

New species of *Entomobryini* from Russia and Armenia (Collembola, Entomobryomorpha)

Rafael Jordana^{1,3}, Mikhail Potapov² and Enrique Baquero¹

¹ Department of Zoology and Ecology, University of Navarra, Irunlarrea 1, 31080 Pamplona, Navarra, Spain

² Moscow State Pedagogical University, Biology/Chemistry Faculty, Zoology Department, Kibalchicha 6, b5 Moscow 129278, Russia

³ Corresponding author: Rafael Jordana (email: rjordana@unav.es)

Abstract

This paper is part of the results of a systematic study of the specimens of *Entomobrya* and related genera from various European museums and other material obtained from private collections. Various new species from Russia and Armenia were identified: *Entomobrya karasukensis* n. sp., *Entomobrya tuvinica* n. sp., *Entomobrya pseudolanuginosa* n. sp., *Entomobrya stebaevae* n. sp., *Entomobrya kuznetsovae* n. sp., *Entomobrya brinevi* n. sp., *Entomobrya primorica* n. sp., *Entomobrya kabardinica* n. sp., *Entomobrya taigicola* n. sp., *Entomobryoides sotoadamesi* n. sp. and *Prodrepanura altaica* n. sp. from Russia, and *Entomobrya armeniensis* n. sp. from Armenia. For the identification and description of these species we used the set of characters proposed by Jordana and Baquero (2005).

Key words: morphological characters, chaetotaxy.

1. Introduction

During the revision of the genus *Entomobrya* from some collections of Russia and Armenia, new species of *Entomobrya* and related genera were identified.

The combined use of colour and macrochaetotaxy allows the identification of new species and provides a good description. The set of characters proposed by Jordana & Baquero (2005), based on a constant and generally visible set of morphological characters (Christiansen 1958; Christiansen & Bellinger 1980), including the dorsal macrochaetotaxy, has proven very useful for the identification of species within the genus *Entomobrya* (Baquero et al. 2010; Jordana & Baquero 2010a; Jordana & Baquero 2010b).

Abbreviations: Abd = abdominal segment, Ant = antennal segment, asl = altitude sea level, MPGU = Moscow State Pedagogical University (Biology/Chemistry Faculty, Zoology Department), SZMN = Siberian Zoological Museum, Institute of Systematics and Ecology of animals, Th = thoracic segment

2. Material and Methods

The specimens were mounted in Hoyer medium, sometimes previously cleared with Nesbitt solution. Observation of the slides was done using an Olympus BX51-TF microscope with a multi-viewing system and phase contrast, and a Zeiss Axio Imager.A1 with differential interference contrast (DIC). For measurements, a UDA drawing attachment UIS (Universal Infinity System) and a scale calibrated with a Graticules Ltd slide (1 mm/0.01 div) were used. Measurements of the species are given in Table 1.

3. Results

Genus *Entomobrya* Rondani, 1861

Entomobrya armeniensis n. sp. (Figs 1A, 4A–D, 16A–D, Tab. 1)

Type locality. Armenia, South Caucasus, Dilizhan District, village of Salakh.

Type material. Holotype and 5 paratypes (juveniles) on the same slide, broadleaf forest, moss on tree trunks and stones, 27.10.1987. M. Potapov leg. Deposited in MPGU.

Description

Body length up to 1.9 mm excluding antennae (Tab. 1). Body colour pattern as in Fig. 1A.

Head: Eight ocelli, GH smaller than EF. Antennae length 1420 μm , 3 or more times the length of the head, Ant IV with simple apical vesicle. Relative length of Ant I/II/III/IV = 1/1.81/1.59/2.04. Labral papillae with a chaeta-like projection (Fig. 16A).

Body: Length ratio Abd IV/III >4 (8 times longer) (Tab. 1). Claw with 4 internal teeth: first pair at 64% from the base of claw; 2 unpaired teeth, first at 85% from the base, the most distal one minute; dorsal tooth not basal. Empodium spike-like, with smooth external edge on leg III (Figs 16B–C). Manubrium and dens length 1070 μm . Manubrial plate with 7 chaetae and 2 pseudopores. Mucronal subapical tooth similar to the terminal one; mucronal spine present (Fig. 16D).

Chaetotaxy: Simplified formula: 4-1-0-3-2/2-6/2-7/0(1)-2-2/0-6-3-3-2 (Fig. 1A).

Head chaetotaxy as in figure 4A (S_{4p} present). Thorax chaetotaxy: T1 area on Th II with 2 macrochaetae (m_1 and m_{2i} present); T2 area on Th II with 6 macrochaetae (Fig. 4B). Abdomen chaetotaxy (Figs 4C–D): A1 and A2 areas on Abd II with 2 and 7 macrochaetae respectively. Abd III with 2 macrochaetae on areas A4 and A5. Sometimes a_1 is present on A3 area. Abd IV macrochaetotaxy as in Fig. 4D.

Biology: It lives in moss on tree trunk and stones.

Remarks: The remarkable length of Abd IV together with the number and disposition of the macrochaetae of area A7 on Abd IV make it some similar to an *Homidia* species.

Discussion. *Entomobrya armeniensis* n. sp and *E. murrensis* Yosii and Ashraf, 1965 share the same chaetotaxy of Abd II (2-7 macrochaetae on A1 and A2 areas) and Abd III (0-2-2). However they differ from each other by the chaetotaxy of Th II (7-3 in *E. murrensis*; 2-6 in the new species). Other differences between the two species concern the colour pattern and other characters.

Etymology. Named after Armenia, the country where the species was found.

Entomobrya karasukensis n. sp. (Figs 1B, 5A–D, 16E–G, Tab. 1)

Type locality. Russia, 21.06.1991. S-W part of Novosibirsk region, 17 km W of Karasuk, above the flood terrace of Lake Krotovaya Lyaga, steppe, under *Festuca pseudovina*, 400 m asl.

Tab. 1 Measurements of the studied specimens, in micrometers. '-': no data.

	<i>E. armenien- sis</i> n. sp.	<i>E. kara- sakensis</i> n. sp.	<i>E. tavinica</i> n. sp.	<i>E. pseudo- lanuginosa</i> n. sp.*	<i>E. stebaevae</i> n. sp.	<i>E. kuznetsovae</i> n. sp.	<i>E. brinevi</i> n. sp.	<i>E. primorica</i> n. sp.	<i>E. kabardinica</i> n. sp.	<i>E. taigicola</i> n. sp.
Ant I	220	80	130	138	70	140	150	130	90	200
Ant II	400	150	220	274	110	210	300	250	180	350
Ant III	350	130	240	198	140	200	-	240	160	300
Ant IIII	450	240	280	285	160	350	-	300	200	450
Ant	1420	600	870	863	480	900	-	920	630	1300
Head	410	250	370	398	240	320	430	380	320	440
Ant/head ratio	3.46	2.40	2.35	2.37	2.00	2.81	-	2.42	1.97	2.95
Th II	260	160	200	241	120	200	300	250	190	300
Th III	100	110	100	155	90	120	200	200	90	150
Abd I	80	90	110	110	70	100	150	120	80	100
Abd II	100	110	150	138	90	150	200	80	110	120
Abd III	80	110	100	143	90	150	140	90	110	140
Abd IV	690	340	500	522	290	500	590	500	350	630
Abd IV/III ratio	8.63	3.09	5.00	3.70	3.22	3.33	4.21	5.56	3.18	4.50
Abd V	90	90	80	154	60	100	130	100	100	150
Abd VI	80	70	80	99	40	80	100	70	70	80
Body	1890	1330	1690	1960	1090	1720	2240	1790	1420	2110
Manubrium	450	280	350	381	240	320	350	400	220	520
Dens	620	270	400	450	200	360	470	470	330	600
Claw	40	27	42	45	30	34	-	-	30	36
Empodium	24	14	24	29	19	24	-	-	20	26
Tenent hair	42	32	26	55	36	46	-	-	40	50

*Mean of 10 specimens, except for antennae: 3 specimens.

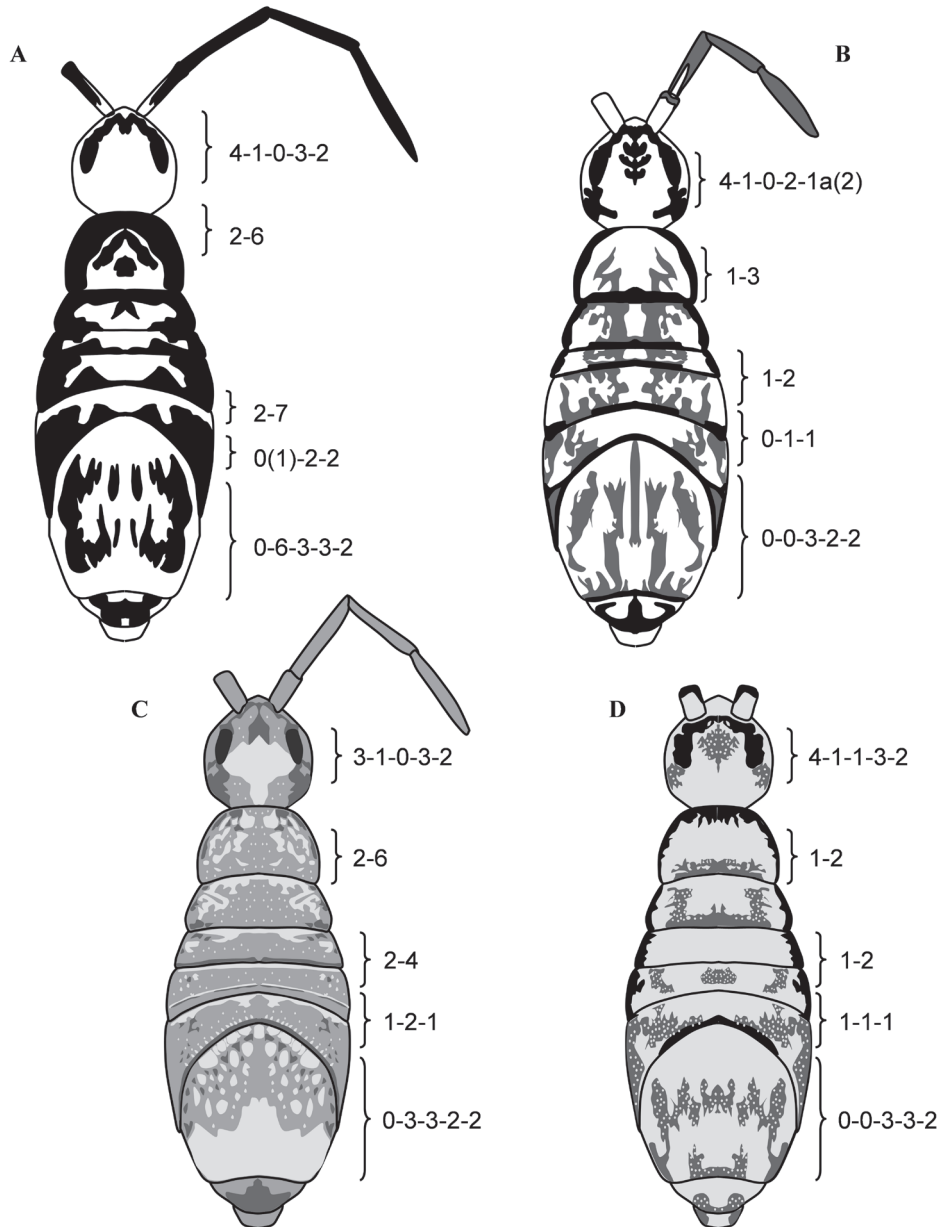


Fig. 1 Colour pattern of some *Entomobrya* species described in this paper. **A:** *E. armeniensis* n. sp.; **B:** *E. karasukensis* n. sp.; **C:** *E. tuvunica* n. sp.; **D:** *E. stebaevae* n. sp.

