New observations on mites of the family Myobiidae MEGNIN, 1877 (Acari: Prostigmata) with special reference to their host-parasite relationships

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Summary

Several species of myobiid mites belonging to ten of the 50 known genera are revised. Among them 5 new species and 4 new subgenera are described: Crocidurobia (Crocidurobia) dusababeki sp. nov., Radfordia (Radfordia) colomes sp. nov., Radfordia (Radfordia) degomyi sp. nov., Radfordia (Radfordia) myomyzeti sp. nov. and Radfordia (Radfordia) delectori sp. nov., Emballomyobia subgen. nov., Otonyobia subgen. nov., Acanonyobia subgen. nov. and Petromycobia subgen. nov.


Four species are synonymized: Acanthophthirius miniopteri Fain, 1972 syn. nov. with Acanthophthirius capensir (de Meeuws et Lavolliere, 1944), Binuncus rousetti Fain, 1972 syn. nov. with Binuncus jamesoni (Hrengaudar et Bal., 1956), Radfordia praomys trifurcata Fain, 1973 syn. nov. with Radfordia praomys zumpt et coffee, 1971, Radfordia chrysophila curfs et al., 1986 syn. nov. with Radfordia angolensis Fain, 1972.

Keys are provided to the genera Ugandobia and Crocidurobia. Lists of hosts and localities are given for the genera, Ugandobia, Neomyobia, Crocidurobia, and the subgenus Radfordia s.s. Host-parasite relationships are analysed for some myobiid genera.

Key words: Acari, Prostigmata, Myobiidae, host-parasite relationships.

Introduction

Mites of the family Myobiidae MEGNIN, 1877 are permanent, mono- or oligoxenous parasites of marsupial and placental mammals (Dusababek, 1969b; Fain, 1994). The anterior pair of legs in these mites is strongly modified into clasper organs which are used for the attachment to the hairs of their hosts. In some genera, the two or three apical segments of the legs I are fused, which increases the effectiveness of this clasper organ. The myobiid mites are true parasites, feeding on lymph and cell contents of the host. Some of them may cause a dermatitis in laboratory rodents. Specificity for certain taxa of hosts and traces of parallel evolution with hosts are well marked at all taxonomical levels of Myobiidae. Most representatives of particular species group, subgenera, genera, tribes and subfamilies of the myobiids are associated with a well-defined taxonomic group of hosts (Dusababek, 1969b; Uchikawa, 1988; Fain, 1994; Bochkov, 1997b, 1999a,b). Therefore, these mites constitute a good model for study the phenomenon of parallel evolution.

According to the traditional point of view, the family Myobiidae belongs to the superfamily Cheyletoidea (Kethley, 1982). However, Volgin (1969) noted the absence of direct phylogenetic relationships between Myobiidae and the other Cheyletoidea. This author was apparently right to place the myobiid mites into a separate superfamil Myobioidae (Volgin, 1969). This point of view was however not accepted by other acarologists. A new attempt to reconstruct the phylogenetic relationships among the cheyletid families was carried out by Bochkov (2002). This author arrived to the conclusion that the myobiid mites are phylogenetically distant from both the typical cheyletoids and the archaic free-living Prostigmata such as Stigmataidae or Raphignathidae, which are, by certain characters related to Cheyletoidea. The myobiids are clearly different from these mites by the following characters: well developed chaetotaxy on coxae, trochanters, femora and genua, presence of setae ic2, presence of deutonymphal stage and in the female by the clear separation of genital and anal orifices. Moreover, the myobiid mites have a full set of idiosomal setae (v1, ve, set, sce, di-d5, II-15) but they lack the setae h, which are always present in the cheyletoids. The only organ which is common for these two groups is the stylophore. However, the development of this structure is probably an adaptation for piercing the integuments of animals or plants. The stylophore is also present in some parasitic Prostigmata, for example in many Heterostigmata. On the other hand, the family Myobiidae shows some similarities with the mites of the family Pomerantziidae (Bochkov, 2002). This family is represented by a few species living in deep soils in North America, and its phylogenetic relations are questionable (Kethley, 1982).
The family Myobiidae has a world wide distribution, up to now it includes more than 450 species. The mites infest mammals of nine orders. It is remarkable, that all the hosts of these mites are of small or relatively small sizes. The reason for this situation is unknown but we may assume that it is related with some ecological conditions peculiar to small animals e.g. The formation of colonies in shelters or the construction of nests where individuals can meet more easily and exchange their parasites. Another condition that could have facilitated the attachment of these mites is the structure of the hairs generally thinner in small mammals than in the large ones.

According to the distribution observed among the host taxa, the parasitism of the myobiid mites on mammals, probably, originated not after the Low Cretaceous, but at the time of the assumed divergence into placentals mammals and marsupials (CARROLL, 1993). The origin and the centre of dispersion of the Myobiidae is probably South America. Actually, the most primitive marsupials are represented in this area (CARROLL, 1993), and the most primitive myobiid: *Xenomyobia hisruta* FAIN et LUKOSCHUS, 1976, has been found from a Peruvian marsupial, *Lestoros inca* (Paucituberculata: Caenolestidae) (FAIN and LUKOSCHUS, 1976a). In this mite, the anterior legs I are almost unmodified and devoid of clasping organs. In other primitive myobiids parasitizing marsupials, the legs I have also a full set of segments, but they are always provided with special clasping structures. In the more evolved myobiids associated with bats and insectivores, the genu, the tibia and the tarsus of the legs I may be fused (FAIN, 1994). It is in the group of myobiids associated with rodents that the regression of the legs I is the most marked. In this group the three apical segments, tarsus, tibia and genu, are fused into one large segment devoid of claws. It appears therefore that in Myobiidae the evolution of the legs I has consisted essentially of the elaboration of a more and more efficient attachment organ.

The present paper provides the descriptions of four new subgenera, five new species and various unknown stages of several recognised species. The species composition of certain genera and subgenera is discussed; keys, host lists and localities of these supraspecies taxa are given. In the descriptions special attention is paid to immature stages, whose importance in the systematics of this family has been neglected for a long time. Furthermore, we give the analysis of host parasite relationships in each case where it seems to be appropriated.

Material and methods

A most part of the material studied was collected by the senior author during his postdoctoral fellowship from the ethanol preserved mammals in the collections of the following institutes:

**IRSNB** - Institut royal des Sciences naturelles de Belgique, Bruxelles, Belgium (Fain Collection);

**MRAC** - Musée royal de l’Afrique Centrale, Tervuren, Belgium;

**ZIN** - Zoological Institute of the Russian Academy of Sciences, St. Petersburg, Russia.

All measurements in descriptions and keys are given in micrometers (µm). We follow here the setal nomenclature of the female idiosoma proposed by FAIN (1973a). Homologies of idiosomal setae in the males are based on the hypothesis of FAIN and BOCHKOV (2002). The scientific names of host genera and species are given according to WILSON and READER (1992); the suprageneric classification of bats is that of JONES et al. (2002), and the suprageneric classification of the “insectivores” and rodents are based on the monograph of PAVLINOV (2002).

**Systematic part**

**Family Myobiidae MEGNIN, 1877**

**Subfamily Protomyobiinae BOCHKOV, 1997**

This subfamily includes 37 myobiid genera arranged into the three tribes, Acanthophthiriini, Protomyobiini and Elephantulobiini; each tribe is restricted in host associations to certain order of mammals, Chiroptera, Soricomorpha and Macroscelidea, respectively (BOCHKOV, 1997a).

The latter host group was originally included into the Insectivora (GRASSE, 1955). At the present time, some specialists consider the macroscelids as a group related to the Rodentia and Lagomorpha (CARROLL, 1993). According to newly obtained molecular data, the macroscelids are closely related to Tenrecidae (Soricomorpha) (MURHY et al., 2001). The myobiids from Macroscelidea are represented by the specific genus *Elephantulobia* FAIN, 1972, which is much more close in the phylogenetic sense to the myobiids from bats and soricomorph insectivores than to the myobiids from the rodents (BOCHKOV, 1997a). Thus, the parasitological data support the original point of view of mammalogists and the hypothesis based on molecular data, that the Macroscelidea have close affinities with the “insectivorous” mammals (Lipotyphla).

**Tribe Acanthophthiriini BOCHKOV, 1997**

This tribe includes 22 genera, all associated with bats of both suborders, Microchiroptera and Megachiroptera (BOCHKOV, 1997a). The monophyly of the Chiroptera contested by some investigators, is confirmed now (SIMMONS, 1994). Two genera, *Binuncus* and *Pteropimyobia*, inhabiting macrochiropterans are closely related with the other myobiid genera from Microchiroptera (UCHIKAWA, 1988; BOCHKOV, 1997a).

Among 18 families of bats recognized until now (JONES et al., 2002), only three, Craseonycteridae, Megadermatidae and Noctilionidae were completely free from myobiid mites (UCHIKAWA, 1988).
Genus *Ugandobia* Dusbabek, 1968

Up to now, this genus has included 11 species and 2 subspecies (FAIN, 1978a; UCHIKAWA et al., 1991) associated with bats of the family Emballonuridae. There is a key for only the African species of this genus (FAIN, 1978a). Moreover, the diagnoses of this genus (DUSBABEK, 1968; FAIN, 1978a) and the analysis of host-parasite relationships of its species need a more complete definition. Therefore, we give here a new diagnosis of this genus based on all developmental stages, key to females and males, and a brief analysis of host-parasite relationships of these mites.

**Definition.** Gnathosoma variable in shape, with full set of setae: *rp, ra* and *rd* - all hair-like. Idiosoma elongated. Legs I with 4 segments, tibia and tarsus completely fused, claws absent. Tibiotarsi I with 13 hair-like setae, one thickened seta and one small striated seta ventrally. Genu I with 5 setae and solenidion *σ*. Clasping tubercle of genu I directed forwards. Femur I with 2 thickened dorsal setae, 3 hair-like ventral setae and one large striated scale-like seta situated on antiaxial margin of the segment. Trochanter I with large antiaxial projection and 3 hair-like setae. Tarsi II-IV with 2 subequal claws, their pretarsi strongly reduced. Chaetotaxy of legs II-IV (number of solenidia between brackets): coxae 2-3-0-1 or 3-2-0-1, trochanters 3-3-3, femora 5-2-2, 5-2-1 or 5-1-1, genua 6(1)-6-6, 6(1)-6-5 or 7(1)-6-6, tibiae 6-6-6 and tarsi 7(1)-6-6.

**Female.** Vulva with well developed lobes and full set of setae (g1-g3, ai, ae). Setae g3 variable in shape, from hair-like to claw-like. Paragenital setae hair-like, slightly thickened, represented by 3 pairs, pg1, pg2 and pg3 or pg2 lacking. Spermatheca well sclerotized. Chaetotaxy of idiosoma: *vi* - short, hair-like in most species; *ve, sce, il, l2, d1, d2* - striated lanceolate; setae *l3, l4, d3* and *d4* - variable in shape, mostly narrowly lanceolate, *d5* hair-like, slightly thickened, *l5* - whip-like, *ic1-ic4* - hair-like, sometimes *ic5* slightly thickened. Striated seta of tibiotarsus I scale-like.

**Male.** Genital shield with bilateral symmetry. With a maximum of 7 pairs of well-developed setae and two pairs of setal vestiges (5 pairs of genital-anal setae and 3 pairs of dorsomedian setae *d1-d3*, ninth pair of setae probably neo-trichial). In some species these vestiges completely disappear, and the number of setae is reduced from 9 pairs to 7 pairs. Chaetotaxy of idiosoma: *vi* - short, hair-like in most species; *sci* - hair-like or thorn-like, situated anterior the level of genital shield; *l2* - striate-lanceolate, flanked the genital shield; *ve, sce and l1* - striate-lanceolate; *d4, d5, l3* and *l4* - variable in shape; *l5* - whip-like. Ventral chaetotaxy as in female. Striated seta of tibiotarsus I inflated.

**Developmental stages**

**Larva.** Gnathosoma dorsally with a pair of microsetae *rd*. Idiosomal dorsum with 7 pairs of setae: *sce, d1-d3, l1-l3*. Setae *l3* whip-like, situated ventrally. Idiosomal venter bears only setae *ic1*. Legs I with bilateral symmetry. Chaetotaxy of legs II-III (number of solenidia between brackets): coxae 0-0, trochanters 0-0, femur+genua 2(1)-0, tibiae 5-4, tarsi 7(1)-6. Coxae I without setae. Tarsi II with 2 claws, tarsi III with a single claw.

**Protonymph.** With a ventral pair of setae on gnathosoma added (rp). Setae *ve, d4, ic2* and *ic3* added. Legs I bilaterally asymmetric. Chaetotaxy of legs II-IV: coxae 0-0-0, trochanters 0-0-0, femur+genua 3(1)-1-0, tibiae 5-4-4, tarsi 7(1)-6-6. Coxae I with one scale-like seta. Tarsi II with 2 claws, tarsi III and IV with a single claw. The protonymph of *U. succolaimis* UCHIKAWA et al., 1991, which strongly differs from this diagnosis, is probably represented by an abnormal specimen.

**Deutonymph.** Setae *l4* and *ic4* added. Legs I asymmetrically. Chaetotaxy of legs II-IV: coxae 1-0-0, trochanters 0-0-0, femora+genua 4(1)-2-1, tibiae 5-4-4, tarsi 7(1)-6-6. Coxae I with one scale-like seta. Tarsi II with 2 claws. Tarsi III and IV with a single claw.

**Tritonymph.** Spermatheca as in female, well sclerotized. Chaetotaxy of legs II-IV: coxae 2-0-0, trochanters 1-1-1, femora+genua 4(1), tibiae 6-5-5, tarsi 7(1)-6-6. Coxae I with 2 scale-like setae. Tarsi II with 2 claws. Tarsi III and IV with a single claw. There are two morphological different forms, large and small ones (probably male and female tritonymphs) (UCHIKAWA et al., 1991).

