MALAYSIAN PARASITIC MITES
II. MYOBIIDAE (PROSTIGMATA) FROM RODENTS

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----- ABSTRACT—The fur-mites of the family Myobiidae parasitic on rodents in Malaysia are studied. They belong to 9 species and 2 genera *Radfordia* Ewing and *Myobia* von Heyden. The new taxa include one new subgenus *Radfordia* (*Rattimyobia*); 4 new species, *Radfordia* (*Rattimyobia*) *pahangensis*, *R.*(*R.*) *selangorensis*, *R.* (*R.*) *subangensis*, *Myobia malaysiensis* and one new subspecies *Radfordia* (*Radfordia*) *ensifera jalorensis*. These are described and illustrated. In addition, the male of *Radfordia* (*Rattimyobia*) *acinaciseta* Wilson, 1967 is described for the first time. -----

During a stay in the Institute for Medical Research, Kuala Lumpur, F.S.L. collected a number of parasitic mites from various hosts (Fain et al., 1980). This paper deals with the species of Myobiidae found on rodents. Nine species in 2 genera-*Radfordia* and *Myobia*, , were collected. A new subgenus, *Radfordia* (*Rattimyobia*), 4 new species, *Radfordia (Rattimyobia) pahangensis*, *R.* (*R.*) *selangorensis*, *R.*(*R.*) *subangensis*, *Myobia malaysiensis*, and 1 new subspecies, *R.* (*Radfordia*) *ensifera jalorensis*, are described and illustrated. In addition, the male of *R.* (*Rattimyobia*) *acinaciseta* Wilson is described for the first time.

The holotypes are deposited in the British Museum, Natural History, London. Paratypes are in the following institutions: Institute for Medical Research, Kuala Lumpur; Academy of Sciences, Department of Parasitology, Prague; Bernice Bishop Museum, Honolulu; Field Museum of Natural History, Chicago; Institut royal des Sciences naturelles, Bruxelles; Institute of Acarology, Columbus; Zoologisches Museum, Hamburg; Rijksmuseum Natural History, Leiden; U.S. Museum Natural History, Washington D.C. and in the collections of authors.

Genus *Radfordia* Ewing, 1938
Subgenus *Radfordia* Ewing, 1938
1. *Radfordia* (*Radfordia*) *ensifera* (Poppe, 1896)

The type host of this cosmopolitan species is *Rattus norvegicus* (Berkenhout). This species is also known from *Rattus rattus* L. in several parts of the world (Fain and Lukoschus, 1977).

In Malaysia, we have found it on two hosts: (1) *Rattus rattus diardii* (Jentink), Gombak Forest Reserve, Selangor, 15.V.1979 (2 females, 1 male, 5 tritonymphs); same host species, 3 hosts, Kuala Lumpur, 7.V.1969 (22 females, 12 males, 4 tritonymphs, 4 deutonymphs, 1 protonymph); (2) *Rattus tiomanicus jalorensis* (Miller), Subang Forest Reserve, Selangor, 7.V.1979 (3 females, 1 male); from the same host in Bukit Lanjan Forest Reserve, Selangor, 27.IV.1979 (2 males, 4 females, 1 tritonymph).

Radfordia (*Radfordia*) *ensifera jalorensis* nov. subspec.

This subspecies is distinguished from the typical species by the shape of setae *ic 4* in both

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sexes. These setae are very thin and short and have the same aspect as *ic 2* and *ic 3* setae. In the female setae *d* 1, *d 2*, *l* 1, *l 2* are 90, 100, 75 and 105μm long and 10, 13,4 and 12μm wide (maximum) respectively. Other characters as in the typical form. Holotype female 375μm x 225μm; allotype male 308μm x 208μm.

HOST AND LOCALITY—On *Rattus tiomanicus jalorensis* (Miller), Bukit Lanjan Forest Reserve, Selangor, 7. V. 1979 (holotype female and allotype male); from the same host and locality 27. IV. 1979 (2 females, 1 male, 2 tritonymphs, 2 deutonymphs, paratypes). Holotype (in British Museum) n° 1979.11. 27. 29, allotype n° 1979. 11. 27. 30.

2. (?) *Radfordia* (*Radfordia*) *hornerae* Domrow, 1963

Radfordia hornerae has been described from *Rattus assimilis* in Australia. We have found on *Rattus sabanus* (Thomas), Templer Park, near Kuala Lumpur, 25. IV. 1979, a female resembling *R. hornerae* but distinguished from that species by the following characters: *ic 4* thicker, setae *sc i* narrower and shorter but their apices are missing (not longer than *sc e*), setae *d 2* and *l 2* narrower (19μm).

The only specimen we have is, unfortunately, in very bad condition and some setae are incomplete. We prefer not to name this species and wait until new and better material becomes available.

Subgenus *Hystricomyobia* Fain, 1975

The type species of this subgenus, *H. hystricosa* Fain, 1972, is known only from the female. This subgenus is characterized by the very strong development of the dorsal setae which are all simple and not furcate nor toothed (Fain, 1975 and Fain, 1978). Up to now 3 species had been described in this subgenus, one (type of genus) from the Afrotropical region and 2 from the Oriental region. We are now of the opinion that the two Oriental species as well as the two new species that we describe here from Eastern Asia, belong in fact to a new subgenus *Rattimyobia*.

Subgenus *Rattimyobia* nov. subgen.

