International Dragonfly Fund - Report
A Journal of the International Dragonfly Fund

196

ISSN 1435-3393

The International Dragonfly Fund (IDF) is a scientific society founded in 1996 for the improvement of odonatological knowledge and the protection of species.
Internet: http://www.dragonflyfund.org/

This series intends to publish studies promoted by IDF and to facilitate cost-efficient and rapid dissemination of odonatological data.

Editorial Work:	Martin Schorr, Milen Marinov, Rory A. Dow, Holger Hunger
Layout:	Martin Schorr
IDF-home page:	Holger Hunger
Printing:	Colour Connection GmbH, Frankfurt
Impressum:	Publisher: International Dragonfly Fund e.V., Schulstr. 7B, 54314 Zerf, Germany. E-mail: oestlap@online.de
Responsible editor:	Martin Schorr
Cover picture:	*Ischnura aralensis,* Gynochromatic female
Photographer:	Oleg. E. Kosterin

Published 10.01.2026

Odonata of South Ural, Russia, as observed on expedition of July 2021

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Abstract

On 3rd-14th July 2021, Odonata were examined in 39 localities in South Ural, in Oremburg and Chelyabinsk Provinces and Bashkortostan Republic, and one locality in Middle Ural, Sverdlovsk Province (Russia). In total 56 species were registered by photographs and/or collections, plus one species just visually. Of them, *Orthetrum albistylum, O. brunneum, O. coerulescens anceps* and *Sympetrum meridionale* are reported for Ural for the first time. While *O. brunneum* and *O. coerulescens* could be overlooked in poorly studied Orenburg Province, *O. albistylum* and *S. meridionale* have obviously extended their ranges to South Ural from south or west, most probably as a result of climate warming. *Anax imperator* and *A. parthenope* were found to have well established themselves across South Ural, the former appearing very common. Flourishing populations of *Ischnura aralensis* at two lakes in Chelyabinsk Province were re-examined. We failed to confirm the arguable reports of *Shaogomphus postocularis epophthalmus, Macromia fraenata, Somatochlora exuberata* and *Cordulegaster boltoni* while visiting the relevant or close localities. Specimens of *Gomphus vulgatissumus* from the south of the region studied had yellow colour on their femora, up to predominating on all femora in both sexes. This character is usually associated with the southern sister species *Gomphus schneideri*. However, their structural characters rather do not fit that taxon so we abstain from associating the South Uralian specimens with it.

Key words: Odonata, dragonflies, damselflies, fauna, distribution, Ural Mts, Europe, Asia, polymorphism in *Ischnura aralensis*, *Gomphus vulgatissimus*.

Introduction

The Ural Mountains are a longitudinally stretched chain of relatively low and gentle, old mountains ca two thousand km long, which form a conventional border between Europe and Asia. In their southern part, they miss any distinct main chain so that the border is associated with the Ural River, which flows more or less to the south and enters the Caspian Sea. Both English and Russian linguistic traditions treat the names of most mountains as plural nouns, with few exceptions, so in English the Ural Mountains are often called ‘the Urals’. In Russian, however, they are just such an exception and bear the name ‘Ural’, a singular noun never used in plural. The same name ‘Ural’ is applied to their general area including the foothills and

even some adjacent plain lands. In this paper, we will follow this tradition and refer to Ural as the area of our study (which by the way did not concern any considerable mountains). The overwhelming majority of Ural lies in Russia, with the southernmost foothills entering Kazakhstan. The following provinces of Russia are traditionally considered to comprise South Ural: Orenburg Province, Chelyabinsk Province and Bashkortostan Republic. Sverdlovsk Province forms Middle Ural, North Ural and Subpolar Ural are shared by parts of Komi Republic and Tyumen Province, and the Polar Ural – by parts of Komi Republic, Nenets and Yamalo-Nenets Autonomous Regions. (It should be noted that in 2000 the Uralian Federal District was introduced which includes Kurgan, Chelyabinsk, Sverdlovsk and the entire Tyumen Povinces and Khanty-Mansi and Yamalo-Nenets Autonomous Regions, solely for economical reason, without any established geographical tradition underlying this solution). This paper concerns South Ural and a little bit of Middle Ural.

South Ural is among the best studied Russian territories with respect to Odonata thanks to the investigations by Anatoliy Yuryevich Haritonov, Olga Nikolaevna Popova, Vasilya Akhatovna Yanybaeva and Ekaterina Evgen'evna Eremina (Haritonov 1975; 1976; 1977; 1978; 1997; Yanybaeva 2004; Yanybaeva et al. 2006; Eremina 2010; Haritonov & Eremina 2010; Popova & Haritonov 2008; 2012; Popova & Eremina 2016). These studies, however, raised some question still unanswered, and new information appeared which needed clarification. In view of information of 2010s, an impression arises that the Odonata fauna of South Ural is changing rapidly, mostly due to penetration of a number of more or less thermophylic species from the south as a result of climate warming. This motivated us to undertake in July 2021 a fortnight-long car trip to a number of localities in South Ural and one locality in Middle Ural, associated with some odonatological aenigmae or interesting facts. These were, first of all, the following problematic and/or unpublished reports:

1) The report by Haritonov & Popova (2010) of a medium stage larva of *Macromia amphigena* Selys, 1871, otherwise not known from Ural (with the 'closest' locality of Novosibirsk, see Kosterin et al. 2001), found on 5.07.2005 in Lake Bol'shoe Miassovo (55.1728 N, 60.2946 E, according to O.N. Popova's pers. comm.) in the Il'menskiy Nature Reserve, Miass District of Chelyabinsk Province. Also, there was an uncertain sighting of a *Macromia* imago in 2010 by Mr. Chibilev (O.N. Popova, pers. comm);
2) The report of a visual observation of *Cordulegaster boltonii* (Donovan, 1807), otherwise not reliably known from Ural, in the Miass River headwaters in Bashkortostan Republic by A.Y. Haritonov on 18.07.2004 (Haritonov & Eremina 2010).
3) The personal communication by Andrey M. Medvedev (dated 3.11.2012) on a female specimen of *Somatochlora exuberata* Bartenev, 1910, so far not reported westerly of Novosibirsk (Kosterin 2020a,b), collected by Dmitriy A. Gavrhyushin on 13.08.2012 at the Nura River in Beloretsk District of Bashkortostan Republic (54.05155º N, 58.26887º E).
4) The personal communication by E. Eremina on the finding on 1.05.2011 of five larvae of the southern species *Lindenia tetraphylla* (Vander Linden, 1825) in the water reservoir in Troitsk Town, Troitsk District of Chelyabinsk Province, near the mouth of the outlet canal with warm water (not freezing in winter) of the Troitsk Hydropower Station. Also, at the canal itself she found another thermophylic species, *Erythromma viridulum* (Charpentier, 1840), first in 2009 (Popova & Haritonov 2012) and then in 2010: 2 ♂♂, 1 ♀ on 20.08.2010 and 2 ♂♂, 1 ♀ on 2.09.2010 (E. Eremina, pers. comm.)

5) The iNaturalist photographic observation No. 81682224 (for explanation see the 'Methods' section) by Evgeiy Samarin dated 5.06.2021 of a female of *Orthetrum brunneum* (Fonscolombe, 1837), not yet reported for Ural, from Sol'-Iletsk Town District of Orenburg Province.
6) The report of four larvae supposedly of *Shaogomphus postocularis epophthalmus* collected by Anton Menshchikov on 20.07.2009 in the Rezh River at Pershino village, Rezh District of Sverdlovsk Province (Eremina 2025: https://www.odonata.su/news-view-63.html).
7) The iNaturalist observations No. 74979082 by P.Y. Gorbunov on 21.06.2007 of *Gomphus vulgatissimus* (Linnaeus, 1758) with largely yellow hind femora, as in *G. schneideri* Selys, 1850, at the Gryaznushinskiy village environs (52.5609 N, 58.9886 E), Kizil'skoe District of Chelyabinsk Province.

Besides, there were also the following well documented and published but still interesting reports to consider:

8) Reports (the first from Ural) of *Coenagrion glaciale* Selys, 1872, found by E. Eremina at a large pond by Slyudorudnik Settlement (55.67 N, 60.35 E) and at Lake Bol'shaya Akulya (55.63 N, 60.57 E) (Eremina 2010; Haritonov, Eremina 2010).
9) Reports by V. Yanybaeva (2004) and Yanybaeva et al. (2006) of *Somatochlora graeseri* (Selys, 1887) from some oxbow lakes near Sargaya village environs, Bashkirskiy Nature Reserve, Bashkortostan Republic.
10) Reports of *Ischnura aralensis* Haritonov, 1979 from 18 lakes in Chelyabinsk Province and Bashkortostan Republic (Yanybaeva et al. 2006; Haritonov & Eremina 2010).

Such a diversity of issues to consider determined a saturated program of our trip including visiting many localities in Orenburg and Chelyabinsk Provinces and Bashkortostan Republic. The output of the trip with respect to the above issues varied from negative to positive (see Discussion), and naturally a number of interesting new findings were made that clarified the current state and updated the knowledge of the fauna of Odonata in South Ural.

Methods

We moved in VO's Ford Focus car and camped in tents or accommodated in small guesthouses. Dragonflies and damselflies specimens were collected by hand nets and/or registered photographically (each species in each locality either in hand or in natural conditions where possible, never posed as if in natural conditions) using a Canon 350D camera with a Macro 50 mm lens, an Apple iPhone 7 or a Xiaomi realme 6 pro smartphone. The collected specimens are indicated by the annotation "coll.:" in the annotated list below; their number was reduced to the necessary minimum. Fresh specimens were immersed in acetone overnight, then dried and placed in cellophane envelopes; they are kept in the collection of the first author and in Naturalis Biodiversity Center (RMNH). All photos were geotagged; those made by the camera by synchronisation with GPS tracks, obtained by Garmine Map navigator, using Lightroom software. They all were submitted to iNaturalist (2025) database, from where they were subsequently adopted by Global Biodiversity Facility (GBIF) (iNaturalist contributors, iNaturalist 2025). At iNaturalist, each observation has a unique identification numeral x of eight to nine digits. Such numerals will be provided in the annotated checklist below, after collected specimens, if photo-

graphed before collecting, in the “coll.:” string, for individuals just photographed in nature - after the annotation “photo:”, for those caught, examined in hand and released - after the annotation “in hand:”. Any such observation may be retrieved using the following link template: https://inaturalist.org/observation/x. These observations can serve as the comprehensive set of external geotagged illustrations. By this, a reader can actually look at almost every dragonfly we have seen! The experts of the same resource, such as R. Romanov and A. Efremov, greatly helped in confirmation or identification of the aquatic and semiaquatic plant species.

The coordinates (and their intervals) are provided in the decimal degree formate, the dates in the dd.mm.yyyy format. Over the vast territory examined, the terrain varied from flatland to hills and low mountains and from steppe to dense forests, mostly of pine (*Pinus sylvestris* L.) and can hardly be characterised in general, so brief habitat annotations are just provided for each locality.

Localities examined

The localities are numbered and also given with short nicknames. Their disposition it shown in Fig. 1.

Orenburg Province (the Ilek Plateau part, formally in Asia)

Sol’-Iletsk Municipality

Loc. 1 - Ilek: the Ilek River valley (Fig. 2) 1.5-2.5 km ESE of Tamar-Utkul’ village, 51.077-51.081 N, 55.046-55.054 E, 109-111 m a.s.l., 3-4.07.2021. A knee-deep, fast and warm river 35-50 m wide, with sandy bottom with some pebble, surrounded by riparian poplar (*Populus nigra* L. et *P. alba* L.) forest strips and then by steppe. Abundant *Typha latifolia* L., *Sparganium erectum* L. and some *Schoenoplectus lacustris* (L.) Palla, *Bolboschoenus maritimus* (L.) Palla and *Butomus umbellaltus* L. grew at banks, the leaves of *Potamogeton nodosus* Poir. (abundant) and *P. natans* L. (few) formed floating mats along them, *Stuckenia pectinata* (L.) Börner, *Ceratophyllum demersum* L. and *Potamogeton perfoliatus* L. grew in the water. A lot of *Unio tumidus* de Philipsson in Retzius, 1788 bivalves on the bottom. Odonata species registered: 20.

Loc. 2 - Elshanka: Sol’-Iletsk Town, the Elshanka Rivulet upstream of the bridge (Fig. 3), 51.139-51.140 N, 54.991-54.998 E, 110-112 m a.s.l., 3.07.2021. A chain of deep dark pools, 18 m as the broadest, united by a weak brook seeping above mud. The left bank was bordered with a wall of giant reed, in which *Lythrum salicaria* L., *Calystegia sepium* (L.) R. Br., *Solanum dulcamara* L., *Lycopus exaltatus* L. and *Stachys palustris* L. were flowering; the right bank had sparse growth of *Schoenoplectus lacustris*, *Sium latifulium* L. and *Lysimachia vulgaris* L. and neighboured a damp meadow with sparse cattail. The water surface of pools was partly covered with some worm-like filamentous green algae, *Lemna* (*minor* L. or *turionifera* Landolt) and some *Hydrocharis morsus-ranae* L.. In two pools, water lily (*Nymphaea candida* L.) was flowering. *Potamogeton crispus* L. grew in the water. *Unio pictorum* (Linnaeus, 1758) was present. A lot of some fish, two cautious *Emys orbicularis* (Linnaeus, 1758) turtles were encountered. Odonata species registered: 19.

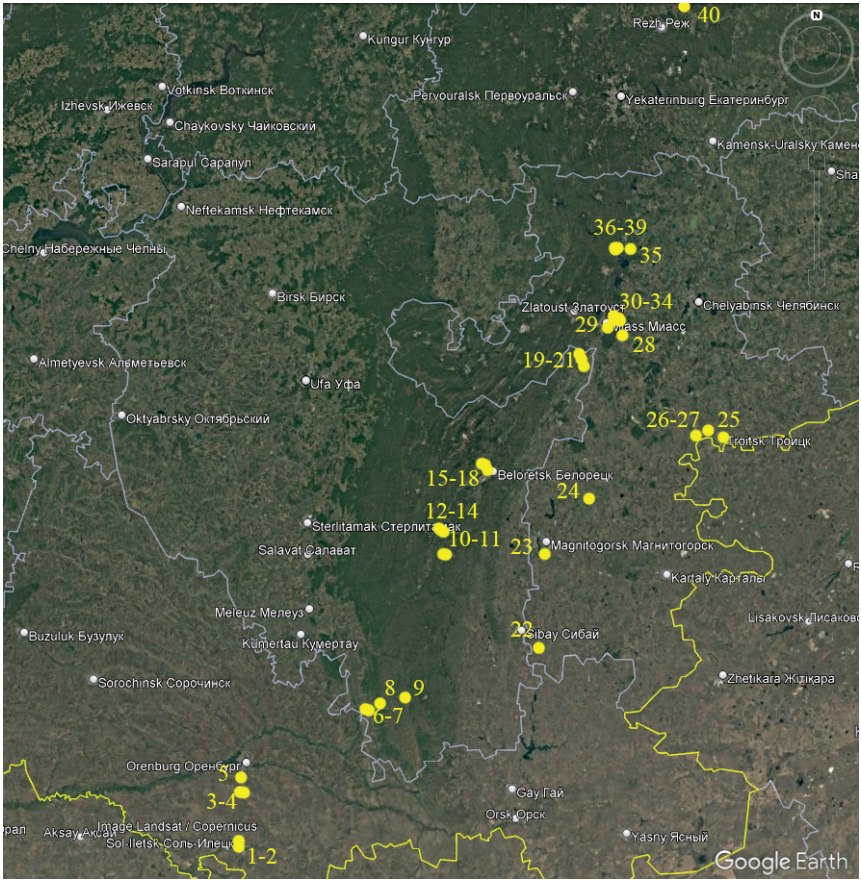

Fig. 1. Disposition of localities examined in Ural on July 3-14, 2021.

Orenburg District

Loc. 3 - Donguz: the Donguz River dammed reach right bank next to Eksperimental'nyy Town, 51.529-51.533 N, 55.043-55.057 E, 116-121 m a.s.l., 3.07.2021. A very broad (up to 600 m wide) and slow, lake-like reach, with the bottom formed by red sand, surrounded by large reed thickets. The left bank was somewhat elevated, with less reed, some willow bushes and a small bluff. There were some *Lythrum salicaria*, *Butomus umbellatus* at banks and *Salvinia natans* L. on the surface. Some *Lymnaea stagnalis* (Linnaeus, 1758) snails were present. Odonata species registered: 12.

Loc. 4 - Experimental'nyy: the pond (Fig. 4) 6.5 km N of Eksperimental'nyy Town, 51.588-51.589 N, 55.025-55.029 E, 149-150 m a.s.l., 4.07.2021. The pond (180×65 m) was formed by a dam on a small brook, beyond which its valley was completely covered by reed. The banks were partly open with sparse trees, partly overgrown with sedge, *Scirpus* sp. and *Juncus*

Fig. 2. The Ilek River (Loc. 1) ca 2 km ESE of Tamar-Utkul' village, Sol'-Iletsk Municipality, Orenburg Province.

Fig. 3. The El'shanka Rivulet (Loc. 2) in Sol'-Iletsk Town upstream of the bridge, Orenburg Province.

Fig. 4. The pond 6.5 km N of Experimental'nyy Town (Loc. 4), Sol'-Iletsk Town municipality, Orenburg Province.

Fig. 5. The lowermost pond at Chistyy village (Loc. 5), Sol'-Iletsk Town municipality, Orenburg Province.

compressus Jacq.; the water was filled with filamentous algae. There were extremely numerous young, just having passed metamorphosis, *Bufotes viridis* (Linnaeus, 1758) toads at the water edge. A huge herd of domestic ducks was present. Odonata species registered: 22.

Loc. 5 - Chistyy: big ponds at Chistyy village, 51.634-51.638 N, 55.039-55.044 E, 118-122 m a.s.l., 4.07.2021. A chain of three reservoirs (the largest 360×330 m) separated by high clay dams, on some of which large willows (*Salix alba* L.) grew; the banks with bushes of smaller willows. The shallow waters with sparse emerging *Typha angustifolia*L. and dense floating *Potamogeton gramineus* L. and *P. natans* (Fig. 5). Odonata species registered: 23.

Bashkortostan Republic

Zinachurinsk District (the Zilair Plateau western part, formally in Europe)

Loc. 6 - Verkhniy Sarabil': a small (220×40 m) roadside oxbow lake (Fig. 6) by a hill foot 0.7 km E of Verkhniy Sarabil' village, 52.127-52.128 N, 56.724-56.727 E, 183-185 m a.s.l., 5.07.2021. Up to man height deep, warm, with a silty (ca 10 cm thick) bottom entirely clad with *Elodea canadensis* Michx.; *Sparganium emersum* Rehmann emerged from the banks, which were rimmed by sedge (*Carex vesicaria* L.), with some *Lythrum salicaria*, *Lysimachia vulgaris* and *Stachys palustris* L., and then were overgrown with *Rubus caesius* L., with sparse tall linden and alder trees. Odonata species registered: 22.

