Cartographic analysis of woodlice fauna of the former USSR

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Abstract
An inventory of the woodlice fauna of the former USSR yielded 190 species, 64 of them were recorded from the territory of Russia. According to the cartographic analysis, the limits of distribution of epigean terrestrial isopods over the area, excluding mountains, is explained by temperature. No woodlice records were found outside the isocline of 120 days a year with the mean daily air temperature >10°C. The highest species diversity was found between the isoclines of 180 and 210 days. These areas correspond to forest-steppe and steppe zones.

Keywords
Woodlice, mean annual air temperature, database, Russia

Introduction
Studies of spatial differentiation of various taxa are among the most important frontiers of modern biogeography. For some well-studied groups, mainly, vertebrates and plants, such trends are already discovered (Loiselle et al. 2003; Guisan and Thuiller 2005; Grenouillet et al. 2011), but for soil-dwelling invertebrates they are only at the stage of species inventory. However, there are certain groups of invertebrates for which analysis of spatial differentiation is already possible due to the large number of records from different geographical localities. Woodlice are among such groups.

There is no faunistic list of terrestrial isopods for the territory of the former USSR until now, as well as of the territory of Russia. However, there are extensive regional lists (Borutzky 1948, 1953; Zalesskaya and Rybalov 1982; Khisametdinova 2007;...
Gongalsky and Kuznetsova 2011), and numerous records scattered in the literature devoted to soil macrofauna. At the same time, there are only a few ecological studies about factors affecting woodlice distribution over regions of the former USSR (Gongalsky et al. 2005; Khisametdinova 2009).

The aim of the study is to determine the factors affecting woodlice distribution over the plain area of the former Soviet Union. To achieve this, an inventory of species distribution across the study area was made. The task was to create a database indicating locations with woodlice presence/absence overlaid with several environmental variable values distribution.

**Material and methods**

**Database**

The first step was to compile a list of species for the study area. We made a database of isopod presence or absence in the locations across the whole territory of the former USSR (both plains and mountains). For each record the database includes information about date, data source, geographical coordinates, location, isopod species list or information about woodlice absence in the soil fauna list, biotope, and natural zone.

Three types of information sources of terrestrial isopod locations were used: i) available literature on soil fauna surveys; ii) collections of the Zoological Museum of Moscow State University (Moscow, Russia) and the Zoological Institute of the Russian Academy of Sciences (St.-Petersburg, Russia); and iii) authors’ personal collections. Here we provide a list of woodlice from the territory of the former USSR since some species and localities were not included in the list of Schmalfuss (2003), although it covered the majority of species. To work with regional databases, a specific list would be useful. Since such a list for this area did not exist, the proposed compilation would be a start to be completed in the future. We used the taxonomic system proposed by Schmalfuss (2003) for species naming. Isopod absence was recorded only in extensively surveyed locations.

For cartographic analysis, 259 locations were chosen, 44 of which with woodlice absence. Due to the difficulty of tracing ecological trends in the mountains, only plain territories were involved into the analysis. Some species were excluded from the analysis: i) synanthropic species and ii) species inhabiting azonal locations, such as sea coasts, caves and anthills.

Then database records with isopod presence or absence locations were laid on the geographic maps to perform cartographic analysis.

**Cartographic analysis**

The map of woodlice distribution was visually compared with the maps of environmental factors (mean annual temperature; the period with temperature above 10°C;
Results and discussion

Limits of isopod distribution

Woodlice have not been recorded northwards the isocline of 120 days a year with temperature >10°C (Fig. 1). The northern border of woodlice distribution matches the distribution of this parameter. Other parameters did not coincide with isopod distribution as well as with this isocline (data not shown).

Species diversity

In total, 190 species were recorded from the territory of the former USSR (Appendix 1). Among them, 64 were recorded from the territory of Russia. Northernmost natural

Figure 1. Map of woodlice presence or absence over the plain territory of the former USSR. The duration of period with temperature >10°C is adapted from Geographical Atlas of the USSR (Kolosova 1980).
zone with woodlice records is southern taiga. No woodlice records were in tundra, northern and middle taiga. The species diversity increases southwards, but decreases in the deserts. However, this may be due to the low number of locations extensively studied to reveal local faunas.