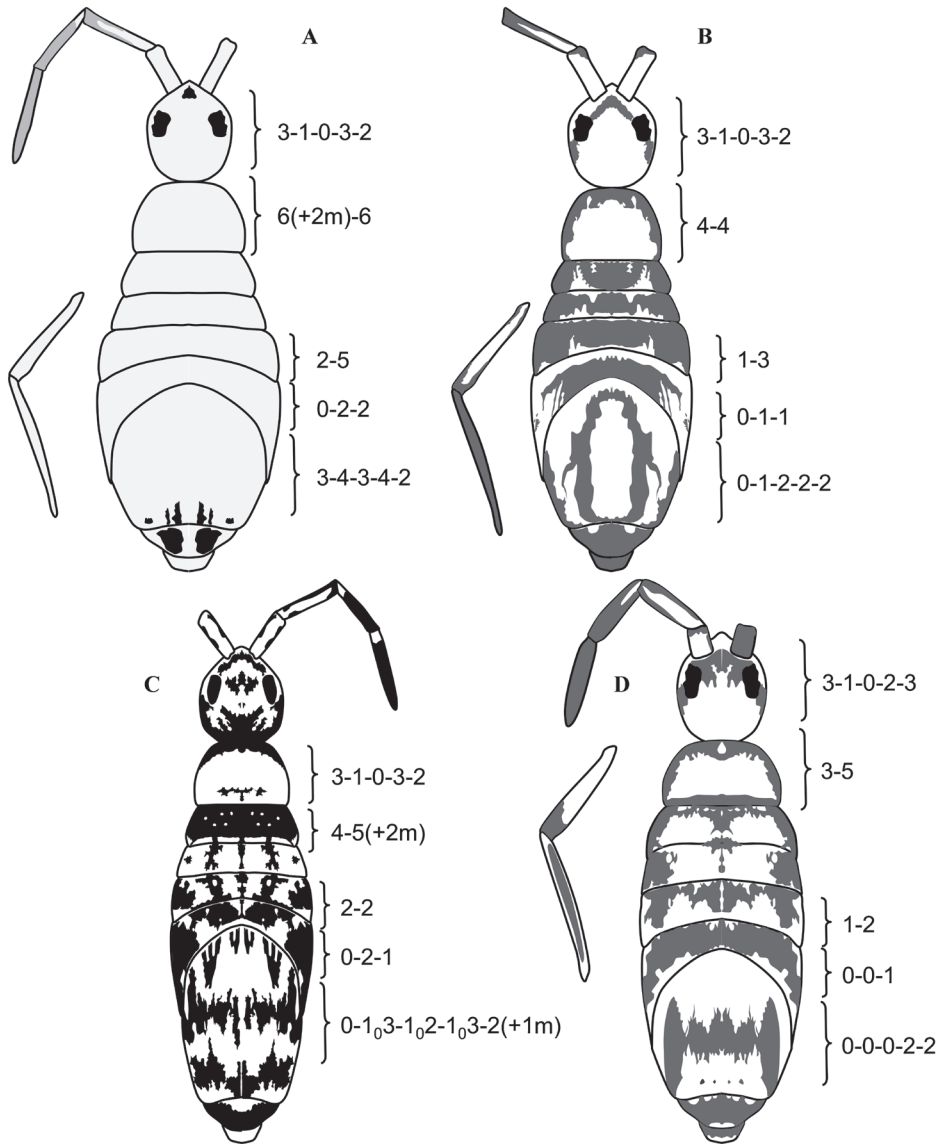


Fig. 2 Colour pattern (cont.). **A:** *E. kuznetsovae* n. sp.; **B:** *E. brinevi* n. sp.; **C:** *E. primorica* n. sp.; **D:** *E. kabardinica* n. sp.

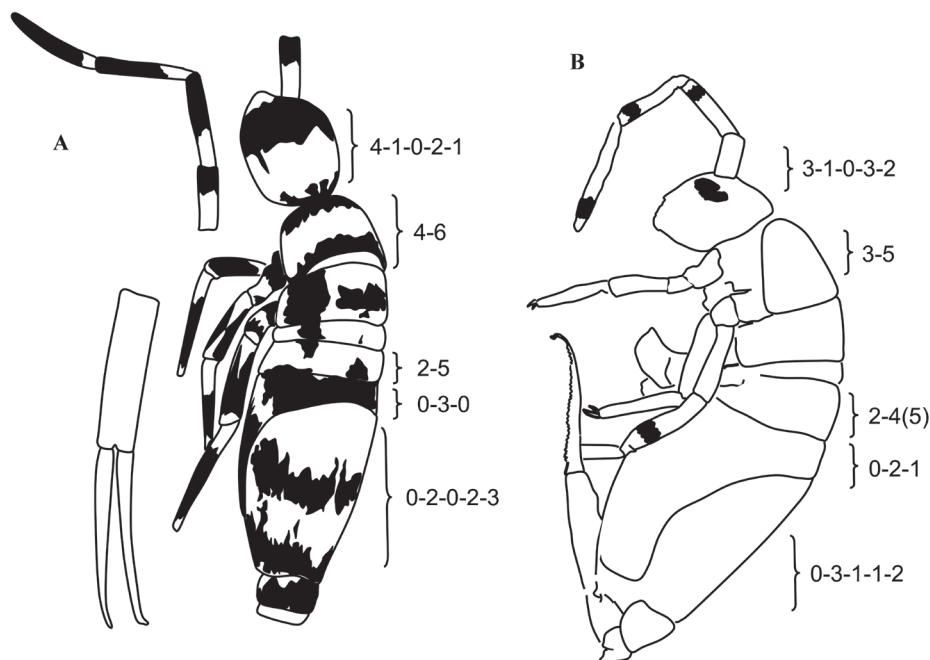


Fig. 3 Colour pattern (cont.). **A:** *Entomobryoides sotoadamesi* n. sp.; **B:** *Prodrepanura altaica* n. sp.

Type material. Holotype on slide and 11 paratypes in ethyl alcohol, steppe, under *Festuca pseudovina*, 400 m asl, 21.VI.1991, Stebaeva leg. and coll. Deposited in SZMN.

Description

Body length up to 1.3 mm excluding antennae (Tab. 1). Body colour pattern as in Fig. 1B.

Head: Eight ocelli, GH smaller than EF. Antennae length 600 μm , 2 times (<3) the length of the head, Ant IV with simple apical vesicle. Relative length of Ant I/II/III/IV = 1/1.87/1.62/3. Labral papillae wrinkled or with some projections (Fig. 16E).

Body: Length ratio Abd IV/III <4 (Tab. 1). Claw with 4 internal teeth; dorsal tooth not basal. Empodium with smooth external edge on leg III. Manubrium and dens length 550 μm . Manubrial plate with 3 chaetae and 2 pseudopores. Mucronal subapical tooth smaller than terminal one; mucronal spine present (Fig. 16F).

Chaetotaxy: Simplified formula: 4-1-0-2-1a(2)/1-3/1-2/0-1-1/0-0-3-2-2 (Fig. 1B). The numbers in brackets are frequent alternatives, usually represented by one additional mesochaeta.

Head chaetotaxy as in figure 5A. Thorax chaetotaxy: T1 area on Th II with one macrochaeta (m_1 present); T2 area on Th II with 3 macrochaetae (Fig. 5B). Abdomen chaetotaxy (Figs 5C–D): Abd II with 1 macrochaeta (a_2) on A1 area, and 2 macrochaetae on A2 area (m_{3ep} and m_{3ca}). Abd III with 1 macrochaeta on areas A4 and A5 (a_3 and m_3). Microchaetae of Abd V slightly thickened (Fig. 16G).

Biology: Lives in steppe with Poaceae.

Discussion. Five Palearctic species have 1-2 macrochaetae on A1 and A2 areas of Abd II and 0-1-1 macrochaetae on Abd III (*E. karasukensis* n. sp., *E. arborea* (Tullberg, 1871),

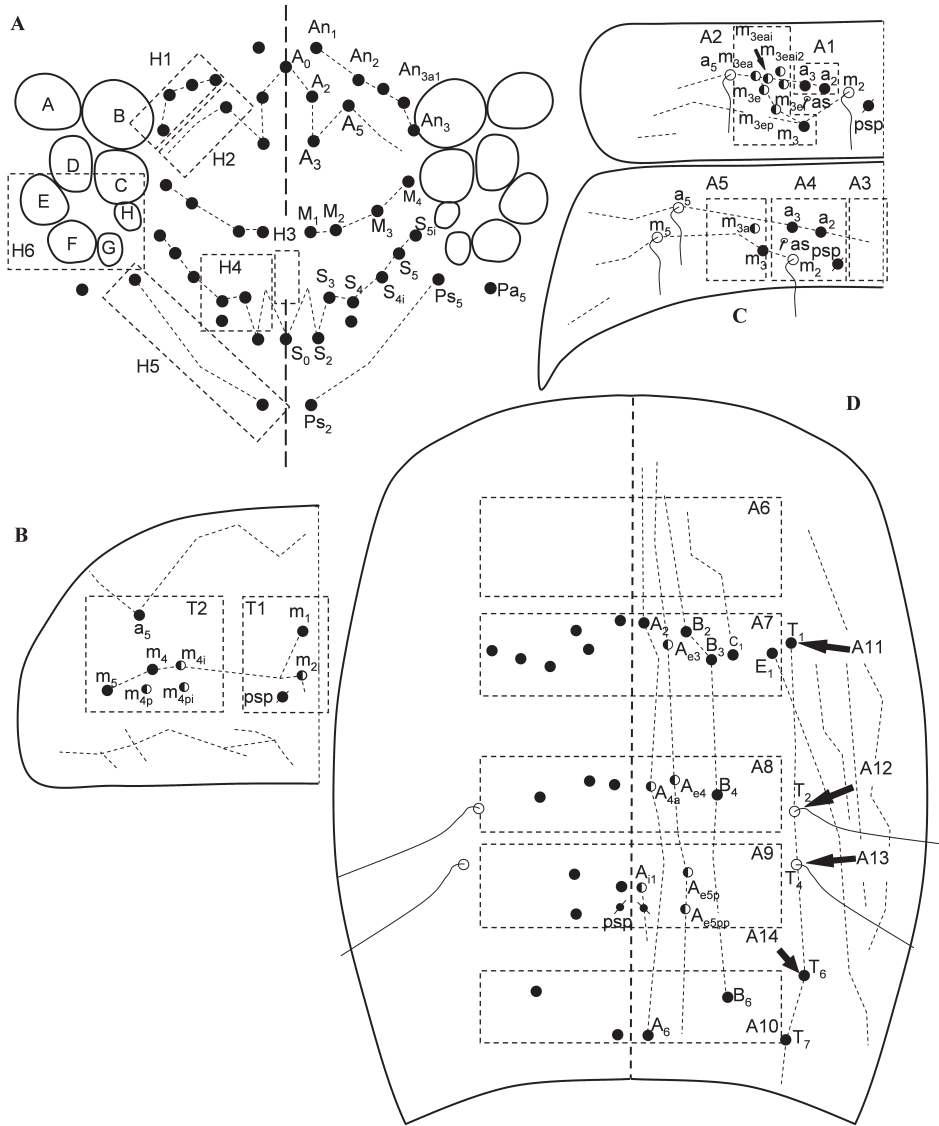


Fig. 4 *E. armeniensis* n. sp. macrochaetotaxy. A: head; B: Th II; C: Abd II-III; D: Abd IV.

