

**The taxonomy and distribution of the genus *Anurida* (Collembola: Neanuridae)
in the northern Palaearctic**

ANATOLY B. BABENKO

Severtsov Institute of Ecology and Evolution, Russian Academy of Sciences,
Leninsky pr. 33, Moscow 117071, Russia

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Abstract. The paper provides information on taxonomy of *Anurida* species from the northern Palaearctic. 4 new species (*A. azurea*, *A. palustris*, *A. tatiana*, *A. sakhensis*) are described and several forms are regarded as junior synonyms, viz. *A. tundricola* Tshelnokov (= *A. alpina* Agrell), *A. balagannakhi* Tshelnokov (= *A. annatshagi* Tshelnokov), *A. nerensis* Tshelnokov (= *A. beringi* Fjellberg), *A. jakutica* Tshelnokov (= *A. bondarenkoae* Tshelnokov), *A. polychaetosa* Tshelnokov (= *A. hammerae* Christiansen), *A. mandibulata* Tshelnokov (= *A. hammerae* Christiansen), *A. macrochaetosa* Tshelnokov (= *A. luciae* Fjellberg), *A. tshuktshorum* Tshelnokov (= *A. narli* Fjellberg), *A. arctica* Tshelnokov [= *A. papillosoides* (Hammer)], *A. wrangelensis* Tshelnokov [= *A. polaris* (Hammer)], *A. tajmyrica* Tshelnokov (= *A. subarctica* Fjellberg). The peculiarities of zonal and geographical distributions of *Anurida* species in the northern Palaearctic are discussed. A key to the identification of the northern Holarctic species of the genus is given.

INTRODUCTION

The paper is concerned with the fauna and distribution of *Anurida* (Collembola: Neanuridae) species in the tundra zone of Eurasia and is based, mainly, on material collected during the joint Russian-Swedish expedition “Tundra Ecology-94”. In addition, unpublished data from the author’s material from the Taimyr Peninsula and from the collections of M. Potapov and N. Kuznetsova (European part of Russia, Yakutia) and D. Berman (northeast Siberia) were also used.

Species of *Anurida* are well represented in the majority of tundra landscapes, have clear specific features* and distinct boundaries of distribution areas and may serve as a good model for faunistic analyses. Furthermore, an additional reason for analysis of this genus is that two taxonomic papers that are partly (Fjellberg, 1985a) or fully (Tshelnokov, 1988) concerned with the rich *Anurida* fauna of Beringia have been published recently. The latter was accepted by *Entomologicheskoe Obozrenie* as early as 1983, but the delay in its publication resulted in many junior synonyms, which should be established before any further investigations. This determined the two main purposes of the present paper, viz. a taxonomic review of *Anurida* species recorded from northern Palaearctic and an analysis of their distribution within regional and zonal boundaries.

ABBREVIATIONS OF COLLECTIONS: TM – Tromsø Museum, Norway; MPUC – Zoological Department of the Moscow Pedagogical University; ZMAS – Zoological Institute and Museum, Russian Academy of Science, St. Petersburg; AB – A. Babenko.

* For the main morphological criteria used for species separation within the genus see Fjellberg (1985a, b).

NORTHERN PALAEARCTIC SPECIES OF THE GENUS *ANURIDA* LABOULBÈNE, 1865

Anurida alpina Agrell, 1939

Anurida alpina Agrell, 1939: 160.

Anurida tundricola Tshelnokov, 1988: 83, syn. n.

TAXONOMIC REMARKS: Comparison of the holotype and two paratypes of *A. tundricola* with several specimens of *A. alpina* from northern Scandinavia indicates that they are conspecific. The described differences of *A. tundricola* are as follows: 5 antennal sensilla (6 in *A. alpina*), only 4 mandibular teeth (5 in *A. alpina*) and two maxillar lamella in *A. tundricola* (3 in *A. alpina*). All these “differences” are just Tshelnokov’s incorrect description.

DISTRIBUTION: A trans-Palaeartic species (Fig. 42), encountered all over the tundra zone of Eurasia, particularly numerous in its northern and central parts. On the Siberian uplands it penetrates far south, at least up to the upper reaches of the Indigirka River.

MATERIAL: 26.vii.1985, Norway, Troms, Målselv, Mt. Njunis, 1,400 m, 7 ex., leg. & det. A. Fjellberg, coll. TM; 9.vii.1992, Russia, Novaya Zemlya Archipelago, Southern Isl., Matochkin Shar, 5 ex., leg. V. Bulavintsev, coll. AB; 1. and 7.viii.1988, Russia, Siberia, western Taimyr, mouth of Uboinaya River, 20 ex., leg. & coll. AB; 4.vii., 2. and 9.viii.1993, Russia, Siberia, eastern Taimyr, northern shore of Taimyr Lake, 25 ex., leg. & coll. AB; 10.–11.viii.1994, Russia, Siberia, northeastern Taimyr, Faddeya shore, Rybnaya River (76°38'N 111°00'E), 10 ex., leg. & coll. AB; 15.–17.viii.1994, Russia, Siberia, northwestern Taimyr, Middendorf Gulf, Opalovaya River (75°56'N 94°13'E), 13 ex., leg. & coll. AB; 6.–8.vii.1994, Russia, Siberia, delta of Olenek River, Vaganytta-Kyuel Lake (73°30'N 118°10'E), 36 ex., leg. & coll. AB; 10.–11.vii.1994, Russia, eastern Siberia, Novosibirsk Isl., Faddeev Isl., Ulakhar-Uryakh River (75°35'N 144°50'E), 38 ex., leg. & coll. AB; 31.vii.1994, Russia, eastern Siberia, Novosibirsk Isl., Bunge Land (75°03'N 140°15'E), 62 ex., leg. & coll. AB; 16.vii.1994, Russia, eastern Siberia, delta of Indigirka River (71°26'N 149°45'E), 7 ex., leg. & coll. AB; 22.vii.1992, Russia, eastern Siberia, upper reaches of Indigirka River, near Ust'-Nera settlement, 1,300–1,600 m, 3 ex., leg. M. Potapov, coll. MPUC; 18.vii.1994, Russia, eastern Siberia, delta of Kolyma River, low left bank (69°32'N 160°44'E), 1 ex., leg. & coll. AB.

Types of *A. tundricola*: Holotype, 20.viii.1974, (Russia, northeast Siberia), Chukotskii Avtonomnyi Okrug (AO), tundra on the shore of El'gygytyn Lake, 2 ex., leg. E. Bondarenko, coll. ZMAS; paratypes: 1 ex., same data as holotype; 25.vii.1971, (Russia, northeast Siberia), Wrangel Isl., bank of Neizvestnaya River, 1 ex., leg. Steinberg, coll. ZMAS.

Anurida amorita Folsom, 1902

Anurida amorita Folsom, 1902: 90.

Anurida amorita Folsom: Christiansen & Bellinger, 1980: 324.

DISTRIBUTION: Described from the central part of Alaska, but no further definitive records; that of Axelson (1903) from central Yakutia (near Zhigansk on the Lena River) appears plausible but requires verification. Tshelnokov (1988) mentioned *A. cf. amorita* as an element of Chukotka fauna, but the only specimen I have been able to find in his collection with the label “*Anurida cf. amorita*” belongs to *A. beringi*.

Anurida annatshagi Tshelnokov, 1988

Anurida annatshagi Tshelnokov, 1988: 74.

Anurida balagannakhi Tshelnokov, 1988: 76, syn. n.

TAXONOMIC REMARKS: Holotypes of *A. annatshagi* and *A. balagannakhi* have been compared and there can be little doubt that they belong to the same species. Both specimens have the same chaetotaxy (as in Fig. 31, but abd. I–III without p2 chaetae); the usual set of



Figs 1-3. *Anurida annatshagi*. 1 – right ant. 3-4, dorso-lateral view, holotype of *A. balagannakhi*; 2 – left mandible, holotype of *A. annatshagi*; 3 – left maxilla, holotype of *A. annatshagi*. Scales: 0.01 mm.

sensilla on ant. 4: A-F, E* clearly thinner (Fig. 1) (the original description implies that one of the lateral sensilla is absent in *A. annatshagi*), mandibles are also identical (Fig. 2); maxillary capitulum with 2 strong apical teeth followed by several smaller and three serrate lamellae (Fig. 3).

DISTRIBUTION: An eastern Palearctic species.

MATERIAL: Holotype, 25.viii.1976, (Russia, northeast Siberia), Magadanskaya oblast', Ten'kinskii raion, larch forest on the spurs of Bolshoi Annachag Mt. ridge, soil under *Formica exsecta* nest, leg. Zhigul'skaya, coll. ZMAS.

Holotype of *A. balagannakhi*: 25.ix.1975, (Russia, eastern Siberia), Yakutskaya ASSR, Oimyakonskii raion, lower reaches of Nera River, in litter of larch forest, leg. D. Berman, coll. ZMAS.

Anurida azurea sp. n.

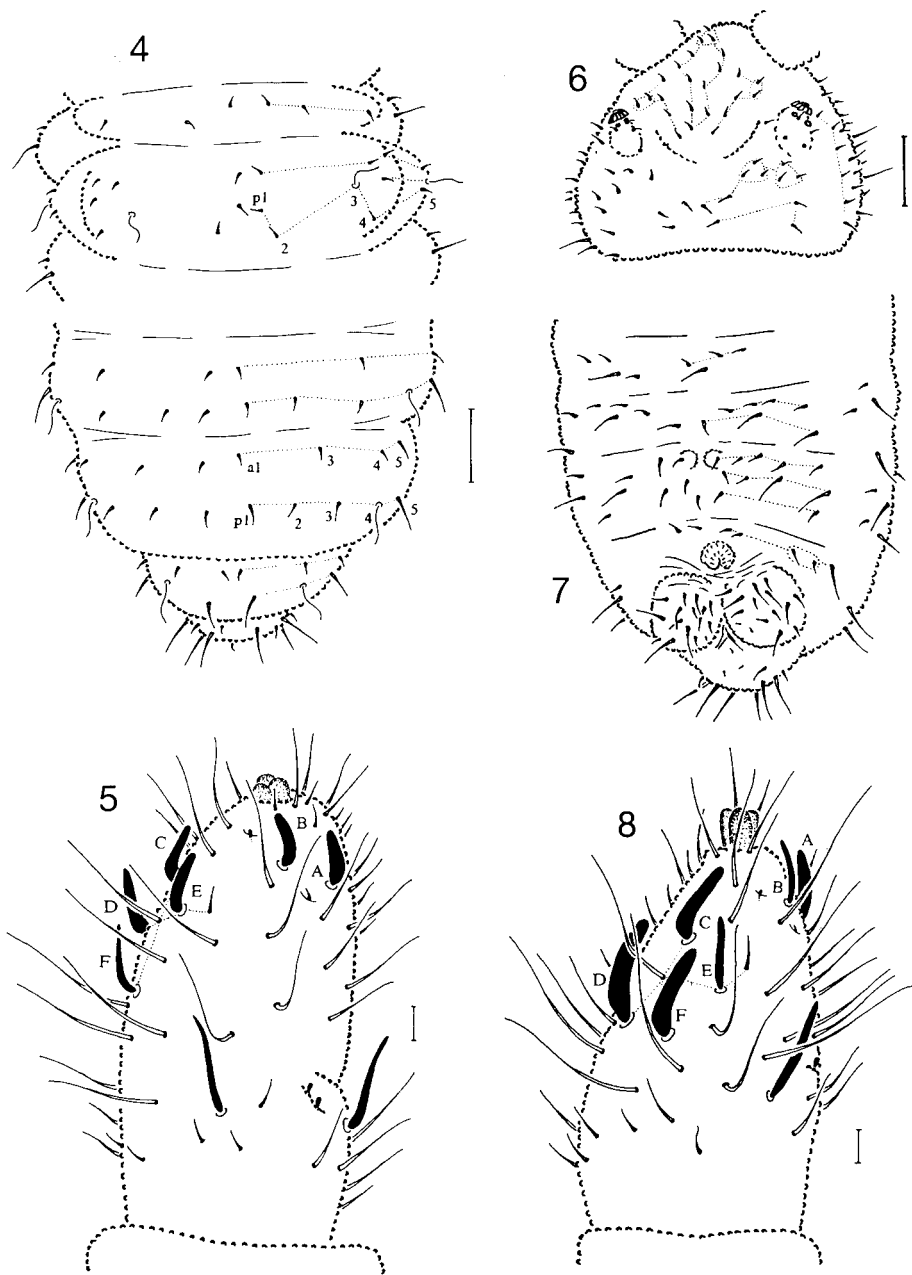
DESCRIPTION

Colour: Pale (white or white-yellow) with diffuse blue pigment, eye spots dark.

