

# Four new species of families Onychiuridae and Isotomidae (Hexapoda, Collembola) from Ubsunur Hollow (Tuva, Russia)

M. Potapov & S. Stebaeva

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*Four new species of families Onychiuridae and Isotomidae (Hexapoda, Collembola) from Ubsunur Hollow (Tuva, Russia).* – The paper presents data on the springtails (Hexapoda, Collembola) of "Ubsunur Hollow" Reserve (Russia, Tuva). Four species are described: *Oligaphorura tuvina* n. sp. (Onychiuridae) is characterized by pseudocellar formula 2+1,2/133/33343, thin granulation of Abd.VI and long  $a_2$  seta on Abd.VI. *Wankeliella intermedia* n. sp. (Onychiuridae) is intermediate in form of PAO between genera *Karlstejnina* Rusek, 1974 and *Wankeliella* Rusek, 1975 and is distinguished from relatives mostly in 1+1 m-setae on Abd.IV. *Folsomides aridoviator* n. sp. (Isotomidae) is similar to *F. angularis* (Axelson, 1905) differing by grey pigment on body and presence of four setae on dorsal side of dens. *Folsomia sparsosetosa* n. sp. (Isotomidae) is characterized by long dens and many chaetae on ventral side of manubrium, from *F. nivalis* (Packard, 1873) it differs in weakly serrated macrochaetae, absence of teeth on claw and more number of setae on ventral side of manubrium. The map of their sampling sites is illustrated. A classification key of the species of genus *Folsomides* Stach, 1922 for the territory of the former USSR is given.

Key words: Collembola, Onychiuridae, Isotomidae, New species, Siberia.

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## Introduction

The European and Japanese Collembola of the Palaearctic are better known than those from continental Asia. During a joint Finnish-Russian expedition in Tuva in June 1995, a trip to Sangilen Plateau in July 1995 as well as during some previous expeditions, the Collembola of "Ubsunur Hollow" Reserve were studied. As a result, about 100 species of Collembola can be recorded for this territory. Data about structure, abundance and distribution of collembolan communities of Ubsunur Hollow have been partly published (STEBAEVA, 1995, 1996).

The aim of the work is to describe four new species found in these campaigns.

## Material and methods

The different types of dry, sandy and semidesert steppes of the northern of the Ubsunur Hollow were studied (fig. 1): in Tes-Khem District, the area from Samagaltay town (5) to Aryskannyg-Khem River (4) and Khol-Oozhu (3); the area nearby the NE bank of Ubsu-Nur Lake (2); the Erzin District area to SW from Erzin town: sandy massives of Tsuger-Ellis (8) and Eder-Elesin nearby Tere-Khol (= Tore-Khol) Lake (9), steppes of upper part of submountain plains nearby Yamaalyg Mt. Range (7), Onchalaan Mt. Range (6) as well as Sangilen Plateau (10) (along Ular and Erzin Rivers) and Mongun-Taiga District (1) (SW Tuva). Steppe ecosystems situated in up-

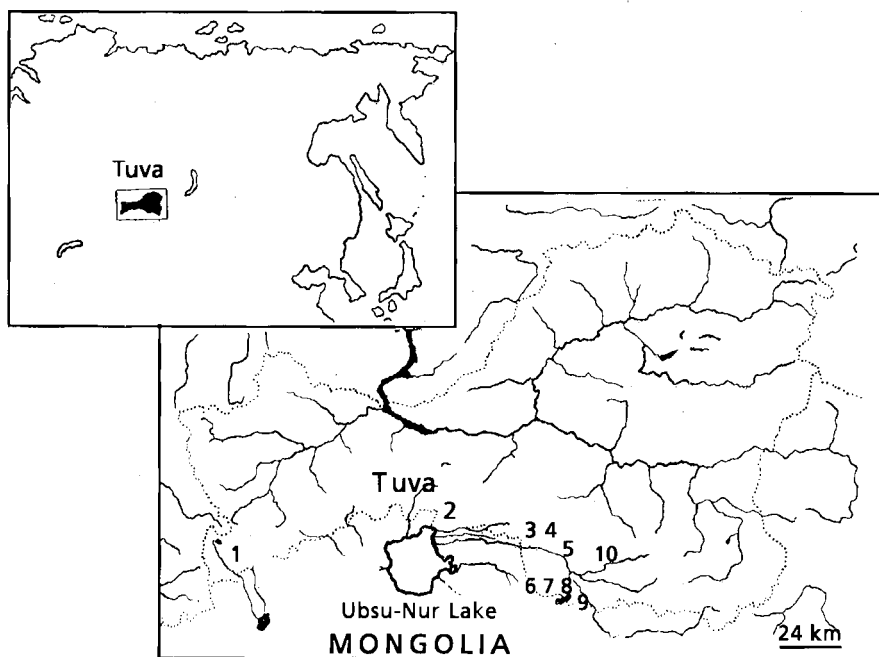


Fig. 1. Localities in which the samples were collected: 1. Mongun-Taiga Mts.; 2. NE bank of Ubsu-Nur Lake; 3. Khol-Oozhu; 4. Aryskannyg-Khem; 5. Samagaltay; 6. Onchalaan; 7. Yamaalyg; 8. Tsuger-Ellis; 9. Eder-Elesin; 10. Ular (Sangilen Plateau).

*Localidades donde se recolectaron las muestras: 1. Mongun-Taiga Mts.; 2. NE bank of Ubsu-Nur Lake; 3. Khol-Oozhu; 4. Aryskannyg-Khem; 5. Samagaltay; 6. Onchalaan; 7. Yamaalyg; 8. Tsuger-Ellis; 9. Eder-Elesin; 10. Ular (Sangilen Plateau).*

per and middle parts of submountain plains, the mountain stony steppes, flood-lands poplar forests, mountain larch forests and other landscapes were also investigated.

Collembola were collected in two ways: A. Between five and 10-15 blocks of soil to depth 5 cm were cut from each ecosystem by special steel anger 5,6 cm in diameter; surface of soil samples was moistened by water after placing in funnels; soil samples were extracted in modified sun Tullgren funnels, into alcohol. B. Pitfall traps placed into the soil with ethylene glycol as collection fluid were used.

