

Species differentiation in the genus *Radfordia* Ewing, 1938 (*Acarina*, *Prostigmata*, *Myobiidae*) from South African *Aethomys* species (Mammalia, Rodentia, Muridae) (1).

Results of the Namaqualand - Namibia Expedition of the King Léopold III Foundation for the Exploration and Protection of Nature (1980).

by J.H.A.J. Curfs, F.S. Lukoschus and A. Fain

Abstract

Radfordia (*Radfordia*) *aethomys* sp. nov. and *Radfordia* (*Radfordia*) *aethomys chrysophila* ssp. nov. are described, figured and compared with related species.

Introduction

In former studies Dusbábek (1969) and Fain (1974) suggested monophyletic origine of the family Myobiidae Megnin, 1877 and parallel evolution of hosts and parasites. In this family of hostspecific mites differentiation is clearly visible by reduction of basical primary and development of secondary adaptative characters.

Systematics of family Myobiidae reflects systematics fo their hosts in the mammal orders Marsupialia, Chiroptera, Insectivora and Rodentia. Closely related hosts are parasitized by closely related parasites. In host families, in which the genera have separated in early phylogenetic periods (like Tenrecidae), large morphological differences are present in their parasites (Fain & Lukoschus, 1977) ; while in host families with recent species separation (like in Muridae) closely related parasites are found.

When a host species is divided by physiological and ecological reasons and the separation becomes manifest by also geographical and/or behaviour isolation, running up to mating incompatibility, the isolated parasite populations first show differences in the genital regions, like in the parasites of voles of subfamily Microtinae (Fain & Lukoschus, 1977).

During the Namaqualand - Namibia Expedition of the King Léopold III Foundation for the Exploration and Protection of Nature (1980), F.S.L. could collect

Radfordia specimens from two *Aethomys* species. They share the unusual characters of long intercoxal setae 2-4 with the South African species *Radfordia* (*Radfordia*) *angolensis* Fain, 1972 ex *Aethomys chrysophilis dollmani* and *Radfordia* (*Radfordia*) *thamnomys* Fain, 1972 ex *Thamnomys rutilans*. They will be described here and compared with the related species. In the description we follow the nomenclature of idiosomal setae of Fain (1973). All measurements are in micrometers (µm).

Radfordia (*Radfordia*) *aethomys* sp. nov.

Female holotype : Length including gnathosoma 429, width 235.

Dorsum (Fig. 1) with herring-bone striated *sc e*, *sc i*, *d 1*, *d 2*, *l 1*, *l 2*. *ve* longitudinally striated ; *ve*, *vi*, *sc e*, *sc i*, *d 3*, *d 4*, *l 1*, *l 2*, *l 3* and *l 4* barbed. *vi* relatively long and strong for subgenus. Genital region dorso-terminal, similar to closely related species.

Venter (Fig. 3) with lateral retrorse hooks of coxal field I. Gnathosoma with two ventral hooks. Trochanter and genu-tibia-tarsus complex of leg I each with one retrorse hook. Setae *ic 2*, *ic 3* and *ic 4* longer than coxal setae. Three pairs of coxal setae I, two pairs of coxal setae II and one pair of coxal setae III and IV. Legs with claw formula, chaetotaxy and solenidiotaxy typical for the subgenus *Radfordia* Ewing, 1938. Dorsal trochanter setae III and IV and femur setae II leaf-like broadened at the end. Measurements in table I.

Male allotype : Length including gnathosoma 341, width 182.

Venter (Fig. 7) Gnathosoma and legs similar to female with exception of stout, blunt, dorso-lateral setae on tarsi II. No hooks on trochanter and genu-tibia-tarsus complex of leg I.