DEFINITION—The female resembles the subgenus *Hystricomyobia* in having very strong and long dorsal setae. It is distinguished from that subgenus by the following characters (females): (1) Setae *v i*, *v e*, *sc i*, *sc e*, *l* 1 and *d* 1 with forked apex and with 2 strong preapical teeth (in *Hystricomyobia* all dorsal setae are smooth and not furcate); (2) Setae *l 5* more paramedian in position; (3) Claws II equal or subequal (distinctly unequal in *Hystricomyobia*). The nymphs of *Hystricomyobia* are unknown. In *Rattimyobia perakensis* the tritonymph bears 11 pairs of long setae of which 4 are bifurcate (*v i*, *v e*, *l* 1 and *l 2*), 4 are trifurcate (*sc i*, *sc e*, *d* 1 and *d 2*) and 3 are simple; all these setae are fringed laterally by thin transparent membranes. In the other species of the subgenus, some of these setae bear either at one or at both sides secondary thin branches and present a pectinate aspect, however these thin branches are always included into the large transparent membranes bodering the setae. These setae are named here "pectinate foliate setae".

TYPE SPECIES—*Radfordia* (*Rattimyobia*) *perakensis* Fain, 1973.

Key to the subgenus *Rattimyobia*

1. Setae *d 2* and *l 2* very thick and distinctly inflated in their apical third; Coxal seta III very thin and short (15μm); *g* 1 thin, 45-50μm long and situated close to *l 5* far behind *ic 4* ..... *R. acinaciseta* Wilson, 1967
- Setae *d 2* and *l 2* thick and attenuated apically; Coxal seta III long and either thin or very thick; *g* 1 variable 2

2. Seta *g* 1 very thick and situated very close to *ic 4*; Coxal seta III very thick; *d 2* and *l 2* without preapical tooth 3
- Seta *g* 1 very thin, long (60μm) and situated very close to *l 5*; Coxal seta III thin; *d 2* and *l 2* without a preapical tooth ..... *R. subangensis* n. sp.

3. Setae *d 3* cylindrical, long and thick; *d 2* 260μm long ..... *R. perakensis* Fain, 1973
- Setae *d 3* very short and thin; *d 2* 160 to 180μm long 4

4. Vulvar lips with 2 long narrow triangular posterior membranous projections; *d 4* with numerous apical and subapical small teeth; On *Rattus inas* and *R. fulvescens*, Malaysia ..... *R. pahangensis* n. sp.
- Vulvar lips without posterior projections; *d 4* forked apically and with 2 subapical teeth; On *Rattus whiteheadi*, Malaysia ..... *R. selangorensis* n. sp.

MALES

(N. B. : The male of *R. subangensis* in unknown)

1. Seta *d 3* strong, divided into 2 strong unequal forks longer than their base, these forks being divided apically into several branches ..... *R. selangorensis* n. sp.
- Seta *d 3* not deeply forked 2

2. Coxal seta III very thin, 30μm long; *d 3* 105-120μm long, only slightly inflated apically where it is 8-10μm thick ..... *R. acinaciseta* Wilson, 1967
- Seta coxal III thick or very thick and much longer 3

3. Seta *d 3* long, attenuated apically and without teeth or projections ..... *R. perakensis* Fain, 1973
- Seta *d 3* very thick, inflated in its apical half, 75μm long, 15μm thick near apex; with numerous apical comblike teeth; Coxal seta III thicker and longer (120μm) than coxal IV (60μm long) ..... *R. pahangensis* n. sp.

TRITONYMPHS

(N. B.: The tritonymphs of *R. selangorensis* and *R. subangensis* are unknown)

1. Dorsum without pectinate-foliate setae; Setae *sc i*, *sc e*, *d* 1 and *d 2* trifurcate ..... *R. perakensis* Fain, 1973
- Dorsum with some setae pectinate-foliate; Only *sc i* and *sc e* trifurcate 2