Specimens were examined in slides using Gisin's liquid.

Types of the new species are kept at the Moscow State Pedagogical University, Moscow (MSPU). Some paratypes are kept at the Institute of Systematics and Ecology of Animals, Siberian Branch of Russian Academy of Sciences, Novosibirsk (ISEA).

Abbreviations used in the text: Abd. I-VI. Abdominal tergites I-VI; Ant. I-IV. Antennal segments I-IV; AO. Antennal organ on antennal segment; Leg I, II, III. First, second, third pair of legs; M. Macrochaeta; ms. Microsensillum; PAO. Postantennal organ; SA. subaxial macrochaetae; Th. I-III. Thoracic segments I-III; Ti. I, II, III. Tibiotarsi I, II, III;  $a_x$ . Chaeta of a-row;  $m_x$ . Chaeta of m-row;  $p_x$ . Chaeta of p-row; pso. Pseudocelli; s. Sensillum.

## Description of the species

*Oligaphorura tuvunica* n. sp. (figs. 2-9)

### Type material

Holotype: ♀ (slide) from Russia, Tuva, "Ubsunur Hollow" Reserve, Tes-Khem Region, 5 km E of Khol-Oozhu, flood-lands poplar forest (with *Populus laurifolia*, *Larix sibirica*) on the riverside at the Aryskaannyg-Khem River, about 1200 m above sea level, under *Populus* and in soil under grasses, 15 VII 1993, S. K. Stebaeva (MSPU).

Paratypes: 15 specimens in the same place, 15 VII 1993, S. K. Stebaeva (five paratypes are kept in MSPU, 10 in ISEA).

### Description

Body length up to 0.65 mm. Colour in alcohol white. Antennae a little shorter than diagonal of head. Ant. III-organ consists of

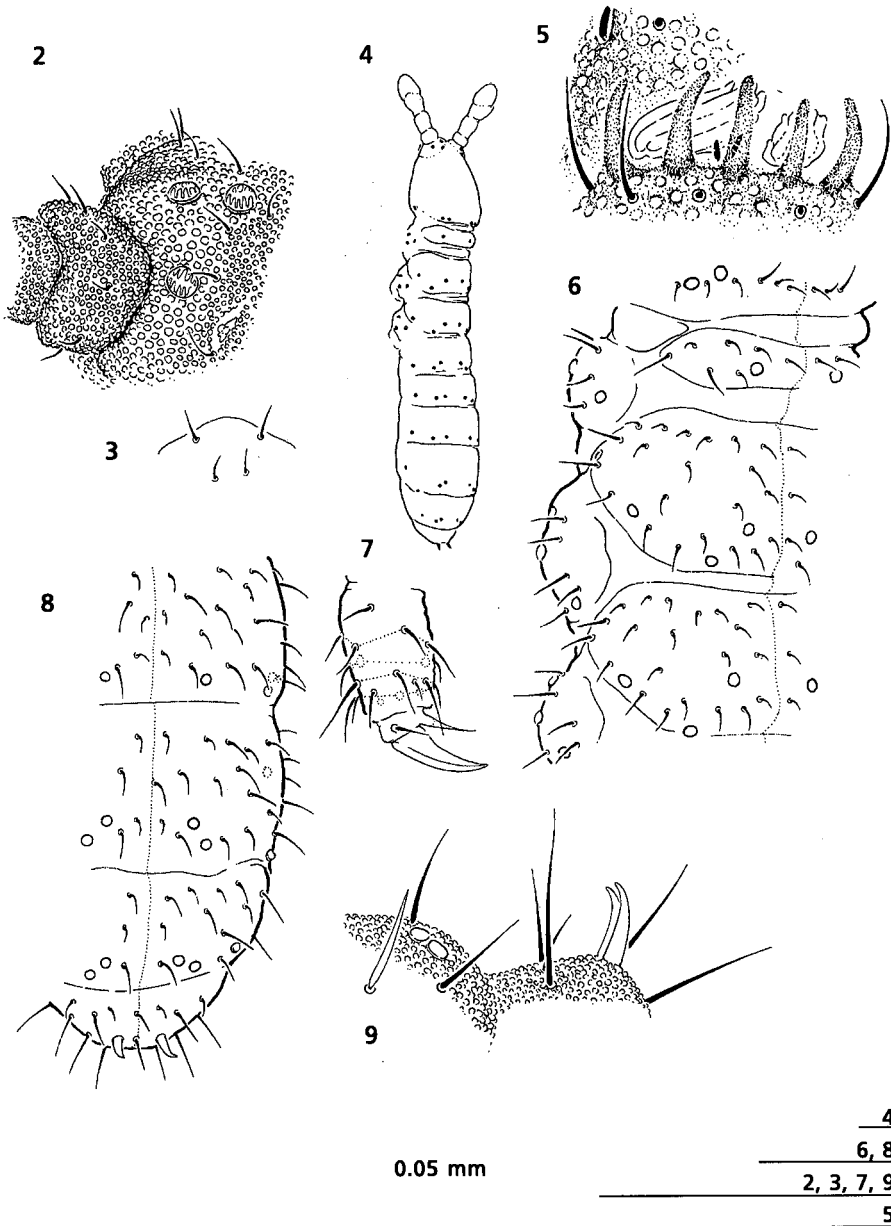
five long guard papillae, two sensory rods and two wrinkled sensory clubs, of which the external one is larger and more curved. Five guard setae. PAO very small, equal to the nearest pseudocellus, composed of 3-4 vesicles. Labral setae as 4/3, 4, 2. Labium with 4+4, postlabial part with 3+1, 3+1 setae. Maxillary outer lobe with two sublobal hairs. Pseudocellar formula: -2+1, 2/133/33343 (dorsal), 1+1/000/- (ventral, on abdomen not calculated). Chaetotaxy without distinct macrochaetae, sensory setae marked slightly. Three pseudocelli on each subcoxa, the specimens with smaller number of pseudocelli (two or one) often observed. Arrangement of sensorial setae: 0, 1+ms, 1+ms/2, 2, 2, 1, 1. Abd. VI with  $a_0$  about 1/2 as long as  $a_2$  seta.

