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A redescription of *Folsomia diplophthalma* (Axelson, 1902) and two new species of the genus *Folsomia* from continental Asia (Insecta; Collembola)

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Abstract

The taxonomic position of *Folsomia diplophthalma* (Axelson, 1902) has remained obscure up to now. The study of the holotype results in finding surprising morphological features unmentioned in the original description. The authors give an emended redescription with information about new findings of *F. diplophthalma* sensu nova in the northern regions of European part of Russia and Siberia. Furthermore a stricter concept of *F. similis* Bagnall, 1939 is proposed.

Within the morphological range of the «traditional *diplophthalma*» there are now discernible forms not corresponding with the holotype from AXELSON. Of these two species are described here: *Folsomia rossica* sp. nov. from Mongolia, W Siberia and N European part of Russia and *Folsomia continentalis* sp. nov. from mountain regions of Mongolia and S Siberia.

Zusammenfassung

Die taxonomische Position von *Folsomia diplophthalma* (Axelson, 1902) ist bisher unklar. Eine Überprüfung des Holotypus ergab überraschende morphologische Befunde, die in der Originalbeschreibung nicht erwähnt sind. Die Autoren geben eine verbesserte Wiederbeschreibung und teilen Neufunde von *F. diplophthalma* sensu nova aus den nördlichen Regionen des europäischen Teiles von Rußland und Sibieren mit. Weiter wird eine präziserte Diagnose für *Folsomia similis* Bagnall, 1939 vorgeschlagen.

Innerhalb der morphologischen Variabilität der «traditionellen *F. diplophthalma*» werden nunmehr Arten unterscheidbar, die mit dem Holotypus von AXELSON nicht übereinstimmen. Hiervon werden zwei Arten neu beschrieben: *Folsomia rossica* sp. nov. aus der Mongolei, Westsibirien und dem Norden des europäischen Teiles von Rußland und *Folsomia continentalis* sp. nov. aus Gebirgsregionen der Mongolei und Südsibiriens.

1. Introduction

Folsomia diplophthalma was described as *Isotoma diplophthalma* by AXELSON 1902 from the northern part of the White Sea shore. Since then the species has been recorded numerously from all over the Holarctic. Though being sometimes redescribed, its taxonomic position remained obscure because the type specimens of Axelson had not been revised. Through the courtesy of Pekka Vilkamaa, Helsinki, the authors were able to study the holotype and to see surprising morphological features unmentioned in the original description. For this reason, a redescription of *Folsomia diplophthalma* becomes necessary.

Based upon our new understanding, many forms within the morphological range of the «traditional *diplophthalma*», but not corresponding to the taxonomic position of the holotype, are to be accepted as new species. Here two of them from continental Asia are described.

2. *Folsomia diplophthalma* (Axelson, 1902) emend. nov. (Fig. 1)

State of the knowledge. Due to the incomplete original description and numerous redescrptions from different parts of the Palaearctic (the most important by STACH 1947, see also MARTYNOVA 1973, CHRISTIANSEN & BELLINGER 1980, FJELLBERG 1984, WETTON 1987) the taxonomic position of *F. diplophthalma* became unclear.

In the last decades the following general diagnosis was usually accepted: 1+1 ommatidia, one pair of anterior chaetae on manubrium, dens equal to or shorter than manubrium, abdominal macrochaetae long. However, two important remarks given in the original description are not consistent with the «usual» diagnosis: «Behaarung dicht, aber kurz» (chaetae dense but short) and «Furca von demselben Bau wie bei *I. fimetaria* (L.) Tullb. Dentes etwas (1 $\frac{1}{4}$ mal) länger als Manubrium» (furca *fimetaria*-like; dens 1.25 times longer than manubrium).

Study of the holotype. We had the opportunity to study a specimen labelled «*I. diplophthalma*. Kar. Keret., Knäsha, 1901. W.M.Axelson» from the northern part of the White Sea shore. An additional label «*Folsomia diplophthalma* (Axels.). USSR (Murmansk Obl.). Kar. Keret., Knäsha. 1901. W.M. Axelson. HOLOTYPE» was made by P. VILKAMAA (1988) based on the correspondence of the Axelson's label data to the information given in the original description. Most of the body chaetae of this specimen were lost, but it still showed that *F. diplophthalma* is dissimilar to *F. quadrioculata* and relatives but belongs to the «*sexoculata*-group» having many chaetae on the anterior side of the manubrium and a specific arrangement of the sensilla (Fig. 1, a-e).

Redescription. The following redescription is based on the holotype and all our material, including fresh specimens from the White Sea shore, collected not far from the type locality.

The most important features that we could find in the studied holotype were: 3 sensilla on Ant I, 4+4 laterodistal chaetae on ventral tube, claws with small lateral teeth (contrary to Axelson's remark «Klauen ohne Zähne»), 4+4 (or 4+3?) anterior chaetae on manubrium, dens with 14/15 anterior and 5 (as 3+2) posterior chaetae.

