

Materials on the fauna of dragonflies (Odonata) of the Taimyrskii Dolgano-Nenetskii District (Krasnoyarskii Krai, Russia)

Материалы по фауне стрекоз (Odonata) Таймырского Долгано-Ненецкого района (Красноярский Край, Россия)

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Ключевые слова: Odonata, *Coenagrion hylas*, *Somatochlora sahlbergi*, Таймыр, плато Путорана, северные пределы распространения.

Abstract. Materials on the dragonfly fauna of the Taimyrskii Dolgano-Nenetskii District (Krasnoyarskii Krai) are summarized. In total, 70 locations are indicated for 13 species of dragonflies (*Coenagrion hylas*, *C. johannsoni*, *Enallagma cyathigerum cyathigerum*, *Aeshna caerulea*, *Ae. juncea*, *Ae. subarctica*, *Cordulia aenea aenea*, *Somatochlora alpestris*, *S. arctica*, *S. sahlbergi*, *Leucorrhinia orientalis*, *Sympetrum danae*, *S. flaveolum*). For 10 species, the northernmost points of the ranges are located in the study area.

Резюме. Обобщены материалы по фауне стрекоз Таймырского Долгано-Ненецкого района (Красноярский Край). В общей сложности указывается 70 локаций для 13 видов стрекоз (*Coenagrion hylas*, *C. johannsoni*, *Enallagma cyathigerum cyathigerum*, *Aeshna caerulea*, *Ae. juncea*, *Ae. subarctica*, *Cordulia a. aenea*, *Somatochlora alpestris*, *S. arctica*, *S. sahlbergi*, *Leucorrhinia orientalis*, *Sympetrum danae*, *S. flaveolum*). Для 10 видов в исследуемом районе находятся самые северные точки ареалов.

Introduction

The dragonfly fauna of the polar part of Russia is still poorly studied, which is largely due to the inaccessibility of the regions of the Far North and, often, the lack of roads there. Such territories include the Taimyrskii Dolgano-Nenetskii District of the Krasnoyarskii Krai. Until 2007, this administrative-territorial region was called the Taimyrskii (Dolgano-Nenetskii) Autonomous Okrug. The region is entirely located beyond the Arctic Circle. Its southern border is north of 67° N. In administrative boundaries, it covers the Taimyr Peninsula, the Lower Yenisey River Valley, the northwestern part of the Putorana Plateau, and the Khatanga Depression. The total area of the district is 879900 km². It occupies about a third of the territory of the territory of Krasnoyarskii Krai and is larger than the territory of any European country.

The history of the study of the odonatofauna of this area began with the legendary Swedish expedition

along the Yenisey River in 1876. Later, F. Trybom [1889] published an article about dragonflies collected during this journey, which was the most difficult for those times. The collected information was unique in many respects and has not lost its relevance to the present day. This article listed a total of 20 species and provided data on the sites and dates of collections of dragonflies along the Yenisey River from Yeniseysk (58°21' N.) in the south to Dudinka (69°25' N) in the north. According to the map, the distance between these points is 1256 km. The number of specimens collected was not indicated for all species of dragonflies. According to M. Hämäläinen [2015], it could be from 50 to 100 copies. Most of them were collected by F. Trybom himself. Only six specimens of four species were collected by J. Sahlberg during his solitary journey in the lower reaches of the Yenisey [Hämäläinen, 2015]. As a result, F. Trybom [1889] described four new species: «*Somatochlora sibirica*, n.sp.», «*Somatochlora Sahlbergi* n.sp.», «*Somatochlora? Theeli* n.sp» and «*Agrion Hylas* n.sp.» Later K.J. Valle [1931], after examining the specimens collected by the expedition and stored in the Swedish Museum of Natural History in Stockholm, found that only two species were valid, namely *S. sahlbergi* and *Coenagrion hylas*.

Within the administrative boundaries of the region under study, we only include a small area in the lower reaches of the Yenisey between the settlements of Plakhino and Dudinka. In the article by F. Trybom [1889], 10 species of dragonflies were indicated for the section of the river between these settlements. Later K.J. Valle [1932], based on the collections of Y. Vuorentaus in 1915, provided additional information about the findings of *Aeshna coerulea* (*Ae. caerulea*) and *S. sahlbergi* here.

More than 60 years after the publication by F. Trybom [1889], the first information about Taimyr

dragonflies appeared. B.F. Belyshev [1953] reported the discovery of *Aeshna subarctica* at Cape Chelyuskin, the northernmost continental point in the world. In addition to this, K.B. Gorodkov [1956] indicated two more species for the northern part of Taimyr: *Aeshna squamata* (*Ae. caerulea*) and *Somatochlora arctica*. So far, these unique data indicated the northernmost locations of dragonflies on the planet. Further, based on the above literature data, B.F. Belyshev and A.Yu. Haritonov [1976] indicated 11 dragonfly species for the Lower Yenisey and Taimyr.