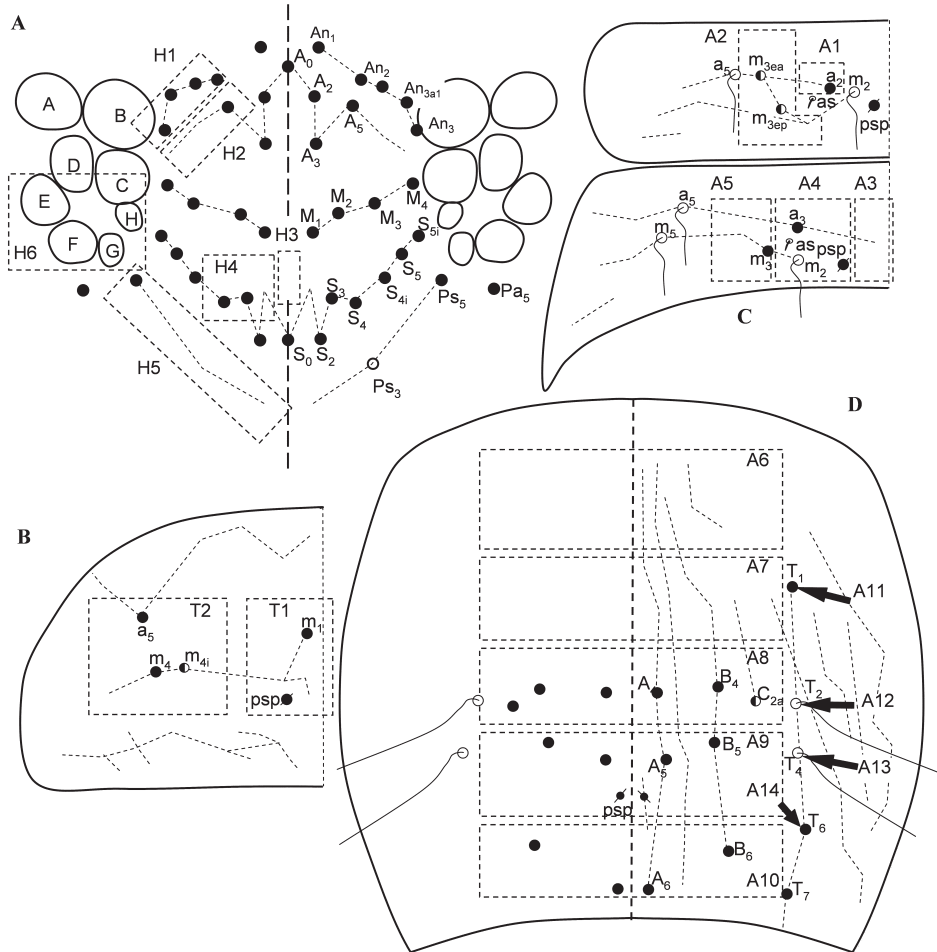


Fig. 5 *E. karasukensis* n. sp. macrochaetotaxy. **A:** head; **B:** Th II; **C:** Abd II–III; **D:** Abd IV.

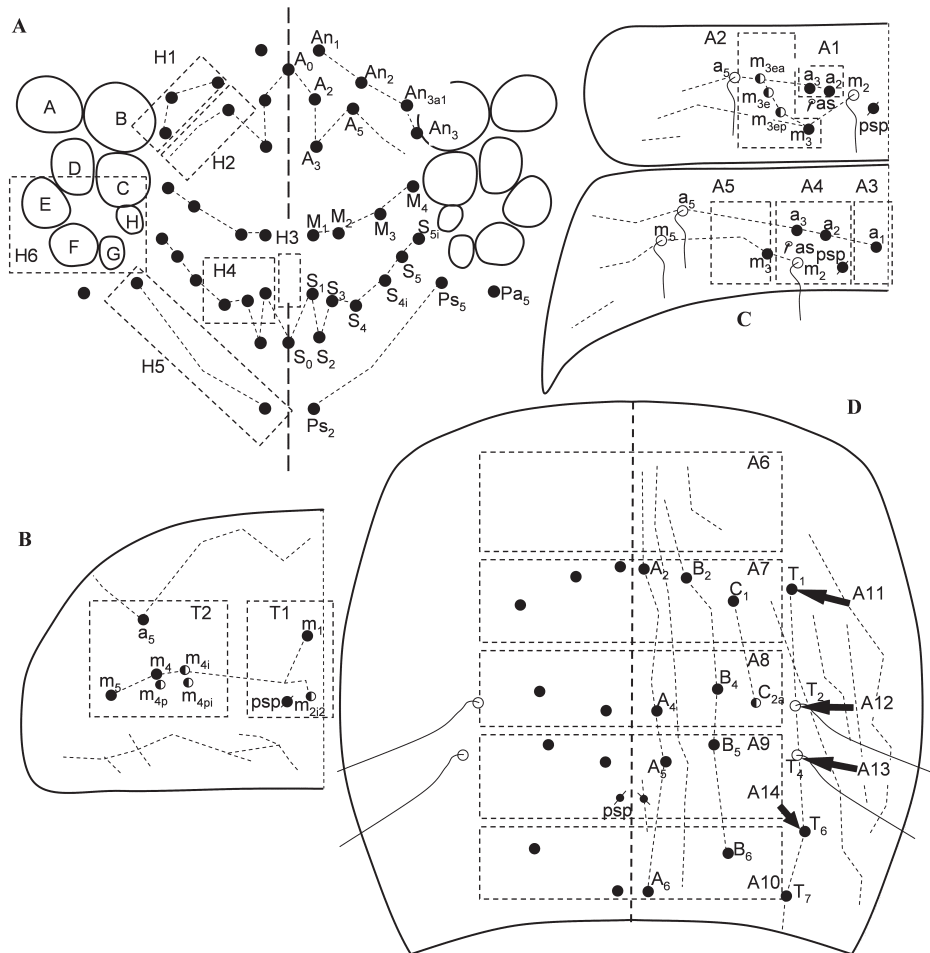


Fig. 6 *E. tuvunica* n. sp. macrochaetotaxy. A: head; B: Th II; C: Abd II-III; D: Abd IV.

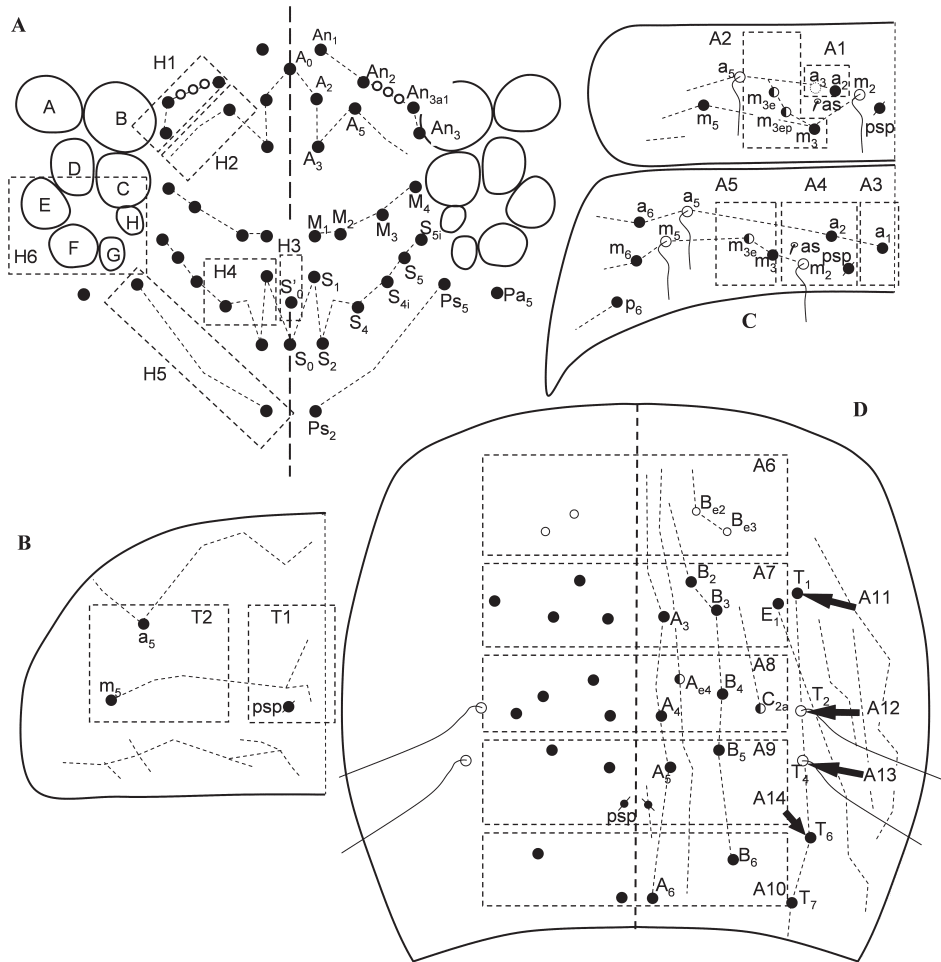


Fig. 7 *E. pseudolanuginosa* n. sp. macrochaetotaxy. **A:** head; **B:** Th II; **C:** Abd II–III; **D:** Abd IV.

E. chomolungmae Yosii, 1971, *E. chungseensis* Baquero & Jordana, 2008 and *E. obensis* Linnaniemi, 1919). The new species, however, can be distinguished from the others because of the presence of 1–3 macrochaetae on areas T1 and T2 of Th II, and by differences in colour pattern and head chaetotaxy.

Etymology: The name refers to the city adjacent to the lake where the species was recorded.

***Entomobrya tuvinica* n. sp.** (Figs 1C, 6A–D, 16H–I, Tab. 1)

Type locality. Russia, Tuva Republic, Tuvinskaya Basin, northern macro-slope of Eastern Tannu-Ola Mt. Range, ca. 5–7 km of south bank of Lake Chagytai, mountain larch forest (with *Larix sibirica*), low part of larch belt, 1300 m asl.

Type material. Holotype on slide and four paratypes in ethyl alcohol, mountain larch forest (with *Larix sibirica*), lower part of larch belt, 1300 m asl., 16.VI.2003, Stebaeva leg. and coll. Deposited in SZMN.

Description

Body length up to 1.7 mm excluding antennae (Tab. 1). Body colour pattern as in Fig. 1C.

Head: Eight ocelli, GH smaller than EF. Antennae length 870 μ m, less than 3 times the length of the head, Ant IV with simple apical vesicle. Relative length of Ant I/II/III/IV = 1.00/1.69/1.84/2.15. Labral papillae with a small chaeta-like projection (Fig. 16H).

Body: Length ratio Abd IV/III >4 (Tab. 1). Claw with 4 internal teeth: first pair at 50% from the base of claw; 2 unpaired teeth, first at 69% from the base; the distal one minute; dorsal tooth at internal paired teeth level. Empodium spike-like, with smooth external edge on leg III (the postero-external lamella is serrated and could be visible for the position of the leg) (Fig. 16I). Length of manubrium and dentes 750 μ m (Tab. 1). Manubrial plate with 4 chaetae and 2 pseudopores. Mucronal subapical tooth similar to the terminal one; mucronal spine present.

Chaetotaxy: Simplified formula: 3-1-0-3-2/2-6/2-4/1-2-1/0-3-3-2-2 (Fig. 1C).

Head chaetotaxy as in Fig. 6A. Thorax chaetotaxy: T1 area on Th II with 2 macrochaetae (m_1 and m_{212} present); T2 area on Th II with 6 macrochaetae (Fig. 6B). Abdomen chaetotaxy (Figs 6C–D): A1 and A2 areas on Abd II with 2 and 4 macrochaetae, respectively. Abd III with 2 macrochaetae on area A4 and 1 macrochaeta on areas A3 and A5. Abd IV, sometimes, shows chaetotaxy asymmetry by absence of C_{2a} Mc.

Biology: It lives in forests of *Larix sibirica*, possibly it is a tree dweller.

