On some little known and a new species of Myobiidae (Acari) associated with rodents

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Summary

Four little known and one new species of myobiid mites (Acari Myobiidae) associated with rodents are described and depicted: Radfordia eremiei sp. n., Radfordia subuliger Ewing, 1938, R. neotomae Jameson et Whitaker, 1975, Radfordia ewingi (Fox, 1937) and Cryptomyobia rotundata (Lawrence, 1951). A new species group “subuliger” is created for the first three species, all associated with North American rodents of the family Sigmodontidae. The place of R. ewingi into the subgenus Graphiurobia is confirmed. A new hypothesis about the homology of the idiosomal setae in male and female myobiids is proposed.

Keywords: Taxonomy. Acari. Myobiidae. Rodentia.

Résumé

Nous décrivons, ou redécrivons, ici quatre espèces mal connues et une espèce nouvelle de Myobiidae (Acari), toutes associées à des rongeurs, c'est à dire Radfordia eremiei sp. n., Radfordia subuliger Ewing, 1938, R. neotomae Jameson et Whitaker, 1975, Radfordia ewingi (Fox, 1937) et Cryptomyobia rotundata (Lawrence, 1951). Un nouveau groupe d'espèces “subuliger” est créé pour les trois premières espèces, associées à des rongeurs nordaméricains de la famille Sigmodontidae. Une nouvelle hypothèse sur l'homologie des pois idiosomaux des Myobiidae, males et femelles, est proposée.

Introduction

Mites of the subfamily Myobiinae (Acari Myobiidae) are obligate parasites of rodents. The high degree of host specificity in myobiid mites is generally considered to be a result of parallel evolution (Fain, 1994). This subfamily includes to date nine genera (Bochkov, 1999). Most of these species have been adequately described. For a few ones, however, the descriptions is insufficient and does not allow us to recognize them with certainty or to assign them to a right genus or a subgenus. Four of these poor known species are redescribed and redepicted in present work. In addition, a new species Radfordia (Radfordia) eremiei sp.n. is described. A new hypothesis about the homology of the idiosomal setae in myobiid males and females is proposed.

The material studied in this paper has been deposited in the collections of the Institut royal des Sciences naturelles de Belgique, Bruxelles. All the measurements are in micrometers (µm). We follow the setal nomenclature of the idiosoma proposed by (Fain, 1973) except for some genital setae in the female (Bochkov, 1997).

Genital shield and dorsal chaetotaxy of the male idiosoma

We will discuss here, very briefly, the homologies observed in the chaetotaxy of the idiosoma in the males of Myobiidae. True homologies are clearly marked for the following setae: vi, ve, sci, sce, II and 15. Owing to the sexual dimor-
Phism of these mites the homologies of the other groups of setae seem less evident. However, a study of some primitive genera of Myobiidae has revealed that these homologies between males and females also exist.

The dorsal chaetotaxy of the male idiosoma is closely connected with the chaetotaxy of the genital shield (GS). Males of the most primitive species of different myobiid genera associated with marsupials, i.e., Xenomyobia Fain et Lukoschus, 1976 and Archemyobia Jameson, 1955 bear eight or nine pairs of setae on the GS and seven or six pairs of setae on the dorsum of hysterosoma, respectively. The maximum number of dorsal hysterosomal setae, including the setae of GS, is 15 pairs for all the known myobiid males. In the females of these species, there are two pairs of anal setae (ai and ae), three pairs of genital setae (pg1-pg3) and ten pairs of dorsal hysterosomal setae (d1-d5 and l1-l5) (Bochkov, 1997). The paragenital setae, as a rule, are absent in the males of the prostigmatic mites. Therefore, the females and males of these genera bear an equal number of dorsal hysterosomal setae (15 pairs), excluding the paragenital setae in females but including the setae of the GS in males.