Folsomia diplophthalma (Axelson, 1902)

Bas.: *Isotoma diplophthalma* Axelson, 1902

Syn.: *Folsomia diplophthalma* 2-punctata-Typus Agrell, 1939



Fig. 1 *Folsomia diplophthalma* (a-e holotype, f-g specimen from White Sea, h-k specimen from Plateau Putorana)

- a furca laterally
- b lateral part of Abd III
- c claw
- d posterior corner of Th II
- e PAO and ommatidium
- f anterior side of manubrium and basal parts of dens
- g dens
- h Ant. I (area of basal microsensilla dotted limited)
- i laterodistal flaps of ventral tube
- k arrangement of sensilla, microsensilla and macrochaetae on body

Body length up to 1.4 mm. Pigment absent excluding eyes region (Fig. 1 k). 1+1 ommatidia. PAO longer than Ant I width, with constriction and small 'denticles', 1.6-1.9 times as long as claw. Maxillary palp bifurcated, outer maxillar lobe with 4 sublobal hairs. Labral formula 4/554, 4-5+4-5 postlabial chaetae, 4+4 basomedian chaetae. Ant. I, II with 3, 3 basal microsensilla and 3, 1 sensilla, respectively. Ant III with one basal microsensillum and 5 sensilla, including 2 inner, 2 outer and 1 lateral one.

Chaetae and macrochaetae short. Number of macrochaetae as usual for the genus (1,1/3,3,3,4), medial ones on Abd I weakly developed. Sensilla about as long as common dorsal chaetae, hard to recognise. Sensillar formula for Th II - Abd V: 4,3/ 2,2,2,3,5 (s), 1,0/1,0,0,0,0 (ms). Medial sensilla on Th II - Abd IV in front of the p-row, on Abd I located between Mac1 and Mac2 or behind Mac2, on Abd II-III between Mac2 and Mac3. Their arrangement is shown in fig. 1 k. The largest macrochaetae on the abdominal tip are 2.1-2.7 times longer than mucro and 0.4-0.5 times as long as dens. Thorax without ventral chaetae.

Claws with lateral teeth, inner tooth absent. Ventral tube with 4+4 laterodistal chaetae and 6-9 posterior ones. Anterior furcal subcoxa with 13-17 chaetae, posterior one with 4 chaetae. Anterior side of manubrium usually with 4+4 chaetae, with variation from 2+3 up to 6+6 chaetae, which are longitudinally arranged as 1+1, 1+1, 2+2 or 1+1, 1+1, 1+1, 1+1. Posterior side with 4+4 laterobasal, 6-7+6+7 central, 2+2 distal, 1+1 apical, and 1+1 chaetae on lateral sides. Dens with 15 (14-17) anterior chaetae, its posterior side with 6 chaetae: 3 basal, 2 in the middle part, and a minute chaeta near the mucro. The latter was not found in some specimens. Ratio manubrium: dens: mucro as 4.6-5.5 : 5.6-6.8: 1.

Material. Holotype (sex unknown): NW European part of Russia, S Murmanskaya district, White Sea, Kandalakshskaya Bay, Knjazja. Other material of Axelson identified by him as *I. diplophthalma* from Kolari, Pallastunturi, Kittila, Kemi, Ylitornio, and Konterojarven (altogether 14 specimens) corresponds to a new species that will be described by POTAPOV & BABENKO (in press). Only one specimen in Axelson's material, from Tampere Messukyla, has the same morphology as the holotype.

Further new material of *F. diplophthalma* sensu nova :

- N Karelia, White Sea, Kandalakshskaya Bay, Veliky Island (Belomorskaya Biological Station), 6 ex., compost heap of *Fucus* sp. on seashore, VII.1976, leg. S. Firsova; ibidem 12 ex., humus of rich beach meadow, VIII.1992, leg. O. Makarova.
- White Sea (main part), Pon'goma, 2 ex., under fallen log on supralitoral, VIII.1995, leg. M. Potapov.
- N European part of Russia, Southern part of Arkhangelsk Region, Ramenye, 3 ex., mixed forest, moist heap of birch leaves on bottom of hollow. VIII.1981, leg. M. Potapov.
- NW Siberia, S Taimyr, Plateau Putorana Dynkengda Mt., basin (100 m a.s.l.), Yt-kyuel lake, numerous specimens, grass meadow on bank of lake, VII.1997, leg. A. Babenko.

Discussion. After the new diagnosis *F. diplophthalma* becomes almost identical to *F. similis* Bagnall, 1939 sensu lato. We propose a stricter concept for *F. similis* which can be characterised by only 3+3 lateral chaetae on ventral tube and the absence of lateral teeth on claws. Such specimens of *F. similis* were found in our material from flower pots from Moscow (Russia) and Wroclaw (Poland) and from the Botanic Garden in Sukhumi (Georgia). We suppose that these specimens correspond better to the type material of *F. similis*,

which has its origin in the mild climate of Great Britain. Accepting that definition, *F. diplophthalma* differs from *F. similis* in having lateral teeth on claws and 4+4 lateral chaetae on ventral tube.

In addition, *F. diplophthalma* sensu nova was possibly described from Finland by AGRELL (1939) under the name «*Folsomia microchaeta* 2-punctata-Typus». The microtube with the holotype of *F. diplophthalma* includes an additional label of unknown origin with the inscription «*Folsomia microchaeta* 2-punctata-Typus sp. n.»

F. diplophthalma sensu nova is also similar to *F. volgensis* Martynova, 1967. The latter is widespread in more southern areas of the European part of Russia and Western Siberia and has 2+2 ommatidia and an unlike arrangement of chaetae on anterior side of manubrium.