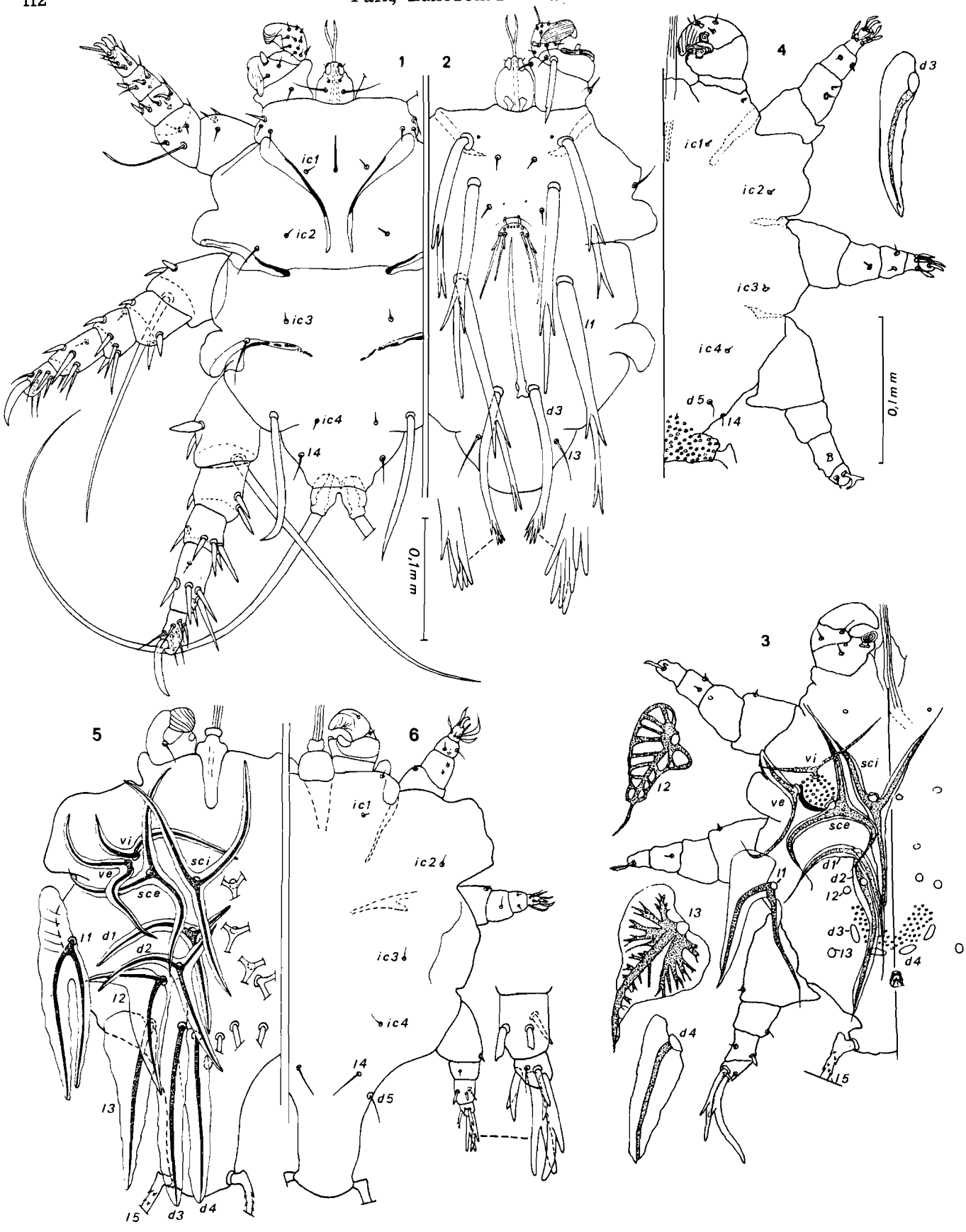
2. Setae *l 2* and *l 3* pectinate-foliate ..... *R. acinaciseta* Wilson, 1967
- Setae *v e*, *l* 1, *l2* and *l 3* pectinate-foliate ..... *R. pahangensis* n. sp.

3. *Radfordia* (*Rattimyobia*) *acinaciseta* Wilson, 1967

The description of this species was based on female specimens from an unidentified rodent (*Rattus* sp.) from Thailand.

We have found new specimens (72 females, 15 males and 45 immatures) of that species on *Rattus rajah* (Thomas) from Jengka, near Mentakab, Pahang, Malaysia, 26. IV. 1979. These specimens were mixed with *R.* (*R.*) *perakensis*. From another rat of the same species and date, from Bukit Lanjan Forest Reserve, Selangor (7 females, 1 male, immatures).

Figs. 1-4: *Radfordia* (*Rattimyobia*) *acinaciseta* (Wilson, 1967)-1, male venter; 2, male dorsum; 3, tritonymph dorsum; 4, tritonymph venter. Figs. 5-6: *Radfordia* (*Rattimyobia*) *perakensis* Fain, 1973-5, tritonymph dorsum; 6, tritonymph venter.


1
ic1
ic2
ic3
pic4
l4
0,1mm
2
l1
d3
l3
4
d3
ic1
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ic4
d5
l4
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l1
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l2
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l5
d3
d4
6
ic1
ic2
ic3
ic4
l4
d5

The male of theat species is described here.

MALE (Fig. 1-2)—Length 328μm, width 210μm; another specimen 335μm x 215μm. DORSUM–*v i* and *sc i* very small; *v e*, *sc e* and *l* 1 very thick, forked apically and with 2 long teeth in their apical half; *d 3* 110μm long, with numerous apical or subapical projections; aedeagus straight 110μm long; *d 2* longer (50μm) than *d 1* (40μm), both toothed. VENTER–All setae very thin except coxal IV very strong and 105μm long; coxae I-IV with 3-2-1-1 setae; legs strong, with strong spines (especially of legs III and IV); trochanters III-IV bearing 2 anterior short and strong spines; chaetotaxy of legs (II-IV): Trochanters 3-3-3, femora 5-3-3, genua 7-6-5, tibiae 6-6-6, tarsi 7-6-6.

The coxae (I-IV) in the female of our series bear 3-2-1-1 setae, the intercoxals *ic* 1-*ic 4* are very small as in the male. The legs bear same number of setae as in male.

The nymphs differ from those of *R. perakensis* by the following characters: setae *l 2* and *l 3* pectinate-foliate, setae *d* 1 and *d 2* bifurcate, presence of a sclerotized area between *v e*, *v i* and *sc e* (Figs. 3-4).

4. *Radfordia* (*Rattimyobia*) *perakensis* Fain, 1973

This species was originally described from a tritonymph ex *Rattus surifer* (Miller), Perak, Malaysia. Further examination of the same animal led A. F. to discover new specimens of nymphs together with males and females (Fain and Lukoschus, 1977).