Distribution of isopods is known to be limited by natural factors, such as temperature and moisture (Harding and Sutton 1985, Hopkin 1991). In our study, the limiting factor of woodlouse distribution towards the north turned out to be the length of the warm period, expressed as number of days when the temperature was above 10°C. The highest species diversity was observed between isoclines of 180 and 210 days with temperature >10°C. Colder conditions slow down their physiological processes (Hopkin 1991) and limit their distribution. For a better understanding of distribution of woodlouse, a Species Distribution Modeling (Elith and Leathwick 2009, Franklin 2009) should be applied, which is a next step in the analysis of the database of Russian isopods.

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## Appendix I

List of woodlice species from the territory of the former USSR. Abbreviations: Ab – Abkhazia, Ar – Armenia, Az – Azerbaijan, Bl – Belarus, Ge – Georgia, Kz – Kazakhstan, Kg – Kyrgyzstan, Lt – Lithuania, Md – Moldova, Ru – Russia, Td – Tajikistan, Tu – Turkmenistan, Ua – Ukraine, Uz – Uzbekistan; S, N, W, E – south, north, west, east. References to authorships of the species can be found in Schmalfuss and Wolf-Schwenninger (2002).

| No. | Species Name                                      | Abbreviations                                      |
|-----|--------------------------------------------------|----------------------------------------------------|
| 1   | Acaeroplastes kosswigi Verhoeff, 1941             | Az: Nabran’                                        |
| 2   | Agabiformius orientalis (Dollfus, 1905)           | Ru: Volgograd region                               |
| 3   | Armadillidium azerbaizhanum Schmalfuss, 1990      | Ar: Khastarak; Az: Baku, Adjikend, Drmbon, Lenkoran, Salyany, Sheki; Ge: Kakhetia, Vashlovan; Ru: Rostov, Stavropol regions, N Ossetia |
| 4   | Armadillidium granulatum Brandt, 1833             | Ru: Krasnodar region; Ua: S Crimea                  |
| 5   | Armadillidium nasatum Budde-Lund, 1885            | Ru: Moscow; Ab: Sukhum                             |
| 6   | Armadillidium opacum (C. Koch, 1841)              | Ua: Kiev                                           |
| 7   | Armadillidium pallasi Brandt, 1833                | Ab: Sukhum; Ua: Crimea, Odessa; Ru: Krasnodar region |
| 8   | Armadillidium pictum Brandt, 1833                 | Ua: Crimea                                         |
| 9   | Armadillidium pulchellum (Zenker, 1798)           | Lt: Vilnius                                        |
| 10  | Armadillidium traiani Demianowicz, 1932           | Md                                                 |
| 11  | Armadillidium versicolor Stein, 1859              | Ru: Penza, Saratov, Tula regions                   |
| 12  | Armadillidium vulgare Latreille, 1804             | Ab: Sukhum; Az: Ge: Adygeni, Tbilisi; Ru: Dagestan, Krasnodar, Kaluga, Volgograd, Rostov regions; Ua: Crimea, Kiev, Odessa |
| 13  | Armadillidium zenckeri Brandt, 1833               | Ua: Crimea, Zakaspyisk region                      |
| 14  | Armadillo allevi Schmalfuss, 1990                 | Az: Baku, Kobustan                                |
| 15  | Armadillo officinalis Duméril, 1816               | Ru: Krasnodar region; Ua: S Crimea, Odessa         |
| 16  | Armadillonicus ellipticus (Harger, 1878)          | Ru: Krasnodar region; Ab: Gabry                    |
| 17  | Borutzkyella revari (Borutzky, 1973)              | Ab: Gudauty region                                 |
| 18  | Buddelundiella cataractae Verhoeff, 1930          | Ge: Tskhaltubo                                     |
| 19  | Caucasocyphonethes caviaticus Borutzky, 1948      | Ru: Krasnodar region                               |