After this, the question arises concerning the status of *F. diplophthalma* sensu Stach, 1947. We suppose that the most records of «*F. diplophthalma*» from Central Europe should be referred to unpigmented or strongly cleared specimens of *F. manolachei* or *F. quadrioculata*. The smaller posterior ommatidium can be simply overlooked by researchers lesser experienced or with bad optic equipment. In Northern Europe there are two new species (POTAPOV & BABENKO in press) that can be mistaken for *diplophthalma*.

Distribution. *F. diplophthalma* sensu nova is up to now recorded in the northern regions of the European part of Russia and Siberia (a more complete list of localities where *F. diplophthalma* was recorded will be given in POTAPOV & BABENKO in press). In the Arctic it prefers different rich organic debris (supralittoral sites, compost heaps, mammal nests), in more southern areas it was also recorded in damp litter. The whole distribution of the species is unknown, since all previous records of «*F. diplophthalma*», as well as «*F. similis*», should be verified.

3. *Folsomia rossica* sp. nov. (Fig. 2)

Description. Body length from 0.7 to 1.3 mm. 1+1 ommatidia. Distinct pigment on body normally weakly developed or absent, always present on eyes region (Fig. 2 d). Some specimens with sparse pigment grains were also found (Fig. 2 c). PAO very long, 1.6-1.7 times as long as the width of Ant I, with distinct constriction and small «denticles». Maxillary palp bifurcated, outer maxillary lobe with 4 sublobal hairs.

Labral formula 4/554. Ventral side of head with 4+4 chaetae along linea ventralis. Labium with 4+4 basomedian chaetae. Ant I,II,III with 3,3,0 basal microsensilla and 2,1,5 sensilla respectively. Ant III with one lateral sensillum. Apical organite on Ant IV stick-like.

Sensilla on body rather long. Sensillar formula for Th II-Abd V: 4,3/ 2,2,2,3,5 (s), 1,1/ 1,0,0,0,0 (ms). Medial sensilla on Th II-Abd IV in front of p-row, on Abd I-III they are located between Mac1 and Mac2. Hind corner of Th II with a lateral sensillum in front of p-row. Medial sensilla on Abd IV nearly at the level with p-row of chaetae. Abd V with lateral sensillum slightly thicker than others (Fig. 2 e). Macrochaetae moderately long, the largest ones on the abdominal tip 3.2-4.2 times as long as mucro. Both Th II and Th III with 1+1 macrochaetae. Th III with 29-32 chaetae in p-row.

Claws without teeth. Upper and lower subcoxa with 2-4 and 7-8 (leg II), 5-7 and 8 (leg III) chaetae, respectively. Retinaculum with 4+4 teeth and a chaeta on corpus. Ventral tube with 3+3 latero-distal chaetae and 4-5 (rarely 7) posterior ones. Anterior furcal subcoxa