Loc. 7 - Bol'shoy Suren': the Bol'shoy Suren' River valley (Fig. 7) 0.7 km E of Verkhniy Sarabil' village, 52.125-52.127 N, 56.723-56.728 E, 178-182 m a.s.l., 5.07.2021. A quite broad (15-30 m wide) but shallow river with partly pebble and partly silty bottom, with broad strips of emerging *Petasites radiatus* (J.F.Gmel.) J.Toman or, at some places, of *Equisetum fluviatile* L. or *Eleocharis palustris* (L.) Roem. et Schult. along banks. *Elodea canadensis* and *Potamogeton perfoliatus* were noticed in the water, *Sparganium erectum* and *Alisma plantago-aquatica* L. among emerging plants, and *Lythrum salicaria*, *Lysimachia vulgaris* and *Stachys palustris* at banks. Flat areas were occupied by dense thickets of *Petasites spurius* Rchb., fil. Odonata species registered: 6.

Loc. 8 - Yamashlinskoe: the Yamashlinskoe Reservoir (1000×350 m), 52.147-52.153 N, 56.858-56.869 E, 203-212 m a.s.l., 5.07.2021. The right bank was open, the left bank was mostly high and covered with birch forest (with some alder, ash and oak) (Fig. 8), partly gentle and bushy. The water edge was bordered with *Carex*/Poaceae grass, with sparse tall *Angelica archangelica* L. plants, *Eleocharis palustris* and some *Sagittaria sagittifolia* L. emerged from the water in most shallow areas. The bottom was again clad with *Elodea canadensis*. Odonata species registered: 24.

Zilair District (the Zilair Plateau central part, formally in Europe)

Loc. 9 - Bol'shoy Shar: the Bol'shoy Shar River valley at its crossing the road Sosnovka-Zilair, 52.226-52.228 N, 57.346-57.350 E, 461-469 m a.s.l., 5.07.2021. In spite of the 'big' name, this was a tiny, slightly dammed brook, flowing upon stones and hidden among tall grass and willow bushes (Fig. 9). The dammed part was very broad and shallow, clad with very dense emerging *Equisetum fluviatile* but with an inaccessible open central area.

Fig. 6. The oxbow lake 0.7 km E of Verkhniy Sarabil' village (Loc. 6), Zinachurinsk District, Bashkortostan Republic.

Fig. 7. The Bol'shoy Suren' River 0.7 km E of Verkhniy Sarabil' village (Loc. 7), Zinachurinsk District, Bashkortostan Republic.

Fig. 8. The Yamashlinskoe Reservoir (Loc. 8) left forested bank, Zinachurinsk District, Bashkortostan Republic.

There were large spots of *Lemna turionifera*; *Veronica anagalis-aquatica* L. was noted. The surrounding hills were clad with birch/pine forest alternating with stony steppe. Odonata species registered: 16.

Burzyan District (the Krakatau Range part, formally in Europe)

Loc. 10 - Sargaya: the Bashkirskiy State Nature Reserve, the Sargaya village S-SE environs, the Uzyan River valley, 53.339-53.345 N, 57.748-57.797 E, 484-497, 12.07.2021. A big and diverse place. Near Sargaya village, the medium-sized Uzyan River (Fig. 10) (15-30 m wide) had a hilly left bank, clad with pine forest, and a gentle right bank occupied by a broad flowery natural meadow with sparse large birches and pines. It was deep and slow, especially along the woody left bank, in some places the current being not noticeable. Ca 1 km upstream of the village, the river divided in two arms, one shallow and fast, hidden in bushes, the other broad and open, of variable speed, with rocks at the right bank. Downstream from the village, the river was open and rather fast. There were broad and dense patches of emerging *Petasites radiatus* along the banks. The village centre had a small pond, with grassy, partly muddy banks; upstream of the village, there was a deep right oxbow lake, partly hidden in bushes, with *Utricularia vulgaris*, *Myriophyllum* sp. and *Potamogeton natans* in the water. Odonata species registered: 11.

Fig. 9. The Bol'shoy Shar River (Loc. 9), Zilair District, Bashkortostan Republic.

Loc. 11 - Bol'shoy Apshak: the Bol'shoy Apshak Rivulet valley, 53.369 N, 57.655 E, 470 m a.s.l., 12.07.2021. A cold fast brook (3-6 m wide) with a stony bottom and sedge banks, partly with tussocks and tall *Angelica archangelica*, flowing through pine forest. Odonata species registered: 1.

Beloretsk District (the elevated part of South Ural, formally in Europe)

Loc. 12 - Kaginskoe swamp: 1.5 km S Kaga village, the Kaginskoe Reservoir swampy upstream end (Fig. 11), 53.506-53.509 N, 57.683-57.685 E, 402-409 m a.s.l., 12.07.2021. A long shallow swamp with a very broad area of dense emerging *Equisetum fluviatile*, punctuated by sparse reed, surrounded by a strip of *Scirpus sylvaticus* L., then willow and bird cherry thickets and then a bushy meadow with intensively flowering *Filipendula ulmaria* (L.) Maxim. Odonata species registered: 10.

Loc. 13 - Sazhelka: Kaga village, the Kaginskoe Reservoir (1.9×0.2 km) E bank (Fig. 12) and the Sazhelka Brook mouth, 53.516-53.520 N, 57.693-57.698 E, 410-416 m a.s.l., 12.07.2021. A large reservoir with almost barren E bank, with a narrow sedge strip, under a stony steppen slope; the brook flowed among tall herbs and grass. *Elodea canadensis, Persicaria amphibia* (L.) Gray, *Lemna* cf. *minor* were registered in the water *Alisma gra-*

mineum Lej. was emerging from it, *Epilobium palustre* L. was present in sedge. Odonata species registered: 16.

Loc. 14 - Agidel': the Belaya (Agidel') River left bank 3 km NE Kaga village at the bridge (Fig. 14) and Agidel' tourist base, 53.542-53.545 N, 57.710-57.714 E, 395 m a.s.l., 10-11.07.2021. A large (60-70 m wide) clear river with willow thickets at its banks, then sparse pine forest at the higher part of its left bank upstream of the bridge and a large meadow downstream of it. Emergent plants were not abundant and were represented by *Petasites radiatus*, *Equisetum fluviatile*, *Myriophyllum spicatum* L. Odonata species registered: 3.

Loc. 15 - Beloretsk: the Beloretsk Town W margin, the Nura River (Fig. 14), 53.968-53.970 N, 58.341-58.342 E, 495-497 m a.s.l., 11.07.2021. The river, there 30 m wide, had brown water, laminar flow and the banks with scarce emerging *Petasites radiatus* and *Veronica anagallis-aqua-*

Fig. 10. The Uzyan River by Sargaya village (Loc. 10), Bashkirskiy State Nature Reserve, Burzyan District, Bashkortostan Republic.

Fig. 11. The Kaginskoe Reservoir swampy upstream end (Loc. 12) 1.5 km S of Kaga village, Beloretsk District, Bashkortostan Republic.

Fig. 12. The Kaginskoe Reservoir E bank at the Sazhelka Brook mouth (Loc. 13), Beloretsk District, Bashkortostan Republic.

Fig. 13. The Belaya (Agidel') River left bank 3 km NE of Kaga village (Loc. 14), Beloretsk District, Bashkortostan Republic.

Fig. 14. The Nura River by the Beloretsk Town W margin (Loc. 15), Beloretsk District, Bashkortostan Republic.

ticus, floating *Potamogeton alpinus* Balb. and submerged *P. lucens* L.. Odonata species registered: 6.

Loc. 16 - Otnurok: Otnurok village, the Nura River (Fig. 15), 54.045-54.046 N, 58.330-58.331 E, 529 m a.s.l., 11.07.2021. There, upstream of the previous place, the river was 10-15 m wide and its banks had long patches of shingle, with more *P. radiatus*. There was a very shallow place with emerging *Alisma plantago-aquatica* and a grassy bank. The valley was clad with pine forest. Odonata species registered: 7.

Loc. 17 - Nura1: 11-12 km NNW Beloretsk Town, the Nura River (Fig. 16), 54.053-54.055 N, 58.302-58.312 E, 543-559 m a.s.l., 11.07.2021. The river at that place was 14-18 m wide, fast but rather warm, and flowed among slippery boulders, with broad thickets of emerging *P. radiatus* along banks. The forest around was formed by spruce, pine, larch and some fir. Odonata species registered: 4.

Loc. 18 - Nura2: the Nura River valley, 13 km NNW Beloretsk Town, 54.051 N, 58.269 E, 603-608 m a.s.l., 11.07.2021. Just 2.7 km W from above. The exact place where the alleged female of *S. exuberata* was collected (pers. comm. by A.M. Medvedev), the conditions like above, but the left river bank had a high slope. Examined for half an hour after a short shower. Only one *Onychogomphus forcipatus* (Linnaeus, 1758) was seen. Odonata species registered: 1.

Uchaly District (the Uraltau Range eastern foothills, formally in Asia)

Loc. 19 - Muldakaevo: the big (500×200 m) pond on the Miass River in Muldakaevo village, 54.758-54.763 N, 59.825-59.830 E, 390 m a.s.l., 10.07.2021. Odonata species registered: 11.

Loc. 20 - Syundyukovo: the pond 4.3 km WSW of Syundyukovo village (Fig. 17), 54.793-54.796 N, 59.804-59.909 E, 414-416 m a.s.l., 10.07.2021. A natural lake 270×120 m, entered by a tiny brook flowing from a vast reed swamp southerly of it, and a sedge bog with sparse birches at the E bank; also, a smaller (120×70 m) lake behind the road northerly of the main one. The banks with sedge and *Schoenoplectus lacustris*; a lot of *Utricularia vulgaris* L. and *U.* ×*neglecta* Lehm., and scarce *Potamogeton natans*, *P. lucens* and *Hydrocharis morsus-ranae* L. in water. Odonata species registered: 26.

Loc. 21 - Muldashevo: 2 km SW Muldashevo village, the Nizhniy Iremel' River upper reaches and inundated old quarries, 54.819-54.824 N, 59.771-59.781 E, 403-408 m a.s.l., 9-10.07.2021. A big and diverse place. The small river had shingle bottom but hid in bushes (mostly alder), with the only open place at the car ford. A number of inundated former sand (?) quarries nearby, of various size (the largest ca 100×80 m, Fig. 18) and depth, some with high banks, one with a gentle barren sand bank. A big meadow nearby. Various aquatic (*Stratiotes aloides* L.) and semiaquatic (*Eleocharis palustris*, *Schoenoplectus lacustris*, *Lythrum salicaria*, *Lysimachia vulgaris*, *Rumex palustris* Sm.) plants in diverse habitats. Odonata species registered: 37, the largest of all.

Chelyabinsk Province (the studied localities formally in Asia)

Kizil'skoe District (on the Transuralian Plateau)

Fig. 15. The Nura River in Otnurok village (Loc. 16), Beloretsk District, Bashkortostan Republic.

Fig. 16. The Nura River 11 km NNW of Beloretsk Town (Loc. 17), Beloretsk District, Bashkortostan Republic.

Loc. 22 - Gryaznushinskiy: the Ural River (Fig. 19) left bank floodplain within 1 km upstream of Gryaznushinskiy village, 52.553-52.559 N, 58.970-58.981 E, 278-283 m a.s.l., 6.07.2021. The river (65-140 m wide) flowed fast over a shingle bottom, with rapids at rocks and also slower reaches. Poplar (*Populus nigra*)/willow (*Salix alba*) riparian forest strips along the banks. Of aquatic/semiaquatic plants, *Stuckenia pectinata* and *Schoenoplectus lacustris* were recorded. Odonata species registered: 10.

Fig. 17. The pond 4.3 km WSW of Syundyukovo village (Loc. 20), Uchaly District, Bashkortostan Republic.

Agapovka District (on the Transuralian Plateau)

Loc. 23 - Narovchatka: 1.8-2.2 km SE Narovchakta village, inundated old quarries (Fig. 20), 53.268-53.273 N, 59.109-59.115 E, 331-333 m a.s.l., 6.07.2021. A number of quarries of very intricate shape, the largest one sized 1.5×0.6 km. The banks were mostly barren and heavily trampled by cattle, at some places with narrow rush strips. There were *Stuckenia pectinata* and *Ulva interstinalis* L. in the water, scarce *Alisma lanceolatum* With. emerged from it. There was also a small and very shallow natural pool filled with *Typha latifolia*. Odonata species registered: 11.

Nagaybak District (on the Transuralian Plateau)

Loc. 24 - Ostrolenskiy: small oxbow lakes (Fig. 21) at the Gumbeyka River left bank at Ostrolenskiy Settlement SE margin, 53.676-53.679 N, 59.731-59.735 E, 361-363 m a.s.l., 6.07.2021. Two small (75×35-40 m) lakes with the water surface half covered with water soldier (*Stratiotes aloides*) thickets, also with *Alisma plantago-aquatica* and *Hydrocharis morsus-ranae*, rimmed with a strip of cattail (*Typha angustifolia*) and surrounded by a damp tussock meadow trampled by cattle. Also, there were two small pools in a broad strip of sedge surrounded by bush lines, with black water filled with *Lemna trisulca* L., with floating *H. morsus-ranae*, *Eleocharis palustris*, *Cicuta virosa* L. and *Oenanthe aquatica* L. growing at the banks. A *Rana arvalis* Nisson, 1842 frog was seen. Odonata species registered: 16.

Fig. 18. One of the inundated quarries 2 km SW of Muldashevo village (Loc. 21), Uchaly District, Bashkortostan Republic.

Fig. 19. The Ural River 1 km upstream of Gryaznushinskiy village (Loc. 22), Kizil'skoe District, Chelyabinsk Province. This bank is Asia, that bank is Europe.

Troitsk District

Loc. 25 - Troitsk: Troitsk Town, the left bank of the water reservoir (with the maximum width of 430 m) on the Uy River and the canal along it, 54.046-54.055 N, 61.614-61.618 E, 158-159 m a.s.l., 7.07.2021. The canal, 12 m wide, was once made as an outlet from a big power station, which no longer worked when we visited it, so the water in the canal was cold but the current powerful. The canal was neighboured by a willow/poplar forest, its banks hardly accessible, with some *Typha angustifolia*, the reservoir bank with a small pine forest. Odonata species registered: 17.

Fig. 20. An inundated quarry ca 2 km SE Narovchatka village (Loc. 23), Agapovka District, Chelyabinsk Province.

Loc. 26 - Uy: the Uy River (Fig. 22) left bank between Khersonskiy and Chkalova villages, 54.072-54.076 N, 61.244-61.247 E, 175-181 m a.s.l., 7.07.2021. The river flowed in rather a deep open valley, with cliffs at the left bank and a birch grove at the right bank, with fast (ca 20 m wide) and very slow, broadened (up to 50 m wide) reaches. *Stuckenia pectinata* and *Ranunculus (Batrachium) trichophyllus* Chaix ex Vill. were registered of aquatic plants and *Alisma gramineum, Sium latifolium* L., *Butomus umbellatus* and *Lythrum salicaria* among semiaquatic plants. A lot of *Pelophylax ridibunduns* (Pallas, 1771) frogs. Odonata species registered: 12.

Loc. 27 - Novyy Mir: a steppe lake between Nizhnyaya Sanarka and Novyy Mir villages, 54.127-54.135 N, 61.282-61.295 E, 220-223 m a.s.l., 6-7.07.2021. The lake (ca 900 m in diameter) was situated in a very flat meadowy to feather grass steppe plain, evenly rimmed with very broad and thick reed thickets and, after some meadowy gap, with a complete ring of willow (*Salix cinerea* L.) bushes, interspersed with some aspen saplings. Of aquatic plants, *Potamogeton lucens, P. gramineus*, *Persicaria amphibia* (L.) Gray, *Alisma plantago-aquatica* were registered. This would be a typical steppe lake of the West Siberian Plain, hence a typical habitat of *Aeshna serrata* Hagen, 1856. Odonata species registered: 19.

Chebarkul' Municipality (Il'menskiy Range E foothills)

Loc. 28 - Chebarkul': Chebarkul' Town, the Lake Chebarkul' (5.5×4.2 km) E bank, 54.957-54.960 N, 60.342-60.346 E, 314-317 m a.s.l., 9.07.2021. The bottom was firm, sandy, with some branchy macrophyte, but the water edge was rimmed by a thick strip of marimo (Fig. 23), curious green spheres of the *Cladophora aegagropila* (L.) Rabenh. alga, drying and rotting out of water to form sucking mud. Interrupted reed thickets and some *Schoenoplectus lacustris* emerged from the shallow water, which was full of some water moss. Odonata species registered: 14.

Miass Municipality (Il'menskiy Range E foothills)

Loc. 29 - Il'menskoe: the Miass City S margin, the Lake Il'menskoe (3.5×1.6 km) NE bank, 55.013-55.016 N, 60.151-60.158 E, 330-337 m a.s.l., 8.07.2021. A deep lake with a firm bottom and clear and warm water. Odonata species registered: 5.

Loc. 30 - Bol'shoe Miassovo: Il'menskiy State Nature Reserve, the Lake Bol'shoe Miassovo (7.8×2.2 km) N bank (Fig. 24), 55.173-55.176 N, 60.267-60.292 E, 304-307 m a.s.l., 8.07.2021. The water warm, moderately deep at the banks, the bottom silty but the banks detritous and then formed by flat shingle and boulders, then, after a grassy gap, bordered with dense alder (*Alnus glutinosa* (L.) Gaertn.) thickets, further apart there were large glades with sparse pine and birch trees and then vast pine/birch forest. There were *Chara* sp., *Potamogeton lucens*, *Myriophyllum* sp., *Ranunculus (Bartachium)* sp. in the water, some patches of *Butomus umbellatus* at the banks. This lake was remarkable for the immense number of *Orthetrum cancellatum* (Linnaeus, 1758), which was the same abundant in 2005 (O.V. Popova, pers. comm.). For some reason, not a single Lestidae was found by us there. Odonata species registered: 18.

Loc. 31 - mire: Il'menskiy State Nature Reserve, a large (1.1×0.4 km) peat-moss mire between Lakes Bol'shoe Miassovo and Bol'shoy Tatkul', 55.180-55.188 N, 60.270-60.274 E,

Fig. 21. A small left oxbow lake of the Gumbeyka River at Ostrolenskiy Settlement (Loc. 24), Nagaybak District, Chelyabinsk Province.

Fig. 22. The Uy River between Khersonskiy and Chkalova villages (Loc. 26), Troitsk District, Chelyabinsk Province.