**Type species:** *Foliomyobia barnleyi* Radford, 1951

This genus includes 13 species parasitizing bats of the family Emballonuridae in the Old World.

**Remark.** FAIN (1972b) divided the genus *Ugandobia* into two subgenera, *Ugandobia* s.str. and *Emballomyobia* FAIN, 1972. Later on, FAIN (1978a) cancelled the subgeneric division of this genus, because of an absence of clear differential characters between these subgenera. Based on a re-examination of all available species and also on reference data (UCHIKAWA and KOBAYASHI, 1978, UCHIKAWA et al., 1991) two natural species groups have been recognised, which are clearly different from each other. We treat them as subgeneric taxa. It is important to point out, that formerly proposed subgeneric name *Emballomyobia syn. nov.* cannot be used, since its type species *U. taphozous* FAIN, 1972 actually belongs to the nominative subgenus and it should be considered as an junior synonym of *Ugandobia* s.str. Therefore, we create here a new subgenus *Emballomyobia subgen. nov.*

**Host-parasite relationships**

The host distribution and locality of all the known *Ugandobia* species are given in the Table 1. Species of this genus parasitize bats of the family Emballonuridae in the Old World only, while, the representatives of the genus *Expletobia* DUSBABEK, 1968 are associated with emballonurid bats in the New World. The findings of the
Figs. 1-5 — *Ugandobia (Ugandobia) garambensis* FAIN, 1973, male. Dorsal view (1), ventral view (2), genital shield (3), leg I in dorsal view (4), same in ventral view (5). Scale lines 100 μm (figs. 1, 2) and 50 μm (figs. 3-4).
species *U. balionycteris* FAIN, 1973 on *Balionycteris maculata* (Pteropodidae) in Malaysia and *U. euthrix* FAIN, 1972 on *Asellia tridens* (Hipposideridae) in Africa (FAIN, 1978a,b) are obviously accidental contaminations.

According to the modern taxonomic views (JONES et al., 2002), the family Emballonuridae consists of two subfamilies, Taphozoinae and Emballonurinae. The latter subfamily is separated into two tribes, Emballonurini and Diclidurini. Probably, the mites of this genus are restricted to the subfamily Taphozoinae and the subgenus *Emballomyobia* subgen. novo is associated with bats of the tribe Emballonurini. It should be noted, that two species of the nominal subgenus, *U. taphozous* and *U. saccolailllus* UCHIKAWA et al., 1991 inhabiting bats of the genus *Saccomallinus* (Taphozoinae) will differ from other species of this subgenus parasitizing bats of the genus *Taphozous* (Taphozoinae) by having strongly modified setae g3 in females. The female of the third species *U. australiensis* FAIN et LUKOSCHUS, 1979 described from *Saccomallinus flaviventris* is unknown. Among the 5 species of the subgenus *Emballomyobia* subgen. novo, parasitizing bats of the subfamily Emballonurinae, the 4 species, including, probably, *U. balionycteris*, are associated with bats of the genus *Emballonura*. Three of them form a complex of morphologically allied forms (*U. salomonensis* FAIN, 1976 stat. nov., *U. leyteensis* UCHIKAWA et al., 1991 stat. nov. and *U. balionycteris*) and the fourth species *U. emballonurae* FAIN, 1972 parasitizing *Emballonura nigriscens* is slightly distant from this complex. While the species *U. ituriensis* FAIN, 1972 described from *Coleura atra* (Emballonurini) differs markedly from other species inhabiting bats of the subfamily Emballonurinae.

Species of the genus *Expletobia* are described from bats of the genera *Rhynchonycteris* and *Saccopteryx* (Diclidurini). Probably, the mites of this genus are restricted in their distribution to this tribe of hosts.

**Subgenus Ugandobia s.str.**

Coxae II with 3 setae, femora III and IV each with 2-setae or femora IV with 1 seta, genua III and IV each with 6 setae. In both sexes setae ic4 whip-like, much longer than coxal setae. **Female.** Setae d1 situated distinctly anterior to the seta l1 bases. Setae pg2 lacking. **Male.** Setae d4 situated anterior to or at the level of seta l1 bases.

This subgenus includes 8 species parasitizing bats of the subfamily Taphozoinae. The male of *U. garambensis* FAIN, 1973 is described here for the first time.

**Ugandobia (Ugandobia) garambensis** FAIN, 1973 (Figs. 1-5)

Figs. 6-10 — *Ugandobia (Emballomyobia) embillonurae* Fain, 1972 *comb.nov.*, female. Dorsal view (6), ventral view (7), vulva (8), leg I in dorsal view (9), same in ventral view (10). Scale lines 100 μm (figs. 6, 7) and 50 μm (figs. 8-10).
developed, setae g3 slightly thickened (Fig. 8). Setae vii hair-like; setae ve, sci, sce, d1, d2, II and 12 - all striated lanceolate, setae d1 situated at the level of seta I1 bases; setae d2, d4, d3 and l4 narrowly lanceolate; setae ic1-ic3 hair-like, setae 14 thickened. Setae pg2 present. Legs. Chaetotaxy of legs II-IV (number of solenidia between brackets): coxae 2-2-0-1, trochanters 3-3-3, femora 5-1-1, d2, d4, 13 setae.

- Setae d2, d4, and d3 situated at the level of seta d3 bases. Setae g3 claw-like 6.
- Setae d4, d3, and d2 situated at the level of seta d2 bases.
- Setae d2, d3, and d4 situated at the level of seta d1 bases.

Key of the species of the genus Ugalndobia

(Females of U. euthrix FAIN, 1972 and U. australiensis FAIN et LUKOSCHUS, 1979 are unknown)

1. Setae d1 situated at the level of seta II bases. Setae ic4 short, subequal or 2-3 times longer than coxal setae. Chaetotaxy on femora II-IV 5-1-1. Coxae II with 2 setae ... subgenus Emballonomyobia subgen. nov...7
   - Setae d1 situated distinctly anterior to the level of seta II bases. Setae ic4 whip-like, much longer than coxal setae. Chaetotaxy on femora II-IV 5-2-2 or 5-2-1. Coxae II with 3 setae ... subgenus Ugalndobia s.str...2
2. Femur IV with 2 setae. 3
   - Femur IV with 1 seta. ...........U. dissimilis UCHIKAWA et KOBAYASHI, 1978
3. Setae I 1 lanceolate. ............4
   - Setae I 3 hair-like. .......U. vachoni FAIN, 1973
4. Setae vii hair-like or slightly thicker, much shorter than ve. ............5
   - Setae vi lanceolate, about 2/3 of length ve. .......U. garambensis FAIN, 1973
5. Setae vi hair-like. Setae I 3 situated anterior to the level of seta d4 bases, almost at the level of seta d3 bases. Setae g3 claw-like. 6
   - Setae vi thickened. Setae I 3 situated at the level of seta d4 bases. Setae g3 thickened. ............U. barnleyi (RADFORD, 1951)
   - Genu II with 7 setae (including solenidium). Gnathosoma with a pair of well developed lobes ventrally. ............U. taphozous FAIN, 1972
7. Setae ic2 and ic3 whip-like, much longer than ic1, setae ic4 hair-like. Genu IV with 5 setae. 8
   - Setae ic2 and ic3 short, as long as setae ic1, setae l4 thickened. Genu IV with 6 setae. ............U. emballonurae FAIN, 1972
8. Setae d3 and d4 narrowly lanceolate. Setae sci and l1 reaching the levels of setae d1 and l2 bases, respectively. Setae pg2 present. 9
   - Setae d3 and d4 hair-like. Setae sci and l1 reaching the levels of setae d2 and d4, respectively. Setae pg2 lacking. ............U. ituriensis FAIN, 1972
9. Setae I 3 situated distinctly anterior to the level of seta d3 bases. ............10
   - Setae I 3 situated at the level of seta d3 bases. ............U. leyeensis UCHIKAWA, OCONNOR et KLOMPEN, 1991 stat. nov.
   - Gnathosoma with parallel lateral margins, length about 1.5 times more than width. ............U. balionycteris FAIN, 1973


1. Setae d4 situated distinctly posterior the level of seta II bases. Setae ic4 relatively short, only slightly longer than coxal setae. Chaetotaxy of femora II-IV 5-1-1. Coxae II with 2 setae ... subgenus Emballonomyobia subgen. nov....7
   - Setae d4 situated anterior or at the level of seta II bases. Setae ic4 whip-like, much longer than coxal setae. Chaetotaxy of femora II-IV 5-2-2 or 5-2-1. Coxae II with 3 setae ... subgenus Ugalndobia s.str...2
2. Setae ic2 and ic3 subequal. 3
   - Setae ic3 much shorter than ic2. ............U. barnleyi (RADFORD, 1951)
3. Setae I 3 and l4 thickened, much narrowly than d3. Genu II with 7 setae (including solenidium). 4
   - Setae I 3 and l4 striated lanceolate, subequal to d3 in width. Genu II with 8 setae (including solenidium). ....U. saccocallamus UCHIKAWA, OCONNOR et KLOMPEN, 1991
4. Femur IV with 2 setae. 5
   - Femur IV with 1 seta. ............U. dissimilis UCHIKAWA et KOBAYASHI, 1978
5. Dorsal seta of trochanters III and IV long, reaching the posterior margins of the respective tibiae. 6
   - Dorsal seta of trochanters III and IV short, reaching the posterior margin of the respective genua or not reaching it. ............U. australiensis FAIN et LUKOSCHUS, 1979
6. Genital shield with 7 pairs of developed setae. Setae sci hair-like. ............U. euthrix FAIN, 1972
   - Genital shield with 6 pairs of developed setae and 3 pairs of setal vestiges. Setae sci thorn-like. ............U. garambensis FAIN, 1973
7. Setae d4 short, thickened, much shorter than II. Genu IV with 5 setae. 8
   - Setae d4 long, striate lanceolate, only 1.2 times shorter than II. Genu IV with 6 setae. ............U. emballonurae FAIN, 1972
8. Setae ic2 and ic3 relatively short, only 1.2-1.3 times longer than ic1 and ic4. 9
   - Setae ic2 and ic3 whip-like, much longer than ic1 and ic4. ............U. ituriensis FAIN, 1972
9. Gnathosoma stubby, with convex lateral margins . . .
   U. salomonensis FAIN, 1976 stat. nov.
– Gnathosoma elongate, with parallel lateral margins .
   U. leyteensis UCHIKAWA, OCONNOR et KLOMPEN, 1991
   stat. nov.

**Genus Acanthophthirius** PERKINS, 1925

This genus is divided into 2 subgenera, *Acanthophthirius*
 s.str. (31 species and 4 subspecies) and *Myotimyobia*
FAIN, 1972 (41 species and 2 subspecies) (UCHIKAWA
and BAKER, 1993). The species of this genus are parasites
of bats of the subfamilies Vespertilioninae, Kerivoulinae
and Murininae (Chiroptera, Vespertilionidae). The records
of some species from the genus *Miniopterus* (Ves­
pertilionidae, Miniopterinae) are obviously accidental
(UCHIKAWA and BAKER, 1993). The monotypic subfamily
Miniopteridae is a sister branch of the other vespertilionid
bats (JONES et al., 2002) and it is occupied by the mites
of the genus *Calcarmyobia RADFORD*, 1948.

**Acanthophthirius (Acanthophthirius) capensis**
(de MEILLON et LAVOIPIERRE, 1944)
(Figs. 11-16)

*Myobia capensis* de MEILLON and LAVOIPIERRE, 1944: 59
(fig. 5c)
*Radfordia capensis*, RADFORD, 1951: 511
*Acanthrophthirius capensis*, DUSABEK, 1969a: 552
*Acanthophthirius (Myotimyobia) capensis*, FAIN, 1978a:
44-45
*Acanthophthirius (s.str.) capensis*, UCHIKAWA and BAKER,
1993: 106
*Acanthophthirius (Chiromyobia) miniopteri* FAIN, 1972a:
152; 1978: 56-60 (figs 61-70) syn. nov.

**Material examined.** 3 females and 1 tritonymph from
*Eptesicus capensis* (specimen n 15626 IRSNB) Banagi

**Female.** Body including gnathosoma 620-655 long (in 3
specimens) and 260-275 wide. *Idiosoma*. Length of idio-
Remarks. The species A. capensis was described from *Eptesicus* capensis (Vespertilionidae, Vespertilioninae) in South Africa (de Meillon and Lavoipierre, 1944). The original description of this species is superficial and the type specimens are, probably, lost (FAIN, 1978a). We examined the specimens of *Eptesicus capensis* (type host of *A. capensis*) kept in ethanol and collected the mites from them. These mites belong to the species *Acanthophthirius minioterii* FAIN, 1972 described by FAIN (1972, 1978a) from *Miniopterus shreibersii* (Vespertilionidae, Miniopteridae) from South Africa. Since, according to our opinion and suggestion of other authors (UCHIKAWA and BAKER, 1993), the miniopterid hosts are accidental for *A. minioterii* from Thailand. Later on, UCHIKAWA (1986) found this species on *Rousettus amplexicaudatus* from Java and *R. aegyptiacus* (type host of *B. rousetti*) from Egypt. The similarity of these two species is quite clear after this re-description as it was mentioned by UCHIKAWA (1986) therefore *B. rousetti* should be consider a junior synonym of *B. (s.str.) jamesoni*.

**Binuncus Radford, 1954**

This genus is divided into 2 subgenera, *Binuncus* s.str. (15 species) and *Probinuncus* FAIN, 1975 (4 species) (UCHIKAWA, 1986). The species of this genus are associated exclusively with bats of the family Pteropodidae (Megachiroptera).

