A NEW MITE GENUS CAENOLESTOMYOBIA GEN. NOV.
(ACARIFORMES: MYOBIIDAE) FROM MARSUPIALS OF THE GENUS
CAENOLESTES (PAUCITUBERCULATA: CAENOLESTIDAE)

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ABSTRACT
A new mite genus Caenolestomyobia gen. nov. (Myobiidae: Archemyobiinae) with two new species, C. lukoschusi sp. nov. (type species) ex Caenolestes fuliginosus (Paucituberculata: Caenolestidae) from Ecuador and C. faini sp. nov. ex Caenolestes caniventer from Peru, are described. The new genus differs from other two genera of the subfamily, Archemyobia and Dromicimyobia by the structure of the internal attaching organ of genua I. Additionally, in Caenolestomyobia, setae f2 and h2 are delayed to adults, and in males, setae c2 are located on the genital shield. The new genus differs also from Archemyobia by the presence of lateral notches on the gnathosoma and by the absence of the second claw on tarsi III and IV. It differs from Dromicimyobia by the absence of setae 3b, 3c, 4b, and 4c in males. Species of the new genus differs from each other by the following characters. In males of C. faini sp. nov., setae e1 are 2.1–2.3 times longer than c2, the apices of setae c2 almost reach the level of seta e2 bases; in tritonymphs, setae f1 are shorter than e2, their length ratio is 1:1.2–1.7. In males of C. lukoschusi sp. nov., setae e1 only 1.1 times longer than c2, the apices of setae c2 far distant from the level of seta e2 bases; in tritonymphs, setae f1 are longer than e2, their length ratio is 1.1–1.4:1.

Key words: Caenolestidae, Caenolestomyobia gen. nov., marsupials, Myobiidae, Paucituberculata, systematics

НОВЫЙ РОД КЛЕЩЕЙ CAENOLESTOMYOBIA GEN. NOV.
(ACARIFORMES: MYOBIIDAE) С СУМЧАТЫХ РОДА
CAENOLESTES (PAUCITUBERCULATA: CAENOLESTIDAE)

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РЕЗЮМЕ
Описан новый род Caenolestomyobia gen. nov. (Acariformes: Myobiidae: Archemyobiinae) с двумя новыми видами C. lukoschusi sp. nov. (типовой вид) с Caenolestes fuliginosus (Paucituberculata: Caenolestidae) из Эквадора и C. faini sp. nov. с Caenolestes caniventer из Перу. Представители нового рода отличаются от клещей двух

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INTRODUCTION

The mite subfamily Archemyobiinae (Prostigmata: Myobiidae) includes two genera of permanent, tissue fluid-feeding parasites of New World marsupials, Archemyobia Jameson, 1955 (7 species) associated with marsupials of the family Didelphidae (Didelphimorphia) and Dromicimyobia Fain, 1973 (monobasic) parasitizing Dromiciops gliroides (Micropbiotheria: Microbiotheridae) (Lukoschus et al. 1972; Fain and Lukoschus 1981; Fain et al. 1981). To date, these mites have not been recorded from hosts of the order Paucituberculata, the third order of marsupials known in the New World. Among myobiid mites, only a single species Xenomyobia hirsuta Fain et Lukoschus, 1976, the only species in the subfamily Xenomyobiinae, was described from a host of this order, Lestoros inca (Paucituberculata: Caenolestidae), in Peru (Fain and Lukoschus 1981; Fain et al. 1981). To date, these mites have not been recorded from hosts of the order Paucituberculata, the third order of marsupials known in the New World. Among myobiid mites, only a single species Xenomyobia hirsuta Fain et Lukoschus, 1976, the only species in the subfamily Xenomyobiinae, was described from a host of this order, Lestoros inca (Paucituberculata: Caenolestidae), in Peru (Fain and Lukoschus 1976; Fain 1994; Bochkov 1997).

In this paper, we describe a new myobiid genus with two new species belonging to the subfamily Archemyobiinae from marsupials of the order Paucituberculata. The new species parasitize marsupials of the genus Caenolestes (Caenolestidae) in South America.

MATERIAL AND METHODS

Some parasites were collected in the field in Peru by one of us (BMOC) and others were collected from fluid-preserved museum specimens by us and by the late Dr. Fritz Lukoschus. Mite specimens were cleared in lactophenol and mounted in Hoyer’s medium. Drawings were made with a Leica microscope with phase contrast optics and a camera lucida. Structures on legs I that have been treated by some authors as ridged plates (Fain and Lukoschus 1981) were examined with polarized light; the presence of actinopilin in their cuticle demonstrates their setal origin. In the descriptions, idiosomal chaetotaxy follows Grandjean (1939) as interpreted by Bochkov et al. (2008). The leg chaetotaxy follows Grandjean (1944). All measurements are given in micrometres (μm). Names of hosts follow Wilson and Reeder (2005).