Discussion. Seven species of *Entomobrya* share the same chaetotaxy on Abd II and III (2-4/1-2-1) (*E. tuvinica* n. sp., *E. arvensis* Latzel, 1918, *E. lindbergi* Stach, 1960, *E. mesopotamica* Rusek, 1971, *E. rohtangensis* Baijal, 1958, sensu Yoshii, 1990, *E. striatella* Börner, 1909 and *E. palmensis* Jordana & Baquero, 2010). Two of them (*E. tuvinica* n. sp. and *E. mesopotamica*) have the labral papillae with a chaeta-like projection, but *E. mesopotamica* has 3-3 macrochaetae on Th II while the new species has 2-6. In addition, the colour pattern of the two species is very different.

Etymology. The name refers to the region where the species was recorded.

***Entomobrya pseudolanuginosa* n. sp.** (Figs 7A–D, 16J–L, Tab. 1)

Type locality. Russia, S-E Altai, Bol'shoi Kuraiskii Mt. Range, ca. 7 km of vil. Kurai, E-S-E slope, mountain larch forest with *Larix sibirica*.

Type material. Holotype and 9 paratypes on the same slide (previously labelled as *E. lanuginosa*), mountain larch forest with *Larix sibirica*, 1600–1700 m asl., E-S-E slope, 22.vii.1964, Stebaeva leg. Deposited in SZMN.

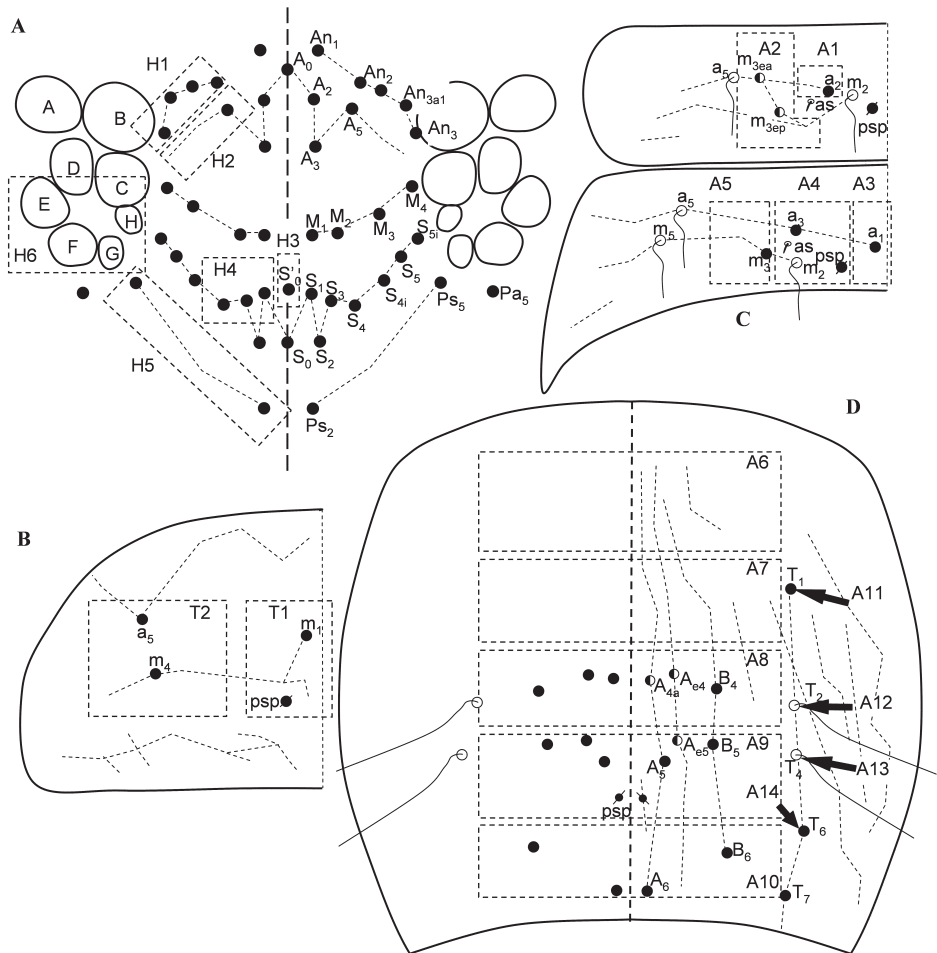


Fig. 8 *E. stebaevae* n. sp. macrochaetotaxy. **A:** head; **B:** Th II; **C:** Abd II-III; **D:** Abd IV.

Description

Body length up to 1.9 mm excluding antennae (Tab. 1). Body colour pattern completely pale, whitish.

Head: Eight ocelli, GH smaller than EF. Antennae length 865 μm , less than three times the length of the head (Tab. 1). Ant IV with simple apical vesicle. Relative length of antennal segments Ant I/II/III/IV = 1/1.98/1.43/2.06 (Tab. 1). Labral papillae wrinkled or with some projections (Fig. 16J).

Body: Length ratio Abd IV/III <4 (Tab. 1). Claw with 4 internal teeth: first pair at 46% from the base of claw; 2 unpaired teeth, first at 77% from the base, the most distal one minute; dorsal tooth between the basis and the level of 2 internal teeth. Empodium spike-like, with smooth external edge on leg III (Fig. 16K). Manubrium and dens length 830 μm (Tab. 1). Manubrial plate with 6 chaetae and 2 pseudopores. Mucronal subapical tooth similar to the terminal one; mucronal spine present. Male genital plate as in Fig. 16L.

Chaetotaxy: Simplified formula: 6-1-1-2-2/0-2/1(2)-3/1-1-2/0-4-4-2-2 (Figs 7A–D).

Head chaetotaxy as in figure 7A; in H1 area 3 of the 6 chaetae are mesochaetae. Thorax chaetotaxy: Th II without macrochaetae on T1 area; T2 area with 2 macrochaetae (a_5 , m_5) (Fig. 7B). Abdomen chaetotaxy (Figs 7C–D): A1 area on Abd II with 1 (sometimes with a mesochaeta) and A2 area with 3 macrochaetae (m_3 , m_{3epm} and m_{3e} , respectively). Abd III with one macrochaeta on areas A3 and A4 and 2 macrochaetae on area A5. On Abd IV sometimes are present 2 mesochaeta on A6 area.

Biology: It lives in larch forest of *Larix sibirica*.

Discussion. Three species of *Entomobrya* (*E. pseudolanuginosa* n. sp. *E. tenkyniensis* Tshelnokov, 1987 and *E. mieheorum* Baquero & Jordana, 2008) have 1-3/1-1-2 macrochaetae on Abd II and III, but only *E. pseudolanuginosa* n. sp. has S'_0 on the head and 0-2 macrochaetae on T1 and T2 areas of Th II. Also the colour pattern is different among these species.

Etymology. Similar in colouration to *E. lanuginosa* (Nicolet, 1842) Rondani, 1861.

***Entomobrya stebaevae* n. sp.** (Figs 1D, 8A–D, 16M–O, Tab. 1)

Type locality. Russia, Tuva Republic, Ubsunurskaya Basin (= hollow), north slope of Tsuger-Eliss sand massive, ca. 15–20 km from Erzin, under *Salix*, 1000 m asl.

Type material. Holotype and 2 paratypes in ethyl alcohol, under *Salix* sp., 1000 m asl, 29.VII.2001, Stebaeva leg. Deposited in SZMN.

Description

Body length up to 1.1 mm excluding antennae (Tab. 1). Body colour pattern as in Fig. 1D.

Head: Eight ocelli, GH smaller than EF (Fig. 16M). Antennae length 480 μm , 2 times the length of the head (Tab. 1). Relative length of antennal segments Ant I/II/III/IV = 1/1.57/2/2.28 (Tab. 1). Labral papillae smooth.

Body: Length ratio Abd IV/III <4 (Tab. 1). Claw with 4 internal teeth: first pair at 50% from the base of claw; 2 unpaired teeth, first at 75% from the base; the most distal one minute; dorsal tooth at level of the paired internal teeth. Empodium spike-like, with smooth external edge on leg III (Fig. 16N). Manubrium and dens length 440 μm (Tab. 1). Manubrial plate with 3 chaetae and 2 pseudopores. Mucronal subapical tooth similar to the terminal one; mucronal spine present (Fig. 16O).

Chaetotaxy: Simplified formula: 4-1-1-3-2/1-2/1-2/1-1-1/0-0-3-3-2.

Head chaetotaxy as in Fig. 8A. Thorax chaetotaxy: T1 area on Th II with 1 macrochaeta (m_1 present); T2 area on Th II with 2 macrochaetae (a_5 and m_4) (Fig. 8B). Abdomen chaetotaxy

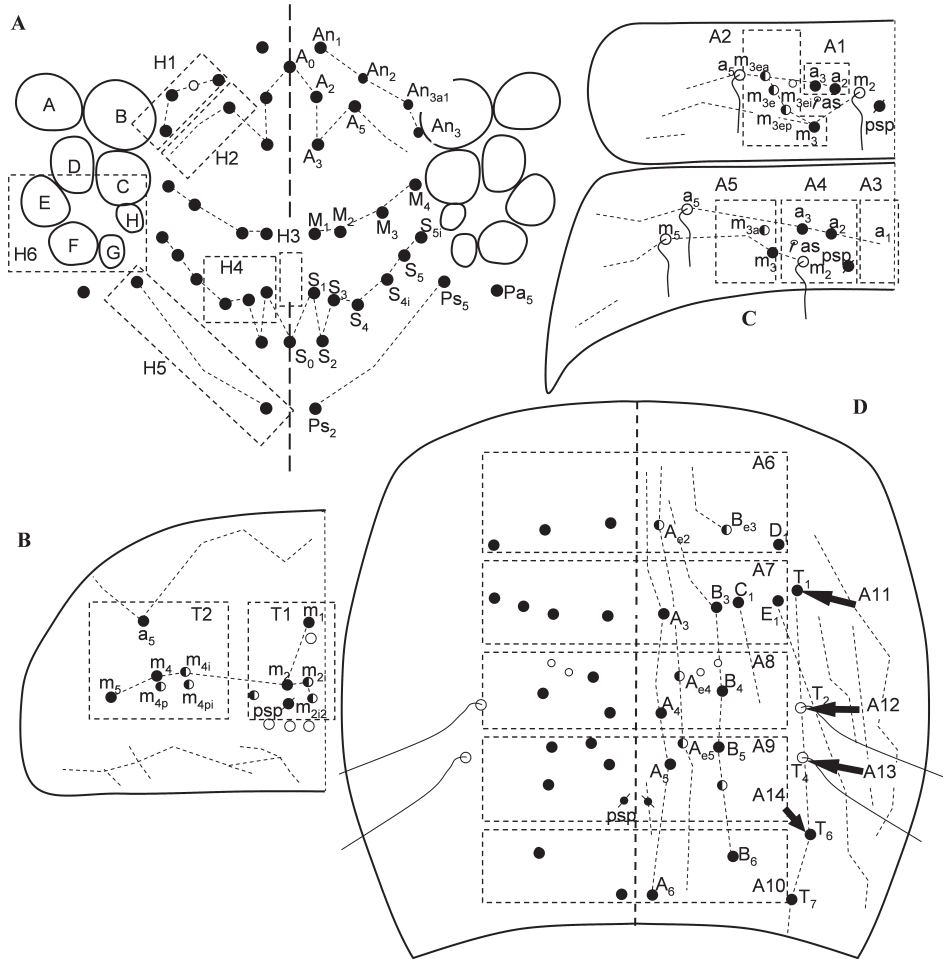


Fig. 9 *E. kuznetsovae* n. sp. macrochaetotaxy. **A:** head; **B:** Th II; **C:** Abd II-III; **D:** Abd IV.