*Binuncus* (Binuncus) *jamesoni*  
(HIREGAUDAR et BAL, 1956)

Folimyobia jamesoni HIREGAUDAR and BAL, 1956: 117-120 (figs 147, 148)  
*Binuncus jamesoni*, DUSBABEK, 1969a: 4  
*Binuncus (Binuncus) jamesoni*, UCHIKAWA and KOBAYASHI, 1978: 368-370 (figs 1, 2)  
*Binuncus rousetti* FAIN, 1972b: 154; 1978a: 104-107 (figs 126-130) syn. nov.


**Binuncus (Binuncus) myonycteris** UCHIKAWA, 1986

*Binuncus (B.) myonycteris* UCHIKAWA, 1986: 259-260 (figs 2-6)  

Material examined: 2 males and female from Myonycteris torquata (n 16851 IRSNB), Liberia, 14.III.1966. 2 males and 2 females from the same host (n 16841 IRSNB), Liberia, 28.XII.1961. 1 male and 1 nymph from the same host (n 16074 IRSNB), Liberia, 21.III.1966. The first finding since the original description.

Remark. *Binuncus myonycteris* is closely related to *B. epomophori*. These two species differ from each other by the body length and position of the opisthogastric sclerite.
in the females (Uchikawa, 1986). According to our data, in the females of *B. myomerycterus* (3 specimens), the body length including gnathosoma is 580-640, the distance between opisthogastric sclerite and seta 15 bases is 2 times longer than distance between opisthogastric sclerite and seta ic4 bases and the body length of male (5 specimens) is 440-475. In females of *B. epomophorii* (10 specimens), the body length is 650-700, the opisthogastric sclerite is equidistant from the seta ic4 and ic5 bases; the body length in males (3 specimens) is 520-550.

**Genus Neomyobia** **RADFORD, 1948**

This genus is divided into 2 subgenera *Neomyobia* s.str. (2 species and one subspecies) and *Rhinomyobia* *Fain, 1978* (11 species and one subspecies) (BOCHKOV, 1996). All species of this genus parasitize bats of the family Rhinolophidae. The data on their host distribution and localities are summarized for the first time in the Table 2.

**Neomyobia (Neomyobia) jacksoni** (RADFORD, 1940)

*Mathobia jacksoni* *RADFORD, 1940*: 94 (figs 5-6)

**Neomyobia jacksoni**, *RADFORD, 1952*: 543 (fig. 123)

**Neomyobia africana** *LAWRENCE, 1951*: 93 (figs 2-3)

**Neomyobia jacksoni**, *FAIN, 1978a*: 64-69 (figs 71-76)

Material examined. 1 female and 1 nymph from *Rhinolophus fumigatus* (n 1949 IRSNB) from Africa. 3 females and 5 nymphs from *Rhinolophus* sp. (n 493 ZIN), near to Victoria lake, Africa, 15.VII.1912. Coll. Troicki.

**Remark.** This species was described from an unidentified bat from Kenya (RADFORD, 1940). Later on, it was found on *Rhinolophus clivosus* from Natal and Zaire (LAWRENCE, 1951; FAIN, 1978a) and on *Rh. capensis* from the South Africa (FAIN, 1978a). *Rh. fumigatus* is new host of this species.

**Tribe Protomyobiini** **BOCHKOV, 1997**

The tribe includes 15 genera associated with the soricomorh insectivores (Soricomorpha). This host order includes four families, Tenrecidae, Soricidae, Talpidae and Selenodontidae. The myobiid mites are unknown only from the species of the latter family.

**Genus Placomyobia** **JAMESON, 1970**

This genus was established by *JAMESON* (1970) for a single species *Placomyobia wilsoni* *JAMESON, 1970* from *Anourosorex squamipes* (Soricidae) from Taiwan. The original diagnosis of this genus is very short and incomplete. Therefore we give here a new diagnosis of this genus.

**Definition.** Gnathosoma normal in shape, with full set of setae: *rp, ru* and *rd* - all hair-like. Idiosoma rather short and oval. Legs I with 5 segments, but tarsus strongly reduced, claws absent. Tibiotarsi I with one solenidion, 9 setiform setae and a very large striated scale-like seta, covering all ventral surface of the segment. Genu I with 8 setae, solenidion *σ* invisible. Clasping tubercle of genu I directed forwards. Femur I with 4 setiform setae, one thickened finger-like seta and one large striated scale-like seta situated on antialianxial surface of the segment. Trochanters II with 2, trochanters III - IV with 3 setiform setae and without projections. Tarsi II-IV with 2 subequal claws, their pretarsi strongly reduced. Chaetotaxy of legs II - IV (number of solenidia between brackets): coxae without setae, trochanters 2-3-3, femora 5-3-2, genua 6(1)-5-5, tibiae 6-6-6 and tarsi 7(1)-6-6.

**Female.** Vulva with well developed lobes and full set of setae (g1-g3, a1, ae). Setae g3 hair like. Paragenital setae presented by 3 pairs, *pg1, pg2* and *pg3*. Spermatheca almost invisible. Chaetotaxy of idiosoma: *vi, sci, d3* and ic1-ic4 - short; *ve, sce* and *II* - narrowly lanceolate; *I5* - whip-like; other setae absent.

**Male** (based on the description of *JAMESON, 1970*). Genital shield symmetrical. It bears 2 pairs of minute setae. Setae *vi, sci, ic1-ic4* short; *ve, sce* and *II* - narrowly lanceolate; *I5* - whip-like; other setae lacking. Penis slender and coiled.

**Type species: Placomyobia wilsoni** *JAMESON, 1970*

**Placomyobia wilsoni** *JAMESON, 1970* (Figs 17-20)

**Placomyobia wilsoni** *JAMESON, 1970*: 83-84 (fig. 2 A, B)

Material examined: 1 female from *Anourosorex squamipes* (specimen n 9175 IRSNB) from Mt. Carin, Burma, 26.VII.1932.

Body length, including gnathosoma 525, width 310. Length of setae: *vi, sci* and *d3* about 15-18, *ve* 85, *sce* 185 and *II* 165. Vulva as in Fig. 18.

**Genus Crocidurobia** **JAMESON, 1970**

This genus is divided into 2 subgenera *Crocidurobia* s.str. (8 species) and *Suncomyobia* *FAIN et LUKOSCHUS, 1976* (3 species). All these mites are parasitizing shrews of the subfamily Crocidurinae (Soricidae). The diagnosis of the genus was given by *FAIN* (1978a) and *BOCHKOV* (1997b). We give here the description of one new species and complete the generic description. The data on host distributions and localities of the *Crocidurobia* species are summarized for the first time in the Table 3.
New observations on mites of the family Myobiidae MEGNIN, 1877 (Acari: Prostigmata) 15

18

17

17A

19

20

Figs. 17-20 — Placomyobia wilsoni JAMESON, 1970, female. Dorsal view (17), ventral view (17A), vulva (18), leg I in dorsal view (19), same in ventral view (20). Scale lines 100 μm (figs. 17, 17A) and 50 μm (figs. 18-20).

Definition. Gnathosoma normal in shape, with full set of setae: rp, rv and rd - all hair-like. Idiosoma elongate. Legs I with 5 segments, but tarsus strongly reduced, claws lacking. Tibiotarsus I with one solenidion, 12 setiform setae and a very large striated scale-like setae, covering all ventral surface of the segment. Genu I with 8 setae, solenidion well visible. Clasping tubercle of genu I directed forwards. Femur I with 4 setiform setae, one thickened finger-like seta and one large striated scale-like seta situated on antiaxial margin of the segment. Trochanter I with 3 setiform setae and without projections. Tarsi II-IV strongly reduced. Chaetotaxy of legs II-IV (number of solenidia between brackets): coxae II with 6 setae, coxae III-IV without setae, trochanters 2-3-3, femora 5-2-2, genua 6(1)-6-6, tibiae 6-6-6 and tarsi 7(1)-6-6.

Female. Vulva with well developed lobes and full set of setae (g1-g3, a1, ae). Setae g3 hair like. Paragenital setae represented by 3 pairs, pg1, pg2 and pg3; setae pg1 mostly multiple. Spermatheca almost invisible. Opisthogastric sclerite present, unpaired. Chaetotaxy of idiosoma: ve, sce, sci, d1-d3, ll, l2 and pg f lanceolate; vi short or long lanceolate; d3-d5, l3, l4 various in shape; ic1-ic4 - hair-like; l5 - whip-like.

Male. Genital shield oval. It bears 3-5 pairs of setae. Setae vl - microsetae; ve, sce, l1 - lanceolate; sci - short; d1-d3, d5, l2-l4 - variable in shape; ic1-ic4 - hair-like; setae d4 present or lacking. Penis slender and coiled.

Developmental stages

Larva unknown; a single known deutonymph in a bad condition (FAIN, 1978a).

Protonymph. Gnathosoma with two pairs of microsetae, rd dorsal and rp ventral. Set of dorsal setae of idiosoma variable. Idiosomal venter: setae ic1-ic3 present. Anal slit without anal setae, nicked. Legs I with bilateral symmetry. Legs IV normally developed. Chaetotaxy of legs II-IV (number of solenidia between brackets): coxae and trochanters without setae, femur-genua 4(1)-2-0, tibiae 6-4-4, tarsi 7(1)-6-6. Coxa I with one pair of scale-like setae. Tarsi II with 2 claws, tarsi III and IV with 1 claw.

Tritonymph. Set of dorsal setae of idiosoma variable. Setae ve, sci, sce, l1, d3, d5, l3, l4 and l5 always present, other setae present or absent. Idiosomal venter: setae ic1short, hair-like; ic2-ic4 microsetae. Anal slit without anal setae, naked. Legs I with bilateral symmetry. Chaetotaxy of legs
II-IV (number of solenidia between brackets): coxae 2-0-0, trochanters 1-2-2, femur-genua 4(1)-2-2, tibiae 6-5-5, tarsi 7(1)-6-6. Coxae I with two pairs of scale-like setae. Tarsi II with 2 claws, tarsi III and IV with 1 claw.

Type species: Myobia blairi RADFORD, 1936

Remarks. This genus until now included 12 species. However, C. notata FAIN, 1973 was described from a single male collected on the ethanol preserved specimen of Glirulus japonicus (Rodentia: Gliridae) from Japan (FAIN, 1973b). This species is shortly described and its systematic position and the host are questionable. Therefore, we consider here this species as a species inquirenda within the family Myobiidae. The mites of the genus Crocidurobia parasitize shrews of the three closely related genera Crocidura, Suncus and Diplomesodon (Crocidurinae: Crocidurini). The shrews of the genera Crocidura and Suncus are widely distributed in Africa and Eurasia, while the single species of the genus Diplomesodon, D. pulchellum has an area extending from Volga river to Balkhash lake. The representatives of both mite subgenera could infest the same host species (Table 3).

Subgenus Crocidurobia s.str.

Female. Setae vi short, more than 3 times shorter than ve. Male. Genital shield with 3-5 pairs of setiform setae.

This subgenus includes 8 species.

Crocidurobia (Crocidurobia) crociduara (LAWRENCE, 1951)


Material examined. 2 males and 3 females from Crocidura flavescens (specimen n 18940 MRAC), Rwanda, Astrida.

Remark. This species was redescribed from the type material by FAIN (1978a). Only a few corrections should be added to this description. In male of this species, the setae vi are represented as hardly visible microsetae and the genital shield bears 5 pairs of setae. In female, there is only a single pair of setae pg1. In tritonymph, the setae vi are lacking.

Crocidurobia (Crocidurobia) dusbabeki sp. nov.
(Figs. 21-30)

Material examined. Holotype female, 1 male, 1 female and 1 TN paratypes from Crocidura gracilipes (specimen 29475 MRAC), Lwiro, Kivu Prov., Congo, 02.VII.1956. Host collected by Rahm, specimens are deposited in MRAC.

Additional material. 1 male and 3 TN from Crocidura gracilipes (specimen 29403 MRAC), Lwiro, Congo. 5 TN from the same host (specimen from MRAC), Congo, 28.III.1967. Female from Crocidura jacksoni (specimen n AC1 008-M-0047 MRAC), Congo. 2 females from Crocidura sellina (specimen AC1 008-M-0007 MRAC), Chyulu, Kenya.

Female (holotype): Body length, including gnathosoma, 420 (440 in paratype), width 190 (225). Length of setae: vi 14 (15) short and slightly lanceolate; ve 87 (80), sci 48 (50), sce 125 (115), dI 50 (52), d2 55 (57), lI 140 (120), l2 55 (60) - all lanceolate; d3 16 (12), l3 18 (15) - thickened; d4 13 (9) - all hair-like; d5 15 (13) and l4 15, pg1 about 15-20 - thickened in basal part; pg2 and pg3 microsetae; ic1 15, ic2 55 (65), ic3 60 (70), ic4 55 (60) - hair-like. There are 2 pairs of setae pg1 in holotype and 2-3 pairs in other specimens. The distance between opisthogastric sclerite and seta ic4 bases is 2 times longer than the distance between opisthogastric sclerite and seta pg1 bases.

Male. Body length, including gnathosoma, 370, width 155. Length of setae: vi hardly visible microsetae; ve 75, sce 125, lI 125 - narrowly lanceolate; sci 10, d1, d2 about 11, d3, l2 15, d5, l3, l4 about 13, ic1 16, ic2 15, ic3 about 50, ic4 25 - all hair-like. Setae d1 situated anterior to the genital shield. Setae d4 lacking. Genital shield with 4 pairs of setae (Fig. 27), situated distinctly posterior to the level of seta lI bases. Aedeagus 115 long.

Tritonymph. Length of setae: ve 25, sce 35 and lI 25, - all lanceolate; sci, d3, d5, l3 and l4 11-15 - all thickened. Setae d1, d2, d4, l2 lacking.