| 20  | Caucasoligidium cavernicolae Borutzky, 1950       | Ab: Gudauty, Sukhum; Ge: Gogolety                  |
| 21  | Caucasonethes borutzkyi Verhoeff, 1932            | Ge: Tskhaltubo                                     |
| 22  | Chaetophiloscia cellaria Dollfus, 1884            | Ru: Rostov region                                  |
| 23  | Chaetophiloscia elongata Dollfus, 1884            | Ua: Crimea                                         |
| 24  | Chaetophiloscia hastata Verhoeff, 1929            | Ru: Krasnodar region                               |
| 25  | Colchidoniscus kutaissianus Borutzky, 1974        | Ge: Tskhaltubo                                     |
| 26  | Cylisticoides angulatus Schmalfuss, 2003          | Az: Istru, Lenkoran, Yardymly; Kz: Astana; Ru: Krasnodar region |
| 27  | Cylisticus albomaculatus Borutzky, 1957           | Ru: Rostov, Voronezh, Volgograd regions            |
| 28  | Cylisticus arnoldii Borutzky, 1961                | Ua: Kharkov, Zmiev                                 |
| 29  | Cylisticus birsteinii Borutzky, 1961              | Ru: Krasnodar region                               |
| 30  | Cylisticus caucasius Verhoeff, 1917               | Ab: Gudauty, Gabry, Kelassuri, Sukhum; Ge: Kutaisti, Tkibuli, Tskhaltubo, Shovi; Ru: Krasnodar region |
|   | Scientific Name                      | Country/Region Description                                                                 |
|---|-------------------------------------|------------------------------------------------------------------------------------------|
| 31| *Cylisticus convexus* De Geer, 1778  | Ru: Chelyabinsk, Kaluga, Moscow, Rostov, Voronezh regions, Ua: S Crimea, Kiev             |
| 32| *Cylisticus cretaceus* Borutzky, 1957| Ru: Rostov region; Ua: Lugansk region                                                     |
| 33| *Cylisticus desertorum* Borutzky, 1957| Ru: Rostov, Stavropol regions; Ua                                                          |
| 34| *Cylisticus giljarovi* Borutzky, 1977| Ru: Adygea, Stavropol, Krasnodar regions, N Ossetia                                       |
| 35| *Cylisticus iners* Budde-Lund, 1880  | Ar: Azizbekov, Leninakan, Tshakhkavan; Az: Airidja, Mardakert, Zakatalinsk regions; Ru: Chechnya; Ge: Manglisi, Shuahevi |
| 36| *Cylisticus lecooranensis* Borutzky, 1977| Az: Prishib                                                                               |
| 37| *Cylisticus mitis* Budde-Lund, 1885  | Ge: Kutaisi                                                                               |
| 38| *Cylisticus orientalis* Borutzky, 1939| Ru: Orenburg region                                                                       |
| 39| *Cylisticus rotabilis* Budde-Lund, 1885| Ua: S Crimea                                                                             |
| 40| *Cylisticus sarmaticus* Borutzky, 1977| Ru: Rostov region; Ua: Zaporozhye region                                                  |
| 41| *Cylisticus silvestris* Borutzky, 1957| Ru: Moscow, Rostov, Stavropol regions                                                    |
| 42| *Cylisticus strouhali* Borutzky, 1977| Ar: W Vanadzor, Spitaki                                                                    |
| 43| *Desertoniscus birsteini* Borutzky, 1945| Tu                                                                                       |
| 44| *Desertoniscus bulbifrons* Borutzky, 1945| Tu                                                                                       |
| 45| *Desertoniscus elongatus* Borutzky, 1945| Tu                                                                                       |
| 46| *Desertoniscus kirghizicus* Borutzky, 1978| Kg                                                                                       |
