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A review of the anthropochore millipede fauna of Asian Russia, with new records from the Altai Province, Siberia (Diplopoda)

Обзор антропохорной диплоподофауны азиатской части России с новыми находками из Алтайского края, Сибирь (Diplopoda)

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KEY WORDS: *Brachyiulus*, *Brachydesmus*, *Poratia*, *Brachyiulus jawlowskii*, *Brachydesmus superus*, *Poratia digitata*, anthropochore, faunistics, introduction, Siberia.

КЛЮЧЕВЫЕ СЛОВА: *Brachyiulus*, *Brachydesmus*, *Poratia*, *Brachyiulus jawlowskii*, *Brachydesmus superus*, *Poratia digitata*, антропохор, фаунистика, интродуцент, Сибирь.

ABSTRACT. The anthropochore millipede fauna of Asian Russia is reviewed, based on the available literature records, as well as new samples from the Altai Province and only partly published, freshly revised material [Nefediev, Nefedieva, 2006, 2011]. The julid genus *Brachyiulus* Berlese, 1884, as well as *B. jawlowskii* Lohmander, 1928, are new to the millipede faunas of Asian Russia and Kazakhstan. The polydesmid genus *Brachydesmus* Heller, 1858 and *B. superus* Latzel, 1884 are reported from Asian Russia for the first time. Both the genus *Poratia* Cook et Cook, 1894 and *P. digitata* (Porat, 1889), as well as the family Pyrgodesmidae they belong to, are formally new to the millipede fauna of Russia. The subcosmopolitan *Nopoiulus kochii* (Gervais, 1847) is recorded in Kazakhstan for the first time. Remarks are provided for all of the anthropochore species of the study area, all being mapped as well.

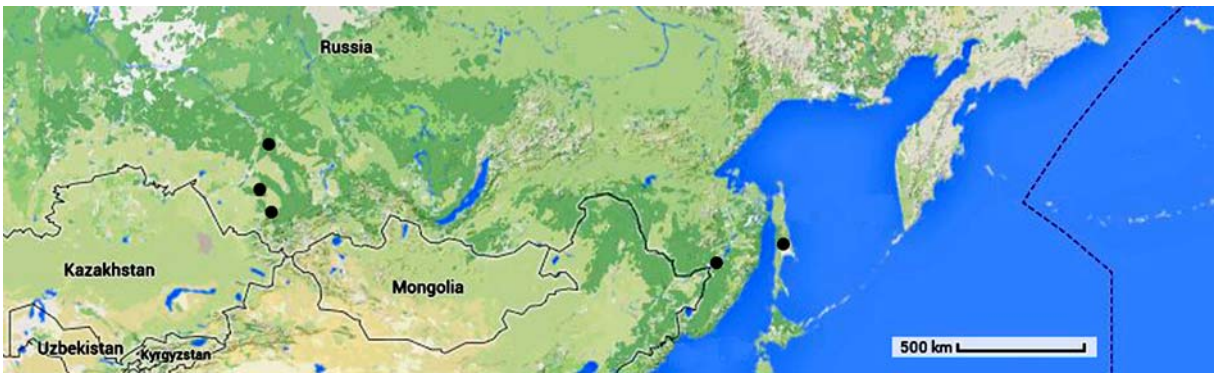
РЕЗЮМЕ. На основе литературных данных, новых находок диплопод из Алтайского края, а также переизучения материала, частично опубликованного ранее [Nefediev, Nefedieva, 2006, 2011], выполнен обзор антропохорной диплоподофауны азиатской части России. Род *Brachyiulus* Berlese, 1884 и вид *B. jawlowskii* Lohmander, 1928 — новые для азиатской части России и Казахстана. Род *Brachydesmus* Heller, 1858 и вид *B. superus* Latzel, 1884 впервые отмечены в азиатской России. И род *Poratia* Cook et Cook, 1894, и вид *P. digitata* (Porat, 1889), а также семейство Pyrgodesmidae, к которому они принадлежат, оказались формально новыми для фауны диплопод России. Субкосмополит *Nopoiulus kochii* (Gervais, 1847) впервые отмечен в Казахстане. Для всех антропохорных видов района исследования приведены замечания и картирование находок.

Introduction

The first anthropochorous diplopod reported from the Asian part of Russia seems to have been *Oxidus gracilis* (C.L. Koch, 1847), encountered in Sakhalin Island [Chamberlin, Wang, 1953]. In the mainland of Asian Russia, this ubiquitous species, apparently Southeast Asian in origin, has hitherto been recorded in green- or hothouses in the cities of Khabarovsk, Russian Far East [Mikhaljova, 1993], as well as in hothouses of the Siberian Botanical Garden in the city of Tomsk, southwestern Siberia [Mikhaljova, Nefediev, 2003; Nefediev, Nefedieva, 2011].

The julidan millipede, *Nopoiulus kochii* (Gervais, 1847), presumably Caucasian in origin, has heretofore been reported from the Russian Far East in kitchen-gardens and semi-natural habitats in the city of Vladivostok [Lokšina, Golovatch, 1979; Golovatch, Enghoff, 1990; Mikhaljova, 1993, 1998a, b] and from a deciduous forest in Elena Island, off the coast near that city [Mikhaljova, 2009a]. In Siberia, this subcosmopolitan species has been recorded in some hothouses and city parks of Tomsk [Mikhaljova, Nefediev, 2003].