Size: 1.0-1.5 mm, sometimes up to 2.0 mm.

Antennae slightly shorter than head. Ant. 1-2 with 7 and 13-14 chaetae respectively. Ant. 3-4 fused dorsally, ventral separation well marked by a fine tegumentary granulation. Ant. 4 with 3-lobed apical bulb and 6 blunt sensilla, F slightly thinner (Fig. 5), external microsensillum and organite present. Ant. 3 organ normal, consisting of two long, widely separated outer sensilla, with two bent sensory pegs between them and a small ventral microsensillum. Ocelli 4+4, the two posterior are distinctly smaller, about as large as tegumentary granules and difficult to detect. PAO with 13-17 vesicles in oval arrangement, as large as 2-2.5 of the nearest ocellar diameter. Mandibles with 3+2 teeth, arranged linearly

* For sensilla designation, the nomenclature proposed by Fjellberg (1985a) is used.



Figs 4-8. 4-7: *Anurida azurea* sp. n. 4 - chaetotaxy of th. 1-2 and abd. 3-6, holotype; 5 - right ant. 3-4, dorso-lateral view, paratype. 6 - head chaetotaxy, paratype; 7 - ventral chaetotaxy of abd. 2-6, paratype; 8 - *Anurida bondarenkoae* (northern Yakutia), right ant. 3-4, lateral view. Scales: 0.1 mm - 4, 6-7; 0.01 mm - 5, 8.

(Fig. 9). Maxillary capitulum with 4 teeth and three lamellae: lam. 1 with fine but clear serration, lam. 2 with many long marginal filaments, passing tip of the capitulum, lam. 3 with 2 prominent hooks (Fig. 10). Labrum and labium with usual set of chaetae and sensorial elements: labrum with 5-5-2 chaetae, labium with 8+3 chaetae and two small sensorial papillae.

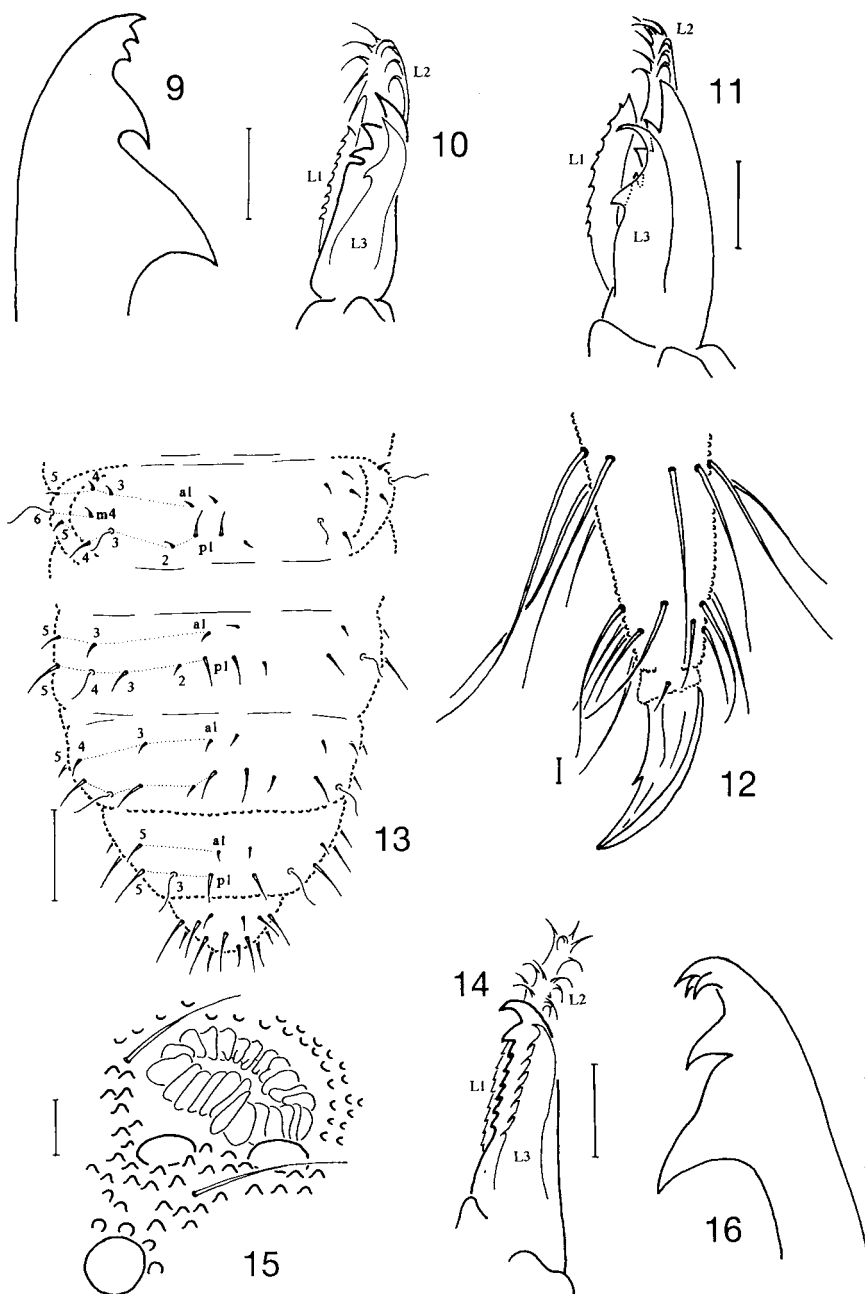
Granulation of integument rather coarse, conical. Dorsal chaetae smooth, short and fine, sensilla clearly longer. Chaetae differentiated into macro/microchaetae only on lateral parts of terga and dorsally on abd. 5–6. Head chaetotaxy somewhat pluri-chaetotic, particularly on the area occipitalis (Fig. 6). Characteristics of dorsal chaetotaxy of thorax and abdomen (Fig. 4): Th. 1 with 3+3 chaetae. Th. 2–3 with full set of chaetae, chaetae p2 in posterior position, sensilla p3 are anterior to p4. Abd. 1–3 usually with 3+3 a-chaetae (a1, a3, a5) and complete numbers of p-chaetae (p1–5). Abd. 5 without p2. Ventral chaetotaxy (Fig. 7), unpaired axial chaetae are absent on all sterna. Tibiotarsi 1–2–3 with full set of chaetae: 19–19–18. Subcoxae with (1)2–2–(2)3 chaetae. Ventral tube with 4+4 chaetae. Unguis without inner tooth. Rather large, broad and flattened species.

TYPE MATERIAL: Holotype ♀, labelled “Western Taimyr, mouth of Uboinaya River, moss/sedge depression. 7.viii.1988”, A. Babenko leg. Paratypes: 5♀, ♂, same data as holotype; ♀, ♂, labelled “North-western Yamal, Murtyakha River (70°18'N 67°53'E), under *Empetrum nigrum* (Empetraceae) on lake bank, 22.viii.1994”; 7♀, 4♂, labelled “Eastern Taimyr, northern bank of Taimyr Lake, sedge/dwarf shrub tundra, polygonal trough with mosses, 13.vii.1993”; 5♀, 3♂, labelled “Eastern Taimyr, northern bank of Taimyr Lake, herbaceous meadow on rocky outcrop, 02.viii.1993”; 3♀, ♂, labelled “Eastern Taimyr, northern bank of Taimyr Lake, under *Novosieversia glacialis* (Rosaceae), 26.vii.1993”; 2♀, labelled “Delta of Yana River, Shirokostas Peninsula, Lake Ledyanoe (72°25'N 141°00'E), sedge/dwarf shrub tundra on rocky outcrops, polygonal trough with mosses, 04.–06.viii.1994”; ♀, labelled “Delta of Yana River, Shirokostas Peninsula, Lake Ledyanoe (72°25'N 141°00'E), herbaceous meadow on southern slope, 04.–06.viii.1994”; ♀, ♂ labelled “Delta of Indigirka River (71°26'N 149°45'E), under *Dryas punctata* (Rosaceae) on northern slope, 14.–16.vii.1994”; ♀, labelled “Delta of Indigirka River (71°26'N 149°45'E), under *Arctophila fulva* (Poaceae) on stream bank, 14.–16.vii.1994”; 2♀, 2♂, labelled “Delta of Indigirka River (71°26'N 149°45'E), sedge/moss bog, 14.–16.vii.1994”; ♀, labelled “Delta of Indigirka River (71°26'N 149°45'E), gramineous meadow in old settlement, 14.–16.vii.1994”; ♀, labelled “Delta of Indigirka River (71°26'N 149°45'E), peat hillock in sedge bog, 14.–16.vii.1994”; ♀: “Delta of Kolyma River (right bank), Vysokaya Mt. (69°21'N 163°35'E), sedge bog near stream. 18.vii.1994”, all A. Babenko leg. Types are deposited in MPUC.

NAME DERIVATION: From “azureus” = sky-blue, colour tone of the new species.

TAXONOMIC REMARKS: The species is closely related to *A. weberi* Christiansen & Bellingier, 1980 from Alaska, having a similar body shape and granulation, number of ocelli, chaetotaxy and the structure of maxillary lam. 2–3. These two species may be distinguished by the number of additional lateral sensilla on ant. 4 (none in *A. azurea*, 2 in *A. weberi*), serrated maxillary lam. 1 and unguis without inner tooth in *A. azurea*. In the eastern Palaearctic there is another similar species – *A. kolymensis* Tshelnokov. It differs from *A. azurea* by the arrangement of its antennal sensilla with up to 6 X-sensilla in the lateral group (Fig. 25), by the presence of strong inner tooth on unguis (Fig. 12), and by its darker colour. *A. interior* Fjellberg, 1985 belongs to the same species-group. As *A. azurea*, it has only two lateral sensilla on ant. 4, but differs by the lower number of ocelli (3+3), simple maxillary lam. 1, and by strong tooth on unguis.

DISTRIBUTION: A species with a broad Siberian distribution. Yamal Peninsula is the westernmost site where it was found (Fig. 46). It is a typical inhabitant of damp and mesophilic communities of the tundra zone, particularly numerous in its central and southern parts.



Figs 9–16. 9–10: *Anurida azurea* sp. n. 9 – left mandible, paratype; 10 – right maxilla, paratype. 11–12: *Anurida kolymensis*. 11 – right maxilla; 12 – right tibiotalpus 2. 13–15: *Anurida bondarenkoae* (northern Yakutia). 13 – chaetotaxy of th. 2, abd. 3–6; 14 – right maxilla, paratype; 15 – PAO and ocelli; 16 – *Anurida alpina* (northern Norway), right mandible. Scales: 0.1 mm – 13; 0.01 mm – 9–12, 14–16.

Anurida beringi Fjellberg, 1985

Anurida beringi Fjellberg, 1985a: 101.

Anurida nerensis Tshelnokov, 1988: 71, syn. n.

TAXONOMIC REMARKS: Original description of *A. nerensis* does not significantly differ from the Fjellberg's description of *A. beringi*. Eight type specimens of *A. nerensis* from Yakutia and Chukotka have been re-examined and there is no doubts that it is the same species as *A. beringi*. All their important morphological characters (sensorial elements on ant. 4, mouth parts, and dorsal chaetotaxy) are the same.

DISTRIBUTION: According to Fjellberg (1985a), *A. beringi* is widespread in Alaska and, probably, mentioned for northern Canada as *A. tullbergi* by Hammer (1953). In the Palaearctic there are sporadic records from Taimyr Peninsula to Chukotka (Fig. 45). *A. beringi* is more common for northern forests and tundra-forests regions, the northernmost record being from within the southern part of the tundra zone.