| 47| *Desertoniscus reductus* Borutzky, 1978| Td                                                                                       |
| 48| *Desertoniscus subterraneus* Verhoeff, 1930| Kg; Tu: (Kizil-arvat); Td: Samgar massif                                                  |
| 49| *Desertoniscus tekinus* Borutzky, 1945| Tu                                                                                       |
| 50| *Desertoniscus zhelchovtsvei* Borutzky, 1945| Uz                                                                                       |
| 51| *Detonella papillicornis* (Richardson, 1904)| Ru: Kamchatka, Sakhalin regions                                                           |
| 52| *Halophiloscia couchii* (Kinahan, 1858) | Ru: Krasnodar region; Ua: Crimea                                                        |
| 53| *Haplophthalmus danicus* Budde-Lund, 1880| Ru: Krasnodar, Rostov regions                                                             |
| 54| *Hemilepistoides meserianus* Borutzky, 1945| Tu                                                                                       |
| 55| *Hemilepistus buddelundi* Borutzky, 1945| Tu                                                                                       |
| 56| *Hemilepistus communis* Borutzky, 1945| Td: Samgar massif; Tu: Central Karakum, Kyzyly-Arvat; Uz: Zakaspiysk, Fergana regions; Kg |
| 57| *Hemilepistus crenulatus* (Pallas, 1771)| Td: Samgar massif; Tu: Central Karakum, Kyzyly-Arvat; Uz: Zakaspiysk, Fergana regions; Kg |
| 58| *Hemilepistus cristatus* Budde-Lund, 1885| Tu: Kyzyly-Arvat                                                                          |
| 59| *Hemilepistus elongatus* Budde-Lund, 1885| Ru: Rostov, Stavropol regions; Tu: SW part                                                |
| 60| *Hemilepistus fedtschenkoi* (Ulianin, 1875)| Kz: Semipalatinsk; Tu: Krasnovodsk; Uz: Bukhara, Samarkand, Syrdaryinsk, Zakaspyisk regions |
| 61| *Hemilepistus heptneri* Borutzky, 1945| Tu                                                                                       |
| 62| *Hemilepistus klugii* (Brandt, 1833)| Az: Baku                                                                                  |
| 63| *Hemilepistus magnus* Borutzky, 1945| Uz                                                                                       |
| 64| *Hemilepistus nodosus* Budde-Lund, 1885| Tu; Kz                                                                                   |
| 65| *Hemilepistus pavlovskii* Borutzky, 1954| Kz                                                                                       |
| 66| *Hemilepistus reductus* Borutzky, 1945| Uz: Bukhara, Samarkand, Syrdaryinsk, Zakaspyisk regions                                    |
| 67| *Hemilepistus rhinoceros* Borutzky, 1958| Kz                                                                                       |
| 68| *Hemilepistus ruderalis* (Pallas, 1771)| Ru: Volgograd region; Kz: Djanybek                                                       |
| 69| *Hemilepistus russenovae* Borutzky, 1951| Az: Baku                                                                                 |
| 70| *Hemilepistus zachvatkini* Verhoeff, 1930| Td: Samgar massif; Tu: Central Karakum, Kyzyly-Arvat; Uz: Zakaspiysk, Fergana regions; Kg |
|   | Species Name                  | Authors, Year | Distribution            |
|---|-------------------------------|---------------|-------------------------|
| 71 | *Hyloniscus riparius* C. Koch, 1838 |               | Ru: Moscow, Penza, Pskov, Rostov, Tula regions; Ua: Kiev region |
| 72 | *Leptotrichus panzerii* (Audoin, 1826) |               | Ua: Crimea               |
| 73 | *Leptotrichus tauricus* Budde-Lund, 1885 |               | Ua: Crimea               |