The synanthropous species, *Cylindroiulus latestriatus* (Curtis, 1845), European in origin, is also common in the Russian Far East and Siberia [Mikhaljova, 2012], having been introduced to Kunashir Island, Kuriles [Mikhaljova, 1998a]. In southwestern Siberia, *C. latestriatus* has only been recorded very recently [Nefediev et al., 2013], collected on open hand-made grounds in the Pervomaiskii District, Altai Province. Both *C. britannicus* (Verhoeff, 1891) and *C. truncorum* (Silvestri, 1896) have also been reported from southwestern Siberia very recently [Nefediev et al., 2013]. The former species has been taken in some



Map 1. Distribution of anthropochore millipedes in the Asian part of Russia: circle — *Oxidus gracilis*.
Карта 1. Распространение антропохорных двупарноногих многоножек в азиатской части России: круг — *Oxidus gracilis*.

anthropogenous habitats in two cities in the Altai Province (Barnaul and Biysk), as well as in the city of Tomsk, Tomsk Area, whereas the latter species in the cities of Barnaul and Tomsk.

The polydesmid millipede, *Polydesmus denticulatus* C.L. Koch, 1847, of European origins, has hitherto been recorded by Mikhaljova & Nefediev [2003] in Siberia in a city park in Tomsk, probably having reached the open ground from the nearby hothouses of the Siberian Botanical Garden. It has also been introduced to the Baktin Cemetery in the suburbs of Tomsk, presumably with flower seedlings [Nefediev, Nefedieva, 2011].

The present paper was presented as a lecture at the 16th International Congress of Myriapodology held in Olomouc, Czech Republic, on July 20–25, 2014 and briefly published in the congress' book of abstracts [Nefediev et al., 2014].

The material treated herein has been deposited mainly in the collection of the Altai State University, Barnaul, Russia (ASU), partly shared also with the collections of the Zoological Museum of the Moscow Lomonosov State University, Moscow, Russia (ZMUM) and of the Institute of Biology and Soil Science, Far Eastern Branch, Russian Academy of Sciences, Vladivostok, Russia (IBSS), as indicated in the text. Literature references to the species concern the Asian part of Russia only.

Taxonomic part

Order POLYDESMIDA
Family PARADOXOSOMATIDAE

Oxidus gracilis (C.L. Koch, 1847)
Map 1.

Oxidus gracilis — Chamberlin, Wang, 1953: 7; Mikhaljova, 1993: 30; 1998b: 59, fig.; 2004: 259, 260, fig.; 2009a: 600; 2009b: 5; 2012: 112; Mikhaljova, Nefediev, 2003: 83; Nefediev, Nefedieva, 2011: 100; Nefediev et al., 2014: 64.

MATERIAL EXAMINED. 1 ♂, 1 ♀, 2 juv. (ASU), Russia, southwestern Siberia, Tomsk Area, Tomsk City, Siberian Botanical Garden, western greenhouse, 3.11.2005, leg. P.S. Nefediev; 1 ♂, 2 ♀♀ (ASU), same locality, greenhouse with pond, pitfall traps, 28.03.–14.04.2006; 3 juv. (ASU), same locality, south greenhouse, pitfall traps, 28.03.–14.04.2006; 3 ♀♀, 27 juv. (ASU), same locality, rose greenhouse, pitfall traps, 28.03.–14.04.2006; 1 ♂, 4 ♀♀, 31 juv. (ASU), same locality, coniferous greenhouse, pitfall traps, 29.03.–14.04.2006; 1 ♀, 2 juv. (ASU), same locality, coniferous greenhouse, 14.06.2006; 2 juv. (ASU), same locality, central greenhouse, pitfall traps, 28.03.–14.04.2006, all leg. P.S. Nefediev & A.M. Folin; 5 ♂♂, 2 ♀♀, 18 juv. (ASU), Altai Province, Biysk City, cucumber greenhouse, 16.03.2010, leg. P.S. Nefediev; 17 ♂♂, 5 ♀♀, 2 juv. (ASU), Barnaul City, Yuzhnyi, South Siberian Botanical Garden, fern greenhouse, 19.06.2013; 3 ♂♂, 1 ♀, 5 juv. (ASU), same locality, flower greenhouse, 19.06.2013; 3 ♂♂, 3 ♀♀, 8 juv. (ASU), same locality, open ground with flowers and fruit trees, under boards and paving tiles of footpaths between beds, all leg. P.S. Nefediev & Yu.V. Dyachkov; 4 ♂♂, 2 ♀♀, 21 juv. (ASU), same locality, fern and exotic greenhouses, 27.09.2013; 2 ♂♂, 2 ♀♀, 1 juv. (ASU), same locality, flower greenhouse, 27.09.2013; 2 ♀♀ (ASU), same locality, open hand-made ground, beds, 27.09.2013, all leg. Yu.V. Dyachkov; 2 ♂♂, 3 ♀♀, 8 juv. (ASU), same locality, fern greenhouse, 28.11.2013, leg. P.S. Nefediev; 4 ♂♂, 4 ♀♀, 7 juv. (ASU), same locality, fern greenhouse, 28.11.2013; 8 juv. (ASU), same locality, flower greenhouse, 28.11.2013; 6 ♂♂, 2 ♀♀, 1 juv. (ASU), same locality, exotic greenhouse, 28.11.2013; 1 ♂, 2 ♀♀ (ASU), same locality, exotic greenhouse, 5.12.2013; 2 ♂♂, 1 ♀, 5 juv. (ASU), same locality, flower greenhouse, 5.12.2013; 2 ♂♂, 3 ♀♀, 5 juv. (ASU), same locality, fern greenhouse, 5.12.2013; 1 ♀, 1 juv. (ASU), same locality, fern greenhouse, pitfall traps, 5.12.2013; 1 ♂ (ASU), same locality, flower greenhouse, pitfall traps, 12.12.2013, all leg. V.M. Mamina.