Differential diagnosis. This new species is closely related to Crocidurobia toroensis DUSBABEK, 1983 from Crocidura pilosa from Uganda (DUSBABEK, 1983). In the males of both species, the genital shield bears 4 pairs of setae, the setae d1 are situated distinctly anterior to this shield, and the setae d4 are lacking. In females, the setae d3, d4 and l2 are short, the setae pg1 are multiple and thickened in their basal part. This species differs from C. toroensis by the following characters. In the female of C. dusbabeki sp. nov., the setae sci are relatively long (50), subequal to d1, the setae lI are subequal or slightly longer than sce; in the male, the setae sce and lI are subequal. In the female of C. toroensis, the setae sci are short, at least, 1/2 length of d1, the setae lI are about 3/4 length of sce; in the male, the setae sce are about 1/3 length of lI.

This new species also differs from females of C. crociduara by the setae pg1 multiple and thickened in their basal parts and by the distance between the opisthogastric sclerite and seta ic4 which is 2 times longer than the distance between opisthogastric sclerite and seta pg1.
bases; in male, 4 pairs of the genital setae are present and by the seta *dl* bases are situated distinctly anterior to the genital shield. In the female of *C. crocidurae*, there is only a single pair of slightly thickened setae *pg1*, the distance between the opisthogastic sclerite and seta *pg1* bases is 2 times longer than the distance between the opisthogastic sclerite and seta *ic4* bases; in the male, the genital shield bears 5 pairs on the genital setae, the seta *dl* bases are situated at the level of the genital shield.

**Subgenus Suncomyobia Fain et Lukoschus, 1976**

**Female.** Setae *vi* long, subequal to *ve* in length. **Male.** Genital shield with 3 pairs of setiform setae and 2 pairs of vestigial setae.

*Type species: Myobia ingens* Vitzthum, 1914

This subgenus includes 3 species.
Key of the species of the genus *Crocidurobia*

**Females**
(female of *C. diplomesodon* Fain, 1973 is unknown)

1. Setae *vi* and *ve* subequal ............................................. 6
   - *Suncomyobia* Fain et Lukoschus, 1976 .......................... 7
   - Setae *vi* one third of the length of *ve* .......................... *Crocidurobia* s.str. .......................... 2

2. Setae *sci* and *dl* subequal in length ............................. 3
   - Setae *sci* more than half of the length *dl* ...................... 4
   - Opisthogastric sclerite situated at the level of the first seta *pg1* bases .......................... 4
   - Opisthogastric sclerite situated distinctly anterior to the level of the first seta *pg1* bases .......................... *C. toroensis* Dusbabek, 1983

3. First pair of *pg1* setae situated almost at the same level as seta *ic4* bases .......................... *C. blairi* (Radford, 1936)
New observations on mites of the family Myobiidae MEGNIN, 1877 (Acari: Prostigmata)

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Figs. 26-27 — Crocidurobia (Crocidurobia) dusbabeki sp. nov., male. Dorsal view (26), genital shield (27). Scale lines 100 μm (fig. 26) and 50 μm (fig. 27).

1. First pair of pg1 setae situated far from the level of seta ic4 bases, the distance between seta ic4 and pg1 bases is about 90 μm. C. lasiurae BOCHKOV, 1997

5. Opisthogastric sclerite situated 2 times closer to seta ic4 bases than to seta pg1 bases. C. dusbabeki sp. nov.

6. With 3-4 pairs of setae pg1. C. michaeli (POPPE, 1896)

7. With 1 pair of setae pg1. C. crocidurae (LAWRENCE, 1951)

8. Opisthogastric sclerite situated distinctly behind the level of seta ic4 bases. C. transvaalensis FAIN et ZUMPT, 1974

2. Setae d4 lacking. C. diplomesodon FAIN, 1973

3. Opisthogastric sclerite situated slightly anterior or at the level of seta l1 bases, between seta d1 and d2 bases. C. lasiurae BOCHKOV, 1997

4. Genital shield with 4 pairs of setae, situated between seta d2 bases, setae l2 subequal to d1-d3 in length. C. lasiurae BOCHKOV, 1997

5. Setae sce and l1 subequal in length. C. dusbabeki sp. nov.


7. Setae ic4 long, subequal to ic2 and ic3 in length. C. michaeli (POPPE, 1896)

8. Genital shield situated distinctly anterior to the level of seta l1 bases. Setae l2 subequal to d3 in length. C. lasiurae BOCHKOV, 1997

Subfamily Myobiinae s. l.

This subfamily includes eight genera exclusively associated with rodents. They occur on rodents of all the five suborders represented in the system of PAVLINOV (2002). Among rodents of the superfamily Muroidea, these mites parasitize 15 host families and 3 subfamilies incerta sedis (BOCHKOV, 1999b). The distribution of the myobiid mites on their host taxa is given in the Table 4. The phylogenetic systems of the subfamily Myobiinae and the Rodentia correspond very well to each other with however two exceptions (BOCHKOV, 1999b). The first discordance is observed in the genus Cryptomyobius RADFORD, 1954 whose species are associated with hosts belonging to two phylogenetically distant superfamilies - Bathyergoidea (mites of subgenus Cryptomyobius s.str.) and Dipodoidea (mites of subgenus Diplomyobius BOCHKOV, 1997). However, it is possible, that these two subgenera are associated by false synapomorphies (BOCHKOV, 1999b). The second discordance is that the myobiid subgenera of

Male

(males of C. ingens (VITZTHUM, 1914) and C. leucodoni BOCHKOV, 1997 are unknown)

1. Genital shield with 5 pairs of setae, 3 pairs of setiform and 2 pairs of vestigial ones. C. lasiurae BOCHKOV, 1997

2. Setae d4 present. C. diplomesodon FAIN, 1973

3. Genital shield situated distinctly posterior to the level of seta l1 bases, between seta d2 or d3 bases. C. lasiurae BOCHKOV, 1997

4. Genital shield with 4 pairs of setae, situated between seta d2 bases, setae l2 subequal to d1-d3 bases. C. lasiurae BOCHKOV, 1997

5. Setae sce and l1 subequal in length. C. dusbabeki sp. nov.


7. Setae ic4 relatively short, 1/2 times length of ic2 and ic3. C. crocidurae (LAWRENCE, 1951)

8. Genital shield situated distinctly posterior to the level of seta l1 bases. Setae l2 subequal to d3 in length. C. lasiurae BOCHKOV, 1997

9. Genital shield situated distinctly anterior to the level of seta l1 bases. Setae l2 subequal to d3 in length. C. lasiurae BOCHKOV, 1997

10. Genital shield situated distinctly posterior to the level of seta l1 bases. Setae l2 3-4 times longer than d3. C. multisetosa (LUKOSCHUS et DRIESEN, 1969)
Figs. 28-30 — Crocidurobia (Crocidurobia) dusabeki sp. nov. Male in ventral view (28), tritonymph in dorsal view (29), same in ventral view (30). Scale line 100 μm.
the genus Radfordia Ewing, 1938, which are associated with so much remote taxa in the PAVLINOV's system as the family Myoxidae (mites of the subgenus Graphiurobia FAIN, 1973) and the superfamily Muroidea (mites of the subgenera Microtomyobia FAIN et LUKOSCHUS, 1976 and Hesperomyobia BOCHKOV, 1996), are closely related according to our concept (BOCHKOV, 1999b). Moreover, Radfordia ewingi (FOX, 1937) from Zapus hudsonicus (Myomorpha: Zapodidae) belongs to the subgenus Graphiurobia which includes the parasites of Myoxidae (FAIN and BOCHKOV, 2001). The rodents of these two families are quite dissimilar in their mode of life. Therefore, the probability of secondary transition seems to be quite low in this case. Since, according to the PAVLINOV's system, the family Myoxidae belongs to the separate suborder Gliromorpha, some authoritative authors include it into the suborder Myomorpha (GAMBARYAN, 1983). The presence of the genera Gliricotes LAWRENCE, 1956 (Astigmata: Myocoptidae) and Radfordia (subgenus Graphiurobia) (Prostigmata: Myobiidae) on rodents of both families Zapodidae and Myoxidae suggests the existence of close affinities between these rodent families (FAIN and WHITAKER, 1974; FAIN, 1994).

**Genus Idiurobia FAIN, 1973**

This genus is represent only by the type species Idiurobia idiuri (FAIN, 1973), described from a single female collected on Idiurus zenkeri (Anomaluridae) from Kivu (FAIN, 1973d, 1974a). We give here description of the male and tritonymph of this species.

**Remark.** FAIN (1974a) mentioned that the Tibio-tarsus of the legs I is clearly separated from the genu. However, the re-examination of this species shows that the structure of the legs I does not differ markedly from that in the other myobiine mites. This leg I consists of three free segments: trochanter, femur and genu-tibio-tarsus.

**Idiurobia idiuri** (FAIN, 1973)

(Figs. 31-37)

Radfordia (Idiurobia) idiuri FAIN, 1973d: 330

Idiurobia idiuri, FAIN, 1974a: 445 (figs 3-7)

**Material examined.** 1 male, 1 female and 2 TN from Idiura macrotis (specimen 82011-M-524 MRAC), Park National Albert, Congo. It is recorded from this host species for the first time.

**Male.** Body length, including gnathosoma, 295, width 130. Length of setae: ve 57, sce 70, I1 80- all lanceolate; vi 25, sci 11, d5 11, I3 23 and I4 18 - all thickened setiform; ic1 30, ic2 and ic3 about 75, ic4 120. Genital shield as in Fig. 32. It bears 8 pairs of setae, 5 pairs of anal-genital and 3 pairs of median, d1 16, d2 29 and d3 10. Penis 73 long. Leg chaetotaxy as in the female, except the absence of the setae cx III 1.


**Remark.** The absence of the setae cxIII in the male is obviously an anomaly, because the females collected from the same specimen of the host have these setae.

**Genus Myobia van HEYDEN, 1826**

This genus is divided into two subgenera Myobia s.str. (13 species) and Angomyobia (2 species). The differences between these subgenera consist in the coxal and leg chaetotaxy, the shape of dorso-idiosomal setae of adults and immature instars. It is possible, that these subgenera are actually separate genera. However, the additional investigations concerning the immature instars of the subgenus Angomyobia are needed before to make a decision. All Myobia species are parasites of the subfamily Murinae and only one, Myobia (s.str.) otomyia Fain, 1972 parasitizes Otomyos irroratus, an Afrotropical rodent of the subfamily Otomyinae. The emended diagnosis of the subgenus Myobia s.str. and the data about host distribution and locality of the Myobia species were given by BOCHKOV and LADZNYCKA (2003). The re-examination of the species M. otomyia showed that a new subgenus should be established for this species. The diagnosis of a new subgenus is given below.

**Subgenus Myobia s.str.**

**Myobia (Myobia) malaysiensis** FAIN, LUKOSCHUS and NADCHATRAM, 1980

(Figs. 38-39)

Myobia (Myobia) malaysiensis FAIN, LUKOSCHUS and NADCHATRAM, 1980: 117-119 (figs. 21-24)

This species was described from Chiropodomys giroides (Murinae) from Malaysia (FAIN et al., 1980). We depict here the tritonymph of this species for the first time from the type series.

**Myobia (Myobia) hyatti** FAIN, 1973

(Fig. 40)


This species have been described from Vandeleuria oler-
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Figs. 31-33 — Idiurobia idiuri (FAIN, 1973), male. Dorsal view (31), genital shield (32), leg I in dorsal view (33). Scale lines 100 μm (fig. 31) and 50 μm (figs. 32-33).

acea (Murinae) from India (FAIN, 1973, 1974). We depict here the tritonymph of this species from the type series for the first time.

Myobia (Myobia) afi'omuris FAIN, 1972
(Fig. 41)

Myobia afi'omuris FAIN, 1972c: 31 (figs 31-34)

Material examined. 3 males, 2 females and 5 TN from Grammomys surdaster (Murinae) (specimen n 78-39-M-666), Congo, Park National Albert. 2 males, 3 females and 2 TN from Grammomys dolichurus (specimen n 80-11-M-1010), Congo, Park National Albert.

This species has been described from different African murines, Praomys jacksoni (type host), Grammomys surdaster and Mus minutoides from Angola (Fain, 1972c).
New observations on mites of the family Myobiidae MEGNIN, 1877 (Acari: Prostigmata)

We depict here the tritonymph of this species from Grammomys surdaster for the first time.

**Subgenus Otomyobia subgen. nov.**

Gnathosoma elongated, its length about 1.5-2 times longer than maximal width. *Female.* Setae d3, d4 and l3 short, hair like. *Tritonymph.* Setae ic2 and ic3 relatively long, about 50. Anal setae lacking. Leg chaetotaxy II-IV (number of solenidia between brackets): coxae 1-1-0, trochanters 1-1-1, femora+genu 3(1)-1-1, tibiae 5-3-3, tarsi 7(1)-6-6. Tarsi II-IV with claw. Coxae I with 2 scarcely visible setae.

**Differential diagnosis.** *Otomyobia subgen. nov.*: In adults, the gnathosomal length is about 1.8 times more than width; in female, the setae d3, d4 and l3 are short,
Figs. 36-37 — *Idiurobia idiuri* (FAIN, 1973), tritonymph. Dorsal view (36), ventral view (37). Scale line 100 μm.

hair like; in tritonymph, the setae *ic2* and *ic3* are relatively long (about 50), the setae *cxIII* and *cxIII* present, well developed.

*Myobia* s.str.: In both sexes, the gnathosomal length and width are subequal; in female, the setae *d3*, *d4* and *l3* are lanceolate; in tritonymph, the setae *ic2* and *ic3* are microsetae, the setae *cxIII* and *cxIII* are lacking.

**Type species:** *Myobia otomyia* LAWRENCE, 1951.

This genus includes the type species only.

*Myobia (Otonyobia) otomyia* LAWRENCE, 1951
(Fig. 42-45)

*Myobia otomyia* LAWRENCE, 1951: 109 (fig. 14-15)

*Myobia (Myobia) otomyia*, FAIN, 1978a: 168-169 (figs 199-202)

Material examined. 3 females and 2 TN from *Otomys irroratus* (specimen from MRAC), Congo, Park National Albert.