MATERIAL: 20.–26.vii.1983, Russia, Siberia, eastern Taimyr, Enisei Bay, mouth of Ragozinka River, 8 ex., leg. & coll. AB; 14.–16.vii.1994, Russia, eastern Siberia, delta of Indigirka River (71°26'N 149°45'E), 7 ex., leg. & coll. AB; 22.vii.1992, Russia, eastern Siberia, upper reaches of Indigirka River, near Ust'-Nera settlement, 1,400 m, 3 ex., leg. M. Potapov, coll. MPUC; 2. and 10.x.1987, Russia, north-east Siberia, upper reaches of Kolyma River, Bolshoi Annachag Mt. ridge, 8 ex., leg. D. Berman, coll. MPUC.

Types of *A. nerensis*: Holotype, 25.ix.1973, (Russia, eastern Siberia), Yakutskaya ASSR, Oimyakonskii raion, lower reaches of Nera River, vicinity of Balagannakh settlement, leg. D. Berman, coll. ZMAS. Paratypes: 2.viii. and 25.ix.1973, same locality as holotype, 4 ex., coll. ZMAS; 7.ix.1978, (Russia, north-east Siberia), Magadanskaya oblast', Ten'kinskii raion, slopes of Bolshoi Annachag Mt. ridge, 600 m, 3 ex., leg. V. Tshelnokov, coll. ZMAS.

Anurida bondarenkoae Tshelnokov, 1988

Anurida bondarenkoae Tshelnokov, 1988: 84.

Anurida jakutica Tshelnokov, 1988: 73, syn. n. (?).

TAXONOMIC REMARKS: *A. bondarenkoae* and *A. jakutica* have the same chaetotaxy (as on Fig. 13) but differ, according to the original descriptions, in the numbers of mandibular teeth and antennal sensilla. Examination of the holotype and 2 paratypes of *A. bondarenkoae* and the holotype of *A. jakutica* have shown that their mandibles (3 small apical teeth in an oblique row and 2 strong basal ones) as well as maxillae (having all three lamellae clearly serrated as on Fig. 14) are identical. The situation with the number of ant. 4 sensilla is uncertain. The only remaining antenna of *A. jakutica* has 5 blunt sensilla (F absent), so the additional sensillum in its original description may be erroneous. Types of *A. bondarenkoae* have the usual 6 sensilla, B and E thinner than others as in my specimens from northern Yakutia (Fig. 8). The latter form differs from the type material only in having PAO with more lobes (up to 25 v. 10–16) (Fig. 15). Until more material is available, these forms are considered conspecific.

DISTRIBUTION: The known distribution is within the east Palaearctic.

MATERIAL: Holotype, 17.vii.1974, (Russia, northeast Siberia), Magadanskaya oblast', Chukotskii AO, tundra on the shore of El'gygytgyn Lake, leg. E. Bondarenko, coll. ZMAS. Paratypes, 2 ex., same data, coll. ZMAS. Further material: 6.–8.vii.1994, Russia, Siberia, delta of Olenek River, Vaganytta-Kyuel Lake (73°30'N 118°10'E), nival slope, 21 ex., leg. & coll. AB.

Holotype of *A. jakutica*: 7.vi.1976, (Russia, eastern Siberia), Yakutskaya ASSR, Oimyakonskii raion, lower reaches of Nera River, sedge bog in the vicinity of Balagannakh settlement, leg. V. Tshelnokov, coll. ZMAS.

Anurida decemocolata Hammer, 1953

Anurida decemocolata Hammer, 1953: 29.

Anurida decemocolata Hammer: Fjellberg, 1985a: 87.

DISTRIBUTION: Widespread in the tundra zone of North America (Fjellberg, 1985a; Rusek, 1994) and Siberia, but rarer in its northernmost parts. The Yamal Peninsula is the westernmost region of its distribution (Fig. 47). In all these areas *A. decemocolata* clearly prefers damp localities.

MATERIAL: 22.–23.viii.1994, Russia, western Siberia, northwestern Yamal, Murtyyakh River (70°18'N 67°53'E), 2 ex., leg. & coll. AB; vii.1967, Russia, Siberia, western Taimyr, vicinity of Ust'-Tareya settlement, 23 ex., leg. Yu. Chernov, coll. AB; 8. and 15.vii.1988, Russia, Siberia, western Taimyr, mouth of Uboinaya River, 18 ex., leg. & coll. AB; 2.viii.1993, Russia, Siberia, eastern Taimyr, northern shore of Taimyr Lake, 18 ex., leg. & coll. AB; 14.–16.vii.1994, Russia, eastern Siberia, delta of Indigirka River (71°26'N 149°45'E), 7 ex., leg. & coll. AB; 18.–19.vii.1994, Russia, eastern Siberia, delta of Kolyma River, low left bank (69°32'N 160°44'E), 5 ex., leg. & coll. AB; 23.–24.vii.1994, Russia, northeast Siberia, Wrangel Isl., Mamontovaya River (70°58'N 179°34'E), 1 ex., leg. & coll. AB; 5.vii.1972, Russia, northernmost Siberia, Chukotka, Lukovoe Lake, 4 ex., leg. E. Bondarenko, coll. MPUC.

Anurida granaria (Nicolet, 1847)

Anoura granaria Nicolet, 1847: 387.

TAXONOMIC REMARKS: The species differs from the known blind *Anurida* (except for *A. ariesi* Harsia & Gruia, 1992, described from Romania) by having th. 2–3 with chaetae p2 set posteriorly, but sensilla p3 anterior to other p-chaetae (Fjellberg, 1985b).

DISTRIBUTION: Recorded throughout the Holarctic, though the majority of these records need to be confirmed. The only reliable records from true tundra regions are those of Fjellberg (1984, 1988) from Spitsbergen. On the Russian Plain it was not recorded with certainty to the east of White Sea.

MATERIAL: 11.vii.1986, Russia, European part, White Sea, Solovetskii Isl., wet sandy beach, 2 ex., leg. M. Potapov, coll. MPUC.

Anurida ellipsoides Stach, 1949

Anurida ellipsoides Stach, 1949: 131.

Anurida ellipsoides [sic] Stach: Pomorski & Skaryski, 1994: 367.

Anurida brunsvigiensis Hüther, 1964: 292.

TAXONOMIC REMARKS: Unique chaetotaxy (chaetae p2 absent on all terga) makes it easy to distinguish *A. ellipsoides* from all other *Anurida* species, except *A. caprariensis* Dallai, 1969 from the Mediterranean. The status of the latter should be verified as the only notable difference (two unpigmented ocelli) could have been easily overlooked in *A. caprariensis*, as they were in the original Stach's description of *A. ellipsoides*.

DISTRIBUTION: This recently re-described species (Pomorski & Skaryski, 1994) appears widespread, but not particularly common in Europe, preferring various littoral and other damp habitats. In Russia it has been recorded on the White Sea shore (Pomorski & Skaryski, 1994), inhabits European forests and tundras and penetrates into western Siberia as well (Fig. 43).

MATERIAL: 29.–30.viii.1994, Russia, European part, Kanin Peninsula, Rybnaya River (68°20'N 46°10'E), wet willow shrubland on low river terrace, 3 ex., leg. & coll. AB; 30.viii.1972, Russia, European part, basin of upper Pechora, Pechoro-Il'ichevskii Reserve, litter in spruce forest, 1 ex., leg. N. Kuznetsova, coll. MPUC; 22.–23.viii.1994, Russia, western Siberia, northwestern Yamal, Murtyyakh River (70°18'N 67°53'E), *Sphagnum* peat hummock in bog, 7 ex., leg. & coll. AB.

Anurida hammerae Christiansen, 1951

Anurida hammeri Christiansen, 1951: 135 [incorrect original spelling].

Anurida hammerae Christiansen: Fjellberg, 1985a: 101.

Anurida polychaetosa Tshelnokov, 1988: 74, syn. n. (?).

Anurida mandibulata Tshelnokov, 1988: 85, syn. n.

TAXONOMIC REMARKS: Examination of the holotype (the single known specimen) of *A. polychaetosa* has shown that it differs from *A. hammerae* only in having more additional chaetae on the terga, which are less differentiated into macro/microchaetae. Ocelli, as well as some peculiarities in mandibular and maxillary structures, were overlooked by the author. Moderate plurichaetosis is also characteristic of *A. hammerae* (Fjellberg, 1985a). The study of several dozen specimens of the latter species from eastern Siberia has shown that, at least in some populations, both characteristics (number of additional chaetae and their differentiation) depend on the age (size) of the specimens. Therefore, the specific status of *A. polychaetosa* appears dubious.

The holotype of *A. mandibulata*, contrary to the original description, has at least 4+5 ocelli, usual number (3) of maxillary lamellae and evidently belongs to the same species. All the described differences could be explained by its juvenile stage.

Nevertheless, the number and size of ocelli is rather variable within this species and I. have even seen blind specimens among typical *A. hammerae*.

DISTRIBUTION: Typical Beringian distribution (Fig. 45), common in both tundra and forest regions of Chukotka, Alaska (Fjellberg, 1985a), and northern Canada (Hammer, 1953; Rusek, 1994). It is also found in Far Eastern Maritime (= Primor'e) province.

MATERIAL: 14.–16.vii.1994, Russia, eastern Siberia, delta of Indigirka River (71°26'N 149°45'E), 26 ex., leg. & coll. AB; 18.–19.vii.1994, Russia, eastern Siberia, delta of Kolyma River, low left bank (69°32'N 160°44'E), 34 ex., leg. & coll. AB; 22.vii.1992, Russia, eastern Siberia, upper reaches of Indigirka River, near Ust'-Nera settlement, 1,600 m, 5 ex., leg. M. Potapov, coll. MPUC; 15.ix. and 2.x.1987, Russia, northeast Siberia, upper reaches of Kolyma River, Bolshoi Annachag Mt. ridge, 41 ex., leg. D. Berman, coll. MPUC; 21.vii.1977, Russia, Far East, Lower Amur basin, northern Primor'e, spruce forest, 1 ex., leg. L. Kutyreva, coll. MPUC.

Holotype of *A. polychaetosa*: 9.vi.1976, (Russia, eastern Siberia), Yakutskaya ASSR, Oimyakonskii raion, lower reaches of Nera River, litter in a larch forest in the vicinity of Balagannah settlement, leg. V. Tshelnokov, coll. ZMAS.

Holotype of *A. mandibulata*: 1.ix.1974, (Russia, northeast Siberia), Magadanskaya oblast', Chukotskii AO, tundra on the shore of El'gygytyn Lake, leg. E. Bondarenko, coll. ZMAS.

Anurida kolymensis Tshelnokov, 1988

Anurida kolymensis Tshelnokov, 1988: 72.

TAXONOMIC REMARKS: Some details not mentioned in the original description: Maxillary capitulum with three clearly serrate lamellae (Fig. 11); ant. 4 with sensilla A–F (E, F thinner) and 5(6) additional laterally (Fig. 25); tibiotarsi with very long inner chaetae in a B-whorl (Fig. 12); subcoxae with 2(3)–(2)3(4)–4(5) chaetae.

The species is very similar to *A. weberi* and *A. azurea*, having the same chaetotaxy, number of ocelli and mandibular teeth. *A. kolymensis* differs from these species by the number of additional lateral sensilla on ant. 4 (none in *A. azurea*, 2 in *A. weberi*). The stronger maxilla with clearly serrated lam. 1 may be also used to distinguish it from *A. weberi*.

DISTRIBUTION: A species with an eastern Palaearctic distribution, described from the forest part of Chukotka. One of the most common *Anurida* in the mountainous regions of Yakutia and southern Chukotka. Occurs also in the southern part of the tundra zone.

