to the curious biology of some ascid (= blattisociid) mites which live normally in hummingbirds-pollinated flowers and use hummingbirds (Trochilidae) as phoretic hosts. They erected two new genera, *Rhinoseius* (with one new species) and *Tropicoseius* (with 10 new species). All these mites were collected in the nares of Venezuelian and Panamanian hummingbirds.
LINDQUIST and EVANS (1965), in a revision of the family Ascidae, synonymized *Tropicoseius* with *Rhinoseius*.
These two fundamental papers were followed by a series of studies on the biology and the systematics of this group of mites.
In 1970, DUSBABEK and CERNY described a new species, *Tropicoseius bakeri,* from a Cuban hummingbird.
In 1972, HUNTER described two new species, *Rhinoseius richardsoni* and *Rh. colwelli,* both collected from flowers and hummingbirds in Costa Rica.
The biology of these two species has been studied in detail by COLWELL (1973, 1979) (see below).
In 1977, FAIN, HYLAND and AITKEN studied two important collections of flower mites. One had been collected by DR AITKEN from the nares of Trochilidae in Trinidad and Northern Brazil (Bélem, Para). The second collection was found by DR KIRMSE (Canada) from hummingbirds in Panama and Venezuela. The total collection included 15 species, of which 12 were new. These new species belonged to 3 genera, i.e. *Lasioseius* (one species), *Proctolaelaps* (4 species) and *Rhinoseius* (7 species). It was the first time that the genera *Lasioseius* and *Proctolaelaps* were recorded from the nares of hummingbirds. Moreover, some of these species were found in other birds than Trochilidae, namely nectar- and pollen-feeding birds. It is to be noted that another species of *Proctolaelaps* (*P. vandenbergi* (Ryke, 1964)) is common in South African *Protea* flowers, and that DOMROW (1966) had recorded the presence in Queensland of a new genus and species of ascid mite (*Hattenia panopla*) from the nares of a honeyeater (Meliphagidae). In 1979, FAIN and LUKOSCHUS recorded again this species from the same host (*Gliciphila indistincta*) in W. Australia. In 1979, DOMROW described a new species of *Hattenia* (*H. cometis*) in the nares of *Gliciphila flava,* in Australia.
In 1978, HYLAND, FAIN and MOORHOUSE recorded 6 species of Ascidae from the nares of birds, mostly Trochilidae, in Vera Cruz, Mexico, among which one new species of *Rhinoseius*.
In 1978, FLECHTMANN and JOHNSTON described for the first time the male of *Rhinoseius braziliensis* BAKER and YUNKER, 1964.
IN 1979, Colwell and Naeem described *Rhinoseius epoecus* sp. n. from flowers in California.
In 1980, FAIN and HYLAND described 8 new species of *Rhinoseius* all collected from the head feathers of hummingbirds in Colombia.
In 1980, MICHERDZINSKI and LUKOSCHUS described *Rhinoseius rafinskii* sp. n. from flowers in Ecuador and Venezuela.
In 1991, OHMER, FAIN and SCHUCHMANN collected 12 species of ascid mites belonging to the genera *Rhinoseius* (10 species), *Proctolaelaps* (1 species) and *Lasioseius* (1 species). Among them 3 species were new (2 of genus *Rhinoseius* and of genus *Lasioseius*). All these mites were collected from the nares of hummingbirds or from flowers in Colombia. In addition the female of *Rh. panamensis* was described for the first time.

Biology of the flower mites

The flower mites of the genus *Rhinoseius* feed mainly on nectar but they are probably also able to utilize pollen or fungi. These mites disperse with the aid of hummingbirds.

The biology of these mites has been extensively studies by COLWELL (1973, 1979). This author believes that the relationship with the hummingbird is exclusively phoretic. He also observed that the diversity of the mite fauna decreases with altitude, latitude and isolation. We summarize herein the most important observations made by this author.

In the tropical lowland wet forest of Trinidad this fauna includes a dozen mite species which occupy 20 flower species and are transported by 7 to 10 species of hummingbirds. In Costa Rica, at 1400 m altitude the number of mite species found was 6, they lived in a dozen plant species and were carried by 5 to 6 species of hummingbirds. In the same country, but at 3000 m altitude, there were only 2 species of *Rhinoseius* associated with 4 species of plants and carried by 3 species of hummingbirds. At 4000 m, in Ecuador, there was only one species of *Rhinoseius* and at 5000 m (Chilean altiplano) no mites were recovered.

The mite fauna also decreases with latitude. Extensive researches made in California revealed the presence, mainly in the coastal area, of only one species, *Rhinoseius epoecus* COLWELL, 1979. This mite was found in 5 plant species and was carried by 2 species of hummingbirds. At similar latitude but in Southern Hemisphere (Coastal Chile), only one species of *Rhinoseius* was discovered. Isolation is also an important factor that influences the composition of the mite fauna. The number of mite species was always reduced or mites were completely absent in several Neotropical islands in spite of the presence of hummingbirds (COLWELL, 1979).

The same author observed interspecific competition among some species (e.g. *Rh. richardsoni* and *Rh. colwelli*) and the preference of some species of mites for certain species of plants (COLWELL, 1979).

MATERIAL EXAMINED

The number of species included in the genus *Rhinoseius* is now 34.

The holotypes of 27 species, paratypes of 3 species and specimens of 4 other species have been examined in the present study.

We were not able to obtain specimens of *Rh. Venezuelensis, Rh. rafinskii* and *Rh. epoecus* for our study and the data given in the keys were based on the original descriptions of these species.

ABBREVIATIONS: IPCAS = Institute of Parasitology of the Czechoslovak Academy of Sciences, Praha; IRSNB = Institut royal des Sciences naturelles de Belgique, Bruxelles; RMNH = Rijksmuseum van Natuurlijke Historie, Leiden; USNM = United States National Museum, Washington D.C.; ZMB = Zoological Museum, Bonn, Germany.

The length of the anal shield includes the cribrum, the width is the maximum width.

REMARKS ON SOME MORPHOLOGICAL CHARACTERS IN GENUS *Rhinoseius*

1. *Dorsal shield*

In *Rhinoseius* the dorsal shield is more reduced than in *Proctolaelaps.* This reduction is probably in relation with the repeated contact of the mites with the nasal mucosa of the birds. In *Proctolaelaps* only a few species are phonetic in birds, the great number being free living in all the stages of development. *Rhinoseius* presents therefore some resemblance with the nasal mites of the family Rhinonyssidae, except that in this group of mites the parasitism is permanent and the regression of structures much more marked. In some species of Rhinonyssidae the tritosternum is lacking (by regression), the dorsal shield strongly reduced or completely absent, the peritreme very short or absent and the chaetoxy drastically reduced.

According ot the degree of reduction of the dorsal shield one may distinguish, in the genus *Rhinoseius,* the four following types of shields:

Type A: dorsal shield entire without lateral incisions. This type is observed only in the male of *Rh. tiptoni.*

Type B: dorsal shield entire with two lateral incisions not connected by a complete or incomplete superficial line (suture). This type is the most frequent in the females of the group *tiptoni.*

Type C: dorsal shield entire with 2 lateral incisions connected by a complete or incomplete superficial line (suture). This type is the most frequent in males and females of the *wetmorei* group.

Type D: dorsal shield completely divided in two separate shields, a podonotal and an opisthonotal. This type is the most frequent in the males of the group *tiptoni* and in both sexes of the group *wetmorei.*

The shape of the dorsal shield is rather an unstable character and it is not rare to find in the same species specimens with two different types of shields, especially types B and C or types C and D.

2. *Inseminating organ or tube in the females of Rhinoseius*

We have described this organ in a previous paper (FAIN et al., 1977). The shape of the inseminating tube varies from species ot species and this character is therefore very important in the systematics of the genus. Three main types have been observed (table n° 1):

Type 1: The entire canal is thin and completely membranous without a distinct sclerotized matura-

Table I: Length, width and shape of inseminating tube (IT) in genus *Rhinoseius* (in µm)

Abbreviations: H = holotype; P = paratype; AC = adductor canal; SP = spermiduct

Species	Type of IT	Total length IT	Length of AC	Maturation Pouch			Length of SP
				Length	Width	Shape	
group tiptoni							
Rh. androdon (H)	1	70-90	—	—	—	—	—
Rh. rafinskii	1	short	—	—	—	—	—
Rh. tiptoni (H)	1	long	—	—	—	—	—
Rh. epoecus	1	long	—	—	—	—	—
Rh. richardsoni (H)	3	70-85	10	30-35	16-20	ovoidal, bilobed	30-40
Rh. antioquiensis (H)	3	141	6	30	20	ovoidal, bilobed	105
Rh. panamensis	3	57-92	5	27	21	ovoidal, bilobed	25-50
group ornatus							
Rh. ornatus (H)	1	20-35	—	—	—	—	—
Rh. colwelli (H)	1	250	—	—	—	—	—
Rh. changensis (H)	1	285	—	—	—	—	—
Rh. chiriquensis (H)	1	165	—	—	—	—	—
Rh. peregrinator (H)	1	310	—	—	—	—	—
group wetmorei							
Rh. adsimilis (H)	1	100	—	—	—	—	—
Rh. eutoxeres (H)	1	110-120	—	—	—	—	—
Rh. erro (H)	1	180	—	—	—	—	—
Rh. uniformis (H)	1	165	—	—	—	—	—
Rh. phoreticus (H)	1	180	—	—	—	—	—
Rh. braziliensis	1	very long	—	—	—	—	—
Rh. chlorestes (H)	2	145	108	37	12	inequally bilobed	—
Rh. bakeri (P)	2	147	120	27	2	cylindrical	—
Rh. phaethornis (H)	2	170-180	135	35-42	2,8-3	cylindrical (in "L")	—
Rh. mathewsoni (P)	2	160	127	33	3-3,1	cylindrical (in "L")	—
Rh. heliconiae	2	182	140	42	2,9-3,2	cylindrical	—
Rh. colombiensis (H,P)	2	95-110	30-35	65-75	3,5-4,2	cylindrical	—
Rh. trinitatis (H)	2	140-155	75	70-80	3,2-6	cylindrical	—
Rh. fairchildi (H)	2	126	48	78		"dumb-bell" shaped	—
Rh. waidei (H)	2	140	65	75	2,5-3	"dumb-bell" shaped	
Rh. venezuelensis	2	120-160	40-60	90-105	4,5-7	cylindrical	—
Rh. bisacculatus (H)	2	130	25	35 and 40	2,8-4,5	cylindrical	—
Rh. eisenmanni (H)	2	140	80	60	3	cylindrical	—
Rh. wetmorei (H)	2	140	100	18	12	short, ovoidal	—

tion pouch. In one species *Rh. ornatus,* the tube is very short (25-35 μm), thin and coiled. In alle the other species this tube is long or very long (from 70 to 310 μm). This group includes 15 species.