DISTRIBUTION. *O. gracilis*, being apparently indigenous to East Asia, is now free-living throughout the tropics, subtropics and warm temperate areas. The species had been introduced to Europe where it mostly inhabits greenhouses in Belgium, mainland France, the Netherlands, Luxembourg, Switzerland, Germany, Austria, Hungary, the Czech Republic, Slovakia, Macedonia, Slovenia, Romania, Poland, Spain together with the Balearics and the Canaries, and also Alboran Island, Madeira (Portugal), mainland Italy, Malta, Monaco, Bulgaria, Finland, Denmark, including Bornholm Island, Sweden, including Gotland Island, mainland Norway, Great Britain, including the Shetlands, the Orkneys, the Hebrides, and also the Isle of Man and Northern Ireland, Iceland, Ireland, Latvia, Lithuania, Ukraine, Moldova, Belarus, the European part of Russia, the Asian part of Russia, namely southwestern Siberia and the Russian Far East, also introduced into

Map 2. Distribution of anthropochore millipedes in the Asian part of Russia: diamond –*Polydesmus denticulatus*.

Карта 2. Распространение антропохорных двупарноногих многоножек в азиатской части России: ромб — *Polydesmus denticulatus*.

North and South America, tropical Africa, the Australian region, maybe native to Vietnam, southern China, Taiwan and/or Japan [Blower, 1985; Enghoff, 2007; Mikhaljova, 2004].

REMARKS. In the Asian part of Russia *O. gracilis* inhabits anthropogenic and semi-anthropogenic localities of both the Russian Far East (Khabarovsk City and Sakhalin Island) and southwestern Siberia (Tomsk City). Now this species has also been found introduced to hothouses in the city of Biysk, to hothouses of the South Siberian Botanical Garden and to open hand-made grounds nearby, all within the city of Barnaul in the Altai Province. This is the southernmost record of *O. gracilis* in Siberia and in the mainland of Asian Russia where it can overwinter and survive outdoors. The locomotor activity of *O. gracilis* in greenhouses of the Siberian Botanical Garden measured by pitfall trapping ranges from 1.3 to 25 ind./100 traps per day with the maximum in the coniferous greenhouse, whereas the dynamic density of the species in the greenhouses of the South Siberian Botanical Garden seems to be rather low, ranging from 1.4 to 2.9 ind./100 traps per day.

Family POLYDESMIDAE

Polydesmus denticulatus C.L. Koch, 1847
Map 2.

Polydesmus denticulatus — Mikhaljova, Nefediev, 2003: 83; Mikhaljova, 2004: 222; Nefediev, Nefedieva, 2011: 100; Nefediev et al., 2014: 64.

MATERIAL EXAMINED. 1 ♂ (ASU), Russia, southwestern Siberia, Tomsk Area, Tomsk City, Borzunov's Farm, greenhouse, on onion, 20.02.2002, leg. Yu.V. Kroshko; 1 ♂, 1 fragm. (ASU), Tomsk City, University Groove, mixed stands, 24.06.2004, leg. P.S. Nefediev; 1 ♂, 1 ♀ (ASU), same locality, Siberian Botanical Garden, coniferous greenhouse, 14.04.2006, leg. P.S. Nefediev & A.M. Folin; 9 ♂♂, 1 juv. (ASU), Tomsk City, experimental plot of Botany Department of Tomsk Agricultural Institute, open ground, 23.09.2006, leg. E.V. Miroshnichenko; 1 ♂ (ASU), Tomsk City, square on crossroad of Gertsen street and Novgorodskaya street, *Betula*, 15.05.2007; 3 ♀♀, 3 juv. (ASU), same locality, 15.05.2008; 1 ♂, 1 ♀, 1 juv. (ASU), Tomsk City, Baktin Cemetery, *Betuletum*, between graves, 18.05.2007, all leg. P.S. Nefediev.

DISTRIBUTION. Throughout Europe in Great Britain, including the Shetlands, the Orkneys, the Hebrides and the Isle of Man, Northern Ireland, Ireland, mainland France, Belgium, the Netherlands, Luxembourg, mainland Italy, Germany, Switzerland, Austria, Hungary, the Czech Republic, Slovakia, Montenegro, Slovenia, Croatia, Serbia, including Kosovo and Voivodina; Romania, Bulgaria, mainland Norway, Sweden together with Gotland Island, Denmark together with Bornholm Island, Finland, Estonia, Lithuania, Latvia, Belarus, Ukraine, the European part of Russia, southwestern Siberia in the Asian part of Russia, also introduced to Newfoundland, Canada [Blower, 1985; Enghoff, 2007; Mikhaljova, 2004].