Ti. I, II, III with 20, 20, 19 setae. Claw without teeth. Empodial appendage without basal lamella. Length of the empodial appendage equals about 3/4 of the inner edge of the claw. Clavate hairs absent.

Th. II and III with 1+1 ventral setae. Ventral tube with 6+6 setae in distal part and 2+2 setae at the base. A rudiment of furca in the form of small fold, with 2+2 setae. Anal spines rather long and thin, almost without papillae. Body granulation fine, uniform, not coarser on Abd. VI. Antennal bases with coarse granulation. Males present.

### Discussion

The new species belongs to the *absoloni*-group for its small size (less than 1.0 mm) and empodial appendage without distinct basal lamella. It is similar to *Oligaphorura alnus* (Fjellberg, 1987), *O. pieninensis* (Weiner, 1988) and *O. kurtshvae* (Martynova, 1981) from this group of species. It differs from *O. alnus* (Russia: Chukotka, Magadan) by thin granulation, absence of microsensillum on Th. II and longer  $a_2$  seta on Abd. VI (*O. alnus* is characterized by rather coarse body granulation, in particular on Abd. VI, presence of microsensillum on Th. II,  $a_2$  setae on Abd. VI as long as  $a_0$ ). The new species differs from *O. kurtshvae* (Russia: Far East, Primorski Territory) as follows: the arrangement of fewer pseudocelli on Abd. IV-V (Abd. I-V: 3334-54 for *O. kurtshvae* 333343 for *O. tuvunica*). The new species is rather similar to *O. pieninensis* (Poland) but differs by absence of medial seta on Abd. IV (this seta present in *O. pieninensis*, according to figure given in de-



Figs. 2-9. *Oligaphorura tuvunica* n. sp.: 2. Head near the basis of antenna; 3. Furca; 4. Habitus; 5. Antennal organ; 6. Dorsal chaetotaxy of posterior part of the head and Thorax; 7. Tibiotarsus I; 8. Dorsal chaetotaxy of Abd. III-VI; 9. Abd. V-VI, lateral view.

*Oligaphorura tuvunica* sp. n.: 2. Cabeza, cerca de la base de la antena; 3. Furca; 4. Habitus; 5. Órgano antenal; 6. Quetotaxia dorsal de la parte posterior de la cabeza y del torax; 7. Tibiotarso I; 8. Quetotaxia dorsal de Abd. III-VI; 9. Abd. V-VI, vista lateral.

scription), as well as form of rudiment of furca (in *O. tuvinica* it is typical for most species of the genus, fold-like).

Distribution

Siberia (Tuva). Only known from the type locality.

Type locality

Tuva, Aryskannyg-Khem River Area.

*Wankeliella intermedia* n. sp. (figs. 10-17)

Type material

Holotype: ♀ (slide) from Russia, Tuva, "Ubsunur Hollow" Reserve, Sangilen Plateau, Khorumnug-taiga Mt. Range, about 25 km NE of Erzin, above flood-lands terrace of Erzin River, steppe with *Caragana spinosa*, in soil (0-5 cm), 2 VIII 1995, S. K. Stebaeva (MSPU).

Paratypes: 2♂, 2♀ (slides) from the holotype sample, 2 VIII 1995, S. K. Stebaeva (Two paratypes are kept in MSPU and two in ISEA).

Additional material

Locality 10, mountain petrophyte steppe, in soil under *Thymus serpyllum*, 1 specimen, 5 VIII 1995; locality 8, sandy steppe, under *Agropyron cristatum*, 1 specimen, dry steppes of upper part of submountain plain, under *Caragana bungei*, *C. pygmaea*, *Stipa krylovii* and *Artemisia frigida*, 4 specimens; locality 7, dry steppe, under *Potentilla acaulis*, *Elymus sp.*, *Koeleria gracilis*, 20 specimens; locality 4, mountain stony steppes, under *Orostachys spinosa* and *Ephimigonia mongolica*, 5 speci-

mens, steppe with *Caragana spinosa* of above flood-lands terrace, 3 specimens, semidesert steppe, under *Stipa sp.* and *Artemisia frigida*, 4 specimens, 11-17 VII 1993, S. K. Stebaeva; locality 1, mountain stony steppe of spurs of Mongun-Taiga Mt. Range, 1 specimen, 23 VII 1993, S. K. Stebaeva.

Description

Body length: male about 0.4 mm, female about 0.5 mm. Colour in alcohol white. Antennae shorter than head. Antennal segment IV with four thickened sensilla a-d, sensillum e recognizable, two small sensory rods f and g and very small, globular subapical papilla. Sensillum b long. Ant.III-organ consists of two small sensory rods hidden behind cuticular fold and two thick sensory clubs curved toward each other. Thick sensory club present on the ventral side of Ant.III. Postantennal organ (PAO) consists of six (3+3) or seven (3+3+1) parallel lying vesicles. Each vesicle has weak longitudinal stripe, sometimes hardly visible. The length of PAO twice as long as nearest pseudocellus.

Granulation on whole body fine, on the lateral parts, along medial line of tergites and on the last abdominal tergite coarse. Macrochaetae and microchaetae well differentiated. Sensilla on the tergites not thickened. Dorsal chaetotaxy is given in table 1.

The most important details of chaetotaxy are following: on Abd.IV medial seta  $p_x$  present, m-row with only 1+1 setae ( $m_4$ ). Dorsal pseudocellular formula: 11/022/11111.

Setae  $l_2'$  and  $l_8$  (encircled) on anal lobe present as in some *Mesaphorura* spp. (e.g.

Table 1. Dorsal chaetotaxy of *Wankeliella intermedia* n. sp.  
*Quetotaxia dorsal de Wankeliella intermedia sp. n.*

Rows of setae	Thorax			Abdomen				
	I	II	III	I	II	III	IV	V
a	-	10	10	10	10	10	10	10
m	8	6	6	1	2	2	2	-
p	-	8	8	10	10	10	11	8
pl	2	3	3	2	3	3	6	1

*M. macrochaeta*, see RUSEK, 1976). Chaetotaxy of genital plate of male consists of 14-15 setae: 8-9+4+2. Pseudocelli circular, with star-like centre.

