Notes on mites of the family Myobiidae (Acari: Prostigmata) parasitising rodents (Mammalia: Rodentia) in Iran

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Abstract. Six mite species of the family Myobiidae, *Radfordia* (*Austromyobia*) *persica* sp. n., *Radfordia* (*Austromyobia*) *merioni* Bochkov, Dubinina et Chirov, 1990, *Radfordia* (*Radfordia*) *acomys* Fain et Lukoschus, 1977, *Radfordia* (*Radfordia*) *affinis* (Poppe, 1896), *Radfordia* (*Graphiurobia*) *dyromys* Fain et Lukoschus, 1973, and *Myobia* (*Myobia*) *murismusculi* (Schrunk, 1781) were found in Iran on the rodents *Gerbillus cheesmani* Thomas, *Meriones libycus* Lichtenstein, *Acomys cahirinus* (Desmarest), *Mus musculus* L., *Dryomys nitedula* (Pallas), and *Mus musculus*, respectively. *R. (A.) persica* is described as a new species from the female, male and tritonymph. The other five myobiid species are new to Iran.

The mites of the family Myobiidae Mégnin, 1778 (Acari: Prostigmata) are permanent monoxenic or oligoxenic ectoparasites of small marsupial and placental mammals (Mammalia) (Dusbábek 1969, Fain 1994). The mites of the nominal subfamily Myobiinae are associated exclusively with rodents (Mammalia: Rodentia) (Bochkov 1997a). Despite of the fact that more than 100 species belonging to six genera have been included to this subfamily, the myobiid fauna is unevenly known and in some regions has not been investigated at all. One of these regions is Iran, the myobiine mites of rodents from Iran being those especially unexplored. Only one myobiid species, *Radfordia* (*Microtimyobia*) *cricketulus* Fain, 1973, has so far been known in this country from the grey hamster *Cricetulus migratorius* (Pallas) (Cricetidae) (Fain 1973). The aim of the present paper is to partly fill in the gap in our knowledge of this mite group. The description of *Radfordia* (*Austromyobia*) *persica* sp. n., and of the tritonymph of *Radfordia* (*Radfordia*) *acomys* Fain et Lukoschus, 1977 as well as a list of the myobiid species found in Iran by us are given below.

MATERIALS AND METHODS

A total of 79 ethanol-preserved rodent specimens (14 species belonging to four rodent families) collected in Iran in 1997-1998 were examined for mites. Six myobiid species belonging to two genera were found on *Gerbillus cheesmani* Thomas, *Meriones libycus* Lichtenstein (both Gerbillidae), *Acomys cahirinus* (Desmarest), *Mus musculus* L., (both Muridae) and *Dryomys nitedula* (Pallas) (Gliridae).

Description of setal nomenclature follows Fain's (1973) system except for minor modifications in the nomenclature of the genital setae (Bochkov 1997a). Three anterior pairs of

genital setae (*gl-g3*) are named herein as paragenitals (*pg*). All measurements are given in micrometres with ranges in parentheses.

RESULTS

Family: Myobiidae Mégnin, 1778

Genus: *Radfordia* Ewing, 1938

Subgenus: *Austromyobia* Lawrence, 1954

***Radfordia* (*Austromyobia*) *persica* Bochkov, sp. n.**
Figs. 1, 2A-C

Description: The species bears all characters of the subgenus *Austromyobia* (species group *forcipifer*): setae of gnathosoma *ra* hair-like. Setal formula of coxa, trochanter, femur, genu, tibia and tarsus of legs II-IV in adults (excluding solenidions): II 3-3-5-7-6-7, III 1-3-3-6-6-6, IV 1-3-3-5-6-6; coxal setae hair-like; dorsal seta of trochanters III-IV lash-like, longer than legs; setae *vi* short, hair-like; setae *l3* of female lanceolate; genital shield of male round, with 8 pairs of setae (including setae *d1*): one pair of setae finger-like, 7 pairs of setae narrow lanceolate or hair-like; dorsal surface of tritonymph with 13 pairs of setae, anal setae absent.