297-311 m a.s.l., 8.07.2021. A typical *Sphagnum* bog with open stand of low, depressive alder, pine and then birch, with *Chamaedaphne calyculata* (L.) Moenh., embracing a vast open watered sedge bog with *Menyanthes trifoliata* L. and *Scheuhzeria palustre* F. Müll. Odonata species registered: 2.

Fig. 23. Marimo, the sphaeric growth of the *Cladophora aegagropila* alga covering the Lake Chebarkul' E bank (Loc. 28), Chebarkul' Municipality, Chelyabinsk Province.

Fig. 24. The N bank of Lake Bol'shoe Miassovo (Loc. 30), Il'menskiy State Nature Reserve, Miass Municipality, Chelyabinsk Province.

Loc. 32 - Bol'shoy Tatkul': Il'menskiy State Nature Reserve, the Lake Bol'shoy Tatkul' (2.0×1.9 km) S bank (Fig. 25), 55.188-55.192 N, 60.276-60.291 E, 303-312 m a.s.l., 8.07.2021. The bank was clad with boggy alder forest with some linden, it was muddy with sedge tussocks, surrounded by hills covered with linden forest. Mats of some floating plants was seen on the water apart from the banks. An enormous abundance of *Enallagma cyathigerus rotundatum* Bartenef, 1929 was remarkable. Odonata species registered: 4.

Argayash District (Il'menskiy Range E foothills)

Loc. 33 - Karasi: Krutolapova village, the dammed Karasi River left bank, 55.149-55.150 N, 60.419-60.425 E, 292-293 m a.s.l., 9.07.2021. A slow and rather broad (35-50 m) but still small river, with dense sedge along the banks, with admixed *Lythrum salicaria*, *Lysimachia vulgaris* and solitary floating rosettes of the water soldier. There were also some patches of *Typha angustifolia*. Odonata species registered: 18.

Loc. 34 - Maloe Miassovo: the Urazbaeva village E environs, at the Inyshko reserve stationary, the Lake Maloe Miassovo (6.2×3.4 km) N bank, 55.183 N, 60.356 E, 292 m a.s.l., 9.07.2021. Superficially similar to Loc. 31, but the banks were formed by sucking mud produced by rotting *Cladophora aegagropila* algae. Nearby in bush thickets, there was a small swamplet, temporarily without water, with *Typha angustifolia* and *Caltha palustris* L. Odonata species registered: 3.

Kyshtym Municipality (E foothills of the South and Middle Ural junction)

Loc. 35 - Bol'shaya Akulya: the Lake Bol'shaya Akulya (3.4×2.7 km) N bank (Fig. 26), 55.642-55.643 N, 60.578-60.585 E, 251-254 m a.s.l., 13.07.2021. The bottom was firm and covered with a carpet of *Charophyta* algae (more *Chara tomentosa* L., less *Nitellopsis obtusa* (N.A. Desvaux) J. Groves), with interrupted thickets of reed and *Typha laxmannii* Lepech. at banks, which were surrounded by a broad zone of low reed over dry *Sphagnum* bog, then bordered by a low birch (*Betula pubescens* Ehrh.)/alder (*Alnus glutinosa*) forest. The following semiaquatic plants were also registered: *Schoenoplectus lacustris*, *Juncus articulatus*, *Carex pseudocyperus* L., *Alisma plantago-aquatica*, *Eleocharis palustris*, *E. acicularis* (L.) Roem. & Schult., *Thelypteris palustris* Schott, *Lythrum salicaria* L., *Rumex maritimus* L. Odonata species registered: 15.

Loc. 36 - Kyshtym: Slyudorudnik Settlement, the pond formed by the dammed Kyshtym River (Fig. 27), 55.665-55.667 N, 60.367-60.373 E, 300-307 m a.s.l., 13.07.2021. Actually a big (4×1.3 km) water reservoir, examined in its narrow (100-120 m wide) N part by the bridge, where a tiny brook entered it. The hilly banks were covered with pine forest. The right bank was swampy, with a very broad area occupied by *Equisetum fluviatile*. The following aquatic and semiaquatic plants were registered: *Potamogeton perfoliatus*, *P. natans*, *Sparganium emersum*, *Alisma plantago-aquatica*, *Eleocharis palustris*, *Persicaria hydropiper* (L.) Delarbre, *P. lapathifolia* (L.) Delarbre, *Persicaria minor* (Huds.) Opiz, *Stellaria aquatica* (L.) Scop., *Bidens radiata* Thuill. Odonata species registered: 12.

Loc. 37 - Novokyshtymskoe: the high right (S) bank of the large (900×700 m) Novokyshtymskoe Water Reserve by Slyudorudnik Settlement, 55.666 N, 60.354 E, 334-336 m a.s.l., 13.07.2021. Odonata species registered: 5.

Fig. 25. The S bank of Lake Bol'shoy Tatkul' (Loc. 32), Il'menskiy State Nature Reserve, Miass Municipality, Chelyabinsk Province.

Loc. 38 - Dolgoe: 0.8-1.8 km SW Slyudorudnik Settlement, Dolgoe Mire (Fig. 28), 55.659-55.666 N, 60.331-60.345 E, 326-337 m a.s.l., 13.07.2021. A huge (2.5×1 km) mire adjacent to the Novokyshtymskoe Water Reserve, at the uncertain border with which it formed floating islands. even with trees. The most part of the bog area was even, soft (hanging) and lacking open water, with *Ledum palustre* L., *Betula nana* L., *Chamaedaphne calyculata* and *Salix myrtilloides* L. In the lower part, pools of dirty open water appeared, with reed, *Comarum palustre* L. and *Thelypteris palustris*. There a bear was met by the first author. Odonata species registered: 6.

Loc. 39 - Slyudorudnik road: 1.8 km SW Slyudorudnik Settlement, a road in pine forest by Dolgoe Bog, 55.659 N, 60.336 E, 355 m a.s.l., 13.07.2021. Odonata species registered: 2.

Sverdlovsk Province, Rezh District (Transuralian elevated land, formally in Asia)

Loc. 40 - Pershino: Rezh District, meadows and pine forest margins at the Rezh River (Fig. 29) right bank next to Pershino village, 57.422-57.428 N, 61.473-61.486 E, 150-170 m a.s.l., 14.07.2021. The river (20-70 m wide) was fast and rapidous, with brown water, with a long rocky bluff at the left bank. At the right bank there were few small oxbow pools. Odonata species registered: 18.

Fig. 26. The N bank of Lake Bol'shaya Akulya (Loc. 35), Kyshtym Municipality, Chelyabinsk Province.

Fig. 27. The big pond on the Kyshtym River in Slyudoruydnik Settlement (Loc. 36), Kyshtym Municipality, Chelyabinsk Province.

Fig. 28. The Dolgoe Mire adjacent to the Novosyshtymskoe Water Reserve (Loc. 38), Kyshtym Municipality, Chelyabinsk Province.

Annotated list of Odonata registered

Lestidae

1. *Lestes dryas* Kirby, 1890

Loc. 2: coll.: 1 ♀ (98271363). **Loc. 5**: coll.: 1 ♂ (98285809, 105448335); many seen. **Loc. 9**: photo in hand: 1 ♂ (105563284). **Loc. 16**: photo: 1 ♀ (98961127). **Loc. 21**: photo in hand: 1 ♂ (98899039). **Loc. 22**: photo in hand: 1 ♀ (98380887, 105787779). 23: photo: 1 tandem (98473454); in hand: 1 ♂ (98473067, 105787836); numerous seen, including tandems. **Loc. 27**: photo: 1 ♂ (105788951); in hand: 1 ♂ (98475508), 3 ♀♀ (98586390, 105787896, 105788948); several more seen.

This species appeared rather local and infrequent.

2. *Lestes sponsa* (Hansemann, 1823)

Loc. 2: coll.: 2 ♂♂ (105372505); photo: 1 ♂ (98271386). **Loc. 4**: coll.: 1 ♂ (98282936). **Loc. 5**: photo: 2 in hand: ♂♂ (98285188, 98286617); many seen. **Loc. 6**: coll.: 1 ♀ (98354534); photo: 6 ♂♂ (98354290, 101203387, 101204313, 101204518, 101234885, 105563210), 2 ♀♀ (98354349, 105563209); in hand: 2 ♂♂ (98354262, 105563202), 1 ♀ (105563206); many seen. **Loc. 9**: photo 1 ♀ (98358054); in hand: 1 ♀ (98357910); many seen. **Loc. 12**: many seen. **Loc. 13**: photo in hand: 1 ♂ (95976045, 105916989). **Loc. 16**: photo: 1 ♂ (98961043), 1 ♀ (105916980). **Loc. 19**: photo in hand: 2 ♂♂ (98954160,

Fig. 29. The Rezh River at Pershino village (Loc. 40), Rezh District, Sverdlovsk Province.

105916096); many seen. **Loc. 20**: photo in hand: 2♂♂ (98902566, 105916091); many seen. **Loc. 21**: photo: 4♂♂ (98864326, 98898744, 102211544; 102364112); in hand: 2 ♂♂ (98789088, 105916062), 1 ♀ (105849107). **Loc. 22**: photo in hand: 1 ♀ (105787787, 98381267); few seen. **Loc. 23**: photo in hand: ♂ (98472832). 23: photo in hand: 1♂ (98473253, 105787846); numerous seen, including tandems. **Loc. 25**: photo in hand: 1 ♀ (105788930); quite a few seen. **Loc. 26**: photo: 1♀ (98587007); few seen. **Loc. 27**: photo: ♂ (105788935), 1 ♀ (105787890); in hand: 2♀♀ (105787899, 105788947); many seen. **Loc. 28**: photo in hand: 1♂ (105849049), no more seen. **Loc. 33**: photo in hand: 1 ♂ (105849033). **Loc. 35**: photo: 1 ♂ (98174495); few seen. **Loc. 36**: photo: 1 ♂ (98176947); in hand: 1 ♂ (105974381). **Loc. 37**: photo in hand: 1 ♂ (105974371), 1 ♀ (98176762). **Loc. 38**: photo in hand: 1♂ (105974396); few seen.

The second commonest damselfly in the region, found in 21 of 40 localities, sometimes abundant in sedge thickets, but not in mass quantities.

The collected female from Loc. 6 was very small, with the hindwing length 20.5 mm and abdomen length 24 mm.

3. *Lestes barbarus* (Fabricius, 1798)

Loc. 1: photo: 2♂♂ (98276161, 105372536). **Loc. 4**: photo: 5♂♂ (98282372, 98285721, 100936687, 100936688, 105448303), 1 tandem (98280889); in hand: 1♀ (105448297); many seen. **Loc. 5**: photo: 3♂♂ (98283441, 100981648, 105448322), 2♀♀ (98283634, 100981506), 4 tandems (100980557, 100985968, 98283723, 98284923); very many seen. **Loc. 6**: photo in hand: 1 ♀ (105563205). **Loc. 22**: photo: 2♂♂ (101409449, 98382049), 3♀♀ (98380191, 98380965, 105787788); few more seen. 23: photo in hand: 1♂ (98474787). **Loc. 25**: photo: 1♀ (98690925); in hand: 1♀ (105788910); few seen. **Loc. 27**: coll.: 1 ♀ (98476111); photo: 2♀♀ (101676793, 101735347).

Common but only in southern regions, with the northernmost finding at Loc. 27 at 54.13º N.

4. *Lestes virens vestalis* (Rambur, 1841)

Loc. 5: coll.: 3♂♂ (98285310, 98285463); photo: 2 ♂♂ (98283490, 105448320); many seen. **Loc. 21**: photo in hand: 1♂ (105849115). **Loc. 25**: photo in hand: 1♀ (105788917); few seen. **Loc. 27**: photo: 3♂♂ (98586425, 98586442, 101676293), 4♀♀ (101676942, 105787894, 105787895, 105788942); very many seen.

Found only in four localities, in Loc. 27 being very abundant.

5. *Sympecma paedisca* (Brauer, 1877)

Loc. 2: coll.: 1 immature ♂ (98274983). **Loc. 3** - Donguz: photo: 1 ♀ (105372488). **Loc. 4**: photo: 2 ♂♂ (100930611, 100931148), 2 ♀ (98281340, 105448308); in hand: 1 ♂ (105448300), 1♀ (98280798); enormous amount seen. **Loc. 5**: photo: 4♂♂ (98284165, 98285034, 98285102, 105448326), 1♀♀ (98283778, 98285883); in hand: 2♂♂ (98283678); very many seen. **Loc. 6**: photo: 1 ♀ (98354328), in hand: 1 ♀ (105563207); many seen, including just emerged ones. **Loc. 13**: photo: 1♀ (102604778). **Loc. 19**: photo in hand: 1♂ 105916098), 1 teneral ♂ (98954487); many emerging ind. seen. **Loc. 21**: photo in hand: 2 ♀♀ (98898984, 105849135); several seen. **Loc. 27**: photo: 1 ♂ (98475342); in hand: 1 ind. (105787900); few seen. **Loc. 33**: photo: 1 teneral♂ (102169817); in hand: 2♂♂ (98783771, 105849025). **Loc. 35**: photo: 1♂ (98175617); in hand: 2♀♀ (105974367);

few. seen. **Loc. 35**: coll.: 1 ♀; photo: 1 ♂ (98174650); in hand: 1 ♀ (105974368). **Loc. 36**: photo in hand: 1♂ (98178090), 1♀ (105974384); many seen.

Common, at Locs 4 and 5 in Orengurg Province very numerous. All specimens we have seen were young, emerged in the same season, but at Loc. 36, two old, overwintered individuals were also met with, thus indicating an overlap of annual generations.

Calopterygidae

6. *Calopteryx splendens* (Harris, 1780)

Loc. 1: coll.: 2 ♂♂ (98275180), 2 ♀♀; photo: 3 ♂♂ (98275422, 98275486), 1 ♀ (100698097); in hand: 1♀(105372520); many seen. **Loc. 2**: coll.: 1♂. **Loc. 4**: photo in hand: 1♂ (98283249); 1 more ♂♂ seen. **Loc. 6**: photo: 1 ♂ (98354432); 1 ♀ (105563201); few seen. **Loc. 7**: photo: 3♂♂ (101255598, 101256665, 101296976); in hand: 2♂♂ (98354920, 105563232); many♂♂,♀♀ seen. **Loc. 8** - Yamashlinskoe: several♂♂ seen. **Loc. 9**: photo in hand: 2 ♂♂ (98358168, 105563273), several ♂♂ seen. **Loc. 10**: photo in hand: 1 ♂ (105917010), 1 ♀ (95982790); few seen. **Loc. 12**: photo: 1 ♀ (95978192). **Loc. 13**: photo in hand: 1♂ (105916994), 1 ♀ (95977556); several♂♂, ♀♀ seen. **Loc. 14**: photo in hand: 2♂♂ (95975197, 105916983); quite a few seen. **Loc. 15**: photo: 1 copula (98954609); photo in hand: 1♂ (105916969); many seen. **Loc. 20**: coll.: 1♂; photo in hand: 1♀ (98953772); few seen. **Loc. 21**: photo: 2♂♂ (102363885, 102386580); in hand: 2 ♂♂ (98899083, 105849101); many seen, but less than the next species. **Loc. 22**: photo in hand: 1 ♂ (98381125, 105787786); quite a few seen. **Loc. 26**: frequent. **Loc. 28**: few ♂♂ seem. **Loc. 29**: photo in hand: 1♂ (98693942); 1♀ (105848979); one more♂ seen. **Loc. 40**: photo: 1♂ (98268127); few seen (20 times less than the next species).

Common almost at every rivulet. No androchromatic females were observed.

7. *Calopteryx virgo* (Linnaeus, 1758)

Loc. 4: photo in hand: 1 ♀ (98281595). **Loc. 7**: coll.: 3 ♂♂ (98354908, 98354956), 105563223; photo: 4 ♂♂ (98355224, 101258508, 101297059, 101300551), 2 ♀♀ (98355192, 98355235); many ♂♂ seen. **Loc. 8**: several ♂♂, 2 ♀♀ seen. **Loc. 9**: photo in hand: 2 ♂♂ (98357761, 105563269), several♂♂ seen. **Loc. 10**: photo: 3♀♀ (102666658, 102714790, 95983185); in hand: 2♂♂ (95979829, 105917008); many seen. **Loc. 15**: photo: 1♂ (98954666); many seen. **Loc. 16**: photo: 2♂♂ (98960887, 105916972), 1♀ (98960896); in hand: 1 ♀ (98959562). **Loc. 17**: photo in hand: 1 ♀ (105916976); many seen. **Loc. 20**: coll.: 3♂♂; photo in hand: 1♀ (98902409); few seen. **Loc. 21**: photo: 4♂♂ (98899139, 102364465, 102386115, 102386118, 105916063), 2♀♀ (98789028, 102331388); in hand: 2♂♂ (105849090, 105916065); many seen. **Loc. 40**: photo: 1♂ (98268960); in hand: 1♂ (105974402); many seen.

In all cases but one, of the Loc. 17 - Nura, occurred together with the previous species but, overall, in almost twice fewer, 10 of 19, localities.

Coenagrionidae

8. *Coenagrion armatum* (Charpentier, 1840)

Loc. 21: photo: 1♂ (98864502).

Just one individual met with during the whole trip, most probably because of the early flight period of this generally common species. This finding took place at a shallow sandy bank of a former quarry, in emerging spikerush, among numerous individuals of the next species, *Coenagrion puella* and and *Nehalennia speciosa* (Charpentier, 1840).

8. *Coenagrion ecornutum (*Selys in Selys et McLachlan, 1872) (Fig. 30)

Loc. 12: photo: 2 ♂♂ (95979054, 95979288), 4 ♀♀ (105917004, 95978310, 95978464, 95979196). **Loc. 20**: photo in hand: 1 ♂ (105916080); several seen. **Loc. 21**: coll.: 1 ♂ (98864293), 1 ♀; photo: 3 ♂♂ (98864365, 98864522, 102297052), 3 ♀♀ (98864450, 98864678, 102297050); in hand: 1 ♂ (105849141); many seen. **Loc. 24**: coll.: 4 ♂♂ (98473031, 98473145, 105787850); photo: 1 ♂ (105787865), 1 copula (98474694); very many seen. **Loc. 27**: photo: 5 ♂♂ (98475522, 98476250, 101632514, 105787891, 105788938), 7 ♀♀ (98475563, 98476042, 98476079, 98476165, 98476230, 101676357, 105788943); in hand: ♂ (105787887); very many ♂♂, several ♀♀ seen.

This species meets its western border in Ural (Haritonov & Eremina 2010; Onishko & Kosterin 2021), and was met by us in five localities, with Loc. 12 as the southernmost and Loc. 21 as the northernmost, so that the latitude span of our records appeared fairly narrow, 53.5–54.8º. Haritonov & Eremina (2010) reported this species for 32 localities in South Ural, with a broader span of 52.6–55.8º N. It is noteworthy that we did find it in the localities in Orenburg Province southerly of 52º N, while Haritonov & Eremina (2010) concerned only one such locality (Belyaevka Settlement on the Ural River), also lacking this species.