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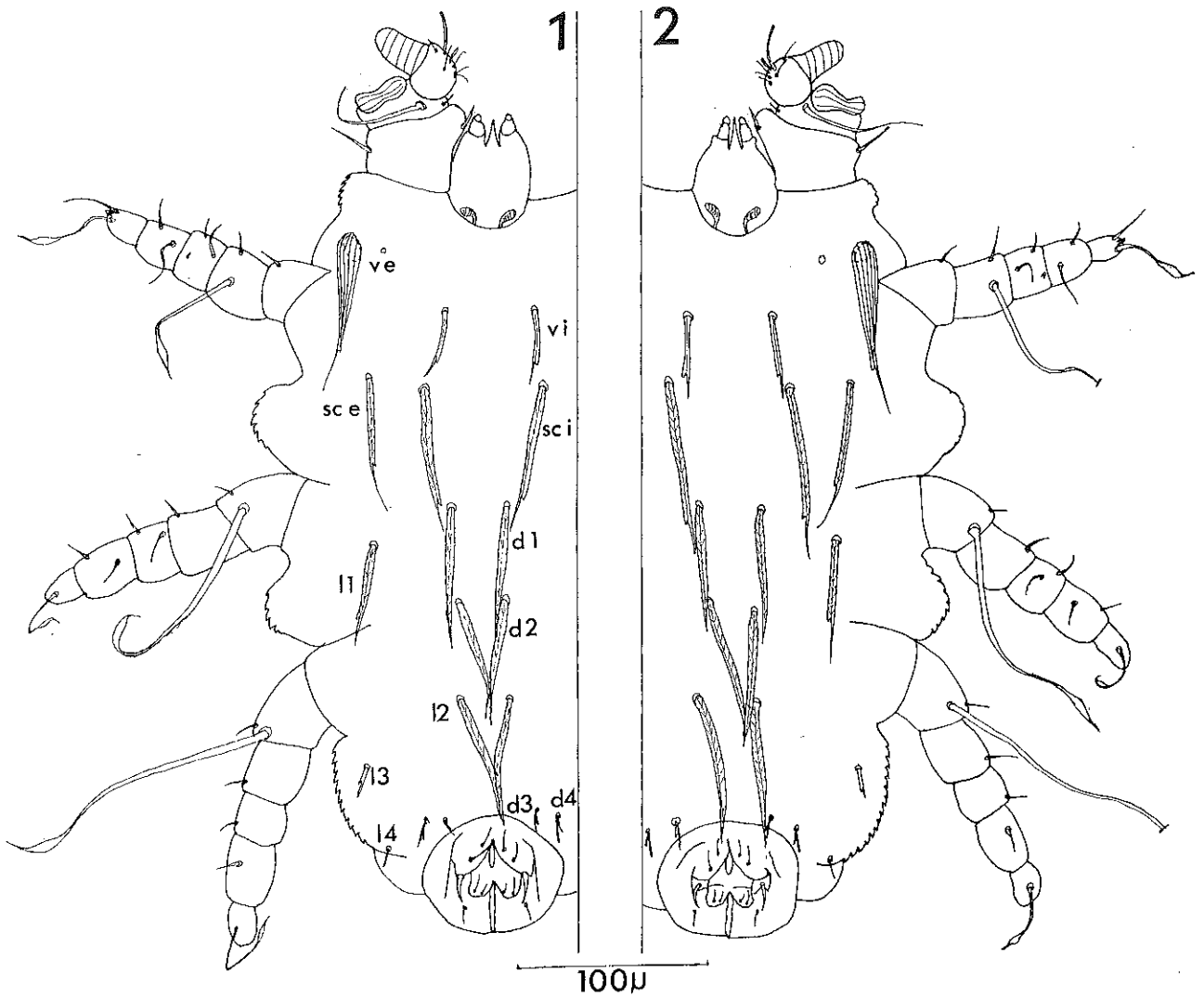


Fig. 1-2 : Dorsum female

1) *Radfordia (Radfordia) aethomys sp. nov.*

2) *Radfordia (Radfordia) aethomys chrysophila sp. nov.*

Dorsum (Fig. 5) with genital region between *sc e*. Aedeagus 125 long, slender and directed forwards with a median file of two setiform setae over its posterior portion. Genital region directed forwards with five pair of setae, some of them surely belonging to the files of dorsals and laterals.

Larva : (Figs. 11-12) Length including Legs I 201, width 104.

Present on venter is *ic 1*. On dorsum *ve, vi, sce, sci, d 1, d 2, d 3, d 5, l 1, l 2* and *l 5* are present. All dorsal setae are barbed.

Chaetotaxy of legs II and III : tarsi 7-5, tibiae 4-3, genua-femora 2-0, trochanters 0-0.

Protonymph : (Figs. 13-14) Length including legs I 291, width 190.

Similar to larva. Added on venter are *ic 2, ic 3* and *cx 1 1*. On dorsum *l 3* is added. Vertical and scapular setae are of the same length which is general for the subgenus. Chaetotaxy of legs II and III : tarsi 7-5, tibiae 4-3, genua-femora 3-1, trochanters 0-0. Leg IV in form of one segmented stump.