Female (holotype, Fig. 1A-B). Body length (gnathosoma included), 348 (337-382 in 4 paratypes), width between legs II and III 270 (236-275). Setae *vi* 11 (11-18) long; *ve* 81 (81-87) × approx. 11 (length × width); *sci* 101 (101-103) × approx. 9; *sce* 78 (78-81) × approx. 11; *d1* 67 (65-68) and *d2* 63 (63-67) long, width approx. 4; *d3*, *d4* and *d5* 22 (22-27), 45 (40-47) and 12 (11-14) long respectively, all hair-like; *l1* 67 (67-72) × approx. 4; *l2* 74 (69-74) × approx. 4; *l3* 50 (50-69) long; *l4* 42 (33-42) long, slightly thicker; *ic1*, *ic2*, *ic3* and *ic4* 25 (24-31), 69 (67-78), 78 (69-85) and 11 (9-11) long

Fig. 1. *Radfordia (Austromyobia) persica* sp. n. **A** – holotype female, dorsal view; **B** – same, ventral view; **C** – male, dorsal view; **D** – same, ventral view; **E** – genital shield of male.

respectively; *pg1* and *pg2* 23 (25-33) and 40 (38-47) long respectively. Distance between bases of setae *d1*-

d2 subequal to distance between bases of setae *d2*-*l2*. Genu III bears 6 setae.

Male (Fig. 1C-E). Body length (gnathosoma included) 258-292 (in 3 paratypes), width between legs II and III 191-202. Length of setae: *vi* 11-12; *ve* 56-60, *sce* 67-69, *ll* 58-72, all narrow lanceolate; *sci* 33-36, *d2* 27-36, *l2* 29-36, *l3* 22-23, *ic1* 15-22, *ic2* 51-67, *ic3* 56-72, *ic4* 8-10, all hair-like. Aedeagus 157-168 long; genital shield as in Fig. 1E. Chaetotaxy of legs as in female.

Tritonymph (Fig. 2A-C). In this subgenus there are no distinctive differences between female and male tritonymphs (Bochkov 1997c). Body length (gnathosoma included) 281-393 (in 5 paratypes), width 258-281. Setae *vi*, *ve*, *sci*, *sce*, *d1* and *ll* are 31-42, 49-56, 72-81, 90-101, 76-81 and 103-112 long respectively, all 5-6 width; *d2* 47-49 × 4; *d3* 18-22, *d4* 69-78, *l2* 24-33, *l3* 18-22, *l4* 40-58, all narrow lanceolate, 2-3 width; *d5* very short, 5-6; *ic1* 15-22, *ic2* 38-45, *ic3*, *ic4* 4-8, all hair-like. Tarsus of leg IV as in Fig. 2C; with 6 relatively short setae; claw absent.

Type species: *Gerbillus cheesmani* Thomas, 1919 (Gerbillidae), the Cheesman's gerbil.

Type locality: Iran, Yazd Province, 30 km north-west of Hojat-Abad.

Date of collection: 27. 04. 1998; F. Golenichshev and V. Malikov coll.

Type material: Holotype female, paratype 4 females, 3 males, 10 tritonymphs, 6 deutonymphs and 1 protonymph.

Deposition of material: Holotype female (coll. No. T-My-31), 3 paratype males (No. P-My-31, 2, 4-5), 8 tritonymphs (No. P-My-31, 1, 3, 6-11), 6 deutonymphs (No. P-My-31, 13-18) and 1 protonymph (No. P-My-31, 12) in the Zoological Institute of the Russian Academy of Sciences, Saint-Petersburg; 1 paratype female and 1 tritonymph (coll. No. 1970) in the Institute of Parasitology, Academy of Sciences of the Czech Republic, České Budějovice; 1 paratype female and 1 tritonymph in Institute Royal des Sciences Naturelles of Belgique, Bruxelles.