MATERIAL: Holotype, 2.ix.1976, (Russia, northeast Siberia), Magadanskaya oblast', Ten'kinskii raion, upper reaches of Kolyma River, mixed forest on steep left bank near steppe, 25 km from Vetrenyi settlement, willow litter, leg. Tshelnokov, coll. ZMAS. Further material: 4.–6.viii.1994, Russia, eastern Siberia, delta of Yana River, Shirokostan Peninsula, Ledyanoe Lake (72°25'N 141°00'E), 3 ex., leg. & coll. AB; 22.vii.1992, Russia, eastern Siberia, upper reaches of Indigirka River, near Ust'-Nera settlement, 1,400–1,600 m, 12 ex., leg. M. Potapov, coll. MPUC; 22.vii.1992, Russia, eastern Siberia, vicinity of Yakutsk (13 km to the west), 2 ex., leg. M. Potapov, coll. MPUC; 10. and 15.ix.1987, Russia, northeast Siberia, upper reaches of Kolyma River, Bolshoi Annachag Mt. ridge, 15 ex., leg. D. Berman, coll. MPUC; 31.viii.1995, Russia, northeast Siberia, upper part of Kolyma River, Bolshoi Annachag Mt. ridge, 1 ex., leg. Bukhalo, coll. AB.

Anurida luciae Fjellberg, 1985

Anurida luciae Fjellberg, 1985b: 359.

Anurida macrochaetosa Tshelnokov, 1988: 70, syn. n.

TAXONOMIC REMARKS: The absence of p1-chaetae on all terga together with 7+7(8) ocelli makes this species easy to recognise. The same (unique for genus) combination of morphological features was found on *A. macrochaetosa*. Both the original description and a re-examination of *A. macrochaetosa* holotype indicate that they are conspecific.

DISTRIBUTION: Known only from the region of the original description, being rather common for different alpine, subalpine and forest habitats.

MATERIAL: 15.ix.–2.x.1987, Russia, northeast Siberia, upper reaches of Kolyma River, Bolshoi Annachag Mt. ridge, birch forest, 17 ex., leg. D. Berman, coll. MPUC.

Holotype of *A. macrochaetosa*: 21.ix.1976, (Russia, northeast Siberia), Magadanskaya oblast', Ten'kinskii raion, mountain tundra on the spurs of Bolshoi Annachag Mt. ridge, 1,200 m, under *Cladonia alpestris*, leg. V. Tshelnokov, coll. ZMAS.

Anurida martynovae Fjellberg, 1985

Anurida martynovae Fjellberg, 1985a: 96.

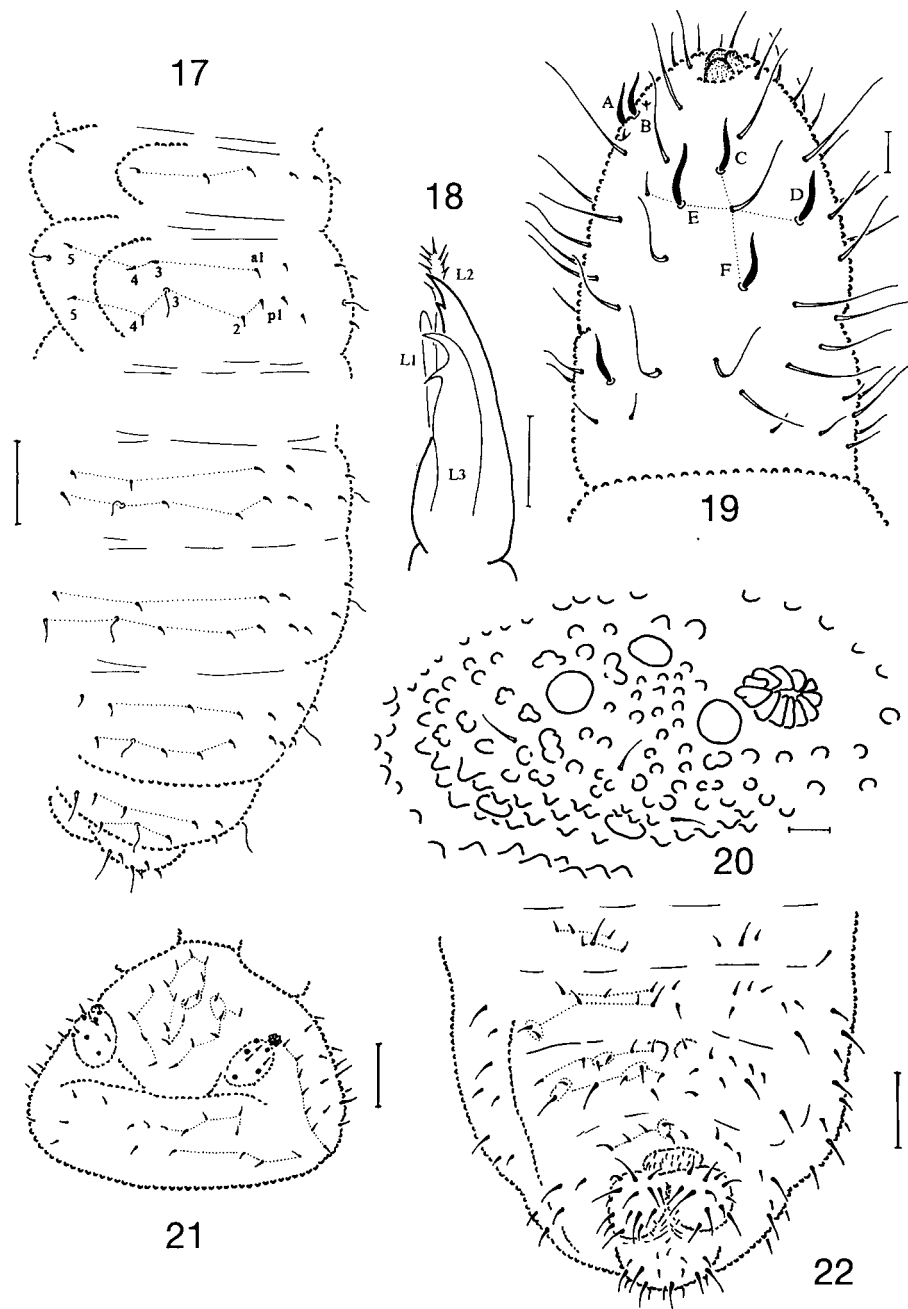
DISTRIBUTION: A Nearctic-eastern Palaearctic species. According to Fjellberg (1985a), common for a wide variety of habitats in arctic and alpine tundras (rarely in sub-arctic/sub-alpine forest) throughout Alaska and Chukotka. It is also found in the Canadian arctic archipelago (Fjellberg, 1986; Babenko, 1993) and has been recorded from the southern parts of the tundra zone of Eurasia from the mouth of Yana River to Chukotka (Fig. 47).

MATERIAL: 4.–6.viii.1994, Russia, eastern Siberia, delta of Yana River, Shirokostan Peninsula, Ledyanoe Lake (72°25'N 141°00'E), 4 ex., leg. & coll. AB; 18.–19.vii.1994, Russia, eastern Siberia, delta of Kolyma River, low left bank (69°32'N 160°44'E), 1 ex., leg. & coll. AB; 18.–19.vii.1994, Russia, eastern Siberia, delta of Kolyma River, right bank, Vysokaya Mt. (69°21'N 163°35'E), 1 ex., leg. M. Berezin, coll. AB; 23.–24.vii.1994, Russia, northeast Siberia, Wrangel Isl., Mamontovaya River (70°59'N 179°35'E), 2 ex., leg. & coll. AB; 17.viii. and 1.ix. 1974, Russia, northeast Siberia, Chukotka, El'gygyt-gyn Lake, 2 ex., leg. E. Bondarenko, coll. ZMAS; 9.viii.1973, Russia, northeast Siberia, Chukotka, lower reaches of Anadyr' River, 2 ex., leg. E. Bondarenko, coll. ZMAS; 15.viii.1972, Russia, northeast Siberia, Chukotka, Volchikha River, 1 ex., leg. E. Bondarenko, coll. ZMAS; 15.vii.1991, Canada, NWT, Devon Isl., Truelove lowland, 12 ex., leg. & coll. AB.

Anurida narli Fjellberg, 1985

Anurida narli Fjellberg, 1985a: 105.

Anurida tshuktshorum Tshelnokov, 1988: 81, syn. n.



Figs 17–22. *Anurida palustris* sp. n. 17 – chaetotaxy of th. 2–3, abd. 2–6, holotype; 18 – right maxilla, paratype; 19 – left ant. 3–4, dorsal view, paratype; 20 – PAO and ocelli, holotype; 21 – head chaetotaxy, paratype; 22 – ventral chaetotaxy of abd. 2–6, paratype. Scales: 0.1 mm – 17, 21–22; 0.01 mm – 18–20.

TAXONOMIC REMARKS: Both original description and re-examination of holotype of *A. tshuktshorum* indicate that it is conspecific with *A. narli*. All the important characters of these two forms are identical. The special structure of chaetae on labrum mentioned by Tshelnokov is an artifact.

DISTRIBUTION: An amph-Beringian species with almost all records from various tundra sites in Alaska and Chukotka (Fjellberg, 1985a; Tshelnokov, 1988), but has also been found on Kamchatka (Fig. 45).

MATERIAL: 8.ix.1978, Russia, Far East, Kamchatka Peninsula, 1 ex., leg. O. Kapust'yants, coll. MPUC.

Holotype of *A. tshuktshorum*: 2.vii.1974, (Russia, northeast Siberia), Magadanskaya oblast', Chukotskii AO, Anadyrskii raion, Nerpich'ya gryada (ridge), tundra, leg. E. Bondarenko, coll. ZMAS.

Anurida palustris sp. n.

DESCRIPTION

Colour: Blue-black, very dark.

Size: Up to 1.5 mm.

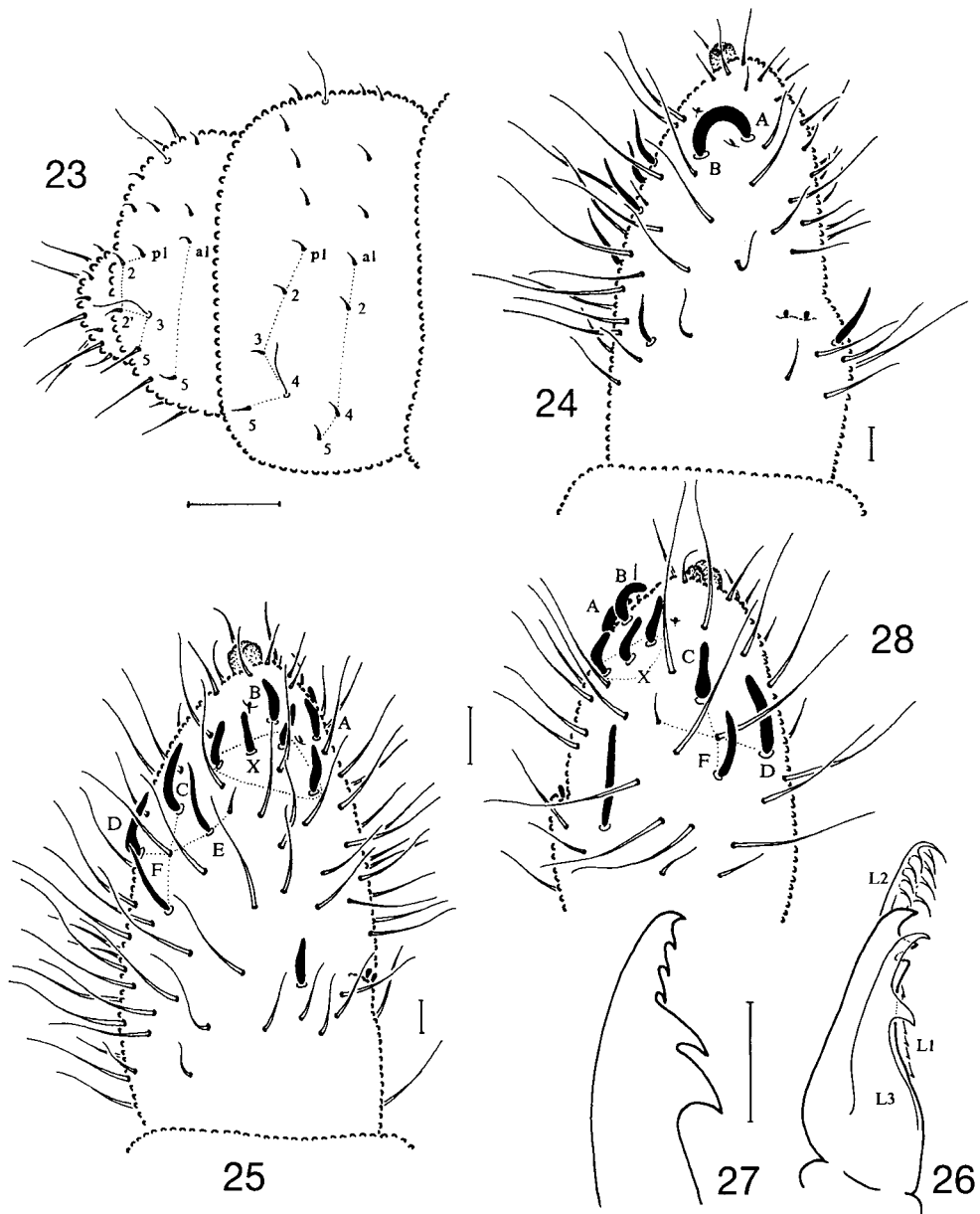
Antennae clearly shorter than head. Ant. 1–2 with 7 and 13 chaetae respectively. Ant. 3–4 fused dorsally, ventral separation distinct with fine tegumentary granulation. Ant. 4 with 3-lobed apical bulb and 6 rather slender blunt sensilla (Fig. 19), external microsensillum and organite present. Ant. 3 organ normal, consisting of two outer sensilla which are similar in shape and size to ant. 4 sensilla, with two bent sensory pegs between them and a tiny ventral microsensillum. Ocelli 5+5, posterior usually smaller. PAO rounded, about as large as 2–3 times the nearest ocellar diameter, usually with 10–13 vesicles (Fig. 20), sometimes up to 20. Maxillary capitulum with 2 apical teeth and three lamellae: lam. 1 fine and smooth, without clear serration, lam. 2 short, hardly extending beyond the capitulum, with few apical filaments, lam. 3 with 2 strong hooks (Fig. 18). Mandibles with 3 apical and 2 larger basal teeth, all in a line. Labrum and labium with usual set of chaetae and sensorial elements.

