

TAXONOMY OF MITES OF THE SUBGENUS *RADFORDIA* EWING, 1938 (ACARI: MYOBIIDAE)

СИСТЕМАТИКА КЛЕЩЕЙ ПОДРОДА *RADFORDIA* EWING, 1938 (ACARI: MYOBIIDAE)

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Ключевые слова: Myobiidae, *Radfordia* s.str., Muridae, паразито-хозяйные отношения

ABSTRACT

Three new species of mites of the subgenus *Radfordia* Ewing, 1938 (Myobiidae: *Radfordia*) are described: *Radfordia* (*R.*) *niviventris* sp.n., *R.* (*R.*) *lukoschusi* sp.n., *R.* (*R.*) *berylmyi* sp.n. Adults of *R.* (*R.*) *davisi* (Radford, 1938) are described and depicted for the first time. The subgenus *Radfordia* s.str. is redefined. At present it includes 26 species, all being confined to rodents of the family Muridae. This subgenus is divided into four species-groups and five subgroups. A list of all the known species of *Radfordia* s.str. with the indication of the hosts is provided.

РЕЗЮМЕ

Приведено описание четырех видов клещей подрода *Radfordia* Ewing, 1938 (Myobiidae: *Radfordia*). Три из них: *Radfordia* (*R.*) *niviventris* sp.n., *R.* (*R.*) *lukoschusi* sp.n., *R.* (*R.*) *berylmyi* sp.n. — новые для науки; самцы и самки *R.* (*R.*) *davisi* (Radford, 1938), известного только по тритонимфам, описываются впервые. Приведен новый диагноз подрода *Radfordia* s.str. Этот подрод включает 26 видов, которые отнесены к 4 группам и 5 подгруппам. Дан список всех известных видов *Radfordia* s.str. и их хозяев.

INTRODUCTION

The subgenus *Radfordia* s.str. comprises 26 species and one subspecies, *R.* (*R.*) *eburneensis mabokeensis* Fain et Lukoschus, 1977, including three new species described hereafter. All the known species are confined to Muridae [Fain et Lukoschus, 1977; Fain et al., 1980; Lukoschus et al., 1981; Curfs et al., 1986; Schepetboer et al., 1987; Bochkov, 1997].

The species of *Radfordia* parasitic on Hesperomyinae (Cricetidae) and included heretofore in the subgenus *Radfordia* s.str. have recently been transferred to a new subgenus *Hesperomyobia* (Bochkov, 1996).

The present paper provides a new diagnosis for the subgenus *Radfordia* s.str. and proposes the establishing of several species groups and subgroups

within *Radfordia*. It includes the descriptions of three new species of mites of the subgenus *Radfordia* s.str. as well as the first illustrated description of *R.* (*R.*) *davisi* (Radford, 1938) formerly known by tritonymph.

All measurements are given in micrometers (μm), those referring to the holotypes are put in brackets. Setal nomenclature follows that of Fain [1973] except for some minor modifications in the designations of genital setae.

Holotypes and paratypes of new species are deposited in ZISP (Zoological Institute of Russian Academy of Sciences, St. Petersburg, Russia), paratypes are also deposited in IRSNB (Institut royal des Sciences naturelles de Belgique, Bruxelles).

DIAGNOSIS OF THE SUBGENUS *RADFORDIA* S.STR.

Genus *Radfordia* Ewing, 1938

Subgenus *Radfordia* s.str.

Type species: *Myobia ensifera* Poppe, 1896

Legs. Setal formula (solenidia included): II cx2–tr3–fe5–ge7(1)–ti6–ta7(1), III 0–3–3–6–6–6, IV 1–3–3–5–6–6, 0–3–3–5–6–6 or 2–3–3–5–6–6. Tarsi II with two subequal claws, III–IV with one claw; dorsal setae of trochanters III–IV very long and strong. Setae of the gnathosoma are piliform.

Female. Setae *vi* narrowly lanceolate or setiform, *ve*, *sci*, *sce*, *l1*, *l2*, *d1*, *d2*, all lanceolate; setae *l3* (excluding *R.* (*R.*) *acomys* Fain et Lukoschus, 1976), *l4*, *d3–d5*, *ic1–ic4*, all setiform; setae *ai*, *ae*, *g1*, *g2* are microsetae, *g3* being hook-like. Genital lobes developed. Three pairs of paragenital setae *pg* present.

Male. Setae *vi* narrowly lanceolate or setiform; *ve*, *sci*, *sce* and *l1*, are all narrowly lanceolate; *d2* long, comparatively thick, *l2* short setiform or long, thick, *l3* short setiform, *ic1–ic4* setiform. Genital shield short conical, with three pairs of genital setae (excluding *R.* (*R.*) *acomys* Fain et Lukoschus, 1976

and *R.(R.) petromyscus* Lukoschus et al., 1981. Two pairs of paragenital setae *pg* present. Ratio of distances between the bases of setae *sce-sci* and the base *sci*-edge of genital shield 1:1.

Tritonymph: Legs I symmetrical, legs II-III with 1 claw.

COMPOSITION OF THE SUBGENUS *RADFORDIA* S.STR.

This subgenus comprises 26 species and is divided into four groups. They parasitize rodents of the family Muridae.

1. **Species group «ensifera».** coxal formula 3-2-1-1, 3-2-1-0 or 3-2-1-2; the genital shield of male short conical, with three pairs of setae. The group includes 17 species and is divided into four subgroups.

Subgroup «ensifera» (11 species). Setae *ic1-ic4* shorter than *l1*.

Female: *d1, d2* and *l2* lanceolate-foliolate, ratio $d1-d2/d2-l2$ approximately 2:1.

Tritonymph: anal setae absent; 11 pairs of idiosomal dorsal setae, all membranous (except *ve*). Parasites of *Rattus* ssp. and several related genera (*Berylmys, Niviventer*) (Muridae: Murinae).

Subgroup «angolensis» (4 species). Setae *ic2-ic4* longer than or subequal to *l1*.

Female: *d1, d2, l2* lanceolate, ratio $d1-d2/d2-l2$ approximately 1:1.

Tritonymph: anal setae present, 13 pairs of idiosomal dorsal setae, all lanceolate. Parasites of *Aethomys* ssp. and *Grammomys rutilans* (Petters) (Muridae: Murinae).

Subgroup «malacomys» (2 species). Setae *ic1-ic4* shorter than *l1*.

Female: *d1, d2, l2* lanceolate, ratio $d1-d2/d2-l2$ approximately 1:1. Parasites of *Malacomys* spp. (Muridae: Murinae).