REMARKS. In Asian Russia, *P. denticulatus* is only known from the city of Tomsk in southwestern Siberia. The record of this species in a greenhouse of the Siberian Botanical Garden supports Nefediev's [2005a] earlier idea that it could have reached the open man-made ground from the nearby hothouses of the Siberian Botanical Garden. This species is free-living in semi-natural habitats in temperate conditions in Siberia, being partly naturalized there.

Brachydesmus superus Latzel, 1884
Map 3.

Brachydesmus superus — Nefediev et al., 2014: 64.

MATERIAL EXAMINED. 1 ♂, 2 ♀♀, 2 juv. (ASU), Russia, southwestern Siberia, Altai Province, Barnaul City, "Yuzhnyi Sadovod" Gardening, open hand-made grounds, pitfall traps, 23–28.07.2012, leg. Yu.V. Dyachkov; 1 ♂ (ASU), Barnaul City, Yuzhnyi, South Siberian Botanical Garden, flower greenhouse, 19.06.2013; 2 ♂♂, 2 ♀♀ (ZMUM), 2 ♂♂, 2 ♀♀ (IBSS), 39 ♂♂, 33 ♀♀, 6 juv. (ASU), same locality, open ground with flowers and fruit trees, under boards and paving tiles of footpaths between beds, 19.06.2013, all leg. P.S. Nefediev & Yu.V. Dyachkov; 1 ♀, 13 juv. (ASU), same locality, open hand-made ground, beds, pitfall traps, 27.08.–07.09.2013; 1 ♂, 1 juv. (ASU), same locality, fern and exotic greenhouses, 27.09.2013; 1 juv. (ASU) same locality, flower greenhouse, 27.09.2013; 65 juv. (ASU), same locality, open hand-made ground, beds, 27.09.2013, all leg. Yu.V. Dyachkov; 1 ♂, 1 ♀, 1 juv. (ASU), same locality, fern greenhouse, 28.11.2013,

Map 3. Distribution of anthropochore millipedes in the Asian part of Russia: crossed circle — *Brachydesmus superus*.
Карта 3. Распространение антропохорных двупарноногих многоножек в Азиатской части России: крест в круге — *Brachydesmus superus*.

Map 4. Distribution of anthropochore millipedes in the Asian part of Russia: asterisk — *Poratia digitata*.
Карта 4. Распространение антропохорных двупарноногих многоножек в азиатской части России: звезда — *Poratia digitata*.

leg. P.S. Nefediev; 1 ♀, 4 juv. (ASU), same locality, exotic greenhouse, 28.11.2013; 1 ♂, 1 ♀ (ASU), same locality, flower greenhouse, pitfall traps, 5.12.2013; 1 ♂ (ASU), same locality, fern greenhouse, pitfall traps, 5.12.2013; 1 ♂, 1 ♀ (ASU), same locality, flower greenhouse, pitfall traps, 12.12.2013, all leg. V.M. Mamina.

DISTRIBUTION. Being European in origin, *B. superus* is widespread in Europe, inhabiting Great Britain, including the Shetlands, the Orkneys, the Hebrides and the Channel Islands, and also the Isle of Man and Northern Ireland, Iceland, Ireland, Spain, including the Balearics and the Canaries, and also Alboran Island, mainland Portugal, including the Azores and Madeira, Belgium, the Netherlands, mainland France and Corsica; Luxembourg, Switzerland, Austria, Germany, Hungary, the Czech Republic, Slovakia, Slovenia, Poland, Bulgaria, Croatia, Italy together with Sardinia, Sicily and adjacent islands; Malta, Monaco, Denmark together with the Faroes and Bornholm Island, Latvia, Lithuania, Estonia, Finland, mainland Norway, mainland Sweden, including Gotland Island, Ukraine, central and northwest part of European Russia, also introduced to Australian, East Palaearctic and Nearctic regions, and also to North Africa [Blower, 1985; Enghoff, 2007; Mikhaljova, 2004].

REMARKS. Both the large European polydesmid genus *Brachydesmus* Heller, 1858 and the widespread, currently Holarctic species *B. superus* Latzel, 1884 are reported from Asian Russia for the first time, having been introduced to hothouses of the South Siberian Botanical Garden and to open hand-made grounds in the environs of the city of Barnaul in the Altai Province. The dynamic density of *B. superus* in greenhouses of the South Siberian Botanical Garden seems to be rather low, ranging from 1.4 to 2.9 ind./100 traps per day, whereas the maximum locomotor activity has been observed in open hand-made grounds near the city of Barnaul where it reached up to 10 ind./100 traps per day.

Family PYRGODESMIDAE

Poratia digitata (Porat, 1889)
Map 4.

Poratia digitata — Nefediev et al., 2014: 64.

MATERIAL EXAMINED. 4 ♀♀ (ASU), Russia, southwestern Siberia, Altai Province, Barnaul City, Yuzhnyi, South Siberian Botanical Garden, fern greenhouse, 19.06.2013; 5 ♀♀ (ZMUM), 5 ♀♀ (IBSS), 16 ♀♀, 2 juv. (ASU), same locality, fern greenhouse, 28.11.2013, all leg. P.S. Nefediev; 1 ♀ (ASU), same locality, fern greenhouse, 28.11.2013, leg. V.M. Mamina.

DISTRIBUTION. Obligatory hothouse-dweller in Western Europe: Austria, Germany, the Netherlands,

Map 5. Distribution of anthropochore millipedes in the Asian part of Russia and Kazakhstan: square — *Nopoiulus kochii*.