In three localities, Loc 21, Loc. 24 and Loc. 27, these damselflies appeared very numerous. At Loc. 24, they were most abundant over the shallow water among water soldier, but also frequent in grass nearby; at Loc. 21 – again over the shallow water among spikerush; at Loc. 27, the males were very abundant, together with *L. virens*, in grass at quite a distance from water, while females occurred even on bushes. However, the actual water surface of that shallow steppe lake, overgrown with reed, was scarcely accessible and we cannot exclude the abundance of these damselflies also there over the water.

9. *Coenagrion johanssoni johanssoni* (Wallengren, 1894)

Loc. 20: coll.: 1 ♂ (98900458, 98900742, 105916079). **Loc. 38**: coll. 1 ♂ (98267783), 1 ♀. **Loc. 36**: photo: 1 ♀ (98176924); in hand: 1 ♂ (105974395).

This rather forest and even taigous species was expected to be abundant in *Sphagnum* bogs, but in such Dolgoe Bog of Loc. 28, just two individuals were met with, and none at Loc. 31 in the Il'menskiy Reserve. The three localities where we found it were in the latitude span of 53.6–54.7º N.

10. *Coenagrion hastulatum* (Charpentier, 1825)

Loc. 6: coll.: 1 ♂ (105563218). **Loc. 9**: photo in hand: 1 ♂ (98358087); many seen. **Loc. 12**: photo: 1 ♂ (95978574). **Loc. 13**: photo in hand: 2 ♂♂ (95977058, 95977661, 105916993). **Loc. 21**: coll.: 2 ♂♂ (98865552, 105849125). **Loc. 36**: coll.: 1 ♂ (105974377); photo: 1 ♂ (98178149); many seen. **Loc. 37**: photo in hand: 1 ♂ (105974370). **Loc. 38**: photo in hand: 2 ♂♂ (98176849, 98267898); many seen.

Fig. 30. *Coenagrion ecornutum*: a-b – males; c-d – females; a – at Loc 12 (95979054), b,d – at Loc. 27 (105787891, 101676357); c – at Loc. 21 (102297050).

This otherwise common species seemed rare, surely due to its early flight period mostly ceased by the time of our visit. Expectedly, it was not found in Orenburg Province.

11. *Coenagrion puella* (Linnaeus, 1758)

Loc. 2: coll.: 1 ♂ (105372491); several ♂♂ seen. **Loc. 4**: coll.: 1 ♂ (105448316); many seen. **Loc. 5**: photo in hand: 1 ♂ (98282988). **Loc. 6**: coll.: 3 ♂♂ (98354314, 101233168); photo: 2 ♂♂ (98354365, 105563212); in hand: 1 ♀ (105563213); few more seen. **Loc. 7**: photo in hand: 1 ♂ (98354946). **Loc. 8**: photo: 2 copulae (101342917, 101344647); in hand: 1 ♂ (105563251); numerous seen. **Loc. 9**: photo 1 ♂ (98358112); in hand: 1 ♂ (98357992, 105563270); many seen. **Loc. 10**: coll.: 1 ♂ (95982875, 105917011). **Loc. 12**: photo in hand: 1 ♂ (105917003). **Loc. 20**: photo: 1 tandem (102389656); in hand: 2 ♂♂ (98900827, 105916082); several seen. **Loc. 21**: coll.: 1 ♂ (98789231); photo: 1 ♂ (102334849), 1 ♀ (98898812); in hand: 1 ♂ (105849117); very many seen in spikerush. **Loc. 23**: photo: 1 copula (101512943); photo in hand: 1 ♂ (105787816). **Loc. 24**: coll.: 2 ♂♂ (101590663), 1 ♀. **Loc. 25**: in hand: 1 ♂ (105788928). **Loc. 26**: photo: 1 ♂ (98587184). **Loc. 33**: photo in hand: 1 ♂ (105849014); few ♂♂ seen. **Loc. 36**: photo in hand: 1 ♂ (105974393).

This common and nearly omnipresent and eurytopic species was generally not so abundant as it would be elsewhere in Europe, being very numerous only at Loc. 8 and Loc. 21, at the latter in spikerush together with *C. ecornutum* and *N. speciosa*.

12. *Coenagrion pulchellum* (Vander Linden, 1825)

Loc. 2: coll.: 2 ♂♂ (98271669, 105372496). **Loc. 4**: coll.: 1 ♀ (98282860). **Loc. 5**: photo in hand: 1 ♀ (98286393). **Loc. 6**: photo in hand: ♂ (98354737). **Loc. 8**: photo: 2 ♂♂ seen. **Loc. 9**: photo in hand: 1 ♂ (105563285); several ♂♂ seen. **Loc. 20**: photo in hand: 1 ♀ (98900900). **Loc. 21**: coll.: 1 ♂ (98789170); photo: 2 ♂♂ (98865606, 102334649); in hand: 1 ♂ (98864485), 1 ♀ (105849122); few (tenfold fewer than the previous species) seen. **Loc. 24**: coll.: 2 ♂♂ (98473090, 105787835); quite a few seen (much fewer than *C. ecornutum*). **Loc. 26**: photo: 1 ♂ (105788899). **Loc. 27**: coll.: 2 ♂♂; photo: 2 ♂♂ (98476194, 105788937); quite many seen. **Loc. 28**: coll.: 1 ♂; 1 more ♂♂ seen. **Loc. 33**: photo in hand: 1 ♂ (105849031). **Loc. 36**: photo: 1 ♂ (98177926); in hand: 1 ♂ (105974383); few seen.

Found in many localities throughout the region, but it was never abundant, except for Loc. 24.

13. ***Erythromma najas najas*** (Hansemann, 1823)

Loc. 1: photo in hand: 2 ♂♂ (98275220, 105372523); few seen (tenfold less abundant than the next species). **Loc. 2**: coll.: 2 ♂♂ (98271466); few more ♂♂ seen. **Loc. 4**: coll.: 1 ♂ (98281042); photo in hand: 1 ♂ (105448310); few more ♂♂ seen. **Loc. 5**: several seen. **Loc. 6**: photo: 2 ♂♂ (101208993, 101235182); in hand: ♂ (98354471), 1 ♀ (105563211); several seen. **Loc. 8**: photo: 2 ♂♂ (101344583, 101369120); in hand: 1 ♂ (101344583); numerous seen. **Loc. 9**: photo in hand: 1 ♂ (98358227, 105563283). **Loc. 13**: photo: 1 ♂ (102604699); in hand: 2 ♂♂ (95975751, 105916984); several seen. **Loc. 19**: photo in hand: 2 ♂♂ (98954220, 105916093); very many seen. **Loc. 20**: photo: 1 ♂ (102389543); in hand: 1 ♂ (105916087); several seen. **Loc. 21**: photo in hand: 2 ♂♂ (98864268, 105849095). 22: photo in hand: 1 immature ♂ (98471608); 1 ♀ (105787807); many seen. **Loc. 28**: photo: 2 ♂♂ (98786070, 98785673); in hand: 1 ♂ (105849040); few seen. **Loc. 29**: photo: 1 ♂ (105848944), 1 just hatched ♂ (98691796).

Loc. 30: coll.: 6 ♂♂; photo: 5 ♂♂ (98691859, 98691913, 98692019, 101935404, 102060523); in hand: 1 ♂ (105848944, 105848955), 1 ♀ (105848947); numerous. **Loc. 32**: photo: 1 tandem (105848999); many seen. **Loc. 32**: photo in hand: 1 ♀ (98783976); quite a few seen. **Loc. 36**: photo: 1 ♂ (98178028); 1 ♀ (98178173); in hand: 1 teneral ♀ (105974386); many seen. **Loc. 37**: photo in hand: 1 ♀ (98176819).

Nearly omnipresent, found in 19 localities, often numerous. In the south it was much less abundant than the next species: ten times fewer at Loc. 1. This species is well known to keep to the water surface perching on floating vegetation. Curiously, we observed it as very numerous also at Loc. 8, Loc. 20, and Loc. 36, where the reservoir and lakes almost lacked floating vegetation. They kept to the water edge, where sit on grass, occupying any floating object, including garbage, as if it were leaves, at Yamashlinskoe and pebble and stones protruding from water at Bol'shoe Miassovo.

The yellow antehumeral stripes were variably present in males. The above referenced photographs offer 32 males for analysis, plus seven were collected but not photographed, in sum 39 males. Most of them (29) had no antehumeral stripes but 10 had: one from Loc. 1, one from Loc. 29, and eight (of 10) from Loc. 30. They either could be not fully mature or some variation for this character could be fixed in some populations.

14. *Erythromma viridulum* (Charpentier, 1840) (Fig. 31)

Loc. 1: photo: 4 ♂♂ (98280303, 100858312, 100862200, 105372522), 4 tandems (98275329, 98280413, 105372524); in hand: 1 ♂ (105372518); many seen. **Loc. 2**: coll.: 1 ♂ (98271241); photo in hand: 2 ♂♂ (98271110 – teneral, 105372501); quite a number seen. **Loc. 4**: photo in hand: 2 ♀♀ (98282012, 105448302); many seen. **Loc. 5**: 1 broken tandem (98284675, 105448330; Fig. 31); many seen. **Loc. 25**: coll.: 3 ♂♂ (98601378, 105788919); photo: 1 ♂ (101855538), 1 ♀ (101858733), many seen.

Haritonov & Eremina (2010) reported this species for the only locality, a pond for natural clearance of sink water of Magnitogorsk (53.3º N), surely to some extent heated by that city. They concluded that this was an outlying locality not less than 600 km northerly of the species' main range. Later Popova & Haritonov (2012) reported this species for our Loc. 25 in Chelyabinsk Province, at 54.0º N, where the species was found in 2009-2010 at the outlet canal of the Troitsk Power Station, which that time still had warm water, not freezing in winter (E. Eremina, pers. comm.) We found the species abundant there, although the station had stopped working in 2020, that is just a year before our visit. It can be concluded that the quite thermophylic *E. viridulum*, once having colonised a heated habitat to the north of its natural habitat, survived its reversion to the natural state, at least for one year. The current status of that population, as well as of the power station, is unknown to us.

Anyway, hereby we for the first time report *E. viridulum* for natural habitats in South Ural, namely for five localities in Orenburg Province, the northernmost of which was at 51.6º N. Moreover, we found it to be very abundant at the Ilek River (51.1º N). Its omission before is easily explainable by the fact that Orenburg Province remained nearly unexplored in odonatological respect (Haritonov & Eremina 2010).

15. *Enallagma cyathigerum rotundatum* Bartenef, 1929 (Fig. 32)

Loc. 2: coll.: 1 ♂ (98270974); photo in hand: 1 ♂ (105372492). **Loc. 4**: photo: 2 ♂♂ (98281377, 100931000), 1 ♀ (98281465), 1 tandem (100930104), in hand: 2 ♂♂ (98281000; 105448299);

Fig. 31. A female of *Erythromma viridulum* with the male's abdomen still grasping its occuiput while the male itself has probably been eaten by some predator, at a pond of Loc. 5 - Chisttyy (98284675, 10544833).

many ♂♂ seen. **Loc. 5**: coll.: 5 ♂♂ (98284571, 98286721), 3 ♀♀ (98285992, 105448338). **Loc. 6**: coll.: 8 ♂♂ (98354455, 105563204); photo: 2 ♂♂ (105563200); many seen. **Loc. 7**: photo: 1 ♂ (101255714); in hand: 1 ♂ (10556321). **Loc. 8**: photo: 2 copulae (101306083, 105563250), 1 ♀ (105563240); numerous seen. **Loc. 9**: photo in hand: 1♂ (98358133, 105563279); ca dozen of ind. seen. **Loc. 13**: coll.: 8♂♂ (95975601, 105916985), 1 ♀; many seen. **Loc. 19**: photo in hand: 2♂♂ (98954076, 105916094). **Loc. 20**: photo in hand: 2 ♂♂ (98900276, 105916083); many seen. **Loc. 21**: coll.: 5 ♂♂ (98788858, 105849116), 2♀♀ (grey); photo: 2♂♂ (98898852, 102214649); in hand: 5♂♂ (105916069). **Loc. 23**: coll.: 3♂♂ (105787801), 3♀♀ (2 blue (98383078, 105787824), 1 grey); many seen. **Loc 23**: photo in hand: 1 ♂ (105787870); few seen. **Loc. 25**: photo: 2♂♂ (98599149, 101882882); in hand: 1♂ (105788904). **Loc. 26**: photo: 2♂♂ (98587028, 105788886); few seen. **Loc. 27**: photo: 2 ♂♂ (98475308, 105788939); in hand: 1 ♂ (98476129, 105787881), 2 ♀♀ (98586408, 105788936); few more seen. **Loc. 28**: photo: 4 ♂♂ (98784251, 98785509, 98785557), 2 copulae (98784501, 102181581); in hand: 1 ♂ (105849076); abundant. **Loc. 29**: photo in hand: 1 ♂ (105848939). **Loc. 30**: coll.: 15 ♂♂ (105848956), 6 ♀♀; photo: 5 ♂♂ (98691832, 98692818, 98693574, 102060720, 102063208), 3 tandems (98693384,

Fig. 32. Numerous males of *Enallagma cyathigerum rotundatum* and some of *Erythromma najas najas* at the S bank of the Lake Bolshoy Tatkul; (Loc. 32) (105785341).

101935587, 102060981), 2 copulae (101986521, 105848945); very numerous. **Loc. 31**: very numerous. **Loc. 32**: photo: 1♂ (98695306); numerous ind. (98695284, 102156997, 105785341); extraordinarily numerous (Fig. 32). **Loc. 33**: photo in hand: 1♂ (105849032); many seen. **Loc. 34**: few seen. **Loc. 35**: coll.: 1♀; photo: 1♂ (98174495); in hand: 1♂ (105974352). **Loc. 36**: photo: 1 ♀ (98177903); in hand: 1 ♂ (105974387); many seen.

The most common damselfly in the region, found in 25 of 40 localities.

The cercus structure of all collected male specimens invariably correspond to the taxon *E. cyathigerum rotundatum* (= *E. risi* Schmidt, 1961; = E. *cyathigerum risi*). For its current taxonomical treatment see Kosterin (2023). No morphology transitory to *E. cyathigerum cyathigerum* was observed.

16. *Ischnura aralensis* Haritonov, 1979 (Figs 33-35)

Loc. 28: coll.: 9♂♂ (98785615, 105849071), 5 gynochromatic ♀♀ (4 orange (105849050, 105849061, 105849080), 1 brown (98786238)); photo: 17♂♂ (86262281, 98784178, 98784223, 98784353, 98784379, 98784625, 98784768, 98784829, 98784889, 98784979, 98785649, 98786181, 98786359, 98786397, 98786493, 102183666, 102183668), 6 orange gynochromatic ♀♀ (98784415, 98784667, 98784736, 98786271, 98786303, 102181634), 2 androchromatic ♀♀ (98786038, 98786460); many seen. **Loc. 35**: coll.: 2 ♂♂ (98174517, 98175764), 3 androchromatic gynomorphic ♀♀ (98174547, 98175648, 98175710); photo: 16 ♂♂ (98174517, 98174609, 98174627, 98174675, 98174706,

98174726, 98175854, 102720789, 102721049, 102721050, 102721051, 102721052, 102721055, 102721056, 105974363, 105974365), 9 gynochromatic orange ♀♀ (98174452, 98174765, 98175413, 98175496, 98175544, 98175800, 98175825, 102720788, 105974357); 1 ?immature androchromatic gynomorphic, dark-violet ♀ (98176731); in hand: 2 androchromatic gynomorphic ♀♀(105974349, 105974361); 2 gynochromatic orange ♀♀ (105974353, 105974362); very abundant.

We found flourishing populations of this species in two large lakes, of Chebarkul' and Bol'shaya Akulya, similar in having a firm sandy bottom with some macrophytes (e.g. Charophyta or water moss) and shallow banks with fragmented reed thickets (not forming a continuous broad ring as e.g. in Loc. 27). These damselflies were quite numerous, perched on reed stems low above the water and flew very rapidly among them, being difficult to catch. Some occurred also in grass behind smaller reed thickets (but not behind long and thick thickets present in the latter lake; that means they penetrate into grass through gaps in reed). Solitary individuals of *I. elegans* occurred among them as well.

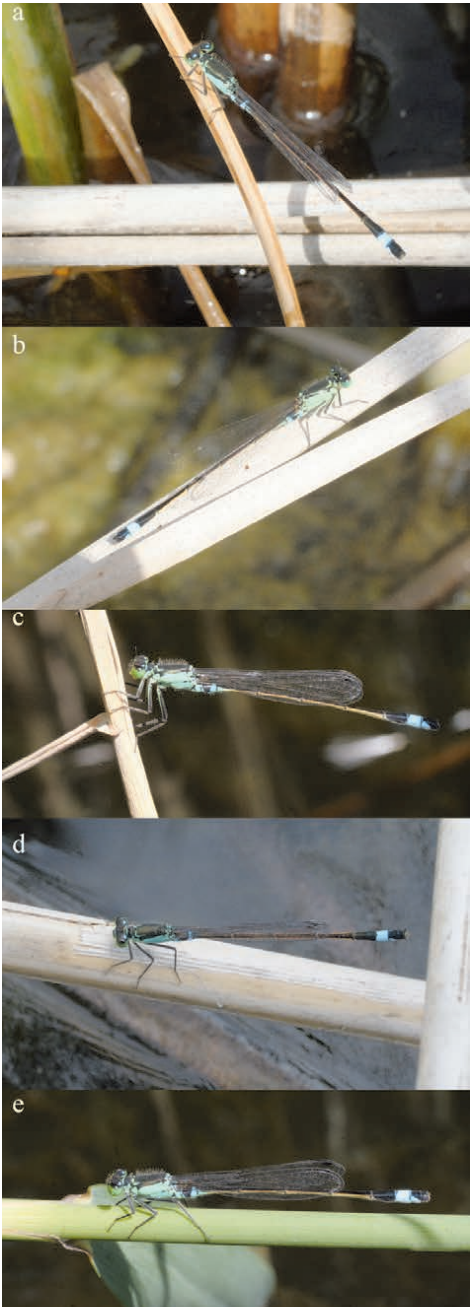

Fig. 33. Males of *Ischnura aralensis* in reed at Lakes Chebarkul (Loc. 28) (c, 102183666; e, 102183668) and Bol'sjaya Akulya (Loc. 35) (a, 102721055; b, 1027-21049; d, 102721050).

Fig. 34. Gynochromatic females of *Ischnura aralensis*, orange (a-c) and brown (d) at Lakes Chebarkul (Loc. 28) (c, 102181634; d, 98786238) and Bol'sjaya Akulya (Loc. 35) (a-b, 102720788).