Subsequently, some additional information about the odonatofauna of the study region was published. O.E. Kosterin [1992], in his work on the distribution of *Somatochlora sahlbergi* in Eurasia, along with the already known findings of dragonflies of this species in the lower reaches of the Yenisey, also indicated the location in Khatanga. A.V. Kuvaev [2007] indicated three species for the former Khatanga region. Finally, T. Brockhaus [2022], in a review of the dragonfly fauna of the polar regions of the Palearctic, with reference to the iNaturalist Internet platform [2022], cited *Sympetrum danae* and *S. flaveolum* for the Putorana Plateau.

Thus, according to the literature data, 13 species of dragonflies are currently known on the territory of the Taimyrskii Dolgano-Nenetskii District.

In July 2022, the author and colleagues from the Institute of Systematics and Ecology of Animals of the Siberian Branch of the Russian Academy of Sciences (hereinafter ISEA), Novosibirsk, collected dragonflies in the southwestern part of this district, which covers the Lower Yenisey River valley and the north-western spurs of the Putorana Plateau.

The purpose of this work is to summarize the currently available information on the odonatofauna of

the Taimyrskii Dolgano-Nenetskii District. At the same time, along with literary sources, extensive data from the iNaturalist [2022] Internet platform were used. The 'research grade' (confirmed by other users) iNaturalist observations are adopted by Global Biodiversity Informational Facility (GBIF) and are recommended to be referred to in scientific literature as a whole (with a single DOI index) as iNaturalist contributors, iNaturalist [2022].

Material and methods

When summarizing data on the dragonfly fauna of the study area, the following materials were used:

(1) collections of dragonflies in July 2022 (63 specimens of 6 species) and collection materials of the ISEA SB RAS (Novosibirsk) (17 specimens of 4 species);

(2) materials from iNaturalist [2022] (32 observations of 12 species);

(3) literature sources [Trybom, 1898; Valle, 1931, 1932; Belyshev, 1953; Gorodkov, 1956; Kosterin, 1992; Kuvaev, 2007] (20 locations of 11 species).

In total, there is information on dragonflies from 70 locations, which are indicated on the schematic maps of Figs 1, 2, 3.

Results

LIST OF LOCATIONS WITH ODONATA RECORDS

I. Locations of dragonflies according to collections in 2022 and ISEA collection materials (locations 1–18) (Fig. 1)

Loc. 1. Taimyr, the mouth of the Yenisey River, the village of Nosok ($70^{\circ}09'51''$ N, $82^{\circ}20'43''$ E), 15.07.1977, A.V. Barkalov (ISEA).

Loc. 2. Helipad, 1 km northeast of Dudinka, $69^{\circ}26'01''$ N, $86^{\circ}10'36''$ E, 10.07.2022, N.V. Lopatina.



Fig. 1. Map of the southwestern part of the Taimyrskii Dolgano-Nenetskii District with the designation of dragonfly collection sites in 2022 and collection materials (ISEA). Location numbers correspond to those in the Location List.

Рис. 1. Карта юго-западной части Таймырского Долгано-Ненецкого района с обозначением мест сбора стрекоз в 2022 году и коллекционным материалам (ISEA). Номера локаций соответствуют таковым в Списке местонахождений.

Loc. 3. The northern outskirts of Dudinka, a small lake (10 x 30 m) in a roadside ditch, 69°25'28" N, 86°09'50" E, 16.07.2022, S.N. Borisov.

Loc. 4 (Fig. 4). Lake (50 x 70 m) near the Dudinka-Norilsk highway near the bridge over the Bystryi Stream, 7 km east of Dudinka, 69°25'06" N, 86°27'13" E, 16, 18.07.2022, S.N. Borisov.

Loc. 5. The bank of the Kosaya River near the bridge on the Dudinka-Norilsk highway, 11 km east of Dudinka, 69°25'00" N, 86°31'50" E, 16.07.2022, V.V. Glupov.

Loc. 6. Lake (50 x 400 m), 1 km southeast of the bridge across the Kosaya River on the Dudinka-Norilsk highway, 12 km east of Dudinka, 69°24'48" N, 86°32'54" E, 16.07.2022, S.N. Borisov.

Loc. 7. At the bridge over the Ozernyi Stream on the Dudinka-Norilsk highway, 22 km east of Dudinka, 69°22'30" N, 86°48'10" E, 3.07.2022, G.N. Azarkina, O.G. Buleu, A.A. Gurina, I.K. Iakovlev.

Loc. 8. A small lake (10 x 20 m) near the Dudinka-Norilsk highway, 34 km east of Dudinka, 69°23'25" E, 87°05'44" E, 15.07.2022, S.N. Borisov.

Loc. 9. A small lake (20 x 30 m) next to the bridge over the Bolgokhtokh River on the Dudinka-Norilsk highway, 38 km east of Dudinka, 69°22'38" N, 87°13'16" E, 15–16.07.2022, S.N. Borisov.

Loc. 10 (Fig. 5). Lake (20 x 150 m) in the floodplain of the Ambarnaya River, 1 km below the bridge on the Norilsk-Dudinka highway, 10 km west of Kayerkan, 69°22'17" N, 87°31'25" E, 19.07.2022, S.N. Borisov.

Loc. 11. Lake (10 x 80 m) near the Norilsk-Dudinka highway near the bridge over the Ambarnaya River, 9 km west of Kayerkan, 69°22'24" N, 87°32'13" E, 19.07.2022, S.N. Borisov.