Type 2: The membranous adductor canal, generally long, is followed by one, very rarely two (in one species) sclerotized maturation pouches. In all the species, except one, this pouch is cylindrical and either thinner or wider than the adductor canal. In one species (*R. wetmorei*) this pouch is short and ovoidal and situated at the proximal end of the inseminating tube. This group includes 13 species.

Type 3: Adductor canal very short and wide. It is followed by a large ovoidal biloded sclerotized maturation pouch. There is a narrow spermiduct partly sclerotized and variable in length. This type is observed in three species: *Rh. richardsoni, Rh. panamensis* and *Rh. antioquiensis.*

In two species (*Rh. caucaensis* and *Rh. haplophaediae*) the inseminating tube has not been observed. In most of the species of the groups 1 and 2 the proximal end of the inseminating tube is prolonged by a complex coiled structure which represent the spermiduct surrounded by a sphincter. In some species (*Rh. tiptoni, erro, chlorestes, bakeri, trinitatis, venezuelensis* and *bisacculatus*) an additional small globulous thin-walled sac is appended to this structure. Its signification is unknown.

3. *Tectum*

In the species of the groups *tiptoni* and *ornatus* the tectum is either rounded and smooth, or rounded and denticulate or truncate and denticulate. In the species of the group *wetmorei* the tectum is long or very long and ends in a very fine point. In some species of this group the tectum is bifid or denticulate apically (e.g. *Rh. braziliensis*).

4. *Peritremes*

Most of the species of the group *tiptoni* have a rather short peritreme which extends to coxa II or I but not beyond the anterior border of the coxa I. In the 5 species of the group *ornatus* and in all the species of the group *wetmorei* the peritremes extend to setae *zl* or very close to them.

5. *Denticles on ventral surface of coxae I*

In all the species of the groups *tiptoni* and *ornatus* (males and females) the coxae I and II bear ventrally one or several (until 7) rows of small denticles. These denticles arre completely absent in the group *wetmorei.*

6. *Spines or spurs on ventral surface of legs II and III in males*

The number of spines or spurs on leg II and III is a character that can be used to separate the species of the genus *Rhinoseius* in 3 main groups:

Group *tiptoni*:

Leg II: tarsus with 2 thick and blunt axial ventral spines; tibia lacking a spine, genu with a blunt spine except in *Rh. panamensis* which lacks this spine, femur with a blunt spine. Tarsus III always lacking ventral blunt spines.

Group *ornatus*:

Leg II: tarsus with 4 ventral blunt spines (2 preapical paraaxial and 2 axial). Some of these spines may be modified into spurs. Tibia with a ventral blunt spine only in *Rh. colwelli,* genu and femur with a blunt spine. Tarsus III with 2 ventral blunt spines (very small in *Rh. ornatus*) or with 3 strong spines (*Rh. peregrinator*).

Group *wetmorei*:

Leg II: tarsus as in group *ornatus,* tibia, genu and femur each always with a blunt spine. Tarsus III always with 2 ventral blunt spines except in *Rh. mathewsoni* with only one spine.

Short conical spines may also be present on ventral surface of leg I but only in some species of groups *tiptoni* and *wetmorei.* In *Rh. antioquiensis* and *Rh. richardsoni* the femur and the genu I bear a blunt spine. In *Rh. caucaensis* only genu I bears such spine. In group *wetmorei* these spines are present on the femur and the genu I of most of the species, except in *Rh. fairchildi.* In *Rh. colombiensis* only the genu I bears this spine.

7. *Variability, hybridization and male heteromorphism*

Intraspecific or geographical variability is probably common in these flower mites, but it has until now, not been studied.

One may also expect the possible occurrence of hybridization between some closely related species living in the same flower.

Another particularity which could increase the difficulty to identify some species is the occurrence in these species of heteromorphic males. Heteromorphism in males has been reported first by HUNTER (1972) for *Rhinoseius colwelli* HUNTER, in the following terms: "Of importance in all types is length of setae in *j-J* and *z-Z* rows compared to longer setae of *s-S* and *r-R* rows, relative relationships of length of these setae was essentially the same for all three types" (HUNTER, 1972, p. 32). From the figures given by HUNTER it appears that in the female and in the homeomorphic males of *Rh. colwelli* all dorsal setae are very short whilst in the heteromorphic males the setae of the *s-S* and *r-R* rows were about five times longer than those of the very short *j-J* and *z-Z* rows. Among the 31 males studied by HUNTER 3 had dorsal setae as in the female, 21 had lateral setae much longer than central setae and 7 were intermediate between these types.

FLECHTMANN and JOHNSTON (1978) observed two different types of males in *Rh. braziliensis*. The homeomorphic male had short dorsal setae as in the female but its shield was slightly wider and included setae *r6, R1* and *R2* and posterior setae *S, R* and *UR* were longer and thicker. In the heteromorphic male all dorsal setae were longer and thicker and the leg II much thicker than in the homeomorphic male.

COLWELL and NAEEM (1979) observed the same phenomenon in the males of their new species *Rh. epoecus,* however, contrarily to the observations of HUNTER, the heteromorphic males were much less numerous than the homeomorphic ones. Of the 56 males examined 38 were homeomorphic, 12 heteromorphic and 6 were intermediate between these types. In the homeomorphic males all dorsal setae were short as in the females, whilst in the heteromorphic ones these setae were about twice as long and stronger and the lateral setae were thicker and longer than the central ones The authors did not depict the legs II in their specimens so that we ignore if they also are involved in heteromorphism.

From these observations it appears that heteromorphism in males of the genus *Rhinoseius* is characterized by an increase in size of either all dorsal setae or only the dorsolateral setae (*s-S, r-R*) and by an enlargement of the legs II. Another character which should be added, from our own observations, is the increase in size in the heteromorphic males of the blunt ventral spine present on most of the segments (tarsus, genu and femur, and sometimes tibia) of leg II.

We think that in several species of *Rhinoseius* the original description of the male paratype was based on an heteromorphic male (e.g. *Rh. erro, Rh. eisenmanni, Rh. venezuelensis, Rh. wetmorei, Rh. fairchildi, Rh. tiptoni, Rh. analis*).

REMARK ABOUT SOME SPECIES IN THE GENUS *Rhinoseius*

1. **Rhinoseius peregrinator**
BAKER & YUNKER, 1964

In all the species of *Rhinoseius* that we have examinated the tectum is similar in both sexes. However, in the original description of *Rh. peregrinator* the tectum is described in the female as "sharply pointed" and in the male as "tectum rounded". We could therefore surmize that the male does not correspond to the female. Through the courtesy of Mr R. SMILEY we were able to examine the complete typical series of *Rh. peregrinator,* consisting of the holotype female, 12 paratypes female and 6 paratypes male. This examination has shown that in all these specimens the tectum is rounded. In the female the tectum is short whilst in the male it is much longer.

Moreover, in both sexes the ventral surface of coxa I bears 6 to 7 rows of small denticles, not mentioned in the original description or figures and the peritreme extends close to setae *zl*. By these characters *Rh. peregrinator* belongs to the group "ornatus".

2. **Rhinoseius epoecus**
COLWELL and NAEEM, 1979

According to COLWELL and NAEEM this species is very close to *Rh. chiriquensis*. However if we refer to the original description of both species we note that they differ from each other by some important characters that we summarize as follows:

In *chiriquensis* (female): only coxa II with a boss; peritreme extending to seta *zl,* sternal lobes lacking, setae *S5* lacking, with 5 rows of denticles on coxa I, tectum finely arched.

In *epoecus* (female): coxae II and III with bosses, peritreme extending to seta *sl,* sternal lobes well developed, setae *S5* present, coxa I with one arched row of denticles, tectum wider.

We were not able to get types or specimens of that species for the present study and the type of that species is not in the collection of the U.S. National Museum of Natural History (Mr R. SMILEY in litt.).

We include this species tentatively in the group *"tiptoni",* until the typical material becomes available for study.

3. **Rhinoseius braziliensis**
BAKER & YUNKER, 1964

FLECHTMANN and JOHNSTON (1978) have described for the first time the male of this species. Unfortunately they did not depict the dorsum or the legs (except leg II) which provide important characters in the systematic of this group of mites.

Through the courtesy of Prof. C. FLECHTMANN, we were able to examine 4 females and 2 males (an homeomorphic and an heteromorphic) of this species. We complete here the description of these males:

Homeomorphic male: dorsal shield of type C, with 20 pairs of setae on its anterior part and 19 pairs of setae on its posterior part. Setae *j3* to *j6* 25 to 30 μm, *s4* to *s6* 35-45 μm, *r4* to *r6* 40-45 μm, *Jv5* 180 μm, *S1* to *S5* 45-63 μm, *Z5* 195 μm, *R1* to *R3* 45-60 μm. Ventrianal shield 270 μm long and 180 μm wide, bearing 4 pairs of setae 60-78 μm long. Tibia II with a blunt spine, tarsus III with 2 blunt spines. Tectum long, pointed. Barbed setae are present on dorsal surfaces of all the femora and on trochanters I, III and IV and also on palpfemora. All these setae of tibiae and genua III and IV much shorter than their respective segments.