| 74 | *Ligia cinerascens* Budde-Lund, 1885 |               | Ru: Kurily islands       |
| 75 | *Ligia italic* Fabricius, 1798    |               | Ua: Crimea               |
| 76 | *Ligia pallasi* Brandt, 1833      |               | Kadakh?                 |
| 77 | *Ligidium biristeini* Borutzky, 1950 |               | Ab: Gagry               |
| 78 | *Ligidium cavaticum* Borutzky, 1950 |               | Ru: Krasnodar region    |
| 79 | *Ligidium fragile* Budde-Lund, 1885 |               | Ab: Sukhum              |
| 80 | *Ligidium germanicum* Verhoeff, 1901 |               | Md                      |
| 81 | *Ligidium hypnorum* Cuvier, 1792 |               | Ab: Sukhum; Bl: Belovezha National Park; Ru: Tver, Kaluga, Moscow regions; Ua: Crimea, Kiev |
| 82 | *Ligidium margaritae* Borutzky, 1955 |               | Kz: Alma-Ata            |
| 83 | *Ligidium nodulosum* Verhoeff, 1918 |               | Ab: Gagry               |
| 84 | *Ligidium shadini* Borutzky, 1948 |               | Td                      |
| 85 | *Ligidium tauricum* Verhoeff, 1930 |               | Ua: Crimea               |
| 86 | *Ligidium zaitzevi* Borutzky, 1950 |               | Ab: Sukhum              |
| 87 | *Ligidium zernovi* Borutzky, 1948  |               | Kg                      |
| 88 | *Mingrelloniscus inchburi* Borutzky, 1974 |       | Ge: Megrelia            |
| 89 | *Nagurus matekini* Borutzky, 1959 |               | Kg                      |
| 90 | *Oniscus asellus* Linne, 1758    |               | Lt: Vilnius; Ru: Pskov region; Ua: Kiev |
| 91 | *Parcylisticus armenicus* Borutzky, 1970 |       | Ar: Daralagez           |
| 92 | *Parcylisticus dentifrons* Budde-Lund, 1885 |       | Az: Kutkashen; Ge: Manglis; Ru: Astrakhan, Stavropol regions, Chechnya, Dagestan, Kabardino-Balkaria, N Osetia; Ua: Crimea |
| 93 | *Parcylisticus georgianus* Schmalfuss, 2003 |       | Ge: Adigeni, Batumi, Kutaissi, Mestia |
| 94 | *Parcylisticus golovatchi* Schmalfuss, 2003 |       | Az: Shikahokh            |
| 95 | *Parcylisticus mrovdaghicus* (Borutzky, 1970) |       | Az: Avash, Dashsalry, Kelbadjar, Kirovobad, Lenkoran, Zuvand |
| 96 | *Parcylisticus waruensis* Borutzky, 1970 |               | Ar                      |
| 97 | *Parcylisticus zangezuricus* Borutzky, 1970 |       | Ar                      |
| 98 | *Platyrhbrus armenicus* Borutzky, 1976 |               | Ar: Megri               |
| 99 | *Platyrhbrus hoffmannseggii* Brandt, 1833 |               | Ru: Krasnodar region    |
| 100| *Platyrhbrus luppovae* Borutzky, 1953 |               | Td                      |
| 101| *Platyrhbrus mesasiaticus* Borutzky, 1976 |               | Tu                      |
| 102| *Platyrhbrus ocellatus* Borutzky, 1953 |               | Td                      |
| 103| *Platyrhbrus schoblii* Budde-Lund, 1885 |               | Ua: Crimea               |
| 104| *Porcellio bistriatus* Budde-Lund, 1885 |               | Ab: Sukhum; Ru: Krasnodar region |
| 105| *Porcellio crassicornis* C. Koch, 1841 |               | Bl: Minsk               |
| 106| *Porcellio dilatatus* Brandt, 1833 |               | Ar: Sevan               |
| 107| *Porcellio laevis* Latreille, 1804 |               | Ab: Sukhum; Ru: Altay, Kalmykia, Moscow, Primorie, Rostov regions; Ua: S Crimea, Odessa; Uz: Bukhara region |
| 108| *Porcellio lamellatus* Budde-Lund, 1885 |               | Ua: Crimea               |
| 109| *Porcellio oboletus* Budde-Lund, 1885 |               | Ua: S Crimea             |
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110 Porcellio scaber Latreille, 1804
Bl: Belovezha, Berezinsky reserves; Lt: Vilnius; Ru: Belgorod, Kaluga, Moscow, Nizhni Novgorod, Primorie, Rostov regions, Kamchatka, Sakhalin islands; Ua: Kiev, Kremenchet, Vinnikaya region (Yampol')