Legs without clavate tibiotarsal hairs (slightly clavate hair on Leg I was found in one specimen). Ti.I,II,III of "Mesaphorura" type (Fjellberg, 1991): with 11,11,11 setae. Claw without teeth. Empodial appendage as long as or slightly longer than 1/3 length of the inner edge of the claw. Ventral tube with 5+5 or 4+4 lateral setae in the distal part and 2+2 ones in the basal part. Abdominal tergite VI with two crescentic ridges in anterior part and two anal spines on distinct papillae.

#### Discussion

The new species is intermediate in form of PAO between genera *Karlstejnina* Rusek, 1974 and *Wankeliella* Rusek, 1975: vesicles are situated in two parallel rows along longitudinal axis of organ, but do not arise from one point as in *Karlstejnina*; from the other side each vesicle has only a weak longitudinal stripe, instead of clear partitioning into two branches as in *Wankeliella*.

The most important difference from the species of genus *Karlstejnina* is: 1+1 m-setae on Abd.IV -  $m_4$  present,  $m_5$  absent [all species of the last genus have at least 2+2 m-setae ( $m_4, m_5$ )]. In addition, the new species differs from *K. rusekiana* Weiner, 1983 by presence of  $p_x$  seta on Abd.IV, from *K. norvegica* Fjellberg, 1974 and *K. montana* Rusek, 1978 by two sensory rods in Ant.III-organ instead of one.

It is differentiated from the other species of genus *Wankeliella* as follows: from *W.*

*peterseni* Rusek, 1975 and *W. pongei* Rusek, 1978 by presence of  $p_x$  seta on Abd.IV; from *W. mediochaeta* Rusek, 1975 and *W. medialis* Simon & Jordana, 1994 by chaetotaxy of Abd.IV. *Wankeliella intermedia* has 1+1 m-setae on Abd.IV:  $m_4$  present,  $m_5$  absent [*W. mediochaeta* without m-setae, *W. medialis* with 2+2 m-setae ( $m_4, m_5$ ) on Abd.IV]. Besides, *Wankeliella intermedia* has no thickened sensilla on abdominal tergites (including Abd.III and Abd.V).

According to structure of PAO, the new species can be compared with *Fissurophorura* Rusek, 1991 (the last has three sensory clubs in Ant.III-organ), *Prabherdia* Salmon, 1965 (has bipartite pseudocelli) and *Sensiphorura* Rusek, 1976 (belongs to another subfamily). *Wankeliella intermedia* differs from species of the first genus by two sensory clubs in AO, from species of the second one by normal pseudocelli.

In modern systematics of Tullbergiinae genera a tendency of splitting predominates. According to this systematics the structures of PAO and AO are the leading features to separate genera. Therefore it would be possible to establish a new genus with type species *Wankeliella intermedia*. However it is preferable to include it into the genus *Wankeliella* until the appearance of a more hierarchical and natural taxonomic system.

#### Distribution

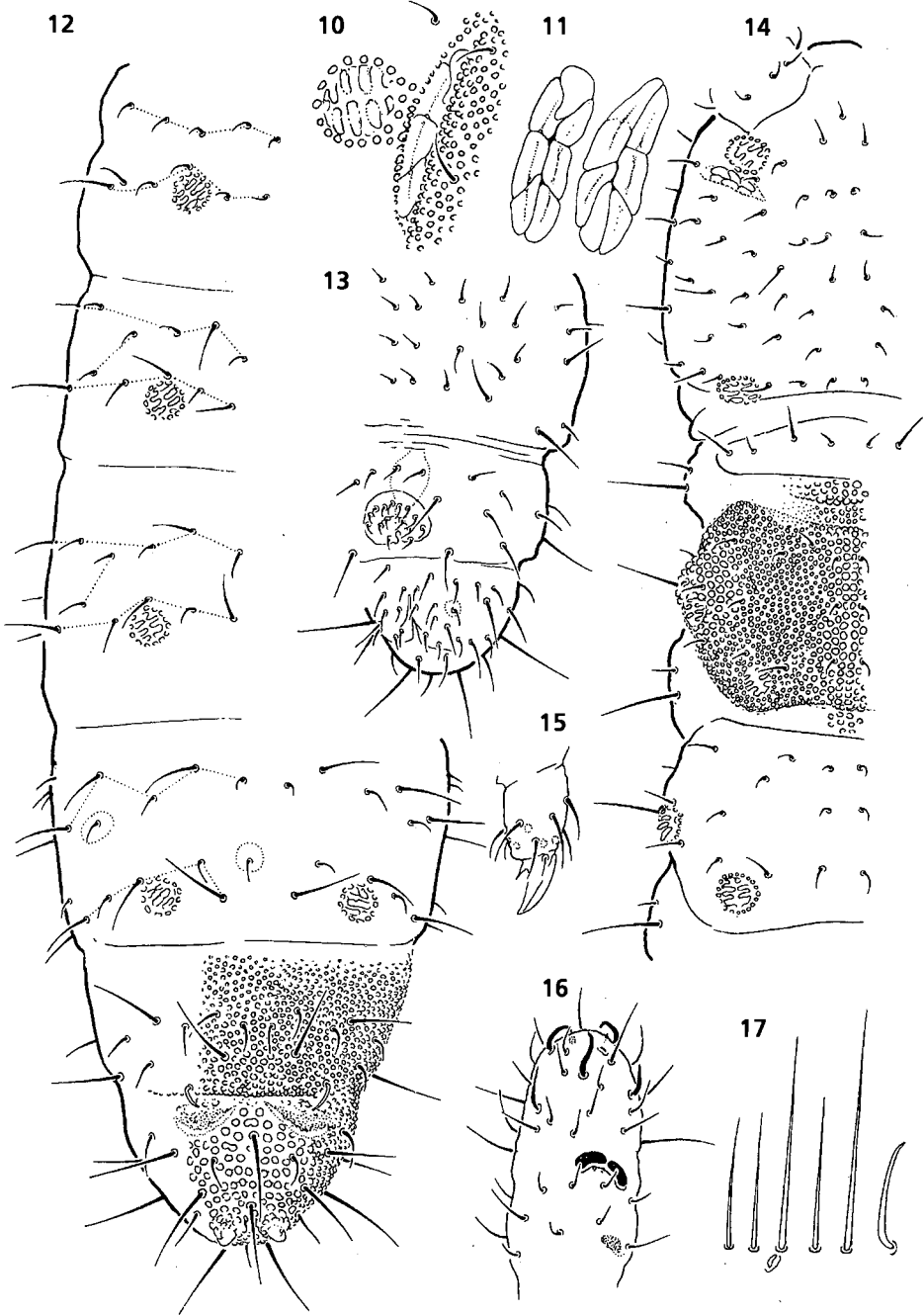
Siberia (Tuva). The species is common in different steppes of the Ubsunur Hollow, but everywhere it has rather low abundance.