Specimen depositories and reference numbers are cited using the following abbreviations: BMOC – B.M. OConnor reference number; IRSNB – Institut royal des Sciences naturelles de Belgique, Brussels, Belgium; MUSM – Museo de Historia Natural de la Universidad Nacional Mayor de San Marcos, Lima, Peru; NNMN – Naturals, Nationaal Natuurhistorisch Museum, Leiden, the Netherlands; UMMZ – University of Michigan Museum of Zoology, Ann Arbor, USA; ZIN – Zoological Institute of the Russian Academy of Sciences, Saint Petersburg, Russia.

SYSTEMATICS

Family Myobiidae Mégén, 1878
Subfamily Archemyobiinae Fain, 1973
Genus Caenolestomyobia gen. nov.
(Figs. 1–15)

Type species. Caenolestobia lukoschusi sp. nov.

Diagnosis. Both sexes (Figs. 1–4, 13, 14). Subcapitulum elongated but distinctly shorter than legs I, with 3 pairs of filiform setae, ao2, n, m, 1 pair of dorsal-cheliceral setae chb represented by microsetae, and 1 pair of short ventral processes. Idiosoma...
Caenolestomyobia gen. nov. (Acari) from marsupials

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Elongated. Idiosomal setation: el, vi, ve, si, se, c1, c2, d1, d2, e1, e2, f1, f2, h1, h2, g1, g2, ps1–ps3 (ag1–ag3 in female). Setae vi and si broadened lanceolate. Most dorsal idiosomal setae lanceolate and longitudinally striated. Both legs I similar in form, with 5 distinct, freely-articulated segments. Coxae I with 1 pair of short triangular processes directed posteriorly. Four distal segments of leg I each with ventral triangular retrorse process. Leg I–IV setation: coxa I – 3 (ta, tb, tc), II – 4 (2a, 2b, 2c, 2d), III – 3 (3a, 3b, 3c in female) or 1 (3a in male), IV – 3 (in female) or 1 (in male); trochanter I – 3 (d, l’, v), II – 3, III – 3, IV – 3; femora I – 6 (d, l’, l”, l”1, v’, v”), II – 5 (d, l’, l”, v’, v”), III – 3 (l’, l”, v), IV – 3; genu I – 9 setae (d, d1, l’, l”, l”1, v’, v”, v”) and 1 solenidion (σ), II – 8 (d, l’, l”, l”1, v’, v”, v”), III – 6 (d, l’, l”1, v’, v”, v”), IV – 6; tibia I – 6 (d, l’, l”, v’, v”, k), II – 6, III – 6, IV – 6; tarsus I – 8 setae (tc’, tc”, p’, p”, a’, a”, u’, u”) and 1 solenidion (σ), II – 7 setae (tc’, tc”, p’, p”, a’, a”, u’, u”) and 1 solenidion (σ), III – 6 (tc’, tc”, a’, a”, u’, u”). Setae of coxae III and IV narrowly lanceolate. Seta l’ of trochanters II spur-like; d of trochanters III and IV whip-like; d of femur I strongly thickened, finger-like, longitudinally striate; l”1 of femur I costate falcate, entirely covering external (antiaxial) surface of segment; l” of genu I fleshy and costate, modified into distinctly developed, hook-like, external process, l’ of genu I striate, cylindrical, approximately 5 times longer than wide. Claw formula 2-2-1-1. Pretarsal claws of leg I subequal, each with basal spur. Claws of leg II unequal.

Male (Figs. 1, 2, 13). Lateral parts of subcapitulum with few short transverse notches in basal part. Genital shield distinctly developed, bearing 10 pairs of setae: g1, g2, ps1–ps3, c1, c2, d1, d2, and e1. Aedeagus short and straight. Setae f1, f2, and h2 short, rod-like. Seta l’ of genu I filiform, displaced ventrally and situated anterior of l’1 base. Seta d1 of genu I filiform.