Loc. 12. Lake (40 x 100 m) near the Norilsk-Dudinka highway, 8 km west of Kayerkan, 69°22'16" N, 87°32'40" E, 18.07.2022, S.N. Borisov.

Loc. 13. Norilsk, southeast corner of Dolgoe Lake (0.7 x 2 km), 69°20'48" N, 88°10'05" E, 17.07.2022, S.N. Borisov.

Loc. 14. Eastern outskirts of Norilsk, lake, 69°20'36" N, 88°15'14" E, 5.07.2022, I.I. Lyubechanskii, F.A. Abrashitov.

Loc. 15. Lakes near the Norilsk-Talnakh highway between the village of Valek and the turn to Oganer, 5 km northeast of Norilsk, 69°22'47" N, 88°20'56" E, 19.07.2022, F.A. Abrashitov.

Loc. 16 (Fig. 6). Valek village, coastal forest and lakes on the western bank of the Norilskaya River near the bridge on the Norilsk-Talnakh highway, 6 km northeast of Norilsk, 69°24'55" N, 88°17'27" E, 19.07.2022, I.I. Lyubechanskii, F.A. Abrashitov.

Loc. 16a. Taimyr, Valek, 6.07.1977, A.V. Barkalov (ISEA).

Loc. 16b. Norilsk, the Listvyanka River (a tributary of the Valek River, flows parallel to the Valkovskoye Highway), 6.08.1964, G.S. Zolotarenko (ISEA).

Loc. 17. Southern outskirts of Talnakh at the entrance, 69°28'35" N, 88°23'00" E, 4.07.2022, F.A. Abrashitov, G.N. Azarkina, O.G. Buleu, A.A. Gurina, I.K. Iakovlev.

Loc. 17a. Norilsk, Talnakh, 29.07.1964, Chelyaev, Kharikova (ISEA).

Loc. 17b. Norilsk, Talnakh, 21.07.1964, Ermolenko (ISEA).

Loc. 17c. Norilsk, Talnakh, 5.08.1964, G.S. Zolotarenko (ISEA).

Loc. 18 (Fig. 7). Lake in the Red Stones Gorge, 6 km east of Talnakh, 69°28'51" N, 88°31'52" E, 05, 20.07.2022, I.I. Lyubechanskii.

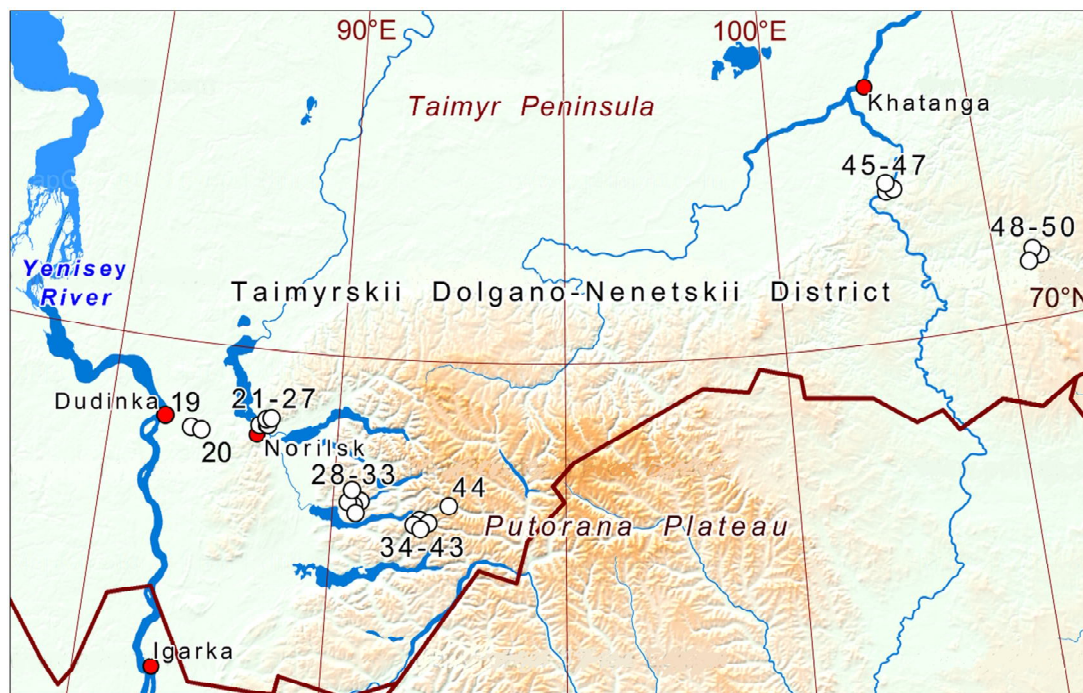


Fig. 2. Map of the southern part of the Taimyrskii Dolgano-Nenetskii District with designation of dragonfly photography sites based on iNaturalist [2022] materials. Location numbers correspond to those in the Location List.

Рис. 2. Карта южной части Таймырского Долгано-Ненецкого района с обозначением мест фотографирования стрекоз по материалам iNaturalist [2022]. Номера локаций соответствуют таковым в Списке местонахождений.