111 Porcellio spinicornis Say, 1818
Bl: Minsk; Lt: Vilnius; Md; Ru: Kaluga, Leningrad, Moscow Pskov regions; Ua: Kiev

112 Porcellio uljanini Budde-Lund, 1885
Ua: Crimea

113 Porcellio variabilis Lucas, 1849
Ua: Crimea

114 Porcellionides approximatus Budde-Lund, 1885
Md; Ru: Stavropol region; Ua: Crimea

115 Porcellionides linearis (Budde-Lund, 1885)
Uz: Nukus

116 Porcellionides pruinosus Brandt, 1833
Ab: Sukhum; Ar: Shorza; Az: Baku, Khachmas, Nabran; Ru: Baikal, Volgograd, Krasnodar region, Moscow, Rostov, Saratov regions; Ua: Crimea

117 Porcellionides rectifrons (Budde-Lund, 1885)
Ua: Crimea

118 Porcellium collicola (Verhoeff, 1907)
Md

119 Porcellium conspersum C. Koch, 1841
Bl: Belovezha Reserve; Ua

120 Protracheoniscus abricossovi Borutzky, 1945
Tu

121 Protracheoniscus alabashensis Borutzky, 1959
Kg

122 Protracheoniscus almaatinus Borutzky, 1975
Kz: Alma-Ata

123 Protracheoniscus anatolii Borutzky, 1959
Kg

124 Protracheoniscus armenicus Borutzky, 1975
Ge: Megri

125 Protracheoniscus asiaticus (Uljanin, 1875)
Ru: Moscow, Nizhni Novgorod, Rostov, Ryazan' regions; Tu: Smagar massif

126 Protracheoniscus atreclus Borutzky, 1945
Tu: Bugdaily

127 Protracheoniscus bugdayliensis Borutzky, 1975
Tu: Bugdaily

128 Protracheoniscus cristatus Borutzky, 1945
Az: Lenkoran, Sara isl.; Tu

129 Protracheoniscus darevskii Borutzky, 1975
Ar: Megri

130 Protracheoniscus deliensis Borutzky, 1945
Tu

131 Protracheoniscus desertoaur Verhoeff, 1930
Turkestan?

132 Protracheoniscus digitifer Borutzky, 1945
Tu

133 Protracheoniscus fossuliger Verhoff, 1901
Ru: Krasnodar, Rostov regions

134 Protracheoniscus giljarovi Borutzky, 1957
Ru: Rostov region; Ua: Lugansk region

135 Protracheoniscus gisarenensis Borutzky, 1975
Td: Dushanbe

136 Protracheoniscus hierutul Verhoff, 1930
Uz: Tashkent

137 Protracheoniscus koptedagicus Borutzky, 1945
Tu

138 Protracheoniscus kryszanovskii Borutzky, 1957
Ru: Volgograd region, Kalmykia

139 Protracheoniscus latus (Uljanin, 1875)
Td: Zeravshan valley

140 Protracheoniscus litoralis (Budde-Lund, 1885)
Ua: Crimea

141 Protracheoniscus major (Dollfus, 1903)
Ru: Rostov region; Ua: Kiev

142 Protracheoniscus maracandicus (Uljanin, 1875)
Td: Smagar massif; Uz: Bukhara, Samarkand, Syrdaryinsk regions

143 Protracheoniscus marginatus (Uljanin, 1875)
Ua: Crimea
| Page | Taxon Name                      | Country/Region                      |
|------|---------------------------------|-------------------------------------|
| 144  | Protracheoniscus nogaicus       | Demianowicz, 1931 Md; Ru: Rostov region |
| 145  | Protracheoniscus orientalis     | Uljanin, 1875                        |
| 146  | Protracheoniscus panphilovi     | Borutzky, 1959 Kg                   |
| 147  | Protracheoniscus politus        | C. Koch, 1841                        |
| 148  | Protracheoniscus scythicus      | Demianowicz, 1932 Md                |
| 149  | Protracheoniscus steinbergi     | Borutzky, 1961 TU: SW part          |
| 150  | Protracheoniscus taschkentensis | Verhoeff, 1930 Uz: Tashkent;Td       |
| 151  | Protracheoniscus tasbicus       | Borutzky, 1976 Tu; Ru: Rostov region |
| 152  | Protracheoniscus topczevi       | Borutzky, 1975 Ru: Krasnodar, Rostov regions; Ua: Zaporozhye region |
| 153  | Protracheoniscus tuberculatus   | Borutzky, 1945 Tu                   |
| 154  | Protracheoniscus turcomanicus   | Borutzky, 1945 Tu                   |
| 155  | Protracheoniscus tzvetkovi      | Borutzky, 1975 Kz: Alma-Ata, Uzun-Agach; Ru: Moscow region? |
| 156  | Protracheoniscus uljanini       | Borutzky, 1953 Td                   |
| 157  | Protracheoniscus verhoeffi      | Strouhal, 1929 Ge: Tbilisi          |
| 158  | Protracheoniscus zenkevitschi   | Borutzky, 1945 Tu                   |