This similarity in the number of hysterosomal setae confirms the homology between these setae in myobiid females and males. The five pairs of the setae on GS are homologous with the setae of the female genital area (two pairs of anal setae and three pairs of genital setae). Three other pairs of the setae situated on the GS shield in males of Archemyobia, are probably the median setae d1-d3.

We may conclude from these observations that the full chaetom of myobiid males consists of the following setae: vi, ve, sci, sce, d4-d5, l1-l5, all situated off GS and ai, ae, g1-g3, d1-d3, all situated on GS. It is, however, more difficult to establish the homologies between the setae situated on the GS.

It should be noted that the number of setae on GS and the setae d4 and l2 situated near to GS are very often reduced in the males of the subfamily Myobiinae.

Systematics
Genus Radfordia Ewing, 1938
Subgenus Radfordia s.str.
Species group "subuliger"

This new species group is created herein for the three species i.e. Radfordia subuliger Ewing, 1938, R. eremici sp. n. and R. neotomae Jameson et Whittaker, 1975, all associated with North American Sigmodontidae (Rodentia). The males of this species group have a genital shield which is a unique for the genus Radfordia sensu Bochkov (1999). This shield is ovoid and bears six pairs of setae (Figs. 4, 10), whilst in the other subgenera of the genus Radfordia, it is, as a rule, conical and bears only five -free pairs of setae. The females have intermediate characters between the subgenera Radfordia Ewing, 1938, Microtimyobia Fain et Lukoschus, 1976 and Hesperomyobia Bochkov, 1996 and they differ from the other species of the genus Radfordia by the absence of setae l3. Unfortunately, the immature instars of this group are still unknown. We think that the study of these immature instars will confirm that these species belong to a distinct subgenus of the genus Radfordia. In the meantime, we propose to consider this group as a incertae sedis group within the genus Radfordia.

Radfordia (Radfordia) subuliger Ewing, 1938

This species was originally described from Reithrodontomys humilis impiger (Rodentia Sigmodontidae) in U.S.A. (Ewing, 1938). Later on it was recorded from other North American sigmodontids: Reithrodontomys megalotis and Peromyscus leucopus (Fain & Lukoschus, 1977).

Fain and Lukoschus (1976, 1977) established the new subgenus Microtimyobia for the myobiids from Arvicolinae (Rodentia Cricetidae). They included R. subuliger into this subgenus without redescription. However, R. subuliger sharply differs from all the other species of the subgenus Microtimyobia. Therefore Bochkov (1995) proposed to consider this species as a species of incertae sedis within the genus Radfordia.
FEMALE (Figs 1, 2): Body, including gnathosoma, 410 long and 195 wide. Gnathosomal setae ra (antero-ventral setae) hair-like. Setae vi narrowly lanceolate, about 17 long. Setae ve 85 long, sci and sce about 55-65 long, d1, d2 and l2 about 60 long, l1 45 long — all lanceolate. Setae l3 absent. Setae d3-d5, and l4 hair-like, about 8-10 long. Setae ic1, ic2, ic3 and ic4 20, 50, 60 and 20 long, respectively, all hair-like. Legs: Inner lateral seta of trochanter I normally developed, not thickened, about 17 long. Setae of coxae I only slightly thickened. Dorsal setae of trochanters III-IV whip-like. Formula of leg II-IV chaetotaxy (solenidia given in parenthesis): II ta 7(1)-ti 6-ge 7(1)-fe 5-tr3-cx2, III 6-6-5-3-3-0, IV 6-6-5-3-3-0.

MALE (Figs 3, 4). Body, including gnathosoma, 400 long and 215 wide. Setae ve 60 long, narrowly lanceolate. Setae vi hair-like and only 9 long, situated behind the level of coxae II. Setae sce lanceolate, 40 long, situated slightly in front of the bases of setae sce. Setae sce and l1 lanceolate, 105 and 90 long, respectively. Setae d4, l2 absent. Setae d5, l3 about 40 long, thickened. Setae l4 15 long and only slightly thickened. Setae ic1, ic2, ic3 and ic4 25, 80, 85 and 35 long, respectively. Genital shield cordiform, it bears 6 pairs of setae (Fig. 4).