(Figs 8C–D): Abd II with 1 macrochaeta on A1 area (a_2) and 2 macrochaetae on A2 area (m_{3ep} , m_{3ca}). Abd III with 1 macrochaeta each on areas A3, A4 and A5.

Biology: It lives under *Salix* sp.

Discussion. Only two species of Palaearctic *Entomobrya* have 1-2/1-1-1 macrochaetae on Abd II and III: the new species and *E. nigrocincta* Denis, 1923. *E. nigrocincta*, however, has 2–3 macrochaetae on T1 and T2 areas on Th II and the colour pattern is quite different.

Etymology. The species is dedicated to Sofia Stebaeva, an esteemed expert on Collembola from southern Siberia.

Entomobrya kuznetsovae n. sp. (Figs 2A, 9A–D, 17A–C, Tab. 1)

Type locality. Russian Federation, N Caucasus, Kabardino-Balkaria Republic (Prielbrusye), near Mt. Elbrus, 1800 m asl.

Type material. Holotype on slide and paratype in ethyl alcohol, sample 47R, steep north slope, pine-wood, in moss on stone, 22.09.1999, M. Potapov leg. Deposited in MPGU.

Other material. Russian Federation: N Caucasus, Kabardino-Balkaria republic (Prielbrusye), Irik Canyon, 2000 m asl, 10 specimens in ethyl alcohol in the sample 27R, pasture, 23.09.1999, M. Potapov leg.; N Caucasus, Kabardino-Balkaria (Prielbrusye), Irik Canyon, 2500 m asl, about 2 km from the Irik Glacier, 5 specimens in ethyl alcohol in the sample 34R, in moss on soil, 23.09.1999, M. Potapov leg. All in Potapov Coll.

Description

Body length up to 1.7 mm, excluding antennae (Tab. 1). Body ground colour yellowish, pattern as in Fig. 2A.

Head: Eight ocelli, GH smaller than EF. Antennae length 900 μ m, 2.8 times the length of the head (Tab. 1). Relative length of antennal segments Ant I/II/III/IV = 1/1.5/1.42/2.5 (Tab. 1). Labral papillae with a chaeta-like projection (Fig. 17A).

Body: Length ratio Abd IV/III < 4 (Tab. 1). Tibiotarsus sub-segmented. Claw with 4 internal teeth: first pair at 60% from the base of claw; 2 unpaired teeth, first at 75% from the base; the most distal one minute; dorsal tooth between the 2 paired internal teeth and the base of the claw. Empodium spike-like, with smooth external edge on leg III (Fig. 17B). Manubrium and dens length 680 μ m (Tab. 1). Manubrial plate with 7 chaetae and 2 pseudopores (Fig. 17C). Mucronal subapical tooth similar to the terminal one; mucronal spine present.

Chaetotaxy: Simplified formula: 3-1-0-3-2/6(+2m)-6/2-5/0-2-2/3-4-3-4-2 (Fig. 2A).

Head chaetotaxy as in Fig. 9A, some time a mesochaeta is present. Thorax chaetotaxy: T1 area on Th II with 6 macrochaetae (m_1 , m_2 , m_{21} and m_{22} present, in addition to 2 additional macrochaetae); T2 area on Th. II with 6 macrochaetae (Fig. 9B). Abdomen chaetotaxy (Fig. 9C–D): A1 and A2 areas on Abd II with 2 and 5 macrochaetae, respectively. Abd III with 2 macrochaetae on areas A4 and A5.

Biology: It lives in moss on stone under pine-wood.

Discussion. *Entomobrya taigicola* shares the same chaetotaxy on Th II and Abd II and III with the new species, but differing in the head and Abd IV chaetotaxy. Also the colour pattern is different in the 2 species.

Etymology. Named after our Russian colleague Natalia Kuznetsova.

Entomobrya brinevi n. sp. (Figs 2B, 10A–D, 17D–E, Tab. 1)

Type locality. Southern Russian Far East, Khabarovsk Krai, Lower reaches of the Bureya River.

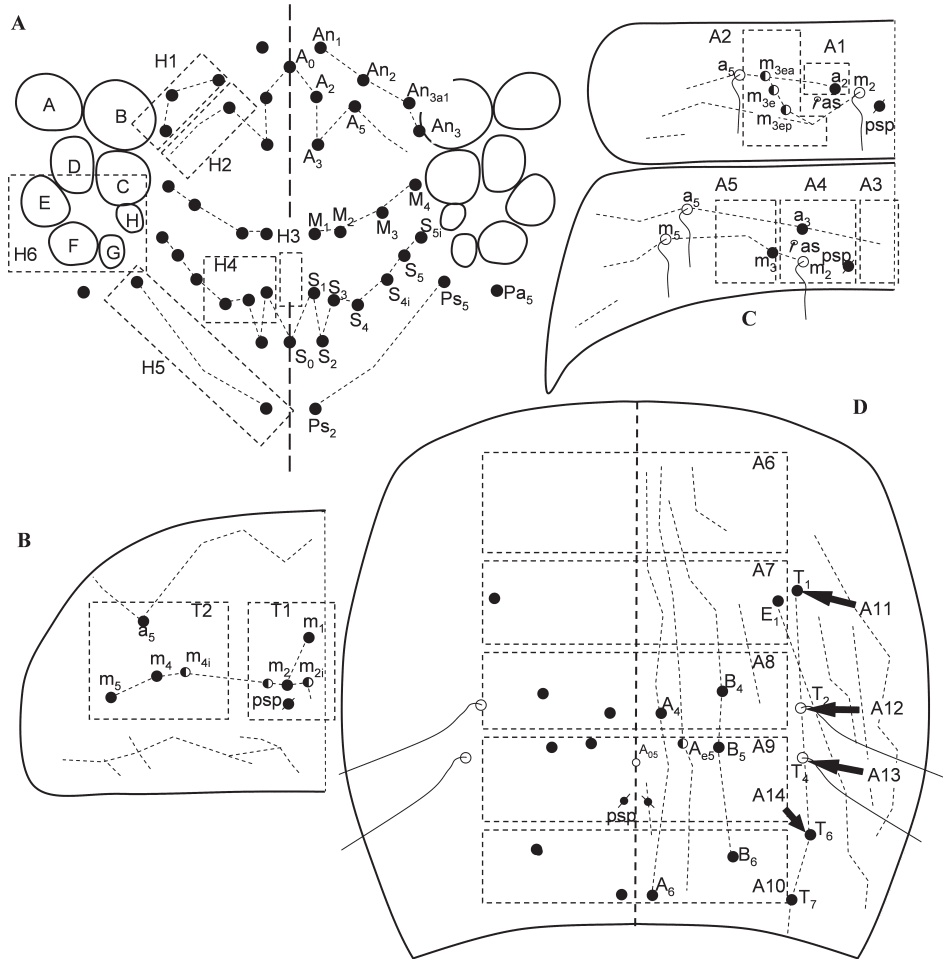


Fig. 10 *E. brinevi* n. sp. macrochaetotaxy. A: head; B: Th II; C: Abd II–III; D: Abd IV.

Type material. Holotype on slide and 5 paratypes in ethyl alcohol, Sample 06 R, station Medvezhe, taiga, in the canopy of *Larix*, 09.07.2006, A. Brinev & A. Polyakov leg. M. Potapov collected together with *E. taigicola* n. sp. Deposited in MPGU.

Description

Body length up to 2.2 mm excluding antennae (Tab. 1). Body colour pattern as in Fig. 2B.

Head: Eight ocelli, GH smaller than EF. Antennae length 800 μm , 2.42 times the length of the head (Tab. 1). Relative length of antennal segments Ant I/II/III/IV = 1/2/2/2.27 (Tab. 1). Labral papillae smooth.

Body: Length ratio Abd IV/ III >4 (Tab. 1). Claw with 4 internal teeth: first pair at 50% from the base of claw; 2 unpaired teeth, first at 75% from the base; the most distal one minute; dorsal tooth apparently absent. Empodium spike-like, with smooth external edge on leg III (Fig. 17D). Manubrium and dens length 820 μm (Tab. 1). Manubrial plate with 3 chaetae and 2 pseudopores. Mucronal subapical tooth similar to the terminal one; mucronal spine present (Fig. 17E).

Chaetotaxy: Simplified formula: 3-1-0-3-2/4-4/1-3/0-1-1/0-1-2-2-2 (Fig. 2B).

Head chaetotaxy as in figure 10A. Thorax chaetotaxy: T1 area on Th II with 4 macrochaetae (m_1 , m_2 , m_{21} and an additional macrochaeta present); T2 area on Th II with 4 macrochaetae (Fig. 10B). Abdomen chaetotaxy (Figs 10C–D): Abd II with 1 macrochaeta on A1 area (a_2) and 3 macrochaetae on A2 area (m_{3ep} , m_{3e} , m_{3ea}). Abd III with 1 macrochaeta on each areas A4 and A5 (a_3 and m_3).

Biology: Tree dweller in the canopy of *Larix*.

Discussion. *E. lhotseae* has the same chaetotaxy on Abd II and III as the new species, however they differ from each other in the macro-chaetotaxy of Th II: 2–3 in *E. lhotseae*, 4–4 in *E. brinevi* n. sp

Etymology. The species is dedicated to Alexey Brinev, who collected the specimens in the mountains of the Russian Far East.

Entomobrya primorica n. sp. (Figs 2C, 11A–D, 17F–H, Tab. 1)

Type locality. Southern Russian Far East, Shkotovsky area, Anisimovka. Western part of Anisimovka (= ‘Stroika’).

Type material. Holotype on slide and paratype in ethyl alcohol, Sample R 8, between stones. Rails, 20.09.2004, M. Potapov leg., Potapov Coll. Deposited in MPGU.

Description

Body length up to 1.8 mm excluding antennae (Tab. 1). Body colour pattern as in Fig. 2C.

Head: Eight ocelli, GH smaller than EF. Antennae length 920 μm , 2.4 times the length of the head (Tab. 1). Relative length of antennal segments Ant I/II/III/IV = 1/1.9/1.8/2.3. Labral papillae with a chaeta-like projection (Fig. 17F).

Body: Length ratio Abd IV/III >4 (5.56) (Tab. 1). Claw with 4 internal teeth. Manubrium and dens length 870 μm (Tab. 1). Manubrial plate with 7 chaetae and 2 pseudopores (Fig. 17H). Mucronal subapical tooth similar to the terminal one; mucronal spine present.

Chaetotaxy: Simplified formula: 3-1-0-3-2/4-5(+2m)/2-2/0-2-1/0-1₀3-1₀2-1₀3-2(+1m) (1₀ indicates there is an unpaired chaeta in addition to the paired ones) (Fig. 2C)

Head chaetotaxy as in Fig. 11A. Thorax chaetotaxy: T1 area on Th II with 4 macrochaetae (m_1 , m_2 , m_{21} and m_{212} present); T2 area on Th II with 5 macrochaetae (in addition to 2 additional chaetae that could be present) (Fig. 11B). Abdomen chaetotaxy (Figs 11C–D): Abd II with 2 macrochaetae on area A1 and 2 macrochaetae on A2 area (m_3 and m_{3ea}). Abd III with 2 macrochaetae on area A4 and 1 macrochaeta on area A5.