Heteromorphic male: It differs from the former by the following characters: greater size of ventrianal shield (300 μm long and 225 wide), and of the preanal setae (75 to 105). Greater length of setae *Jv5* (250), *S5* (105), *R1* to *R3* (79-90), *j3* to *j6* (60-90), *r4* to *r6* and *s4* to *s6* (60-90). Peritreme longer (reaching close to *zl*). Some setae of tibia IV are as long as the tibia, or slightly longer than the latter.

4. **Rhinoseius waidei**
FAIN & HYLAND, 1980

This species is very close to *Rh. fairchildi* (in females) by most of the characters except the following: 1. Peritreme narrower (6 μm) than in *fairchildi* (9 to μm); 2. pattern of network on dorsal and anal shields strongly marked in *waidei,* very poorly marked in *fairchildi*; 3. anal shield always wider than long in *waidei*: length and width in holotype 108 × 120 μm, in 5 paratypes: 105 × 117, 109 × 117, 110 × 115, 111 × 118, 120 × 132. In the holotype and in 5 paratypes of *fairchildi* these measurements are 116 × 102, 120 × 114, 120 × 113, 126 × 111, 126 × 117 and 127 × 118 (these measurements include the cribrum). The inseminating tubes are identical in both species.

5. **Rhinoseius changensis**
(BAKER & YUNKER, 1964)

The presence (in the female) of 6 pairs of sublateral dorsal setae on the soft cuticle anterior to the shield incisions is highly characteristic for that species. In the holotype the peritreme does not reach the seta *zl* but is more close to this seta than to *sl.* Tectum rather long but with rounded apex. All ventral setae short (15-20 μm). Scutal setae short (10-18 μm). Scutum of type B. Inseminating tube very long (285 μm). Fixed digit of chelicerae distinctly longer than movable digit. Coxa I with one curved row of denticles.

6. **Rhinoseius chiriquensis**
(BAKER & YUNKER, 1964)

We have remounted the holotype which was completely opaque. Coxae I with 5-6 rows of denticles. Tectum rounded. Scutum and anal shield with a well-developed network of lines. Sternal shield without lobes and bearing several lateral transverse lines. Genital shield with numerous and long longitudinal lines. Scutum of type C, with deep lateral incisions in its posterior third. Scutal setae short, the longest (*Z5*) is 18 long. Metapodal shields rectangular, 36 μm long and 7,5 μm wide. Inseminating tube 165 μm long, very narrow and lacking a sclerotized maturation pouch. Anal shield 120 μm long and 93 μm wide. Peritremes reaching seta *zl*. Seta *S5* lacking at one side.

Table II: Main characters separating the groups in genus *Rhinoseius*

	Group *tiptoni*	Group *ornatus*	Group *wetmorei*
In both sexes			
Tectum	rounded or truncate	rounded	pointed
Rows (1 to 7) of denticles on coxa I	+	+	O
Peritreme			
long (extending to setae *zl*)	O	+	+
short (not extending beyond coxa I)	+	O	O
In males			
Number of blunt ventral spines on			
Tarsus II	2	4	4
Tarsus III	O	2 or 3	2 (or 1 in (one species)
In females			
Type of inseminating tube	1 or 3	1	1 or 2

Table III: Geographical distribution of the species of genus *Rhinoseius* and locations of the holotypes

Abbreviations: H = holotype; + = paratype or specimen; HB = hummingbirds; F = flower

Species	Brazil		Ecuador		Venezuela		Colombia		Panama		Costa Rica		Trinidad		Mexico		Cuba	California (U.S.A.)		Location of holotypes
	HB	F	HB	F	HB	F	HB	F	HB	F	HB	F	HB	F	HB	F	HB	HB	F	
group tiptoni																				
Rh. androdon							H													IRSNB
Rh. rafinskii			H		+															RMNH
Rh. tiptoni							+	+	H											USNM
Rh. epoecus																	+	+	H	?
Rh. richardsoni									+		+	H								IRSNB
Rh. antioquiensis							H													IRSNB
Rh. panamensis							+		H											IRSNB
Rh. caucaensis							H													ZMB
Rh. haplophaediae							H													ZMB
group ornatus																				
Rh. ornatus							H													IRSNB
Rh. colwelli											+	H								IRSNB
Rh. changensis							+		H											USNM
Rh. chiriquensis							+		H											USNM
Rh. peregrinator															H					USNM
group wetmorei																				
Rh. eutoxeres							H													IRSNB
Rh. erro							+								H					USNM
Rh. uniformis	H																			IRSNB
Rh. phoreticus													H							IRSNB
Rh. braziliensis		H																		USNM
Rh. adsimilis							H													IRSNB
Rh. chlorestes	H																			IRSNB
Rh. bakeri																	H			IPCAS
Rh. phaethornis	H												+							IRSNB
Rh. mathewsoni							+								H					USNM
Rh. heliconiae									+	H					+					USNM
Rh. colombiensis							H													IRSNB
Rh. trinitatis													H							IRSNB
Rh. fairchildi							+	+	H											USNM
Rh. waidei							H													IRSNB
Rh. venezuelensis	+				H		+		+	+			+							USNM
Rh. bisacculatus	H												+							IRSNB
Rh. eisenmanni									H											USNM
Rh. wetmorei									H											IRSNB
Rh. analis							H													

KEY TO THE GENUS *Rhinoseius*

FEMALES

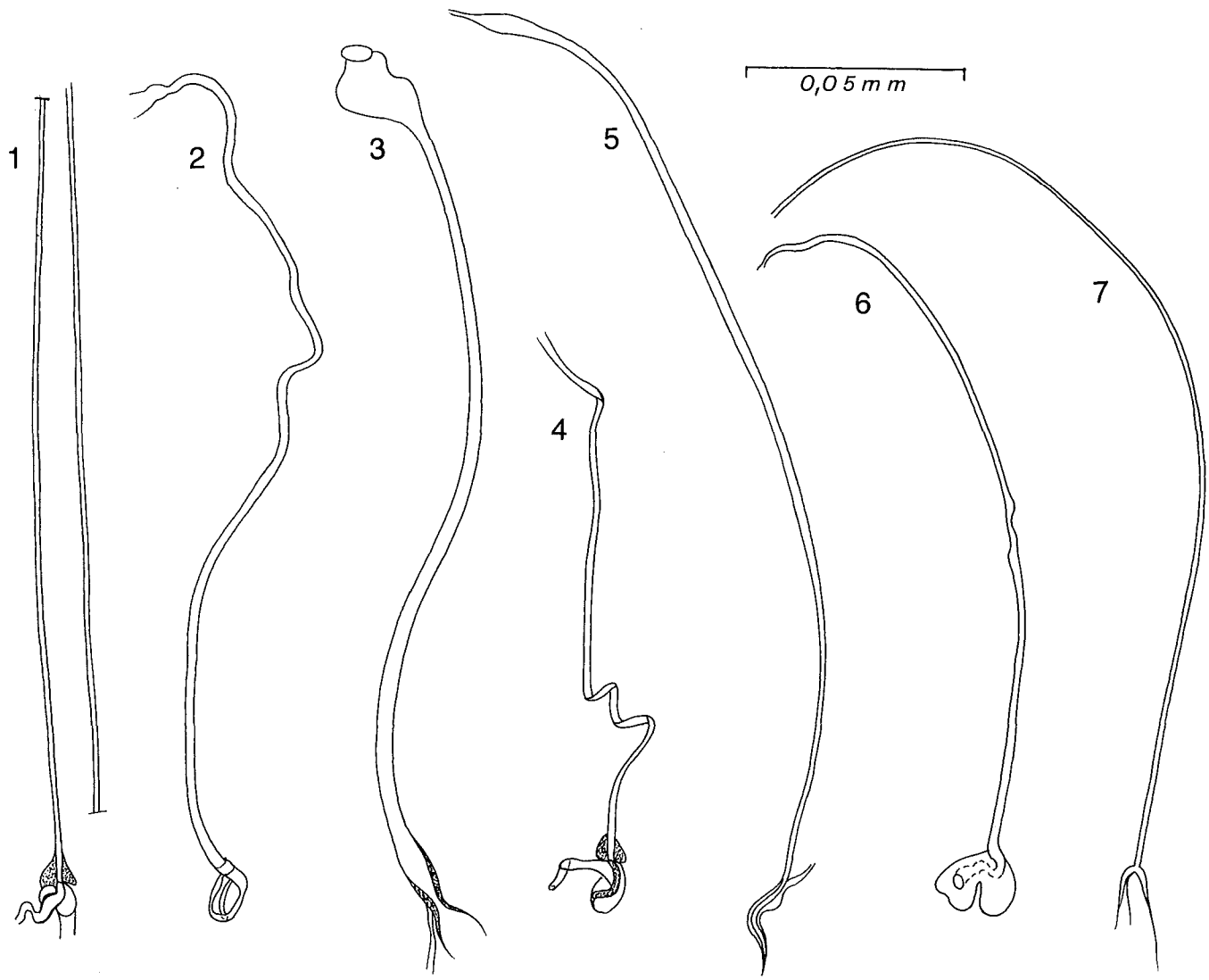
Remarks:

1. The female of *Rh. analis* is unknown
2. *Rh. changensis* and *Rh. chiriquensis* are tentatively placed in the group *ornatus* owing to their long peritreme