II. Locations of dragonflies according to the photo data of the Internet platform iNaturalist [2022] (locations 19–50) (Fig. 2)

All photographic observations on this Internet platform are geo-referenced in the form of coordinates in decimal degrees, which we provide with an accuracy of four decimal digits. Hyperlinks to specific observations are of the form <http://inaturalist.org/observations/xxxx>, where xxxx is the unique identification number of the observation, which we provide in brackets.

Loc. 19. (126800634): 25 km southeast of Dudinka, 69.3360° N, 86.9056° E, 08.07.2022, photo of a male of *Aeshna caerulea*, A. Maslov.

Loc. 20. (126800774): 25 km southeast of Dudinka, 69.3366° N, 86.8880° E, 08.07.2022, photo of female of *Leucorrhinia orientalis*, A. Maslov.

Loc. 21. (126019893): approximately 7 km northeast of Norilsk, 1.3 km northwest of the bridge over the Norilsk River, 69.4174° N, 88.2628° E, 02.07.2022, photo of a male of *Enallagma c. cyathigerum*, A. Maslov.

Loc. 22. (126019791): approximately 7 km northeast of Norilsk, 1.3 km northwest of the bridge over the Norilsk River, 69.4197° N, 88.2686° E, 02.07.2022, photo of a female of *Leucorrhinia orientalis*, A. Maslov.

Loc. 23. (51674752): northern part of Valek village, 7 km northeast of Norilsk, 69.4100° N, 88.3020° E, 01.07.2015, photo of a teneral male of *Enallagma c. cyathigerum*, V. Strekalovskaya.

Loc. 24. (51674927): 9 km northeast of Norilsk, 2 km northeast of the bridge across the Norilskaya River, 69.4297° N, 88.3400° E, 08.08.2014, photo of a female of *Aeshna juncea*, V. Strekalovskaya.

Loc. 25. (125795945): 11 km northeast of Norilsk, 2.5 km northeast of the bridge across the Norilskaya River, 69.4368° N, 88.3331° E, 11.07.2022, photo of a male of *Enallagma c. cyathigerum*, I. Pospelov.

Loc. 26. (103356264): recreation center «Mechta», 1.3 km south of Talnakh, 69.4674° N, 88.3995° E, 21.06.2021, photo of a male of *Cordulia a. aenea*, V. Strekalovskaya.

Loc. 27. (51253127): 4 km southeast of Talnakh, 69.4761° N, 88.5036° E, 28.06.2020, photo of a female of *Aeshna juncea*, I. Pospelov.

Loc. 28. (94081671): at the western end of Lake Nakomyaken, about 100 km southeast of Norilsk, 68.8716° N, 90.4157° E, 15.07.2021, photo of a male of *Leucorrhinia orientalis*, I. Pospelov.

Loc. 29. (94082729): at the western end of Lake Nakomyaken, about 100 km southeast of Norilsk, 68.8805° N, 90.4602° E, 22.07.2021, photo of a male of *Aeshna juncea*, I. Pospelov.

Loc. 30. (94082783): at the western end of Lake Nakomyaken, about 100 km southeast of Norilsk, 68.8842° N, 90.4657° E, 22.07.2021, photo of a teneral male of *Soma-tochlora arctica*, I. Pospelov.

Loc. 31. (94082928): at the western end of Lake Nakomyaken, about 100 km southeast of Norilsk, 68.8843° N, 90.4688° E, 22.07.2021, photo of a male of *Enallagma c. cyathigerum*, I. Pospelov.

Loc. 32. (94086551): southwestern tip of Lake Nakomyaken, approximately 105 km southeast of Norilsk, 68.8568° N, 90.6444° E, 06.08.2021, photo of a male of *Leucorrhinia orientalis*, I. Pospelov.

Loc. 33. (94085095): southwestern tip of Lake Nakomyaken, approximately 105 km southeast of Norilsk, 68.8592° N, 90.6280° E, 31.07.2021, photo of a female of *Aeshna caerulea*, I. Pospelov.

Loc. 34. (65822568): Lake Kutaramakan, a small island at the mouth of the Irkingda River, about 160 km southeast of

Norilsk, 68.7730° N, 91.8658° E, 25.07.2020, photo of a tandem of *Coenagrion hylas*, I. Pospelov.

Loc. 35. (65822743): Lake Kutaramakan, a small island at the mouth of the Irkingda River, about 160 km southeast of Norilsk, 68.7729° N, 91.8662° E, 25.07.2020, photo of a male and female (in copula) of *Aeshna juncea*, I. Pospelov.

Loc. 36. (65758270): Lake Kutaramakan, mouth of the Irkingda River, about 160 km southeast of Norilsk, 68.7764° N, 91.8944° E, 6.07.2020, photo of a tandem of *Coenagrion hylas*, I. Pospelov.

Loc. 37. (65821690): Lake Kutaramakan, mouth of the Irkingda River, about 160 km southeast of Norilsk, 68.7646° N, 91.8913° E, 24.07.2020, photo of a female (teneral) and exuvia of *Sympetrum danae*, I. Pospelov.