#### Type locality

Tuva, Sangilen Plateau.

Figs.10-17. *Wankeliella intermedia* n. sp.: 10. Postantennal organ and pseudocellus; 11. Postantennal organ (left and right side of paratype); 12. Dorsal chaetotaxy of abdomen; 13. Ventral chaetotaxy of Abd.IV-VI of male; 14. Dorsal chaetotaxy of head and thorax; 15. Tibiotarsus I; 16. Antennal segment III and IV; 17. Sensilla (from left to right) on pleurite of Abd.II and III, Th.II, Abd.III ( $p_3$ ), Abd.IV ( $p_5$  and  $p_3$ ).

*Wankeliella intermedia* sp. n.: 10. Órgano postantenal y pseudocelo; 11. Órgano postantenal (lado izquierdo y derecho del paratipo); 12. Quetotaxia dorsal del abdomen; 13. Quetotaxia ventral del Abd.IV-VI del macho; 14. Quetotaxia dorsal de la cabeza y del tórax; 15. Tibiotarso I; 16. Segmentos antenales III y IV; 17. Sensilos (de izquierda a derecha) en el pleurito de Abd.II y III, Th.II, Abd.III ( $p_3$ ), Abd.IV ( $p_5$  y  $p_3$ ).



0.02 mm

12-14  
15-16  
10,11,17

*Folsomides aridoviator* n. sp. (figs. 18-26)

## Type material

Holotype: ♀ (slide) from Russia, Tuva, "Ubsunur Hollow" Reserve, Tsuger-Ellis area, about 10 km to SW from Erzin town, dry steppe with *Caragana pygmaea*, *Stipa krylovii*, *Carex korzynski*, *Potentilla acaulis* in upper part of submountain plain, near rocky massive, 12 VII 1993, S. K. Stebaeva (MSPU).

Paratype: 10 specimens from the holotype sample, 12 VII 1993, S. K. Stebaeva (five paratypes are kept in MSPU, five in ISEA).

## Additional material

Form 1 (see variability). Locality 8, dry steppe with *Caragana pygmaea*, numerous (habitat and data as in the holotype); locality 4, mountain petrophyte steppe, about 1,200-1,400 m above sea level, 4 specimens, dry and semidesert steppes with *Caragana bungei*, *C. pygmaea*, *Nanophyton erinaceum* in upper and middle part of submountain plain, 7 specimens.

Form 2. Locality 9, in dune sands along Tere-Khol (= Tore-Khol) lake, 1,150-1,200 m alt., under *Caragana bungei*, 10 specimens; locality 8, under *Artemisia globosa*, 130 specimens; locality 7, 1,300-1,350 m alt., dry steppe with *Koeleria*, *Elymus*, 125 specimens, (together with *Folsomides portucalensis*), 11-17 VII 1993, S. K. Stebaeva.

## Description

Body length up to 0.75 mm. Body shape is normal, rather stout. Ocelli dark, otherwise diffusely pigmented including antennae, base of legs and manubrium.

Head with 5+5 ocelli. Postantennal organ (PAO) elongate, usually with two posterior setae, about 2-2.5 as long as the nearest ocellus, weakly constricted in the middle. Maxillary palp bifurcate, with three sublobal hairs. Labral formula is 2/5,5,4.

Number of microsensilla on Ant.I,II,III is 2,3,0 respectively, sensilla on Ant.I,II,III are 2,1,5 (2+2+1). Formula of microsensilla on Th.II-III, Abd.I-III is 10/000-1 (about variability on Abd.III see below). Formula of sensilla on Th.II-III, Abd.I-V is 33/22224. Sensilla long and slender, lateral pair on Abd.V slightly thicker and distinctly shorter than medial sensilla. Abdominal

macrochaetae type 3 (see FJELLBERG, 1993). SA on Abd.IV about 0.2 as long as tergite. Ti.I,II,III with 20,20,22 setae, Ti.I-II with unpaired B4/5. Claw without tooth. Empodial appendage with inner lamella and short apical filament, about 1/2 as long as inner edge of claw 3. Retinaculum with 4+4 teeth and one seta.

Furca well developed. Manubrium ventrally without setae, dorsally with 3+3 setae in the basal part and 7+7 setae in the proximal part (sometimes there are six or nine setae on one side). Dens with four dorsal and one ventral setae, sometimes with three dorsal setae on one side. Juvenile specimens usually with three dorsal setae on dens. Mucro with lateral lamella from subapical tooth.

## Discussion

The new species is most similar to *F. angularis* (Axelson, 1905) *sensu* Fjellberg, 1993. It differs by grey pigment on body and presence of four setae on dorsal side of dens (*F. angularis* lacks pigmentation and has three dorsal dental setae, rarely two). Besides, the new species has the lower pair of sensilla on Abd.V much shorter than the upper pair. The lower pair of sensilla in *Folsomides angularis* is only slightly shorter than the upper one.