Deutonymph : (Figs. 15-16) Length including legs I 308, width 208. Similar to protonymph. Added are on dorsum *d 4* and on venter *ic 4*. Chaetotaxy of legs II and III : tarsi 7-5, tibiae 4-3, genua-femora 3-1, trochanters 1-1.

Tritonymph : (Figs. 17-18) Length including legs I 404. Width 239. Similar to deutonymph. Added are on venter *cx 1 2* and on dorsum *l 4*. Leg IV developed. Chaetotaxy of legs II-IV : tarsi 7-6-5, tibiae 4-3-2, genua-femora 3-1-1, trochanters 1-1-1.

Host and locality : *Aethomys namaquensis* (Smith 1834) Studer Pass, South Africa (30° 25' S ; 18° 00' E).

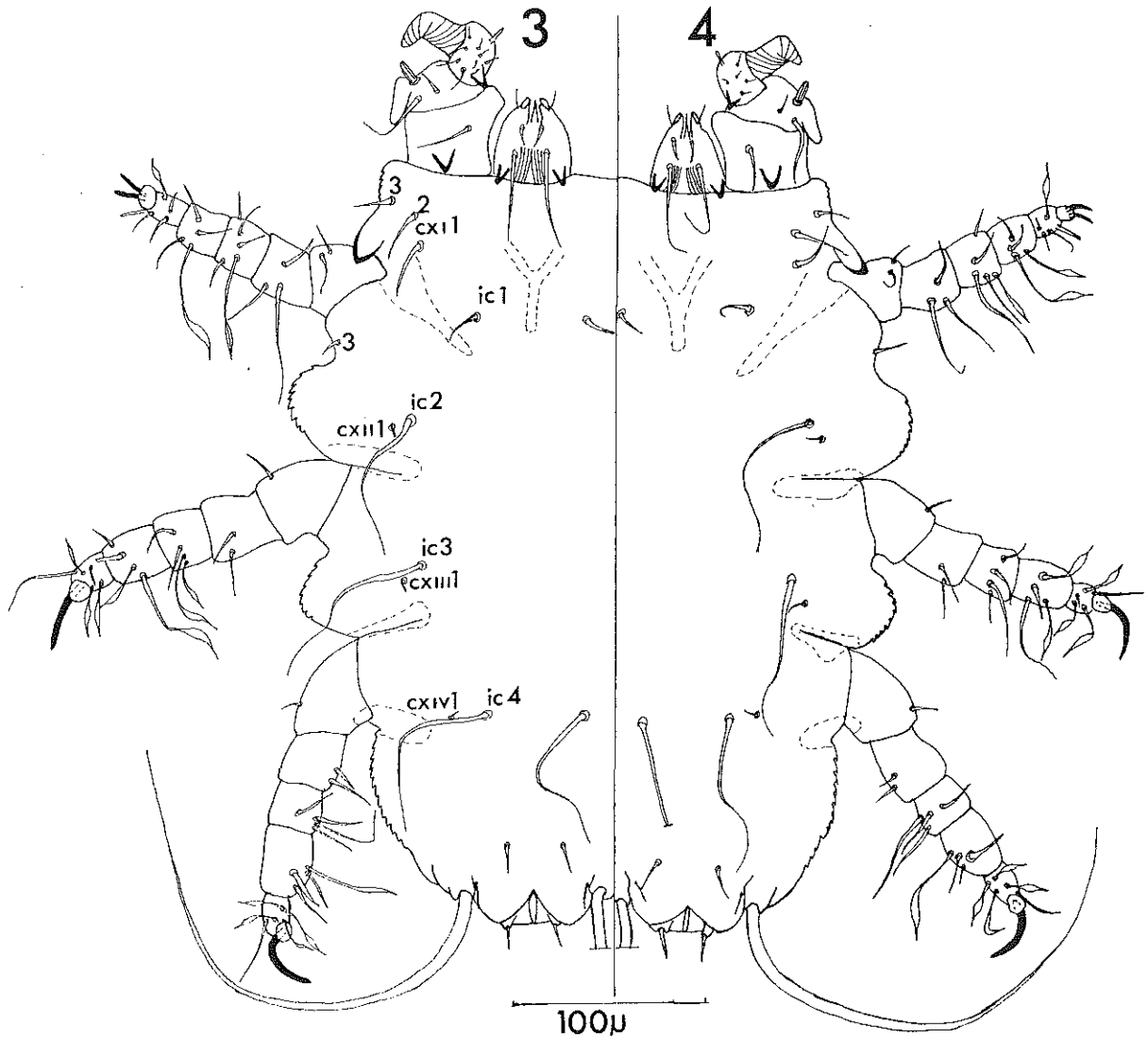


Fig. 3-4 : Venter female

3) *Radfordia (Radfordia) aethomys* sp. nov.