Etymology: The species is named after the geographical region in which it was collected.

Differential diagnosis. The adults of *R. (A.) persica* bear 6 setae on genu III. This is the characteristic feature of the species group *forcipifer* (6 species) (Bochkov 1997c), but only in three species within this group the setae *ic4* are short as in *R. (A.) persica*.

The new species is most closely related to *Radfordia (A.) gerbillus* Fain et Lukoschus, 1977 from the lesser Egyptian gerbil *Gerbillus gerbillus* (Olivier), the type host, from Egypt, and from the Baluchistan gerbil *Gerbillus nanus* Blanford from Tunis (Fain and Lukoschus 1977). The male of *R. (A.) gerbillus* is unknown; the female has been described briefly but not figured. However, the tritonymph has been described and figured in detail.

The tritonymph of the new species differs from that of the latter species by length of setae *d4*, *l4*, and *ic3*, which are 69-78, 40-58 and 4-8 respectively; the length

ratio of setae *d1-d2* is about 1.5 : 1. According to the original description, length of setae *d4* and *l4* in *R. (A.) gerbillus* tritonymph is 10-25 and of *ic3* 45; the length ratio of setae *d1-d2* is about 1.1 : 1 (Fain and Lukoschus 1977).

Furthermore, the new species is close to *Radfordia (A.) aegyptica* Radford, 1951 from North African gerbils of the genera *Gerbillus* and *Dipodillus* (Radford 1951, Bochkov 1997d). The male of *Radfordia aegyptica* is almost indistinguishable from, but the female is well differentiated by the following characters from the new species. In the female of *R. (A.) persica* setae *d4*, *d5* and *l4* are 40-47, 11-14 and 33-42 long respectively; setae *d4* are about 1-1.2 times longer than setae *l4*; setae *l4* are slightly thicker; in the deutonymph setae *ic3* are short as *ic4*. In female *R. (A.) aegyptica* setae *d4*, *d5* and *l4* are 47-51, 23-25 and 23-26 long respectively; setae *d4* are about twice as long as setae *l4*; setae *l4* are thin, hair-like; in the deutonymph setae *ic3* are as long as *ic2*.

The female of *R. (A.) persica* is well distinguished from the female of *R. (A.) forcipifer* Lawrence, 1954 from South African gerbils of the genus *Tatera* (Lawrence 1951, Fain 1978) by the length ratio of distances between bases of setae *d1-d2* and *d2-l2* (1:1 in the new species, 3:1 in *R. (A.) forcipifer*).

Radfordia (Austromyobia) merioni Bochkov, Dubinina et Chirov, 1990

Material examined. One tritonymph from the Libyan gerbil *Meriones libycus* Lichtenstein (Gerbillidae); Markazi Province, near Arak, 7. 11. 1996, H. Bogdanova and V. Malikov coll.

Distribution. The type host of this species is the tamarisk gerbil *Meriones tamariscinus* (Pallas) from Kirghizia (Bochkov et al. 1990). This species is a parasite of the gerbils of the genus *Meriones*. It has been recorded from the midday gerbil *Meriones meridianus* (Pallas) from Uzbekistan (Bochkov 1997c) and *M. tamariscinus* from Kirghizia (Bochkov et al. 1990). *Meriones libycus* is a new host record.

Subgenus: *Radfordia*

Radfordia (Radfordia) acomys Fain et Lukoschus, 1977 Fig. 2D-G

Material examined. Ten females, 7 males, 7 tritonymphs, 6 deutonymphs and 2 protonymphs from the spiny mouse *Acomys cahirinus* (Desmarest) (Muridae); Hormozgan Province, near Hodji-Abad, 6. 02. 1998, V. Malikov coll.; 19 females, 9 males, 8 tritonymphs, 1 protonymph and 1 larva from the same host, Baluchistan, near Choboghar, 17. 12. 1996, V. Malikov coll.