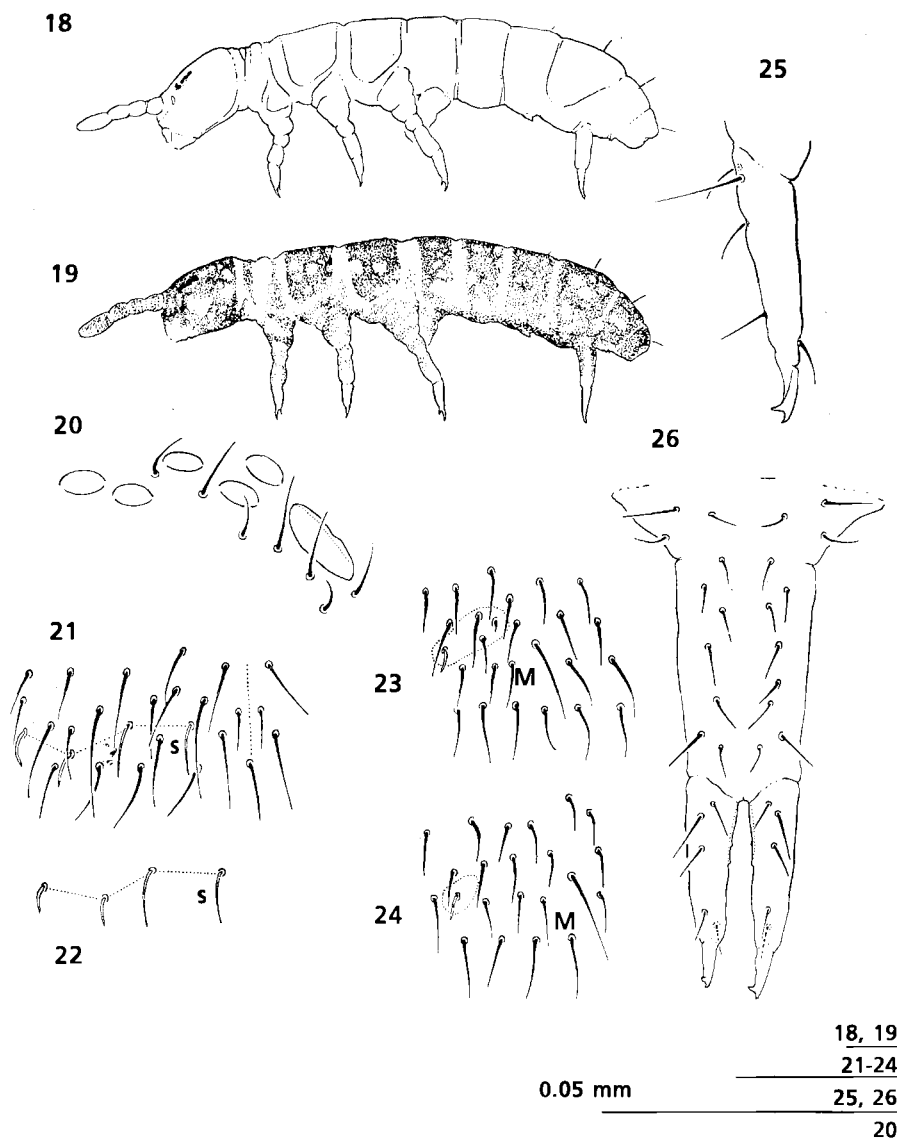
Among another species of genus *Folsomides* described from territory of the former USSR two species can be mentioned: *F. arenosus* Martynova, 1979 and *F. asiaticus* Martynova, 1970. The new species is easily separated from the first species by ocelli number (see the key) and maxillary palp. *Folsomides asiaticus* belongs to genus *Subisotoma sensu* Fjellberg (FJELLBERG, 1993).

*Folsomides portucalensis* is recorded in Russia for the first time. In the specimens studied a variability of dens chaetotaxy has not been observed as it was in specimens from Canary Islands (FJELLBERG, 1993). All specimens of *F. portucalensis* from Tuva have 5-6 dorsal setae on dens. Body pigment present but weakly developed.

## Variability

In materials from Tuva studied here, there are two forms of indistinct status. Principal form (form 1) lacks ms on Abd.III, usually with lateral sensilla on Abd.V 2/3 as long as medial sensillae. The first mentioned feature addi-





Figs.18-26. *Folsomides angularis* (18) and *Folsomides aridoviator* n. sp. (19-26): 18, 19. Habitus; 20. Ommatidia and postantennal organ; 21. Dorsal chaetotaxy of Abd.V (Tsuger-Ellis); 22. Dorsal chaetotaxy of Abd.V (only sensilla shown, Yamaalyg); 23. Lateral part of Abd.III (form 2); 24. Lateral part of Abd.III (form 1); 25. Furca, lateral view; 26. Furca, dorsal view. (For abbreviations see Material and methods.)

*Folsomides angularis* (18) y *Folsomides aridoviator* sp. n.. (19-26): 18, 19. Habitus; 20. Omatidios y òrgano postantenal; 21. Quetotaxia dorsal del Abd.V (Tsuger-Ellis); 22. Quetotaxia dorsal del Abd.V (sòlo se muestran los sensilos, Yamaalyg); 23. Parte lateral del Abd.III (forma 2); 24. Parte lateral del Abd.III (forma 1); 25. Furca, vista lateral; 26. Furca, vista dorsal. (Para abreviaturas ver Material and methods.)

Key to species of genus *Folsomides* of Russia and adjacent territories.

*Clave de las especies del género Folsomides de Rusia y territorios adyacentes.*

1. With 2+2 ocelli. (Widely distributed throughout Russia, except the northern regions.)	<i>parvulus</i> Stach, 1922
With more than 2+2 ocelli	2
2. Ocelli 4+4, maxillary palp simple (Middle Asia: Turkmenia.)	<i>arenosus</i> Martynova, 1979
Ocelli 5+5, maxillary palp bifurcate	3
3. Dens with one ventral and 5-6 dorsal setae (5-6/1). Microsensillar formula 11/111 (Middle Povolzhje, Tuva: Ubsunur Hollow.)	<i>portucalensis</i> Gama, 1961
Dens with one ventral and 3-4 dorsal setae (3-4/1). Microsensillar formula 10/000-1	4
4. Dens with one ventral and 3 dorsal setae (3/1). Body pigment absent (Reliable note from Russia-Tuva: Ubsunur Hollow.)	<i>angularis</i> (Axelson, 1905) <i>sensu</i> Fjellberg, 1993
Dens with one ventral and 4 dorsal setae (4/1). With grey body pigment (Tuva: Ubsunur Hollow.)	<i>aridoviator</i> n. sp.

tionally separates this form and *F. angularis*.