Integumental granulation uniform and usually not particularly coarse, although specimens with coarser, conical granules also observed.

Dorsal chaetae are very short and fine, tergal sensilla clearly differentiated. The usual chaetotaxy of head as in Fig. 21, although the position and numbers of some chaetae varied. Dorsal chaetotaxy of thorax and abdomen as in Fig. 17. Characteristics are: th. 1 with 3+3 chaetae between subcoxal macrochaetae, th. 2–3 with m4 absent, but a4 present, p2 in posterior position, sensilla p3 more anteriorly than p4. Abd. 1–4 with 3+3 chaetae between sensilla p4. Ventral chaetotaxy (Fig. 22) highly variable, unpaired axial chaetae absent. The furcal field is indicated by 2 minute warts with 1–2 chaetae and a group of 3–4 tiny setulae. Ventral tube with 5+5(4) chaetae. Subcoxae with 1-2-2 chaetae. Tibiotarsi 1-2-3 with 19-19-18 chaetae respectively. Unguis with small inner tooth.

TYPE MATERIAL: Holotype ♂, labelled "Pechora Bay, vicinity of Kuznetskoe Lake (68°50'N 53°45'E), wet gramineous meadow on stream bank, 25.viii.1994", A. Babenko leg. Paratypes: 2 ♀, ♂, same data as holotype; 3 ♀, labelled "Pechora bay, vicinity of Kuznetskoe Lake (68°50'N 53°45'E), herbaceous meadow on lake bank"; 2 ♀, ♂, labelled "Western Taimyr, mouth of Uboinaya River, moss/sedge depression, 7.viii.1988"; ♀, labelled "Eastern Taimyr, northern bank of Taimyr Lake, sedge/moss bog with willow shrubs, 20.viii.1993"; ♀, labelled "Eastern Taimyr, northern bank of Taimyr Lake, wet meadow on river slope, 2.viii.1993"; ♀, labelled "Eastern Taimyr, northern bank of Taimyr Lake, sedge/moss bog with willow shrubs, 26.vii.1993", A. Babenko leg. Types are deposited in MPUC.

NAME DERIVATION: The name reflects the biotopic preference of the species as it is found only in damp places.



Figs 23–28. 23–24: *Anurida papillosa*. 23 – chaetotaxy of abd. 4–6; 24 – right ant. 3–4, lateral view; 25 – *Anurida kolymensis*, right ant. 3–4, dorso-lateral; 26–27: *Anurida parapapillosa*, holotype. 26 – left maxilla; 27 – left mandible. 28 – *Anurida* cf. *parapapillosa* (same region as type locality of *A. parapapillosa*), left ant. 3–4, dorsal view. Scales: 0.1 mm – 23; 0.01 mm – 24–28.

TAXONOMIC REMARKS: The main morphological features of *A. palustris* are similar to those of *A. weberi*, *A. azurea*, *A. kolymensis*, and *A. interior*. It differs from all species of this group having more ocelli (5+5 v. 4+4 or 3+3) and very dark colour. The absence of m4 chaetae on th. 2–3 is also characteristic. In general appearance, it also resembles the co-existing (in Taimyr, for example) *A. decemocolata*. They can be distinguished by the structure of mandibles (3 small apical teeth in *A. palustris*, 4–5 apical teeth in *A. decemocolata*) and by the more complete chaetotaxy in *A. palustris*: two chaetae (a3, a4) in front of sensilla on th. 2–3 in *A. palustris*, only one (a4) in *A. decemocolata*; all p-chaetae (p1, p2, p3) present on abd. 1–4 in *A. palustris*, p3 is absent in *A. decemocolata*.

Tshelnokov (1988) described another dark coloured Siberian species with 5+5 ocelli – *A. arctica*. Its taxonomic position is uncertain and discussed below (see remarks to *A. papillosoides*).

A single specimen collected in the Kola Peninsula differs from the above description in having two additional teeth on the main part of maxillary capitulum and may represent another species.

DISTRIBUTION: A typical inhabitant of the tundra zone, including its northern part. Presumably an eastern European species, recorded also in Siberia up to the Taimyr Peninsula (Fig. 43) and found only in damp places (various sedge bogs, mosses in polygon trough, stream banks, etc.).

Anurida papillosa (Axelson, 1902)

Micranurida papillosa Axelson, 1902: 103.

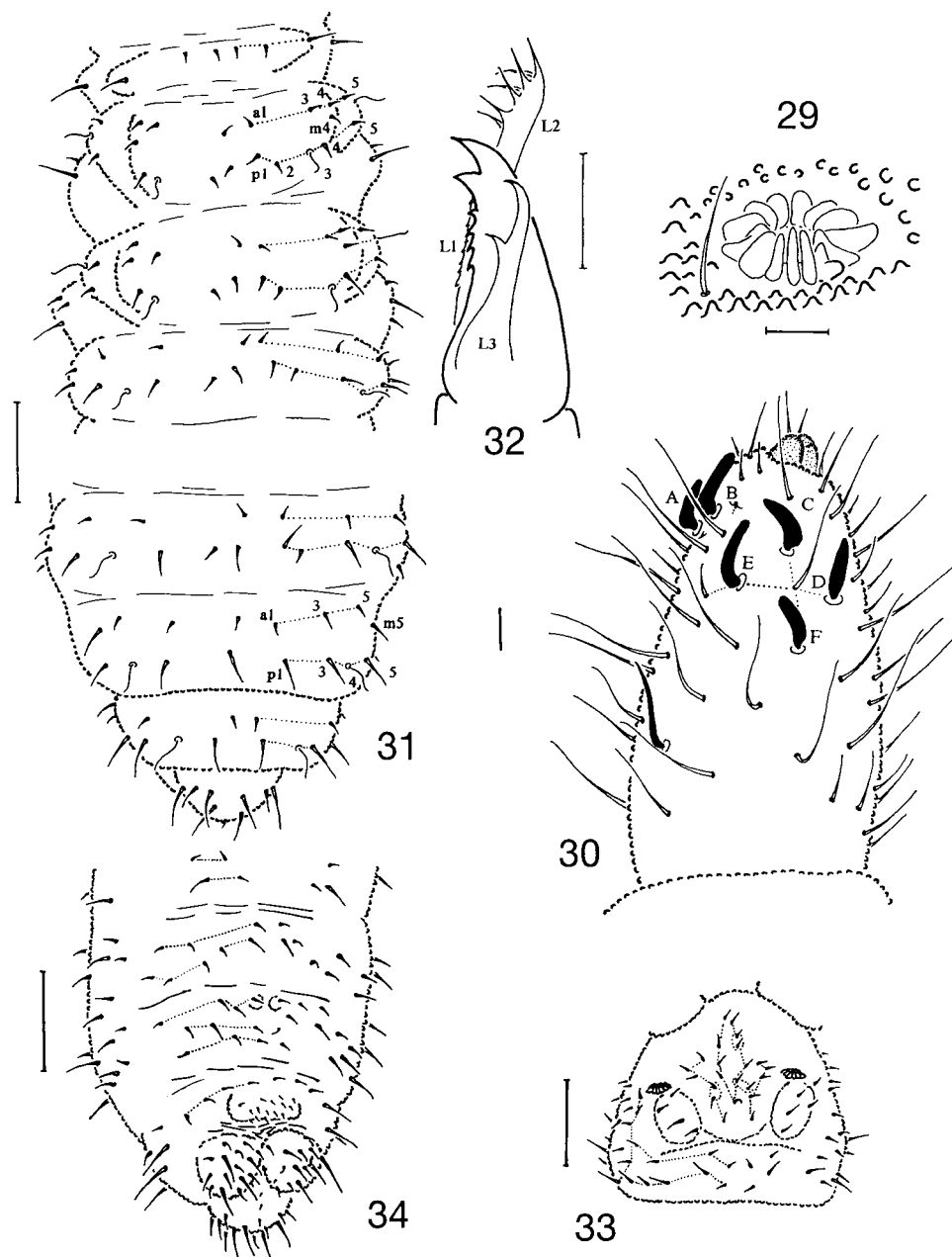
Anurida papillosa (Axelson): Fjellberg, 1985a: 91.

TAXONOMIC REMARKS: Fjellberg (1985a), comparing Alaskan specimens with Axelson's types, suggested that they might represent two different but virtually indistinguishable species. Analysing my material from different parts of northern Europe, I have been able to find several minor but constant differences between European specimens and Fjellberg's description, i.e., maxillary lam. 1 always smooth (with minute teeth in Alaskan specimens), ant. 4 without additional sensilla, E and F usually thinner, A and B often inosculated forming an arch* (Fig. 24); th. 2–3 as a rule without chaetae m4, abd. 4 without m5; abd. 5 with two microchaetae in p-row between p1 and sensilla p3 (Fig. 23); subcoxae with less number of chaetae: (3)4–(3)4(5)–(3)4. Hence, I suggest that the Alaskan and European specimens are not conspecific.

DISTRIBUTION: It is the most common species of *Anurida* all over the Arctic coast of the European part of Russia, but is probably absent in Scandinavia. The eastern limit of its distribution appears to be on western Taimyr (Fig. 43), where it has been found only on the coast of Enisei Bay, but is absent inland.

MATERIAL: 22.viii.1992, Russia, European part, White Sea, southern shore, 4 ex., leg. A. Nituzhylin, coll. AB; 22.viii.1986, Russia, European part, White Sea, vicinity of Kandalaksha, 5 ex., leg. N. Kuznetsova, coll. MPUC; 27.–28.viii.1994, Russia, European part, Kolguev Isl., Gol'tsovaya River (69°12'N 49°30'E), 3 ex., leg. & coll. AB; 25.–26.viii.1994, Russia, European part, Pechora Bay, Kuznetskoe Lake (68°50'N 53°45'E), 7 ex., leg. & coll. AB; viii.1992, Russia, Novaya Zemlya Archipelago, Southern Isl., Rusanov Peninsula, 7 ex., leg. V. Kalyakin, coll. AB; 22.–23.viii.1994, Russia, western Siberia, north-western Yamal, Murtyyakh River (70°18'N 67°53'E), 5 ex., leg. & coll. AB; 21.viii.1994, Russia, western Siberia, northern Yamal, mouth of Yakhadeyakh River (72°52'N 70°56'E), 1 ex., leg. & coll. AB; 10.viii.1989, Russia, Siberia, western Taimyr, Enisei Bay, low island in mouth of Ragozinka River, 4 ex., leg. & coll. AB.