Карта 5. Распространение антропохорных двупарноногих многоножек в азиатской части России и Казахстане: квадрат — *Nopoiulus kochii*.

Switzerland, Great Britain, including the Shetlands, the Orkneys, the Hebrides and the Isle of Man, mainland Norway, Denmark together with Bornholm Island, also Sweden, including Gotland Island, and a hothouse in the city of Chicago (U.S.A.), but free-living in the southern U.S.A., the U.S. Virgin Islands and Java (Indonesia), probably also in Panama and Costa Rica [Golovatch, Sierwald, 2000; Enghoff, 2007].

REMARKS. This species is an obligate parthenogen mainly restricted to hothouses across the Holarctic, now found introduced to a fern hothouse of the South Siberian Botanical Garden in Barnaul. The basically tropical American genus *Poratia* Cook et Cook, 1894 and the widespread *P. digitata* (Porat, 1889), as well as the family Pyrgodesmidae they belong to, are formally new to the millipede fauna of Russia.

ORDER JULIDA
Family BLANIULIDAE

Nopoiulus kochii (Gervais, 1847)
Map 5.

Nopoiulus kochii — Lokšina, Golovatch, 1979: 385; Golovatch, Enghoff, 1990: 115; Mikhaljova, 1993: 9; 1998a: 6; 1998b: 73, 74, fig.; 2009a: 601; 2009b: 2; 2012: 112; Mikhaljova, Nefediev, 2003: 85; Nefediev, 2005a: 43; 2005b: 6; Nefediev, Nefedieva, 2006: 98; 2011: 100; Nefediev et al., 2014: 64.

MATERIAL EXAMINED. 1 ♀ (ASU), Russia, southwestern Siberia, Tomsk Area, Tomsk City, Siberian Botanical Garden, western greenhouse, 3.11.2005, leg. P.S. Nefediev; 7 ♂♂, 15 ♀♀ (ASU), same locality, coniferous greenhouse, 14.06.2006; 1 juv. (ASU), same locality, coniferous greenhouse, pitfall traps, 29.03.–14.04.2006; 1 juv. (ASU), same locality, greenhouse with pond, pitfall traps, 28.03.–14.04.2006; 2 juv. (ASU), same locality, south greenhouse, pitfall traps, 28.03.–14.04.2006; 2 juv. (ASU), same locality, rose greenhouse, pitfall traps, 28.03.–14.04.2006, all leg. P.S. Nefediev & A.M. Folin; 1 ♀, 2 juv. (ASU), Tomsk City, experimental plot of Botany Department of Tomsk Agricultural Institute, open ground, 23.09.2006, leg. E.V. Miroshnichenko; 1 ♀ (ASU), Tomsk City, *Betuletum* in kindergarten, 29.04.2008; 9 ♂♂, 30 ♀♀, 6 juv., 1 fragm. (ASU), same locality, park, *Acero-Populetum*, 15.05.2008, all leg. P.S. Nefediev; 6 ♂♂, 16 ♀♀ (ASU), Altai Province, Biysk City, Sorokino, *Populus*, under bark of logs, 19.10.2009, leg. P.S. Nefediev & J.S. Nefedieva; 7 ♂♂, 22 ♀♀ (ASU), Biysk City, cucumber greenhouse, 16.03.2010, leg. P.S. Nefediev; 8 ♂♂, 10 ♀♀, 4 juv., 1 fragm. (ASU), Pervomaiskii District, Beryozki Railway Station, 53°33′35,8′′ N, 83°44′48,7′′ E, 225 m a.s.l, gardens, strawberry bed, 24.07.2007; 7 ♂♂, 15 ♀♀, 55 juv. (ASU), same locality, under squash, 20.08.2007; 14 ♂♂, 23 ♀♀, 2 juv. (ASU), same locality, under *Prunus* and in dung heap, 12.06.2010; 2 ♂♂, 3 ♀♀, 3 juv. (ASU), same locality, strawberry bed, 30.06.2013; 5 ♂♂, 5 ♀♀, 4 juv. (ASU), same locality, onion bed, 30.06.2013, all leg. P.S. Nefediev; 7 ♂♂, 8 ♀♀, 4 juv. (ASU), Barnaul City, Yuzhnyi, South Siberian Botanical Garden, fern greenhouse, 19.06.2013; 3 ♂♂, 4 ♀♀, 3 juv. (ASU), same locality, flower greenhouse, 19.06.2013; 15 ♂♂, 28 ♀♀, 7 juv. (ASU), same locality, open ground with flowers and fruit trees, under boards and paving tiles of footpaths between beds, 19.06.2013, all leg. P.S. Nefediev & Yu.V. Dyachkov; 1 ♀, 6 juv. (ASU), same locality, open hand-made ground, beds, pitfall traps, 27.08.–7.09.2013; 3 ♂♂, 7 ♀4, 10 juv. (ASU), same locality, fern and exotic greenhouses, 27.09.2013; 7 ♂♂, 19 ♀♀, 14 juv. (ASU), same locality, open hand-made ground, beds, 27.09.2013, all leg. Yu.V. Dyachkov; 3 ♂♂, 3 ♀♀, 6 juv. (ASU), same locality, fern greenhouse, 28.11.2013, leg. P.S. Nefediev; 2 ♂♂, 2 ♀♀, 3 juv. (ASU), same locality, fern greenhouse, 28.11.2013; 1 ♂, 3 ♀♀ (ASU), same locality, exotic greenhouse, 28.11.2013; 6 ♂♂, 4 ♀♀, 2 fragm. (ASU), same locality, flower greenhouse, pitfall traps, 5.12.2013; 1 ♂, 1 ♀ (ASU), same locality, fern greenhouse, 5.12.2013; 2 ♂♂, 2 ♀♀, 1 juv., 1 fragm. (ASU), same locality, fern greenhouse, pitfall traps, 5.12.2013; 4 ♂♂, 8 ♀♀ (ASU), same locality, flower greenhouse, pitfall traps, 12.12.2013; 6 ♂♂, 1 ♀, 2 juv. (ASU), same locality, fern greenhouse, pitfall traps, 12.12.2013, all leg. V.M. Mamina; 2 ♀♀, 26 juv. (2 subadult males) (ASU), Barnaul City, *Populus* stands, 9.07.2013, leg. P.S. Nefediev; 2 ♀♀ (ASU), same locality, “Izumrudnyi” park, *Acero-Populetum*, 3.06.2014, leg. P.S. Nefediev & A.A. Streltsova; 2 ♀♀ (ZMUM), Kazakhstan, environs of Uralsk City, garden near river, 16.05.2009, leg. A.V. Matyukhin.