Form 2 has ms on Abd.III present, and lateral sensilla on Abd.V 1/2 as long as medial sensilla.

Occurrence of both forms is given above.

Distribution

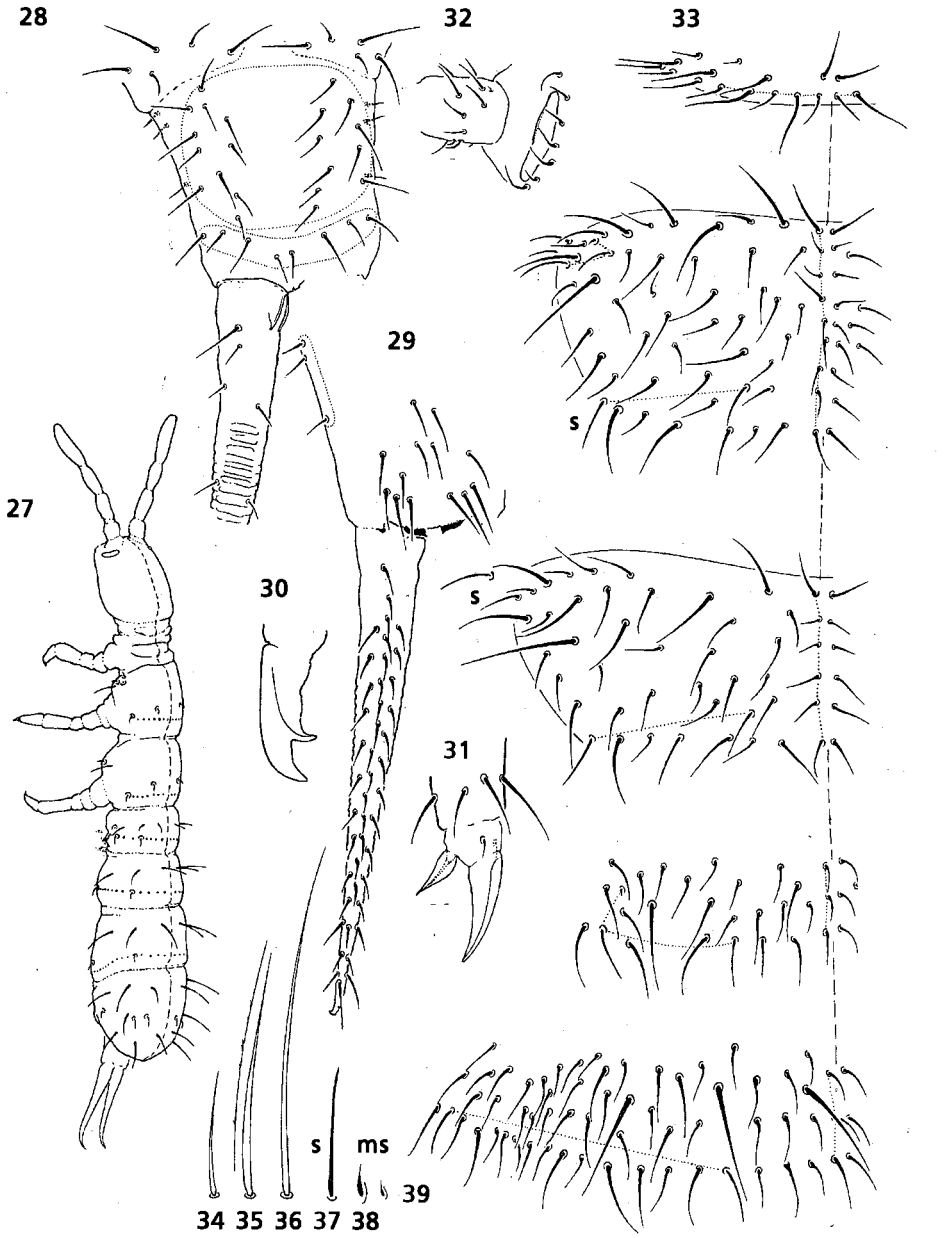
Siberia (Tuva).

Type locality

Tuva, Tsuger-Eliss area.

Figs. 27-39. *Folsomia sparsosetosa* n. sp.: 27. Habitus and scheme of chaetotaxy; 28. Furca, dorsal view; 29. Furca, ventral view; 30. Mucro, lateral view; 31. Apical part of Leg II; 32. Postantennal organ and basis of antennae; 33. Chaetotaxy of posterior part of the head, Th.II,III and Abd.I,II; 34. Common seta; 35. Large seta (with variation); 36. Macrochaeta; 37. Sensilla; 38. Microsensillum on Th.II; 39. Microsensillum on Abd.I. (For abbreviations see Material and methods.)

*Folsomia sparsosetosa* sp. n.: 27. Habitus y esquema de la chaetotaxia; 28. Furca, vista dorsal; 29. Furca, vista ventral; 30. Mucro, vista lateral; 31. Zona apical de la pata II; 32. Órgano postantenal y base de las antenas; 33. Chaetotaxia de la parte posterior de la cabeza, Th.II,III y Abd.I,II; 34. Seda común; 35. Seda grande (con variación); 36. Macroqueta; 37. Sensilos 38. Microsensilo en Th.II; 39. Microsensilo en Abd.I. (Para abreviaturas ver Material and methods.)



27

28, 29, 32, 33

31

34-39

30

0.03 mm

*Folsomia sparsosetosa* n. sp. (figs. 27-39)

## Type material

Holotype: ♀ (slide) from Russia, Tuva, Ubsunur Hollow, 2 km to W from Samagaltay town, flood-lands poplar forest with *Populus laurifolia*, *Larix sibirica* along the Samagaltay River, under *Populus*, in soil, 13 VII 1993, S. K. Stebaeva (MSPU).