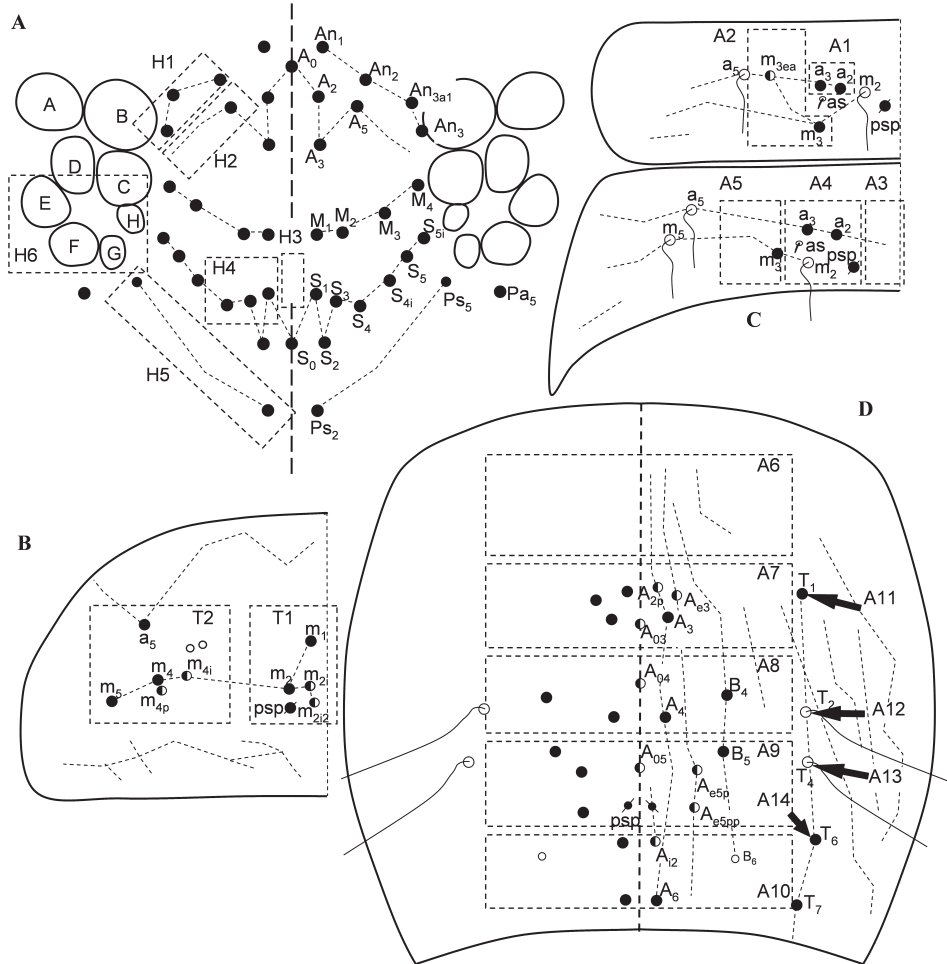


Fig. 11 *E. primorica* n. sp. macrochaetotaxy. **A:** head; **B:** Th II; **C:** Abd II–III; **D:** Abd IV.

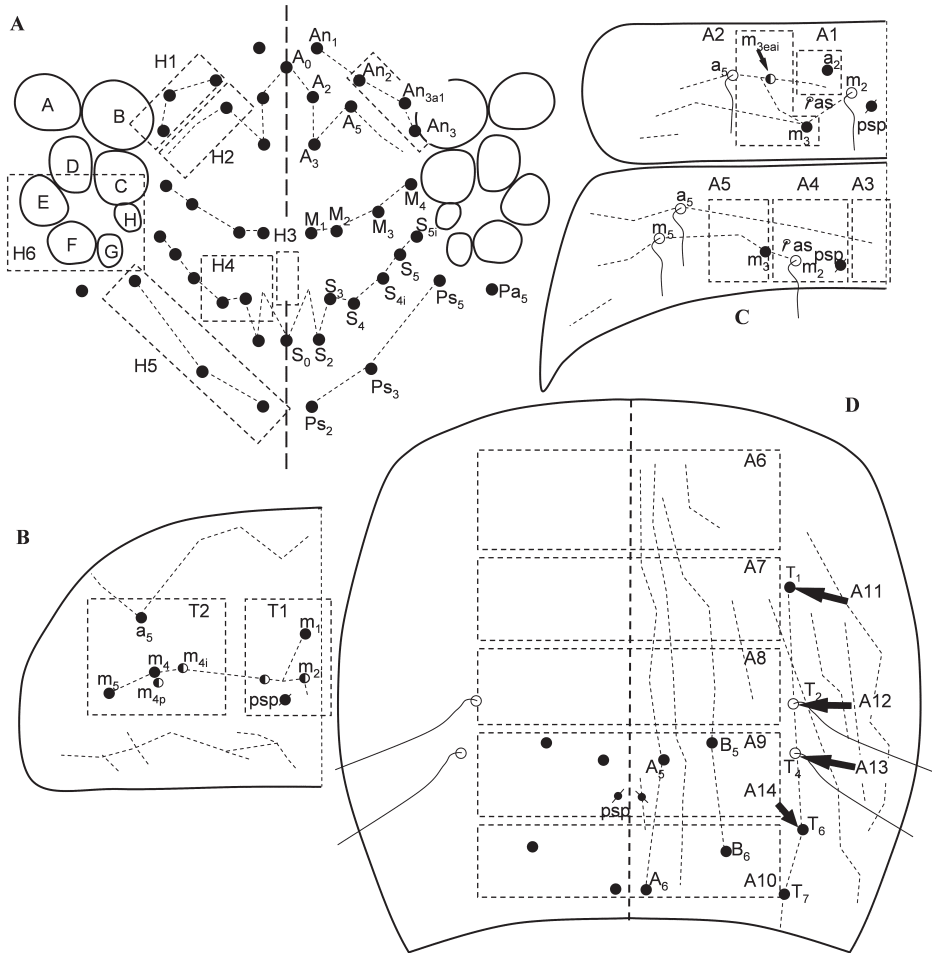


Fig. 12 *E. kabardinica* n. sp. macrochaetotaxy. **A:** head; **B:** Th II; **C:** Abd II-III; **D:** Abd IV.

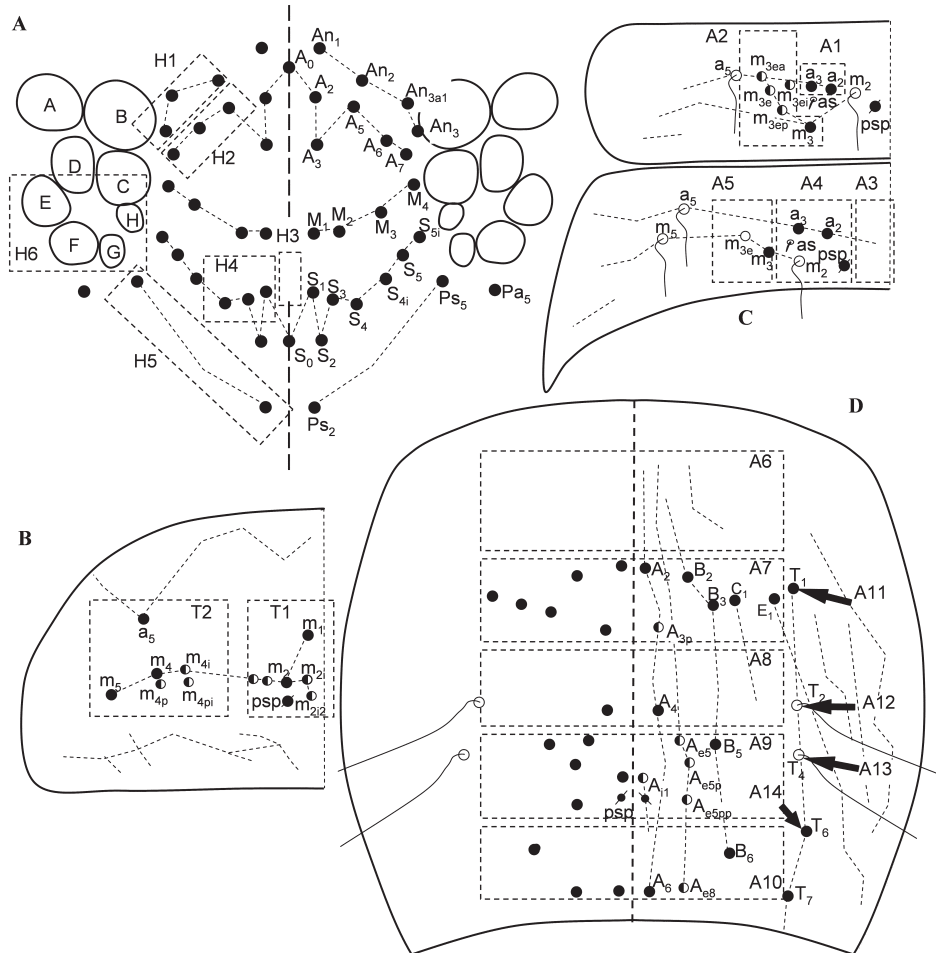


Fig. 13 *E. taigicola* n. sp. macrochaetotaxy. A: head; B: Th II; C: Abd II-III; D: Abd IV.

Biology: Found among stones.

Discussion. It is the only known Palaearctic species with 2-2/0-2-1 macrochaetae on Abd II and III and with a very characteristic Abd IV chaetotaxy.

Etymology. Primorye is another name of southern part of the Russian Far East where the species was collected.

Entomobrya kabardinica n. sp. (Figs 2D, 12A–D, 17I–K, Tab. 1)

Type locality. Russian Federation, N Caucasus, Kabardino-Balkaria Republic (Prielbrusye), Adylsu Canyon, 2300 m asl., near MVTU station.

Type material. Holotype on slide and 3 paratypes in ethyl alcohol, Sample 49R, pine-wood, under loose bark, 25.09.1999, M. Potapov leg and coll. Deposited in MPGU.

Description

Body length up to 1.4 mm excluding antennae (Tab. 1). Body colour pattern as in Fig. 2D.

Head: Eight ocelli, GH smaller than EF. Antennae length 630 μm , almost 2 times the length of the head (Tab. 1). Relative length of antennal segments Ant I/II/III/IV = 1/2/1.7/2.2 (Tab. 1). Labral papillae smooth.

Body: Length ratio Abd IV/III <4 (Tab. 1). Claw with 4 internal teeth: first pair at 65% from the base of claw; 2 unpaired teeth, first at 85% from the base, the most distal one minute; dorsal tooth near the base of the claw. Empodium spike-like, with smooth external edge on leg III (Fig. 17I). Manubrium and dens length 550 μm (Tab. 1). Manubrial plate with 3 chaetae and 2 pseudopores (Fig. 17J). Mucronal subapical tooth similar to the terminal one; mucronal spine present (Fig. 17K).

Chaetotaxy: Simplified formula: 3-1-0-2-3/3-5/1-2/0-0-1/0-0-0-2-2 (Fig. 2D).

Head chaetotaxy as in Fig. 12A. Thorax chaetotaxy: T1 area on Th II with 3 macrochaetae (m_1 , m_{2i} and m_{2e} present); T2 area on Th II with 5 macrochaetae (m_5 present) (Fig. 12B). Abdomen chaetotaxy (Figs 12C–D): Abd II with 1 macrochaeta on A1 (a_2) and 2 macrochaetae on A2 area (m_3 and $m_{3\text{ca}}$). Abd III showing only the m_3 macrochaeta on area A5. Abd IV with few macrochaetae.

Biology: Found in pine-wood, under loose bark, probably it is corticicole.

Discussion. *Entomobrya kabardinica* n. sp. and *E. nigrina* Latzel, 1918 share the same macrochaetotaxy on Abd II and III (1-2/0-0-1) but they differ in the chaetotaxy of Th II, Abd IV and head.

Etymology. Name refers to the name of both the republic where the species was found and its inhabitants.

Entomobrya taigicola n. sp. (Figs 13A–D, 17L, Tab. 1)

Type locality. Russia, southern Russian Far East, Khabarovsk Krai, Lower reaches of Bureya River.