Remarks. This species was described from *Acomys cahirinus* from Zoo Hamburg (Germany) (Fain and Lukoschus 1977). Later, it was relegated to the separate

Fig 2. Details of tritonymphs of *Radfordia* species. **A-C:** *Radfordia (Austromyobia) persica* sp. n. **A** – idiosoma, dorsal view; **B** – same, ventral view; **C** – tarsus IV, dorsal view. **D-G:** *Radfordia* (s. str.) *acomys* Fain et Lukoschus. **D** – idiosoma, dorsal view; **E** – anus; **F** – tarsus IV, dorsal view; **G** – same, ventral view.

species group *acomys* (Bochkov and Fain 1997). The immature stages of *R. (s. str.) acomys* have not been described. However, the morphology of tritonymphs is important for differentiating of the species groups and subgroups within the subgenus *Radfordia*. Herein we give the description of the tritonymph for the first time.

Tritonymph (Fig. 2D-F). In this subgenus there are no distinctive differences between female and male tritonymphs (Bochkov and Fain 1997). Body length (gnathosoma included) 430-465 (in 5 specimens), width 227-240. All setae of dorsal surface narrow lanceolate, 3-5 width (except hair-like setae *d5*). Length of setae: *vi* 20-24, *ve* 22-25, *sci* 56-60, *sce* 30-38, *d1* 29-34, *d2* 36-

44, *d3* 24-27, *d5* 9-15, *l1* 51-65, *l2* 43-47, *l3* 31-36, *l4* 36-38; anal setae absent. All setae of ventral surface hair-like, very short, 3-6 long and only setae *ic2* 18-32 long. Tarsus of leg IV as in Fig. 2F-G, with 5 relatively short setae ventrally and one long seta dorsally; claw absent.

***Radfordia (Radfordia) affinis* (Poppe, 1896)**

Material examined. One female from the house mouse *Mus musculus* L. (Muridae); Tehran city, 12. 10. 1996, V. Malikov coll.; 15 females, 8 males, 10 tritonymphs from the same host, Tehran, 12. 10. 1997, V. Malikov coll.

Distribution. This species was described from *Mus musculus* in Germany (Poppe 1896) and is cosmopolitan (Fain and Lukoschus 1977). It was also recorded from the field mouse *Apodemus sylvaticus* (L.) (Muridae) from Belgium and Ukraine (Fain and Lukoschus 1977, Bochkov 1997b), from the yellow-necked mouse *Apodemus flavicollis* (Melchior) from Crimea (Bochkov 1997b), from the little Indian field mouse *Mus booduga* (Gray) from India, and from *Mus castaneus* Waterhouse from Philippine islands (Fain and Lukoschus 1977).

Subgenus: *Graphiurobia* Fain, 1972

Radfordia (Graphiurobia) dyromys Fain et Lukoschus, 1973

Material examined. One female from the forest dormouse *Dryomys nitedula* (Pallas) (Gliridae); Kerman Province, Shah-Dad Tunnel, Kuh-Benan Mountains, 30. 04. 1998, V. Malikov, F. Golenichshev and J. Gourchenko coll.; one tritonymph, deutonymph and protonymph ex the same host with the same data.

Distribution. This host-species specific parasite was described from *Dryomys nitedula* (Fain and Lukoschus 1973). It is distributed in Poland, Turkey (Fain and Lukoschus 1973) and Russia (near Anapa) (Bochkov 1994).

Genus: *Myobia* Heyden, 1826

Myobia (Myobia) murismusculi (Schrank, 1781)

Material examined. Sixteen females, 1 male and 3 tritonymphs from *Mus musculus*; Kerman Province, Sardueh, Bahr-e-Aseman Mountains, 08. 09. 1996, V. Malikov and M. Arbobi coll.; one female from the same host; Tehran, 10. 10. 1996, V. Malikov coll.