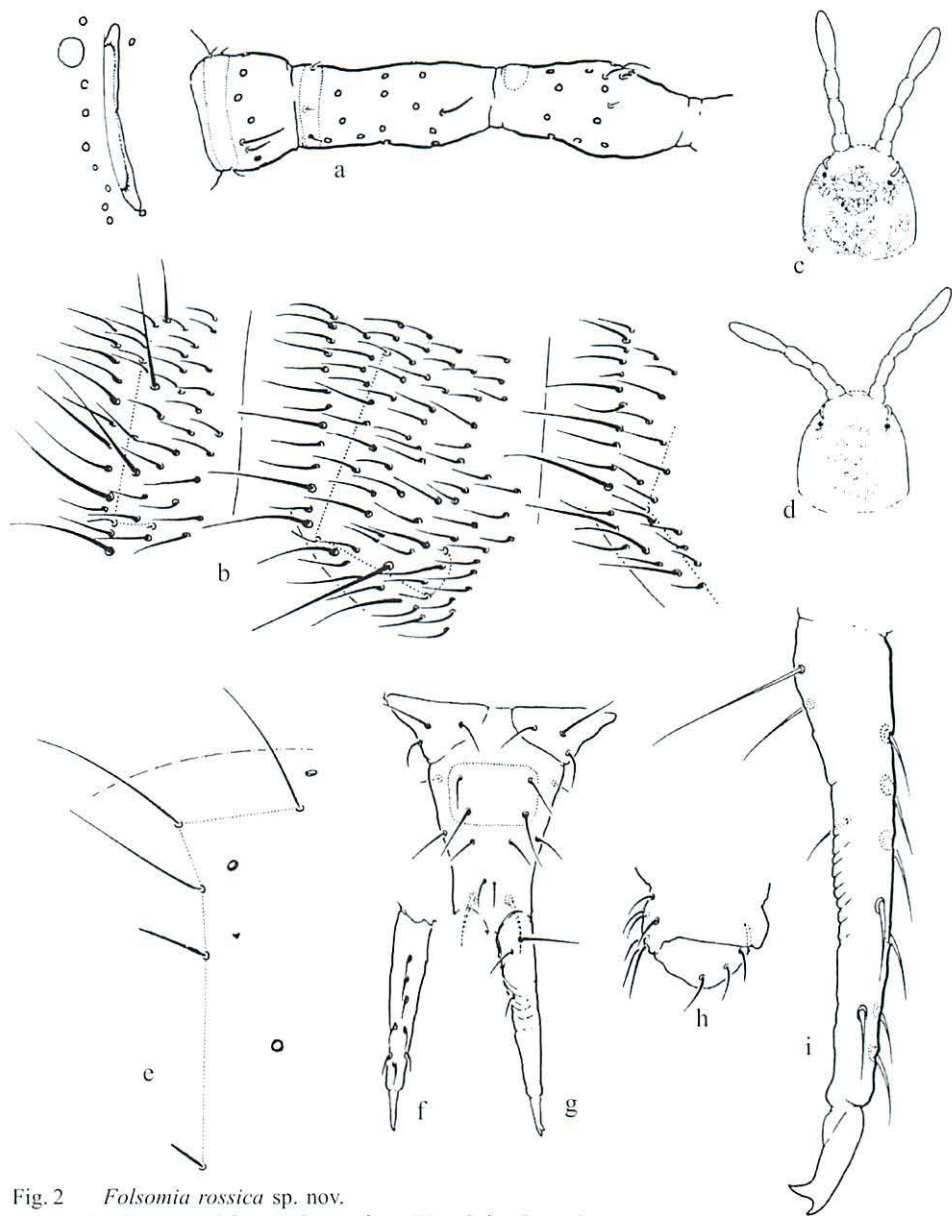


Fig. 2 *Folsomia rossica* sp. nov.

(a,b,c,e,h,i holotype, c,d,f,g specimens from West Sajan Range)

- a PAO, ommatidia and Ant I-III (areas of basal microsensilla dotted limited)
- b lateral parts of Th II-III and Abd I (areas of sensilla and microsensilla dotted limited)
- c coloration of head in darkest specimen
- d common coloration of head
- e sensilla and bases of macrochaetae of Abd V
- f anterior side of dens
- g posterior side of furca
- h ventral tube
- i dens laterally

with 4-6 chaetae, the posterior one usually with 3 chaetae. Manubrium with 1+1 anterior chaetae apically, posterior side with 3+3 latero-basal, 2+2 central, 2+2 distal, 1+1 apical, and 1+1 chaetae on lateral sides. Dens crenulated, with 8 (1,1,1,2,3) anterior and 3 posterior chaetae. Manubrium: dens: mucro as 4.2-5.4: 3.4-4.3: 1.

Type material. Holotype (female, on slide) is labelled «MVR Ulangom. Berlese. 30.7.1977. Hagerans Moos. Dorn» (Tagebuch Nr. 13738), leg. Dorn, coll. W. Dunger. Site description:

NW Mongolia, Uvs aimak, 35 km SW Ulaangom; Chöchöögien Nuruu, NE slope of mount Carchiraa-complex; 40° 50' N, 91° 45' E, 1400 m a.s.l. Damp moss on rocks of a bank of a mountain brook (near station I, Fig. 4). Paratypes: 1 specimen from the holotype site; 2 specimens, labelled «Russia, SE TUVA, Sangelen Plateau, Chorumnug taiga, Mt. Range, 30-35 km NWW of Erzyn, confluence of Ular-Khom and Erzyn rivers, 50° 23' N, 95° 32' E, 1200-1300 m a.s.l., flood larch-spruce forest with *Larix sibirica*, *Picea obovata*, *Alnus*, *Equisetum*), 6.-9.VIII.1995, leg. S. Stebaeva»; 5 specimens labelled «Russia, S Krasnoyarskii region, West Sayany Mts., Oiskiy Mt. Range, 8-10 km S of Oiskoye lake, Olenia Rechka river, 52° 48' N, 93° 12' E, 1400 m a.s.l., *Marshansia* on the stone along river, 10.VII.1990, leg. S. Stebaeva».

Holotype and one paratype are deposited at the Museum of Natural History Görlitz, other paratypes at the Moscow State Pedagogical University.

Further material (for details of localities we thank Dr. S. Stebaeva)

- S Krasnoyarskii region, West Sayany Mts., Oiskiy range, 8-10 km S of Oiskoye lake, Olenia Rechka river, 52° 48' N, 93° 12' E, 900-2000 m a.s.l., mountain moss-lichen stony tundra, 10.VII.1990, 10 ex. leg. S. Stebaeva.
- SW Tuva, 30-35 km SW of Mugur-Aksy, the upper reaches of Mugur river, Monguntaiga Mt., 50° 22' N, 90° 05' E, wet sedge meadow, nearby low line of tundra belt, 23.VII.1993, 2 ex. leg. S. Stebaeva. Ibidem, tundra with *Betula rotundifolia*, 40 ex.
- SE Tuva, ca. 10 km SW of Erzyn, Tsuger-Eliss, upper part of plain steppe with *Stipa*, *Artemisia*, *Caragana bungei*, 50° 01' N, 95° 03' E, 1150 m a.s.l., 12.VII.1993, 1 ex. leg. S. Stebaeva.
- Tuva, 10 km of Tanzybei environs, wet meadow with *Calamagrostis* along spring, 53° 08' N, 92° 53' E, 400 m a.s.l., 13.VII.1990, 1 ex. leg. S. Stebaeva.
- NW Tuva, nearby Kara-Khol lake, larch-spruce forest, 2 ex. leg. I. Vtorov.
- Krasnoyarskii region, Kemerovskaya oblast', 25 km E of Novokuznetsk, nearby vil. Baidayevka, undisturbed meadow, 1981, 3 ex. leg. S. Stebaeva.
- Krasnoyarskii region, Khakassia, West Sayany Mts., Tashtypsky district, Zapadosayansky pass, alpine belt, 5 ex. leg. S. Jordansky.
- Republic «Altai», Central Altai, Seminsky pass, 2000 m a.s.l., subalpine grass meadow, under *Juniperus*, 16.IX.1988, 26 ex. leg. S. Stebaeva & W. Weiner.