2. **Species group «affinis»** (7 species). Coxal formula 3-2-0-0 or 3-2-0-1; genital shield of male short conical, with three pairs of setae. The species group includes two subgroups:

Subgroup «affinis» (4 species). Coxal formula 3-2-0-1, setae *ic4* longer than or subequal to *l1*; tritonymph with 13 pairs of idiosomal dorsal setae (*d5, l4* are microsetae). Parasites of closely related genera *Apodemus* and *Mus* (Muridae: Murinae).

Subgroup «praomys» (3 species). Coxal formula 3-2-0-0, setae *ic1-ic4* shorter than *l1*; tritonymph with seven pairs of idiosomal dorsal setae. Parasites of closely related African murine genera *Praomys, Mastomys* and *Myomys* (Muridae: Murinae).

3. **Species group «acomys»** (1 species). Coxal formula 3-1-0-0; genital shield of male rounded, bearing 6 pairs of setae. Parasites of *Acomys cahirinus* (Desmarest). The systematic position of the host genus is questionable. The genus is usually considered to belong to the subfamily Murinae. Some biochemical studies however revealed its extreme remoteness from the other genera of the subfamily [Sarich, 1983].

4. **Species group «petromyscus»** (1 species). Coxal formula 3-2-0-0; genital shield of male is round, bearing 5 pairs of setae. Parasite of *Myomys daltoni* (Thomas) (Muridae: Petromyscinae).

REMARKS

1) Herein we elevated the subspecies *R.(R.) aethomys chrysophila* Curfs, Lukoschus et Fain, 1986 and *R.(R.) praomys trifurcata* Fain, 1973 to the species rank. They are readily discernible from the corresponding nominal species by several features: from the female of *R.(R.) praomys stat.n.* by the form of dorsal setae and from the male of *R.(R.) chrysophila stat.n.* by the form of the genital shield.

2) We consider *R.(Graphiurobia) chiropodomys* Fain, 1974 belongs to the subgenus *Radfordia* s.str. because of the similarity in the form of dorsal setae and the Coxal formula in the female. The male is unknown.

3) *R.floridens* Ewing, 1938 and *R.sicula* Willmann, 1955 have been inadequately described. These species should be retained in the genus *Radfordia* as «*incertae sedis*» species.

DESCRIPTION OF SPECIES

Radfordia (Radfordia) niviventris Bochkov et Fain, sp.n.
Figs. 1-7.

Female (Figs. 1-2). Length, including gnathosoma 405-450 (427); distance between legs II-III 225-247 (236), length/breadth ratio 1.8-1.9 (1.8).

Dorsum. Setae *vi* 38-49 (38), *sci* 85-101 (85), *sce* 45-56 (49), *l1* 42-49 (45), all narrow, lanceolate; setae *d1* 56-60 (56) in length, 13-15 (13) in width; *d2* 80-90 (80) × 15-17 (15); *l2* 83-90 (83) × 13-17 (15) (specimens from Tibet), and 67 × 17, 89 × 18, 91 × 18 respectively in specimen from China; all lanceolate-foliolate; setae *d3, d4, l3, l4* short, setiform, length 11-13 (13). Genital lobes normally developed for the subgenus; setae *g3* hook-like.

Venter. The lateral retrograde hooks of coxal field I present, formula of coxal setae 3-2-1-1. All setae setiform, *ic1* 22-24 (24), *ic4* 8-10 (8), *pg1, pg2* 11-12 (11), *d5* 10-11 (11). Distance between bases of setae *ic4-cxIV* 33-40 (40), *ic4-ic4* 29-47 (47).

Male (Figs. 3-4). Length, including gnathosoma 274, distance between legs II-III 157; length/breadth ratio 1.7.

Dorsum. Setae *vi* 15, setiform; *ve* 54-60, *sci* 18, *sce* 78-83, *l1* 69-78, *d2* 45-47, all are narrow, lanceolate; *l2, l3* 10-11 setiform; distance between bases of setae *sci-sce* 7-9, *d2-d2* 8-9, *l2-l2* 22-24, *l3-l3* 45-65. Genital shield (Fig. 4) short conical, with 3 pairs of short setae: 1 setiform, 1 membranous and 1 narrowly lanceolate; setae *pg1* 11-13, *pg2* 12-15 narrowly lanceolate; penis 94-112 in length.

Venter. As in the female; setae *ic1* 17-18, *ic4* 6-9. Chaetotaxy of legs as in the female, medial seta on tarsi I-II stout and blunt.

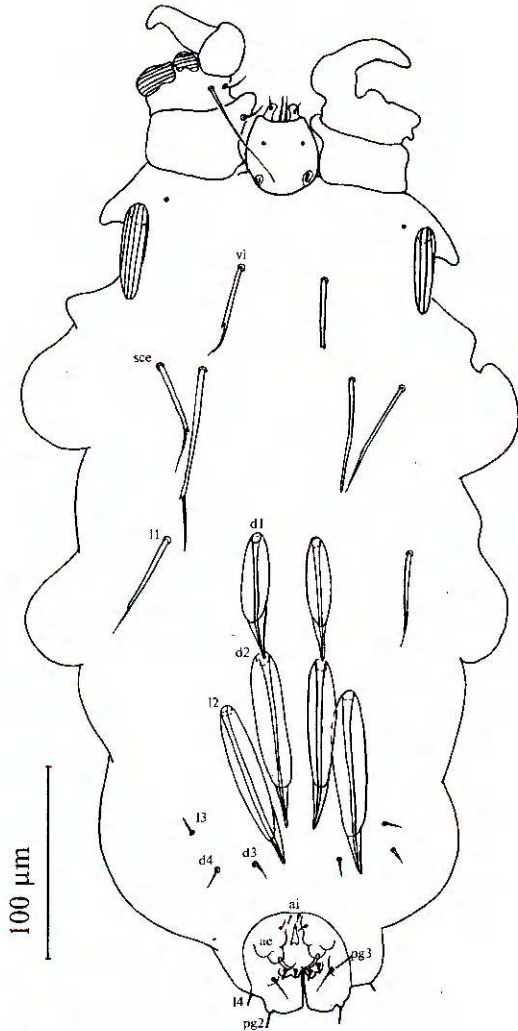


Fig.1. *Radfordia niviventris* sp.n. female, dorsal view.
Рис.1. *Radfordia niviventris* sp.n., самка дорсально.