More specimens of this species were recently collected by F. S. L. from *R. rajah* (Thomas), Bukit Lanjan Forest Reserve, Selangor, 26. IV. and 7. V. 1979 (13 males, 8 females, 33 nymphs) and on 7 May 1979 (10 females, 3 males, 22 nymphs). Additional material (24 females, 5 males and 5 nymphs) were collected by Salleh Ismail from the same host trapped in Kampong Awak, Temerloh, Pahang on 4. IX. 1979.

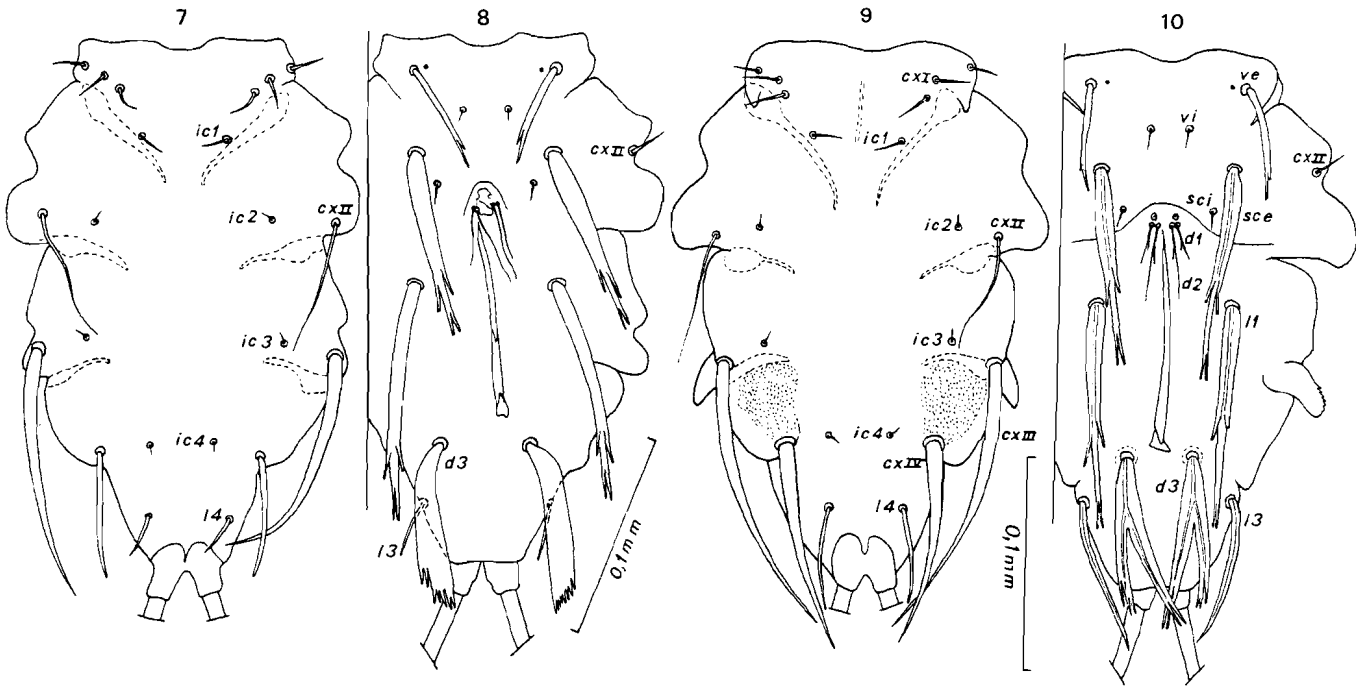
In the drawing of the male (Fain & Lukoschus, 1977, Fig. 24), setae *ic 4* had been overlooked. As a matter of fact these setae are very short and thin as in the female and are situated slightly inside and posterior to coxals IV. The setae mentioned as *ic 4* in that paper are in fact *l 4*.

The drawing of the holotype tritonymph should be slightly modified as the specimen used for drawing was not in very good condition and some characters could not be correctly observed. We give here a new figure of this tritonymph based partly on specimens found on *R. rajah* (Figs. 5-6). All the dorsal setae of the tritonymph have membranous margins very difficult to see even in good preserved specimens. There are 4 pairs of trifurcate setae (*sc i*, *sc e*, *d* 1 and *d2*), 4 pairs of bifurcate setae (*v i*, *v e*, *l* 1 and *l 2*) and 3 pairs of simple setae (*d 3*, *d 4*, *l 3*). None of these setae is pectinate. The opisthosoma is long and relatively strongly narrowed so that the setae *l 4* and *d 5* are displaced in ventral position, the *l 4* being the most anterior and ventral.

5. *Radfordia* (*Rattimyobia*) *pahangensis* nov. spec.

MALE (Figs. 7-8)—Holotype 300μm long, 171μm wide. DORSUM–*v i* and *sc i* very thin and short; *v e* 54μm, toothed; *sc e* and *l* 1 thick, forked apically and with 2 preterminal teeth; *d l* and *d2* thin 30-40μm long; *d 3* 80μm long, inflated apically (maximum width 13-15μm), ending in numerous cylindrical projections; aedeagus 90μm long, straight. VENTER–*ic* 1 to *ic 4* very thin and short; coxal III thick, 120μm long; coxal IV thin, 60μm long. Inner coxal II thin and long; CHAETOTAXY OF LEGS-Coxae 3-2-1-1, trochanters 3-3-3, femora 5-3-3, genua 7-6-5, tibiae 6-6-6, tarsi 7-6-6.