4) *Radfordia (Radfordia) aethomys chrysophila* ssp. nov.

4-X-1980. Host in collection of Institut Royal des Sciences Naturelles de Belgique, Bruxelles.

Deposition of types : Holotype, allotype and figured nymphs in collection of Institut Royal des Sciences Naturelles de Belgique, Bruxelles. Paratypes in collection of authors.

Radfordia (Radfordia) aethomys chrysophila ssp. nov.

Female holotype : (Figs. 2, 4) Length including gnathosoma 429, width 241. Similar to *R. (R.) aethomys aethomys* sp. nov., except *ve*, *vi*, *sc e*, *sc i*, *d 1*, *d 2*, *l 1* and *l 2* which are longer.

Male allotype : (Figs. 6, 8) Length including gnathosoma 312, width 182. Similar to *R. (R.) aethomys*

aethomys sp. nov., except aedaegus which is 12 shorter. The shape of the genital region is conical, while the shape of the genital region in *R. (R.) aethomys aethomys* sp. nov. males is somewhat rectangular.

Nymphs : As in *R. (R.) aethomys* ssp. nov.

Host and locality : *Aethomys chrysophilus chrysophilus* (de Winton 1897) Narubis, Namibia (27° 10' S ; 19° 06' E), 19-X-1980. Host in collection of Institut Royal des Sciences Naturelles de Belgique, Bruxelles.

Deposition of types : Holotype and allotype in collection of Institut Royal des Sciences Naturelles de Belgique, Bruxelles. Paratypes in collection of authors.