Distribution. This species was described from *Mus musculus* in Germany (Schrank, 1781). It is a parasite of *Mus musculus* and of mice of the genus *Apodemus* (subgenus *Sylvaemus*): *Apodemus flavicollis* and *A. sylvaticus* (Fain and Lukoschus 1977, Bochkov 1997b). It is distributed all over the world together with the house mice (Fain and Lukoschus 1977).

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REFERENCES

- BOCHKOV A.V. 1994: Mites of the subgenus *Graphiurobia* (Myobiidae, *Radfordia*) of the fauna of Russia and surrounding states. *Parazitologiya* 28: 421-428. (In Russian.)
- BOCHKOV A.V. 1997a: New classification of myobiid mites (Acari, Acariformes). *Entomol. Obozr.* 76: 938-951. (In Russian.)
- BOCHKOV A.V. 1997b: Myobiid mites (Acariformes: Myobiidae) parasitizing the rodent family Muridae (Rodentia) in Russia and neighbouring countries. *Parazitologiya* 31: 201-209. (In Russian.)
- BOCHKOV A.V. 1997c: Two new subgenera of myobiid mites of the genus *Radfordia* (Acariformes: Myobiidae). *Entomol. Obozr.* 76: 684-704. (In Russian.)
- BOCHKOV A.V. 1997d: Description of the female of the mite *Radfordia (Austromyobia) aegyptica* (Acariformes: Myobiidae). *Parazitologiya* 31: 458-461. (In Russian.)
- BOCHKOV A.V., DUBININA E.V., CHIROV P.A. 1990: The first record of mites of the subgenus *Austromyobia* (Acariformes, Myobiidae) from fauna of the USSR. *Izv. Akad. Nauk Kirg. SSR Ser. Khimiko-tekhn. Nauk* 1: 55-66. (In Russian.)
- BOCHKOV A.V., FAIN A. 1997: On the systematics of mites of the subgenus *Radfordia* s.str. (Acari: Myobiidae: *Radfordia*). *Acarina* 5: 19-28.
- DUSBÁBEK F. 1969: To the phylogeny of genera of the family Myobiidae (Acarina). *Acarologia* 11: 537-574.
- FAIN A. 1973: Notes sur la nomenclature des poils idiosomaux chez les Myobiidae avec description de taxa nouveaux (Acarina: Trombidiformes). *Acarologia* 15: 279-309.
- FAIN A. 1978: Les Myobiidae d'Afrique au sud du Sahara et de Madagascar (Acarina-Prostigmata). *Ann. Mus. R. Afr. Cent., Sér. Zool.* 224: 1-186.
- FAIN A. 1994: Adaptation, specificity and host-parasite coevolution in mites (Acari). *Int. J. Parasitol.* 24: 1273-1283.
- FAIN A., LUKOSCHUS F.S. 1973: Note sur un nouveau Myobiidae parasite *Dryomys nitedula* (Acarina: Trombidiformes). *Bull. Ann. Soc. R. Entomol Belg.* 109: 320-322.
- FAIN A., LUKOSCHUS F.S. 1977: Nouvelles observations sur les Myobiidae parasites de rongeurs (Acarina: Prostigmata). *Acta Zool. Pathol. Antverp.* 69: 11-28.
- LAWRENCE R.F. 1951: New fur-mite from South African mammals. *Ann. Natal Mus.* 12: 91-133.
- POPPE S.A. 1896: Beitrag zur Kenntnis der Gattung *Myobia* v. Heyden. *Zool. Anz.* 19: 327-333.
- RADFORD C. 1951: A revision of the fur-mites Myobiidae (Acarina) (suite). *Bull. Mus. Natl. Hist. Nat. (Paris)* 23: 269-276.
- SCHRANK F.P. 1781: *Pediculus muris musculi*. *Enum. Insect. Austria Indig.* 1058: 513.