The species is famous for having three female morphs: gynochromatic (orange or brownish), androchromatic gynomorphic (coloured more or less like males but with more expressed green antehumeral stripes) and androchromatic andromorphic (with leafy expansions of the mesostigmal plate like in males) (Haritonov 1988; Yanybaeva et al. 2006)

Fig. 35. Androchromatic (a-b) and a violet, perhaps immature androctromatic (c) females of of *Ischnura aralensis* at Lake Bol'sjaya Akulya (Loc. 35) (a, 105974349; b, 98174547; c, 98176731).

At Lake Chebarkul', most females were gynochromatic in the orange stage. They had a black dorsal stripe on the thorax but two had the thorax entirely orange (Fig. 24a-c); S8 had bright blue spots. In *Ischnura*, this stage is considered as immature, but we saw such also involved in couplae. Few gynochromatic gemales had dull brownish ground colour, including the spots on S8. The latter fact made us think that in this species, the orange and brownish may be different female morphs. The androchromatic gynomorphic females were rare. The photographic and collection data revealed the following counts: 10 gynochromatic orange (Fig. 34a-c), 1 gynochromatic brown (Fig. 24d), 2 (15%) androchomatic gynomorphic. At Lake Bol'shaya Akulya the same morphs were found but the share of androchromatic females (Fig. 24a-b) was somewhat greater (31%): there were 11 gynochromatic orange and 5 androchomatic gynomorphic (Fig. 35a-b). Unlike males, these androchromatic females had well expressed antehumeral stripes (Fig. 35a-b). One female, perhaps immature androchromatic, had a violet ground colour (Fig. 35c). No androchromatic andromorphic females were encountered.

17. *Ischnura elegans* (Vander Linden, 1825)

Loc. 1: photo: 3♂♂ (98275452, 100859046, 105372525), 1 androchromatic ♀ (100695687); in hand: 2 ♂♂ (98275053, 105372517); numerous seen. **Loc. 2**: photo in hand: 2 ♂♂ (98274652, 105372494); numerous seen. **Loc. 3**: coll.: 1 ♂, 1 androchromatic ♀ (98270287); many seen. **Loc. 4**: coll.: 1 ♂ (105448313); photo: 3♂♂ (98281509, 100933761, 100936205); in hand: 1♂ (105448317); few seen. **Loc. 5**: coll.: 1 immature ♀ (105448332). **Loc. 6**: coll.: 1 androchromatic ♀ (98354442). **Loc. 8**: photo in hand: 1 ♂ (105563255), 1 androchromatic ♀ (98357052); few more seen. **Loc. 12**: photo in hand: 1 androchromatic ♀ (95978952).

Loc. 13: coll.: 1♂ (95975871); photo: 1 gynochromatic (orange)♀ (105916997), 1 copula (95977951); in hand: 1♂ (105916987), 1 gynochromatic (orange)♀ (95976318); many seen. **Loc. 19**: photo in hand: 2♂♂ (98954095, 105916097); very many seen. **Loc. 21**: photo: 1 gynochromatic♀ (98899292); in hand: 1♂ (105849132); few more seen. **Loc. 22**: photo in hand: 1♂ (98382467). 22: photo in hand: 2♂♂ (98383468, 105787821); few seen. **Loc. 25**: coll.: 2 ♂♂ (98600378); photo: 1 ♂ (101823113), 2 androchromatic ♀♀ (101823119, 101823123), 1 gynochromatic♀ (101823111), 1 copula (101859505); in hand: 1 gynochromatic♀ (98600889, 105788915); many seen. **Loc. 26**: photo: 1♂ (98586984), 1 androchromatic ♀ (105788885); many seen. **Loc. 28**: coll.: 2 ♂♂, photo: 1 ♂ (98784578); few seen. **Loc. 3**0: coll.: 1♂ (98693849), 1 gynochromatic♀ (98693891, 105914929); photo: 1 ♂ (102063257); in hand: 1 ♂ (105848951); few seen. **Loc. 33**: 1 ♂ seen. **Loc. 35**: coll.: 1 ♀; photo: 1 ♂ (98174650); in hand: 1 ♀ (105974368); infrequent, among the previous species. **Loc. 36**: photo: 1 ♂ (98177992); in hand: 1 ♀ (98178063).

Common, and sometimes numerous.

18. *Ischnura pumilio* (Charpentier, 1825)

Loc. 4: coll.: 3♂♂; photo: 2♂♂ (98281228, 105448306), 1 orange♀ (98281437); many seen. **Loc. 5**: photo: 3♂♂ (98285369, 98285648, 105448333).

Found only at two close localities in the southern Orenburg Province.

19. *Nehalennia speciosa* (Charpentier, 1840) (Fig. 36)

Loc. 21: coll.: 5♂♂ (105849139), 3 gynochromatic♀♀; photo: 1♂ (98864310, 98864352, 98864392, 98864434, 98864464, 102297015), 3 copulae (98865373, 98865284, 98865261); very many, including many copulae, seen.

Found only once, at a shallow sandy bank of a small former quarry, in emerging spikerush. This is not the most typical habitat of the species (which are *Sphagnum* bogs), yet this is the second typical habitat (Berdard & Wildermuth 2005). These damselflies were observed in their habitat in two adjacent days, 9th and 10th of July. In the evening of the first day, they were very numerous, while in the morning of the second day they subjectively seemed fewer but almost all were in copulae. No androchromatic females were seen.

Platycnemididae

20. *Platycnemis pennipes* (Pallas, 1771)

Loc. 1: photo: 2♂♂ (98275996, 98279876), 5♀♀ (100700696, 100780282, 100780284, 105372529, 105448278), 2 tandems (100859565, 98280552); many seen. **Loc. 2**: coll.: 1♂ (105372513); photo: 1♂ (98270768), 1♀ (98274961); several seen. **Loc. 3**: photo: 2♀♀ (100478108, 105372485), 1 tandem (98270106); several ind. seen. **Loc. 4**: photo in hand: 1♂ (105448307); few seen. **Loc. 5**: photo: 2♂♂ (98283823, 100985904); many seen. **Loc. 6**: photo: 3♀♀ (98354271, 101118958, 105563208); few seen. **Loc. 7**: photo: 2♂♂ (98354895, 101303647); in hand: 1♂ (105563233). **Loc. 8**: photo: 1♂ (105563257), 1 copula (101343791); in hand: 1♂ (105563241); many seen. **Loc. 10**: photo: 1♂ (105917007), 1 copula (95979471); few seen. **Loc. 13**: photo in hand: 1♂ (105916995); many seen. **Loc. 14**: photo: 2♂♂ (98961192, 102544249), 1♀ (98961159); extremely numerous. **Loc. 15**: photo in hand: 1♀ (105916971); several seen. **Loc. 21**: photo: 1♀

Fig. 36. *Nehalennia speciosa* (left – male, 102297015; right – copula, 98865261) in spike-rush emerging from a shallow sandy bank of an inundated quarry at Loc. 21.

(102309682); in hand: 1 ♂ (105916064), 1 ♀ (98899600); several seen. **Loc. 22**: photo: 6 ♂♂ (98380281, 98380697, 101435625, 101438438, 101439986, 105787774), 3 ♀♀ (98379593, 98382365, 101118958); in hand: 1 ♂ (105787772); seen in immense numbers, virtually clouds. 23: photo in hand: 2 ♀♀ (98474635, 105787845); several seen. **Loc. 25**: photo in hand: 1 ♂ (105788925); very few seen. **Loc. 26**: photo: 2 ♀♀ (98586973, 105788889); many seen. **Loc. 27**: photo: 2 ♂♂ (101735454, 105788945); in hand: 1 ♀ (105787897); several seen. **Loc. 36**: photo: 1 ♂ (98178207); in hand: 1 ♀ (105974373); many seen. **Loc. 40**: coll.: 2 ♂♂ (105974398), 1 ♀; photo: 3 ♂♂ (98268102, 98268872, 102878217); not numerous.

Common at all brooks, rivulets and rivers, in Loc. 22 it was extraordinarily abundant.

Aeshnidae

21. *Aeshna cyanea* (Müller, 1764) (Fig. 37)

Loc. 9: coll.: 1 ♂ (98357823, 105563268).

Just once met with (in the European part of the area): a male flew low along a brook course just at its crossing a ground road, in a forested rather deep valley. S Ural is the eastern limit of the range of this species (Skvortsov 2010).

22. *Aeshna juncea juncea* (Linnaeus, 1758)

Loc. 10: coll.: 1 ♂ (95983006). **Loc. 20**: coll.: 1 ♂ (98900077, 105916075); photo in hand: 4 ♂♂ (98902304, 98902669, 98953828, 105916081); few more ♂♂ seen. **Loc. 21**: photo in hand: 1 ♂ (98864629); several ♂ ♂ seen. **Loc. 25**: coll.: 1 ♂ (98599909, 105788906), 1 ♀ (98600521, 105788911); several seen. **Loc. 36**: photo in hand: 2 ♂♂ (98178303, 105974374). **Loc. 38**: ca 5 ♂♂ seen. **Loc. 40**: coll.: 1 ♂; 1 more ♂ seen.

Fig. 37. A male of *Aeshna cyanea* from the Bol'shoy Shar Rivulet (Loc. 9).

Expectedly found in the northern part of the examined area, but also at Loc 25, as southerly as at 54.0º N: three individuals were registered supposedly on their maiden flight from the large water reservoir to a pine forest patch on the bank; they obviously emerged on the same day but were already fully coloured. At Loc. 21, several males were observed in a searching flight low above water along vegetation, without certain territories, as common for this species.

Aeshna subarctica Walker, 1908

Loc. 20: 1♂ seen.

A male was observed by the first author in a low flight above a boggy patch of the bank (of an inundated quarry), which is so common for the species. It was identified by sight as being shorter and greyer than *A. juncea*. Since we failed to get any objective evidence, we do not ascribe this species a number. So far, this species was only once reported for South Ural, from Tygynskoe Bog in Beloretsk District of Bashkiria (Eremina 2010; Haritonov & Eremina 2010).

23. *Aeshna grandis* (Linnaeus, 1758) (Fig. 38)

Loc 6: 1♂ seen. **Loc. 7**: photo in hand: 1♂ (98355079, 105563223). **Loc. 8**: coll.: 1♂; photo in hand: 1♀ (98357558); many ♂♂, ♀♀ seen. **Loc. 9**: coll.: 1♀(105563280), several ind. seen. **Loc. 10**: few seen. **Loc. 12**: 1♀seen. **Loc. 19**: photo in hand: 1♀ (98954253); several ovipositing ♀♀ seen. **Loc. 20**: photo in hand: 1♀ (98902360). **Loc. 21**: coll.: 1♀(98789805); photo: 1♀(105916060), wings (98789412); many seen. **Loc 22**: photo in hand: 1 ♀ (98472660, 105787822). **Loc. 24**: photo: 1 ♀ (98474520); in hand: 2♀♀ (98474310, 105787851); 1♂, ca dozen more ♀♀ seen. **Loc. 25**: 1 ind. seen. **Loc. 26**: 1♀ seen. **Loc. 28**: 1 ind. seen. **Loc. 30**: coll.: 1♀ (98692984); photo: 2♀♀ (98692203, 105848980); in hand: 2 ♀ ♀ (105848968, 105848971), 1 wing of ♂ (105849007). **Loc. 32**: 2 ind. seen. **Loc. 33**: photo in hand: 1 ♀ (105849023); 1 more ♀ seen. **Loc. 37**: few ind. seen. **Loc. 38**: 2 ♂♂ seen. **Loc. 40**: photo in hand: 1 ♀ (105974427); many seen.

Common, but not found in Orenburg Province.

Fig. 38. A female of *Aeshna grandis* disturbed while ovipositing at the N bank of Lake Bol'shoe Miassovo (Loc. 30), Il'menskiy State Nature Reserve (98692-203).

24. *Aeshna viridis* Eversmann, 1836

Loc. 21: 1 ♀ seen. **Loc. 24**: coll.: 1 ♀ (98474754); photo in hand: 1 ♀ (105787859); 1 ♂, few more ♀♀ seen. **Loc. 30**: photo in hand: 1 ♀ (98695536, 105849004).

This species is known for its association with water soldier, among the leaves of which its larvae are adapted to live, and also for an inclination to crepuscular activity (Bernard & Kosterin 2010). At Loc. 24, it was found 'in place': in two small lakes with the surface half covered with water soldier, among which its females oviposited, while a male patrolled along the bank (at midday). At Loc. 21, the only female was also observed in a trophic flight, notably in the dusk, but again near the only small patch of water soldier in that area. At Loc. 20 Lake, the female was also obtained in the late dusk, thus exhibiting crepuscular activity, but in an absolutely unfit place: by a stony bank of a huge lake, without any water soldier or analogous vegetation.

25. *Aeshna crenata* Hagen, 1856 (Fig. 39)

Loc. 8: 2 ♂♂ seen. **Loc. 19**: photo in hand: 1 ♂ (98954341); several more ♂♂ seen. **Loc. 20**: coll. 1 ♀ ; photo in hand: 3 ♂♂ (98902743, 98903010, 98903630, 105916076); 1 ♀ (105916090), few more ♂ ♂ seen. **Loc. 21**: coll. 4 ♂ ♂ (987841224, 98789363, 98899815, 98865689); photo in hand: 5 ♂♂ (98865498, 98865468, 105849126, 105916048, 105916050), 1 ♀ (105916049); quite a few seen.

This species, common in Siberia but rare and local in Eastern Europe, was mostly found in the three localities studied in Uchaly District of Bashkiria. The fourth locality was in Zinachurinskiy District, also of Bashkiria, where two males were observed at a large reservoir - one of them in a patrolling flight ca 1-1.5 m above the water, to and fro for 5-10 m, very typically for the species, in a reservoir bay shaded by a birch forest on its high bank. (It was not at all afraid of a net and did not pay attention to the first stroke, but, ironically, we missed twice.)

26. *Aeshna serrata serrata* Hagen, 1856 (Fig. 40)

Loc. 20: photo in hand: 1 ♂ (98901647, 98902912, 98903369, 98903950). **Loc. 21**: 1 ♂ seen. **Loc. 25**: photo: 3 ♂♂ (98690701, 98690966, 98690729), 3 ♀♀ (98690769, 98690783, 105788933); in hand: 2 ♂ ♂ (98601628, 105788921, 105788929), 1 ♀ (105788932). **Loc. 26**: photo in hand: 1 ♀ (98587172, 105788898). **Loc. 27**: coll.: 3 ♂♂ (98475391, 98475639, 98691407), 1 ♀ (105787884); photo: 8 ♂♂ (98476277, 98586531, 98586683, 98586704, 98586730, 98690999, 101678687, 101706093), 1 ♀ (98586852), 1 tandem (98690986); in hand: 4 ♂ ♂ (98586779, 105787885, 105787886, 105788952); many seen. **Loc. 28**: photo in hand: 2 ♂ ♂ (98785793, 98785858); several ♂ ♂ seen. **Loc. 33**: photo in hand: 1 ♂ (98783939). **Loc. 35**: photo in hand: 1 ♂ (98175892). **Loc. 38**: 3-4 ♂ ♂ seen.

While this species has a restricted distribution in Europe, it is the most common aeshnid in the steppe and forest-steppe zones of Siberia (Onishko & Kosterin 2021). The lake of Loc. 27 looks like its typical habitat in Siberian steppes and actually belongs to this zone, steppen Transuralia, which is the western border of the steppe zone of Siberia. There is no surprise that *A. serrata* abounded there.

Both in Siberia and our region this species is doubtlessly associated with reed. At Loc. 27, females were observed ovipositing in reed thickets, but since the latter were broad and continuous, it was not possible to observe reproductive males, just many individuals

Fig. 39. Comparison of males of *Aeshna serrata* (left) and *Aeshna crenata* (right) from Loc. 20 (98903369, 98903950). Note that the pattern elements which are yellow in *A. serrata* (the face, the thoracic stripes, the central spot pair on the abdominal segments) are blueish in *A. crenata*.

of both sexes were observed resting and startled from bushes around the lake. The reproductive behaviour of males was observable in habitats where reed thickets were represented by discontinuous patches. It resembled that of *A. juncea*: the males flew low above the water examining the bases of reed stems in search for females, without distinct territories. The same was observed in Tuva (Kosterin & Zaika 2010).

At two localities, Loc. 28 and Loc. 33, these males occurred together with those of *Anax imperator* Leach, 1815, which always flew substantially higher, roughly at the level of reed tops. Curiously, in both cases they did not exhibit any interaction like attempts of chasing, although they were dragonflies of similar size and colour and surely saw each other. At Lake Saylyg-Khol' in Todzha Depression in Tuva, reproductive males of *A. serrata* demonstrated the same segregation of flight height with those of *A. crenata*, which flew at the same height as *A. imperator* in our case (but, unlike them, had distinct territories) (Kosterin & Zaika 2010). However, at Loc. 25, the second author startled a female of *A. imperator* which was attached by a male of *A. serrata* who tried to grasp her for some 15 seconds while she curled the abdomen as a sign of rejection and tried to escape. Curiously, in Omsk, the males of *A. serrata* fly similarly along reed thickets without distinct territories, but at a greater height, that can be explained by the ab-

Fig. 40. A male (left, , 98586531) and female (right, 98586852) of *Aeshna serrata* (left) at Loc. 27.

sence or scarcity of other large aeshnids (observations by the second authors, see also Kosterin & Zaika 2010).

27. *Aeshna affinis* Vander Linden, 1820

Loc. 1: 1 ♂ seen. Loc. 2: coll.: 2 ♂♂ (98271521, 98271566); photo: 3 ♂♂ (100646308, 103202746, 103202795), 1 ovipositing tandem (105372510), 3 tandems (103163114, 103163145, 103163206, 103163270); in hand 4 ♂♂ (98271622, 98274483, 98274863, 105372507); quite a few more ♂♂ seen. **Loc. 3**: photo: 3 ♂♂ (103202877, 103202916, 103202942); in hand: 3 ♂♂ (98270330, 98270547, 105372487), 1 ♀ (105372486); many ♂♂ seen. **Loc. 4**: photo in hand: 1 blue ♀ (98283213, 105448318). **Loc. 24**: coll.: 1 ♂ (98473215); photo: 2 ♂♂ (98473303, 98474560); in hand: 1 ♂ (105787838). **Loc. 27**: 1 ♂ seen.

At Loc. 3, the males were especially numerous in their typical habitat: low bank with sparse cattail, trampled by cattle.

28. *Aeshna soneharai* Asahina, 1981 (Fig. 41)

Loc. 35: coll.: 1 ♂, 1 ♀ (105974358).

Just one record in the northern part of the region examined. The collected specimens exhibited all diagnostic characters of this species (e.g. shown in Fig. 41), which we treat following Onishko et al. (2022).