Female (Figs. 3, 4, 14). Lateral parts of subcapitulum with short transverse notches along its full length.
Hypostomal lobes elongated and attenuate apically. Setae \( f_2 \) and \( h_2 \) short rod-like. Vulva naked. Setae \( ps_3 \) only slightly curved. Setae \( g_2 \) located on small sclerotised plate. Ovipore aperture distinctly separated from vulva. Bases of setae \( 3b, 3c \) and \( 4b, 4c \) situated anterior to bases of setae \( 3a \) and \( 4a \), respectively. Costate seta \( l' \) of genu I strongly thickened. Internal (paraxial) hair-clasping organ of genu I consisting of setae \( l' \) and \( l'' \). Seta \( d_1 \) of genu I spindle-shaped.
smaller inflated seta, located at base of segment), and 1 apical fist-like seta.

Protonymph (Figs. 7, 8). Setae e2, 1b, 2a, and 3a added on idiosoma; 1b scale-like. Legs IV added. Leg I–IV setation: trochanters 0-0-1-0, femora-genua 4-5-2-0, tibiae 4-4-3-4, tarsi 7-8-6-6. Claw formula 0-1-1-1.

Deutonymph (Figs. 9, 10). Setae 2b added on idiosoma. Leg I–IV setation: trochanters 0-1-1-1, femora-genua 5-4-2-2, tibiae 4-5-4-4, tarsi 7-8-6-6. Claw formula 0-1-1-1.

Female tritonymph (Figs. 11A, B, 12, 15A, B). Setae 4c, 3b, and 4b added on idiosoma; 4c scale-like. Leg setation: trochanters 0-1-2-2, femora-genua 6-5-2-2, tibiae 4-6-5-5, tarsi 7-8-6-6.

Male tritonymph (Figs. 11C, D, 15C, D). Setae 3b and 4b absent. Leg setation as in female tritonymph.

Hosts. Ceonolestid marsupials of the genus Caenolestes (Paucituberculata: Caenolestidae).

Distribution. South America.

Other included species. C. faini sp. nov.

Remarks. Mites of the genus Caenolestomyobia possess some features rarely observed in other myobiids.

(1) In females and males of these mites, the numbers of setae on coxal fields III and IV are different – setae 3b, 3c, 4b, and 4c are present in females, but are absent in males. These differences appear at the tritonymphal stage, because of in male tritonymphs setae 3b, 3c, and 4b are absent, whereas in female tritonymphs, they are present.
(2) Setae $f_2$ and $h_2$ that normally appear in archemyobines in the deutonymph and tritonymph, respectively (Lukoschus et al. 1972; Fain and Lukoschus 1981) are delayed to the adult stage.

(3) In adults, the structure of the internal hair clasping organ of genu I is unique for myobiids (see differential diagnosis).

**Differential diagnosis.** (1) This new genus differs from other two genera of the subfamily by the elongate, rod-like setae $l'$ of genu I. In both sexes of *Archemyobia*, these setae are foliate and relatively short (Fig. 4D'); in females of *Dromicimyobia*, they are similar to those in *Archemyobia*, but in males, they are thickened and spur-like.

(2) In females of *Caenolestomyobia*, the hair clasping organ of genu I consists of two setae: seta $l'$ is strongly thickened and striated, $l''$ is also striated, rod-like, approximately 5 times longer than wide; in males, setae $l'$ are filiform, displaced ventrally and probably not a functional part of the clasping organ, setae $l''$ as in females (Fig. 4D, E). In both sexes of *Archemyobia*, the clasping organ of genu I consists of three setae: setae $l'$ and $v$ are trapezoidal in shape, seta $l''$ is short, foliate and situated between them (Fig.
Fig. 5. *Caenolestomyobia* lukoschusi sp. nov., egg and prelarva (paratypes): A – egg; B – prelarva, dorsal view.
Fig. 6. 

_Acanthothripidae_ sp. nov., larva (paratype): A – dorsal view; B – ventral view; C – leg I, dorsal view; D, same, ventral view; E – tarsus II, dorsal view; F – leg II, ventral view; G – tarsus III, dorsal view; H – leg III, ventral view. Scale bars: 100 μm = A, B; 50 μm = C–H).
In females of *Dromicimyobia*, the clasping organ of genu I consists of two setae having a different shape than those in *Caenolestomyobia*: the large seta i' is costate foliate, and seta i'1 is short foliate; in males, the internal clasping organ of genu I is not developed.

(3) In males of *Caenolestomyobia*, setae c2 are located on the genital shield, whereas in males of both other genera, these setae are off the genital shield.

(4) Setae f2 and h2 are delayed to the adult stage, whereas they appear in juvenile stages of both other genera, deutonymphs and tritonymphs, respectively.

(5) The new genus also differs from *Archemaomyobia* by the presence of lateral notches on the gnathosoma (vs. absent in *Archemaomyobia*), and by the absence of the second claw on legs III and IV (vs. present in *Archemaomyobia*).