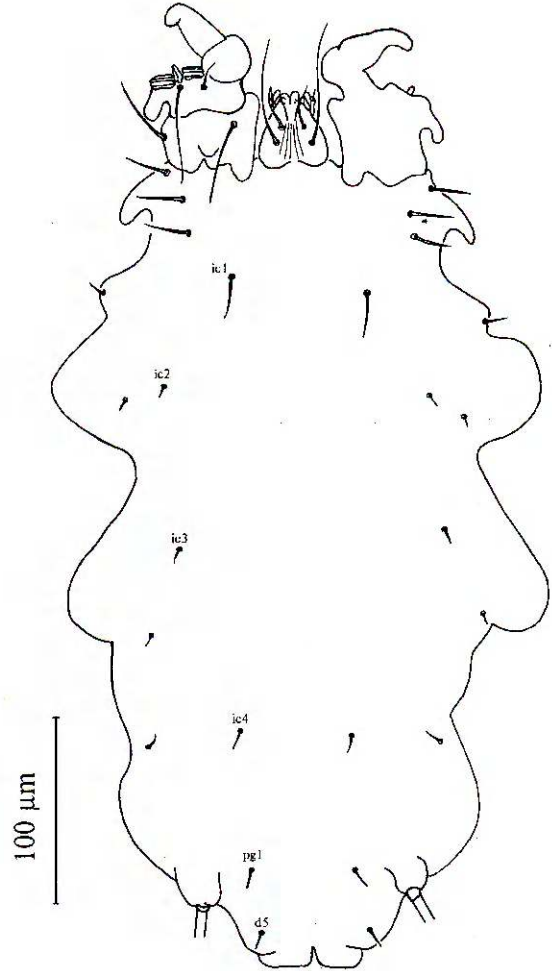


Fig.2. *Radfordia niviventris* sp.n. female, ventral view.
Рис.2. *Radfordia niviventris* sp.n., самка вентрально.

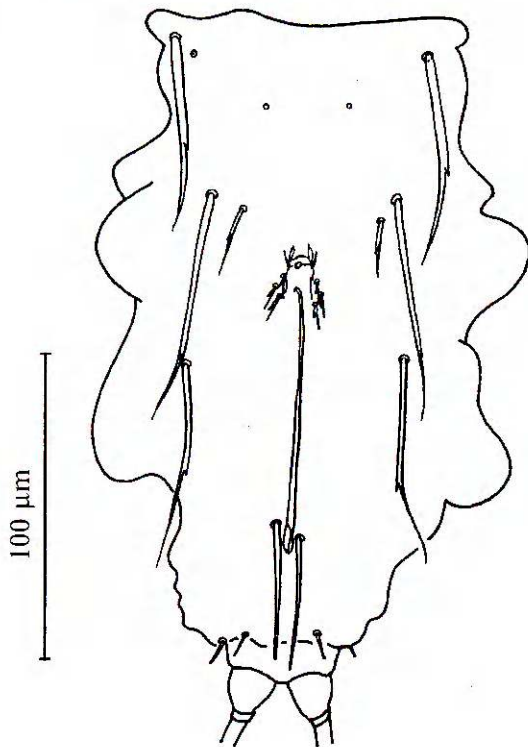


Fig.3. *Radfordia niviventris* sp.n. male, dorsal view.
Рис.3. *Radfordia niviventris* sp.n., самец дорсально.

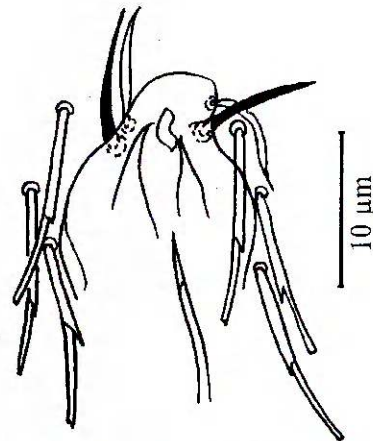


Fig.4. *Radfordia niviventris* sp.n. male genital shield.
Рис.4. *Radfordia niviventris* sp.n., генитальный щит самца.

Tritonymph (Figs. 5–7). Dorsum. Setae *vi* 33–49 (8 specimens from Tibet), 67 (specimen from China), *sci* 56–78, 90, *sce* 51–72, 78, *d1* 51–78, 63, *d2* 47–67, 69, *d3* 38–64, 56, *d4* 33–56, 63, *l1* 50–67, 69, *l2* 49–67, 69, *l3* 45–67, 60, all membranous, maximum width of the *vi* is approximately 4, *sce* 11, *l1* 20; *ve* short 11–13, narrowly lanceolate. 2 pairs of shields present, propodosomal and opisthosomal; setae *sci* and *sce* are localized on propodosomal

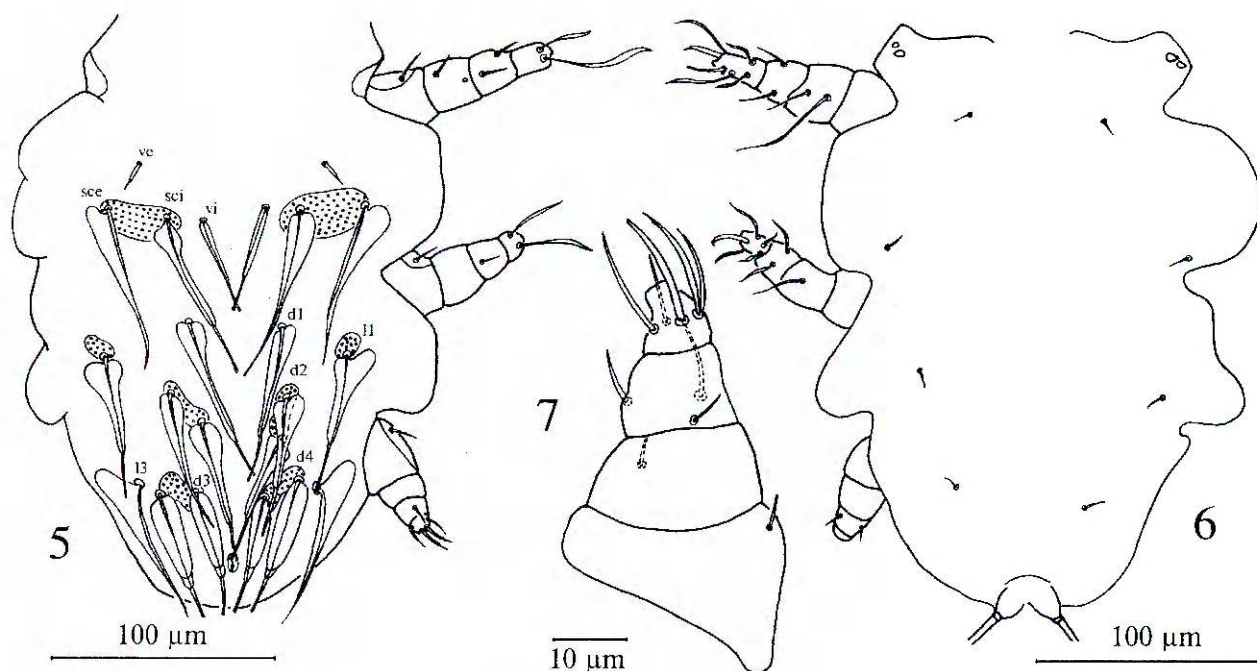


Fig.5-7. *Radfordia niviventeris* sp.n. tritonymph: 5- dorsal view, 6-ventral view, 7-leg IV, dorsal view.
Рис.5-7. *Radfordia niviventeris* sp.n., тритонимфа: 5- дорсально, 6-вентрально, 7- нога IV, дорсально.

shield, setae *d3* and *d4* on opisthosomal shield; bases of setae *l1*, *d2* and *l2* derived from small sclerotized plates.