This species was described from *Otomys irroratus* from the South Africa (LAWRENCE, 1951). Later on, FAIN (1978a) redescribed this species based on the type material. It should be noted that the membranous setae *ra* in the holotype female which were depicted by FAIN (1978: fig. 200, p. 169) are actually hair-like in their shape (Fig. 43). Probably, these setae are overlapped with the well developed hypostomal membranes in the type specimen. We give below a description of the tritonymph for the first time.

**Genus Austromyobia** LAWRENCE, 1954

**Subgenus Dendromyobia** BOCHKOV, 1997

This subgenus includes two species associated with rodents of the subfamily Dendromurinae (Muroidea s.l.) (BOCHKOV, 1997c).

*Austromyobia (Dendromyobia) mesomelas* (FAIN et LUKOSCHUS, 1976)

(Fig. 46)

Radfordia (Austromyobia) mesomelas FAIN and LUKOSCHUS, 1976: 178; 1977: 24 (figs 11, 12)

Radfordia (Dendromyobia) mesomelas, BOCHKOV, 1997c: 701

Austromyobia (Dendromyobia) mesomelas, BOCHKOV, 1999: 771

**Material examined.** 2 females and 4 TN from Dendromus mesomelas (Dendromurinae) (specimen n 38412 MRAC) from Zaire.

This species was described from Dendromus mesomelas from the South East Africa (FAIN and LUKOSCHUS, 1976, 1977). The tritonymph is described here for the first time.


**Genus Radfordia** EWING, 1938

This genus includes nine subgenera, six of them occur on rodents of the subfamily Murinae (Muridae) or on closely related taxa of an uncertain taxonomic status from the Tropical Africa (BOCHKOV, 1999b). The taxonomic status...
of the three subgenera, *Radfordia* s.str., *Rattinyobia* Fain et al., 1980 and *Syconycterobia* Fain, 1973 is not contestable. Differences between these taxa are most well expressed in the females, males and immatures. The males and immatures of the monotypical subgenera *Lophurinyobia* Fain, 1973 and *Hystricomyobia* Fain, 1974 have not been described until now.

The new morphological data obtained from the study of male and immature instars allow to examine the phylogenetic relationships of these subgenera and to re-estimate their taxonomical status.

Among the species of the subgenus *Radfordia* s.str., *Radfordia acomys* Fain et Lukoschus, 1996 and *Radfordia petromyscus* Lukoschus et al., 1986 were treated as species groups, "acomys" and "petromyscus", respectively (Bochkov and Fain, 1997). Both species differ clearly from each other and from the other species of the subgenus. Therefore we establish for them two new subgenera *Acomyobia* subgen. nov. and *Petromyobia* subgen. nov.

The subgenus *Hylomyscobia* includes 4 species and is obviously heterogeneous. In three species of them, including the type species *Radfordia hylomyscus* Fain, 1972, the trochanters II-III bear 3 setae, the setae of coxae III are absent and the setae *ic2-ic4* are short. These mites are associated with rodents of closely related genera *Hylomyscus* and *Zelatomys* belonging to the section "Rattus" (Murinae). In *Radfordia grammomys* Fain, 1972, the fourth species of the subgenus *Hylomyscobia*, the trochanters II-III bear 2 setae, the coxae III have one seta and the setae *ic2-ic4* are long. This species parasitize rodents of the genus *Grammomys*, which belongs to the section "Arvicantis" (Murinae). We think, that the first three species should be treated as the subgroup
Figs. 42-45 — *Myobia (Otomyobia) otomyia* LAWRENCE, 1951. Gnathosoma of female in dorsal view (42), same in ventral view (43), vulva (44), tritonymph in dorsal view (45). Scale lines 100 μm (figs. 42-44) and 50 μm (fig. 45).
"praomys", within the species group "affinis", subgenus Radfordia s.str. The short dorsal setae of the trochanters III-IV is a single difference between these species and the other representatives of the subgroup "praomys". The length of these setae is a variable character and in the species R. bukokoensis (from the former subgenus Hylomyscus) they are only slightly shorter than in some species of the subgroup "praomys". Furthermore, according these new data, the structure of the immatures of R. bukokoensis does not differ from that in the other species of Radfordia s.str. Therefore, we include here these three species to the subgroup "praomys". While, the last species, R. grammomys differs from the species of the subgenus Radfordia s.str. only by the absence of the dorsal seta on the trochanters III-IV. Other characters of this species correspond to those in the species group "ensifera", subgroup "angolensis". Therefore, we include this species into the species subgroup "angolensis" of the nominative subgenus, and we consider the subgenus Hylomyscomyobia syn. nov. as an junior synonym of the subgenus Radfordia s.str.

The subgenus Lophurmyobia can be distinguished from the typical Radfordia s.str. species by the following characters: In adults of the Lophurmyobia, the gnathosoma has the lateral lobes, the genu III bears 5 setae, the coxae III and IV are without setae; in the male, the genital shield oval, with 4 pairs of setae, the setae d1 and d2 are flanked this shield; in the tritonymph, the anal slit is covered with the cuticular folds.

A single species of the subgenus Hystricomyobia, Radfordia hystricosa FAIN, 1972, differs from the typical species of the subgenus Radfordia s.str. only by the extremely long dorsal setae of idiosoma. However, the relationships of this species with the representatives of the species group "ensifera" of the subgenus Radfordia s.str. are obvious. Therefore we include here this species into this group as the separate subgroup "hystricosa" and consider the subgenus Hystricomyobia syn. nov. as a junior synonym of Radfordia s.str.

Finally, the species group "subuliger" has been established for the three species from rodents of the subfamily Neotomynae (Sigmodontidae) within the nominative subgenus (FAIN and BOCHKOV, 2002). This group shows the intermediate characters between the subgenera Radfordia s.str. and Hesperomyobia. Probably, a new subgenus may be established for this group after the finding of its immature instars, which are still unknown. Therefore, we consider conventionally this group as a group incertae sedis within the genus Radfordia.

Thus, after recombinations listed above, we separate the genus Radfordia, onto the nine subgenera, including the two newly recognized subgenera; the subgenera Hystricomyobia and Hylomyscomyobia are synonymized with the subgenus Radfordia s.str.
Subgenus *Radfordia* s.str.

This subgenus includes now two species groups, “*ensi­fera*” and “*affinis*”; both are associated with rodents of the subfamily Murinae (Bochkov and Fain, 1997). The group “*ensi­fera*” consists of the four subgroups: “*ensi­fera*”, newly recognized “*hystricos­a*”, with a single species, “*malo­comys*” and “*angolensis*”. The group “*affinis*” consists of the two subgroups: “*affinis*” and “*pra­moms*”. The name of the former group should be changed, because the species *Radfordia affinis* (Poppe, 1896), as it is shown by the present study, actually belongs to the “*pra­moms*” subgroup. Therefore, we give here a new name “*lancea­ria*” for the former “*affinis*” group and subgroup, respectively. The data on the host distribution and locality of the *Radfordia* s.str. species are summarized in the Table 5.

**Definition.** Gnathosoma without lobes and it bears full set of setae, *rp*, *ra* and *rd* - all hair-like. Idiosoma elongated. Chaetotaxy of legs II-IV (number of solenidia between brackets): coxae 3-2-0 or 1-1, trochanters 3-3-3 (3-2-2 in *R. grammom­oms*), femora 5-3-3, genua 7(1)-6-5, tibiae 6-6-6 and tarsi 7(1)-6-6. Dorsal seta of trochanters III-IV whip-like.

**Female.** Vulva with well developed lobes and it bears full set of setae (g1-g3, a1, ae), setae g3 claw-like. Paragenital setae *pg1, pg2* and *pg3* - short, hair-like. Chaetotaxy of idiosoma: *v1, ve, sci, sce, d1, d2, H, l2* - always lanceolate; *d3, d4, l3* - in different shape, mostly hair-like; *d5, l4, ic1-ic4* - hair-like; in some species *ic2-ic4* - whip-like; *l5* - whip-like.

**Male.** Genital shield conical. It bears 3 pairs of genitoanal setae and also 2 pairs of setae (*d1* and *d2*) situated immediately behind this shield. Chaetotaxy of idiosoma: *ve, sce, H* - lanceolate; *v1, sci, d5, l3* and *l4* - in different shape; *l5* - whip-like. Seta *sci* far distant from *sce*, distances *sci-sce* and *sci* - genital shield subequal. Striated seta of tibiotarsus I inflated.

**Tritonymph.** Gnathosoma with a pair of microsecta *rd* dorsally and *rp* ventrally. Idiosomal dorsum with 8-14 pairs of setae of different shape. Setae *l5* whip-like, situated ventrally. Anal slit without setae or with vestigial ones, naked. Legs I bilaterally symmetric. Legs IV in different shape. Chaetotaxy of legs II-III (number of solenidia between brackets): coxae 1-0-, trochanters 1-1, femur-genua 3(1)-1, tibiae 4-3, tarsi 7(1)-6. Coxa I with two pairs of small scale-like setae. Tarsi II-III with 1 claw, tarsi III without claws.

Species group “*ensi­fera*”

Coxal chaetotaxy 3-2-1-1

Species subgroup “*ensi­fera*”

Setae *ic2-ic4* short. In female, setae *d1, d2* and *l2* foliate, the seta *d2* bases 2 times close to *l2* than to *d1*; setae *l3* short, mostly hair-like. In tritonymph, setae *d5, l4* lacking.

It includes 11 species from the Oriental, New Guinea and Australian rodents of the subfamily Murinae.

**Radfordia (Radfordia) pogon­omoms**

Fain et Lukoschus, 1976

(Fig. 47)

**Radfordia (Radfordia) pogon­omoms** Fain et Lukoschus, 1976: 177, 1978: 36-39 (figs. 30-35)

This species was described from the ancient New-Guinea endemic, *Pogonomys lortae* (Murinae) (Fain and Lukoschus, 1976, 1977). We depict here the tritonymph of this species based on a type series for the first time.

Species subgroup “*angolensis*”

Setae *ic2-ic4* whip-like. In female, setae *d1, d2* and *l2* lanceolate, the distance between seta *d1-d2* and *d2-l2* bases subequal; setae *l3* short, mostly hair-like. In tritonymph, setae *d5, l4* present.

We consider the species *Radfordia chrysophila* Curfs et al., 1986 *syn. nov.* as a junior synonym of *Radfordia angolensis* Fain, 1972. These mites are described from *Aethomys chrysophilus* (Murinae) from South Africa. The insignificant differences in measurements between these species are probably the result of individual variability.

One more species, *Radfordia grammom­oms* comb. *nov.* is added here to this subgroup.

Thus, the subgroup includes four species parasitizing the African rodents of the genera *Aethomys* and *Grammomys* (Murinae).

**Radfordia (Radfordia) thamnom­ys**

Fain, 1972

(Fig. 48)

**Radfordia thamnom­ys** Fain, 1972: 46-47 (figs 47-48)

This species has been described from *Grammomys rutilans* (Murinae) from Angola (Fain, 1972c). We depict here the tritonymph from the type series for the first time.

Species subgroup “*malo­comys*”

Setae *ic2-ic4* short. In female, setae *d1, d2* and *l2* lanceolate, the distance between seta *d1-d2* and *d2-l2* bases subequal; setae *l3* short, hair-like. In tritonymph, setae *d5* and *l4* lacking.

The subgroup includes two species parasitizing the African rodents of the genus *Malac­omys* (Murinae)
Figs. 48-49 — Tritonymphs in dorsal view. \textit{Radfordia (Radfordia) thonnomyx} FAIN, 1972 (48), \textit{Radfordia (Radfordia) malacomys} FAIN, 1972 (49). Scale line 100 μm.

\textbf{Radfordia (Radfordia) malacomys} FAIN, 1972

(Fig. 49)


\textit{Material examined.} 2 TN from \textit{Malacomys longipes} (Murinae) (specimen n 97-009-M-2609), Zaire, Basiana.

This species was described from \textit{Malacomys sp. and Malacomys longipes} from Zaire and Angola (FAIN, 1978a). We depict here the tritonymph of this species from \textit{Malacomys longipes} for the first time.

Species subgroup "\textit{hystricosa}"

Setae \(ic_2-ic_4\) short. In female, setae \(d_1, d_2\) and \(l_2\) lanceolate, the distances between setae \(d_1-d_2\) bases and seta \(d_2-l_2\) bases subequal; setae \(l_3\) lanceolate. In tritonymph, setae \(d_5, l_4\) lacking, anal setae vestigial.

This new subgroup differs from all other subgroups by the extremely long dorsal setae, especially long and lanceolate setae \(l_3\) in the female. It differs from subgroup "\textit{ensifera}" by the lanceolate setae \(d_1, d_2\) an \(l_2\) setae and by the subequal distances between bases of these setae in the female. It differs from "\textit{angolensis}" by the short setae \(ic_2-ic_4\) in female and by the absence of the setae \(d_5, l_4\) and anal setae in the tritonymph.

\textbf{Radfordia (Radfordia) hystricosa} FAIN, 1972 \textit{comb. nov.}

(Figs. 50-54)

\textit{Radfordia (Radfordia) hystricosa} FAIN, 1972b: 149
\textit{Radfordia (Hystricomyobia) hystricosa}, FAIN, 1974b: 449-450; 1978a: 164-166 (figs. 197, 198)

\textit{Material examined.} 1 male and 2 females from \textit{Stochomys longicaudatus} (Murinae) (specimen n 95-051-M-1671 MRAC) from Masako, Zaire. 2 females and 2 TN from the same host (specimen 95-051-M-1673 MRAC) and from the same locality. 1 male and 2 females from the same host and locality.

This species was described by FAIN (1972) from \textit{Stochomys longicaudatus} (Murinae) from Rwanda. The male and immature stages of this species were unknown (FAIN, 1978a). We give below a description of the male and tritonymph for the first time.