Loc. 38. (65826892): Lake Kutaramakan, mouth of the Irkingda River, about 160 km southeast of Norilsk, 68.7601° N, 91.8921° E, 6.08.2020, photo of a male (teneral) of *Sympetrum danae*, I. Pospelov.

Loc. 39. (65829705): Lake Kutaramakan, opposite shore opposite the mouth of the Irkingda River, about 160 km southeast of Norilsk, 68.8015° N, 91.9160° E, 10.08.2020, photo of a female (oviposition) of *Aeshna juncea*, I. Pospelov.

Loc. 40. (65756544): Lake Kutaramakan, mouth of the Irkingda River, about 160 km southeast of Norilsk, 68.7766° N, 91.8927° E, 6.07.2020, photo of a tandem of *Coenagrion johanssoni*, I. Pospelov.

Loc. 41. (65758591): Lake Kutaramakan, mouth of the Irkingda River, about 160 km southeast of Norilsk, 68.7762° N, 91.8954° E, 6.07.2020, photo of a male of *Leucorrhinia orientalis*, I. Pospelov.

Loc. 42. (65830899): Lake Kutaramakan, mouth of the Irkingda River, about 160 km southeast of Norilsk, 68.7861° N, 91.9304° E, 13.08.2020, photo of a male of *Sympetrum flavellum*, I. Pospelov.

Loc. 43. (65756660): Lake Kutaramakan, mouth of the Irkingda River, about 160 km southeast of Norilsk, 68.7761° N, 91.8950° E, 6.07.2020, photo of a tandem of *Coenagrion johanssoni*, I. Pospelov.

Loc. 44. (65823513): the mouth of the Kutaramakan River (at the confluence with the lake of the same name), about 175 km southeast of Norilsk, 68.8934° N, 92.4817° E, 30.07.2020, photo of a female of *Aeshna subarctica*, I. Pospelov.

Loc. 45. (42381906): Kotuy River, about 100 km south of Khatanga, 71.0481° N, 102.3190° E, 18.08.2011, photo of a male of *Aeshna caerulea*, I. Pospelov.

Loc. 46. (42381952): Kotuy River, 90 km south of Khatanga, 71.1616° N, 102.7151° E, 19.08.2011, photo of an ovipositing female of *Aeshna juncea*, I. Pospelov.

Loc. 47. (68263523): Kotuy River, 90 km south of Khatanga, 71.1231° N, 102.5832° E, 12.07.2005, photo of a male of *Coenagrion hylas*, I. Pospelov.

Loc. 48. (68367328): Kotuykan River, about 200 km southeast of Khatanga, 70.5387° N, 105.9659° E, 6.07.2007, photo of a male of *Aeshna caerulea*, I. Pospelov.

Loc. 49. (68370063): Kotuykan River, about 200 km southeast of Khatanga, 70.5370° N, 105.9626° E, 30.06.2007, photo of a teneral male of *Aeshna caerulea*, I. Pospelov.

Loc. 50. (68365025): Kotuykan River, about 200 km southeast of Khatanga, 70.5359° N, 105.9685° E, 02.07.2007, photo of a male of *Leucorrhinia orientalis*, I. Pospelov.

III. Locations of dragonflies according to literature data (locations 51–70) (Fig. 3)

Locations of dragonflies according to literature data are given [Trybom, 1889; Valle, 1931, 1932; Belyshev, 1953; Gorkodkov, 1956; Kosterin, 1992; Kuvaev, 2007]. From the work of