Figs 3-7. *Radfordia subuliger* EWING, 1938, male: dorsal view (3), genital shield (4). *Radfordia eremici* sp. n., female: antero-ventral seta of gnathosoma *ra* (5), dorsal view (6), trochanter I in dorsal view (7). Scale lines 100 μm (figs 3, 6), 25 μm (figs. 4, 5) and 10 μm (fig. 7).


**Radfordia (Radfordia) eremici** sp.n.

FEMALE (holotype, Figs 5-7): Body, including gnathosoma, 420 long and 215 wide (435 long and 200 wide in paratype). Gnathosomal setae *ra* narrowly membranous. Setae *vi* narrowly lanceolate, 26 long (24). Setae *ve* 115 long, *sci* 85 long (80), *sce* 120 long (115), *d1*, *d2* and *l2* about 80-
90 long, II 70 long (65) – all lanceolate. Setae I3 absent. Setae d3-d5, and I4 hair-like, about 15-18 long. Setae ic1, ic2, ic3 and ic4 15, 85, 90 and 25 long, respectively, all hair-like. Legs: Inner lateral seta of trochanter I well developed, thickened, about 30 long (35). Setae of coxae I only slightly thickened. Chaetotaxy as in R. subuliger.

MALE. Unknown.

DIFFERENTIAL DIAGNOSIS. This new species is closely related to R. subuliger and differs by the following characters: In the female of R. eremici sp. n. the setae sce are 120 long, the setae ra are narrowly membranous, and the inner lateral seta of trochanter I is 30-35 long, thickened. In the female of R. subuliger the setae sce are 55-65 long, the setae ra are hair-like, and the inner lateral seta of trochanter I is 17 long and not thickened.

TYPE DATA. Female holotype and one female paratype from Peromyscus eremicus, Arizona, U.S.A. Other data unknown. Holotype and paratype are deposited in the Institut royal des Sciences naturelles de Belgique, Bruxelles, Belgique.

Radfordia (Radfordia) neotomae JAMESON et WHITAKER, 1975

This species was described from a female ex Neotoma fuscipes (Rodentia Sigmodontidae) in U.S.A. (JAMESON & WHITAKER, 1975). FAIN and LUKOSCHUS (1977) included this species into the subgenus Radfordia s.str. Later on, BOCHKOV (1996) described the subgenus Hesperomyobia for myobiids associated with Sigmodontidae and R. neotomae was provisionally included into this subgenus. However, the study of the male of
Figs 11-14. *Radfordia ewingi* (FOX, 1937). Female in dorsal view (11), male in dorsal view (12) and ventral view (13), genital shield of male (14). Scale lines 100 µm (figs 11-13) and 25 µm (fig. 14).
R. neotomae, unknown before, has shown that its genital shield is very similar to that of R. subuliger. Furthermore, females of the both species are similar, excluding the absence of setae 13 in R. subuliger and the absence of setae ic3 and ic4 in R. neotomae.

FEMALE (Fig. 8): Body, including gnathosoma, 480 long and 250 wide. Gnathosomal setae 7a hair-like. Setae vi almost hair-like, about 16 long. Setae ve 75 long, sci and sce about 100 and 90 long, d1, d2 and l2 about 85-90 long, 11 80 long—all lanceolate. Setae d3-d5, 13 and 14 hair-like, about 18 long. Setae ic1 17 long, ic2 25 long. Setae ic3 and ic4 absent. Legs: Inner lateral seta of trochanter I normally developed, not thickened, about 20 long. Setae of coxae I only slightly thickened. Dorsal setae of trochanters III-IV whip-like. Formula of leg II-IV chaetotaxy as in R. subuliger.