Venter. All setae short 7-11, setiform.

Legs. Claw formula of legs II-IV 1-1-0; chaetotaxy (solenidia included): tarsi 7(1)-6-5, tibiae 4-3-3, genua-femora 3(1)-1-1, trochanters 1-1-1, coxae 1-0-0. Legs I symmetrical, coxa I with 2 setae. Setae of tarsus IV unequal, 2 setae being comparatively strong and long, and 3 setae very small.

Deutonymph. Dorsum. Setae *vi* 29-31, *sci* 56-67, *sce* 49-56, *d1* 49-60, *d2* 45-56, *d3* 33-43, *d4* 40-47, *l1* 42-56, *l2* 42-51, *l3* 49-60, all membranous; *ve* short 9-11, narrowly lanceolate.

Venter. Setae *ic1-ic4* present, short (7-10) and setiform.

Legs. Claw formula of legs II-III is 1-0; chaetotaxy (including solenidia): tarsi 7(1)-6, tibiae 4-3, genua-femora 3(1)-1, trochanters 1-1, coxae 0-0; coxa I with 1 seta.

Protonymph. Dorsum. Setae *vi* 22, 29, *sci* 45, 56, *sce* 38, 45, *d1* 42, 47, *d2* 38, 42, *d3* 27, 33, *d4* 33, 36, *l1* 33, 45, *l2* 38, 40, all membranous; *ve* short 9-11, narrow lanceolate, setae *l3* 45/69 asymmetrically membranous.

Venter. Setae *ic1-ic3* present, all short 7-9, setiform.

Legs. Claw formula of legs II-III 1-0; setal formulas (solenidia included): tarsi 7(1)-5, tibiae 4-3, genua-femora 2(1)-0, trochanters 0-0, coxae 0-0; coxa I bearing 1 seta.

Larva. Dorsum. Setae *ve* 9 (specimen from China), 6 (specimen from Tibet), *vi* 9, 6, *sci* 18, 22, *sce* 6, 9, *d1* 22, 24, *d2* 22, 27, *d3* 15, 13, *l1* 18, 13, *l2* 15, 22, *l4* 22, 18, all narrow lanceolate.

Venter. Only short setiform setae *ic1* present.

Legs. Claw formula of legs II-III 1-0; setal formula (solenidia included): tarsi 7(1)-5, tibiae 4-3, genua-femora 2(1)-0, trochanters 0-0, coxae 0-0; coxa I bearing no setae.

DIFFERENTIAL DIAGNOSIS

R.(R.) niviventeris sp.n. is closely related to *R.(R.) jalorensis* Fain et al., 1980 ex *Rattus tiomanicus jalorensis* (Miller) from Malaysia [Fain et al., 1980], and is distinguishable from the latter by comparatively short setae *d1*, *d2*, *l1*, *l2* in females (56, 80, 45, 80 respectively, compared to 90, 100, 75, 105 of *R.(R.) jalorensis* holotype). In the male the setae of genital shield are as follows: 1 setiform, 1 membranous and 1 narrowly lanceolate (in *R.(R.) jalorensis* all these setae setiform). The new species differs from *R.(R.) hornerae* Domrow, 1963 by the ratio length *d1/d2* and the ratio length/width in setae *l2* in female (1.4, 5.2 respectively, for approximately 1 and 3 in *R.(R.) hornerae*).

It differs from *R.(R.) australiana* Fain et Lukoschus, 1979 by the presence of one seta on coxa IV in both sexes and of short setae *l1* 45 in female (in *R.(R.) australiana* the coxa IV bears 2 setae, and setae *l1* 80 in length). The new species is distinguishable from *R.(R.) expansa* Jameson et Whitaker, 1975 by *sci/sce* lengths in female and *ic1/ic4* in both sexes (1.7, 3.0 respectively, for approximately 1.2 and 1.2 in *R.(R.) expansa*). It also differs from *R.(R.) ensifera* (Poppe, 1896) and *R.(R.) davisi* (Radford, 1938) by shorter setae *ic4* in both sexes (8, for 20-35 in 30 specimens of *R.(R.) ensifera* ex *Rattus norvegicus* from Pskov).

Type material. Holotype female (T-My-27), paratypes: 2 males in tritonymphal skins, 3 females, 6 tritonymphs, 2 deutonymphs, 2 protonymphs and one larva

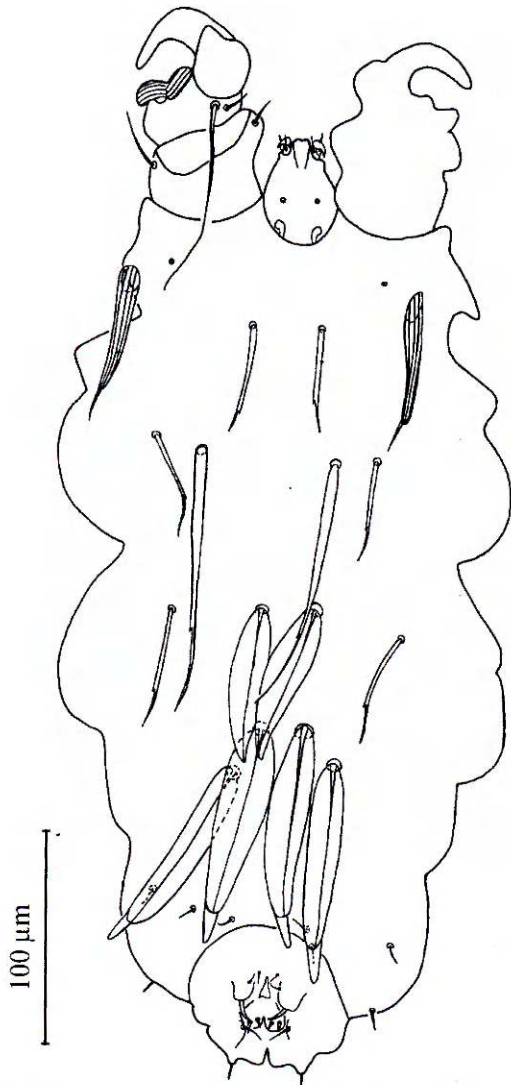


Fig.8. *Radfordia lukoschusi* sp.n. female, dorsal view.
Рис.8. *Radfordia lukoschusi* sp.n., самка дорсально.