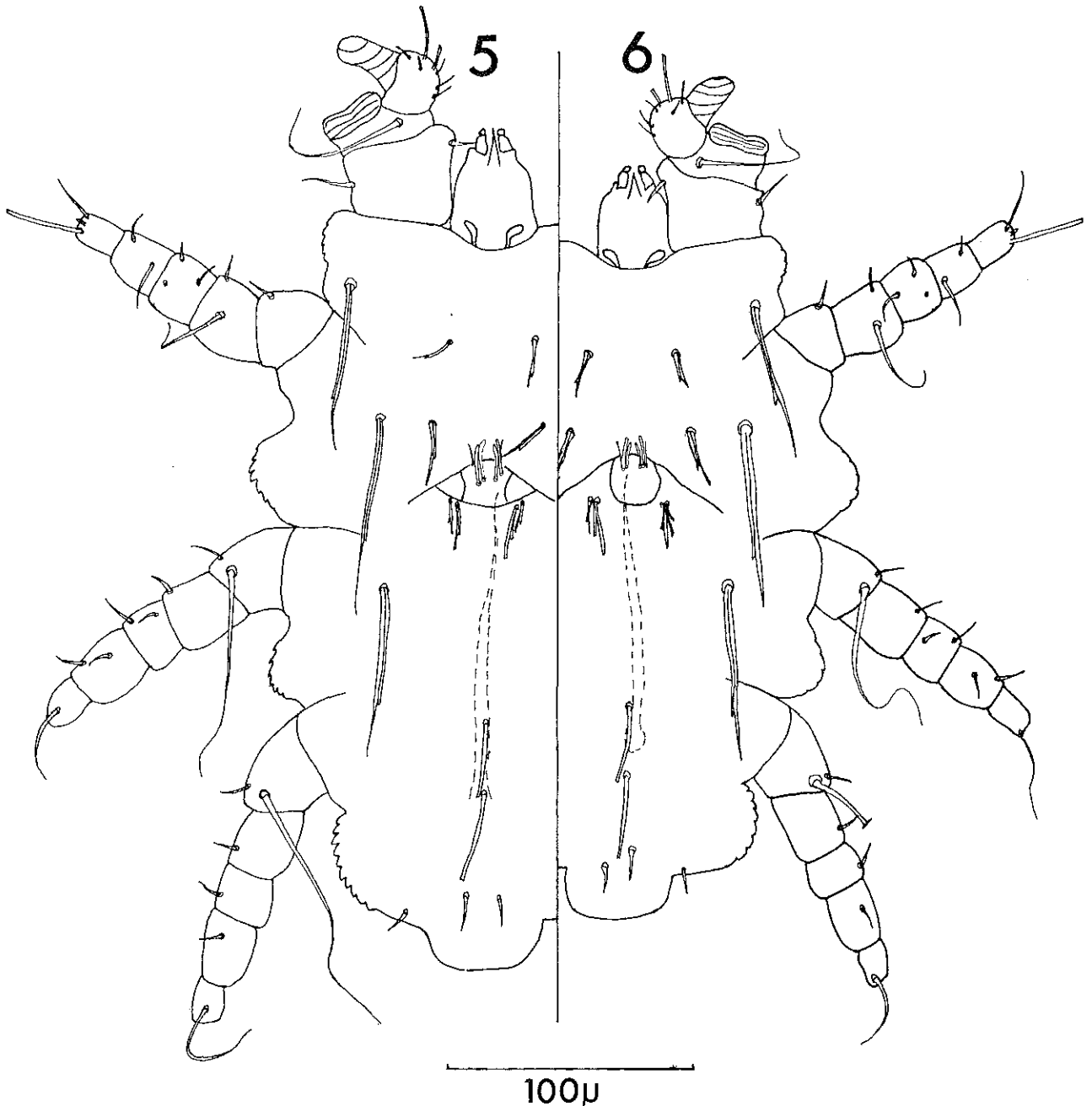


Fig. 5-6 : Dorsum male

5) *Radfordia (Radfordia) aethomys* sp. nov.

6) *Radfordia (Radfordia) aethomys chrysophila* ssp. nov.

COMPARISON TO RELATED SPECIES

For the subgenus *Radfordia* Ewing, 1938 the ventral chaetotaxy is of systematical importance. Until now there are only four species known which share the characteristics of long *ic* 2-4: *R. (R.) angolensis* Fain, 1972, *R. (R.) thamnomys* Fain, 1972, *R. (R.) aethomys aethomys* sp. nov. and *R. (R.) aethomys chrysophila* ssp. nov. From the two by Fain described species only the male types are known. All four species are found to parasitise on South African Muridae.

The new subspecies share the characteristics of *R. (R.) angolensis*, however there are differences :

1. *d 1* and *d 2* are longer and broader as in *R. (R.) angolensis*.

R. (R.) angolensis d 1 is 8 and *d 2* is 10 long.

R. (R.) aethomys aethomys ssp. nov. *d 1* is 12 and *d 2* is 19 long.

R. (R.) aethomys chrysophila ssp. nov. *d 1* is 14 and *d 2* is 21 long.

2. dorsal hair on trochanter IV in *R. (R.) angolensis* is longer (150) as in the new subspecies (120).