MALE (Figs 9, 10). Body, including gnathosoma, 430 long and 130 wide. Setae ve 80 long, narrow lanceolate. Setae vi hair-like and only 13 long, situated behind level of coxae II. Setae sci lanceolate, 70 long, situated anterior bases of setae sce. Setae sce and 11 lanceolate, 130 and 115 long, respectively. Setae d4, l2 absent. Setae d5 and 13 about 35 long, thickened. Setae 14 13 long and only slightly thickened. Setae ic3 and ic4 absent. Genital shield ovoid, it bears 6 pairs of setae (Fig. 10).


Subgenus Graphiurobia FAI N, 1972

Radfordia (Graphiurobia) ewingi (FOX, 1937)

This species was described from Zapus hudsonicus americanus (Rodentia Zapodidae) in U.S.A. (FOX, 1973). FAI N and LUKOSCHUS (1977) included this species into the subgenus Graphiurobia without re-description. The original description was very poor and BOCHKOV (1994) proposed to consider this species as a species incertae sedis within the genus

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Figs 15-17. Radfordia ewingi (FOX, 1937), tritonymph. Dorsal view (15) and ventral view (16), tarsus IV in dorsal view (17). Scale lines 100 μm (figs 15, 16) and 25 μm (fig. 17).
Fig. 18. Cryptomyobia rotundata (LAWRENCE, 1951). Female in dorsal view. Scale line 100 μm.

Radfordia. New material of this species has become available during these last years and we can now redescribe this species and confirm that R. ewingi belongs to the subgenus Graphiurobia.

FEMALE (Fig. 11): Body, including gnathosoma, 600 long and 250 wide. Setae vi 15 long and 8 wide. Setae ve, sci, see and li 60, 50, 75 and 35 long, respectively, all lanceolate. Setae d1, d2 and l2 lanceolate, about 40-45 long. Setae l3 narrow lanceolate, 30 long. Setae d3, d4 and l4 hair-like, about 11-18 long. Setae ic1, ic2, ic3 and ic4 11, 50, 60 and 7 long, respectively. Leg chaetotaxy as in the other species of the subgenus Graphiurobia.

MALE (Figs 12-14): Body, including gnathosoma, 365 long and 235 wide. Setae vi, ve, sci, sce and li 35, 115, 20, 125 and 90 long, respectively, all narrowly lanceolate. Setae l2 hair-like, 17 long. Setae d4 absent. Setae d5 and l4 about 60 long, thickened. Setae l4 hair-like, 20 long. Setae ic1, ic2, ic3 and ic4 15, 80, 90 and 10 long, respectively. Genital shield with 3 pair of setae, 2 pairs of hair-like and 1 pair of strong, finger-like (Fig. 14).

TRITONYMPH (Figs 15-17): Length of setae: vi 33, ve 60, sci 65, sce 115, d1 60, d2 55, d3 20, d4 18, d5 17, li 115, l2 55, l3 40, l4 17. Anal region with 2 pairs of well developed setae. Setae ic1, ic2, ic3 and ic4 10, 60, 65 and 15 long, respectively. Tarsi IV normally developed, without claw and protrusion, bearing 5 setae. Coxae I with 2 setae, coxa II with one seta.

MATERIAL EXAMINED. One female and 11 tritonymphs from Zapus hudsonicus, Rhode Island,
Figs 19-22. Cryptomyobia rotundata (LAWRENCE, 1951). Female in ventral view (19), tritonymph in dorsal view (20) and ventral view (21), tarsus IV of teleonymph (22). Scale lines 100 μm (figs 19-21) and 25 μm (fig. 22).
Setae see situated far from sci. Setae d3, d4, 13 and I4 40, 25, 28 and 10 long, respectively, all hair-like. Setae ic1, ic2, ic3 and I4 45, 100, 110 and 60 long, respectively. Setae ic1-ic3 hair-like, setae ic4 strongly thickened. All coxal setae finger-like except hair-like cx III-3. Dorsal setae of trochanters III-IV whip-like. Formula of leg II-IV chaetotaxy (solenidia given in parenthesis): II ta 7(1)-ti 6-ge 7(1)-fe 5-tr3-cx3, III 6-6-7-3-3-3, IV 6-6-5-3-3-1.