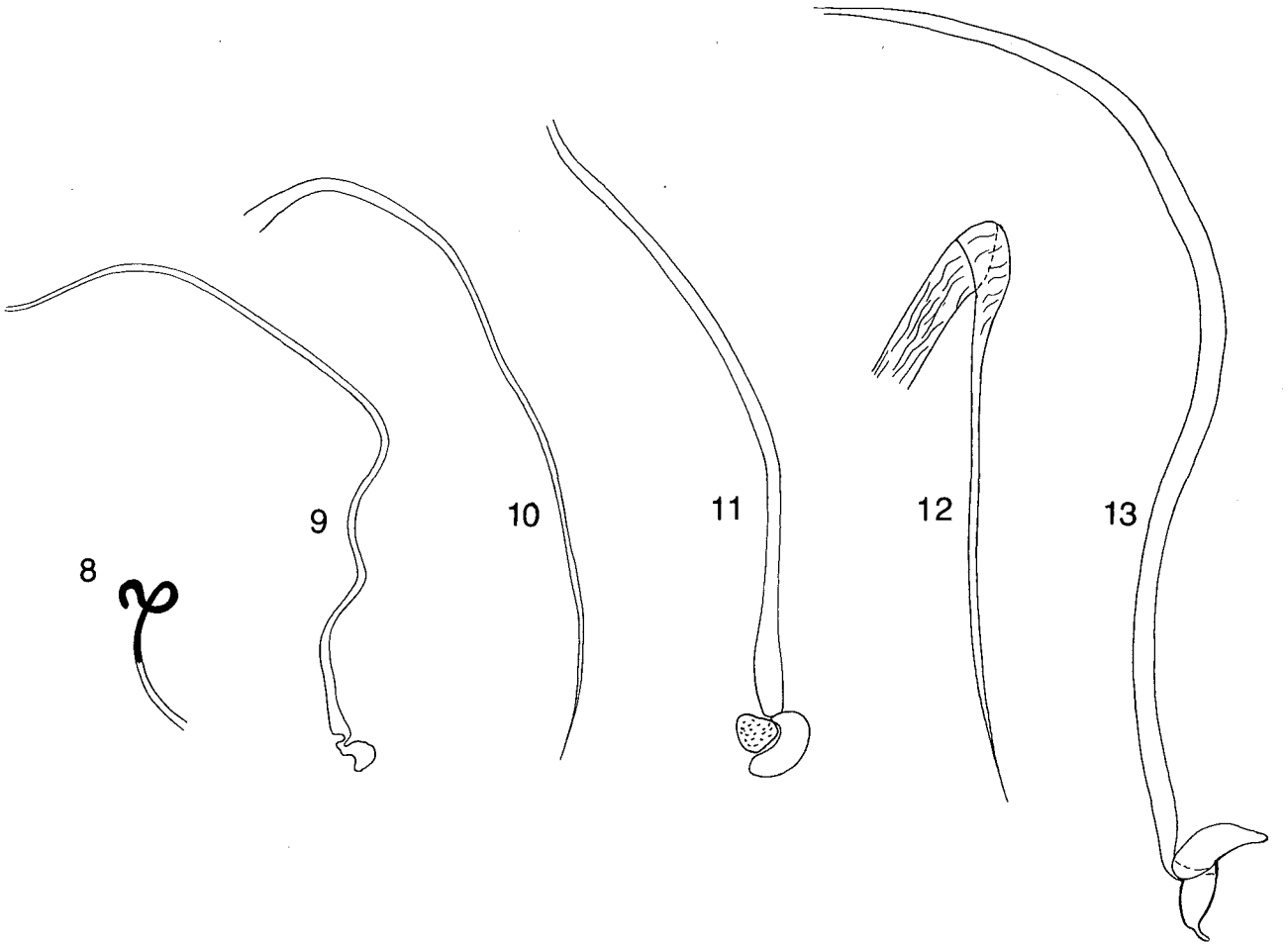
1. Coxa I with one or several rows of small denticles on their ventral surface.
   Tectum rounded or truncate, smooth or denticulate, never ending in a fine point.
   Peritreme either short and extending to coxa II or I or long and reaching setae *zl*.
   Anterior margin of sternal shield either with 2 lobes or lacking lobes.
   Dorsal shield generally of type B, never of type D ..... 2.

   Coxa I without denticles. Coxa IV always without a spur.
   Tectum ending in a fine point.
   Peritreme extending to seta *zl*.
   Anterior margin of sternal shield with 2 lobes.
   Dorsal shield generally of types C or D.
   Inseminating tube long, either completely membranous or with proximal part forming a sclerotized thick-walled cylindrical or ovoidal maturation pouch ..... group *wetmorei* 15.

2. Peritremes extending close to setae *zl*.
   Coxa IV without a ventral spur.
   Inseminating tube narrow, variable in length, without a sclerotized maturation pouch.
   ..... group *ornatus* 3.



Figs. 1-7 – Inseminating tube in *Rhinoseius* spp. lacking a sclerotized maturation pouch: 1. *Rh. peregrinator*; 2. *Rh. braziliensis*; 3. *Rh. phoreticus*; 4. *Rh. chiriquensis*; 5. *Rh. colwelli*; 6. *Rh. erro*; 7. *Rh. changensis*.



Figs. 8-13 – Inseminating tube in *Rhinoseius* spp. lacking a sclerotized maturation pouch: 8. *Rh. ornatus*; 9. *Rh. eutoxeres*; 10. *Rh. tiptoni*; 11. *Rh. adsimilis*; 12. *Rh. androdon*; 13. *Rh. uniformis.*

Peritreme shorter, reaching middle of coxa II or anterior part of coxa I.
Coxa IV with a ventral triangular spur in most of species.
Inseminating tube either membranous, long and narrow and without sclerotized maturation pouch or with a very short membranous adductor canal followed by an ovoid bilobed maturation pouch situated close to coxae III or IV.
..... group *tiptoni*
7.

3. With 6 pairs of sublateral dorsal setae anterior to the shield incisions. Anterior margin of sternal shield with 2 well-developed lobes Genital shield narrowing posterior to the genital setae. Anal shield about twice as long as wide. Metapodal shields elongate. Inseminating tube very long, narrow, without maturation pouch. Tectum smooth, long and rounded. (From the holotype) ..... *Rh. changensis*
(BAKER & YUNKER, 1964)

With 4 pairs of sublateral dorsal setae anterior to the shield incisions. Genital shield expanded posterior to the genital setae. Tectum smooth and rounded, either long or short ..... 4.

4. Ventral and sublateral setae set on small sclerotized platelets. A pair of small setae set lateral to genital plate. Tectum short. Most of scutal setae 20-30 μm long. *Z5* 40 μm long. Inseminating tube membranous, narrow, 300 μm long, lacking a maturation pouch.
Scutum of type C. (From holotype and paratypes) ..... *Rh. peregrinator*
(BAKER & YUNKER, 1964)

Ventral and sublateral setae not set on sclerotized platelets. Without a pair of small setae lateral to genital plate. Other characters variable ..... 5.

5. Tectum long. Scutal setae short (6-15 µm). *Z5* 18 µm. Inseminating tube membranous, narrow, 250 µm long, lacking a sclerotized maturation pouch. Scutum of type B. (From holotype) ..... *Rh. colwelli* HUNTER, 1972.

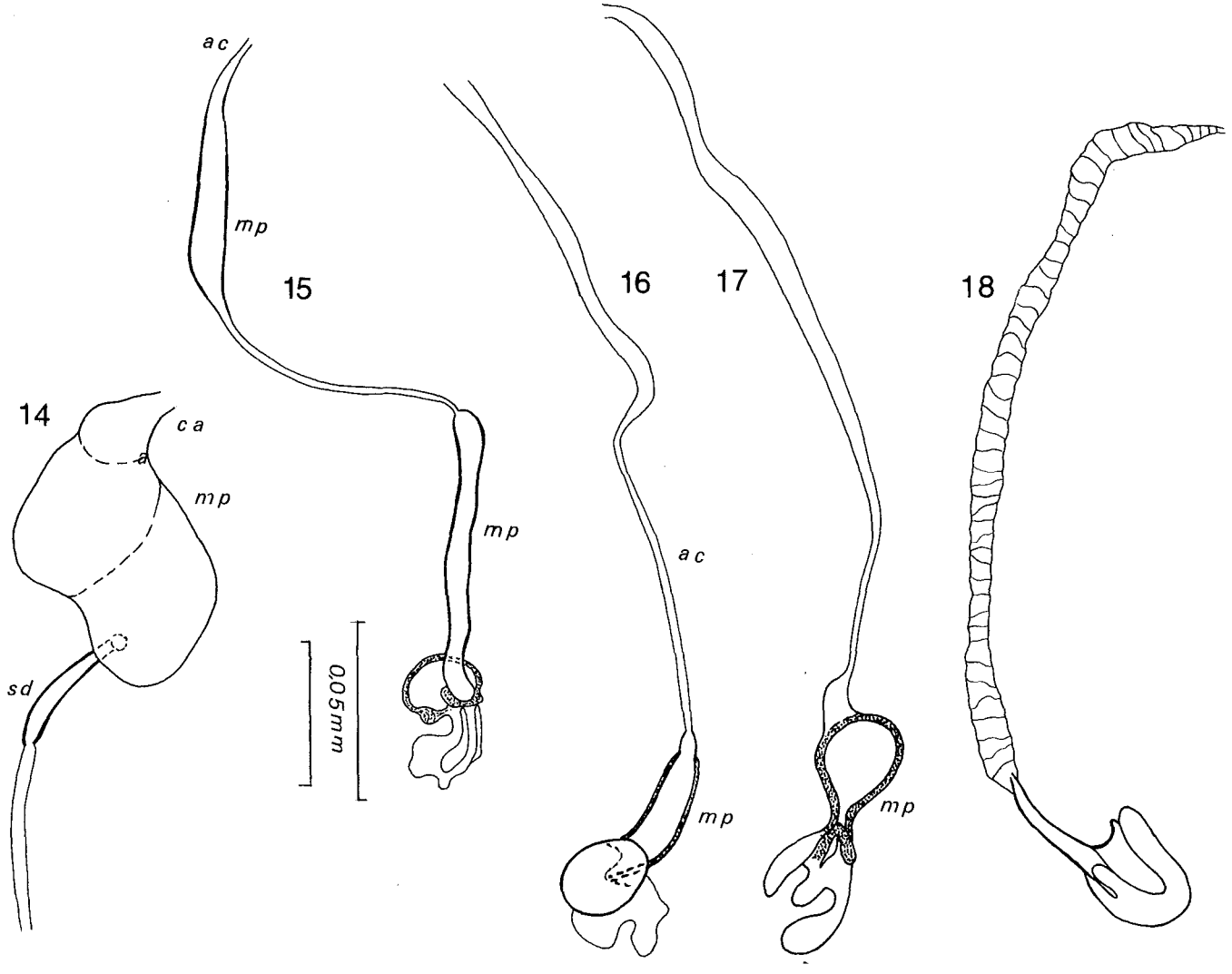
Tectum very short. Other characters variable ...6.