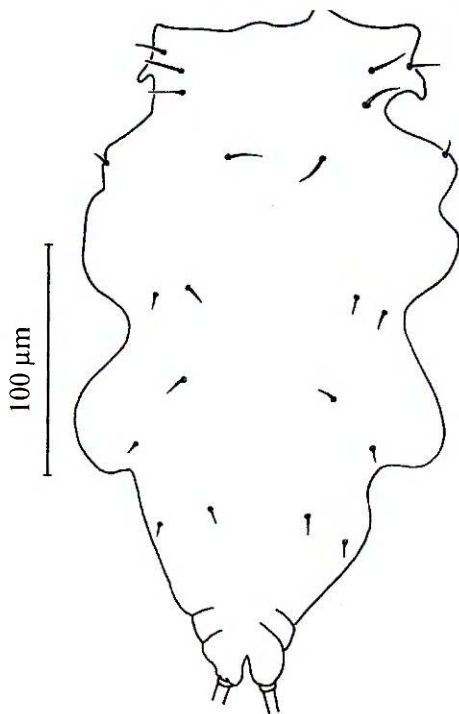


Fig.10. *Radfordia lukoschusi* sp.n. male, ventral view.
Рис.10. *Radfordia lukoschusi* sp.n., самец вентрально.

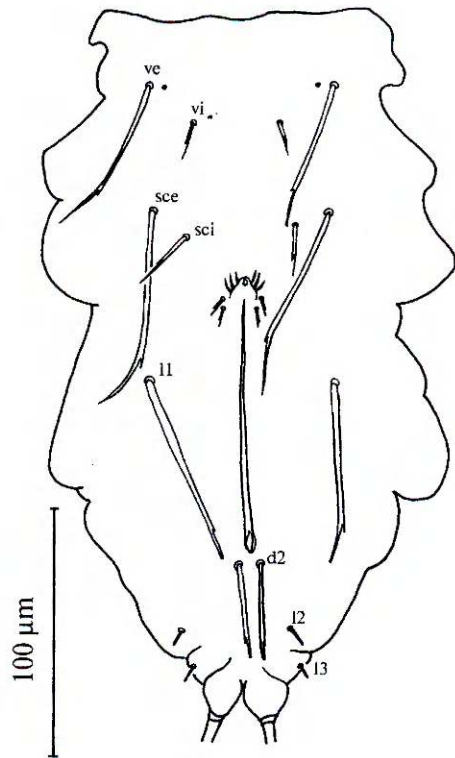


Fig.9. *Radfordia lukoschusi* sp.n. male, dorsal view.
Рис.9. *Radfordia lukoschusi* sp.n., самец дорсально.

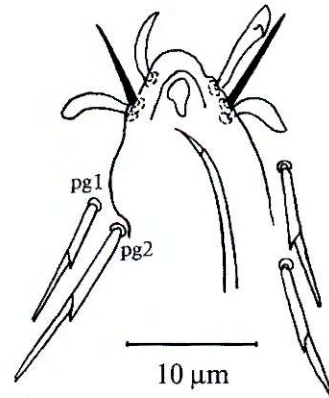


Fig.11. *Radfordia lukoschusi* sp.n. male genital shield.
Рис.11. *Radfordia lukoschusi* sp.n., генитальный щит самца.

ex *Niviventer* sp.1 (ZISP № 82767) from East Tibet, the basin of Yangtze river, district of Nru-chu, the Sogon-Gomba heathen temple, 23. 07. 1900, P.Kozlov coll. The holotype and paratypes are deposited in ZISP. Female, male, 2 tritonymphs, deutonymph and 2 protonymph paratypes are deposited in IRSNB.

Additional material. 1 female, 1 male in skin of tritonymph, tritonymph and larva ex *Niviventer* sp.2 (ZISP №8276) from China, Szechwan, Lu-ngan'-Fu, canon Ho Uzu-Gou, 1893, M.Berezovskij coll. The female is in ZISP, tritonymph and larva — in IRSNB.

Radfordia (Radfordia) lukoschusi Bochkov et Fain, sp.n.
Figs. 8–13.

Female (Fig. 8). Length, including gnathosoma 326–382, the distance between legs II–III 180–191, the length/breadth ratio 1.8–2.

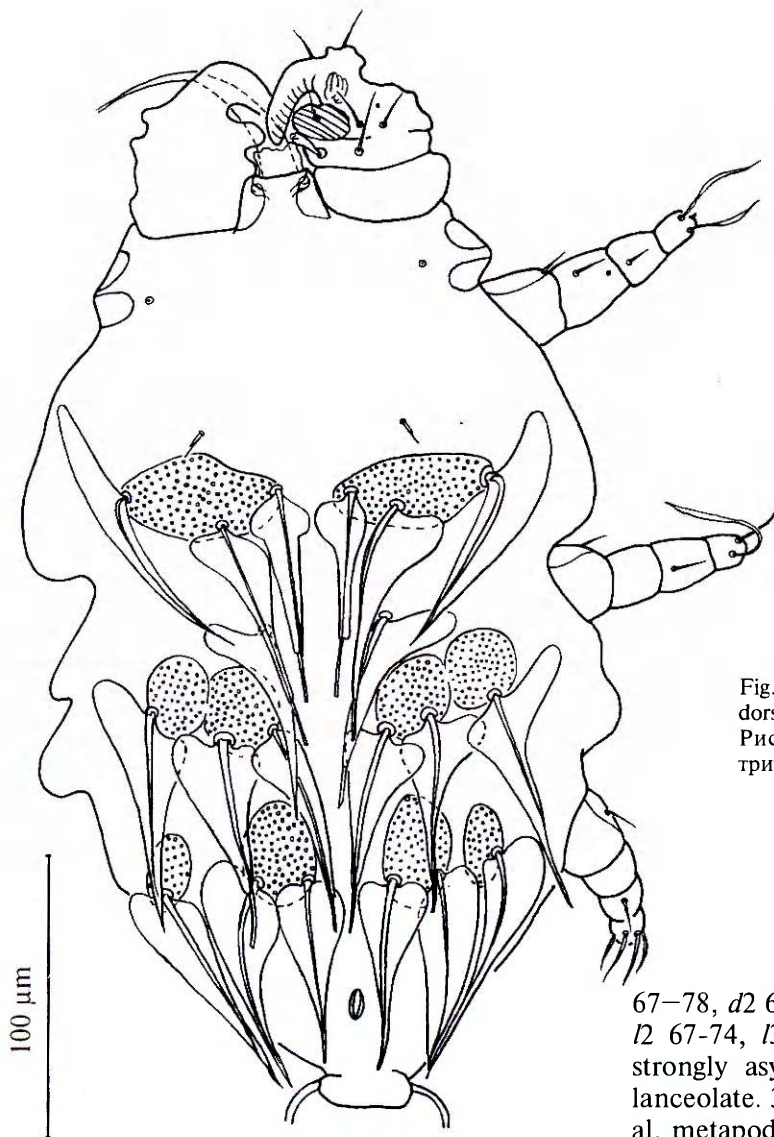


Fig.13. *Radfordia lukoschusi* sp.n. tritonymph, dorsal view.
Рис.13. *Radfordia lukoschusi* sp.n., тритонимфа дорсально.