| 159  | Psachonethes czerkecicus        | Borutzky, 1969 Ru: Krasnodar region  |
| 160  | Pseudobuddelundiella hostensis  | Borutzky, 1967 Ru: Krasnodar region  |
| 161  | Pseudobuddelundiella ljovuschkini| Borutzky, 1967 Ru: Krasnodar region  |
| 162  | Schizidium davidi               | Dollfus, 1887 Az: Divichi           |
| 163  | Schizidium golowati              | Schmalfuss, 1988 Ar: Shikalyukh; Az: Baku; Ge: Batumi |
| 164  | Schizidium reinoehli            | Schmalfuss, 1988 Ru: Rostov region  |
| 165  | Tedzhikoniscus coecus           | Borutzky, 1976 Td                   |
| 166  | Tauroligidium stygium           | Borutzky, 1950 Ua: Crimea           |
| 167  | Tauronethes lebedinskii         | Borutzky, 1949 Ua: Crimea           |
| 168  | Titanethes albus                | C. Koch, 1841 Ua: Crimea            |
| 169  | Trachelipus azerbaidzhanus      | Schmalfuss, 1986 Az: E part         |
| 170  | Trachelipus caucasicus          | Verhoeff, 1918 Ab: Gagry; Ru: Krasnodar region |
| 171  | Trachelipus difficilis          | Radu, 1950 Bl: Belovezha, Berezinsky reserves; Ua: S Crimea |
| 172  | Trachelipus ensiculorum         | Verhoeff, 1949 Ar: Yerevan          |
| 173  | Trachelipus gagiensis           | Verhoeff, 1918 Ab: Gagry            |
| 174  | Trachelipus kerszliei           | Arcangeli, 1938 Ru: Rostov region   |
| 175  | Trachelipus signa              | Verhoeff, 1918 Ab: Gagry; Ru: Rostov region |
| 176  | Trachelipus longipennis         | Budde-Lund, 1885 Ab; Ua: S Crimea   |
| 177  | Trachelipus luteshnikii         | Verhoeff, 1933 Ru: Krasnodar region  |
| No. | Species                          | Ab: | Az:  | Ar:  | Ge:  | Bl: | Lt:  | Md: | Ru:                  | Ua:                  |
|-----|---------------------------------|-----|------|------|------|-----|------|-----|----------------------|----------------------|
| 178 | *Trachelipus rathkii* Brandt, 1833 |     |      |      |      |     |      |     | Belgorod, Kursk, Tver, Maryi-El, Kaluga, Mordovia, Moscow, Penza, Rostov, Leningrad, Saratov, Tula regions | Crimea, Kiev          |
| 179 | *Trachelipus razzautii* (Arcangeli, 1913) |     |      |      |      |     |      |     | Krasnodar region      |                      |
| 180 | *Trachelipus sarculatus* (Budde-Lund, 1896) |     |      |      |      |     |      |     | Crimea               |                      |
| 181 | *Trachelipus trachealis* Budde-Lund, 1885 |     |      |      |      |     |      |     | Md                   |                      |
| 182 | *Trichoniscus aphonicus* Borutzky, 1977 |     |      |      |      |     |      |     | Ab                   |                      |
| 183 | *Trichoniscus gudaucicus* Borutzky, 1977 |     |      |      |      |     |      |     | Ab                   |                      |
| 184 | *Trichoniscus pusillus* Brandt, 1833 |     |      |      |      |     |      |     | Crimea, Kiev          |                      |
| 185 | *Trichoniscus pygmaeus* Sars, 1898 |     |      |      |      |     |      |     | Krasnodar region      |                      |
| 186 | *Turanoniscus anacanthotermitis* Borutzky, 1969 |     |      |      |      |     |      |     | Uz: Tashkent         |                      |
| 187 | *Tylos granuliferus* Budde-Lund, 1885 |     |      |      |      |     |      |     | Primorie region, S Kuril Islands |                      |
| 188 | *Tylos ponticus* Grebnicki, 1874 |     |      |      |      |     |      |     | Crimea, Odessa        |                      |
| 189 | *Typhloligidium coecum* (Carl, 1904) |     |      |      |      |     |      |     | Crimea               |                      |
| 190 | *Typhloligidium karabijajae* Borutzky, 1962 |     |      |      |      |     |      |     | Crimea               |                      |