* Such an unusual character has been previously found only in the genus *Chiolavia* (Deharveng, 1991).



Figs 29–34. *Anurida sakhensis* sp. n. 29 – PAO, paratype; 30 – left ant. 3–4, dorsal view, paratype; 31 – chaetotaxy of th. 1–3, abd. 1, 3–6, holotype; 32 – right maxilla, paratype; 33 – head chaetotaxy, paratype; 34 – ventral chaetotaxy of abd. 2–6, paratype; Scales: 0.1 mm – 31, 33–34; 0.01 mm – 29–30, 32.

Anurida papillosoides (Hammer, 1953)

Micranurida papillosoides Hammer, 1953: 28.

Anurida papillosoides (Hammer): Fjellberg, 1985a: 92.

Anurida arctica Tshelnokov, 1988: 78, syn. n. (?).

TAXONOMIC REMARKS: Unfortunately, I have not been able to find slides labelled as *A. arctica* in Tshelnokov's collection. There exists only one slide with a pencil label "*A. violacea* sp. nov, holotype" and 3 more unnamed slides from the same biotope. Their labels are identical (habitat, date and collector) to data published for the holotype of *A. arctica* and some paratypes. Tshelnokov has never published any description of *A. violacea* and it may be assumed that his description of *A. arctica* was based on the above slides. They contain 9 specimens of *A. papillosoides*, so I see no reason to treat *A. arctica* as a separate species.

The only notable difference between the description of *A. arctica* and *A. papillosoides* is the number of ocelli (5 in *A. arctica*, 4 in *A. papillosoides*). Published type material of *A. arctica* also includes specimens from "tundra on the bank of Lukovoe Lake" (Chukotka) and Chernov's material from Ust'-Tareya (Taimyr Peninsula). Slides with such labels do exist in the Tshelnokov's collection, but they are without species names. They contain either specimens of *A. decemocolata* (Chukotka) or a mixture of *A. decemocolata* and *A. palustris* (Taimyr), both of which possess 5+5 ocelli and dark colour. Thus, the original description of *A. arctica* was probably based on specimens belonging to more than one species.

DISTRIBUTION: A Nearctic-eastern Palaearctic species (Fig. 47). All the known records are from treeless sites (Fjellberg, 1985a).

MATERIAL: 18.–19.vii.1994, Russia, eastern Siberia, delta of Kolyma River, low left bank (69°32'N 160°44'E), *Sphagnum* mat on hillslope, 8 ex., leg. & coll. AB; 18.–19.vii.1994, Russia, eastern Siberia, delta of Kolyma River, low left bank, (69°32'N 160°44'E), lake shore, under debris, 2 ex., leg. & coll. AB; 26.viii.1972, Russia, northeast Siberia, Chukotka, lower reaches of Anadyr' River, Volchikha River, tundra, 9 ex. including specimen labelled as holotype of "*A. violacea*", leg. E. Bondarenko, coll. ZMAS.

Anurida parapapillosa Tshelnokov, 1988

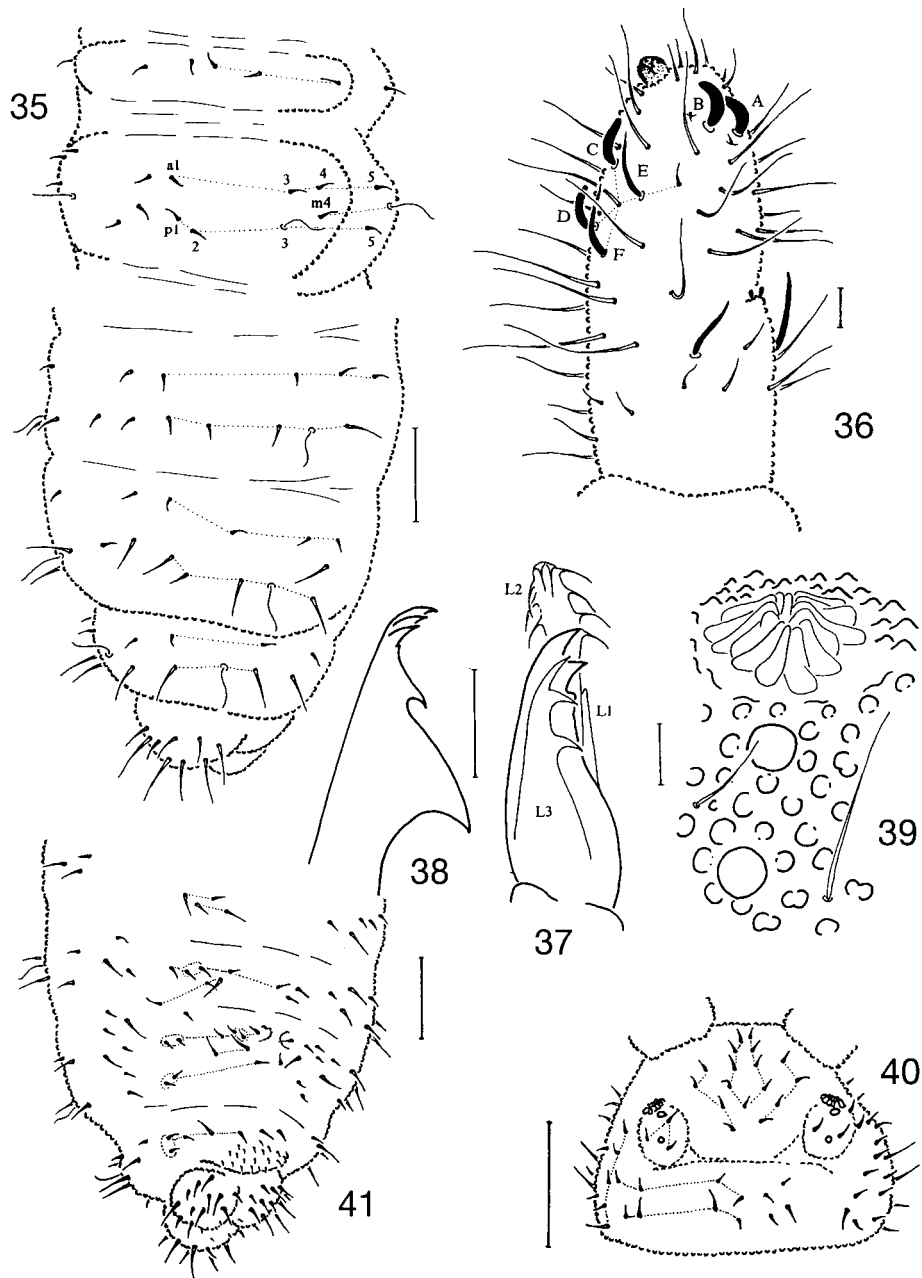
Anurida parapapillosa Tshelnokov, 1988: 79.

TAXONOMIC REMARKS: Similar to *A. weberi*, *A. kolymensis*, *A. azurea*, and *A. interior* but differs from all of them in having more mandibular teeth (4+2 as in Fig. 27, v. 3+2). According to the original description, another very specific character of the species is the complete absence of blunt sensilla on ant. 4. Examination of the holotype has shown that it is correct but may well be explained by its juvenile stage (probably, first instar). I have seen another specimen from the same region which might be conspecific but had a normal set of sensilla (A–F) and some additional ones as well (Fig. 28). Unfortunately, it is also juvenile and the status of *A. parapapillosa* remains dubious.

DISTRIBUTION: Known only from the type locality.

MATERIAL: Holotype, 1.ix.1974, (Russia, northeast Siberia), Magadanskaya oblast', Chukotskii AO, tundra on the bank of El'gygytgyn Lake, leg. E. Bondarenko, coll. ZMAS.

A. cf. parapapillosa: Summer 1974, Russia, northeast Siberia, Chukotka, El'gygytgyn Lake, 1 ex., leg. E. Bondarenko, coll. ZMAS.



Figs 35–41. *Anurida tatianae* sp. n. 35 – chaetotaxy of th. 1–3, holotype; 36 – right ant. 3–4, dorso-lateral view, holotype; 37 – left maxilla, paratype; 38 – left mandible, paratype; 39 – PAO and ocelli, holotype; 40 – head chaetotaxy, paratype (juv.); 41 – ventral chaetotaxy of abd. 2–6, holotype. Scales: 0.1 mm – 35, 40–41; 0.01 mm – 36–39.

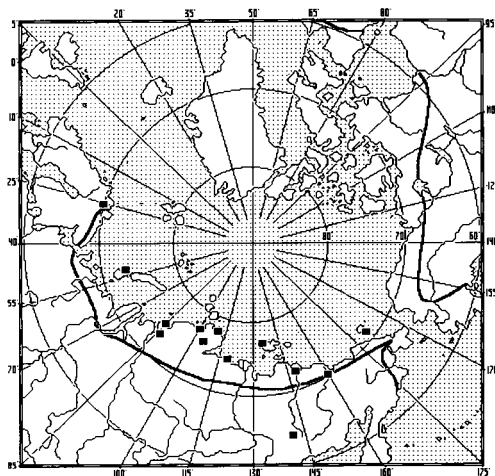


Fig. 42. Trans-Palaearctic distribution of *A. alpina*.

Anurida polaris (Hammer, 1954)

Micranurida polaris Hammer, 1954: 9.

Anurida frigida Fjellberg, 1973: 285.

Anurida polaris (Hammer): Fjellberg, 1985a: 92.

Anurida wrangelensis Tshelnokov, 1988: 86, syn. n.

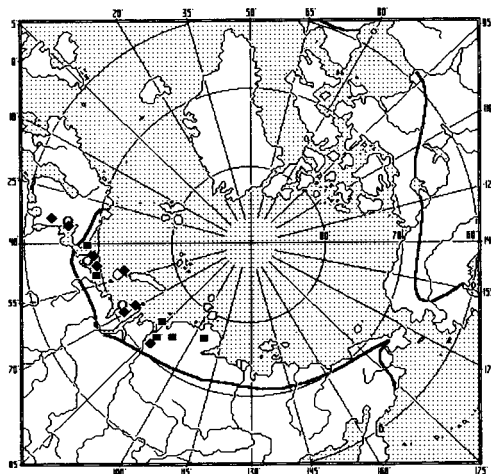
TAXONOMIC REMARKS: Examination of the types of *A. wrangelensis* indicates that this species is conspecific with *A. polaris*. The described differences in number of sensilla on ant. 4 (6 in *A. wrangelensis*, 7 in *A. polaris*), mandibular teeth (5 v. 6) and number of maxillary lamellae (2 v. 3) are errors in the original description of *A. wrangelensis*, as are some "differences" in details of chaetotaxy of head and abd. 1–4.

A. polaris itself may be a junior synonym of *A. remyi* Denis, 1947 (Fjellberg, 1985a).

DISTRIBUTION: The only *Anurida* species with a true circumpolar distribution, surviving in the most severe conditions of the polar desert on Arctic islands. Originally described from northern Greenland, this species has been recorded throughout the Arctic (Fig. 44). The alpine habitats of southern Scandinavia (Fjellberg, pers. comm.) and mountainous regions of Beringia (Fjellberg, 1985a) are the southernmost limits of its existence.