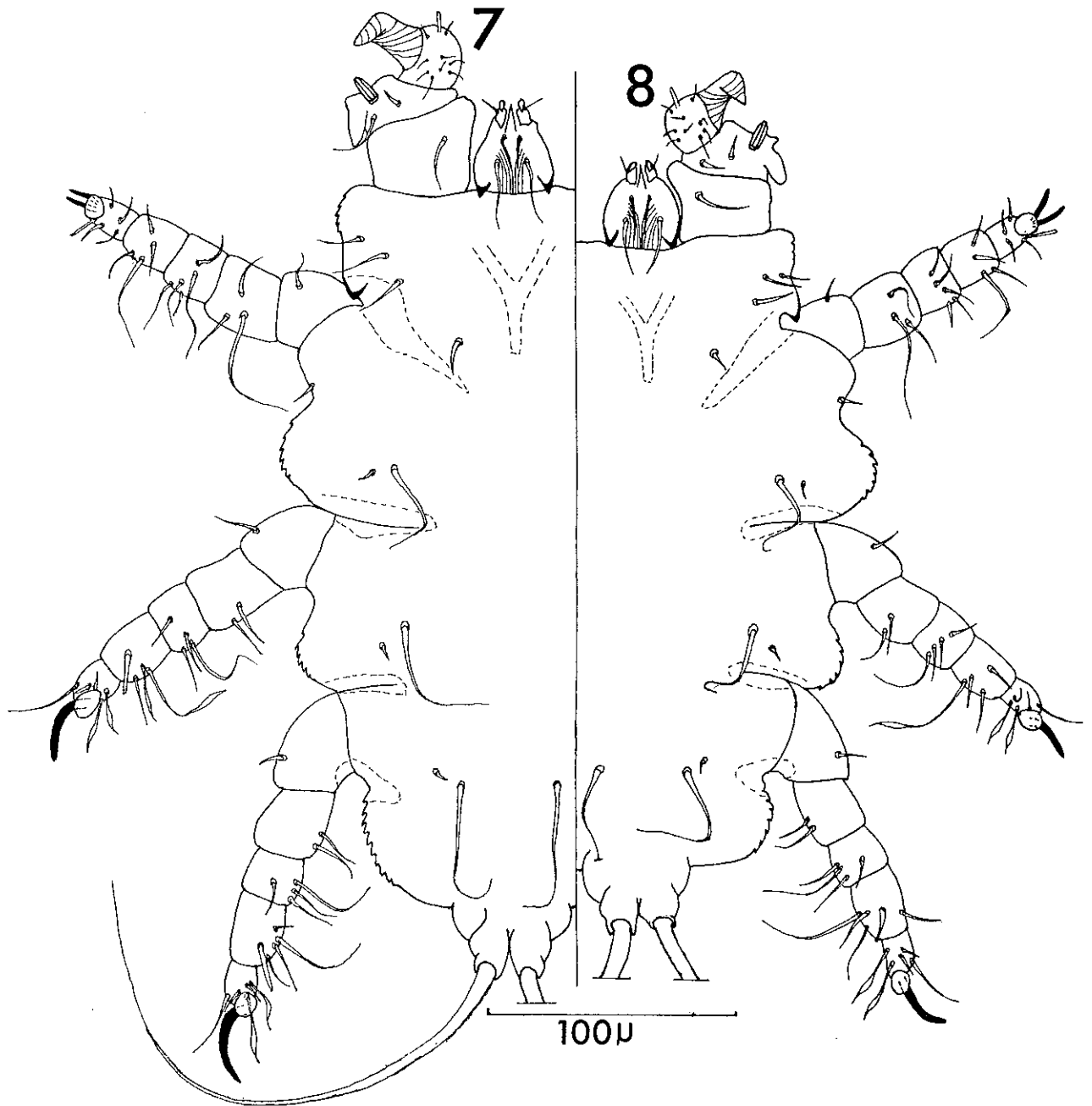


Fig. 7-8 : Venter male

7) *Radfordia (Radfordia) aethomys* sp. nov.

8) *Radfordia (Radfordia) aethomys chrysophila* ssp. nov.

3. In the new subspecies a second hair, median on opisthonorium, is added in comparison to *R. (R.) angolensis*. In contrast to *R. (R.) thamnomya* who has also two median hairs on opisthonorium, the hairs in the new subspecies are lying below each other; in *R. (R.) thamnomya* they are lying next to each other.

The female types from the two new subspecies differ only by length of the dorsal setae. In *R. (R.) aethomys chrysophila* ssp. nov. almost all dorsal setae are somewhat longer as in *R. (R.) aethomys aethomys* sp.

nov., *sc e*, *sc i*, *l1* and *l2* show the greatest difference in length.

In male types there is less difference in length of dorsal setae, here the genital regions prove to be different. The shape of the genital cone in *R. (R.) aethomys aethomys* sp. nov. is rectangular while in *R. (R.) aethomys chrysophila* ssp. nov. the shape of the genital cone is conical. Mating incompatibility appears between these subspecies.

The fact that the host species are separated recently links up with the fact that the parasites differ only clearly in the shape of the genital region. This is in agreement with the theory of Fain (1974) of parallel evolution of hosts and parasites.