6. Tectum broadly rounded. Sternal lobes well developed. Setae *S5* present. Posterior seta of coxa II short. Coxae II-IV each with a well-developed boss. Inseminating tube narrow, very short and coiled, 20-35 µm long. Scutum of type B. (From holotype) ..... *Rh. ornatus* FAIN & HYLAND, 1980.

Tectum narrowly arched, with rounded apex. Sternal lobes lacking; seta *S5* lacking at one side. Posterior seta of coxa II long (30 µm). Only coxae II with a boss. Inseminating tube 165 µm long and very narrow. Scutum of type C
(From holotype) ..... *Rh. chiriquensis* (BAKER & YUNKER, 1964)

7. Coxa IV with a triangular ventral spur. Scutum of type B ..... 8.
Coxa IV without such spur ..... 13.

8. Inseminating organ consisting of a very short broad adductor canal, a rather voluminous ovoidal bilobed and sclerotized maturation pouch situated close to coxae III and IV and a longer membranous and narrow spermiduct. Peritreme extending to the middle or the anterior margin of coxa I. Sternal lobes absent.



Figs. 14-17 – Inseminating tube in *Rhinoseius* spp. with a sclerotized maturation pouch: 14. *Rh. richardsoni*; 15. *Rh. bisacculatus*; 16. *Rh. chlorestes*; 17. *Rh. wetmorei*; 18. *Rh. bakeri*.

Anal shield subcircular. Dorsal shield with 26-28 pairs of setae. Setae *J5* very small emerging from a bundle of minute spinules, or replaced by a small bundle of spinules. Setae *zl* variable ..... 9.

Inseminating tube not as above or not observed. Anal shield longer than wide. Setae *zl* present. Peritreme variable ..... 11.

9. Peritreme not extending beyond anterior margin of coxa II. Setae *zl, J4* and *Z4* lacking...10.

Peritreme extending to middle of coxa I. Setae *zl* present. Dorsal shield with 27 pairs of setae (16 + 11), 15-25 µm long. Seta *Z5* thin, 21 µm long. *J5* lacking replaced by a bundle of minute spinules. Anal shield almost square with rounded corners, 96 µm long and 89 µm wide. Spermiduct about 100 µm long. (From the holotype) . *Rh. antioquiensis* FAIN & HYLAND, 1980.

10. Tectum smooth, rounded. Dorsal shield with 55 setae (30 + 25). Setae *j2* and *z2* much longer (36 µm) than *j3* to *j5* (10-12 µm). (From holotype) ..... *Rh. richardsoni* HUNTER, 1972.

Tectum truncate and denticulate. Dorsal shield with 26-27 pairs of setae (14 + 12 or 15 + 12). Setae *j2* slightly longer (16 µm), *z2* distinctly longer (21 µm) than *j3* to *j5* (12 µm). (From specimens from Panama and Colombia) ..... *Rh. panamensis* FAIN & HYLAND, 1977.

11. Peritreme extending to anterior half of coxa II. Inseminating tube membranous, poorly defined, narrow, dilated in distal half. Seta *zl* situated relatively far (30 µm) from *jl*. Setae *Z5* and *Jv5* very short. (From the holotype) ..... *Rh. androdon* FAIN & HYLAND, 1980.

Peritreme extending to anterior margin of coxa I but not reaching setae *zl*. Inseminating organ not observed. Tectum truncate, denticulate. Genital shield abruptely widened behind genital setae, these setae situated on soft cuticle. Setae *J5* very small emerging from a small bundle of spinules. Seta *Z5* long and strong, *S5* variable...12.

12. Setae *Z5* and *S5* thick, cylindricoconical and with very short barbs, they are 68 and 59 µm long respectively. Coxa II with 2 large rounded posterolateral lobes. (From holotype and paratypes) ..... *Rh. caucaensis* OHMER et al., 1991.

Setae *Z5* long, thick, cylindrical with a dilated apex and 65 µm long. Setae *S5* very small. Coxa II without lobes. (From the holotype) ..... *Rh. haplophaediae* OHMER et al., 1991.

13. Peritreme reaching the middle of coxa I (at level of seta *sl*). Anal shield longer than wide. Dorsal shield of type B or C ..... 14.

Peritreme reaching anterior third of coxa II. Anal shield wider (91 µm) than long (82 µm). Dorsal shield of type B, with 28 pairs of setae (14 + 14). (From original description) ..... *Rh. rafinskii* MICHERDZINSKI et al., 1980.

14. Dorsal shield of type B, with 29 pairs of setae (17 + 12). Opisthogastric integument with more than 20 pairs of setae. Anal shield about 1,6 times as long as wide. Metapodal shields short, curved. (From holotype) ..... *Rh. tiptoni* BAKER & YUNKER, 1964.

Dorsal shield of type C with 32 pairs of setae (17 + 15). Opisthogastric tegument with 9 pairs of setae (one pair very small at level of genital shield). Anal shield about 1,4 times as long as wide. Metapodal shields long, rodlike. (From original figures) ..... *Rh. epoecus* COLWELL & NAEEM, 1979.

15. Anal shield subcircular. Metapodal shields triangular ..... 16.

Anal shield distinctly longer than wide. Shape of metapodal shields variable..... 19.

16. Anal shield slightly longer than wide. Dorsal shield with 32 pairs of setae (17 + 15) ..... 17.

Anal shield always wider than long. Number of setae on dorsal shield variable ..... 18.

17. Anal shield 99 µm long and 96 µm wide. Dorsal shield of type D, Palpfemur with a short and thick ventrolateral spine. Inseminating tube membranous, long and narrow devoid

of maturation pouch. (From holotype) ..... *Rh. eutoxeres* FAIN & HYLAND, 1980.

Anal shield always longer than wide (116 µm long and 102 µm wide in holotype). Dorsal shield of type B. Palpfemur with thin ventral setae. Inseminating tube with in its proximal two third a sclerotized dumb-bell shaped maturation pouch. (From holotype and 5 paratypes) ..... *Rh. fairchildi* (BAKER & YUNKER, 1964)

18. Anal shield abnormally large (180 µm wide and 165 µm long). Dorsal shield of type D, with 29 pairs of setae (14 + 15), the *jl, zl* and *sl* lacking. Adductor canal very narrow (30-35 µm long), sclerotized maturation pouch cylindrical 65-75 µm long and 3,5-4,2 µm wide. (From the holotype) ..... *Rh. colombiensis* FAIN & HYLAND, 1980.

Anal shield smaller, always wider than long (in holotype 120 µm wide and 111 µm long). Dorsal shield of type C, with 32 pairs of setae. Setae *Z5* and *Jv5* 21 and 45 µm long respectively. Inseminating tube as in *Rh. fairchildi*. (From the holotype)..... *Rh. waidei* FAIN & HYLAND, 1980.

19. Ventral and sublateral setae set on sclerotized platelets. Some dorsal setae of legs and palpfemur serrate. Dorsal shield of types D or C..... 20.

Ventral and sublateral setae not set on minute platelets. Trochanters and femora of legs and palpfemur either with some or without serrate setae. Dorsal shield variable, generally of type C or D, very rarely (1 species) of type B..... 21.

20. Femora and trochanters of legs I, III and IV and palpfemur with some dorsal setae serrate. Setae *Z5, S5* and *Jv5* about 100, 60 and 200 µm long respectively. Setae *R* stout, about 50-90 µm long. Anal shield expanded in anterior half. Setae *S1* lacking. Dorsal shield with 31 pairs of setae (17 + 14). Inseminating tube very long without sclerotized maturation pouch. Idiosoma 733 µm long. (From original description) ..... *Rh. braziliensis* (BAKER & YUNKER, 1964)

Femora and trochanters I to IV and palpfemora with one or several dorsal serrate setae. Setae *Z5, S5* and *Jv5* 60, 24 and 105 µm long respectively. Setae *R* smaller (30 µm long). Anal plate slightly expanded in posterior half. Setae *S1* present. Dorsal shield with 32 pairs of setae. Inseminating tube membranous, 180 µm long, slightly dilated at proximal end. Idiosoma 675 µm long. (From the holotype) ..... *Rh. phoreticus* FAIN & HYLAND, 1977.

21. Setae *Z5* lacking. Dorsal shield of type D or C, bearing 31 pairs of setae (17 + 14). Anal shield almost twice as long as wide. Inseminating tube with a long (140 µm) membranous adductor canal and a short sclerotized cylindrical maturation pouch (42 µm long and 2,9-3,2 µm wide). Coxae II and III with a distinct boss. Dorsal setae of legs short, spinelike. (From original description and specimens from Mexico) ..... *Rh. heliconiae* (BAKER & YUNKER, 1964)

Setae *Z5* present. Dorsal shield with 32 pairs of setae (17 + 15). Other characters variable.. 22.

22. Inseminating tube membranous, narrow, without sclerotized maturation pouch. Coxae II-III each with a well developed boss ..... 23.