FEMALE (Figs. 13-14)—Two specimens in our collection extracted from their nymphal skin are not in very good condition. Allotype 400μm x 198μm. DORSUM–Most setae very thick,



Figs. 7-8: *Radfordia (Rattimyobia) pahangensis* n. sp. (holotype male)-7, venter; 8, dorsum. Figs. 9-10: *Radfordia (Rattimyobia) selangorensis* n. sp. (allotype male)-9, venter; 10, dorsum.

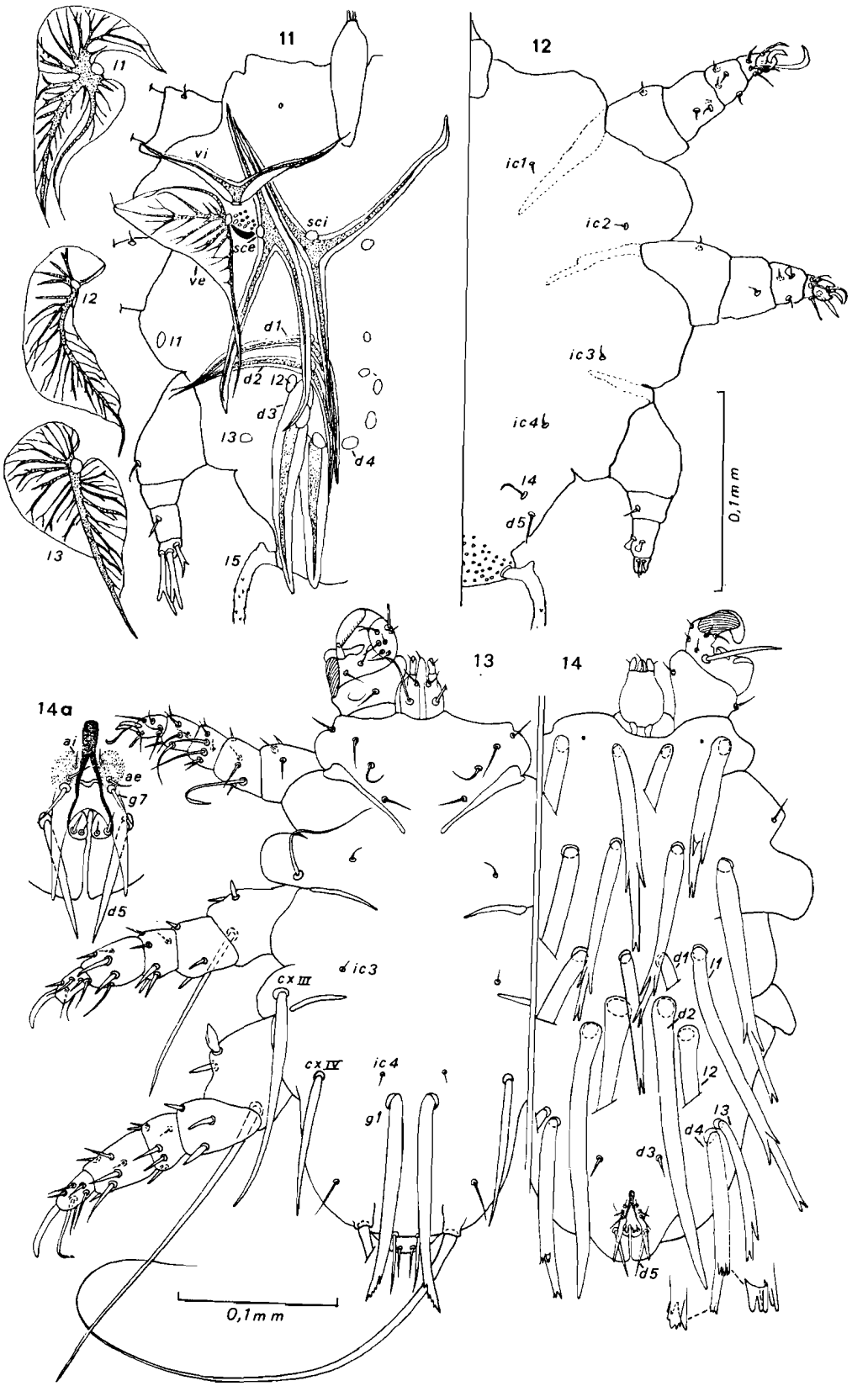
with forked apex and two teeth in their apical third or quart ; *d 2* and *l 2* subcylindrical, 180μm long and not forked or toothed; *d 4* ending in numerous small projections; vulva with 2 long, narrow, triangular posterior projections. VENTER–*ic* 1 to *ic 4* thin and short; coxals II and III thick and long; *g* 1 very thick, cylindrical, barbed apically; chaetotaxy of legs as in the male.