\textit{Male.} Body length including gnathosoma 295-310, width 175-180. Length of setae: \(vi 13-15, ve 70-80, sce 35-40, sce 120-130, l_1 140-150, l_3 50-52, l_4 10-13, d_1 40-45, d_2 40-45, d_3 35-40 -\) all lanceolate, \(l_3\) and \(d_5\) with multifurcate apices; setae \(ic_1-ic_4\) short, hair-like. Aedeagus 115-145 long. Genital shield conical. It bears 3 pairs of genito-anal setae, 2 pairs of lanceolate setae \(d_1-d_2\) 40-45 (Fig. 53). Seta \(sci\) situated closer to \(sce\) than to the genital
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Figs. 50-51 — Radfordia (Radfordia) hystericosa FAIN, 1972 comb. nov., female. Dorsal view (50), ventral view (51). Scale line 100 μm.

shield. Striated seta of tibiotarsus I inflated. Chaetotaxy of legs II-IV (number of solenidia between brackets): coxae 3-2-1-1, trochanters 3-3-3, femora 5-3-3, genua 7(1)-6-5, tibiae 6-6-6 and tarsi 7(1)-6-6. Dorsal seta of trochanters III-IV whip-like.

Tritonymph. Gnathosoma with two pairs of microsetae, rd dorsally and rp ventrally. Idiosomal dorsum with 11 pairs of setae: vi, ve, sce, sci, d1-d4, l1-l3; setae l4 and d5 lacking. Setae l5 whip-like, situated ventrally. Idiosomal venter: setae ic1/short, hair-like; ic2-ic4 microsetae. Anal slit with 2 pairs of vestigial setae, naked. Length of setae: vi 95-100, ve 125-140, sce 135-140, sci 120-125, l1 120-150, l2 55-57, l3 45, d1 95-105, d2 75-85, d3 55, d4 45 - all narrowly lanceolate. Legs I bilaterally symmetric. Legs IV normally developed. Chaetotaxy of legs II-IV (number of solenidia between brackets): coxae 1-0-0, trochanters 1-1-1, femur + genua 3(1)-1-1, tibiae 4-3-3, tarsi 7(1)-6-6. Coxae I with two pairs of small scale-like setae. Tarsi II-III with 1 claw, tarsi III without claws.

Species group “lancearia”

Coxal chaetotaxy 3-2-0-1

The immatures of Radfordia elegantula Zumpt et Cohen, 1971 are unknown. Therefore we consider this species as a species incertae sedis within this group.

Subgroup “lancearia”

Setae ic3 and ic4 whip-like. Tritonymph. Setae d1-d5 and l1-l5 present. Legs IV normally developed, without spur.

The subgroup includes 2 species, the parasites of the genera Mus and Apodemus (Murinae)

Subgroup “praomys”

Setae ic2-ic4 short, or only setae ic4 whip-like. Tritonymph. Some dorsal idiosomal setae lacking. Legs IV strongly reduced with lateral spur.
The species *Radfordia hylomyscus* FAIN, 1972, *R. zelotomys* FAIN, 1976 and *R. bukokoensis* FAIN and LUKOSCHUS, 1976 are added here to the subgroup “praomys”.

Four new species are described here. The discriminative characters of these new species, being closely related to them *Radfordia praomys* and *R. daltoni*, are given in the Table 6.

It includes now 6 already described and 4 new species from a group of closely related African murines of the genera *Praomys, Myomyscus, Colomys* and others belonging to of the section “*Rattus*” (PAVLINOV, 2002).

*Radfordia (Radfordia) colomys* sp. nov.
(Figs. 55-58, 60)

*Material examined.* Holotype female, 11 paratypes, 3 males and 5 TN paratypes from *Colomys goslingi* (specimen 97-009-M-4647 MRAC), Zaire, Tshopo. Coll. M. COLYN. The holotype and most of the paratypes are deposited in MRAC.

*Female.* Body length, including gnathosoma, 370 (345-375 in 10 paratypes), width 208 (190-210). Length of setae: vi 52 (46-52), ve 62 (57-65), sei 105 (103-105), sce 87 (85-90), d1 80 (73-80), d2 105 (98-105), lII 85 (80-85), l2 80 (75-80), pg2 9 (5-9), ic1 11 (10-15), ic2-ic4 very short. Width of setae: vi 4, ve 9, sei 6, d1, d2, lII and l2 3-4. Setae sei, sce and lII with pair of lateral barbs and bifurcate apices. Dorsal seta of trochanters III and IV about 75 in length; seta cxIV1 situated laterally.

*Male* (3 paratypes). Body length, including gnathosoma, 273-297, width 165-178. Length of setae: vi 11-13, ve 40-45, sei 18, sce 73-87 and lII 87-92. Setae d5, l3 and l4 very short. Setae vi and sei setiform; setae ve, sce and lII narrowly lanceolate, with a pair of lateral barbs and bifurcate apices. Genital shield oval in shape (Fig. 58). Penis 75-82 in length. Setae d1 and d2 short lanceolate, about 10.

*Tritonymph* (5 paratypes). Setae ve 18-23 narrowly lanceolate, with a pair of lateral barb, sce 90-110 narrowly lanceolate, with a pair of lateral barbs and bifurcate apex, vi and sei very short, lanceolate, with a single lateral barb; d3 18-20 narrowly lanceolate with slightly bifurcate apex, d4 37-42 narrowly lanceolate, with forked apex; l3 with
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Figs. 55-56 — Radfordia (Radfordia) colomys sp. nov., female. Dorsal view (55), ventral view (56). Scale line 100 µm.

Differential diagnosis. This new species is closely related with Radfordia praomys from Mastomys natalensis and Radfordia daltoni Scheperboer et al., 1987 from Myomyscus daltoni from Ivory Coast (Scheperboer et al., 1987). Both sexes of R. colomys sp. nov. are clearly distinguished from these species by the bifurcate apices of the setae sce and ll. R. colomys sp. nov. differs from R. praomys and R. daltoni by the following characters. In the female of R. colomys, the setae sci are slightly longer than sce; in the male, the genital shield is oval, the setae d1 and d2 are subequal in length; in the tritonymph, the small sclerotized plates are present anteriorly to seta sce bases, the setae vi and sci are subequal in length. In the females of R. praomys and R. daltoni, the setae sci are slightly shorter than sce; in the males, the genital shield is conical (R. praomys, Fig. 59) or rectangular (R. daltoni), the setae d1 are 1/3 of length d2; in the tritonymphs, the small sclerotized plates situated anterior to seta sce bases are absent, the setae vi are 2 times shorter than sci (R. praomys).

Material examined. Holotype female, 3 males and 3 females paratypes from Dephomys defita (Murinae) (specimen n 93-012-M-0229 MRAC), Ivory Coast. The holotype and most part of paratypes are deposited in MRAC.

Female. Body length, including gnathosoma, 380 (368-370 in 4 paratypes), width 200 (202-215). Length of setae: vi 45 (50-57), ve 48 (55-57), sci 62 (62-65), sce 85 (90-95), d1 80 (80-92), d2 105 (103-105), ll 110 (105-110), l2 80 (70-85), ic1 20 (18-20), ic2-ic4 very short. Width of setae: vi 5, ve 9, sci 6, d1, d2, ll and l2 3-4. Setae sci, sce and ll with a pair of lateral barbs and bifurcate apices. Dorsal seta of trochanters III and IV about 65 in length; seta cxIVl situated laterally.
Figs. 57-60 — Species of “praomys” group. Radfordia (Radfordia) colomys sp. nov., male in dorsal view (57), same, genital shield (58), Radfordia (Radfordia) praomys Zumpt et Coffee, 1971, genital shield (59), Radfordia (Radfordia) colomys sp. nov., tritonymph in dorsal view (60). Scale lines 100 μm (fig. 57) and 50 μm (figs. 58-60).

Male (3 paratypes). Body length, including gnathosoma, 260-270, width 165-190. Length of setae: vi 9-11, ve 52-57, sci 11-13, sce 85-92 and li 100-115. Setae d5, i3 and i4 very short. Setae vi and sci setiform; setae ve, sce and li narrowly lanceolate, with pair of lateral barbs and bifurcate apices. Genital shield oval in shape (Fig. 63). Penis 80-85 in length. Setae d1 11-18, d2 6-9.

Differential diagnosis. This new species differs from Radfordia colomys by the length ratio of the setae sci and sce: in the female (1:1.3) and by the length ratio of the setae d1 and d2 in the male (2:1). It differs from the Radfordia praomys, R. daltoni, R. derooi sp. nov. and R. delictori sp. nov. by having the apices of the setae sce and li bifurcate in both sexes.

Radfordia (Radfordia) praomys Zumpt et Coffee, 1971
(Fig. 59)

Radfordia praomys Zumpt and Coffee, 1971: 100 (figs 5, 6)
Radfordia (Radfordia) praomys, Fain, 1978a: 150
Radfordia (Radfordia) praomys trifurcata Fain, 1973a: 304, 1978a: 150 (fig. 180) syn. nov.

Material examined. 1 female, 1 male and 1 TN from Mastomys natalensis (Murinae) (specimen n 96-037-M-1050 MRAC), Tanzania. 1 female, 1 male and 1 TN from the same host (specimen 81 MRAC), Congo, 06.VI.1946.

According to the original description of Fain (1973a), Radfordia trifurcata Fain, 1973 differs from Radfordia praomys Zumpt et Coffee, 1971 by the presence of the two lateral barbs in some dorsal setae. Both species were found from one host, Mastomys natalensis (Murinae). Re-examination of large series from the type host has shown that these setae always have the lateral barbs, but in some specimens they may be situated in a such aspect that are almost invisible. Therefore we consider here R. trifurcata syn. nov. as a junior synonym of R. praomys.

Radfordia (Radfordia) myomysci sp. nov.(Figs. 64-65)

Material examined. Holotype TN, 2 females, 4 males and 3 TN paratypes from Myomyscus derooi (Murinae) (specimen n 73-13-M-161 MRAC), Togo, Borgou. The ho-
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Fig. 61-63 — Radfordia (Radfordia) dephomys sp. nov. Female in dorsal view (61), male in dorsal view (62), genital shield of male (63). Scale line 100 μm (61, 62) and 50 μm (fig. 63).

The females and males of this species are not distinguishable from Radfordia daltoni, while the tritonymphs are clearly different by the shape of the setae d4 and l3.

Tritonymph. Setae ve 25 (20-35 in 3 paratypes) narrowly lanceolate, with a single lateral barb, sce 105 (90-100) lanceolate, with a pair of lateral barbs and bifurcate apex, vi and sci very short, d3 23 (23-25), d4 40 (25-29) and l3 35 (27-35) - all similar in shape, lanceolate, with slightly bifurcate apex (Fig. 64). Small sclerotized plates situated anterior to base sce setae absent. Leg II-III chaetotaxy (number of solenidia between brackets): trochanters 1-1, femora+gena 3(1)-1, tibiae 4-3, tarsi 7(1)-6. Tarsi I-II with claw, coxae I with 2 scale-like setae. Legs IV primordial, with 3 segments without setae, its intermediate segment with well developed spur.

Differential diagnosis. The tritonymph of the new species differs from R. daltoni by having a similar shape of the setae d4 and l3; the tips of these setae are devoid of bifurcation.

Radfordia (Radfordia) delectori sp. nov. (Figs 66-67)

Material examined. Holotype TN, 10 females, 5 males and 3 TN paratypes from Praomys delectorum (Murinae) (specimen n 96-037-M-4841), Tanzania, Bungue, 9°10'S and 33°39'E. Coll. VERHEYEN. 1 female, 3 males and 1 TN from the same host (specimen n 96-037-M-4614 MRAC), Tanzania, Mbete. The holotype and most part of paratypes are deposited in MRAC.

The female and male of this new species are not distinguishable from R. praomys, while the tritonymph
Figs. 64-67 — Species of "praeomys" group. *Radfordia (Radfordia) myomsci* sp. nov.: Tritonymph in dorsal view (64), genital shield of male (65). *Radfordia (Radfordia) delectori* sp. nov.: Tritonymph in dorsal view (66), genital shield of male (65). Scale lines 100 μm (figs. 64, 66) and 50 μm (figs. 65, 67).
clearly differs from this species by the poorly developed spur on the legs IV.

*Tritonymph* (4 paratypes). Setae vi 5 (5-9), sci 13-(13-16) and ve 35 (35-45) all with single lateral barb, *see* 92 (89-115) with a pair of lateral bars and bifurcate apex, d3 23 (23-34) narrowly lanceolate with slightly bifurcate apex, d4 45 (36-59) narrowly lanceolate, with bi- or trifurcate apex, I3 with bifurcate-foliate apex as in Fig. 66. Small scleritized plates situated anterior to base *setae* lacking. Leg II-III chaetotaxy (number of solenidia between brackets): trochanters 1-1, femora+genua 3(1)-1, tibiae 4-3, tarsi 7(1)-6. Tarsi I-II with claw, coxae I with 2 scale-like setae. Legs IV primordial, with 3 segments without setae; spur of the intermediate segment poorly developed (Fig. 66).

Remark. Within the “praomys” subgroup, the species *Radfordia praomys*, *R. detectori*, *R. daltonii* and *R. myomys* are more closely related to each other than to the other species of this group. They infest rodents of the genera *Mastomys*, *Praomys* and *Myomys*. Some mammologists include the genera *Mastomys*, *Praomys* and *Myomys*. Some mammologists include the genera *Mastomys*, *Praomys* and *Myomys*. Our data are indirectly support this point of view.

**Radfordia (Radfordia) bukokoensis**

FAIN et LUKOSCHUS, 1976 comb. nov.  
(Figs. 68-70)


Material examined. 2 males, 6 females and 2 TN from *Hylomyscus stella* (Murinae) (specimen in ZIN), Zaire, Masako.