In the southernmost locality, the Ilek River valley, we twice happened to males and once a female flying by in tree shade, which was either this species or (more probably) *Aeshna mixta* Latreille, 1805, but failed to obtain one to identify.

29. *Anax imperator* Leach, 1815

Loc. 1: photo: 2 ♀♀ (98280351, 100900465); in hand: 3 ♀♀ (98275372, 98280242, 105372526); several ind. of both sexes seen. **Loc. 3**: photo in hand: 1 ♀ (98270439);

Fig. 41. A female of *Aeshna soneharai* from Loc. 35 (105974358). Note the diagnostic characters distinguishing it from *A. mixta* (Onishko et al. 2021): the roundish pale spots of the central pair on the abdominal segments (a) and the right triangular spot on S2 adjacent to the tergite lower margin (b).

several ♂♂, ♀♀ seen. **Loc. 4**: photo: 1 ♂ (98280925); in hand: 1 ♂ (98281153); quite many seen. **Loc. 5**: photo: 1 ♂ (98287265, 100992062, 105785338); in hand: 4 ♂♂ (98287163, 105448342, 98286938, 98286200); several ♂♂, 1 ♀ seen. **Loc. 6**: photo in hand: 1 ♂ (98354715), 2 ♀♀ (98354794, 98354826); about a dozen in total ♂♂, ♀♀ seen. **Loc. 7**: photo in hand: 1 ♂ (105563223). **Loc. 8**: photo: 1 ♂ (101372950), 1 ♀ (105785339); in hand: 1 ♂ (98356550, 105563248); many ♂♂, ♀♀ seen. **Loc. 12**: photo in hand: 1 ♂ (95979398, 105917005). **Loc. 13**: photo in hand: 1 ♂ (95977826); several more ♂♂ seen. **Loc. 20**: 1 ♂ seen. **Loc. 23**: photo in hand: 1 ♀ (98472931,

105787829); 2♂♂ seen. **Loc. 25**: photo: 3♂♂ (98600160, 98690830, 98690894); in hand: 2 ♂♂ (98601897, 105788922), 1 ♀ (105788924); fem more ♂♂ seen. **Loc. 26**: photo: 1♂ (105788888); in hand: 1♂ (98587212), 1♀ (98586884), 1 more♂ seen. **Loc. 27**: photo: 1♂ (98691054). **Loc. 28**: photo in hand: 1♂ (105849048); several♂♂ seen. **Loc. 30**: 3♂♂ seen. **Loc. 33**: 2♂♂ seen. **Loc. 35**: photo in hand: 1♂ (98176670).

A common species from the very south up to 55.6ºN (Loc. 35). Haritonov & Eremina (2010) noted that the species was not at all registered in South Ural until 1970, while in 2000s they had recorded it as northerly as up to Chelyabinsk (55.1ºN). We may conclude that this species is successfully spreading northwards and has been well established in South Ural, likely because of the current climate warming.

30. *Anax parthenope* (Selys, 1839)

Loc. 1: several♂♂ seen. **Loc. 2**: 1 dark-winged♀ seen. **Loc. 4**: few seen. **Loc. 5**: 2 ♂♂ seen. **Loc. 8**: coll.: 1♂ (98357600, 105563265); 1 more♂ seen. **Loc. 23**: coll.: 1♂ (98472890, 105787827). **Loc. 28**: photo: 1 tandem (105849042); in hand: 2♂♂ (105849041, 105849064); 1 dark winged♀ (105849068); several more♂♂ seen. **Loc. 30**: coll.: 1♂ (98692428), 1 ♀ (98692554); photo: 1 hatching♂ (98692669); in hand 2♀♀ (98692758, 98692897). **Loc. 35**: coll.: 2 ♂♂ (102745674, 105974366); few more ♂♂ seen.

Found in the same latitude span as the previous species of the same genus, but less abundant and in twice fewer localities (9 versus 18). Haritonov & Eremina (2010) commented this species similarly to the above, and our comment is the same.

For some reason, all the three individuals which hatched in the same stretch of the bank of Lake Bol'shoe Miassovo (Loc. 30) had problems with spreading their wings (see observations 98692669, 98692758, 98692897).

31. *Isoaeschna isoceles* (Müller, 1767) (Fig. 42)

Loc. 2: coll.: 3♂♂ (98271020, 98271427, 98274367); photo: 2♂♂ (100609290; 105372495); in hand: 3♂♂ (105372504, 105372512, 105372514), several seen.

Found in only one locality in the very south (51.1ºN). The males patrolled pools of the El'shanka brook (Loc. 2), bordered by tall reed, and sometimes rested on dry slanting stems, which is their typical behaviour. Haritonov & Eremina (2010) reported it only for two localities at the Bol'shaya Karaganka River in the south of Chelyabinsk Province, which is more northerly than our point, 52.7ºN

Gomphidae

32. *Gomphus vulgatissimus* (Linnaeus, 1758) (Figs 43-46)

Loc. 1: coll.: 1♀ (98280725, 100901561, 105448295). **Loc. 7**: coll.: 5♂♂ (98354989), 1 ♀. **Loc. 8**: photo: 3 ♂♂ (98357312, 98357745, 101345343); in hand: 2 ♂♂ (98357082, 105563256), 1♀ (98357338,); many♂♂ seen. **Loc. 10**: coll.: 1♀; photo: 1♀ (95981570); few seen. **Loc. 12**: coll.: 1♀ (102609384). **Loc. 21**: coll.: 1♀ (98899890, 105916072). **Loc. 22**: coll.: 2 ♂♂ (98381482, 105787778); photo: 1 ♂ (98380588). **Loc. 40**: coll.: 2♂♂ (98269782, 105974422), 1♀ (102869730); photo in hand: 1♀ (105974413).

Observed at rivers from south to north throughout.

Fig. 42. A male of *Isoaeschna isoceles* perching on the bank of the El'shanka River (Loc. 2) in Sol'-Iletsk Town.

The female from our southernmost locality, the Ilek River (Loc. 1; 51.08º N) had all (!) femora yellow with black stripes and apices (Fig. 43a). The three males from Loc. 22 - Gyyaznushinskiy (52.55º N) also have all (!) femora yellow with black streaks (Fig. 44).

Specimens from the two southernmost of the rest localities had the yellow colour on the femora restricted and variable. The photographed female from Loc. 8 (52.15º N) had the yellow colour only on the lower surface of the profemora (Fig. 43b). The same was in one of the males from Loc. 7 (52.13º N), another male from there had the yellow also on the midfemora, while the two other examined males and the only collected female from the same locality had all the femora black.

All other specimens, originating from localities northerly of 53º N, have their legs entirely black.

The yellow femora used to be considered a character of *Gomphus schneideri*, a species closely related to *G. vulgatissimus* but ranging more southerly in Europe and Near East This feature of *G. schneideri* has been formulated in the two recent guides as follows:

- "Femur black often with yellow markings" (in the key, opposed to "Femur black without yellow markings" for *G. vulgatissimus*) (Kalkman 2006: 49).
- "Yellow markings in females in particular can be more extensive, e.g. with yellow streaked legs ..." (Dijkstra et al. 2020: 192).

We see that in some of our localities, the specimens have the yellow colour on the legs even more expressed than stated for *G. schneideri*, namely "yellow streaked legs" in

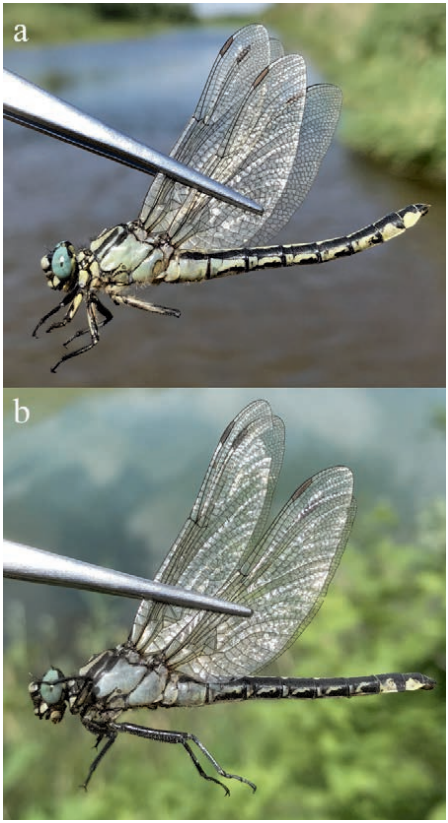

Fig. 43. Females of *Gomphus vulgatissimus* from the south of the region studied with yellow colour on their femora: a – that from the Ilek River (Loc. 1; 98280725) with all femora yellow with black stripes; b – that from Yamashlinskoe Reservoir (Loc. 8; 98357338) with the yellow colour present only on the profemora.

males and even black streaked yellow legs in the Ilek female. What about other distinguishing characters?

Kalkman (2006: 49) provided only one more character appliable for males: "Abdomen clearly club-shaped" for *G. vulgatissimus* versus "Abdomen less club--shaped" for *G. schneideri*. The female differences were provided as follows: "Vulvar scale as broad as the visible part of the ninth sternum (the 'floor' of S9) ... Distance between the tips of the vulvar scale less broad as the depth of the incision" for *G. vulgatissimus* versus "Vulvar scale less broad than the visible part of the ninth sternum. ... Distance between the tips of the vulvar scale as broad as the depth of the incision" for *G. schneideri* (Kalkman 2006: 49), and only the latter was figured schematically.

Dijkstra et al. (2020: 190-192) provided the differences between these species in a remarkable way:

For *G. vulgatissimus*: "*G. vulgatissimus* is most similar to the generally blue-eyed *G. schneideri*". "Hybridises with *G. schneideri* in a broad contacy zone in the southern Balkans, often [!] making identification there impossible".

For *G. schneideri*: "Tends to be smaller and more slender than *G. vulgatissimus*, with eyes of mature males blue rather greenish. Othewrise very similar to that species. While the black lines of the thorax may be thinner, with the yellow antehumeral stripes about as wide as the black humeral stripes behind them, this is not a reliable character. Yellow markings in females in particular can be more extensive, e.g. with yellow streaked legs ..." "Replaces *G. vulgatissimus* in Turkey and the southern Balkans. It is yellower and has bluer eyes, therefore appearing more like other *Gomphus* species, but both it and *G. vulgatissimus* are variable and may be distinguished only by the male appendages and female's vulvar scale, although these too barely differ."

The illustrations in Dijkstra et al. (2020) showed the male appendages but very slightly differing: in *G. vulgatissimus* both are more robust and more strongly curved, the cercus with

Fig. 44. Males of *Gomphus vulgatissimus* from the Ural River at Gryaznushinskiy village (Loc. 22) with all femora yellow with black stripes (98380588, 105787778).

a more expressed dorsobasal projection and with the tip slightly raised up. Curiously, earlier Seidenbusch (1997) enumerated and photographically ilustrated the differences between *G. vulgatissimus* and *G. schneideri* based on his series from Germany and Turkey respectively, which were basically the same but the slight curving up of the male

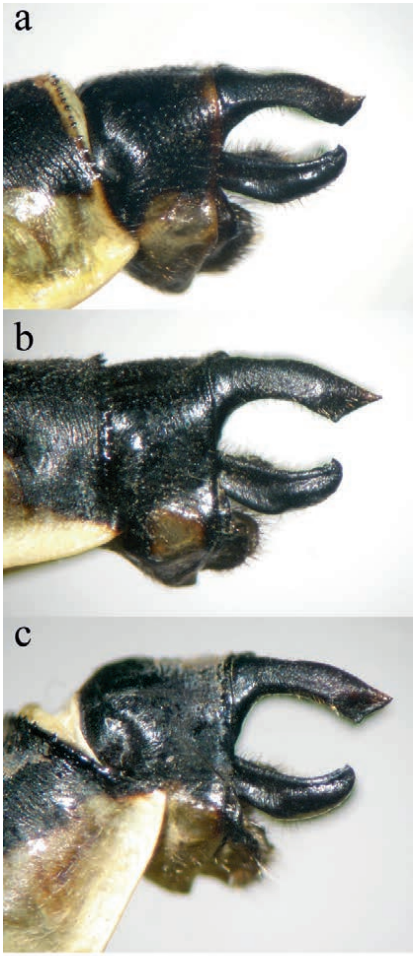

Fig. 45. Anal appendages in lateral view of males of *Gomphus vulgatissimus* from the Ural River at Gryaznushinskiy village (Loc. 22), with all femora yellow with black stripes, (a), from the Bol'shoy Suren' village (Loc. 7), with black legs (b) and from the Rezh River (Loc. 40) in the north of the studied area , also with black legs (c). Scale bar 1 mm.

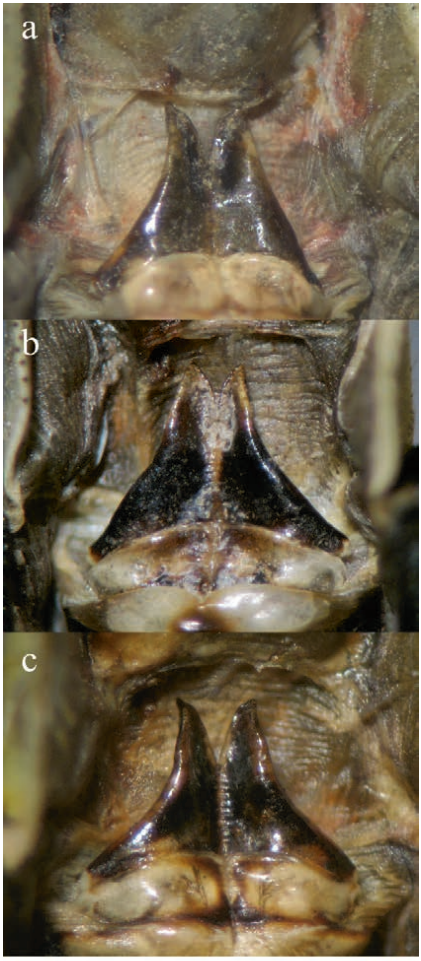

Fig. 46. Vulvar lamina in ventral view of females of *Gomphus vulgatissimus* from the Ilek River (Loc. 1), with all femora yellow, (a), from the Bol'shoy Suren' village (Loc. 7), with black legs (b) and from the Rezh River (Loc. 40) in the north of the studied area, also with black legs (c). Scale bar 1 mm.

cercus tip was claimed to be a feature of *G. schneideri* rather than *G. vulgatissimus*. The same was stated by Onishko (2019) for *G. schneideri* from Goryachiy Klych, North Caucasus. Schorr (2022) compiled a comprehensive collection of structural illustrations

of these two species from different sources, which are in general in line with those in Dijkstra et al. (2020) but with some deviations.

In fact, it is difficult to compare any particular collected specimen with all these figures. Moreover, both the cerci and epiproct arms in *Gomphus* diverge in parallel, and so may be figured in two alternative views: that perpendicular to their axes or that perpendicular to the body axis, and it is never known which of them was the case of most drawings or photos (our Fig. 45 shows them in the lateral view perpendicular to the border axis.).

Our specimens have the eyes bluish-green, maybe bluer in southern specimens (Figs 43-44). The appendages of males from all our localities (Fig. 45) more or less resemble the figure of *G. vulgatissimus* in Dijkstra et al. (2020) and other sources (see Schorr 2022). Curiously, the cerci of the males with yellow femora from Loc. 22 are somewhat stouter and less attenuated at the apices (Fig. 45a) than in specimens with black legs from elsewhere (Fig. 45b-c). The male abdomen is distinctly club-shaped, even in southern specimens, thus also conforming *G. vulgatissimus*. The vulvar lamina is similar in all collected females, its base is somewhat narrower than the floor of S9 and the cleft 9s as deep as broad (Fig. 46), corresponding to *G. schneideri* rather than *G. vulgatissimus* according to Kalkman (2006), but the difference looks unreliable.

Basing on the distinct club-shaped abdomen even in South Uralian males (Fig. 44) and the anal appendage shape more fitting figures published for *G. vulgatissimus* s. str. (Fig. 45), and in spite of the femora with yellow colour (Figs 43-44), we identify our specimens as *G. vulgatissimus* rather than *G. schneideri*. (They are currently identified as *G. schneideri* in iNaturalist (2025), to be changed in near future.)

The actual taxonomic status of *G. schneideri* is still disputable (De Knijf et al. 2013; Boudot & Jović 2015; Dijkstra et al. 2020; Dumont et al. 2021; Schorr & Snegovaya 2022; Boudot 2022; Schorr 2022), while the results of molecular phylogenetic analysis by Dumont et al. (2021) are equivocal. This issue will be addressed in a special work taking into account specimens from broader geographical scale, first of all the Caucasus, and hopefully involving further molecular analysis.

33. *Stylurus flavipes* (Charpentier, 1825)

Loc. 1: coll.: 2 ♂♂ (98278628, 98280191, 105448294), 1 ♀ (98275835); photo: 1 ♂ (98276029).

Found only in our southernmost locality, the medium-sized Ilek River.

34. *Ophiogomphus cecilia* (Geoffroy in Fourcroy, 1785)

Loc. 1: coll.: 3 ♂♂ (98275636, 98280116, 105448291), 1 ♀ (98275009); photo: 2 ♂♂ (98276128, 98280040), 2 ♀♀ (98280489, 105448292); in hand: 3 ♂♂ (105448283, 105448281, 105448276), 2 ♀♀ (105372531, 105785337); many ♂♂ and ♀♀, including copula, seen, mostly on large glades behind the riparian forest. **Loc. 7**: photo in hand: 2 ♂♂ (98355114, 105563230); many ♂♂ seen. **Loc. 8**: photo: 1 ♂ (101344579). **Loc. 10**: coll.: 1 ♂ (95982663); few seen. **Loc. 15**: coll.: 1 ♂ (98954687). **Loc. 17**: photo in hand: 2 ♂♂ (98960977, 105916977). **Loc. 20**: 1 ♂ seen. **Loc. 21**: coll.: 1 ♂; photo: 4 ♂♂ (98899349, 102208793, 105849109, 105916068), 2 ♀♀ (98899422, 98899460); in hand: 3 ♀♀ (98788982, 98789695, 105849096); many seen. **Loc. 40**: coll.: 1 ♂

(98269021); photo: 10 ♂♂ (98269209, 98269265, 98269312, 98269347, 102871442, 102873094, 102878869, 105974419, 105974425, 105974426); in hand: 1 ♂ (105974408), ♀ (105974418).

Found at rivers from south to north throughout, as neither rare nor abundant. At Loc.1: we observed a female which rested on small islands amidst the river, with its abdomen risen like males do. Sometimes it got into the air, flew above the surface, made very few oviposition movements and landed to a next island.