Dorsum. Setae *vi* 45, *sci* 96–101, *sce* 45–47, *l1* 42–45, all narrowly lanceolate; setae *d1* 60–67 in length, 20–22 in width, *d2*, *l2* 90–94 × 18–20, all lanceolate-foliolate; setae *d3*, *d4*, *l3*, *l4* short setiform, 11–13 in length. Genital lobes normally developed for the subgenus; setae *g3* hook-like.

Venter. The lateral retrograde hooks of the coxal field I present, formula of the coxal setae 3–2–1–1. All setae setiform, *ic1* 22, *ic4* 8, *pg1*, *pg2* 11–12, *d5* 10–11.

Male (Figs. 9–11). Length, including gnathosoma 281 (281), distance between legs II–III 157 (168), the length/breadth ratio 1.8 (1.7).

Dorsum. Setae *vi* (15), setiform; *ve* 51 (54), *sci* 20 (20), *sce* 69 (72), *l1* 67 (74), *d2* 47 (34), all narrow lanceolate; *l2*, *l3* 10–11 setiform. Genital shield short conical, bearing 3 pairs of short setae: 1 setiform and 2 membranous; setae *pg1* 11–13, *pg2* 12–15 narrow lanceolate; penis 94–112.

Venter. As in the female; setae *ic1* 16–17, *ic4* 7–9.

Tritonymph (Figs. 12, 13). Dorsum. Setae *vi* 60–74 × 24–28, *sci* 63–94 × 31–35, *sce* 56–74, *d1*

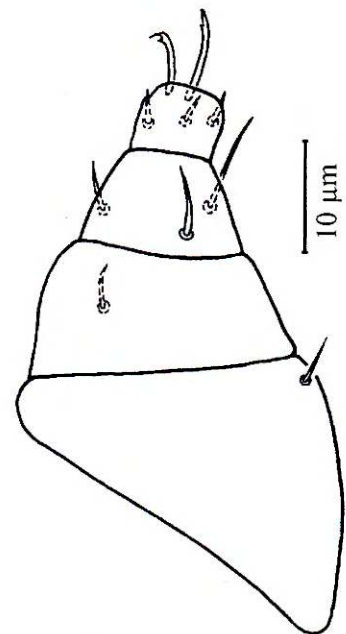


Fig.12. *Radfordia lukoschusi* sp.n. tritonymph leg IV, dorsal view.

Рис.12. *Radfordia lukoschusi* sp.n., нога IV тритонимфы дорсально.

67–78, *d2* 65–90, *d3* 47–76, *d4* 56–67, *l1* 56–74, *l2* 67–74, *l3* 56–90, all widely membranous and strongly asymmetrical; *ve* short 11–13, narrow lanceolate. 3 pairs of shields present: propodosomal, metapodosomal and hysterosomal; *sci*, *sce* derived from propodosomal shield, *d2*, *l2* from metapodosomal shield and *d3*, *d4* from hysterosomal shield; the bases of setae *l1* and *l3* derived from large sclerotized plates.

Venter. All setae short 7–9, setiform. Setae of tarsus IV of different morphology: 4 setae comparatively thick and long, and 1 seta thin, setiform.

Deutonymph. Dorsum. Setae *vi* 56, *sci* 74, *sce* 60, *d1* 67, *d2* 67, *d3* 45, *d4* 49, *l1* 56, *l2* 58, *l3* 56, all membranous; *ve* short 9–11, narrow lanceolate.

Venter. The setae *ic1*–*ic4* present, all short 8, setiform. Claw formula of legs II–III: 1–0.

DIFFERENTIAL DIAGNOSIS

This species is very closely related to *R.(R.) niviventris* sp.n. It differs from the latter by the shape of the genital shield setae in males and the foliaceous, strongly asymmetrical shape of the dorsal setae in tritonymphs. In *R.(R.) lukoschusi* sp.n. the male genital shield bears 1 pair of setiform setae and 2 pairs of membranous setae (Fig. 11). In *R.(R.) niviventris* sp.n. 1 pair of setiform setae, 1 pair of membranous and 1 pair of narrow lanceolate setae present. In the tritonymph of *R.(R.) lukoschusi* sp.n. the maximum widths of setae *vi* and *sce* are

approximately 28 and 35, *ll* 47 (in *R.(R.) niviventeris* 4, 11, 20, respectively).

Type material. Holotype male (T-My-28), paratypes: 5 tritonymphs and one deutonymph ex *Niviventer flaviscens* from N. Vietnam, village Huan-Tju, 01. 07. 1986, M.Mejer coll. The holotype and paratypes are deposited in ZISP; 2 tritonymphs in IRSNB.

Additional material. One male and 3 females ex *Niviventer niviventer* (Hodgson) from N. Vietnam, 1993 (Kon Van Shung coll.); 2 females are in ZISP, one male and one female in IRSNB.

ETYMOLOGY

The species is named after the late prominent acarologist Prof. Dr. F.S.Lukoschus (Holland).

Radfordia (Radfordia) berylmysi Bochkov et Fain,
sp.n.

Figs. 14–15.

Female. Length, including gnathosoma 360, distance between legs II–III 223, the length/breadth ratio 1.6.

Dorsum. Setae *vi* 45 (47), *sci* 96 (99), *sce* 67 (67), *ll* 45 (46), all narrow lanceolate; setae *d1* 60 (60) in length, 9 (9) in width, *d2* 83 (78), *l2* 78 (72) x (10), all lanceolate-foliolate; setae *d3*, *d4*, *l3*, *l4* short, setiform, 11–13 in length. Genital lobes normally developed for the subgenus; setae *g3* hook-like.

Venter. Lateral retrograde hooks of the coxal field I present, formula of coxal setae 3–2–1–1. All setae setiform, *ic1* 22 (23), *ic2*, *ic3* 12 (11), *pg1* (11), *pg2* (15), *d5* (11); *ic4* 20 (18) slightly thickened.

DIFFERENTIAL DIAGNOSIS

The new species is mostly close to *R.(R.) expansa* Jameson et Whitaker, 1975. It differs from the latter by the length *sci/sce* ratio which is 1.4 (compare to 1.2 in *R.(R.) expansa*), by the presence of setae *cx IV* (absent in *R.(R.) expansa*).