MALE (Figs. 23, 24). Body, including gnathosoma, 325 long and 250 wide. Setae vi and ve 40 and 25 long, respectively, almost hair-like. Setae sci, sce and li 60, 150 and 230 long, respectively, all lanceolate. Bases of setae vi and ve close to each other. Setae sce situated far from sci. Setae d3, d4, 13 and I4 40, 25, 28 and 10 long, respectively, all hair-like. Setae ic1, ic2, ic3 and I4 45, 100, 110 and 60 long, respectively. Setae ic1-ic3 hair-like, setae ic4 strongly thickened. All coxal setae finger-like except hair-like cx III-3. Dorsal setae of trochanters III-IV whip-like. Formula of leg II-IV chaetotaxy (solenidia given in parenthesis): II ta 7(1)-ti 6-ge 7(1)-fe 5-tr3-cx3, III 6-6-7-3-3-3, IV 6-6-5-3-3-1.

TRITONYMPH (Figs. 20-22). Setae vi, ve, sce, d1- d3 and li-li3 about 65-80 long, all foliate,
with maximal width about 27. Setae \(sci\) 30 long, narrowly foliate. Setae \(d4\) and \(l4\) about 6 long, hair-like. Setae \(d5\) and anal setae absent. Setae \(ic\) 1 25 long, \(ic\) 2 100 long, all hair-like. Setae \(ic\) 3 and \(ic\) 4 finger-like. All setae coxae II-III finger-like. Tarsi IV normally developed, bearing 4 setae, without claw and protrusion.

**MATERIAL EXAMINED.** Three females and one male from Cryptomys hottentotus, Zovo, Angola, 15. VIII. 1962 (Coll. MACHADO). One female and 3 tritonymphs from the same host species, Town Bush, Pietermaritzburg, III. 1951 (Coll. ZUMPT).

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**References**


Récolte de Microlépidoptères au Kenya,
avec description d’une méthode de préparation
par Ugo DALL’ASTA\textsuperscript{1}, Jurate DE PRINS\textsuperscript{1} & Willy DE PRINS\textsuperscript{2}

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Résumé
Dans le cadre de deux projets du MRAC, des missions ont été organisées dans des biotopes naturels du Kenya pour y récolter, entre autres, des Microlépidoptères. Une technique de préparation y a été testée : elle consiste à tuer les insectes en plongeant le flacon dans lequel ils ont été capturés dans de l’eau bouillante; la préparation même s’effectue sur des lames de préparation microscopiques transformées en étaloirs. Des Gracillariidae (mineuses de feuilles) ont été récoltés au stade larvaire et élevés en boîtes de Pétri. Les résultats sont excellents.

Summary
In the scope of two projects of the MRAC field work has been carried out in natural habitats in Kenya in order to collect among others Microlepidoptera. A preparation technique has been tested : killing the insects by immersing the vials with which they were caught in hot water; the preparation itself is carried out on microscopic slides transformed into setting boards. The Gracillariidae (leaf miners) were collected at the larval stage and reared in Pétri dishes. The results were excellent.

Introduction

Le projet cadre et le projet d’études innovatrices
Le Musée royal de l’Afrique centrale, dans lequel deux des auteurs travaillent, a la possibilité de financer des travaux de terrain grâce à un projet de collaboration avec les ‘National Museums of Kenya (NMK)’ à Nairobi. Il s’agit d’un projet de la coopération au développement belge, surnommé projet cadre, dont trois des volets sont le transfert d’expertise taxonomique vers le NMK, la formation de techniciens kenyans aux travaux de terrain et l’enri-