35. *Onychogomphus forcipatus* (Linnaeus, 1758) (Fig. 47)

Loc. 1: coll.: 1 ♂ (98278520, 105448284). **Loc. 3**: 1 ♂ seen. **Loc. 4**: coll.: 1 ♂ (98283306). **Loc. 6**: photo in hand: 1 ♂ (98354843). **Loc. 7**: coll.: 2 ♂♂ (98355369, 105563224), 2 ♀♀ (98354858, 105563231, 105563236); photo: 3 ♂♂ (98355138, 98355177, 101299985); very many ♂♂, ♀♀ seen. **Loc. 8**: photo: 4 ♂♂ (98356896, 101343049, 101373173, 105563247, 105563245), 1 ♀ (101343702); in hand: 3 ♂♂ (98356436, 98356568, 105563242); numerous ♂♂ seen. **Loc. 10**: photo: 5 ♂♂ (95979655, 95982156, 95982406, 102689050, 105917014), 1 ♀ (95983271); in hand: 2 ♂♂ (95979539, 105917012); very many seen. **Loc. 12**: photo in hand: 1 ♂ (105917000); few more seen. **Loc. 13**: 1 ♂ seen. **Loc. 14**: photo in hand: 1 ♂ (95975412), 1 ♀ (95975321); few more ♀ ♀ seen. **Loc. 15**: photo in hand: 2 ♂ ♂ (98954537, 105916967); many ♂♂ seen. **Loc. 16**: photo: 1 ♂ (98959582), **Loc. 17**: photo: 1 ♂ (102516429); in hand: 1 ♂ (98961001); several ♂♂ seen. **Loc. 18** - Nura2: 1 ♂ seen. **Loc. 21**: photo in hand: 1 ♂ (98899716; 105916071). **Loc. 22**: photo: 2 ♂ ♂ (98379369, 101480047), 1 ♀ (98382799), 1 copula (98379849); in hand: 3 ♂♂ (98382302, 105787794, 105787798). **Loc. 26**: photo in hand: 1 ♀ (98587054, 105788891). **Loc. 40**: coll.: 1 ♂ (98268144), 1 ♀ (98268216); photo: 2 ♂ ♂ (98268287, 98269177, 102876561), 1 ♀ (98268987); in hand: 2 ♀ ♀ (98269512, 105974417); many seen.

As well as the two previous species, observed at rivers from south to north throughout.

At Loc. 8, twice males were observed flying slowly just above the water surface far from the bank, sometimes approaching and again departing from it; this seems to be their patrolling flight.

Fig. 47. Males of Onychogomphus forcipatus from the south (52.1° N, Loc. 7 - Bol'shoy Suryen', 98355138, left) and north (57.4° N, Loc. 40, 102876561, right) of the region studied.

The Uralian representatives of the species were rather dark, that is with a restricted pale maculation, throughout from south to north of the region (Fig. 43), being very different from the very pale Caucasian representatives (to be published).

Corduliidae

36. *Cordulia aenea aenea* (Linnaeus, 1758)

Loc. 6: coll.: 1 ♀ (98354700); few more ♀♀ seen, including ovipositing ones. **Loc. 8**: coll.: 2 ♂♂ (98357534, 98357688); photo: 1 ♂ (105563264); in hand: 1 ♂ (105563260); many seen. **Loc. 10**: coll.: 1 ♂ (95980011). **Loc. 20**: photo in hand: 1 ♂ (105916088); many seen. **Loc. 21**: photo in hand: 2 ♂♂ (98789934, 105849131); many ♂♂ seen. **Loc. 30**: photo in hand: 1 ♀ (98695379). **Loc. 33**: photo in hand: 1 ♂ (105849026), few ♂ ♂ seen. **Loc. 36**: photo in hand: 2 ♂♂ (98178233, 105974394). **Loc. 40**: 1 ind. seen.

Was not found in the southern Orenburg Province (south of 52ºN). Not common, maybe due to its early flight period. Males used to fly above the water rather far from banks (but not as far as the next species).

37. *Epitheca bimaculata* (Charpentier, 1825)

Loc. 6: 1 ♂ seen. **Loc. 8**: photo: 1 ♂ in a cobweb (105563262), 1 exuvia (98357454); 1 ♂ seen. **Loc. 12**: 1 ♀ (?) seen. **Loc. 20**: 1 ♂ seen. **Loc. 21**: photo: 1 copula (102387905); many seen. **Loc. 3**0: 1 ind. seen. **Loc. 33**: 1 ♂ seen.

In all cases, males flew above the water far from banks, usually at middle of lakes and ponds, and were impossible to get. We failed to catch a single specimen and only once a copula was photographed on an alder bush.

38. *Somatochlora arctica* (Zetterstedt, 1840)

Loc. 39: coll.: 1 ♂ (98267995; 105974397). **Loc. 40**: coll.: 4 ♂♂ (98269078, 98269456, 105974420); photo in hand: 1 ♀ (105974421); quite a few ♂♂ seen.

Found only in the two northernmost localities (55.7, 57.4º N), that was quite expectable. These were dragonflies in trophic flight above a forest road (Loc. 39), forest margins and meadows (Loc. 40).

39. *Somatochlora flavomaculata* (Vander Linden, 1825)

Loc. 20: coll.: 1 ♂ (98902092); photo in hand: 2 ♂ ♂ (98902152, 105916092); about 3 more ♂ ♂ seen. **Loc. 21**: 1 ♂ seen. **Loc. 3**0: coll.: 1 ♂ (98695232, 105848995); 2 more ♂ ♂ seen. **Loc. 39**: coll.: 1 ♂ (98268022). **Loc. 40**: coll.: 1 ♂ (98269703); photo in hand: 1 ♂ (105974428).

Found starting from 54.8º N (Loc. 20) and more northerly. Each time only males were observed flying high, ca 3 m, above glades and meadows not far from lakes in daytime.

40. *Somatochlora metallica* (Vander Linden, 1825)

Loc. 6: coll.: 2 ♂ ♂ (98354685, 101201887, 105563217); many ♂ ♂ seen. **Loc. 8**: photo: 1 ind. in a cobweb (98357494, 105563259); many ♂♂ seen. **Loc. 9**: coll.: 1 ♀ (98357960, 105563274); several ♂♂ seen. **Loc. 10**: coll.: 1 ♂ (95980011); photo in hand: 2 ♂♂ (95979741, 95982297, 95983096, 105917006, 105917009); many seen. **Loc. 11**: photo in hand: 1 ♂ (105917006); 1 more ♂ seen. **Loc. 12**: 1 seen. **Loc. 13**: photo in hand: 1 ♂ (105916999). **Loc. 15**: coll.: 2 ♂♂ (98959022, 105916970), 1 ♀ (98959542); 2 more ♂♂

seen, **Loc. 16**: photo in hand: 1 ♂ (105916978). **Loc. 17**: coll.: 3 ♂♂ (98960942, 105916975); quite a few ♂♂ seen. **Loc. 20**: photo in hand: 2 ♂♂ (98953799; 105916086); several ♂♂ seen. **Loc. 21**: coll.: 1 ♂ (102249745); photo in hand: 2 ♂♂ (98899197, 105849086), ♀♀ (98790021, 98864590); many ♂♂ seen. **Loc. 3**0: photo in hand: 2 ♂♂ (98693776, 105849000). **Loc. 36**: photo in hand: 2 ♂♂ (98178257, 105974376); quite a few ♂♂ seen. **Loc. 37**: photo in hand: 1 ♂ (105974369). **Loc. 40**: photo in hand: 2 ♂♂ (98269606, 98269663, 105974424); many ♂♂ seen.

Found everywhere but the Orenburg Province, at lakes and rivers, closely following banks (unlike other local cordulids) in patrolling flight without territories, as common for this species. At the Nura River (Locs 16-17) males usually flew along the stream by margins of thickets of emerging *Petasites radiatus*, but some of them were also observed flying among its petioles on rather restricted areas of shallow water. No *S. exuberata* was found among them.

Libellulidae

41. *Libellula depressa* Linnaeus, 1758

Loc. 4: coll.: 1 ♂ (98281673, 98281552); photo: 1 ♀ (100972323). **Loc. 6**: photo: 1 ♂ (98354642); 1 ♀ seen. **Loc. 7**: photo: 1 ♂ (98355330); in hand: 1 ♂ (98355309). **Loc. 8**: 2 old ♀♀ seen. **Loc. 9**: photo in hand: 1 ♂ (98358209). **Loc. 10**: 1 ♂ seen at a pool in the village. **Loc. 16**: photo: 2 ♂♂ (98961078), **Loc. 21**: coll.: 1 ♀ (98899546, 105916067); photo in hand: 1 ♂ (105849092). **Loc. 23**: coll.: 1 ♂ (98472977, 105787830). **Loc. 27**: photo: 1 ♂ (105788946).

Found throughout the region but neither common nor numerous.

42. *Libellula quadrimaculata* Linnaeus, 1758

Loc. 2: photo in hand: 2 very old ♂♂ (98271304, 105372502). **Loc. 3**: 1 ind. seen. **Loc. 4**: photo in hand: 1 ♀ (98281709). **Loc. 5**: photo in hand: ♂ (105448339), ♀ (98284389); several seen. **Loc. 6**: photo: 2 ♂♂ (98354555, 101234322); in hand: ♂ (105563215); a dozen seen. **Loc. 7**: photo in hand: 1 ♂ (105563226). **Loc. 8**: photo: 1 ♂ (101371725); in hand: 1 ♂ (105563253); many old ♂♂, ♀♀ seen. **Loc. 9**: photo in hand: 1 ♂ (98357977, 105563278). **Loc. 13**: photo in hand: 2 ♂♂ (95976705, 105916992); few seen. **Loc. 19**: several seen. **Loc. 20**: frequent. **Loc. 21**: coll.: 1 ♀ (98865521); photo in hand: 1 ♂ (105916056); very many ♂♂, ♀♀ seen. **Loc. 23**: photo in hand: ♂ (98383241); several seen. **Loc. 24**: photo: 1 ♂ (101549400); photo in hand: 1 ♀ (98473425, 105787866); many seen. **Loc. 25**: photo in hand: 2 ♀♀ (98600964, 105788926); few seen. **Loc. 26**: few seen. **Loc. 27**: coll.: 1 ♀ (105787879); photo: 1 ♂ (101631191); extremely numerous in the wind-breaking tree stripe nearby. **Loc. 28**: photo: 1 wing (105849072). **Loc. 30**: photo: 1 ♂ (101983555); in hand: 2 ♂♂ (98692612, 105848959); few seen. **Loc. 32**: 2 ind. seen. **Loc. 33**: photo in hand: 1 ♂ (105849013); many seen. **Loc. 35**: photo 1 ♂ (98175917); in hand: 1 ♂ (105974355), 1 ♀ (98174835); quite a number seen. **Loc. 36**: photo in hand: 1 ♂ (105974378); few seen. **Loc. 37**: few ind. seen. **Loc. 38**: 1 ind. seen. **Loc. 40**: few seen.

Omnipresent but not abundant, surely because the main flight period was before our visit.

43. *Orthetrum coerulescens anceps* (Schneider, 1845) (Fig. 48)

Loc. 2: coll.: 1 ♂ (98271208); 2 more ♂♂ seen.

Only found in one, the second southernmost locality. Only three males were observed, two at banks of the El'shanka brook and one on a glade nearby. The first record of South Ural; however, this was not too surprising since Orenburg Province was nearly unexplored in odonatological respect.

Fig. 48. Male of *Orthetrum coerulescens anceps* from the El'shanka River (Loc. 2) in Sol'-Iletsk Town (98271208).

44. *Orthetrum brunneum* (Fonscolombe, 1837) (Fig. 49)

Loc. 1: photo: 1 ♂ (100863696), 1 ♀ (105448286); in hand: 3 ♂♂ (98275901, 98275975, 105448285), 1 ♀ (105372530); several seen. **Loc. 2**: coll.: 3 ♂♂ (98271079, 98274745, 105372498); photo: 2 ♂♂ (98274697, 100610538), in total 7 ♂♂ met.

This species was only found in the two southernmost localities. At Loc. 2 it accompanied the previous species but was twice as numerous. In the Ilek River valley, some dozen of individuals of both sexes were met in glades behind the riparian poplar forest strip, while two territorial males were observed as occupying small islands of the river.

Also, the first record for Ural, for the same reason as above.

45. *Orthetrum albistylum* (Selys, 1848) (Fig. 50)

Loc. 1: photo: 5 ♂♂ (100695688, 100697207, 100819952, 105448282), 1 ♀ (100780543); in hand: 4 ♂♂ (98275157, 98275276, 98275679, 105372519), 1 ♀ (98276072); many, mostly ♂♂, seen. **Loc. 2**: coll.: 1 ♂. **Loc. 3**: coll.: 1 ♀; in hand: ♂ (98270218), 1 ♀ (105372490); many seen. **Loc. 4**: 2 ♂♂ seen. **Loc. 5**: photo in hand: ♀ (98287088), several seen. **Loc. 8**: coll.: 1 ♂ (98357430, 105563258); 1 more ♂ seen.

Fig. 49. *Orthetrum brunneum* in Sol'-Iletsk District: a-b – males, c – female, a,c – Loc. 1 (100863696, 105448286), b – Loc. 2 (98274697).

Again, the first record for Ural, of a representative of the same genus *Orthetrum*. It was further more numerous, met in all the five examined localities in Orenburg Provnice but also on one of the southernmost ones (52.1º N, Loc. 8) in Bashkortostan. We may suppose that this species is expanding in the northern direction.

46. *Orthetrum cancellatum* (Linnaeus, 1758)

Loc. 1: photo: 3 ♂♂ (98275536, 105372515, 105448277); many seen. **Loc. 3**: photo: 1 ♀ (100477660); in hand: ♂ (98270726), 1 ♀ (105372484); many seen. **Loc. 4**: photo in hand: 2 ♂♂ (98281303, 105448304); many seen. **Loc. 5**: photo in hand: ♂ (98284782); several seen. **Loc. 6**: photo: 1 ♂ (101234701); in hand: 1 ♂ (105563219). **Loc. 8**: photo in hand: 3 ♂♂ (98356528, 98357295, 105563267); many ♂♂, few copulae seen. **Loc. 13**: photo in hand: 2 ♂♂ (95976608, 105916990); 1 ♀ (95976490); several seen, including 1 copula. **Loc. 21**: coll.: 1 ♂ (98900005); photo 1 ♀ (102300100); in hand: 1 ♀ (98899930); 1 teneral ♀ (105916057). **Loc. 23**: photo in hand: 2 ♂♂ (98382964; 105787808), 1 ♀ (98472869); many ♂♂, ♀♀ seen. **Loc. 2**5: photo: 1 ♂ (101829597), 4 ♀♀ (101857767, 101859106, 101882540, 105788912); in hand: 2 ♀♀ (98600065, 105788907); very numerous (with few tenerals). **Loc. 26**: photo in hand: 1 ♀ (98587128, 105788894). **Loc. 28**: few ♂♂ seen. **Loc. 30**: photo: 1 ♂ (102063316), 1 ♀♀ (98693052, 105849008), 1 copula (102014102); in hand: 1 ♂ (105848962), 1 ♀ (98692127); extremely numerous. **Loc. 33**: few seen. **Loc. 34**: few seen. **Loc. 35**: photo: 1 ♂ (102767305), 1 ♀ (102766150); in hand: 1 ♂ (105974364); wings: (105974348); quite a few

Fig. 50. A male of Orthetrum albistylum perching over the Ilek River (Loc. 1; 100697207).

seen. **Loc. 36**: photo in hand: 1 ♂ (105974390); few more ♂♂ seen. **Loc. 40**: 1 ♂ seen.

Omnipresent and common, prefers open banks. It was remarkably numerous at stony banks of Lake Bol'shoe Miassovo (Loc. 30), the same was observed there by O. Popova (pers. comm.) in 2005.

47. *Leucorrhinia albifrons* (Burmeister, 1839) (Fig. 51)

Loc. 8: coll.: 2 ♂♂ (98357629, 98357701); photo in hand: 1 ♂ (98357629). **Loc. 20**: photo: 4 ♂♂ (102445817, 102445818, 98954047); 1 copula (98900570); in hand: 2 ♂♂ (98900179; 105916074). **Loc. 30**: photo in hand: 2 ♂♂ (98693286, 105848991), 1 ♀ (98693657). 35: photo in hand: 2 ♂♂ (98175591, 105974350); few more ♂♂ seen. **Loc. 36**: photo: 1 ♂ (98176905).

Found at five lakes and reservoirs, in two of which (Bol'shoe Miassovo and Bol'shaya Akulya), Charophyta algae were abundant, with which this species is partly associated (Onishko & Kosterin 2021). Males were observed to perch on sedge and twigs over the water.

48. *Leucorrhinia caudalis* (Charpentier, 1840) (FIg. 52)

Loc. 20: coll.: 1 ♂ (98900360); photo: 1 ♂ (102416785); in hand: 1 ♂ (105916077).

Found at just one small lake: males in company with those of the previous species, showing the same behaviour.

49. *Leucorrhinia pectoralis* (Charpentier, 1825)

Loc. 21: photo: 2

Fig. 51. *Leucorrhinia albifrons* at Loc. 20: left – males (102445818), right – copula (98900570).

Fig. 52. A male of *Leucorrhinia caudalis* at Loc. 20 (102416785).

♂♂ (102209548, 105849110). **Loc. 24**: coll.: 1 ♂ (98474590); photo in hand: 1 ♂ (105787853). **Loc. 27**: coll.: 1 ♂ (98475235); photo: 2 ♂♂ (101675311, 98691022), 1 ♀ (98475261); in hand: 1 ♂ (105787880); several seen. **Loc. 29**: photo: 1 ♀ (98691708).

This otherwise common species appeared even more sporadic than the rarer *L. albifrons*.

50. *Sympetrum danae* (Sulzer, 1776)

Loc. 12: photo in hand: 1 ♂ (105917002); 1 ♀ (95978104); few seen. **Loc. 21**: photo: 1 ♀ (98898639), in hand: 2 ♀♀ (98865234, 105916051); many teneral and few mature ind. seen. **Loc. 27**: coll.: 1 teneral ♂ (98691437, 105788953). **Loc. 35**: photo

in hand: 1 ♀ (98176684). **Loc. 36**: photo in hand: 1 ♀ (105974375); few ind. seen. **Loc. 38**: photo 1 ♂ (102797599), in hand: 1 ♂ (98267977). **Loc. 40**: photo: 1 ♀ (105974416); few, at the 'stripy phase', seen.

Found in the northern part of the region to the south up to 53.5º (Loc. 12). This species has generally a late fligh period but prolonged emergence. In line with this, mostly immature individuals were observed, but at Loc. 12 - Kaginskoe and Loc.26, semimature ones, at the 'black stripy' stage were met with.