(6) It differs from *Dromicimyobia* by the absence of setae 3b, 3c, 4b, and 4c in males.

*Caenolestomyobia lukoschusi* sp. nov. (Figs. 1–12)

**Male** (holotype; Figs. 1, 2). Body, including gnathosoma, 370 long (370–400 in 6 paratypes), 210 wide (195–210) (Fig. 3). Gnathosoma 55 long (55–62), 35 wide (35–45). Setae vi, ve, and si – all widely lanceolate, about 7–11 wide. Setae se, c2, e1, and e2 – all narrow lanceolate, 3–4 wide. Length of setae: vi 44 (42–45), ve 100 (85–100), si 45 (45–48),
Fig. 8. Caenolestomyobia lukoschusi sp. nov., legs of protonymph (paratype): A – leg I, dorsal view; B – same, ventral view; C – tarsus II, dorsal view; D – leg II, ventral view; E – tarsus III, dorsal view; F – leg III, ventral view; G – tarsus IV, dorsal view; H – leg IV, ventral view.
Caenolestomyobia gen. nov. (Acari) from marsupials

Female (10 paratypes; Figs. 3, 4). Body, including gnathosoma, 515–530 long, 230–255 wide (Fig. 3). Gnathosoma 75–80 long and 45–53 wide (Fig. 4A, B). Setae vi, ve, si, and se – all widely lanceolate, 15–16, 22, 12–15, and 10–11 wide, respectively. Setae c1, c2, d1, d2, e1, e2, and f1 – all narrow lanceolate, 7–8 wide. Bases of setae c2 located slightly posterior to bases of setae f1; bases of setae f1 and e2 located almost at the same level. Length of setae: vi 65–77, ve 95–110, si 120–125, se 105–110, c1 68–75, c2 110–115, d1 60–65, d2 58–72, e1 60–65, e2 80–90, f1 60–65, f2 16–24, f3 265–290, h2 14–22, ta about 25, tb and tc 65–75, 2a 75–90, 2b and 2c 11–13, 2d 70–75, 3a 75–85, 3b 55–65, 3c 50–65, 4a 110–130, 4b and 4c 75–90, ag1 15–22, ag2 and ag3 10–15, ps3 12–15, g1 14–16, g2 about 10.

Egg (10 paratypes; Fig. 5A). 220–230 long, 80–90 wide.

Prelarva (6 paratypes; Fig. 5B). 150–200 long, 80–90 wide.

Larva (10 paratypes; Fig. 6). Idiosoma 170–185 long, 140–155 wide. Length of setae: vi 20–22, ve 22–25, si 24–26, se 42–45, c1 17–20, c2 22–25, d1, d2, and e1 20–22, f1 24–26, h1 140–160, ta 8–11.

Fig. 9. Caenolestomyobia lukoschusi sp. nov., deutonymph (paratype): A – dorsal view; B – ventral view.
Fig. 10. *Caenolestomyobia lukoschusi* sp. nov., legs of deutonymph (paratype): A – leg I, dorsal view; B – same, ventral view; C – tarsus II, dorsal view; D – leg II, ventral view; E – tarsus III, dorsal view; F – leg III, ventral view; G – tarsus IV, dorsal view; H – leg IV, ventral view.
Fig. 11. Caenolestomyobia lukoschusi sp. nov. tritonymphs (paratypes): A – female tritonymph, dorsal view; B – same, ventral view; C – male tritonymph, dorsal view; D – same, ventral view.


Type material. Holotype – male, paratypes: 6 males, 16 females, 38 female tritonymphs (1 pharate), 16 male tritonymphs (3 pharate), 39 deutonymphs (7 pharate), 19 protonymphs (1 pharate), 20 larvae (1 pharate), 6 prelarvae (1 pharate), and 11 eggs (BMOC 81-0129-014) ex Caenolestes fuliginosus Tomes, 1863 (Paucituberculata: Caenolestidae) (UMMZ 127158), ECUADOR: Pichincha, Old

Fig. 12. Caenolestomyobia lukoschusi sp. nov., legs of female tritonymphs (paratype): A – leg I, ventral view; B – same, dorsal view; C – tarsus II, dorsal view; D–F – legs II–IV, respectively, ventral view.

**Type depositories.** Holotype and paratypes are deposited at UMMZ; other paratypes in IRSNB, NNMN, and ZIN.

**Etymology.** This species is dedicated to the late Prof. F.S. Lukoschus (the Netherlands), who recognized this genus and species as new for science and prepared the extensive slide series of these mites. Unfortunately, his untimely death in 1988 prevented him from describing these taxa.