Type material. Holotype female (T-My-29) and paratype female ex *Berylmys bermorei* (Blyth) (ZISP №79063) from N. Vietnam, 1963, Kon Van Shung coll. The holotype is deposited in ZISP, one paratype in IRSNB.

Radfordia (Radfordia) davisi (Radford, 1938)

Myobia davisi Radford, 1938 : 433

Radfordia davisi Radford, 1951: 118; Fain, 1975: 470; Fain, 1978: 148–149 (Figs. 178–179).

The adults of *R.(R.) davisi* have not been described. This species is closely related to *R.(R.) ensifera*. Only tritonymphs can be distinguished by the length of the setae *vi* (65–70, compared to 29–40 in *R.(R.) ensifera*), the strong asymmetrical, foliaceous setae of dorsal surface of idiosoma and the presence of a pair of well-developed dorsal shields on propodosoma.

Female. Length, including gnathosoma 337–393 (in specimens from New Zealand), 360 (specimen from China), the distance between legs II–III 191–202, 213, the length/breadth ratio 1.8–1.9, 1.7. Lengths of setae *vi* 45–51, 49, *sci* 87–99, 90, *sce* 69–76, 78, *ll* 45–51, 47, *ic4* 22–33, 27, *pg1* 13–15, 13.

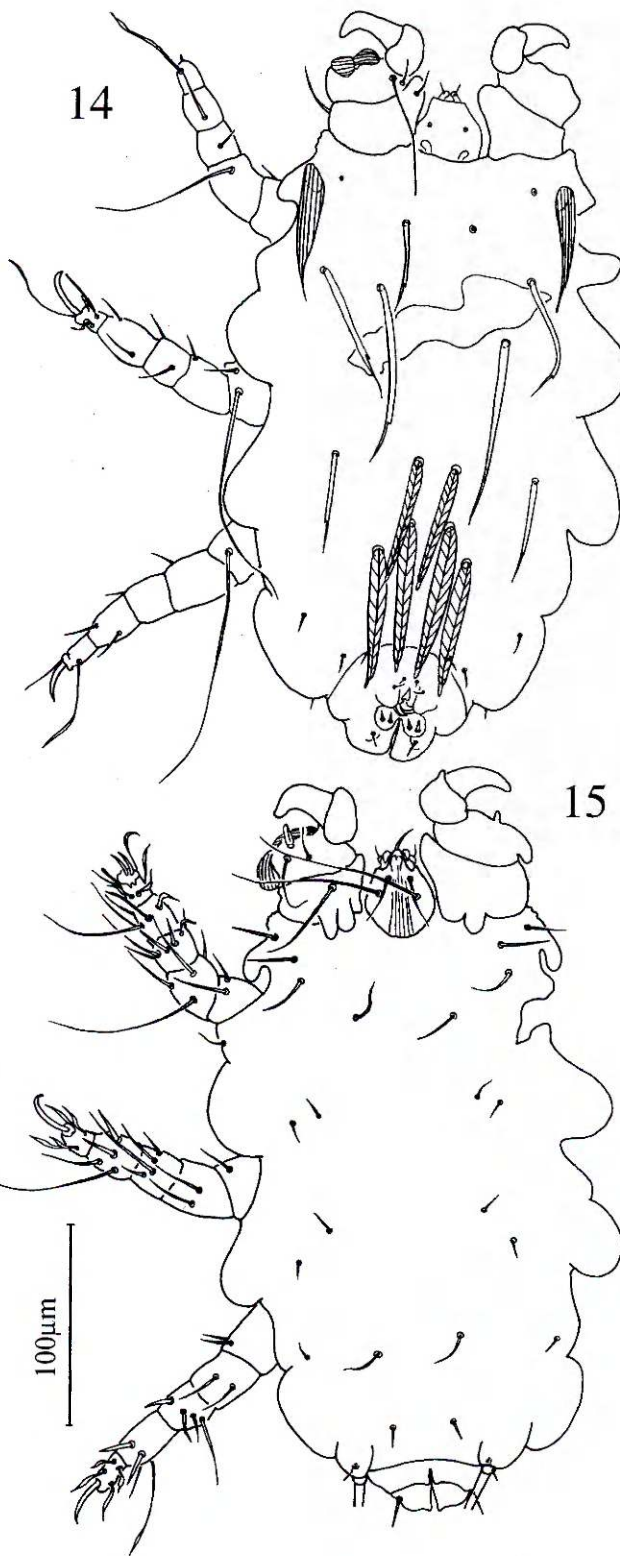


Fig.14–15. *Radfordia berylmysi* sp.n. female: 14– dorsal view, 15–ventral view.

Рис.14–15. *Radfordia berylmysi* sp.n., самка: 14–дорсально, 15–вентрально.

Male. Length, including gnathosoma 281–315 (in specimens from New Zealand), 292 (specimen from China), the distance between legs II–III 168–180, 180, length/breadth ratio 1.6–1.8. Lengths of setae: *vi* 13–15, 15, *sci* 22–24, 24, *sce* 83–101, 110, *ll* 85–92, 103, *ic4* 22–23, 22.

Material. 8 females, 3 males, 5 tritonymphs and 1 deutonymph ex *Rattus exulans* (Peale) (ZISP №8163)

from New Zealand, South Island, Marlborough, 1902, H.Suter coll. 1 female and 1 tritonymph ex *Rattus exulans* (ZISP № 59) from S. Burma, 1895, L.Fea coll. Female, male and tritonymph ex *Rattus* sp. from China, Huj-Sjan', 1894, M.Berezovskij coll. The female, male and tritonymph (specimens from New Zealand) are deposited in IRSNB, all the others in ZISP.

DISCUSSION

Subgenera *Hylomyscobia*, *Radfordia* s.str., *Rattimyobia*, *Syconycterobia*, *Hystricomysobia* and *Lophurmyobia* form a homogenous complex within the genus *Radfordia*. Members of this complex are very similar by the structure of the legs and the idiosomal chaetotaxy and by the shape of the genital shield in males.

Two of these subgenera (*Lophurmyobia* and *Hystricomysobia*) are known only by females. That makes the inclusion of these subgenera into the complex provisional. All representatives of these subgenera parasitize rodents of the family Muridae.

The analysis of relationships between the parasitic mites and their murine hosts reveals, once again, the high degree of specificity of the parasites. That also leads to a better understanding of the phylogeny and the geographic distribution of the hosts [Fain, 1975, 1977, 1994].