MATERIAL: 22.vii.1979, Russia, Franz Josef Land, Graham Bell Isl., 12 ex., leg. V. Bulavintsev, coll. AB; 25.vii.1987, Russia, Severnaya Zemlya, Bol'shevik Isl., 15 ex., leg. V. Bulavintsev, coll. AB; 21.viii.1994, Russia, western Siberia, northern Yamal, mouth of Yakhadeyakh River (72°52'N 70°56'E), 15 ex., leg. & coll. AB; 26.vii.1993, Russia, Siberia, eastern Taimyr, northern shore of Taimyr Lake, 22 ex., leg. & coll. AB; 15.vii., 1. and 8.viii.1988, Russia, Siberia, western Taimyr, mouth of Uboinaya River, 47 ex., leg. & coll. AB; 15.vii. and 20.viii.1983, Russia, Siberia, western Taimyr, Yenisei Bay, mouth of Ragozinka River, 30 ex., leg. & coll. AB; 13.–14.viii.1994, Russia, Siberia, northern Taimyr, Chelyuskin point, Serebryanka River (77°36'N 103°49'E), 14 ex., leg. & coll. AB; 10.–11.viii.1994, Russia, Siberia, northeastern Taimyr, Faddeya shore, Rybnaya River (76°38'N 111°00'E), 10 ex., leg. & coll. AB; 6.–8.vii.1994, Russia, Siberia, delta of Olenek River, Vaganytta-Kyuel Lake (73°30'N 118°10'E), 27 ex., leg. & coll. AB; 10.–11.vii.1994, Russia, eastern Siberia, Novosibirsk Isl., Faddeev Isl., Ulakhar-Uryakh River (75°35'N 144°50'E), 92 ex., leg. & coll. AB; 31.vii. and 1.viii.1994, Russia, eastern Siberia, Novosibirsk Isl., Kotel'nyi Isl., Belyktakh River (75°03'N 140°10'E), 36 ex., leg. & coll. AB; 14.–16.vii.1994, Russia, eastern Siberia, delta of Indigirka River (71°26'N 149°45'E), 8 ex., leg. & coll. AB; 18.vii.1994, Russia, eastern Siberia, delta of Kolyma River, low left bank (69°32'N 160°44'E), 6 ex., leg. & coll. AB; 23.–24.vii.1994, Russia, northeast Siberia, Wrangel Isl., Mamontovaya River (70°59'N 179°35'E), 64 ex., leg. & coll. AB; 12. and 15.vii.1991, Canada, NWT, Devon Isl., Truelove lowland, 33 ex., leg. & coll. AB; 22.vii.1991, Canada, NWT, Ellesmere Isl., Swerdrup Pass, 15 ex., leg. & coll. AB.

Holotype and 4 paratypes of *A. wrangelensis*: 25.vii.1971, (Russia, northeast Siberia), Wrangel Isl., under stones on the bank of Neizvestnaya River, leg. Shteinberg, coll. ZMAS.



○ - *A. ellipsoidea* ■ - *A. palustris* ◆ - *A. papillosa*
 Fig. 43. Distribution areas of European species of *Anurida* in northern Palearctic.

Anurida sakhensis sp. n.

DESCRIPTION:

Colour: White.

Size: 1.4 mm.

Antennae clearly shorter than head. Ant. 1–2 with (6)7 and (11)12 chaetae respectively. Ant. 3–4 fused dorsally, ventral separation well marked by finer tegumentary granulation. Ant. 4 with 3-lobed apical bulb and 6 subequal sensilla (Fig. 30), external microsensillum and organite present. Ant. 3 organ normal, consists of two slender, widely separated outer sensilla, with two bent sensory pegs between them and a small ventral microsensillum. Ocelli absent. PAO rounded with 10–15 vesicles (Fig. 29). Maxillary capitulum with 2 apical teeth followed by several smaller, and with three lamellae: lam. 1 serrated,

lam. 2 strong with long apical filaments, lam. 3 with 2 hooks (Fig. 32). Mandibles with 3+2 teeth, those apical in an oblique line (as in Fig. 2). Labrum and labium with usual set of chaetae and sensorial elements.

Integumental granulation uniform and not particularly coarse.

Dorsal chaetae clearly differentiated only on lateral parts of terga and on abd. 4–6, macrochaetae slightly serrate. Head chaetotaxy as in Fig. 33, p1 chaetae sometimes absent, high variability of number and position of chaetae also observed on area frontalis. Dorsal chaetotaxy of thorax and abdomen (Fig. 31): th. 1 with 3+3 chaetae, th. 2–abd. 3 with complete set of chaetae, both chaetae p2 and sensilla p3 on th. 2–3 are in posterior position. Abd. 4 without p2 (only 2+2 p-chaetae between sensilla p4). Ventral chaetotaxy (Fig. 34): unpaired medial chaetae are absent on all sterna, except abd. 6. Furcal field indicated by two minute warts, each with a group of small setulae. Ventral tube with 4+4 chaetae. Subcoxae with 1-2-(2)3 chaetae. Tibiotarsi 1-2-3 with 19-19-18 chaetae respectively. Unguis without inner tooth, distinctly shorter than the tibiotarsus.

TYPE-MATERIAL: Holotype ♀, labelled "Yakutia, Oimyakon district, vicinity of settlement Ust'-Nera, under *Pinus pumila* (Pinaceae), 1,600 m alt., 22.vii.1992", M. Potapov leg. Paratypes: 7 ♀, 2 ♂, on the same slide; 3 ♀, 2 ♂, 1 juvenile, same data as holotype, but 1,400 m alt. Types are deposited in MPUC.

NAME DERIVATION: After the local name for Yakutia (Sakha).

TAXONOMIC REMARKS: *A. sakhensis* is most similar to *A. annatshagi* and *A. subarctica*. All these blind, white species have 6 blunt sensilla on ant. 4 and almost identical chaetotaxy of thorax with both p2 chaetae and sensilla p3 in posterior positions. It can be easily separated from *A. subarctica* by the structure of mandible (all teeth are in a line in *A. subarctica*) and the presence of m4 on th. 2–3. From *A. annatshagi* it differs in having subequal antennal sensilla (sensillum E is slender in *A. annatshagi*), p2-chaetae on abd. 1–3, and maxillary lam. 3 with 2 hooks (serrated in *A. annatshagi*).

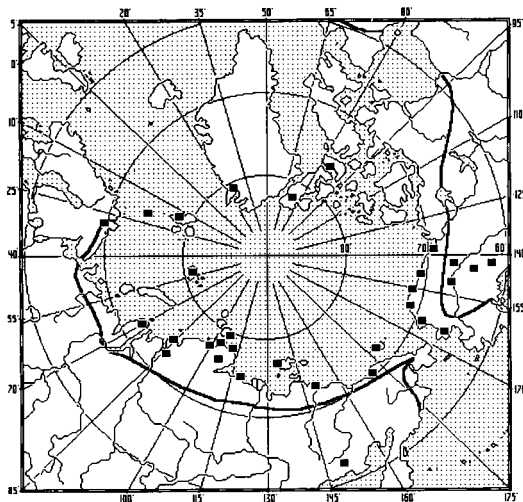


Fig. 44. Circulopolar distribution of *A. polaris*. Bold line marks the southern boundary of the tundra zone. Scandinavian, Alaskan and Canadian data according to Fjellberg, 1985a, 1988; Hammer, 1953, 1954; Christiansen & Bellingier, 1980; Rusek, 1994.

MATERIAL: 9.–13.vii.1992, Russia, Novaya Zemlya Archipelago, Southern Isl., 3 ex., leg. V. Bulavintsev, coll. AB; 27.–28.viii.1994, Russia, European part, Kolguev Isl., Gol'tsovaya River (69°12'N 49°30'E), 4 ex. leg. & coll. AB; 20.viii.1983, Russia, Siberia, western Taimyr, Yenisei Bay, Ragozinka River, 12 ex., leg. & coll. AB; 10., 22.vii. and 8.viii.1988, Russia, Siberia, western Taimyr, mouth of Uboinaya River, 18 ex., leg. & coll. AB; 26.vii. and 2.viii.1993, Russia, Siberia, eastern Taimyr, northern shore of Taimyr Lake, 4 ex., leg. & coll. AB; 4.–6.viii.1994, Russia, eastern Siberia, delta of Yana River, Shirokostas Peninsula, Ledyanoe Lake (72°25'N 141°00'E), 2 ex., leg. & coll. AB; 18.–19.vii.1994, Russia, eastern Siberia, delta of Kolyma River, low left bank, (69°32'N 160°44'E), 8 ex., leg. & coll. AB.

Holotype of *A. tajmyrica*: vi.1966, (Russia, Siberia), western Taimyr, tundra in the vicinity of Taimyr biogeocenology field station (middle reaches of Pyasina River, Ust'-Tareya settlement), leg. Yu. Chernov, coll. ZMAS.

Anurida tatianae sp. n.

DESCRIPTION:

Colour: White, without dark pigment, even the eye spots lacking.

Size: 1.4 mm.

Antennae slightly shorter than head. Ant. 1–2 with 7 and 12 chaetae respectively. Ant. 3–4 fused dorsally, ventral separation distinguished by fine tegumentary granulation. Ant. 4 with 3-lobed apical bulb and 6 sensilla, E and F thinner, external microsensillum and organite present (Fig. 36). Ant. 3 organ normal, consists of two rather long, slender outer sensilla, with two bent sensory pegs between them and a small ventral microsensillum. Ocelli 2+2, unpigmented, each ocellus about as large as 1.5–2 tergal granules. PAO rounded with 12–15 vesicles (Fig. 39) about as large as 2.5–3 times the ocellar diameter. Maxillary capitulum with 3 teeth and three lamellae, lam. 1 fine and apparently smooth,

DISTRIBUTION: Known only from the type locality.

Anurida subarctica Fjellberg, 1985

Anurida subarctica Fjellberg, 1985a: 94.

Anurida tajmyrica Tshelnokov, 1988: 76. syn. n.

TAXONOMIC REMARKS: After having re-examined the holotype of *A. tajmyrica* I have no doubt that it is conspecific with *A. subarctica*. No significant differences in dorsal chaetotaxy, structure of mouth parts, antennal sensilla, etc. were noted. The reported number of sensilla (5) on ant. 4 in *A. tajmyrica* (6 in *A. subarctica*) is Tshelnokov's error.

DISTRIBUTION: A species with a broad Holarctic distribution (Fig. 47). Previously recorded from Alaska and Chukotka (Fjellberg, 1985a), Novaya Zemlya and the Taimyr Peninsula (Babenko & Bulavintsev, 1993).

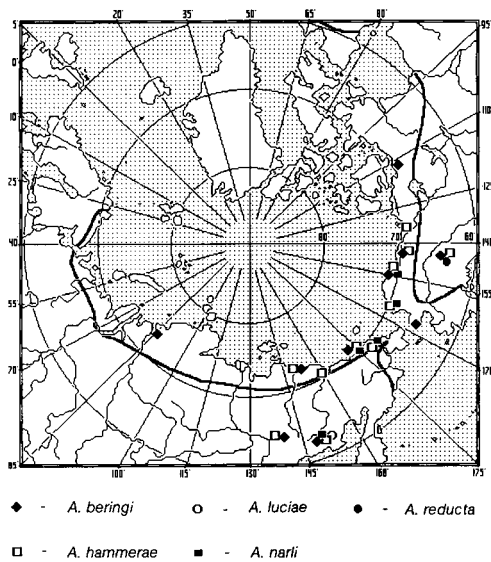


Fig. 45. Distribution of species of the *A. hammerae*-group.

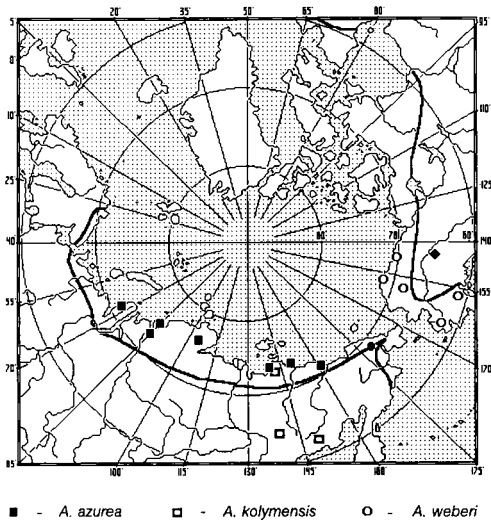


Fig. 46. Distribution of species related to *A. weberi*.

lam. 2 extending beyond the capitulum with many long filaments, lam. 3 with 3 hooks (Fig. 37). Mandibles with 3 apical teeth, in an oblique line, and 2 larger basal (Fig. 38). Labrum and labium with usual set of chaetae and sensorial elements.

Secondary integumental granulation uniform and not particularly coarse.