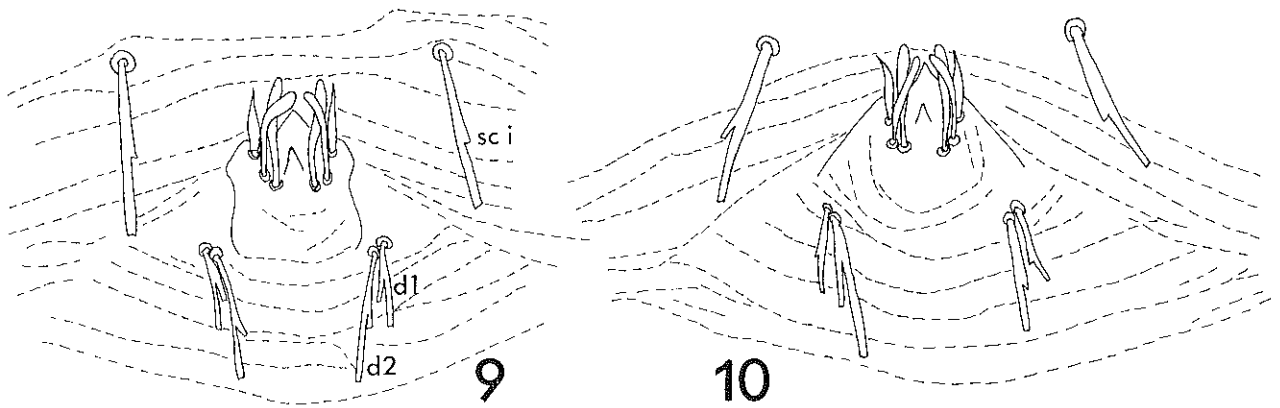


Fig. 9-10 : Genital regions

9) *Radfordia (Radfordia) aethomys aethomys* sp. nov.10) *Radfordia (Radfordia) aethomys chrysophila* ssp. nov.

TABLE I.

Average measurements of *Radfordia (Radfordia) aethomys aethomys* sp. nov. and *Radfordia (Radfordia) aethomys chrysophila* ssp. nov.

n	<i>Radfordia (Radfordia) aethomys aethomys</i> sp. nov.		<i>Radfordia (Radfordia) aethomys chrysophila</i> ssp. nov.	
	female 10	male 10	female 5	male 1
ve	83 (74-95)	68 (64-78)	86 (84-93)	65
vi	37 (30-45)	16 (12-18)	40 (36-45)	16
sc e	67 (59-74)	83 (69-96)	73 (65-81)	80
sc i	80 (74-89)	24 (18-27)	87 (84-91)	25
d 1	60 (56-74)	12 (9-15)	62 (57-67)	14
d 2	65 (59-74)	19 (15-21)	68 (60-72)	21
d 3	12 (9-15)	--	12 (12-14)	--
d 4	14 (9-15)	--	13 (12-14)	--
l 1	50 (48-56)	73 (66-81)	59 (53-65)	75
l 2	65 (59-71)	--	71 (67-74)	--
l 3	15 (12-18)	--	15 (12-17)	--
l 4	12 (9-12)	--	12 (10-12)	--
l 5	385 (356-431)	301 (264-330)	368 (342-413)	broken
cx I 1	28 (24-30)	17 (15-21)	25 (17-29)	17
cx I 2	26 (24-30)	17 (15-21)	25 (22-29)	21
cx I 3	20 (18-24)	14 (12-18)	18 (14-22)	15
cx II 1	7 (6- 9)	6 (6- 9)	9 (7-10)	5
cx II 3	12 (9-15)	11 (9-15)	13 (10-14)	10
cx III 1	8 (6- 9)	6	7 (5-10)	5
cx IV 1	6	6	6 (5- 7)	5
ic 1	17 (15-18)	16 (15-18)	17 (14-19)	17
ic 2	76 (65-83)	58 (42-60)	79 (72-88)	55
ic 3	79 (65-89)	57 (45-66)	81 (74-86)	60
ic 4	81 (74-86)	57 (48-66)	82 (74-88)	57
body length	459 (379-486)	332 (300-357)	450 (429-470)	312
body width	252 (227-264)	182 (177-204)	248 (241-259)	182
aedeagus	--	125 (121-129)	--	113

Developmental stages :

Radfordia (Radfordia) aethomys aethomys sp. nov.

	body length	body width	n
Larva	201 (184-214)	104 (89-122)	4
Protonymph	291 (276-315)	190 (178-214)	4
Deutonymph	308 (306-309)	208	2
Tritonymph	404 (376-447)	239 (200-276)	10

Radfordia (Radfordia) aethomys chrysophila ssp. nov.