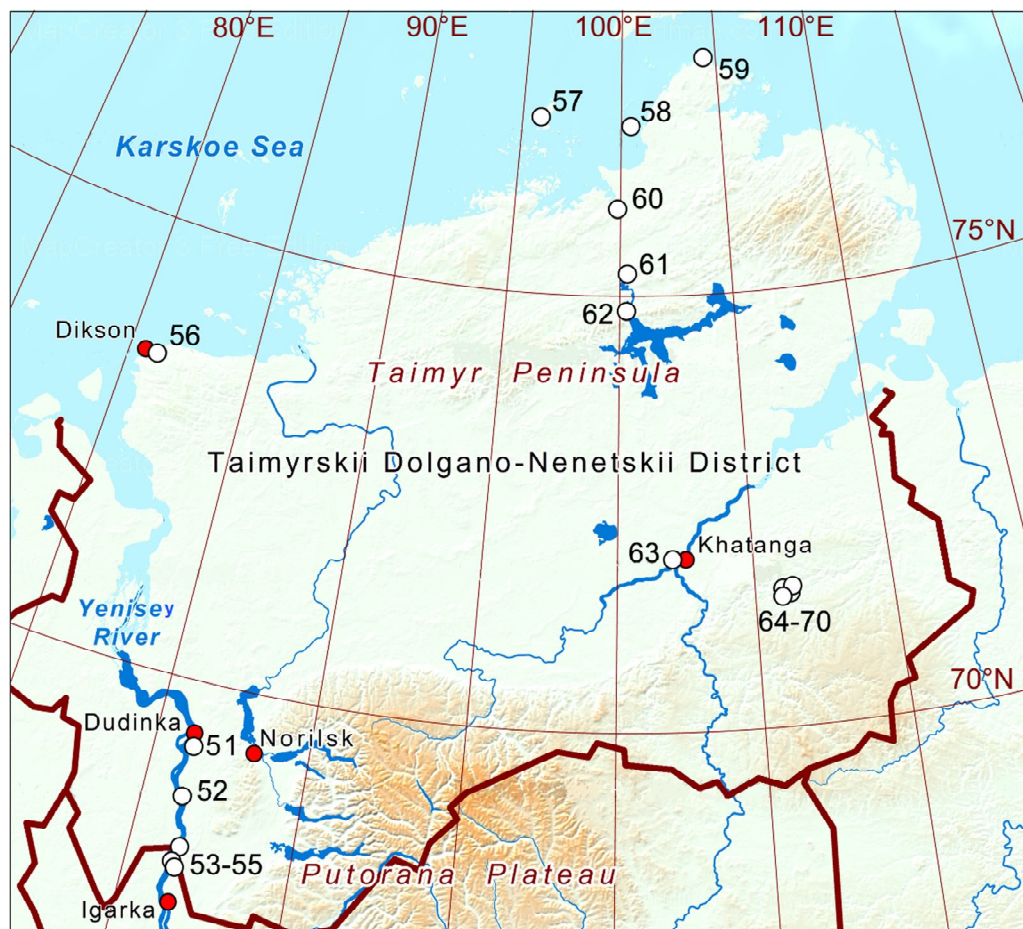


Fig. 3. Map of the Taimyrskii Dolgano-Nenetskii District with the designation of dragonfly collection sites according to literary data. Location numbers correspond to those in the Location List.

Рис. 3. Карта Таймырского Долгано-Ненецкого района с обозначением мест сбора стрекоз по литературным данным. Номера локаций соответствуют таковым в Списке местонахождений.

F. Trybom [1889], only locations within the administrative boundaries of the studied region in the lower reaches of the Yenisey from the village of Dudinka to Plakhino (loc. 51–55) are taken into account. In some cases, the note provides updated coordinates of locations and other explanations.

Loc. 51. [Trybom, 1889]: Dudinka (Dudinskoje), 69°25' N, 30.07.1876, F. Trybom.

Notes: approximate coordinates of Dudinka are 69°24' N, 86°12' E.

Loc. 51a. [Valle, 1931, 1932]: Dudinka, 5.07.1915, Y. Vuorentaus.

Loc. 51b. [Valle, 1932]: Dudinka, 6, 18, 24.07.1915, Y. Vuorentaus.

Loc. 52. [Trybom, 1889]: Potapovskoe (Potapovskoje) 68°55' N, 25.07.1876, F. Trybom.

Notes: the small settlement of Potapovo (modern name) is located on the right bank of the Yenisey — 68°40'54" N, 86°16'33" E, that is, approximately 0°14' degrees of latitude south of the indicated by F. Trybom [1889].

Loc. 52a. [Valle, 1932]: Potapowskoje (Potapovo), 29.07.1915, Y. Vuorentaus.

Loc. 53. [Trybom, 1889]: Khantayka (Chantaika, Chantajskoje), 68°25' N, 19.07.1876, J. Sahlberg.

Notes: in the essay on the Swedish expedition along the Yenisey in 1876, M. Hämäläinen [2015, p. 24] mentioned that

the entomologist J. Sahlberg found «acceptable accommodation» in Khantayka, where he stayed for eight days. The former village of Khantayka (Khantayskoye, or Khantayskoye winter hut) was located in the Khantai Tract on the right bank of the Yenisey at the mouth of the Galevka River. This place is located 15 km (downstream of the Yenisey) from the mouth of the Khantayka River [Krasnoyarskii Krai... 2007: page 38; <https://www.marshruty.ru/Maps/Maps.aspx?x=86.1949348453343&y=68.74376538861121&z=10&t=4>] and has coordinates 68°15'35" N, 86°37'22" E, that is, the latitude is slightly different from the indicated F. Trybom [1889].

Loc. 54. [Trybom, 1889]: Plakhino (Plachino), 68°55' N, 23.07.1876, F. Trybom.

Notes: the former settlement of Plakhino (nowadays a seasonal fishing camp) was located on the left bank of the Yenisey at the mouth of the Kochevka River and actually has coordinates 67°56'05" N, 86°24'42" E [Krasnoyarskii Krai... 2007: page 38; <https://www.marshruty.ru/Maps/Maps.aspx?x=86.1949348453343&y=68.74376538861121&z=10&t=4>], that is a degree (about 100 km) south of the indicated latitude in the article by F. Trybom [1889]. Trybom [1889: page 4] listed locations in a strict geographical order from south to north but his latitude of 'Plachino' of 68°55' N was obviously out of row unless 68 is corrected to 67. (It is noteworthy that the same latitude of 68°55' was further in the

list ascribed to «Potapovskoje» (Potapovskoe, our Loc. 52). There is no doubt that 68° was just a typo by Trybom. (It should also be noted that this Plakhino should not be confused with another Plakhino in the same Krasnoyarskii Krai, at 57°17' N, 96°45' E in Abanskii District.)

Loc. 54a. [Trybom, 1889]: Plakhino (Plachino), 14.07.1876. J. Sahlberg.

Loc. 55. [Trybom, 1889]: 9 versts from Plakhino (Plachino), 22.07.1876, F. Trybom.