In addition, some material of this species came from several localities in NW Siberia and the N European part of Russia (Murmanskaya District, Kolguev Island, S Taimyr).

Discussion. In chaetotaxy of furca and ventral tube *F. rossica* n. sp. resembles the widely distributed species *F. quadrioculata* and *F. manolachei*. It can be separated by the number of ommatidia (1+1 against 2+2), microsensillum on lateral part of Th III (present against absent), basal microsensillum on Ant III (absent against present), number of

apical chaetae on posterior side of manubrium (two paired against one unpaired). Habitually the new species easily differs in pale coloration that is found in the new species but unusual for both of the other species discussed. A very long postantennal organ is also characteristic. From *F. taimyrica* and relatives the new species is distinguished by 2+2 (instead of 4+4 - 6+6) chaetae in central part of posterior side of manubrium and 3+3 (instead of 4+4) laterodistal chaetae on ventral tube.

Derivatio nominis. Almost all records of this species came from Russia ("rossica": Russian).

Distribution. The species is recorded in the mountain region of Mongolia, W Siberia and N European part of Russia. For southern part of W Siberia it is usually found in alpine meadows and tundra, in lower altitudes it prefers different damp sites. Some previous records of «*F. diplophthalma*» in Siberia have to be referred to *F. rossica*.

4. *Folsomia continentalis* sp. nov. (Fig. 3)

Description. Body length up to 1.0 mm. Coloration «*quadrioculata*-like», grey, never very dark, distribution of pigment grains diffuse (Fig. 3 c). 1+1 pigmented ommatidia. PAO slender, about as long as the width of Ant I, with distinct constriction and weak «denticles». Maxillary palp bifurcated, outer maxillary lobe with 4 sublobal hairs.

Labral formula 4/554. Ventral side of the head with 4-5+4-5 chaetae along linea ventralis. Labium with 4+4 basomedian chaetae. Ant I,II,III with 3,3,1 basal microsensilla and 2,1,5 sensilla respectively. Ant III with one lateral sensillum.

Sensilla on body short and well differentiated. Sensillar formula for Th II-Abd V: 4,3/2,2,2,3,5 (s), 1,0/ 1,0,0,0,0 (ms). Medial sensilla on Th II-Abd IV in front of p-row, on Abd I-III they are located between Mac1 and Mac2. Hind corner of Th II with a lateral sensillum in front of p-row. Medial sensilla on Abd IV well in front of p-row of chaetae. Abd V with lateral sensillum slightly thicker than others. Macrochaetae moderately long, the largest ones on the abdominal tip 3.0-3.4 times as long as mucro. Both Th II and Th III with 1+1 macrochaetae. Th III with 29-33 chaetae in p-row.

Claws without teeth. Upper and lower subcoxa with 3-4 and 8-9 (leg II), 6-8 and 8-10 (leg III) chaetae, respectively. Retinaculum with 4+4 teeth and one chaeta on corpus. Ventral tube with 4+4 latero-distal chaetae and 6-7 (rarely 8) posterior ones. Anterior furca subcoxa with 9-11 chaetae, the posterior one with 5 chaetae. Manubrium with 1+1 anterior chaetae apically, posterior (dorsal) side with 3+3 latero-basal, 4+4 (rarely 4+3) central, 2+2 distal, 1+1 apical, and 1+1 chaetae on lateral sides. Dens crenulated, with 8 (1,1,1,2,3) anterior and 3 posterior chaetae. Manubrium: dens: mucro as 4.3-5.2: 3.3-3.7: 1.

Type material. Holotype (female, on slide) labelled «MVR. Dorn. 14.8.1977. (13738) III alp. Rind», leg. Dorn, coll. W. Dunger. Site description: NW Mongolia, Uvs aimak, 35 km SW Ulaangom; Chöchöögien Nuruu, NE slope of mount Carchiraa-complex; 40° 50' N, 91° 45' E, 2200 m a.s.l. (near station II, Fig. 4). Grazed alpine grassland, substrate superficially dried cowpat. Paratypes: 14 specimens from the holotype site. Holotypes and paratypes are deposited at the State Museum of Natural History Görlitz.