Type material. Holotype on slide and three paratypes in ethyl alcohol, Sample 06 R, station Medvezhe, taiga, from canopy of *Larix*, 09.07.06, A. Brinev & A. Polyakov leg. M. Potapov collected together with *E. brinevi* n. sp. Deposited in MPGU.

Description

Body length up to 2.1 mm excluding antennae (Tab. 1). Body colour pattern uniformly yellow, without pigment except the eye patches.

Head: Eight ocelli, GH smaller than EF. Antennae length 1300 μm , almost 3 times the length of the head (Tab. 1). Relative length of antennal segments Ant I/II/III/IV = 1/1.75/1.5/2.25 (Tab. 1).

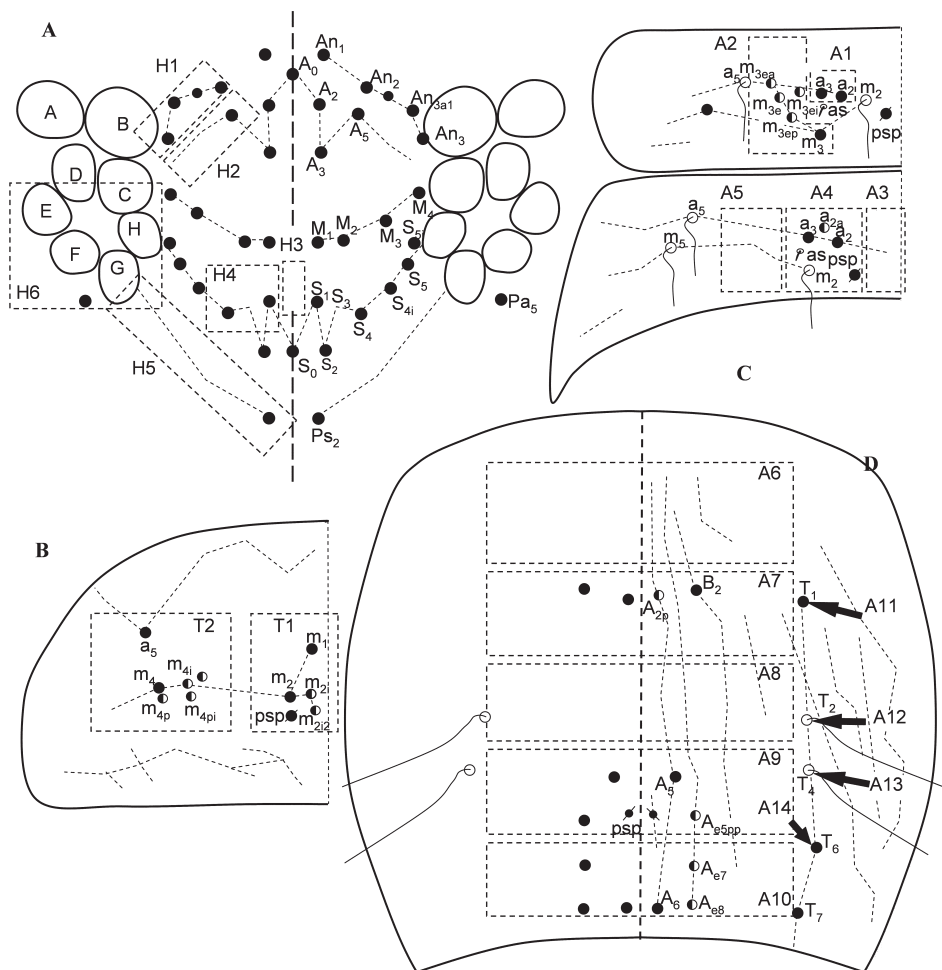


Fig. 14 *Entombryoides sotoadamesi* n. sp. macrochaetotaxy. A: head; B: Th II; C: Abd II-III; D: Abd IV.

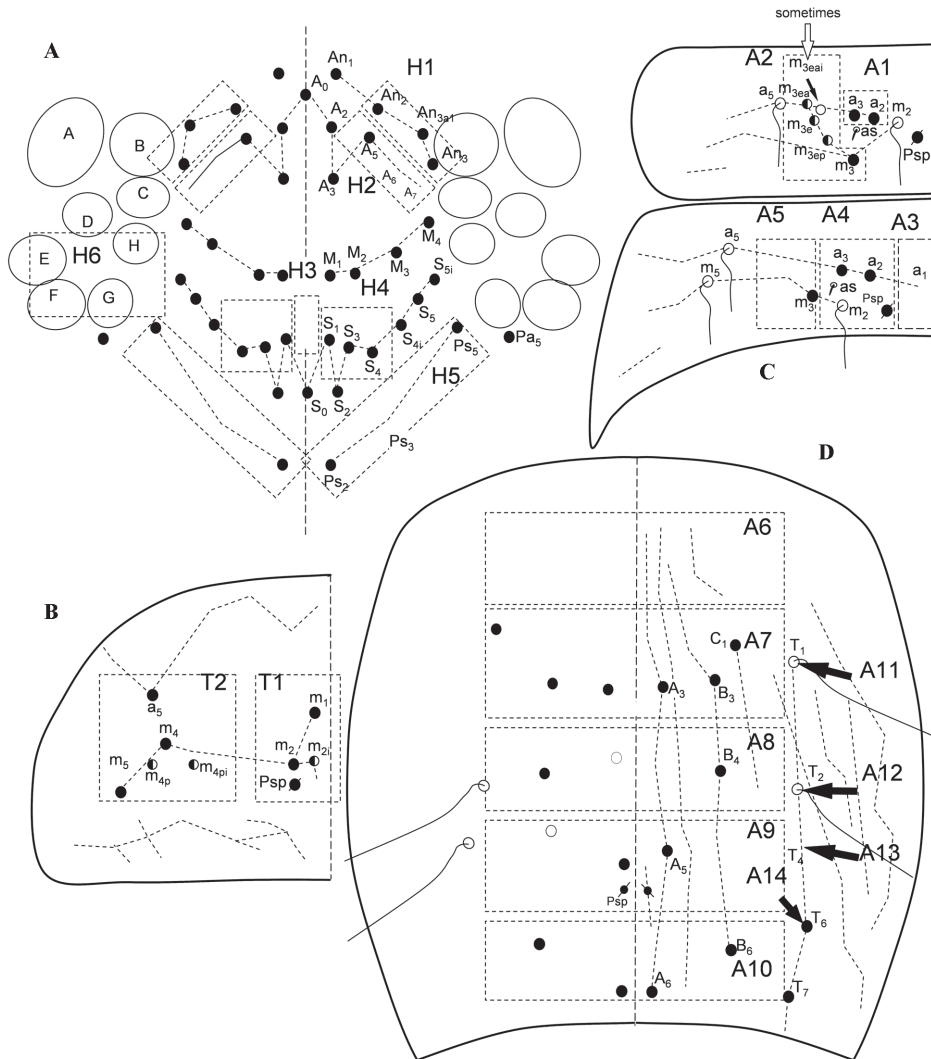


Fig. 15 *Prodrepanura altaica* n. sp. macrochaetotaxy. A: head; B: Th II; C: Abd II–III; D: Abd IV.

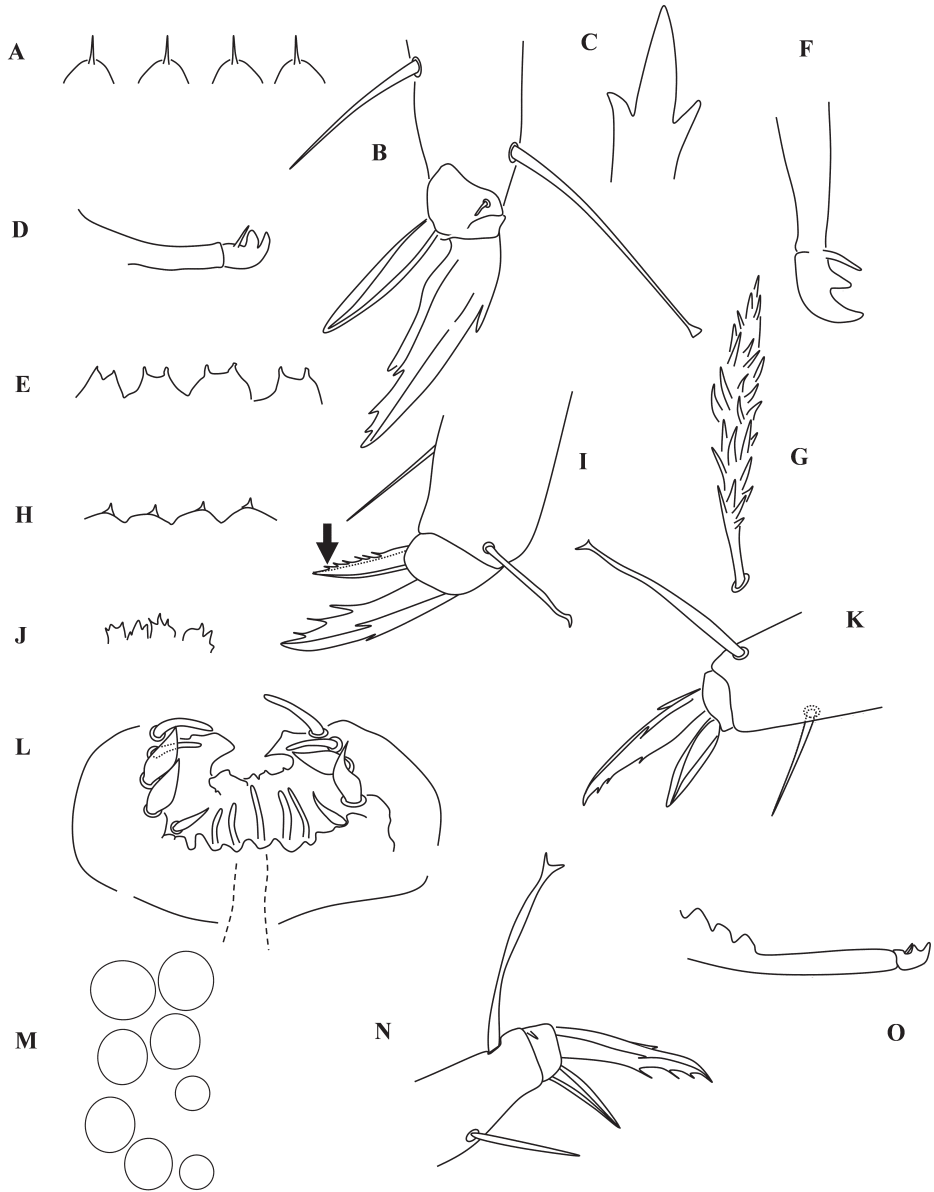


Fig. 16 *Entomobrya armeniensis* n. sp. **A**: labral papillae; **B–C**: claw, and detail of claw in dorsal view; **D**: mucro and tip of dentes.

E. karasukensis n. sp. **E**: labral papillae; **F**: mucro and tip of dentes; **G**: microchaetae of Abd V.

E. tuvinica n. sp. **H**: labral papillae; **I**: claw (the arrow points, probably, the postero-external lamella).

E. pseudolanuginosa n. sp. **J**: labral papillae; **K**: claw; **L**: male genital plate.

E. stebaevae n. sp. **M**: ocelli; **N**: claw; **O**: mucro and tip of dentes.

Body: Length ratio Abd IV/III >4 (Tab. 1). Claw with 4 internal teeth: first pair at 55% from the base of claw; 2 unpaired teeth, first at 80% from the base, the most distal one minute. Empodium spike-like, with smooth external edge on leg III. Manubrium and dens length 1120 µm (Tab. 1). Manubrial plate with 5 chaetae and 2 pseudopores. Mucronal subapical tooth similar to the terminal one; mucronal spine present (Fig. 17L).

Chaetotaxy: Simplified formula: 3-3-0-3-2/6-6/2-5/0-2-2/0-6-1-5-3.