This species was described from *Hylomyscus* sp. and *Hylomyscus stella* (Murinae) from Central African Republic (FAIN and LUKOSCHUS, 1976, 1977). The original description of the male was based on specimen in a bad condition. We give here figures of tritonymph for the first time (Fig. 70). It should be noted that in a contrast to the original description, the male of this species actually has the setae d4 and d5 and three pairs of setae on the genital shield (Figs. 68-69). The tritonymphal structure does not differ from that in other species of the subgroup “praomys”, except the serrate setae I3 (Fig. 70).

**Subgenus Acomyobia subgen. nov.**

Definition. Gnathosoma without lobes, with full set of setae: *rp*, *ra* and *rd* - all hair-like. Idiosoma elongated. Chaetotaxy of legs II-IV (number of solenidia between brackets): coxae 3-2-0-0, trochanters 3-3-3, femora 5-3-3, genua 7(1)-5-5, tibiae 6-6-6 and tarsi 7(1)-6-6. Dorsal seta of trochanters III-IV whip-like.

**Female.** Vulva with well developed lobes and full set of setae (g1-g3, a1, ae), setae g3 claw-like. Paragenital setae pg1 and pg2 slightly thickened, pg3 - short, hair-like. Chaetotaxy of idiosoma: vi, ve, sce, see, d1, d2, I1, I2 - lanceolate; d3, d4, I3 - narrowly lanceolate; d5, l4, ic1, ic3 and ic4 - short, hair-like; i5 - and ic2 - whip-like.

**Male.** Genital shield oval. It bears 5 pairs of genito-anal setae also 3 pairs of dorso-median setae d1-d3 flanked this shield. Chaetotaxy of idiosoma: vi, ve, sce, see, I lanceolate; d5, I3 and I4 - narrowly lanceolate; i5 - whip-like. Seta *sci* situated close to *see* than to the genital shield. Ventral chaetotaxy as in female. Striated seta of tibiotarsus I inflated.

**Tritonymph.** Gnathosoma with two pairs of microsetae: *rd* dorsally and *rp* ventrally.

Idiosomal dorsum with 14 pairs of setae: *ve*, *vi*, *sce*, *sci*, d1-d4, *I1-I4* - lanceolate, d5, ic1, ic3 and ic4 - short, hair-like, ic2 - 4-5 times longer, 25-30. Setae I5 whip-like, situated ventrally. Anal slit without setae, naked. Legs I bilaterally symmetric. Legs IV normally developed. Chaetotaxy of legs II-IV: coxae 1-0-0, trochanters 1-1-1, femora+genua 3(1)-1-1, tibiae 5-3-3, tarsi 7(1)-6-6. Coxae I with two scale-like seta. Tarsi II and III with 1 claw. Tarsi IV without claw.

**Type species: Radfordia (Radfordia) acomys** FAIN et LUKOSCHUS, 1976

This subgenus includes a single species *Radfordia acomys*, which was described from *Acomys cahirinus* from Hamburg Zoo (FAIN and LUKOSCHUS, 1977) and later it was collected again from the same host species from Iran (BOCHKOV et al., 2000).

**Differential diagnosis.** This new subgenus differs from subgenus *Radfordia* s.str. by the presence a single seta on the coxae II, the absence of setae on coxae III and IV, the presence on the genu II of 5 pairs of setae only in both sexes, and by the oval genital shield with numerous pairs of setae associated with the genital complex in the male.

**Subgenus Petromyscobia subgen. nov.**

**Definition.** Gnathosoma without lobes, with full set of setae: *rp*, *ra* and *rd* - all hair-like. Idiosoma elongated. Chaetotaxy of legs II-IV (number of solenidia between brackets): coxae 3-2-0-0, trochanters 3-3-3, femora 5-3-3, genua 7(1)-6-6, tibiae 6-6-6 and tarsi 7(1)-6-6. Dorsal seta of trochanters III-IV whip-like.

**Female.** Vulva with well developed lobes, with full set of setae (g1-g3, a1, ae), setae g3 claw-like. Paragenital setae pg1 and pg2 slightly thickened, pg3 - short, hair-like. Chaetotaxy of idiosoma: vi, ve, sce, see, d1, d2, I1, I2 - lanceolate; d3, I3 - narrowly lanceolate; d4, d5, l4, ic1, ic3 - short, hair-like; i5 - and ic2 - whip-like.
Figs. 68-70 — *Radfordia (Radfordia) bukokoensis* FAIN et LUKOSCHUS, 1976 **combi nova**. Male in dorsal view (68), genital shield of male (69), tritonymph in dorsal view (70). Scale lines 100 μm (fig. 68, 70) and 50 μm (fig. 69).
New observations on mites of the family Myobiidae MEGNIN, 1877 (Acari: Prostigmata)

71

Figs. 71-73 — Radfordia (Lophurlyobia) brevipilis FAIN, 1972, female. Dorsal view (71), vulva (72), ventral view (73). Scale lines 100 μm (figs. 71, 73) and 50 μm (fig. 72).

Male. Genital shield oval. It bears 5 pairs of genito-anal setae also 2 pairs of dorsomedian setae d1-d2 situated immediately behind this shield. Chaetotaxy of idiosoma: ve, sce, l1 - lanceolate; v1, sci - narrowly lanceolate; l3 and l4 thickened; d5 short, hair-like; i5 - whip-like. Seta sci equidistant from sce and the genital shield. Ventral chaetotaxy in the female. Striated seta of tibiotarsus I inflated.

Tritonymph. Gnathosoma with two pairs of microsetae, rd dorsally and ventrally (rp). Idiosomal dorsum with 14 pairs of setae: ve, vi, sce, sci, d1-d4, l1-l3 - lanceolate, l4, d5 - short, hair-like; setae i5 whip-like, situated ventrally. Anal slit with a single pair of setae. Legs I bilaterally symmetric. Legs IV normally developed. Chaetotaxy of legs II-IV: coxae 1-0-0, trochanters 1-1-1, femora+genua 3(1)-1-1, tibiae 5-4-3, tarsi 7(1)-6-6. Coxa I with two scale-like seta. Tarsi II and IV with claw.

Type species: Radfordia (Radfordia) petromyscus LUKOSCHUS, CURFS et FAIN, 1976

This subgenus includes a single species Radfordia petromyscus, described from Petromyscus collinus (Petromyscinae) from Namibia (LUKOSCHUS et al., 1981).

Differential diagnosis. The new subgenus differs from the species of the nominative subgenus by the oval genital shield, which bears the 5 pairs of the genital setae and two pairs of setae d1, d2 situated slightly posterior to this shield, and by the absence of the setae on coxae III and IV. It also differs from Acomyobia subgen. nov. by the presence of the 2 setae on coxae II and 6 setae on genu III in both sexes and by the chaetotaxy of the genital shield in the male.

Subgenus Lophurlyobia FAIN, 1973

This monotypic subgenus was established by FAIN (1973a) for the species Radfordia (L.) brevipilis FAIN, 1972 from Lophuromys sikapusi (Rodentia: Murinae) from Tropical Africa. The male of this subgenus was unknown and a single specimen of tritonymph was in a poor condition (FAIN, 1978a). Therefore, we give below a new diagnosis of this subgenus, which is based on an addition material including males and immature stages, and a redescription of R. (L.) brevipilis.

Definition. Gnathosoma with ventro-lateral lobes, with full set of setae: rp, ra and rd - all hair-like. Idiosoma
elongated. Chaetotaxy of legs II-IV (number of solenidia between brackets): coxae 3-2-0-0, trochanters 3-3-3, femora 5-3-3, genua 7(1)-5-5, tibiae 6-6-6 and tarsi 7(1)-6-6. Dorsal seta of trochanters III-IV whip-like.

**Female.** Vulva with short lobes, with full set of setae (g1-g3, ai, ae). Setae g3 very long and thin. Paragenital setae pg1, pg2 and pg3 - all microsetae. Chaetotaxy of idiosoma: vi, ve, sci, sce, l1, l3, l4, d3, d4 and d5 - all very short; setae d1, d2 and l2 narrowly lanceolate; l5 - whip-like; ic1-ic4 - very short.

**Male.** Genital shield oval. It bears 4 pairs of genito-anal setae, and also 3 pairs of dorso-median setae d1-d3 situated near this shield. Chaetotaxy of idiosoma: vi, sci, l1 - short and narrowly lanceolate; setae ve, sce, l3, l4 and d5 - narrowly lanceolate; l5 - whip-like. Seta sci closer to sce than to the genital shield. Ventral chaetotaxy as in female. Striated seta of tibiotarsus I inflated.

**Tritonymph.** Gnathosoma with two pairs of microsetae: rd dorsally and rp ventrally. Idiosomal dorsum with 11 pairs of setae represented by microsetae: ve, sce, sci, d1-
d4, l1-13, setae vi lacking. Setae t5 whip-like, situated ventrally. Idiosomal venter bears microsetae ic1-ic3, setae ic4 not registered. Anal slit without anal setae, covered with cuticular folders. Legs I bilaterally symmetric. Legs IV normally developed. Chaetotaxy of legs II-IV: coxae 1-0-0, trochanters 1-1-1, femora-genua 3(1)-1-1, tibiae 5-3-2, tarsi 7(1)-6-4. Coxa I with two scale-like seta. Tarsi II and II I with 1 claw. Tarsi IV without claw.

Type species: Radfordia (Radfordia) brevipilis FAIN, 1972

This genus includes only the type species parasitizing rodents of the genus Lophuromys in Tropical Africa.

Radfordia (Lophurmyobia) brevipilis FAIN, 1972

(Figs 71-78)

Radfordia (Radfordia) brevipilis FAIN, 1972b: 149
Radfordia (Lophurmyobia) brevipilis, FAIN, 1973a: 308; 1978a: 160-161 (figs 192, 193)

Material examined.: Female holotype from Lophuromys sp., Guiglo Mbla, Ivory Coast (MRAC). Paratypes: 2 males, 4 females, 5 TN, 2 DN and 3 PN from Lophuromys sikapusi (Deomyinae) from Mbwambala, Zaire. (MRAC)

Female. Body length, including gnathosoma, 420-440, width 250-270. Length of setae: d1 33-34, d2 30-32, l2 34-36. Other setae, excluding whip-like t5, 9-12 in length. Vulva as in Fig. 72.

Male. Body length, including gnathosoma, 280-290, width 175-185. Aedeagus 80-90 long. Length of setae: vi 10-12, ve 35-45, sci 15-18, sce 45-50, II 10-12, d3 33-35, l3 18-20, l4 16-18, d5 14-16. Genital shield as in Fig. 75.

Remark. The rodents of the genus Lophuromys, hosts of Radfordia brevipilis, belong to the subfamily Deomyinae which also includes three genera i.e., Deomys, Uranomys, Acomys. This subfamily is probably not closely allied to other Afro tropical murines and their relations with the other murines are still unclear (Musser and Carleton, 1992). At present, this taxon is considered as the subfamily incerta sedis within the superfamily Muroidea (PAVLINOV, 2002).

The myobiids from the genera Deomys and Uranomys are unknown, species of the genus Acomys are infested by Radfordia acomys. Among the mite species of the genus Radfordia, the oval genital shield and naked coxae III and IV are also present in a single species of the subgenus Petromysconia subgen. nov. (see above). This species, Radfordia petromyscus, is a parasite of the Afro tropical rodents of the subfamily Petromyscinae, which in turn has unclear relationships. However, the chaetotaxy of this shield in R. petromyscus differs from this in R. acomys by the absence of setae d3 and by the position of the setae d1 and d2, which are situated immediately behind the shield. At the same time, the structure of this shield is almost identical in R. lophuromys and R. acomys, a single species of the newly recognized subgenus Acomyobia. In spite of the peculiar characters of R. lophuromys, the structure of the genital shield and leg chaetotaxy shows the close affinity of the subgenera Lophurmyobia and Acomyobia. Thus, the parasitological data indirectly support the monophyly of Deomyinae and they prove relatively independent positions of the host subfamilies Deomyinae and Petromyscinae in the system of the Afro tropical murines.
Table 1. Distribution of species of the genus *Ugandobia* DUSBABEK, 1968 on hosts of the family Emballonuridae

* - type host, ** - type species, *** - accidental host

<table>
<thead>
<tr>
<th>Mite species</th>
<th>Host species</th>
<th>Host subfamily</th>
<th>Locality</th>
<th>Reference</th>
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<td>FAIN 1978a</td>
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<td><em>Asellia tridens</em>**</td>
<td>Hipposideridae</td>
<td>Arabia</td>
<td>FAIN, 1972a, 1978a</td>
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<td><em>Taphozous sudani</em></td>
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<td>FAIN, 1973a, 1978a, present study</td>
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Table 2. Distribution of species of the genus *Neomyobia* RADFORD, 1948 on hosts of the family Rhinolophidae

* - type host, ** - type species, *** - accidental host

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<th>Host species</th>
<th>Locality</th>
<th>Reference</th>
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<td><em>Rh. boharicus</em></td>
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<td><em>C. lasiurae</em></td>
<td><em>Crocidura lastura</em></td>
<td>Russia (Far East)</td>
<td>Bochkov, 1997b</td>
</tr>
<tr>
<td><em>C. michaeli</em></td>
<td><em>Crocidura russula</em></td>
<td>Germany, Switzerland, France, Czech Republic</td>
<td>Bochkov, 1997b</td>
</tr>
<tr>
<td><em>C. crocidurae</em></td>
<td><em>Crocidura flavescens</em></td>
<td>South Africa</td>
<td>Lawrence, 1951, Fain, 1978a</td>
</tr>
<tr>
<td><em>Diplomesodon</em></td>
<td><em>Diplomesodon pulchellum</em></td>
<td>Asia</td>
<td>Fain, 1976</td>
</tr>
<tr>
<td><em>C. toroensis</em></td>
<td><em>Crocidura pilosa</em></td>
<td>Uganda</td>
<td>Dusbabek, 1983</td>
</tr>
<tr>
<td><em>C. dusbabeki</em> sp. nov.</td>
<td><em>Crocidura gracilipes</em></td>
<td>Congo</td>
<td>Present study</td>
</tr>
<tr>
<td><em>C. sellina</em></td>
<td><em>Crocidura jacksoni</em></td>
<td>Congo</td>
<td>Present study</td>
</tr>
<tr>
<td><em>Suncomyobia</em></td>
<td><em>Suncomyobia transvaalensis</em></td>
<td>Shrew</td>
<td>Fain and Zumpt, 1974</td>
</tr>
<tr>
<td><em>C. multisetosa</em></td>
<td><em>Crocidura russula</em></td>
<td>Holland Lophuromys</td>
<td>Lukoschus and Driesen, 1969</td>
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</table>
Table 4. System of the order Rodentia at the family level (from Pavlinov, 2002)