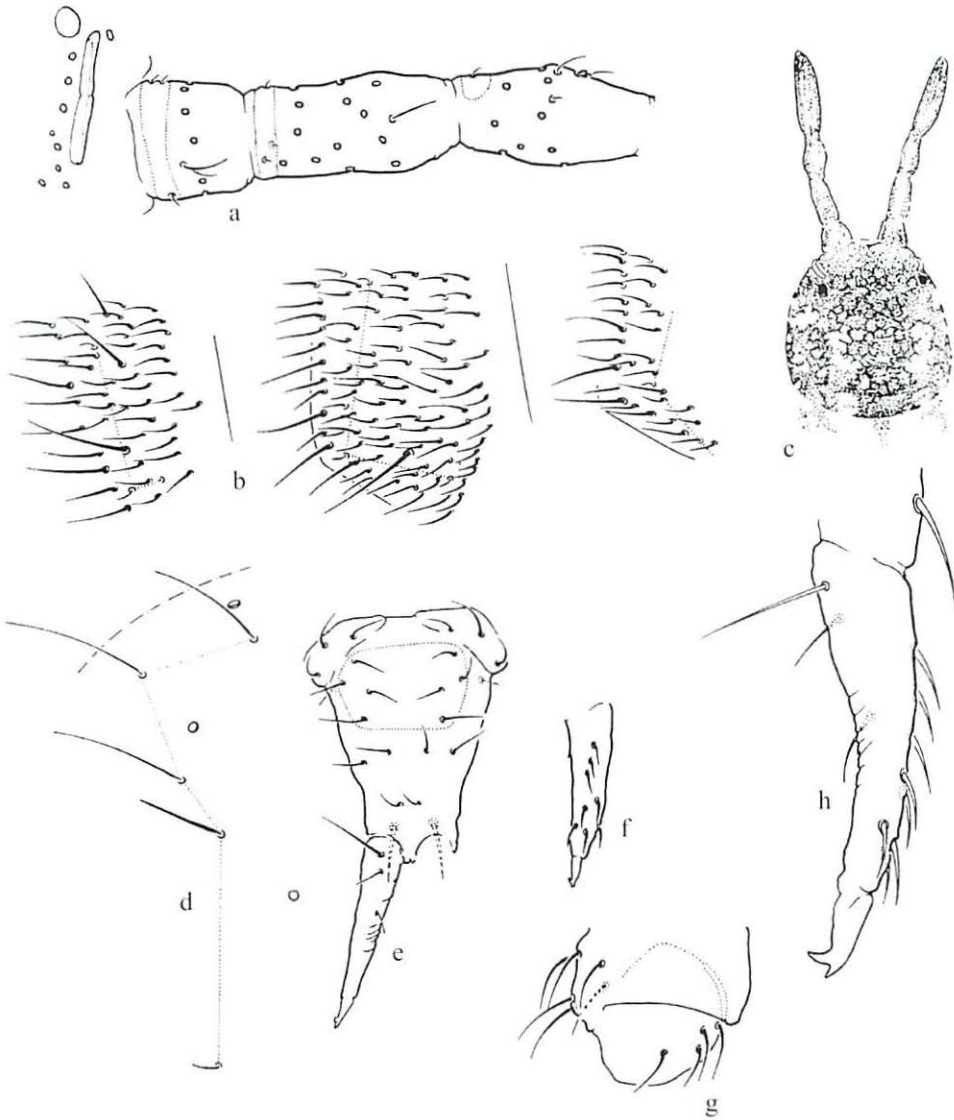


Fig. 3 *Folsomia continentalis* sp. nov. (paratypes)

- a PAO, ommatidia and Ant I-III
- b lateral parts of Th II-III and Abd I
- c coloration of head in darkest specimen
- d sensilla of Abd V
- e posterior side of furca
- f anterior side of dens
- g ventral tube
- h dens laterally

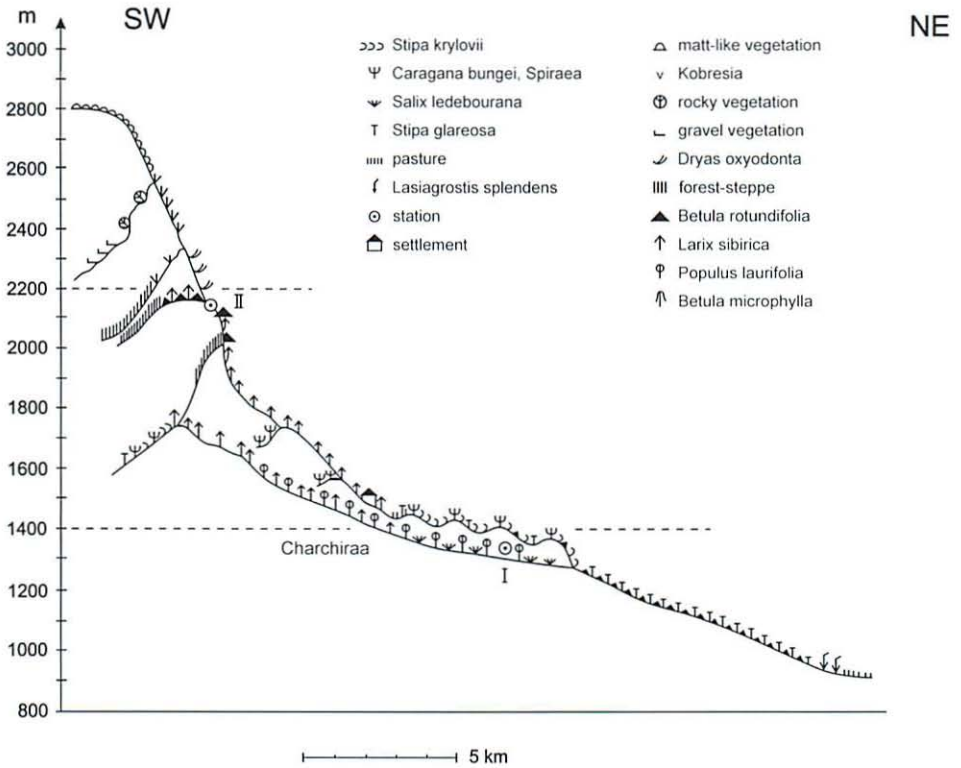


Fig. 4 Chöchöögien Nuruu, NE slope of mount Charchiraa-complex, NW Mongolia, Uvs aimak, 35 km SW Ulaangom. Locus typicus of *Folsomia rossica* above station I at 1400 m a.s.l. (the mountain brook not shown). Locus typicus of *Folsomia continentalis* on cowpats near station II at 2200 m a.s.l.