DISTRIBUTION. This species, probably of Caucasian origin, is widespread all over the world through human agency: mainland Europe, including the Netherlands, Belgium, France, Luxembourg, Switzerland, Germany, Austria, Hungary, the Czech Republic, Slovakia, Poland, Italy together with Sicily and adjacent islands, Spain, including Alboran Island, the Balearic Islands and the Canaries, Portugal, including Madeira and the Azores, Greece, including some islands (Andikithira, Euboea, Samothrace and Thasos) and archipelagos (the Ionian Islands and the Northern Sporades), Croatia, Albania, Bosnia and Herzegovina, Slovenia, Macedonia, Bulgaria, Romania, Belarus, Ukraine, Moldova, Norway, Finland, Latvia, Lithuania, Estonia, Denmark together with Bornholm Island, Sweden together with Gotland Island, European Turkey, including Im-

Map 6. Distribution of anthropochore millipedes in the Asian part of Russia: empty triangle — *Cylindroiulus britannicus*.

Карта 6. Распространение антропохорных двупарноногих многоножек в азиатской части России: прозрачный треугольник — *Cylindroiulus britannicus*.

roz Island, and also Great Britain, including the Shetlands, the Orkneys, the Hebrides and the Isle of Man, Northern Ireland, the European and Asian parts of Russia, also introduced to the Australian, Nearctic and Neotropical regions, as well as to the Near East [Lokšina, 1969; Blower, 1985; Enghoff, 2007; Mikhaljova, 2004].

REMARKS. Now *N. kochii* has also been found introduced to hothouses of the South Siberian Botanical Garden and open hand-made grounds nearby, to some parks and hothouses in the cities of Barnaul and Biysk, as well as to open hand-made grounds in the Pervomaiskii District, Altai Province. The above record of this species in northwestern Kazakhstan (Golovatch S.I. pers. comm.) is new to the millipede fauna of that country. The locomotor activity of *N. kochii* in greenhouses of the Siberian Botanical Garden seems to be very low, ranging from 0.6 to 1.2 ind./100 traps per day. In greenhouses of the South Siberian Botanical Garden a high dynamic density has been registered in November where it ranges from 8.6 to 17.1 ind./100 traps per day.

Family JULIDAE

Cylindroiulus britannicus (Verhoeff, 1891)
Map 6.

Cylindroiulus latestriatus — Mikhaljova, Nefediev, 2003: 85; Nefediev, 2005a: 43; 2005b: 6; Nefediev, Nefedieva, 2006: 98; 2011: 100.

Cylindroiulus britannicus — Nefediev et al., 2013: 340, 2014: 64.

MATERIAL RE-EXAMINED. 2 ♂♂, 2 ♀♀ (ZMUM), 2 ♂♂, 2 ♀♀ (IBSS), Russia, southwestern Siberia, Altai Province, Barnaul City, Yuzhnyi, South Siberian Botanical Garden, open ground with flowers and fruit trees, under boards and paving tiles of footpaths between beds, 19.06.2013, leg. P.S. Nefediev & Yu.V. Dyachkov.

NEW MATERIAL EXAMINED. 1 ♀, 1 juv. (ASU), Russia, southwestern Siberia, Altai Province, Barnaul City, Yuzhnyi, South Siberian Botanical Garden, fern and exotic greenhouses, 27.09.2013; 1 fragm. (ASU), same locality, flower greenhouse, 27.09.2013; 1 ♂, 5 ♀♀ (ASU), same locality, open hand-made ground, beds, 27.09.2013, all leg. Yu.V. Dyachkov; 3 ♀♀ (ASU), same locality, fern greenhouse, 28.11.2013; 4 ♂♂, 4 ♀♀, 1 juv. (ASU), same locality, flower greenhouse, 28.11.2013; 5 ♀♀ (ASU), same locality, flower greenhouse, 5.12.2013; 1 ♀ (ASU), same locality, fern greenhouse, 5.12.2013, all leg. V.M. Mamina.