Notes: this place is located about 10 km upstream from Plakhino (67°52' N, 86°32' E).

Loc. 56. [Gorodkov, 1956]: Dikson, Konus Island, 31.07.1948, B.N. Gorodkov, E.S. Korotkevich.

Notes: Coordinates of Konus Island in Dikson Bay are 73°30'22" N, 80°28'14" E.

Loc. 57. [Gorodkov, 1956]: Russkii Island, 77°20' N, 7.08.1948, B.N. Gorodkov, E.S. Korotkevich.

Notes: the coordinates of Russkii Island are 77°02' N, 95°58' E.

Loc. 58. [Gorodkov, 1956]: Cape Sterligov, 75°20' N, 11.08.1948, B.N. Gorodkov, E.S. Korotkevich.

Notes: in fact, the coordinates of Cape Sterligov are 76°57' N 100°27' E, i.e., 1°37' (approximately 160 km) north of the indicated K.B. Gorodkov [1956].

Loc. 59. [Belyshev, 1953]: Cape Chelyuskin, mid-summer (date and year of collection not specified).

Notes: Cape Chelyuskin coordinates are 77°43' N, 104°18' E.

Loc. 59a. [Gorodkov, 1956]: Cape Chelyuskin, 23.07.1948, Medvedeva.

Loc. 60. [Gorodkov, 1956]: Foma Island at the mouth of the Nizhnyaya Taimyra River, 76° N, 30.08.1948, B.A. Tikhomirov, V.M. Sdobnikov.

Notes: This is Fomina Island (modern name) at the mouth of the Nizhnyaya Taimyra River, the northern part of which has the coordinates 75°58' N, 99°50' E.

Loc. 61. [Gorodkov, 1956]: The right bank of the Nizhnyaya Taimyra River, in the area of the Bunge River, 75°20' N, 13.08.1948, B.A. Tikhomirov, V.M. Sdobnikov.

Notes: the actual coordinates of the confluence of the Bunge River in the Nizhnyaya Taimyra River are 75°17' N, 100°06' E.

Loc. 62. [Gorodkov, 1956]: Western shore of Lake Taimyrskoe, opposite to the Betling River, at the head of the Nizhnyaya Taimyra River, 25–26.07.1948, B.A. Tikhomirov, V.M. Sdobnikov.

Notes: in fact, it means the coast opposite to Betling Island (the modern name is Botlina Island), 74°50' N, 100°17' E.

Loc. 63. [Kosterin, 1992]: Khatanga. (Primary data source, specimens and date of collection of *Somatochlora sahlbergi* are not indicated).

Notes: Khatanga village coordinates are 71°58' N, 102°29' E.

Loc. 64. [Kuvaev, 2007]: Khatanga region, northern shore of Western Afanasievskoye Lake (former Khatanga region, about 130 km east-southeast of Khatanga, ca. 71°35' N, 105°59' E), 15.08.2006, A. Kuvaev.

Loc. 65. [Kuvaev, 2007]: Approximately the same as loc. 64, 22.08.2006, A. Kuvaev.

Loc. 66. [Kuvaev, 2007]: Approximately the same as loc. 64, 29.07.2006, A. Kuvaev.

Loc. 67. [Kuvaev, 2007]: Approximately the same as loc. 64, 9.08.2006, A. Kuvaev.

Loc. 68. [Kuvaev, 2007]: Khatanga district, left bank of the Fomich River (former Khatanga district, about 140 km



Fig. 4. Lake (50 x 70 m) near the highway Dudinka-Norilsk (loc. 4). Five species of dragonflies were noted here: *Coenagrion bylas*, *Enallagma c. cyathigerum*, *Aeshna caerulea*, *Somatochlora sahlbergi*, *Leucorrhinia orientalis*. Photo by V.V. Glupov.

Рис. 4. Озеро (50 x 70 м) возле автодороги Дудинка-Норильск (Лос. 4). Здесь отмечено 5 видов стрекоз: *Coenagrion bylas*, *Enallagma c. cyathigerum*, *Aeshna caerulea*, *Somatochlora sahlbergi*, *Leucorrhinia orientalis*. Фото В.В. Глупова.



Fig. 5. Lake (20 x 150 m) in the floodplain of the Ambarnaya River (loc. 10). There are 2 species of dragonflies: *Aeshna caerulea* and *Somatochlora sablbergi*. Photo by S.N. Borisov.

Рис. 5. Озеро (20 x 150 м) в пойме реки Амбарная (loc. 10). Отмечены 2 вида стрекоз: *Aeshna caerulea* и *Somatochlora sablbergi*. Фото С.Н. Борисова.

east-southeast of Khatanga, ca. 71°37' N, 106°22' E), 23.07.2006, A. Kuvaev.

Loc. 69. [Kuvaev, 2007]: Approximately the same as loc. 68, 30.07–19.08.2006, A. Kuvaev.

Loc. 70. [Kuvaev, 2007]: Approximately the same as loc. 68, 17.08.2006, M. Korolyova.

List of recorded species with indication of locations

Coenagrion hylas (Trybom, 1889)

Fig. 8.