After a sketch by W. Hilbig, from «Ergebnisse der Mongolisch-Deutschen Biologischen Expeditionen seit 1962», Nr. 235, Halle 1984. Courtesy of Doz. Dr. M. Dorn, Halle.

Further material

- Mongolia: Ara-Khangai Aimak, Tevshrulekh, leg. A. Druk, 5 ex.
- SW Tuva, Tsagan-Shibetu Mt. Range, 8-9 km NE Mugur-Aksy, 50° 24' N, 90° 30' E, 2100-2700 m a.s.l., dry rocky lichen tundra, 22.VII.1993, leg. S. Stebaeva, 3 ex.
- SW Tuva, West Tannu-Ola Mt. range, 13 km from Chandagaity, 50° 46' N, 91° 55' E, 21.VII.1993, leg. S. Stebaeva, 1 ex.
- SE Tuva, North macroslope of East Tannu-Ola Mt. Range, nearby Shuurmak, 51° 45' N, 95° 17' E, 1450 m a.s.l. petrophyte steppe, in soil under lichen *Cladonia pyxidata*, 12.VIII.1997, leg. N. Sedel'nikova, 2 ex.
- SE Tuva, SW spurs of Khorumnug-taiga Mt. Range, 30-35 km NWW of Erzyn, confluence of Ular-Khem and Erzyn rivers, 50° 23' N, 95° 32' E, 1200-1300 m a.s.l., steppe slope of above flood terrace, under *Orostachis spinosa*, 6.VIII.1993, leg. S. Stebaeva, 28 ex. Ibidem, flood larch-spruce forest, numerous specimens.
- Krasnoyarskii region, Khakassia, West Sayany Mts., Tashtypsky district, nearby Bol'shoi-On, forest with *Pinus sibirica*, leg. S. Jordansky, 2 ex.
- Krasnoyarskii region, West Sayany Mts., Kurtushibinskiy Mt. Range, 10 km NW of Shivilig, 52° 14' N, 93° 28' E, 1100-1300 m a.s.l., petrophyte steppe with *Artemisia* under *Orostachis spinosa* on rocks, 7.VI.1990, leg. S. Stebaeva, 15 ex.
- Chita region (Chitonskaya oblast'), Dahuria, between Argun' and Budumkan rivers, small forest of *Quercus mongolicus*, 29.VII.1997, leg. O. Berezina, 1 ex.

Discussion. *F. continentalis* n. sp. belongs to the *F. taimyrica* group in having 4+4 chaetae in central part of posterior side of manubrium and 4+4 laterodistal chaetae on ventral tube. After our study (POTAPOV & BABENKO in press) all northern members of this group show the presence of two lateral sensilla on Ant III and one microsensillum on Th III, with the whole ms-formula 1,1/1,0-1,0-1. The new species has one lateral sensilla on Ant III and no microsensillum on Th III (ms: 1,0/1,0,0). These two features are shared with *F. vtorovi* Martynova, 1971, distributed in highland of N Tien Shan Mts. It differs from *F. continentalis* in lacking ommatidia and pigment, shorter macrochaetae, and medial sensilla on Abd IV situated almost at the level with p-row. The characters of *F. vtorovi* were studied in one paratype and many specimens from Zailiysky Ala-Tau Range (N Tien Shan). *F. bidentata* Lee, 1974 (S Korea) also resemble the new species, differing in the absence of ommatidia and longer PAO.

Derivatio nominis. The species was recorded from the continental areas of Asia.

Distribution. The species is only recorded in the mountain regions of Mongolia and S Siberia.