Head chaetotaxy as in figure 13A. Thorax chaetotaxy: T1 and T2 areas on Th II with 6 macrochaetae (Fig. 13B). Abdomen chaetotaxy (Figs 13C–D): A1 and A2 areas on Abd II with 2 and 5 macrochaetae, respectively. Abd III with 2 macrochaetae on areas A4 and A5 (m_{3c} could be a mesochaeta).

Biology: Tree dweller in the taiga on the canopy of *Larix*.

Discussion. For the differences with other species see the discussion of *E. kuznetsovae*.

Etymology. The name refers to the biotope (taiga) where the species was collected.

Genus *Entomobryoides* Maynard, 1951

Entomobryoides sotoadamesi n. sp. (Figs 3A, 14A–D, 17M–R)

Type locality. Russia, southern Russian Far East, Shkotovsky area, western part of Anisimovka (= ‘Stroika’).

Type material. Holotype and 2 paratypes on slide; 3 paratypes in ethyl alcohol, sample R 8, between stones, 20.09.2004, M. Potapov leg., Potapov Coll. Deposited in MPGU.

Other material. Russia, 3 specimens from southern Russian Far East, Partizansky area, not far from Ekaterinovka. Przhevalskogo Range, near entrance of Geographicheskogo Obschestva Cave (sample R 24). 25.09.2004, leg. M. Potapov.

Description.

Body length up to 2.7 mm excluding antennae. Body colour pattern as in Fig. 3A.

Head: Eight ocelli, GH similar in size to EF. Antennae length 1400 µm, up to 2.6 times the length of the head, antennal III sensory organ rod-like; external labial papilla with the external spine-like chaeta about twice as thick at its base as the base of the normal chaeta on the same papilla; spine-like chaeta up to half the length of normal chaeta (Fig. 17M); Ant IV without apical vesicle (Fig. 17N). Relative length of antennal segments Ant I/II/III/IV = 1/2.11/2.11/2.17. Labral papillae very small, with a minute terminal projection (Fig. 17O).

Body: Length ratio Abd IV/III >4 (between 4.9 to 6.6). Some inner tibiotarsal chaetae much more finely ciliated (nearly smooth) than others species within this genus. Claw with 4 internal teeth: first pair at 55% from the base of claw; 2 unpaired teeth, first at 80% from the base; the most distal one minute; dorsal tooth on middle distance between the paired internal teeth and the base of the claw (Fig. 17P). Empodium spike-like, with serrate external edge on leg III. Manubrium and dens length between 1280 to 1360 µm. Manubrial plate with 11 chaetae and 2 pseudopores (Fig. 17Q). Dens conical, with crenulation on the distal half and with a tip not crenulated three times of mucro length. Mucronal subapical tooth slightly larger than the terminal one; mucronal basal spine present (Fig. 17R).

Chaetotaxy: Simplified formula: 4-1-0-2-1/4-6/2-5/0-3-0/0-2-0-2-3 (Fig. 3A).

Head chaetotaxy as in figure 14A. Thorax chaetotaxy: T1 area on Th II with 4 macrochaetae (m_1 , m_2 , m_{21} and m_{212} present); T2 area on Th II with 6 macrochaetae (m_5 absent) (Fig. 14B). Abdomen chaetotaxy (Figs 14C–D): A1 and A2 areas on Abd II with 2 and 5 macrochaetae respectively. Abd III has only 3 macrochaetae on area A4.

Biology: Unknown.

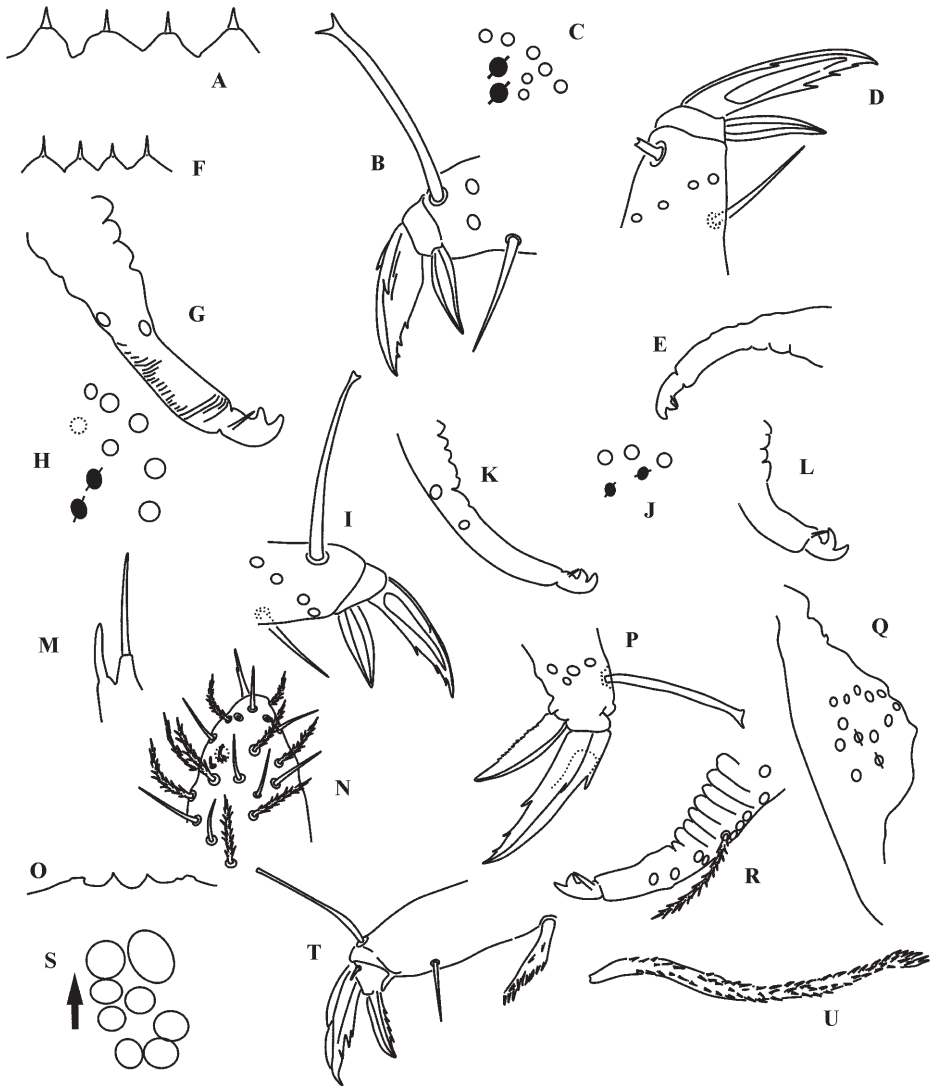


Fig. 17 *E. kuznetsovae* n. sp. A: labral papillae; B: claw; C: manubrial plate.
E. brinevi n. sp. D: claw; E: mucro and tip of dentes.
E. primorica n. sp. F: labral papillae; G: mucro and tip of dentes; H: manubrial plate.
E. kabardinica n. sp. I: claw; J: manubrial plate; K: mucro and tip of dentes.
E. taigicola n. sp. L: mucro and tip of dentes.
Entomobryoides sotoadamesi n. sp. M: external labial papilla with the external spine-like differentiated chaeta; N: antennal tip; O: labral papillae; P: claw; Q: manubrial plate; R: mucro and tip of dentes.
Prodrepanura altaica n. sp. S: ocelli; T: claw; U: macrochaeta.

Discussion. The colour pattern of the new species is quite different from that of other known species of *Entomobryoides*. *E. sotoadamesi* n. sp. shares the same chaetotaxy as Abd II (2–5 macrochaetae on areas A1 and A2) as *E. puakea* Christiansen & Bellinger, 1992 and *E. malena* Christiansen & Bellinger, 1992, both from Hawaii. However, it differs from both in the chaetotaxy of Abd III, which is 0-2-1 in the Hawaiian species and 0-3-0 in the new species. Other differences are found in the colour pattern, and the head and Abd IV chaetotaxy.

Etymology. The species is dedicated to Felipe Soto-Adames, American specialist in Entomobryoidea.

Genus *Prodrepanura* Stach, 1963

Prodrepanura altaica n. sp. (Figs 3B, 15A–D, 17S–U)

Type locality. Russia, S-E Altai, Bol'shoi Kuraiskii Mt. Range, ca. 7 km of vil, Kurai, 3100 m asl., polygonal tundra.

Type material. Holotype and 5 paratypes on the same slide (labelled 3021), 27.07.1964. Ten paratypes on another slide, 7.08.1964. Leg. Stebaeva, Stebaeva Coll. Deposited in SZMN.

Description.

Body length up to 1.8 mm (between 1.6 to 1.9 mm, $n = 7$ specimens) excluding antennae. Body colour: ground colour yellowish without any additional pigmentation (Fig. 3B).

Head: Eight ocelli, GH similar in size to EF (Fig. 17S). Antennae length 670 μm , less than twice the length of the head. Relative length of antennal segments Ant I/II/III/IV = 1/1.93/1.63/2.39.

Body: Length ratio Abd IV/III < 4 (2.38 to 3.80; $n = 7$). Claw with 3 internal teeth: first pair at 55% from the base of claw; unpaired tooth at 66% from the base. Empodium spike-like, with serrate external edge on leg III (Fig. 17T). Manubrium and dens length 620 μm (550 to 770 μm ; $n = 6$). Manubrial plate with 6 chaetae and 2 pseudopores. Mucro with a single tooth and without mucronal spine.

Chaetotaxy: Simplified formula: 3-1-0-3-2/3-5/2-4(5)/0-2-1/0-3-1-1-2.

Head chaetotaxy as in Fig. 15A. Thorax chaetotaxy: T1 and T2 areas on Th. II with 3 and 5 macrochaetae, respectively (with m_3) (Fig. 15B). Abdomen chaetotaxy (Figs 15C–D): A1 and A2 areas on Abd II with 2 and 4 (sometimes 5) macrochaetae, respectively. Abd III with 2 macrochaetae on area A4 and 1 on area A5. Aspect of a macrochaeta as in figure 17U.

Biology: Found in polygonal tundra.

Discussion. The new species is the only one within the genus *Prodrepanura* with 2-4(5)/0-2-1 macrochaetae on areas A1–A5 on Abd II and III.

Etymology. The name refers to the mountains where the new species was collected.

4. References

- Baquero, E., J. Arbea, & R. Jordana (2010): New species of Entomobryni from the Mediterranean Palaearctic (Collembola, Entomobryidae) and a new name for *Folsomia potapovi* (Collembola, Isotomidae). – *Soil Organisms* **82** (3): 285–300.
- Christiansen, K. (1958): The Nearctic members of the genus *Entomobrya* (Collembola). – *Bulletin of the Museum of Comparative Zoology* **118** (7): 1–545, 24 pl.
- Christiansen, K. & P. Bellinger (1980): Family Entomobryidae. – *The Collembola of North America North of the Rio Grande*, Grinnell College, Iowa, December, 1980, **3**: 785–1042.
- Jordana, R. & E. Baquero (2005): A proposal of characters for taxonomic identification of *Entomobrya* species (Collembola, Entomobryomorpha), with description of a new species. – *Abhandlungen und Berichte des Naturkundemuseums Görlitz* **76** (2): 117–134.
- Jordana, R. & E. Baquero (2010a): A new species of *Entomobrya* from Iraq (Collembola, Entomobryidae). – *Soil Organisms* **82** (3): 351–356.
- Jordana, R. & E. Baquero (2010b): A new species of *Entomobrya* (Collembola, Entomobryidae) from La Caldera de Taburiente National Park (La Palma Island, Canary Islands) and its associated collembolan fauna. – *Soil Organisms* **82** (3): 357–365.

Accepted 25 January 2011