TRITONYMPH (Figs. 11-12)—All the tritonymphs, as well as deuto- and protonymph, were not attached to the hair but glued to the skin of the host by means of a cement excreted by the mite. Measurements in 2 specimens 300μm x 230μm and 230μm x 175μm; opisthosoma broadly conical, with rounded apex; dorsum bearing 4 pairs of pectinate-foliate setae (*v e, l* 1, *l 2* and *l 3*) and several bifurcate (*v i, d* 1 and *d 2*) or trifurcate setae (*sc i* and *sc e*); ventral setae short or very short; tarsi II-III ending in one claw, tarsus IV ending in 3 barbed spines.

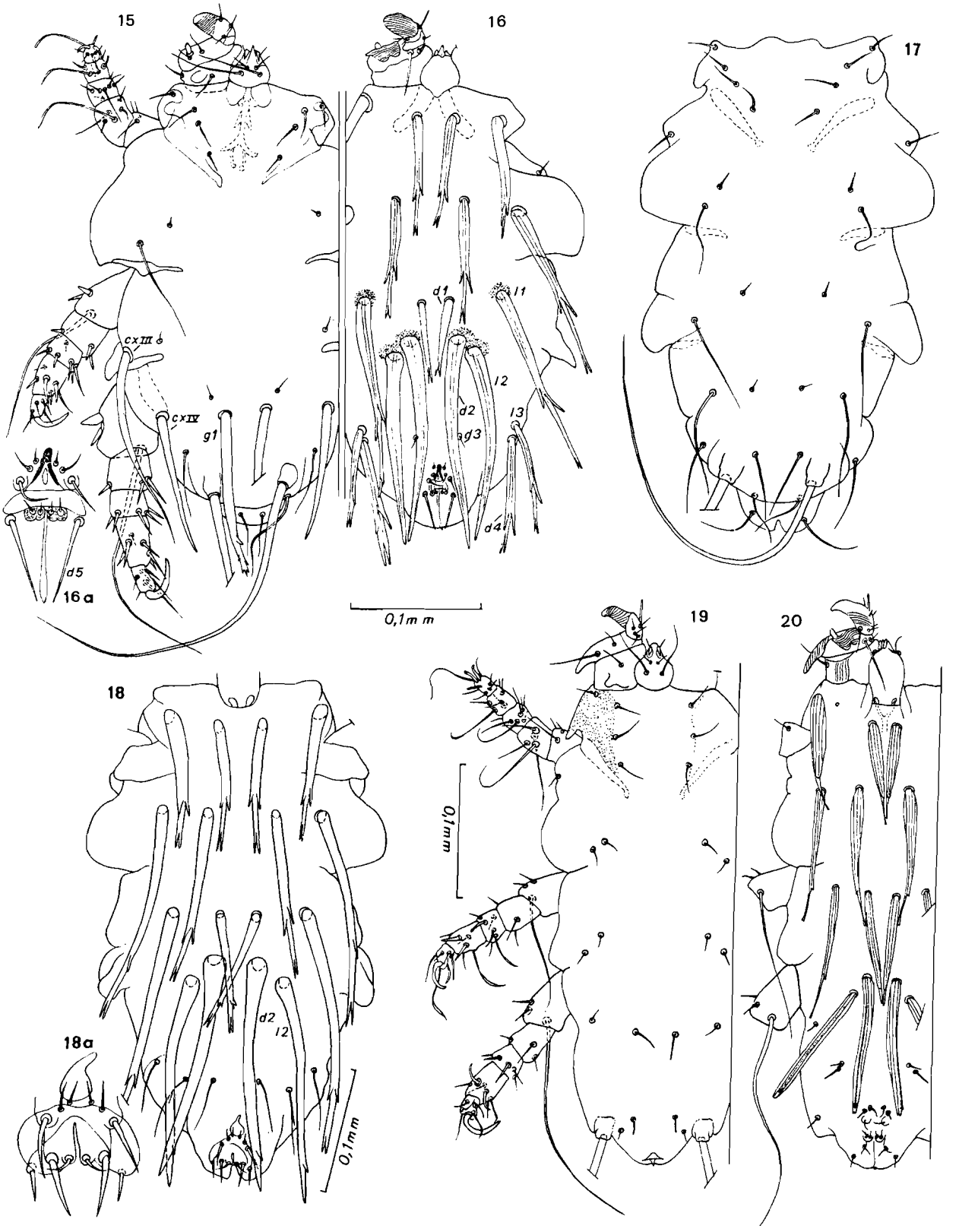
HOST AND LOCALITY—(1) *Rattus inas* (Bonhote, 1906), Mt. Brinchang, 1800 m., Cameron Highlands, Pahang, 21. IV. 1979 (holotype and 1 paratype male; allotype and 1 paratype female), extracted from nymphal skins; 6 tritonymphs, 5 deuto- or protonymphs (from another rat of same species) (types in British Museum, n° 1979. 11. 27. 34-35). (2) *Rattus fulvescens* (Grey, 1847), same locality, 19. IV. 1979 (3 tritonymphs and 1 protonymph, paratypes).

6. *Radfordia (Rattimyobia) selangorensis* nov. spec.

FEMALE (Figs. 15-16a)—Holotype 360μm long, 255μm wide. DORSUM—Most dorsal setae thick, long, forked apically and with 2 long teeth in apical half or third; *d 2* and *l 2* thick, 150μm long, without fork or teeth and attenuated apically; *d 3* very short and thin; vulvar lips without projections. Cuticle of lateral surface of body between coxae III and IV distinctly produced. VENTER–*ic* 1 to *ic 4* very small; *g* 1 thick, 120μm long and with several apical or subapical teeth; coxal setae III and IV thick and long; internal coxal II thin and 60μm long; legs as in *R. pahangensis*; chaetotaxy of legs II-IV (number of setae) as in *R. pahangensis*.