Tritonymph	381 (353-400)	224 (206-241)	4
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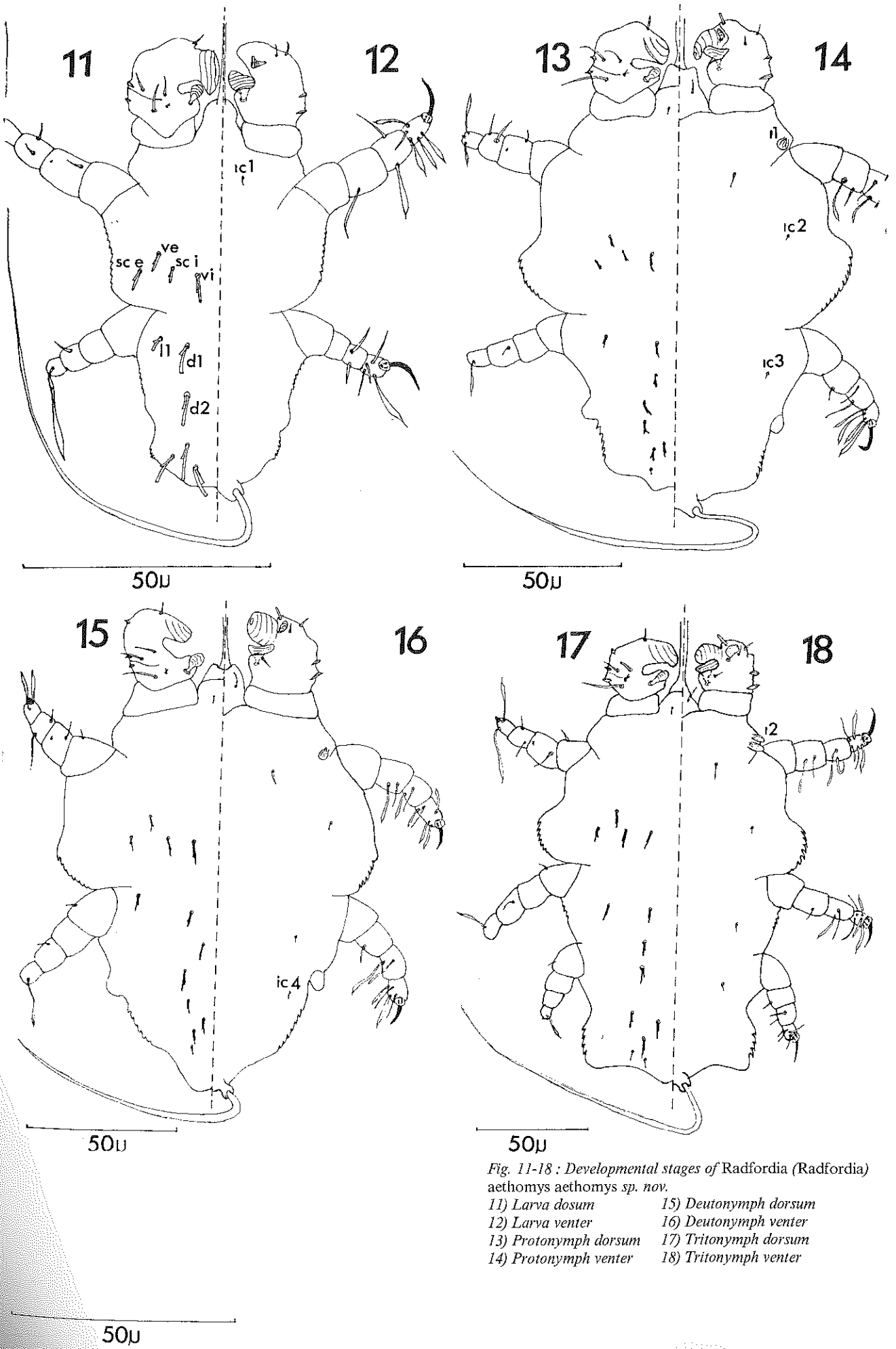


Fig. 11-18 : Developmental stages of *Radfordia* (*Radfordia*) *aethomys aethomys* sp. nov.

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|-----------------------|-----------------------|
| 11) Larva dorsum | 15) Deutonymph dorsum |
| 12) Larva venter | 16) Deutonymph venter |
| 13) Protonymph dorsum | 17) Tritonymph dorsum |
| 14) Protonymph venter | 18) Tritonymph venter |

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