Fig. 5

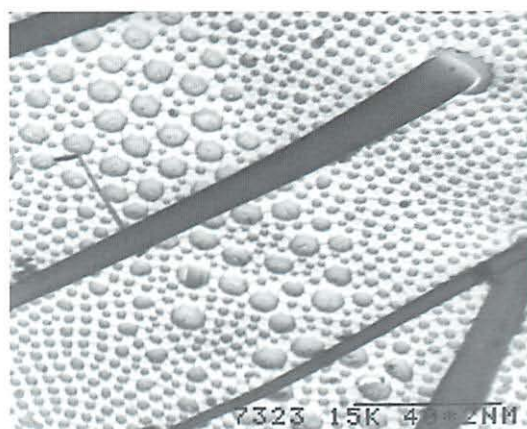
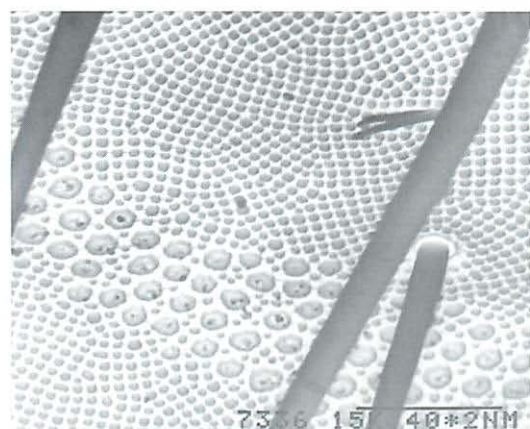
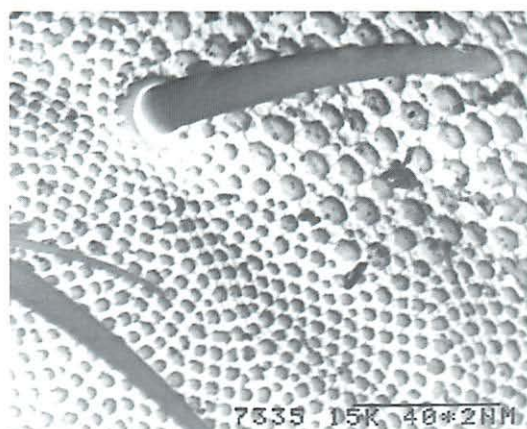
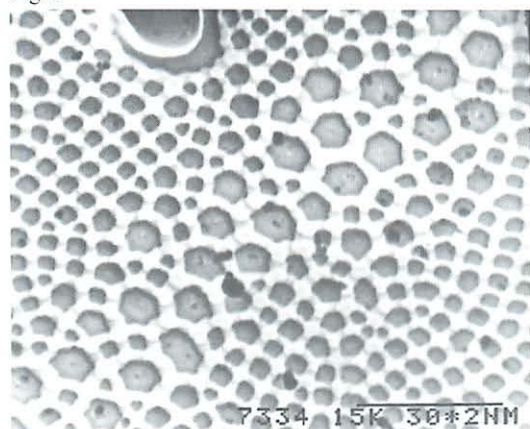


Fig. 6

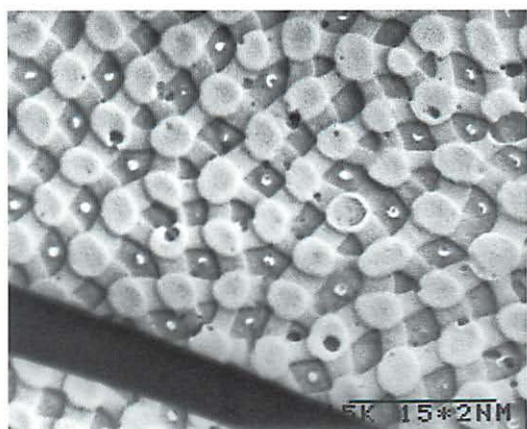
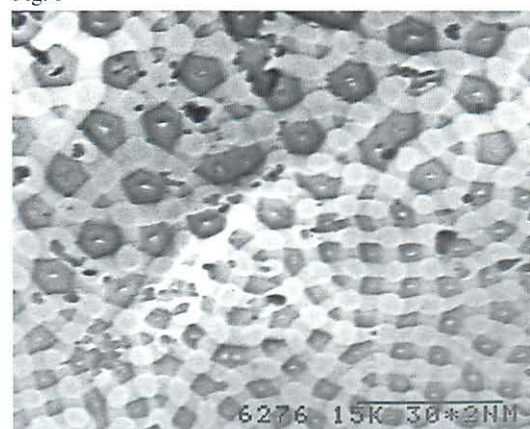


Fig. 5 SEM photos of cuticular structure on posterior edge of Abd IV in the *F. sexoculata*-group. Enlargement: a 10.000 x ; b,d,e 7.500 x; c 15.000 x
a, b – *F. microchaeta* (NE Yakutia)
c – *F. diplophthalma* sensu nova (S Taimyr)
d – *F. sexoculata* (Karelia)

Fig. 6 SEM photos of cuticular structure on posterior edge of Abd IV in the *F. quadrioculata*-group. Enlargement: 20.000 x.
a – *F. rossica* (S Taimyr)
b – *F. continentalis* (Tuva)

5. Studies on cuticle structure (Figs. 5, 6)

As has been demonstrated by LAWRENCE & MASSOUD (1973) with four species of *Folsomia*, the cuticle structure varies strongly in this genus. To find differences between the species, we studied the lateral area of posterior edge of Abd IV in the three species treated in this paper, and two species of the *sexoculata*-group, viz. *sexoculata* Tullberg and *microchaeta* Agrell were examined by SEM (Figs. 5-6). The results show that *F. diplophthalma* sensu nova belongs to the *sexoculata*- group in cuticle structure as well. It can be inferred that in members of *sexoculata*-group the preliminary granules mostly lack apertures and are more roundish; connections are rather thin. In contrast to this, species of the *quadrioculata*-group show granules with central aperture, more angular in form and less densely scattered, and wider connections (for *F. quadrioculata* see photo 15 in LAWRENCE & MASSOUD 1973).

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Abbreviations

Abd	abdomen
Ant	antenna
Mac	macrochaeta (-ae)
ms	microsensillum (-a)
PAO	postantennal organ
p-row	posterior row of chaetae
s	sensillum (-a)
Th	thorax

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