Figs. 11-14: *Radfordia* (*Rattimyobia*) *pahangensis* n. sp.–11, tritonymph dorsum; 12, tritonymph venter; 13, female venter; 14, female dorsum; 14a, genito-anal area.



Figs. 15-16: *Radfordia* (*Rattimyobia*) *selangorensis* n. sp. (female)—15, venter; 16, 16, dorsum; 16a, genito-anal area. Figs. 17-18a: *Radfordia* (*Rattimyobia*) *subangensis* n. sp. (holotype female)-17, venter; 18, dorsum; 18a, genito-anal area. Figs. 19-22: *Radfordia* (*Graphiurobia*) *chiropodomys* Fain, 1974 (female)-19, venter; 20, dorsum.

MALE (Figs. 9-10)—Allotype 285μm long and 168μm wide. DORSUM—Aedeagus straight 85μm long; *v i* and *sc i* very small; *v e*, *sc e* and *l* 1 moderately thick; *d1* (external) thin, shorter than *d2*, both toothed; *d 3* deeply forked in two strong unequal branches, the apices of these branches ending in several teeth. VENTER—*ic* 1 to *ic 4* very small; internal coxal II long (65μm) and very thin; coxal III thick and very long (135μm), coxal IV shorter (90μm) than coxal III but thicker; chaetotaxy of legs as in female.

TRITONYMPH—Unknown.

HOST AND LOCALITY—From *Rattus whiteheadi* (Thomas, 1894), Subang Forest Reserve Selangor, 8. V. 1979 (holotype and 2 paratype females, allotype and 2 paratype males). Types in British Museum, n° 1979. 11. 27. 40. 41.

7. *Radfordia* (*Rattimyobia*) *subangensis* nov. spec.

FEMALE (Figs. 17-18a)—Holotype 411μm long and 225μm wide. In paratype 420μm x 228μm. DORSUM—*v i*, *v e*, *sc i*, *sc e* and *l* 1 measure 105μm, 105μm, 136 μm, 165μm and 183 μm long respectively; *d 2* and *l 2* 170μm long, attenuated, not forked apically and with a preapical tooth; *d 3* and *l 3* very thin, 30μm and 60μm long respectively. VENTER—*ic 2* to *ic 4* very small; internal coxal II thin and 45μm long, coxals III and IV thin and 75μm long; *g* 1 thin, 50-60μm long (in the paratype); legs as in other species or subgenus; chaetotaxy of legs as in *A. pahangensis*.

MALE AND NYMPHS—Unknown.

HOST AND LOCALITY—On *Rattus rajah* (Thomas), Subang Forest Reserve, Selangor, 7. V. 1979 (rat n° 90) (holotype and 2 paratypes female). Holotype in British Museum, 1979. 11. 27. 42.

Graphiurobia Fain, 1972

8. *Radfordia* (*Graphiurobia*) *chiropodomys* Fain, 1974

The type host of this species is *Chiropodomys gliroides* from Djakarta, Indonesia. We have found a series of new specimens on the same host species from Gombak Forest Reserve, Selangor, 4. V. 1979 (10 females).