Inseminating tube with one or two sclerotized maturation pouches. Coxal bosses variable... 25.

23. Femora I-II and trochanter I with most of dorsal setae serrate. Palps without serrate setae. Setae *Z5, S5* and *Jv5* 48, 27 and 72 µm long respectively. Metapodal plates narrow, elongate and slightly curved. Dorsal shield of type D or C. Inseminating tube 165 µm long. (From the holotype)..... *Rh. uniformis* FAIN et al., 1977.

Femora I-II, trochanter I and palps lacking serrate setae ..... 24.

24. Inseminating tube 180 µm long. Metapodal shields elongate. Dorsal shield of type C. Anal shield 160 µm long and 108 µm wide. (From holotype) ..... *Rh. erro* (BAKER & YUNKER, 1964)

Inseminating tube 100 µm long. Metapodal shields triangular. Dorsal shield of type B or C. Anal shield 125 µm long and 78 µm wide. (From holotype) ..... *Rh. adsimilis* FAIN & HYLAND, 1980.

25. Inseminating tube long and narrow with 2 sclerotized cylindrical maturation pouches separated by a narrow membranous tube. Setae *Z5, S5* and *Jv5* 26, 23 and 70 µm long. Metapodal plates triangular. Anal shield 135 µm long and 81 µm wide. Femur IV with a strong ventral spine. Dorsal shield of type D or C. (From holotype) ..... *Rh. bisacculatus* FAIN et al., 1977.

Inseminating tube long with only one maturation pouch either cylindrical or globulous .....26.

26. Inseminating tube with a long (120 µm), wide and striated adductor canal and a short (27 µm long) and narrow cylindrical sclerotized proximal maturation pouch. Dorsal shield of type C. (From a paratype) ..... *Rh. bakeri* DUSBABEK & CERNY, 1970.

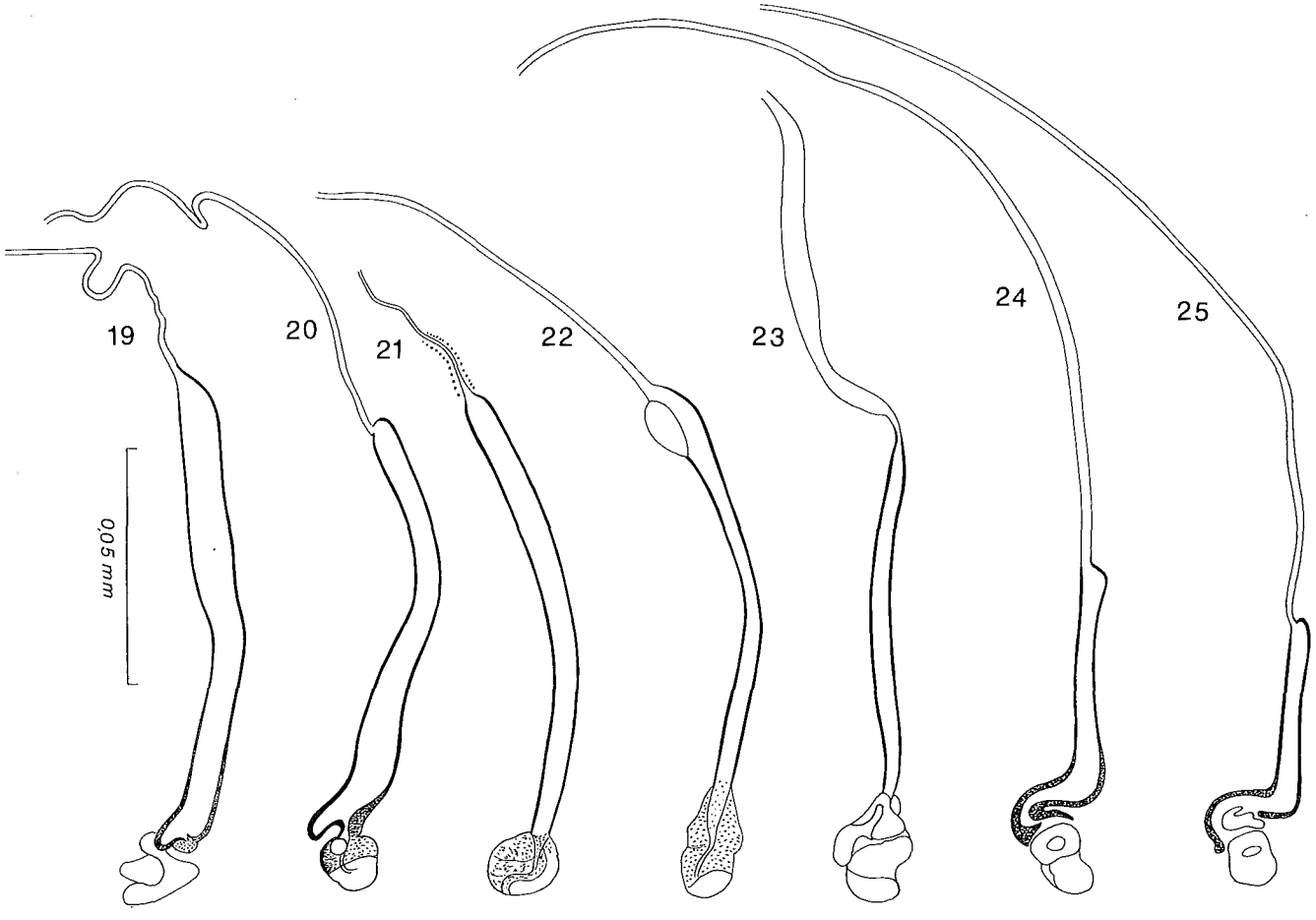
Inseminating tube not as above ..... 27.

27. Inseminating tube 160-180 µm long (total length) with a proximal cylindrical "L-shaped" maturation pouch 33-42 µm long. Dorsal shield of type C. Metapodal plates triangular ..... 28.

Inseminating tube not as above ..... 29.

28. Dorsal shield with a well-developed pattern of mostly transverse and irregular lines extending to entire surface of the shield. Anal shield 120 µm long and 70 µm wide. Setae *Z5, S5* and *Jv5* 18, 18 and 75 µm long. Opisthogaster with 10-12 pairs of setae on soft cuticle. (From the holotype) ..... *Rh. phaethornis* FAIN et al., 1977.

Dorsal shield without a distinct pattern of lines. Anal shield 138 µm long and 83 µm wide. Setae *Z5, S5* and *Jv5* 20, 20 and 34-45 µm long. (From paratypes) ..... *Rh. mathewsoni* HYLAND, et al., 1978.



Figs. 19-25 – Inseminating tube in *Rhinoseius* spp. with a sclerotized maturation pouch: 19. *Rh. venezuelensis*; 20. *Rh. trinitatis*; 21. *Rh. colombiensis*; 22. *Rh. waidei*; 23. *Rh. eisenmanni*; 24. *Rh. heliconiae*; 25. *Rh. phaethornis.*

29. Inseminating tube 140-155 µm long (total length) with a proximal cylindrical sclerotized maturation pouch 75 µm long. Setae *Z5* 20-25 µm long. *Jv5* is a cylindricoconical strong spine 80-96 µm long. Dorsal shield of type D, its posterior margin almost straight. Metapodal plates triangular. Palpfemur with a rather thick ventral spine. Idiosoma 580 µm long. (From the holotype) ..... *Rh. trinitatis* FAIN et al., 1977.

Inseminating tube not as above ..... 30.

30. Inseminating tube with a membranous adductor canal 5-6 µm wide and 80 µm long and a very narrow sclerotized maturation pouch 3 µm wide and 60 µm long. Coxae II-III each with a well-developed boss. Scutum of type C. Anal shield 150 µm long and 82 µm wide. Metapodal shields triangular. Sternal shield sclerotized. Genital shield with a pattern of longitudinal lines. Palpfemur with a ventral spine. Dorsal setae of legs short, spinelike. *Jv5* strong and long (60 µm). *Z5* 27 µm, *S5* 16 µm. (From the holotype) ..... *Rh. eisenmanni* (BAKER & YUNKER, 1964)

Inseminating tube not as above ..... 31.