51. *Sympetrum flaveolum* (Linnaeus, 1758)

Loc. 3: 1 ♀ seen. **Loc. 5**: coll.: 1 ♀ with wing amber reduced (98287022, 105448341). **Loc. 9**: photo in hand: 1 ♀ (98358147); few ind. seen. **Loc. 10**: only 1 ind. seen. **Loc. 12**: photo: 1 ♀ (102611285); in hand: ♂ (95978010). **Loc. 13**: photo: 1 ♀ (105916998); several seen. **Loc. 16**: photo in hand: 1 ♂ (105916979). **Loc. 19**: photo in hand: 1 ♂ (98954380); quite a few seen. **Loc. 20**: photo in hand: 2 ♀♀ (98900656, 105916085); several, including a copula, seen. **Loc. 21**: photo in hand: 2 ♂♂ (98864656, 105916055); many (twice more than the previous species) seen. **Loc. 23**: photo in hand: 1 ♂ (98472708, 105787814); many seen. **Loc. 24**: photo: 1 ♂ (101543596); in hand: 1 ♂ (98473348, 105787855); quite many seen. **Loc. 25**: photo: 1 ♀ (98690947); in hand: 2 ♀♀ (98599524, 105788908); few seem. **Loc. 27**: photo: 1 ♂ (101677112), 2 ♀ ♀ (101712599, 105787889); in hand: 1 ♂ (105788944), 1 ♀ (105787877); many seen, immature and mature. **Loc. 30**: photo: 1 immature ♂ (102013653); in hand: 2 ♀♀ (98693210, 105848972); few seen. **Loc. 31**: 6 ind. seen. **Loc. 33**: photo in hand: 1 ♂ (98783594); few seen. 35: photo in hand: 2 ♀♀ (98174471, 105974356); quite a few seen. **Loc. 36**: photo: 1 ♀ (98176924); in hand: 1 ♀ (105974392); many seen. **Loc. 38**: photo in hand: 1 ♂ (98178326). **Loc. 40**: photo in hand: 2 ♂♂ (105974411, 98268072); many seen.

Nearly an omnipresent species, yet not found in the two southernmost localities. It is rather an early flying among our species of the genus, so we observed individuals at different stages of maturity, up to fully mature red males at Loc. 13 and Loc. 26.

52. *Sympetrum pedemontanum pedemontanum* (Müller in Allioni, 1766)

Loc. 19: photo: 1 fully mature ♂ (98954487); quite a few seen. **Loc. 13**: photo in hand: 1 immature ♂ (95977145). **Loc. 20**: coll.: 1 mature ♂ (98953917), 1 mature ♀ (105916089); several mature ♂♂ seen. **Loc. 21**: coll.: 1 ♀; photo in hand: 1 teneral ♂ (98865590). **Loc. 40**: photo in hand: 1 mature ♀ (98268155).

Very local, as found in only five localities; observed at different stages of maturity, up to fully mature red males (see the materials above).

53. *Sympetrum sanguineum* (Müller, 1764)

Loc. 1: photo: 1 ♀ (100855348). **Loc. 2**: photo in hand: 2 ♂♂ (98274807, 105372499); 3 more ♂♂ seen. **Loc. 3**: photo: 1 ♂ (100477603); in hand: 1 ♂ (98270398), 1 ♀ (98270162); several seen. **Loc. 4**: photo in hand 2 ♂♂ (98282890, 105448312). **Loc. 5**: photo: 1 ♂ (105448327); in hand: 1 ♂ (98286266), quite a few ♂ ♂ seen. **Loc. 6**: photo in hand: 1 ♂ (105563222). **Loc. 7**: photo in hand: 1 ♀ (105563225). **Loc. 8**: photo: 2 ♂♂ (101369669, 101372379); in hand: 3 ♂♂ (98356816, 98357362, 105563252); many ♂♂, several tandems seen. **Loc. 9**: few ♂♂ seen. **Loc. 21**: photo in hand: 1 ♂ (98898589); several

♂♂ seen. **Loc. 22**: photo in hand: 1 ♂ (98381578), 1 ♀ (105787797). **Loc. 24**: photo: 1 ♂ (101590233); in hand: 1 ♂ (98474488); several ♂♂ seen. **Loc. 25**: photo: 1 ♂ 105788931); 1 more ♂ seen. **Loc. 27**: photo: 1 ♂ (98475283); in hand: 1 ♀ (105787878). **Loc. 29**: photo: 1 ♀ (105848937). **Loc. 33**: 2 ♂♂ seen. **Loc. 34**: 1 ♂ (102166859); 1 more ♂ and 1 tandem seen. **Loc. 37**: 1 ♀ seen.

Common. This is the earliest among the congeners in our area, so we observed fully mature individuals, except for those in Loc. 27, where they were still ochraceous.

54. *Sympetrum meridionale* (Selys, 1841) (Fig. 53)

Loc. 1: photo in hand: 1 ♂ (105372535). **Loc. 3**: coll.: 1 ♂ (98269912), 1 ♀; photo: 3 immature ♂♂ (98270472, 100476700, 100477759); in hand: 3 ♂♂ (98270266, 98270601, 105372483); many immatures seen. **Loc. 4**: photo: 6 immature ♂♂ (98282066, 98282103, 98282211, 100940795, 105785342), 5 ♀♀ (98281828, 98281878, 98282103, 98282154, 100975445); in hand: 1 ♂ (98281943), ♀ (105448311); enormous amount seen (98283035, 105448314). **Loc. 5**: photo: many immature ♂♂, ♀♀ (98283391, 100979199, 100979360, 100979774, 100983739, 100983920, 100991847, 105448321, 105448334); enormous amount seen. **Loc. 22**: coll.: 1 ♂ (98380088); photo in hand: 1 ♂ (105787777). **Loc. 23**: photo in hand: 1 ♀ (98383546). **Loc. 24**: coll: 1 teneral ♀. **Loc. 27**: coll.: 1♀ (98586610); in hand: 2 ♀♀ (105787898, 105788949); many seen.

A new species for Ural, found at once in eight localities in all three provinces, to the north up to 54.1º N (Loc. 27), and usually in large numbers, especially at Loc. 4 and Loc. 5, where up to several individuals could be observed resting on the same bush branch (Fig. 49). It is needless to say that only immature ones were observed.

55. *Sympetrum vulgatum vulgatum* (Linnaeus, 1758)

Loc. 1: coll.: 1 ♀ (98278458); photo in hand: 2 ♀♀ (98279995, 105448290). **Loc. 2**: coll.: 1 ♂ (98271162, 105372500). **Loc. 4**: photo in hand: 1 immature ♂ (98283087), 1 ♀ (105448315); 2 more ind. seen. **Loc. 5**: photo: 1 ♀ (105448646). **Loc. 6**: photo in hand: 2 teneral ♂♂ (98354390, 105563214), few more seen. **Loc. 8**: photo in hand: 2 ♂♂ (98356316, 105563239), many seen. **Loc. 13**: photo: 1 teneral ♀ (102605139); in hand: 1 teneral ♂ (95976888), 1 teneral ♀ (105916988); very many seen. **Loc. 19**: photo in hand: 2 ♂♂ (98954310, 98954422); quite a few seen. **Loc. 20**: 1 ind. seen. **Loc. 21**: photo: 1 ♂ teneral (102334412); in hand: 2 ♂♂ (98864604, 105916047); many emerging ind. seen. **Loc. 22**: coll.: 1 ♂ (98382608); 1 ♀. **Loc. 23**: 1 seen. **Loc. 24**: coll.: 1 ♀; photo: 1 ♀ (101590115). **Loc. 25**: coll.: 1 ♂ (98601258), 1 immature ♀ (98690871); photo: 1 immature ♂ (101829875), 1 ♀ (101882350); in hand: 1 ♂ (105788916); many seen. **Loc. 27**: photo in hand: 1 ♀ (98691370). **Loc. 28**: photo in hand: 2 ♂♂ (98784135, 105849056), several ♂♂ seen. **Loc. 29**: photo: 1 ♀ (105848940). **Loc. 30**: coll.: 1 ♂ (98694018), 2 ♀♀; photo: 2 ♂♂ (98783462, 102165866), 2 ♀♀ (102014530, 105848963). **Loc. 33**: coll.: 2 ♂♂ (98783655, 105849012); photo: 1 ♂ (102169160); in hand: 1 ♂ (98783501); many seen. 35: photo in hand: 1 ♂ (98176647); few seen. **Loc. 36**: photo in hand: 1 ♀ (105974388). **Loc. 40**: coll.: 1 ♀ (98269488); photo: 1 ♂ (102871944); in hand: 1 ♀ (105974416); many seen.

Nearly omniptesent but rarely very numerous (like at Loc. 13). Almost everywhere only teneral and immature individuals were observed, but at Loc. 19, Loc. 33, Loc. 2, Loc. 28, mature bright-red males were found (at Loc. 33 together with immature ones).

Fig. 53. Numerous immature *Sympetrum meridionale* at Loc. 4 (top left, 105448314) and Loc. 5 (top right, 100979774; bottom, 100983920).

The specimens substantially varied in size. Those from Locs 24 and 30 were remarkably small. In the two females collected (one from each), the hindwing and abdomen (with apendages) were 26 and 22 mm, respectively. In the male collected at Loc. 30 these values were 27 and 24 mm. These dragonflies from Loc. 22 were very large, in the collected female these measurements were 30.5 and 27 mm. All other collected specimens had the hindwing 29 mm, invariably in both sexes, and the abdomen 25-26 mm in males and 25-27 mm in females.

56. *Sympetrum fonscolombii* (Selys, 1840)

Loc. 5: coll.: 2 old ♂♂ (98284286, 98283970, 105448328), 2 ♀♀; photo in hand: 1 old ♂ (105448331), 2 immature ♂♂ (98286831, 98286469, 105448340).

Found at only one southern locality where both immature and old individuals remarkably co-existed, which seemed to result from a complicated migration strategy of this species.

Discussion

The ten issues which motivated our expeditions were provided in introduction and it is reasonable to start with particular results of their investigation.

1) No *Macromia* was found at Lake Bol'shoe Miassovo. We happened not to investigate the exact place of the finding of the enigmatic larva, but based 0.5 km NW from it, although in the same bay. However, macromias are strong fliers, which would reveal themselves if present anywhere at the lake. The enigmatic larval specimen was most probably lost on a series of relocations of materials in the Laboratory of Ecology of Animals at the Institute of Systematics of Ecology of Animals of the Siberian Branch of the Russian Academy of Sicences (ISEA) (O.N. Popova, pers. comm.). (It is not excluded that a larva of *E. bimaculata* of some pre-final stage could be misidentified for that of *Macromia*.) We therefore still doubt in the actual presence of *Macromia* in Ural.

   There is another indirect reason why it is hardly present there. Our observations on *Macromia fraenata* (Martin, 1907) (= *M. amphigena fraenata*, for the current treatment see Kosterin et al. 2025) in South Siberia suggest that the European part of Russia would fit very well to habitation of this species, with respect to natural conditions and similar fauna of other large dragonflies. Most probably its absence there can be explained by inability of this species to cross the West Siberian Plain while its spreading from East Asia, from where it no doubt originated. That plain is so flat that has scarse running water necessary for this species, having instead numerous lakes, often brackish, in the south and vast bogs in the north. If this species occurred in Ural, it would inevitably spread further westwards to Europe. (One could think about its introduction to Europe, but this could have disastrous consequences since it seems to be able to displace aeshnids from its riverine habitats.)

2) The locality 144 mentioned with respect to the *Cordulegaster* sighting (Haritonov & Eremina 2010) had the coordinates 54º46' N, 59º38' E (which is 54.77º N, 59.63º E) and indeed points at the exact Miass River source (exactly at the present day Taynaya Stoyanka [Russ. 'Secret Stay'] tourist base) on the short but steep Nurali Mountain Range. On 9.07.2021 we approached the Nurali Range by a hardly permeable muddy ground road to a point some 7.5 km NE of that locality, to find a small brook hardly suitable for *Cordulegaster*, which was the headwaters of the Nishniy Iremel' River, a tributary of the Miass River headwaters. So, we returned somewhat downstream of that river, to our Loc. 20, which was 10.5 km NE from the locality 144 by Haritonov & Eremina (2010). It had a rich odonate fauna and looked very suitable for *Cordulegaster*, which, however, was not found. Next day we moved to Loc. 19, at the same distance to the east from Haritonov's point, with the same result. It is still possible that some other dragonfly was misidentified for *Cordulegatser* by sight. At the same time, occurrence of *Cordulegaster boltoni* in the Russian Plain is very sporadic and seems erratic, not associated with certain stream/river type (maybe some geochemical factor matters?) and so hardly predictable (Onishko & Kosterin 2021; unpublished observations by VO), so it may still hide in Ural as well.

3) No *S. exuberata* was found at Loc. 18 - Nura2, including in the exact point from where the identified female specimen originated, but the expectable and common *S. metallica* were present nearby instead. The specimen in question is not available for examination; perhaps the identification was made by unreliable characters. So, we abstain from

assuming *S. exuberata* to occur in Ural. The westernmost known record of this species is still Novosibirsk (Kosterin 2020a,b; Onishko & Kosterin 2021).

4) The Troitsk Hydropower Station no longer worked so the water in its outlet canal was no longer warm. *E. viridulum*, however, still abounded at this canal, while *L. tetraphylla* was not found, as expectable in this situation.

5) *O. brunneum* is indeed common at Sol'-Iletsk, hereby reported for South Ural in literature for the first time.

6) No *S. postocularis epophthalmus* was found in Rezh District of Sverdlovsk Province, from where it was reported by larvae in internet (but not published in literature). We abstain from assuming this eastern species, with the westernmost (~83º N) known records at Plotnikovo village in Tomsk Province (Bernard & Kosterin 2010) and in Novosibirsk City, to occur in Ural, from where it was reported (Eremina 2025) by a single larval record only.

7) *G. vulgatissimus* from the Gryaznushinskiy village appeared to have yellow femora indeed but are still identifiable as this species.

8) *C. glaciale* was not found at the pond at Slyudorudnik Settlement (Loc. 35 - Slyudorudnik pond), most probably because our trip took place too late for this early flying species. According to Eremina (2010), it was very abundant there on 9.06.2009 but already disappeared to 11.06.2009. So, we ascribe our failure to find the species there to its short flight period (Onishko & Kosterin 2021). Remarkably, in 2003 a number of Uralian observations of this species appeared in iNaturalist (2025) from Chelyabinsk and Sverdlovsk Provinces (Kosterin & Onishko 2025).

9) No *S. graeseri* was found in the Sargaya village environs in Bashkirskiy Nature Reserve, which was quite common there in 2000s (Yanybaeva 2004; Yanybaeva et al. 2006; V. Yanybaeva, pers. comm.). This could be a matter of chance but probably a result of the climate warming associated with extension of the ranges of some southern species to the north but also some withdrawal to the north of the ranges of the northern, boreal species.

10) *Ischnura aralensis* was not found at Lake Bol'shy Tatkul' from where it was reported by Yanybaeva et al. (2006) and Haritonov & Eremina (2010), but its flourishing populations were observed at Lakes Bol'shaya Akulya and Chebarkul', as reported by Haritonov & Eremina (2010).

So, of the ten issues which had motivated our trip, we got positive results for three, partly positive for one and negative for six.

In addition to the above-mentioned *O. brunneum*, three more species, *O. albistylum, O. coerulescens anceps* and *S. meridionale*, were registered in Ural for the first time (for the last published checklist see Haritonov & Eremina 2010). While *O. brunneum* and *O. coerulescens* could just be overlooked since Orenburg Province remained almost unexplored odonatologically, there is no doubt that *O. albistylum* and *S. meridionale*, which were found also in Bashkortodtan, and the latter also in Chelyabinsk Province, have extended their ranges to South Ural from the southern European Russia and/or West Kaza-

khstan as a result of the current climate warming. *S. meridionale* appeared especially numerous and found in as many as eight localities.

It is noteworthy that recently few well identified observations of *S. meridionale* appeared in iNaturalist (2025) also from the West Siberian Plain, from where it had never been reported before, although expected: from the Ishim Town environs, Ishim District, Tyumen' Province (observation 233234350; ♂; 56.01656º N, 69.48561º E; 1.08.2024; by Ekaterina Tsekhmister), the Ozernoe village environs, Russkaya Polyana District, Omsk Province (233740511; ♀; 53.91223º N, 73.77542º E; 4.08.2024; by tatyana555m), the Russkaya Polyana village environs of the same district and province and by the same observer (323478569; ♂; 53.78740º N, 73.89314º E; 5.07.2025), the Malaya Shelkovka village, Egoryevo District, Altaiskiy Kray (176072474; ♀; 51.49575º N, 80.77952º E; 1.08.2023; by Tatyana Kakoshkina), and from Rubtsovsk Town environs, Rubtsovsk District, Altaiskiy Kray (304428012; ♀; 51.53174º N, 81.26028º E; 7.08.2025; by Dmitriy Veretel'nikov). Curiously, the second and fifth of these observations show the dragonflies with water mites, many in the fifth, the presence of which is also a usual feature of this species elsewhere.

Based on our observations on the here reported trip we may also conclude that both species of *Anax* have well established themselves all over South Ural.

All in all, we met 56 species of Odonata (plus a sighting of one more which was not proved) for 12 days of our trip to South Ural (the only locality formally in Middle Ural brought no additional species). This illustrates how rich the Uralian odonate fauna is. An overwhelming majority of these species are widespread in Europe, the exceptions are the Central Palearctic species *I. aralensis* and the Eastern Palearctic species *C. ecornutum*, which find in Ural the western limit of its current range.

Beyond the above-mentioned ones, eight more species which we did not meet have been reliably reported for South Ural (not counting two more reported unreliably) (Haritonov & Eremina 2010). Of them we more or less expected to find *Lestes macrostigma* (Eversmann, 1836), *Coenagrion lunulatum* (Charpentier, 1840), *Leucorrhinia dubia* (Vander Linden, 1825), *L. rubicunda* (Linnaeus, 1758) and *Brachytron pratense* (Müller, 1767). Three of them have early flight periods so we most probably missed them just visiting the region in July, while *L. marcostigma* prefers brackish water which we did not come across. At the same time *L. dubia* could well be met with, e.g. on bogs of Locs 31 and 38. *Aeshna caerulea* (Ström, 1783) and *Somatochlora alpestris* (Selys, 1840) should be sought in the taiga zone higher in the mountains, while *Selysothemis nigra* (Vander Linden, 1825) was a singular and very strange record (by the way at our Loc. 10).

No doubt, the Odonata fauna of Ural deserves further studies, at least to monitor the rapid faunal change going on at present, and also to make further unexpected discoveries.

Acknowledgements

We are deeply grateful to Aleksandr V. Lagunov and Vasilya A. Yanybaeva for arrangements and help in Il'menskiy and Bashkirskiy State Nature Reserves, respectively, to Pavel Gorbunov for his help in the Nizhniy Iremel' River headwaters, to Ekaterina Eremina and Olga Popova for their consultations, and to Martin Schorr for permanent various help. Gerard Chartier has kindly taken a labour of checking the language.

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