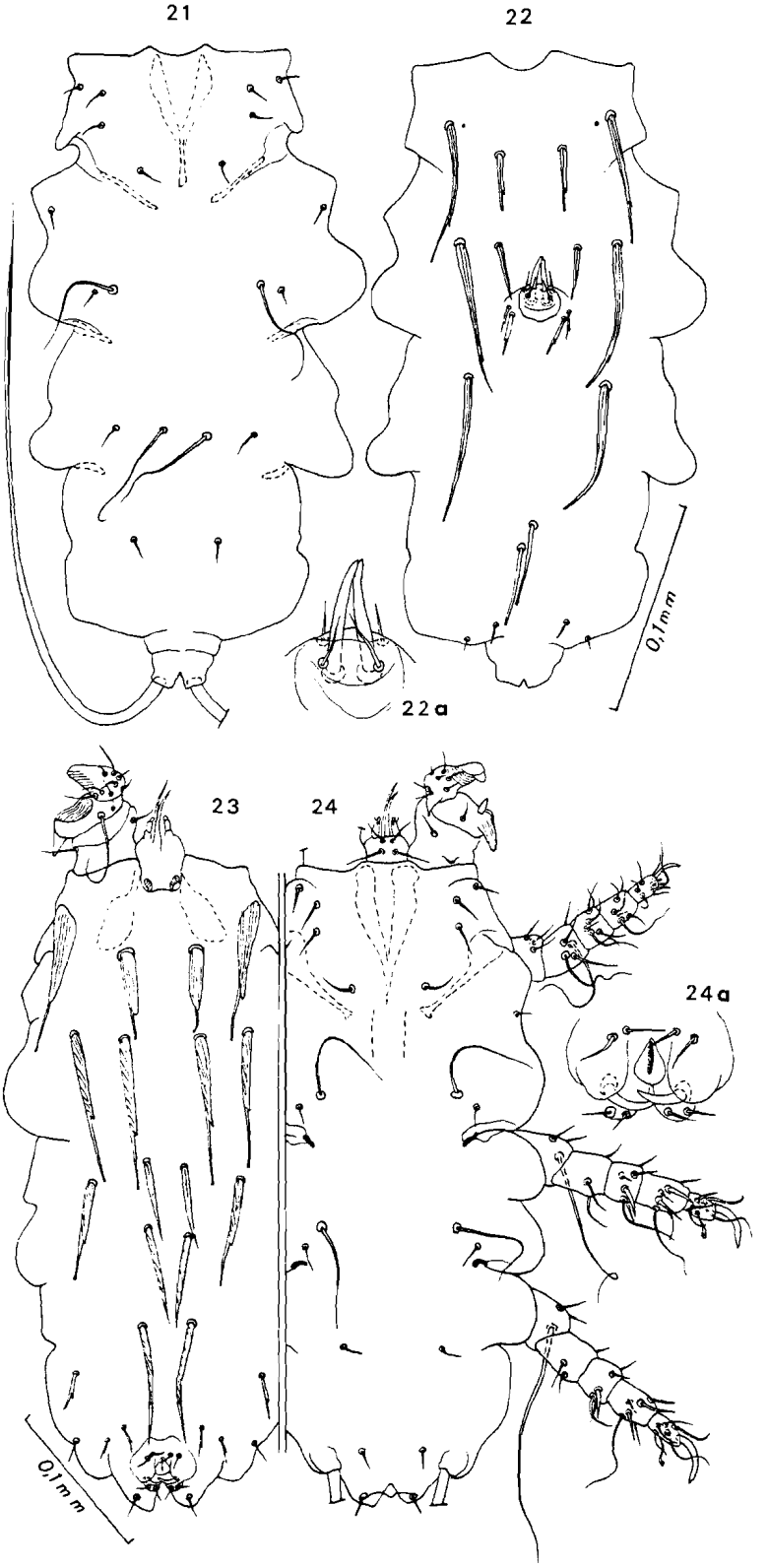
The following corrections should be made to the original figures of this species (Fain, 1976, p. 7): (1) *ic 4* should be longer; *ic* 1, *ic 2*, *ic 3* and *ic 4* in holotype and paratype females are 21μm, 9-11μm, 9-11μm and 18-21μm long respectively. (2) *ic 4*, *g* 1 and *g 2* should be slightly thicker than in drawing. (3) *a 2* and *l 3* had been omitted in the drawing. We give here a new corrected drawing of the female of that species. The male is still unknown (Figs. 19-20).

Genus *Myobia von* Heyden, 1826
Subgenus *Myobia* von Heyden, 1836

A key to the females of that genus has been given by Fain, 1974.

9. *Myobia (Myobia) malaysiensis* nov. spec.

The female of this new species possesses very thin and short setae *ic 4* as in *Myobia* (*M.*) *musculi* (Schrank, 1781) and *Myobia* (*M.*) *otomyia* Lawrence, 1951. It is distinguished from these species by the shape of *v i* being much thicker (9μm thick instead of 3 to 3.5μm in these species) and longer. The male is distinguished by the closeness of *ic 3* (which are 21μm apart, instead of 60-80μm in these species).



Figs. 21-24: *Myobia* (*Myobia*)*malaysiensis* n. sp.–21, allotype male venter; 22, allotype male dorsum; 22a, allotype male genital area; 23, holotype female dorsum; 24, holotype female venter; 24a, holotype female genito-anal area.

FEMALE (Figs. 23-24)—Length of holotype 425μm (upto tips of palps), width 185μm. In 2 paratypes: 390 x 185μm and 420 x 193 μm. DORSUM—*v i, v e, sc i, sc e* and *l* 1 toothed and 54, 84, 95, 84 and 61μm long respectively; *v i* are 8 and 8-9μm thick; *d* 1, *d 2* and *l 2* not toothed, 48, 60 and 75μm long; posterior setae short and toothed; vulvar lobes poorly developed; *g 7* in form of curved spines. VENTER—Coxa I with a distinct triangular lateral process; setae on coxal (I-IV): 3-2-1-0; setae *ic* 1 and *ic 4* thin and short, *ic 2* and *ic 3* 60-70μm long; *ic 3* 80μm apart; *g* 1 and *g 2* thin and short; trochanters I with a ventral rounded projection directed backwards; leg chaetotaxy (II-IV): trochanters 3-3-3, femora 5-3-3, genua 7-6-5, tibiae 6-6-6, tarsi 7-6-6.

MALE (Figs. 21, 22)—Allotype 332μm long and 154μm wide. DORSUM—Genital orifice at 18μm behind *sc i*; *v i, v e, sc e, d* 1 and *d 2* toothed; other setae smooth; *v i*, and *sc i* 30μm and 25μm long; *d 2* thicker and longer (24μm) than *d* 1 (15μm); *d 3* cylindrical and 42μm long; aedeagus 100μm long, very thin apically and slightly curved. VENTER—Chaetotaxy as in female except that *ic 3* are only 18μm apart.

HOST AND LOCALITY—On *Chiropodomys gliroides* (Blyth, 1855), Gombak Forest Reserve, Selangor, 4. V. 1979 (holotype and 15 paratype females, allotype and 4 male paratypes, 9 nymphs). These mites were mixed with *Radfordia* (*Graphiurobia*) *chiropodomys* Fain. Holotype in British Museum, n° 1979. 11. 27. 25; allotype n° 1979. 11. 27. 26).

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