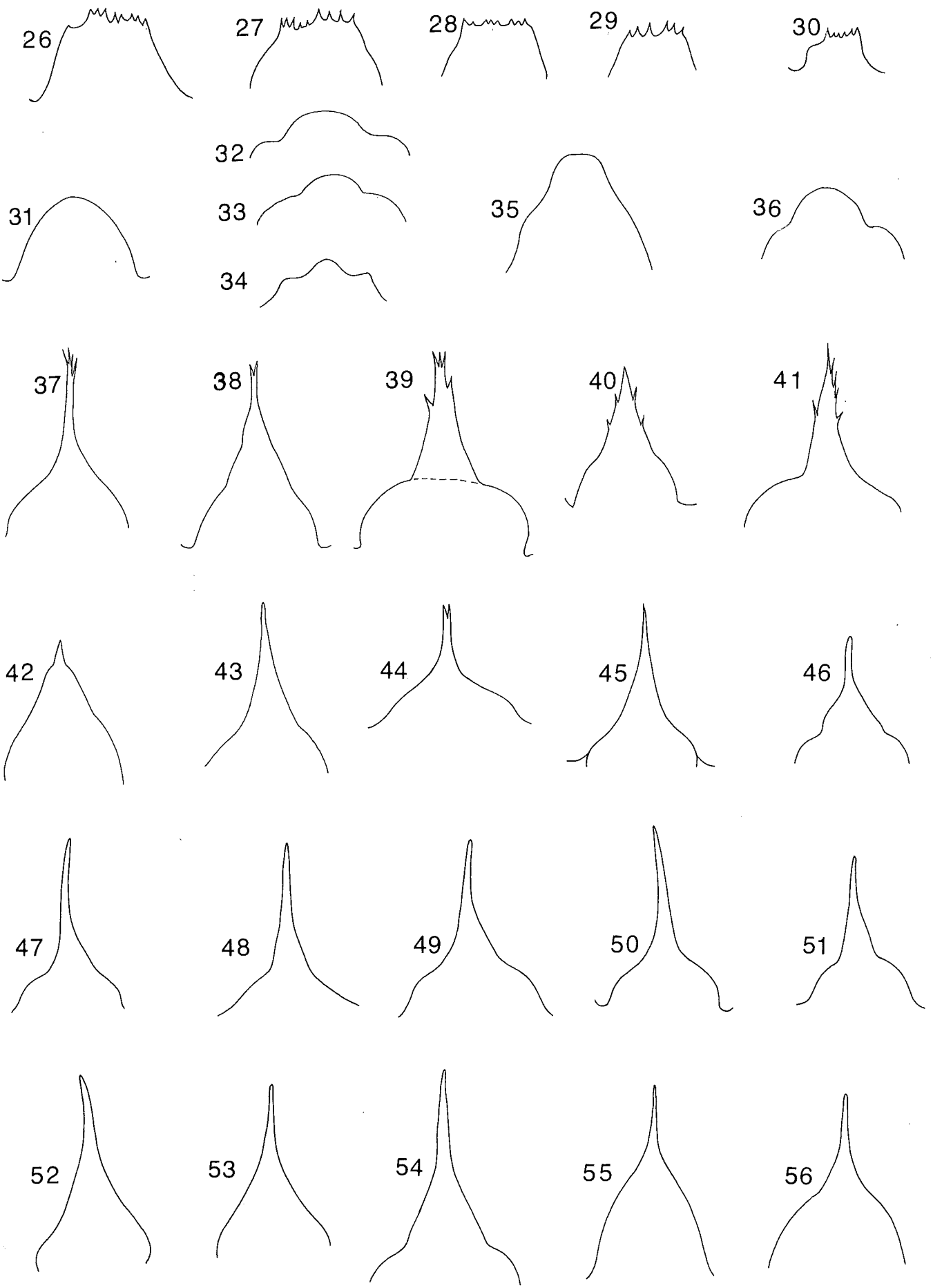
31. Inseminating tube 120-160 µm long (total length), with an adductor canal membranous 40-60 µm long and a sclerotized cylindrical maturation pouch 90-105 µm long and 4,5-7 µm wide. Metapodal shields triangular. Dorsal shield of type B. Setae *Z5* and *S5* spinelike. 27 and 23 µm long respectively; *Jv5* stronge, 60-70 µm long. (From original description and specimens from Colombia) ..... *Rh. venezuelensis* (BAKER & YUNKER, 1964)

Inseminating tube not as above; metapodal shields triangular ..... 32.

32. Inseminating tube 145 µm long (total length) with a membranous adductor canal 108 µm long and a sclerotized maturation pouch consisting of a distal cylindrical tube 25 µm long and 4 to 5 µm wide and a more proximal ovoidal pouch 12 µm long and 9 µm wide. Anal plate 129 µm long and 72 µm wide. Setae *Z5* and *S5* thin, 18 µm long. *Jv5* very strong, 72 µm long. Coxa II with a well-developed boss. Dorsal shield of type D. (From the holotype) ..... *Rh. chlorestes* FAIN et al., 1977.

Inseminating tube 140 µm long (total length), the membranous adductor canal is 4 µm wide and 100 µm long, the sclerotized maturation pouch is shortly ovoidal and 18 µm long for 12 µm wide. There is a short proximal pouch 10 µm long and 3 µm wide. Anal shield 153 µm long and 96 µm wide. Setae *Z5* and *S5* 33 and 25 µm long respectively. Coxae II-III with defined bosses. Dorsal shield of type B. (From the holotype) ..... *Rh. wetmorei* (BAKER & YUNKER, 1964)

Figs. 26-56 – Tectum in the females of *Rhinoseius* spp.: 26. *Rh. richardsoni*; 27. *Rh. androdon*; 28. *Rh. haplophaediae*; 29. *Rh. antioquiensis*; 30. *Rh. caucaensis*; 31. *Rh. tiptoni*; 32. *Rh. peregrinator* (holotype); 33. *Rh. ornatus*; 34. *Rh. chiriquensis*; 35. *Rh. changensis*; 36. *Rh. colwelli*; 37. *Rh. bisacculatus*; 38. *Rh. wetmorei*; 39. *Rh. braziliensis*; 40. *Rh. fairchildi*; 41. *Rh. phoreticus*; 42. *Rh. waidei*; 43. *Rh. trinitatis*; 44. *Rh. uniformis*; 45. *Rh. eisenmanni*; 46. *Rh. bakeri*; 47. *Rh. phaethornis*; 48. *Rh. chlorestes*; 49. *Rh. erro*; 50. *Rh. heliconiae*; 51. *Rh. venezuelensis*; 52. *Rh. eutoxeres*; 53. *Rh. uniformis*; 54. *Rh. mathewsoni*; 55. *Rh. adsimilis*; 56. *Rh. colombiensis*.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MALES

Remarks:
The males of the following species are unknown: *Rh. chiriquensis, changensis, bakeri, trinitatis, phoreticus, uniformis, chlorestes, bisacculatus, waidei, adsimilis, haplophaediae*

1. Coxa I with one or several rows of denticles on ventral surface.
Tectum either rounded or truncate, never pointed.
Peritreme extending to coxa II or to anterior margin of coxa I (group *tiptoni*) or to seta *zl* (group *ornatus*).
Tarsus II with either 4 or 2 thick and blunt ventral spines; tibia II lacking a blunt ventral spine except in *Rh. colwelli*; genu and femur II always with a blunt ventral spine except in *Rh. panamensis* which lacks the genual spine.
Tarsus III lacking ventral blunt spines (group *tiptoni*) or with 3 (*Ph. peregrinator*) or 2 of such spines (*Rh. ornatus* and *colwelli*).
Tibiae and genua III and IV with all their setae shorter than their respective segments.
Dorsal shield variable, either type A, B, C or D.
Coxa IV with or without a triangular ventral spur ..... 2.

Coxa I without denticles on ventral surface.
Tectum strongly attenuated apically in a fine point.
Peritreme extending very close to setae *zl*.
Tarsus II with 4 short and blunt strongly sclerotized ventral spines or spurs, of which two are paraaxial subterminal. Tibia, genu and femur II with one ventral blunt spine. Femur and genu I generally with a blunt ventral spine.
Tarsus III with 2 ventral blunt spines except in *Rh. mathewsoni* were there is only one spine.
Tibiae and genua III and IV sometimes with some setae much longer than their relative segments.
Coxae IV never with a spur.
Dorsal shield generally of type C or D, rarely of type B ..... *group wetmorei* 12.

2. Tarsus II with 2 thick and blunt ventral axial spines (one of these may be a spur). Tarsus III and tibia II without blunt spines. Peritreme not arriving close to *zl*. Coxa IV generally with a triangular ventral spur ..... *group tiptoni* 3.

Tarsus II with 4 ventral thick conical, blunt or pointed spines or spurs, of which 2 subapical paraaxial and 2 ventral. Tarsus III with 2 or 3 thick and blunt ventral spines. Tibia II with a blunt ventral spine only in *Rh. colwelli*. Peritremes arriving close to *zl*. Coxae IV without a spur ..... group *ornatus* 10.

3. Opisthogaster with 2 separate shields, a ventral and an anal.
Tectum rounded. Coxae IV without a ventral spur (in some specimens of *Rh. tiptoni* there is a very small rounded spur, often unilaterally)... 4.

Opisthogaster with a ventrianal shield. Tectum either rounded or truncate, smooth or serrate.
Ventral surface of coxae IV with or without a triangular spur ..... 5.

4. Ventral shield much smaller than anal shield. Femur II with a very strong ventral spine. Posterolateral margins of body with 5 pairs of strong setae 100-200 µm long. Setae *z4* and *s4* rodlike and strong, the central setae of scutum very small. Dorsal shield entire of type A. (From original description and specimens male from Colombia) ..... *Rh. tiptoni* BAKER & YUNKER, 1964.

Ventral shield large, much wider than anal shield. Femur II with a very small ventral spine. Setae *z4* and *s4* and setae of posterolateral margins of body thin and short. Dorsal shield of type B, bearing in posteromedian third a transverse row of 3 pairs of strong spines. (From original description)
..... *Rh. rafinskii* MICHERDZINSKI & al., 1980.

5. Coxa IV with a triangular ventral or posteroventral spur. Tectum either truncate and denticulate or very short and rounded without denticulations ..... 6.

Coxa IV without a ventral spur. Peritreme extending to seta *sl*. Ventrianal shield roughly rectangular with lateral margins sinuous, bearing 5 pairs of setae in front of anus. Only 2 pairs of short setae on tegument of opisthogaster. Dorsolateral setae (*z, Z, s, S*) subequal to central setae. Tibia and genu II without bunt spines. Dorsal shield of type C. (From original figures) ..... *Rh. epoecus* COLWELL& NAEEM, 1979

6. Dorsal shield of type D. Anteromedian region of opisthonotal shield with 2 pairs of very heavy spines set close together (*J1* and *J2*). Legs II not distinctly dilated. Femora II with a small conical ventral spine ..... 7.

   Dorsal shield variable. Opisthonotal shield lacking these strong spines. Legs II slightly dilated. Femora II with a strong conical ventral spine ..... 9.

7. Peritreme longer, extending to the middle of coxa I and slightly in front of seta *s1*. Setae *Z5* and *S5* 110-120 µm long, about 3 µm thick at their base and progressively attenuated apically. Ventrianal shield strongly widened in its posterior half where it is approximately as wide as long; it bears 7-8 pairs of stout setae and the 3 anal setae. Presence of a pair of small triangular paraanal sclerotized processes. Tectum short truncate-denticulate. (From a paratype) ..... *Rh. antioquiensis* FAIN & HYLAND, 1980.