**Remarks.** Pharate specimens of all stages of *Caenolestomyobia lukoschusi* sp. nov. (see material above) were available for study. This allowed us to verify the presence of three nymphal instars in the life cycle of the subfamily Archemyobiinae as hypothesized by Lukoschus et al. (1972) and Fain and Lukoschus (1981).

**Caenolestomyobia faini** sp. nov.

(Figs. 13–15)

*Male* (holotype: Fig. 13). Body, including gnathosoma, 390 long, 195 wide. Gnathosoma 55 long, 36 wide. Setae *vi, ve, and si* – all widely lanceolate, about 6–10 wide. Setae *se, c2, e1, and e2* – all narrow lanceolate, 3–4 wide. Length of setae: *vi* 33 (35 in 1 paratype), *ve* 75 (75), *si* 33 (39), *se* 140 (130), *c1* 13 (15), *c2* 57 (60), *d1* 11 (14), *d2* 15 (17), *e1* 133 (125), *e2* 88 (84), *f1, f2,* and *h2* – all 13–16, *h1* 325, *ta* 13, *tb* and *tc* about 60, *2a* 57, *2b* and *2c* about 10, *2d* 50,
3a 75 (85), 4a 102 (85), ps1–ps3 about 6, g1 26 (22), g2 14 (12). Setae e1 2.1–2.3 times longer than c2, apices of setae c2 almost reaching to level of seta e2 bases. Aedeagus 60 long (70).

**Female** (paratype; Fig. 14). Body, including gnathosoma, 515 long, 237 wide. Gnathosoma 70 long and 37 wide. Setae vi, ve, si, and se – all widely lanceolate, 15, 22, 15, and 13 wide, respectively. Setae c1, c2, d1, d2, e1, e2, and f1 – all narrow lanceolate, 6–7 wide. Bases of setae c2 located slightly posterior to bases of setae c1; bases of setae f1 and e2 located almost at the same level. Length of setae: vi 66, ve 117, si 130, se 133, c1 55, c2 110, d1 60, d2 62, e1 53, e2 100, f1 66, f2 20, h1 265, h2 21, ta 22, tb and tc about 75, 2a 73, 2b and 2c 11, 2d 74, 3a 65, 3b and 3c 57, 4a 122, 4b and 4c 65, ag1 20, ag2 and ag3 9, ps3 13, g1 22, g2 8.


**Male tritonymph** (2 paratypes; Fig. 15C, D). Idiosoma 310–370 long, 220–290 wide. Length of setae: vi 44–45, ve 58–60, si 57–66, se 75–88, c1 about 31, c2 32–33, d1 and e1 33–37, d2 35–37, e2 56–66, f1 40–42, h1 190–200, ta about 11, 1b and 1c about 40, 2a 23–24, 2b 19–20, 2c 15–16, 3a 28–31, 4a 55–66. Length ratio f1:e2 1:1.3–1.6.

**Type material.** Holotype – male (BMOC 06-0924-050, #1), paratypes: 1 pharate male in tritonymph, 1 female, 3 female and 2 male tritonymphs (BMOC 06-0924-050, #2-9) ex *Caenolestes caniventer* Antho-
Fig. 15. *Caenolestomyobia faini* sp. nov., tritonymphs (paratypes): A – female tritonymph, dorsal view; B – same, ventral view; C – male tritonymph, dorsal view; D – same, ventral view.
dres de Cutervo, 2969 m, 06°14’59.9”S, 78°45’59.5”W, 13 September 2006, coll. L. Luna Wong (# LLW 1128). Mites removed by B.M. O’Connor.

**Type depositories.** The holotype is deposited in MUSM, paratypes are deposited in UMMZ and ZIN.

**Etymology.** This species is dedicated to the renowned Belgian acarologist Prof. Alex Fain (1906–2009).

**Differential diagnosis.** This species differs from *C. lukoschusi* sp. nov. by the following characters. In males of *C. faini* sp. nov., setae *e1* are 2.1–2.3 times longer than *c2*, the apices of setae *c2* almost reach to the level of seta *e2* bases; in tritonymphs, setae *f1* are shorter than *e2*, the length ratio is 1:1.2-1.7. In males of *C. lukoschusi* sp. nov., setae *f1* only 1.1 times longer than *c2*, the apices of setae *c2* are far removed from the level of seta *e2* bases; in tritonymphs, setae *f1* are longer than *e2*, the length ratio *f1* and *e2* is 1.1-1.4:1. Females of these species are almost undistinguished from each other.

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