The mites of the subgenus *Radfordia* s.str. parasitize Murinae and Petromyscinae (Muridae). As a rule, mites of some of these groups and subgroups are associated with host species belonging to several definitely close related genera (Table). For instance, the mites of the subgroup «ensifera» mainly parasitize species of *Rattus* and two closely related genera, *Niviventer* and *Berylmys*. The center of diversity of these genera is known to be in Indochina. It worths noting that the mites of the subgroup «ensifera» are morphologically closely related to the species of the subgenus *Syconycterobia*, which parasitize the endemic Australian rats of the genera *Pseudomys*, *Notomys*, *Mastacomys*, *Conilurus*, *Zyzyomys*, *Melomys*, *Mesembriomys*, *Hydro-*

mys (Murinae) [Fain et Lukoschus, 1979; Domrow, 1991]. It is suggested that the common ancestors of these Australian rats, originated in Malaysia, only lately invaded Australia.

One can surmise that this long geographic isolation has resulted in the evolving of new genera. The mites living on these Australian rats have followed the evolution of their respective hosts (coevolution) and modified their structures which resulted in speciation.

It is interesting to note that among the species-group «ensifera» (subgenus *Radfordia* s.str.) the species *Radfordia* (*R.*) *pogonomys* Fain et Lukoschus, 1976 parasitize *Pogonomys loriae* Thomas, a rat endemic in New Guinea. This observation confirms the hypothesis of murine immigration to Australia.

The mites of the subgenus *Rattimyobia* are specific for the Indochinese genus *Maxomys* (Murinae). The subgenera *Hylomyscobia*, *Hystricomysobia* and *Lophurmyobia* are associated with African murines. The mites of the first subgenus parasitize rodents of the genera *Hylomyscus*, *Zelotomus* and *Grammomys*. The only representative of the subgenus *Lophurmyobia* (*R.*(*L.*) *brevipilis* Fain, 1972) parasitizes *Lophuromys* spp. in Central Africa.

Subgenus *Hystricomysobia* is represented by three species, parasitic on several species of murines in Central Africa, Thailand and Perek. The African host belongs to the monotypic genus *Stochomys* (*S.longicaudatus* Tullberg).

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Table.

List of species of mites of the subgenus *Radfordia* s.str. (Myobiidae). (The type host is shown by an asterisk).

Species	Host	Distribution
1. Species group "ensifera"		
Subgroup "ensifera"		
<i>ensifera</i> (Poppe, 1896)	* <i>Rattus norvegicus</i> (Berkenhout)	cosmopolitan
	<i>Rattus rattus</i> (L.)	cosmopolitan
	<i>Rattus turkestanicus</i> (Satunin)	Turkmenia
	<i>Rattus tanezumi</i> Temminck	Malaysia
<i>davisi</i> (Radford, 1938)	* <i>Rattus norvegicus</i>	Africa(SierraLione)
	<i>Rattus exulans</i> (Peale)	Burma, New Zealand, China
<i>jalorensis</i> Fain, Lukoschus et Nadchatram, 1930	* <i>Rattus tiomanicus</i> (Miller)	Malaysia

<i>hornerae</i> (Domrow, 1963)	* <i>Rattus fuscipes</i> (Waterhouse)	Australia
<i>expansa</i> Jameson et Whitaker, 1975	* <i>Rattus losea</i> (Swinhoe)	Taiwan
<i>australiana</i> Fain et Lukoschus, 1979	* <i>Rattus tunneyi</i> (Thomas)	Australia
<i>niviventeris</i> Bochkov et Fain, sp.n.	* <i>Niviventer</i> sp.	Tibet, S.China
<i>lukoschusi</i> Bochkov et Fain, sp.n.	* <i>Niviventer flaviscens</i>	N.Vietnam
	<i>Niviventer niviventer</i> (Hodgson)	N.Vietnam
<i>berylmysi</i> Bochkov et Fain, sp.n.	* <i>Berylmys berdmorei</i> (Blyth)	Vietnam
<i>pogonomys</i> Fain et Lukoschus, 1976	* <i>Pogonomys loriae</i> Thomas	New Guinea
<i>chiropodomys</i> Fain, 1974	* <i>Chiropodomys gliroides</i> (Blyth)	Malaysia
Subgroup " <i>angolensis</i> "		
<i>angolensis</i> Fain, 1974	* <i>Aethomys nyicae</i> (Thomas)	Africa(Angola)
<i>chrysophila</i> Curfs, Lukoschus et Fain, 1986	* <i>Aethomys chrysophilus</i> (de Winton)	Africa(Namibia)
<i>aethomys</i> Curfs, Lukoschus et Fain, 1986	* <i>Aethomys namaquensis</i> (Smith)	S.Africa
<i>thamnomys</i> Fain, 1972	* <i>Grammomys rutilans</i> (Petters)	Africa(Angola)
Subgroup " <i>malacomys</i> "		
<i>eburneensis</i> Fain, 1972	* <i>Malacomys</i> sp.	Africa(Ivory Coast)
<i>malacomys</i> Fain, 1972	* <i>Malacomys</i> sp.	Africa(Zaire)
	<i>Malacomys longipes</i> Milne-Edwards	Africa(Zaire, Angola)
2.Species group " <i>affinis</i> "		
Subgroup " <i>affinis</i> "		
<i>affinis</i> (Poppe, 1896)	* <i>Mus musculus</i> L.	cosmopolitan
	<i>Mus booduga</i> (Gray)	India
	<i>Apodemus sylvaticus</i> (L.)	Eurasia
	<i>Apodemus flavicollis</i> (Melchior)	Eurasia
<i>lancearia</i> (Poppe, 1909)	* <i>Apodemus sylvaticus</i> (L.), <i>A.agrarius</i> (Pallas)	Eurasia
<i>mironovi</i> Bochkov, 1997	* <i>Apodemus flavicollis</i> (Melchior)	Eurasia
<i>elegantula</i> Zumpt et Coffee, 1971	* <i>Mus minutoides</i> Smith	S.Africa
	<i>Mus kasaiicus</i> (Cabrera)	Africa(Zaire)
	<i>Mus musculooides</i> Smith	S.Africa

Subgroup «praomys»

<i>praomys</i> Zumpt et Coffee, 1971	* <i>Mastomys natalensis</i> (Smith)	Africa(S. Africa, Angola)
	<i>Praomys morio</i> (Trouessart, 1881)	Africa(Liberia)
	<i>Praomys jacksoni</i> (de Winton)	Africa(Angola)
<i>trifurcata</i> Fain, 1973 stat.n.	* <i>Mastomys natalensis</i>	Africa(Ivory Coast)
<i>daltoni</i> Schepherboer, Lukoschus et Fain, 1987	* <i>Myomys daltoni</i> (Thomas)	Africa(Ivory Coast)

3. Species group «acomys»

<i>acomys</i> Fain et Lukoschus, 1976	* <i>Acomys cahirinus</i> (Desmarest)	Zoo of Hamburg
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4. Species group
«petromyscus»

<i>petromyscus</i> Lukoschus, Curfs et Fain, 1981	* <i>Petromyscus collinus</i> (Thomas et Hinton)	Africa(Namibia)
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