   Peritreme extending to the anterior half of coxa II. Setae *Z5* and *S5* thick, cylindrical or subcylindrical ..... 8.

8. Setae *Z5* almost cylindrical, 4,5 µm thick and 66 µm long, without a spiral pattern. *S5* cylindricoconical 3,2 µm thick and 60 µm long. Femur and genu of leg I with a short blunt ventral spine. Ventrianal shield longer than wide with 7 pairs of setae 20-45 µm long. Absence of paraanal sclerotized processes. Length of setae (in µm): *j1* and *j2* 27; *j3* to *j6* 15; *s1* 10; *s5* 65. All posterolateral setae of body thick, almost rodlike and 33-45 µm long. (From a paratype) ..... *Rh. richardsoni* HUNTER, 1972.

   Setae *Z5* and *S5* subcylindrical, 9 µm and 7,5 µm thick and 90 and 78 µm long respectively, both setae with a spiral pattern. Ventrianal shield subcircular with 7-8 pairs of rather long setae (40-60 µm). Femur and genu I without a conical blunt spine. Presence of a pair of paraanal truncate slerotized processes. Length of setae (in µm): *j1* and *j2* 45; *j3* to *j6* 30-34; *s1* to *s5* 45 to 57 µm. Most of posterolateral setae of body (8 pairs) longer (90-100 µm), sinuous, inflated basally and finely attenuated at apex. (From holotype) ..... *Rh. panamensis* FAIN & HYLAND, 1977.

9. Ventrianal shield almost as wide as long, with two large anterodorsal lobes bearing 7-8 pairs of stout setae and the 3 anal setae. Peritreme extending to anterior half of coxa II. Setae *Z5* and *S5* thick, 60 µm long, the *Z5* either smooth or very shortly barbed. *J5* very thin and short. Dorsal shield of type D. (From the holotype) ..... *Rh. androdon* FAIN & HYLAND, 1980.

   Ventrianal shield without lateral lobes, much longer than wide and bearing 5 pairs of stout setae and the 3 anal setae. Peritreme extending to the anterior three quarters of coxa I (= between setae *s1* and *z1*). Setae *Z5* and *S5* thick, subcyclindrical and with very short barbs. Setae *J5* replaced by bundles of very short spinules. Dorsal shield of type B. (From a paratype) ..... *Rh. caucaensis* OHMER et al., 1991.

10. Tibia II with a short and thick sclerotized blunt ventral spine (larger in the heteromorphic than in the homeomorphic male). Dorsal shield of type C, with setae *s* and *S* either much stronger and longer than setae *j* and *J* (in heteromorphic males) equal or subequal and very short (20 µm) (in homeomorphic males). Setae *Z5* either sinuous, very strong and 125-150 µm long (in heteromorphic males) or very short and thin (20 µm) (in homeomorphic males) (from paratypes)..... *Rh. colwelli* HUNTER, 1972.

    Tibia II with only thin ventral setae. Other characters variable ..... 11.

11. Tarsus II with 4 ventral spines, some modified in spurs, one being very large. Tarsus III with 3 ventral short and thick blunt spines. Dorsal shield of type C, bearing strong setae, the centrals 45-60 and the laterals 75-90 µm long. *Z5* 140 µm long. Idiosoma 640-705 µm long. (From examination of 5 paratypes) ..... *Rh. peregrinator* (BAKER & YUNKER, 1964)

    Tarsus II with 4 subequal conical blunt spines. Tarsus III with 2 very small apicoventral conical spine. Dorsal shield of type C with all setae very small, subequal (the longest, *Z5* is 25 µm long). Idiosoma 525 µm long. (From a paratype) ..... *Rh. ornatus* FAIN & HYLAND, 1980.

12. Femora and trochanters I-III-IV, femora II and palpfemora with one or several dorsal barbed setae ..... 13.

    Absence of barbed setae on dorsal surface of trochanters and femora I-IV and of palpfemora ..... 14.

13. All setae of tibiae and genua III and IV shorter than their respective segments. Ventrianal shield 270 µm long and 165 µm wide. Lengths of setae (in µm): preanal setae 60-78, *Jv5* 180, *S5* 63, *Z5* 195, *R1* to *R3* 45-60. (Homeomorphic male, specimen from FLECHTMANN and JOHNSON, 1978) ..... *Rh. braziliensis* (BAKER & YUNKER, 1964)

    Tibiae IV with one seta 1,2 times longer than the segment. Ventrianal shield 300 µm long and 225 µm wide. Lengths of setae (in µm): preanal setae 75-105, *Jv5* 250, *S5* 105, *Z5* 225, *R1* to *R3* 75-90. (Heteromorphic male from FLECHTMANN & JOHNSON, 1978). *Rh. braziliensis* (BAKER & YUNKER, 1964)

14. All setae of genua and tibiae III and IV much shorter than their respective segments ..... 15.

    Some setae of tibiae III-IV and in some species also of genua III-IV either slightly or much longer than their respective segments. (? Heteromorphic males)..... 16.

15. Setae *Z5* lacking. Ventrianal shield with a distinct constriction in its middle, bearing 4 pairs of setae 15-21 µm long. Dorsal shield of type C or D. (From original description and a specimen from Mexico) ..... *Rh. heliconiae* (BAKER & YUNKER, 1964)

    Setae *Z5* thick, 90 µm long. Ventrianal shield lacking a median constriction, bearing 5 pairs of setae 18-27 µm long. Dorsal shield of type C or D ..... *Rh. phaethornis* FAIN et al., 1977.

16. Ventrianal shield slightly trapezoidal, wider posteriorly (180 µm in anal region) than anteriorly (165 µm in anterior fifth). Some setae of tibiae and genua III and IV 1,4 to 1,9 times longer than respective segments. Setae *j2* to *j6* equal or subequal to setae of rows *z* and *r*. Some setae of *S* and all setae of *R* rows much longer and thicker than setae of *J* and *Z* rows. Dorsal shield of type D..... *Rh. colombiensis* FAIN y HYLAND, 1980.

    Ventrianal shield trapezoidal, widened anteriorly and distinctly attenuated posteriorly. Lateral setae of *s-S* and *r-R* rows stronger and longer than those of *j-J* rows and of most of *z-Z* rows. Length of setae of tibiae III and IV either slightly or much longer than their relative leg segments ..... 17.

17. Soft cuticle of opisthogaster with 8 pairs of very thin and short setae (8 µm long). Ventrianal shield with 4 pairs of stout preanal setae. Tarsus III and femur and genu I each with a small ventral blunt spine. Dorsal shield of type C ..... *Rh.mathewsoni* HYLAND et al., 1978.

    Soft cuticle of opisthogaster with all setae long and stout, similar to the 5 pairs of preanal setae of ventrianal shield. Tarsus III with 2 ventral blunt spines. Ventral blunt spines on femur and genu I variable ..... 18.

18. Ventrianal shield very large with anterolateral lobes resulting of the inclusion of the metapodal shields, wider (240 µm) in anterior third than long (225 µm). Setae *Z5* 135 µm, *S5* 75 µm. Femur and genu I with a short ventral blunt spine. Some setae of tibiae III and IV 1,5 to 1,6 times longer than their respective leg segments; genua III with all setae shorter or subequal to the segments, genua IV with some setae 1,2 times longer than the segments. Dorsal shield lof type C, with a very poor pattern of lines restricted to the anterolateral parts of the shield. (From holotype) ..... *Rh. analis* FAIN & HYLAND, 1980.

    Ventrianal shield much longer than wide, without anterolateral lobes ..... 19.

19. Some setae of tibiae III and IV from 1,1 to 1,3 times longer than their respective leg segments.. 20.

    Some setae of tibiae III and IV from 1,7 to 2 times longer than their respective leg segments.. 21.

20. Some setae of tibiae III and IV 1,1 times longer than their respective leg segments. All setae of genua III and IV much shorter than their respective leg segments. Genu and femur I with a ventral blunt spine. Dorsal shield of type C. (From a paratype) ..... *Rh. eisenmanni* (BAKER & YUNKER, 1964)

Some setae of tibiae III and IV and of genua III 1,3 times longer than their respective leg segments. Setae *Z5* and *S5* subequal. All setae of genua IV either equal to or shorter than these genua. Genu and femur I with a small ventral blunt spine. Dorsal shield of type B. (From original figures and specimens from Trinidad) ..... *Rh. venezuelensis* (BAKER & YUNKER, 1964)

21. Femur and genu I lacking a short blunt ventral spine. Some setae of tibiae III and IV and of genu III 1,7 to 2 times longer than their respective leg segments. Genua IV with some setae 1,3 times longer than these segments. (From original figures) ..... *Rh. fairchildi* (BAKER & YUNKER, 1964)

Femur and genu I with a short blunt ventral spine. Other characters variable..... 22.

22. All setae of genua IV shorter than these segments; all the setae of genua III subequal in length to these segments. Some setae of tibiae III and IV 1,9 and 1,6 times longer than their respective leg segments. Setae *Z5, S4, S5* and *Jv5* subequal (55-60 µm long). Dorsal shield of type C. (From a paratype) ..... *Rh. eutoxeres* FAIN & HYLAND, 1980.

Tibiae III and IV with some setae 1,8 to 1,9 times longer than their respective leg segments; genua III and IV with some setae 1,5 to 1,7 times longer than their respective segments.. 23.

23. Lengths of setae (in µm): *Z5* 135, *S4* 90, *S5* 100, *Jv5* 90. Legs thicker: genu IV 1,1 times longer than wide. Dorsal shield of type C. (From a paratype) ..... *Rh. erro* (BAKER & YUNKER, 1964)

Setae *Z5* only slightly longer than *S4, S5* and *Jv5*. Legs thinner: genu IV about twice as long as wide. Dorsal shield of type D (? or C). (From original figures) ..... *Rh. wetmorei* (BAKER & YUNKER, 1964)

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