Paratypes: 8 specimens from the holotype sample, 13 VII 1993, S. K. Stebaeva, (four paratypes are kept in MSPU and four in ISEA).

## Additional materials

Krasnoyarsk Territory, 12 km SE of Nazarovo, undisturbed steppe meadow, in soil, 0-5 cm, 15 specimens, 15 VI 1987 and 25 specimens, 22 VI 1989; Krasnoyarsk Territory, about 3-5 km N of Nazarovo, forest with *Pinus sylvestris* under technogenic pollution, in soil, 0-5 cm, 5 specimens, 19 VII 1986; Khakasia, 3-5 km E from Shira, bank of Itkul Lake, mesophytic forest meadow, in soil, 0-5 cm, 10 specimens, 21 VII 1990, S. K. Stebaeva; Mongolia, Ara-Khangai Aimak, Tevshrulekh, mountain forest with *Larix sibirica*, 3 specimens., A. Ya. Druk.

## Description

Body length about 1.0 mm. White, without pigmentation. Body shape prolonged with thickened last segments. Head without ocelli. Postantennal organ (PAO) rather wide and elliptical, with 6 setae along posterior edge, 1,7-2,0 times longer than inner edge of claw III and 1,3 as long as width of Ant.I, weakly constricted. Maxillary palp bifurcate, outer maxillary lobe with four sublobal hairs.

Labral formula 4/5,5,4. Postlabial setae 4+4. Ant.I,II,III with 2,3,1 microsensilla and 2,1,6 (two inner, two outer and two lateral) sensilla respectively. Ant.I with 17-18 normal setae in addition to microsensilla and sensilla. Males have erected modified setae on Ant.II, which in subadults are short and in adults as long as normal setae on this antennal segment. Such male setae present on Ant.II only, but on Ant.III absent.

Body sensilla long and weakly differentiated. Sensillar formula for Th.II,III, Abd.I,II,III,IV: 4+ms, 3/2+ms, 2,2,3. Medial accp-sensilla on Abd.I-III are situated in p-row of setae. Microsensillum (ms) on

Abd.I very short and sometimes absent. Lateral sensilla of a-row on Th.III are displaced from their normal position to lateral side of tergite. Body setae large and sparse. Macrochaetae are well differentiated only on abdominal segments. Macrochaetae on Abd.I are developed rather weakly (2+2 only). Abd.II-III with 3+3 macrochaetae. All macrochaetae practically smooth, on last abdominal segments sometimes weakly serrated. The largest macrochaetae of the last abdominal segments about six times longer than mucro. Axial chaetom is relatively constant. The most frequently occurring variant of axial setae (for half body) is 9,6/333. Thorax without ventral setae. Claw without teeth. Retinaculum with 4+4 teeth and one seta. Ventral tube with 4+4 latero-distal setae and five (seldom six) posterior ones. Furca well developed and ranges up to anterior part of Abd.II. Anterior furcal subcoxa usually with 15 setae, posterior one with seven-eight setae. Manubrium ventrally with 11-15 setae (3+3,1+1,1+1,1+1).

The following variants have been observed: 3+3,2+2,2+1,1+1 and 3+3,1+0,1+1,1+0. Manubrium dorsally with 5+5 setae in basal part and 12+12 or 14+14 setae in proximal part. Besides, there are 3+3 setae on lateral sides of manubrium. Dens with 36-43 ventral setae, dorsally with four (rarely with five) setae in basal part and two setae in middle part. Dens crenulated, about two times longer than manubrium. Mucro with two teeth, 17-19 times shorter than dens, with lateral lamella from subapical tooth.

## Discussion

The new species is similar to *F. tianschanica* Martynova, 1969 (Middle Asia: Tien Shan Mts.) and *F. duodecimsetosa* Hammer, 1953 (North Canada). The latter species was recently synonymised (CHRISTIANSEN & BELLINGER, 1980) with *F. nivalis* (Packard, 1873), one of the most common Nearctic species. The new species differs from *F. nivalis* by weakly serrated macrochaetae, absence of teeth on claw, a greater number of setae on ventral side of manubrium. Besides, medial sensilla on thorax in *F. sparsosetosa* are anterior to p-row chaetae (according to Grow & CHRISTIANSEN, 1976 sensilla of *F. nivalis* are

situated in p-row). The new species differs from *F. tianschanica* by its larger size, distinctly longer PAO and longer macrochaetae on last abdominal segments in comparison with mucro length.

#### Distribution

Siberia (South of the Krasnoyarsk Territory, Tuva), Mongolia.

#### Type locality

Tuva, Samagaltay area.

### Resumen

*Cuatro nuevas especies de las familias Onychiuridae y Isotomidae (Hexapoda, Collembola) de Ubsunur Hollow (Tuva, Russia)*

Se describen cuatro nuevas especies de las familias Onychiuridae e isotomidae (Hexapoda, Collembola): *Oligaphorura tuvunica* sp. n. (figs. 2-9) se caracteriza por su fórmula pseudocelar 2+1,2/133/33343, granulada fina en Abd.VI y largas sedas  $a_2$  en Abd.VI.

*Wankeliella intermedia* sp. n. (figs. 10-17) (Onychiuridae) con un PAO de forma intermedia entre *Karlstejnina* Rusek, 1974 y *Wankeliella* Rusek, 1975 y se distingue de las especies más próximas por las 1+1 sedas m del Abd.IV.

*Folsomides aridoviator* sp. n. (figs. 18-26) es similar a *F. angularis* (Axelson, 1905), difiere en la pigmentación parda del cuerpo y en la presencia de cuatro sedas en la parte dorsal del dens.

*Folsomia sparsosetosa* sp. n. (figs. 27-39) (Isotomidae) se caracteriza por su largo dens y por las sedas de la cara ventral del manubrio, se diferencia de *F. nivalis* (Packard, 1873) por sus macroquetas fuertemente aserradas, por la ausencia de dientes en la uña y por un mayor número de sedas en la cara ventral del manubrio. Se muestran las localidades de muestreo (fig. 1) y una clave de clasificación para las especies del género *Folsomides* Stach, 1922 de la antigua Rusia.

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