Dorsal chaetae on thorax short and fine, tergal sensilla much longer. Abdominal chaetae clearly differentiated into macro/microchaetae, particularly on the lateral parts of terga and dorsally on abd. 4–6. Head chaetotaxy as in Fig. 40. Characteristics of dorsal chaetotaxy of thorax and abdomen (Fig. 35): th. 1 with 3+3 chaetae, th. 2–3 with p2 posteriorly to p1, sensilla p3 probably moved forward, chaeta p4 absent. Abd. 1–4 usually with 4+4 a-chaetae (a1, a3, a5, a6) and complete numbers of p-chaetae (p1–5). Ventral chaetotaxy asymmetrical (Fig. 41), unpaired medial chaeta appears to be present on abd. 3. Ventral tube with 4+4 chaetae. Furcal field with two small warts. Subcoxae with 1-2-2 chaetae. Tibiotarsi 1-2-3 with 19-19-18 chaetae respectively. Unguis without obvious inner tooth, smaller than tibiotarsus.

TYPE MATERIAL: Holotype ♀, labelled "Yakutia, Oimyakon district, vicinity of settlement Ust'-Nera, under *Pinus pumila* (Pinaceae), 1400 m alt., 22.vii.1992", M. Potapov leg. Paratypes: 5 specimens (juveniles) from the same sample. Types are deposited in the collection of the Zoological Department of the Moscow Pedagogical University.

NAME DERIVATION: Named after my elder daughter Tatiana to stimulate her interest in biology.

TAXONOMIC REMARKS: The new species shares two uncommon characters (unpigmented ocelli and the absence of p4 on th. 2–3) with *A. alpina* and is probably related to the latter. It can be distinguished by the presence of a4 chaetae on th. 2–3 and by the more complete abdominal chaetotaxy (3+3 p-chaetae between sensilla v. 2+2 p-chaetae in *A. alpina*); by the position of subapical teeth

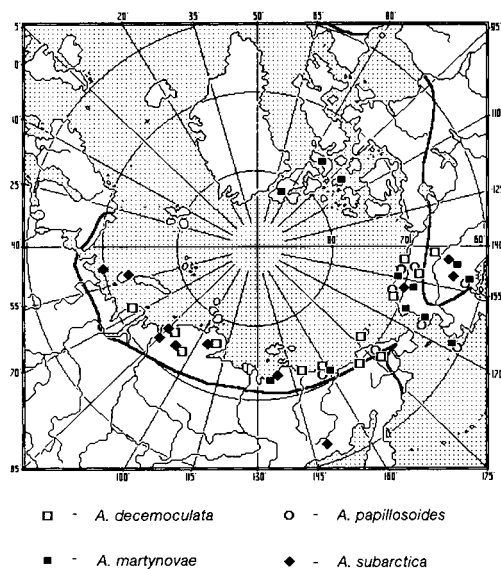


Fig. 47. Distribution of Nearctic-eastern Palaearctic species of *Anurida*.

on mandible (cf. Fig. 38 and Fig. 16) and by the form of maxillary lam. 3 (with 3 hooks in *A. tatarica*, serrate in *A. alpina*).

DISTRIBUTION: Known only from the type locality.

In this review of northern Palaearctic *Anurida* I have not included four species: *A. granulata* Agrell, 1943, *A. maritima* (Guérin-Méneville, [1837]), *A. thalassophila* (Bagnall, 1939) and *A. tullbergi* Schött, 1891. All of them are common in Europe, including the northernmost part of Norway (Fjellberg, 1988), but have not been recorded from true tundra regions.

In Russian taxonomic papers there are some "nomina nuda" which have never been formally established:

A. orientalis Martynova mentioned by Tshelnokov (1988)

A. frigida ssp. *orientalis* Martynova and *A. borealis* Martynova (Stebaeva, 1976).

CONCLUSION

Species of the genus *Anurida* rarely predominate in tundra communities, but they are characteristic members of the tundra zone and are partly responsible for its exclusively northern appearance. The fauna of *Anurida* of the northern landscapes is remarkably rich when compared with the world fauna of the genus. Thus, 14 species of *Anurida* have been registered in Alaska in comparison with 17 known nearctic forms (Fjellberg, 1985a). Evidently the same ratio is true for the Palaearctic, where, at least, two dozen of species exist in its northern part.

According to the available data, there is some correlation between the patterns of regional and zonal (latitudinal) distribution of the *Anurida* species in the Arctic. Thus, such species as *A. polaris* and *A. alpina*, which are common up to the northernmost limits of the tundra zone and penetrate even into the polar deserts, have the broadest distribution areas: trans-Holarctic (circumpolar) and trans-Palaearctic (Figs 42, 44). Those *Anurida* species which do not reach the northern limits of the tundra zone and which are most numerous in its central and southern parts usually inhabit smaller areas. A number of northern *Anurida* could be referred to this group, namely *A. azurea* (Siberia), *A. papillosoides* (amphi-Beringia), *A. palustris* (eastern Europe to west and central Siberia), *A. subarctica* (eastern Europe through Siberia to Alaska), or *A. martynovae* (eastern Siberia through Alaska to north Canada). Still smaller areas are characteristic for species which are typical

inhabitants of the forest/tundra zone and the northern forests, penetrating only into the southern parts of the tundra, although this could be due to the inadequate exploration of the vast Siberian territory.

Species of the *A. hammerae*-group sensu Fjellberg (1985a) offer a good example of typical regional distribution that appears to be independent of the zonal boundaries. Almost all of them, including the widely distributed *A. beringi* (central and eastern Siberia through Alaska to northern Canada), are typical amphi-Beringian species (Fig. 45).

Though, the faunas of *Anurida* in the tundra zone of eastern Europe, Siberia and Beringia are clearly different, several European species such as *A. papillosa*, *A. palustris* or *A. ellipsoides* have also been recorded in western Siberia as far as Taimyr Peninsula (Fig. 43). The same region constitutes the western limit of some Beringian forms, for instance *A. beringi*, but their distribution in the Palaearctic appears to be usually limited to the basins of the Indigirka and Kolyma rivers. The division of the Arctic into the Eurasian (Palaearctic) and American (Nearctic) parts is largely irrelevant as concerns *Anurida*, which is also the case in many other northern insects (Levanidova, 1982; Chernov, 1995). The faunas of the regions on both sides of the Beringian Strait evidently forms a single biogeographical complex having many species in common.

Key to the northern Holarctic species of the genus *Anurida**

1	Head with 7+7(8) ocelli	<i>luciae</i>
-	Head with fewer ocelli	2
2	Mandible with more than 10 teeth, PAO with 30-40 vesicles	<i>amorita</i>
-	Mandible with fewer teeth	3
3	All terga pluri-chaetotic	4
-	Terga without additional chaetae	5
4	Dark species	<i>maritima</i>
-	White species, without dark pigment, even without eye spots	<i>hammerae</i>
5	Axial group on th. 2-3 with 1 p-chaeta (either p1 or p2)	6
-	Axial group on th. 2-3 with 2 p-chaetae (p1 and p2) (Fig. 4)	8
6	Sensilla p3 on th. 2-3 anterior to chaeta p4	7
-	Sensilla p3 on th. 2-3 level with or posterior to p4-chaeta	<i>ellipsoides</i>
7	Head with 3+3(2-4) ocelli, chaeta a3 present on abd. 4-5	<i>narli</i>
-	Ocelli absent, abd. 4-5 without a3	<i>*reducta</i>
8	Th. 2-3 with both p2 and p3 in anterior position	9
-	Only one chaeta (either p2 or p3) on th. 2-3 in anterior position, or both of them level with or posterior to other p-chaetae	10
9	Th. 1 with many chaetae in more than 1 row. Th. 2-3 with chaeta m5	<i>hammerae</i>
-	Th. 1 with not more than 4+4 chaetae in single row. Th. 2-3 without chaeta m5	<i>beringi</i>
10	Ocelli and dark eye spots present	11
-	Ocelli present, without pigment	21
-	Ocelli absent	22
11	Head with 5+5 ocelli	12
-	Head with 4+4 ocelli	14
-	Head with 3+3 ocelli	19
12	Th. 2-3 with one chaeta of a-row (a4) in front of p3-p4	<i>decemoculata</i>
-	Th. 2-3 with 2 chaetae of a-row in front of p3-p4	13

* Species marked by asterisks known, so far, only from North America.

- 13 Chaetae fine and short. Abd. 1–4 with 3+3 p-chaetae between sensilla (Fig. 13, 17). Mandible with 5 teeth, maxillary lam. 3 with 2 hooks *palustris*
 – Dorsal chaetae strongly differentiated. Abd. 1–4 with 2+2 p-chaetae between sensilla (p3 absent). Mandible with 7 teeth. Maxillary lam. 3 serrate *tullbergi*
- 14 Th. 2–3 with sensilla p3 levelling with or posterior to p4. Maxillary lam. 3 serrate *papillosoides*
 – Th. 2–3 with p3 anterior to p4. Maxillary lam. 3 with 2 hooks 15
- 15 Abd. 5 with p2 chaeta, sensilla p3 clearly moved anteriorly (Fig. 23) *papillosa*
 – Abd. 5 without p2-chaeta, sensilla level with other p-chaetae 16
- 16 Mandible with 4 small apical teeth followed by 2 strong ones *parapapillosa*
 – Mandible with 3+2 teeth 17
- 17 Ant. 4 with usual set of sensilla (Fig. 5) *azurea*
 – Ant. 4 with several additional sensilla 18
- 18 Ant. 4 with 2 additional lateral sensilla. Maxillary lam. 1 smooth. Ventral tube with 4–5 chaetae
 – Ant. 4 with 4–6 additional sensilla (Fig. 25). Maxillary lam. 1 serrate. Ventral tube with 6–7 chaetae **weberi*
 *kolymensis*
- 19 Maxillary lam. 3 with 2 hooks **interior*
 – Maxillary lam. 3 serrate 20
- 20 Th. 2–3 with 3 chaetae (a3, a4, m4) in front of p3–p4 (Fig. 13). Abd. 1–4 with 3+3 p-chaetae between sensilla p4. Apical teeth on mandible in an oblique row (as on Fig. 2) *bondarenkoae*
 – Th. 2–3 without chaeta a4 (2 chaetae in front of p3–p4). Abd. 1–4 with 2+2 p-chaetae between sensilla p4 (p2 absent). All mandibular teeth in a line *granulata*
- 21 Th. 2–3 without a4. Abd. 1–4 with 2+2 p-chaetae between sensilla. Maxillary lam. 3 serrate *alpina*
 – Th. 2–3 with a4. Abd. 1–4 with 3+3 p-chaetae between sensilla (Fig. 35). Maxillary lam. 3 with 3 hooks (Fig. 37) *tatianae*
- 22 Th. 2–3 with sensilla p3 anterior to p4 *granaria*
 – Th. 2–3 with sensilla p3 levelling with or posterior to p4 23
- 23 Th. 2–3 with chaeta p2 anterior to p1 24
 – Th. 2–3 with p2 posterior to p1 25
- 24 Ant. 4 with 2 usual lateral sensilla (A and B). Maxillary lam. 3 serrate *martynovae*
 – Ant. 4 with an additional sensillum in lateral group. Maxillary lam. 3 with 2 hooks followed by a small additional tooth **similis*
- 25 Ant. 4 with additional sensillum in lateral group. Abd. 4 with 3+3 chaetae between sensilla 26
 – Ant. 4 with 2 lateral sensilla. Abd. 4 with 1+1 or 2+2 chaetae between sensilla p4 27
- 26 Th. 1 with 2+2 chaetae between subcoxal macrochaetae *polaris*
 – Th. 1 with 4+4 chaetae between subcoxal macrochaetae *thalassophila*
- 27 All mandibular teeth in a line. Th. 2–3 without chaeta m4 *subarctica*
 – Apical teeth on mandible in an oblique row. Th. 2–3 with m4 28
- 28 All antennal sensilla subequal (Fig. 30). Abd. 1–3 usually with p2-chaetae (Fig. 31). Maxillary lam. 3 with 2 hooks (Fig. 32) *sakhensis*
 – Antennal sensillum E clearly thinner (Fig. 1). Abd. 1–3 as a rule without p2-chaetae. Maxillary lam. 3 serrate (Fig. 3) *annatshagi*

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