* - taxon associated with myobiid mites

<table>
<thead>
<tr>
<th>Suborder</th>
<th>Infraorder</th>
<th>Superfamily</th>
<th>Family</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sciurognatha *</td>
<td></td>
<td></td>
<td>Aploodontidae</td>
</tr>
<tr>
<td></td>
<td>Sciuroidea</td>
<td></td>
<td>Sciuridae</td>
</tr>
<tr>
<td></td>
<td>Castoroidea</td>
<td></td>
<td>Castoridae</td>
</tr>
<tr>
<td></td>
<td>Geomyoidea *</td>
<td></td>
<td>Geomyidae Heteromyidae *</td>
</tr>
<tr>
<td>Myomorpha *</td>
<td>Dipodoidea *</td>
<td></td>
<td>Sminthidae Zapodidae *</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Allactagidae * Dipodidae *</td>
</tr>
<tr>
<td></td>
<td>Muroidea *</td>
<td></td>
<td>Rhizomyidae Spalacidae</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Cricetidae Myospalacidae Sigmodontidae</td>
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<td></td>
<td></td>
<td></td>
<td>Placanthomyidae Muridae</td>
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<td></td>
<td></td>
<td></td>
<td>Muroidea * incertae sedis</td>
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<td></td>
<td></td>
<td></td>
<td>Cricetomyinae Dendromurinae Petromyscinae</td>
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<td></td>
<td></td>
<td>Deomyinae Otomyinae Nesomyinae Lophiomyinae</td>
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<td></td>
<td></td>
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<td>Gerbillidae *</td>
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<tr>
<td>Anomaluromorpha *</td>
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<td>Anomaluridae *</td>
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<tr>
<td>Gliromorpha *</td>
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<td>Myoxidae *</td>
</tr>
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<td>Hysterocognathi *</td>
<td>Hysteromorpha</td>
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<td>Hysteridae</td>
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<td></td>
<td></td>
<td>Erithizontoidea</td>
<td>Erithizontidae</td>
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<tr>
<td>Caviomorpha *</td>
<td>Cavioida</td>
<td></td>
<td>Caviidae Hydrochoeridae Dasyproctidae</td>
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<td></td>
<td></td>
<td>Chinchilloidea</td>
<td>Chinchillidae Abrocomidae</td>
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<td>Octodontoidea</td>
<td>Capromyidae Octodontida Ctenomyidae Echimyidae</td>
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<td>Phiomorpha</td>
<td></td>
<td></td>
<td>Thryonomyidae Petromuridae</td>
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<td>Ctenodactyloidea *</td>
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<td>Ctenodactylidae *</td>
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<tr>
<td>Bathyergomorpha *</td>
<td>Bathyergoidea *</td>
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<td>Bathyergidae *</td>
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Table 5. Distribution of species of the subgenus *Radfordia* *Ewing*, 1938 on hosts of the subfamily Murinae

* - type host, ** - type species

<table>
<thead>
<tr>
<th>Mite species</th>
<th>Host species</th>
<th>Locality</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Species group &quot;ensifera&quot;</td>
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<tr>
<td>Species subgroup &quot;ensifera&quot;</td>
<td></td>
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<tr>
<td><em>R. ensifera</em> (Poppe, 1896) **</td>
<td><em>Rattus norvegicus</em></td>
<td>Cosmopolitan</td>
<td>BOCHKOV and FAIN, 1997</td>
</tr>
<tr>
<td>**</td>
<td><em>Rattus rattus</em></td>
<td>Cosmopolitan</td>
<td>BOCHKOV and FAIN, 1997</td>
</tr>
<tr>
<td>**</td>
<td><em>Rattus turkestanicus</em></td>
<td>Turkmenia</td>
<td>BOCHKOV and FAIN, 1997</td>
</tr>
<tr>
<td>**</td>
<td><em>Rattus tanezumi</em></td>
<td>Malaysia</td>
<td>FAIN et al., 1981</td>
</tr>
<tr>
<td><em>R. davisi</em> (Radford, 1938) **</td>
<td><em>Rattus norvegicus</em></td>
<td>Africa (Sierra Leone)</td>
<td>FAIN, 1978a</td>
</tr>
<tr>
<td>**</td>
<td><em>Rattus exulans</em></td>
<td>Burma, New Zealand, China</td>
<td>BOCHKOV and FAIN, 1997</td>
</tr>
<tr>
<td><em>R. hornerae</em> (Domrow, 1963) **</td>
<td><em>Rattus fuscipes</em></td>
<td>Australia</td>
<td>DOMROW, 1991</td>
</tr>
<tr>
<td><em>R. jalorensis</em> FAIN et al., 1980 **</td>
<td><em>Rattus tironanicus</em></td>
<td>Malaysia</td>
<td>FAIN et al., 1980</td>
</tr>
<tr>
<td><em>R. expansa</em> Jameson et Whitaker, 1975 **</td>
<td><em>Rattus losea</em></td>
<td>Taiwan</td>
<td>JAMESON and WHITAKER, 1975</td>
</tr>
<tr>
<td><em>R. australiana</em> FAIN et Lukoschus, 1979 **</td>
<td><em>Rattus tunneyi</em></td>
<td>Australia</td>
<td>FAIN and LUKOSCHUS, 1979</td>
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<tr>
<td><em>R. niviventer</em> BOCHKOV et FAIN, 1997 **</td>
<td><em>Niviventer sp.</em></td>
<td>Tibet, South China</td>
<td>BOCHKOV and FAIN, 1997</td>
</tr>
<tr>
<td><em>R. berylnysi</em> BOCHKOV and FAIN, 1997 **</td>
<td><em>Berylnysi bethmorei</em></td>
<td>Vietnam</td>
<td>BOCHKOV and FAIN, 1997</td>
</tr>
<tr>
<td><em>R. lukoschusi</em> BOCHKOV and FAIN, 1997 **</td>
<td><em>Niviventer flaviscens</em></td>
<td>North Vietnam</td>
<td>BOCHKOV and FAIN, 1997</td>
</tr>
<tr>
<td>**</td>
<td><em>Niviventer niviventer</em></td>
<td>North Vietnam</td>
<td>BOCHKOV and FAIN, 1997</td>
</tr>
<tr>
<td><em>R. chiropodomys</em> Fain, 1974 **</td>
<td><em>Chiropodomys gliroides</em></td>
<td>Malaysia</td>
<td>FAIN et al., 1981</td>
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<td>Subgroup &quot;angolensis&quot;</td>
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<tr>
<td><em>R. angolensis</em> FAIN, 1972 **</td>
<td><em>Aethomys chrysophila</em></td>
<td>Africa (Namibia)</td>
<td>CURFS et al., 1986</td>
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<td><em>R. aethomys</em> CURFS et al., 1986 **</td>
<td><em>Aethomys namaquensis</em></td>
<td>South Africa</td>
<td>CURFS et al., 1986</td>
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<td><em>R. thamnomys</em> FAIN, 1972 **</td>
<td><em>Grammomys rutilans</em></td>
<td>Africa (Angola)</td>
<td>FAIN, 1972c</td>
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<tr>
<td><em>R. grammomomys</em> FAIN, 1972 comb. nov. **</td>
<td><em>Grammomys surdaster</em></td>
<td>Africa (Rwanda, Angola)</td>
<td>FAIN, 1972a</td>
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<td><em>R. eburneensis</em> FAIN, 1972 **</td>
<td>Malacomys sp.*</td>
<td>Africa (Ivory Coast)</td>
<td>FAIN, 1978a</td>
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<td><em>Radfordia malacomys</em> FAIN, 1972 **</td>
<td>Malacomys sp.*</td>
<td>Africa (Zaire)</td>
<td>FAIN, 1978a</td>
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<tr>
<td>**</td>
<td>Malacomys longipes</td>
<td>Africa (Zaire, Angola)</td>
<td>FAIN, 1978a</td>
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<td>Mite species</td>
<td>Host species</td>
<td>Locality</td>
<td>Reference</td>
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<td><em>R. hystricosa</em> FAIN, 1972</td>
<td><em>Stochomys longicaudatus</em></td>
<td>Africa (Rwanda)</td>
<td>FAIN, 1978a</td>
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<td><strong>Group “lancearia”</strong></td>
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<td><em>R. elengatula</em> ZUMPT et COFFEE, 1971</td>
<td><em>Mus minutoides</em></td>
<td>South Africa, Angola</td>
<td>FAIN, 1978a</td>
</tr>
<tr>
<td>**</td>
<td><em>Mus bellus</em></td>
<td>Zaire</td>
<td>FAIN, 1978a</td>
</tr>
<tr>
<td>**</td>
<td><em>Mus gratus</em></td>
<td>Rwanda</td>
<td>FAIN, 1978a</td>
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<tr>
<td><strong>Subgroup “lancearia”</strong></td>
<td></td>
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<tr>
<td><em>R. lancearia</em> (Poppe, 1909)</td>
<td><em>Apodemus sylvaticus</em></td>
<td>Europe</td>
<td>BOCHKOV, 1997d</td>
</tr>
<tr>
<td>**</td>
<td><em>Apodemus agrarius</em></td>
<td>Europe</td>
<td>BOCHKOV, 1997d</td>
</tr>
<tr>
<td><em>R. mironovi</em> BOCHKOV, 1997</td>
<td><em>Apodemus flavicollis</em></td>
<td>Eurasia</td>
<td>BOCHKOV, 1997d</td>
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<tr>
<td><strong>Subgroup “praomys”</strong></td>
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<td><em>R. affinis</em> (POPPE, 1896)</td>
<td><em>Mus musculus</em></td>
<td>Cosmopolitan</td>
<td>BOCHKOV, 1997d</td>
</tr>
<tr>
<td>**</td>
<td><em>Mus booduga</em></td>
<td>India</td>
<td>BOCHKOV, 1997d</td>
</tr>
<tr>
<td>**</td>
<td><em>Apodemus sylvaticus</em></td>
<td>Europe</td>
<td>BOCHKOV, 1997d</td>
</tr>
<tr>
<td>**</td>
<td><em>Apodemus flavicollis</em></td>
<td>Europe</td>
<td>BOCHKOV, 1997d</td>
</tr>
<tr>
<td><em>R. praomys</em> ZUMPT et COFFEE, 1971</td>
<td><em>Mastomys natalensis</em></td>
<td>Africa (South Africa, Angola, Ivory Coast)</td>
<td>FAIN, 1978a</td>
</tr>
<tr>
<td>**</td>
<td><em>Praomys morio</em></td>
<td>Africa (Liberia)</td>
<td>FAIN, 1978a</td>
</tr>
<tr>
<td>**</td>
<td><em>Praomys jacksoni</em></td>
<td>Africa (Angola)</td>
<td>FAIN, 1978a</td>
</tr>
<tr>
<td><em>R. daltoni</em> SCHEPERBOER et al., 1987</td>
<td><em>Myomyscus daltoni</em></td>
<td>Africa (Ivory Coast)</td>
<td>SCHEPERBOER et al., 1987</td>
</tr>
<tr>
<td><em>R. colomys</em> sp. nov.</td>
<td><em>Colomys goslingi</em></td>
<td>Africa (Zaire)</td>
<td>Present study</td>
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<tr>
<td><em>R. myomysi</em> sp. nov.</td>
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<td>Africa (Togo)</td>
<td>Present study</td>
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<td><em>R. delectori</em> sp. nov.</td>
<td><em>Praomys delectorum</em></td>
<td>Africa (Tanzania)</td>
<td>Present study</td>
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<td><em>R. dephomys</em> sp. nov.</td>
<td><em>Dephomys defua</em></td>
<td>Africa (Ivory Coast)</td>
<td>Present study</td>
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<tr>
<td><em>R. hylomyscus</em> FAIN, 1972 comb. nov.</td>
<td><em>Hylomyscus simus</em></td>
<td>Africa (Ivory Coast)</td>
<td>FAIN, 1978a</td>
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<td><em>R. zelotomys</em> FAIN, 1976 comb. nov.</td>
<td><em>Zelotomys hildegardiae</em></td>
<td>Africa (Kenya)</td>
<td>FAIN, 1976</td>
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<tr>
<td>**</td>
<td><em>Hylomyscus stella</em></td>
<td>Centro African Republic</td>
<td>FAIN and LUKOSCHUS, 1977</td>
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</tbody>
</table>
Table 6. The distinctions of the new and closely related species of the group "praomys"

<table>
<thead>
<tr>
<th>Species</th>
<th>Both sexes</th>
<th>Female</th>
<th>Male</th>
<th>Tritonymph</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Tips of setae see and II bifurcate (+), not bifurcate (−)</td>
<td>Setae sci longer than see (+); shorter (−)</td>
<td>Genital shield conical (0), rectangular (1), oval (2)</td>
<td>setae dl and d2 subequal (0), dl longer than d2 (1)</td>
</tr>
<tr>
<td>praomys</td>
<td>−</td>
<td>−</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>daltoni</td>
<td>−</td>
<td>−</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>colomys</td>
<td>+</td>
<td>+</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>myomyscil</td>
<td>−</td>
<td>−</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>delectori</td>
<td>−</td>
<td>−</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>dephonys</td>
<td>+</td>
<td>−</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

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