DISTRIBUTION. In Europe, this species is mainly associated with human activity: Austria, the Netherlands, Belgium, Germany, Poland, Spain together with the Canaries and Alboran Island, Portugal together with the Azores and Madeira, mainland Norway, Denmark together with Bornholm Island, Sweden together with Gotland Island, Finland, also Great Britain, including the Shetlands, the Orkneys, the Hebrides, also the Isle of Man and Northern Ireland, Iceland, Ireland, Lithuania, Romania, Ukraine, the central and northwestern parts of European Russia, the southwestern part of Asian Russia; introduced into the U.S.A. and Newfoundland (Canada), as well as to South Africa, India, Tasmania (Australia) and New Zealand [Lokšina, 1969; Blower, 1985; Enghoff, 2007; Nefediev et al., 2013].

REMARKS. In Asian Russia, *C. britannicus* dwells in anthropogenic and semi-natural habitats such as greenhouses and city parks of the city of Tomsk, Tomsk Area and the cities of Barnaul and Biysk, Altai Province. It seems to be the most widespread and abundant anthropochore millipede in southwestern Siberia. Nevertheless, the dynamic density of *C. britannicus* in greenhouses of the Siberian Botanical Garden in Tomsk has been observed as being of a very low level: 0.6 ind./100 traps per day.

Cylindroiulus latestriatus (Curtis, 1845)
Map 7.

Cylindroiulus latestriatus — Mikhaljova, 1998a: 6; 1998b: 61, fig.; 2009a: 602; 2009b: 3; 2012: 112; Nefediev et al., 2013: 339; Nefediev et al., 2014: 64.

non *Cylindroiulus latestriatus* — Mikhaljova, Golovatch, 2001: 104; Mikhaljova, Nefediev, 2003: 85; Nefediev, 2005a: 43; 2005b: 6; Nefediev, Nefedieva, 2006: 98; 2011: 100.

MATERIAL EXAMINED. 4 ♂♂, 8 ♀♀ (ASU), Russia, southwestern Siberia, Altai Province, Pervomaiskii District, Beryozki Railway Station, 53°33′35,8″ N, 83°44′48,7″ E, 225 m a.s.l, gardens, under *Prunus*, 12.06.2010; 1 ♂, 3 ♀♀, 2 juv. (ASU), same locality, strawberry bed, 30.06.2013; 1 ♀ (ASU), same locality, gardens, 1.09.2013; 2 ♂♂, 2 ♀♀ (ASU), same locality, hand-made ground, 15.06.2014, all leg. P.S. Nefediev.

DISTRIBUTION. Being mainly synanthropic, this species is very widespread around Europe: Great Britain, including the Shetlands, the Orkneys, the Hebrides,

Map 7. Distribution of anthropochore millipedes in the Asian part of Russia: filled triangle — *Cylindroiulus latestriatus*.

Карта 7. Распространение антропохорных двупарноногих многоножек в Азиатской части России: треугольник — *Cylindroiulus latestriatus*.

Map 8. Distribution of anthropochore millipedes in the Asian part of Russia: triangle inside circle — *Cylindroiulus truncorum*.

Карта 8. Распространение антропохорных двупарноногих многоножек в азиатской части России: треугольник в круге — *Cylindroiulus truncorum*.

the Isle of Man, the Channel Islands and Northern Ireland, Ireland, France, Belgium, the Netherlands, Austria, Germany, Switzerland, Hungary, Poland, the Czech Republic, Slovakia, Spain together with the Canaries and Alboran Island, Portugal together with the Azores, Norway, Denmark together with the Faroes and Bornholm Island, Sweden together with Gotland Island, Finland, Estonia, Latvia, Lithuania, Romania, Ukraine, Belarus, the central and northwestern parts of European Russia, southwestern Siberia and the Kuriles in Asian Russia, also introduced to Canada, the U.S.A., Mexico, and as far as Peru, Chile, St. Paul Island (Antarctic), Gough Island in the Atlantic, the Afrotropical and the Australian regions [Blower, 1985; Enghoff, 2007; Mikhaljova, 2004; Nefediev et al., 2013].

REMARKS. In the Asian part of Russia, *C. latestriatus* occurs in anthropogenic habitats in Kunashir Island, Kuriles in the Russian Far East and on open private grounds in southwestern Siberia in the Altai Province.

Cylindroiulus truncorum (Silvestri, 1896)
Map 8.

Cylindroiulus latestriatus — Mikhaljova, Nefediev, 2003: 85; Nefediev, 2005a: 43; 2005b: 6; Nefediev, Nefedieva, 2006: 98; 2011: 100.

Cylindroiulus truncorum — Nefediev et al., 2013: 341; 2014: 64.

MATERIAL RE-EXAMINED. 2 ♂♂, 2 ♀♀ (ZMUM), 2 ♂♂, 2 ♀♀ (IBSS), Russia, southwestern Siberia, Tomsk Area, Tomsk City, Siberian Botanical Garden, coniferous greenhouse, 14.04.2006, leg. P.S. Nefediev.

NEW MATERIAL EXAMINED. 1 ♂ (ASU), Russia, southwestern Siberia, Altai Province, Barnaul City, Yuzhnyi, South Siberian Botanical Garden, open hand-made ground, beds, 27.09. 2013, leg. Yu.V. Dyachkov.

DISTRIBUTION. It seems very likely that this species has been introduced to Europe and then all over the world from North Africa, currently inhabiting Portugal, including Madeira, the Canaries (Spain), France, Belgium, the Netherlands, Luxembourg, Switzerland, Germany, Austria, Hungary, Romania, Poland, Ukraine, Denmark together with Bornholm Island, Norway, Sweden together with Gotland Island, Finland, Lithuania, also Great Britain, including the Shetlands, the Orkneys, the Hebrides, the Isle of Man and Northern Ireland, the central and northwestern parts of European Russia, southwestern Siberia in Asian Russia; also introduced to the Nearctic, Neotropical and Australian regions [Schubart, 1946; Lokšina, 1969; Blower, 1985; Enghoff, 2007; Nefediev et al., 2013].

REMARKS: In Asian Russia, *C. truncorum* is currently known only from greenhouses of the Siberian Botanical Garden of the city of Tomsk and on open

Map 9. Distribution of anthropochore millipedes in the Asian part of Russia and Kazakhstan: filled square inside circle — *Brachyiulus jawlowskii*.

Карта 9. Распространение антропохорных двупарноногих многоножек в азиатской части России и Казахстане: квадрат в круге — *Brachyiulus jawlowskii*.

grounds near the South Siberian Botanical Garden in the city of Barnaul, both southwestern Siberia. The species seems to be rather rare at every locality. The maximum locomotor activity of *C. truncorum* in greenhouses of the Siberian Botanical Garden reaches not more than 3.5 ind./100 traps per day.

Brachyiulus jawlowskii Lohmander, 1928
Map 9.

Brachyiulus jawlowskii — Nefediev et al., 2014: 64.

MATERIAL EXAMINED. 1 ♂, 1 ♀ (IBSS), 5 ♂♂, 12 ♀♀, 10 juv., 1 fragm. (ASU), Russia, southwestern Siberia, Altai Province, Biysk City, Sorokino, *Malus* and *Populus* on bank of Biya River, in litter and under bark, 11.10.2009; 12 ♂♂, 6 ♀♀ (ASU), same locality, 19.10.2009, all leg. P.S. Nefediev; 8 ♂♂, 8 ♀♀, 3 juv. (ASU), Pervomaiskii District, Beryozki Railway Station, 53°33′ 35,8″ N, 83°44′48,7″ E, 225 m a.s.l, gardens, under *Prunus* and in dung heap, 12.06.2010; 3 ♂♂, 4 ♀♀, 5 juv. (ASU), same locality, strawberry bed, 30.06.2013; 2 ♂♂, 12 ♀♀, 2 juv. (ASU), same locality, onion bed, all leg. P.S. Nefediev; 2 ♀♀, 1 fragm. (ASU), Barnaul City, "Izumrudnyi" park, *Acero-Populetum*, 20.06.2012, leg. P.S. Nefediev; 2 ♂♂, 2 ♀♀ (ZMUM), 2 ♂♂, 2 ♀♀ (IBSS), 3 ♂♂, 4 ♀♀, 2 juv. (ASU), same locality, 3.06.2014, leg. P.S. Nefediev & A.A. Streltsova; 1 ♂, 1 ♀ (ZMUM), Kazakhstan, environs of Uralsk City, garden near river, 16.05.2009, leg. A.V. Matyukhin.

DISTRIBUTION. Being an endemic of the Eastern European Plain [Golovatch, 1984], this species is currently known from the European part of Russia, Moldova, Romania, Ukraine and Poland [Lokšina, 1969; Blower, 1985; Enghoff, 2007; Jastrzębski, 2012].

REMARKS. The basically Euro-Mediterranean julid genus *Brachyiulus* Berlese, 1884, as well as the widespread Eastern European species, *Brachyiulus jawlowskii*, Lohmander, 1928, are new to the millipede fauna of the Asian part of Russia, currently recorded in several anthropogenous and semi-anthropogenous habitats in the cities of Barnaul and Biysk, as well as on open hand-made grounds in the Pervomaiskii District in the Altai Province. This species is here reported from Kazakhstan (S.I. Golovatch, pers. comm.) for the first time.

Conclusions

At present, at least 9 species from 7 genera, 5 families and two orders of Diplopoda are known to occur in the Asian part of Russia as anthropochore introductions. Both the genus *Poratia* Cook et Cook, 1894 and *P. digitata* (Porat, 1889), as well as the family Pyrgodesmidae they belong to, are formally new to the millipede fauna of Russia. Two species and two genera appear to be new to Asian Russia's list: the genus *Brachyiulus* Berlese, 1884, with *Brachyiulus jawlowskii* Lohmander, 1928, and the genus *Brachydesmus* Heller, 1858, with *Brachydesmus superus* Latzel, 1884. Two records from northwestern Kazakhstan, *Brachyiulus jawlowskii* and *Nopoiulus kochii* (Gervais, 1847), are formally new to the fauna of that country. All of them have been recorded in southwestern Siberia and only three species, namely, *Oxidus gracilis*, *Nopoiulus kochii* and *Cylindroiulus latestriatus*, are common to Siberia and the Russian Far East. All their records are strictly confined to anthropogenic habitats such as green- or hothouses, but most of the alien species, except for *Poratia digitata* and *Cylindroiulus britannicus*, have entirely acclimated to open hand-made grounds and semi-natural habitats, and even the thermophilic *O. gracilis* can survive outdoors at its southernmost locality.

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