Material. Locations: 4 (4♂♂), 6 (6♂♂), 8 (1♂), 9 (2♂♂), 17 (2♂♂).

iNaturalist [2022]: 34 (photo of tandem), 36 (photo of tandem) (Fig. 8), 47 (♂, photo).

Literature. [Trybom, 1889]: 54 (3♂♂).

Coenagrion johanssoni

(Wallengren, 1894)

iNaturalist [2022]: 40 (photo of tandem), 43 (photo of tandem).

Literature. [Trybom, 1889]: 54a (1♀, listed as *Coenagrion concinnum*).

Enallagma cyathigerum cyathigerum (Charpentier, 1840)

Fig. 9.

Material. 4 (1♂, 1♀), 9 (2♂♂, 2♀♀), 13 (1♂, 1♀), 16 (3♂♂), 17 (1♂).

iNaturalist [2022]: 21 (♂, photo), 23 (♂, photo), 25 (♂, photo), 31 (♂, photo) (Fig. 9).

Literature. [Trybom, 1889]: Locations: 54 (numerous, specimens not listed); [Kuvaev, 2007]: Locations: 69 (1♀).

Notes. From a taxonomic point of view, this is a complex species. We are of the opinion that on the territory of Russia the species is represented by two subspecies — the nominative one and *E. c. risi* Schmidt, 1961 [Kosterin, Zaika, 2010; Onishko, Kosterin, 2021].

Aeshna caerulea (Ström, 1783)

Fig. 10.

Material. 4 (1♂) (Fig. 10), 6 (1♀), 10 (1♂), 16 (1♀), 16b (2♂♂).

iNaturalist [2022]: 19 (♂, photo), 33 (♀, photo), 45 (♂, photo), 48 (♂, photo), 49 (♂, photo).

Literature. [Valle, 1932]: 51b (4♂♂), 52a (1♂); [Trybom, 1889]: 55 (listed as *Aeshna borealis*, fairly numerous, specimens not listed); [Gorodkov, 1956]: Locations: 61 (1♂, listed as *Aeshna squamata*), 62 (1♂, listed as *Aeshna squamata*); [Kuvaev, 2007]: Locations: 64 (1♂), 65 (1♂).

Aeshna juncea (Linnaeus, 1758)

Fig. 11.

Material. 2 (1♂), 7 (1♀), 14 (1♂), 15 (1♂, 1♀), 16 (1♀), 17a (4♂♂, 2♀♀), 17c (1♂, 1♀), 18 (2♂♂, 1♀).

iNaturalist [2022]: 24 (♀, photo, Fig. 11), 27 (♀, photo), 29 (♂, photo), 35 (photo of copulating couple), 39 (♀, photo), 46 (♀, photo).

Literature. [Trybom, 1889]: Locations: 55 (instances not listed); [Kuvaev, 2007]: Locations: 68 (1♂).

Aeshna subarctica Walker, 1908

iNaturalist [2022]: 44 (♀, photo).

Literature. [Belyshev, 1953]: 59 (1 copy); [Gorodkov, 1956]: Locations: 58 (2♂♂, 2♀♀), 59a (1♂), 60 (badly damaged copy), 62 (1♂, 1♀).

Notes. The question of whether the Eurasian dragonflies belong to a separate subspecies *Ae. subarctica elisabethae*



Fig. 6. Coastal forest and lake on the western bank of the Noril'skaya River (loc. 16). 4 types of dragonflies are noted here: *Enallagma c. cyathigerum*, *Aeshna caerulea*, *Ae. juncea*, *Leucorrhinia orientalis*. Photo by I.I. Lyubechanskii.

Рис. 6. Прибрежный лес и озеро на западном берегу реки Норильская (loc. 16). Здесь отмечены 4 вида стрекоз: *Enallagma c. cyathigerum*, *Aeshna caerulea*, *Ae. juncea*, *Leucorrhinia orientalis*. Фото И.И. Любечанского.



Fig. 7. A lake in the Red Stones (Krasnye Kamni) gorge, 6 km east of Talnakh (loc. 18). 1 species registered here — *Aeshna juncea*. Photo by I.I. Lyubechanskii.

Рис. 7. Озеро в ущелье Красные Камни в 6 км восточнее Талнаха (loc. 18). Здесь отмечен 1 вид — *Aeshna juncea*. Фото И.И. Любечанского.

Djakonov, 1922 (originally described as a species) remains debatable [Onishko, Kosterin, 2021].

Cordulia aenea aenea (Linnaeus, 1758)

Fig. 12.

iNaturalist [2022]: 26 (♂, photo, Fig. 12).

Literature. [Trybom, 1889]: 52 (instances not listed).

Somatochlora alpestris (Selys, 1840)

Literature. [Trybom, 1889]: 54 (1♀, listed as *Somatochlora sahlbergi*).

Somatochlora arctica (Zetterstedt, 1840)

iNaturalist [2022]: 30 (♂, photo).

Literature. [Trybom, 1889]: 55 (1♂, 1♀); [Gorodkov, 1956]: Locations: 56 (1♂), 57 (1♂).

Somatochlora sahlbergi Trybom, 1889

Fig. 13.

Material. 1 (2♀♀), 3 (2♂♂), 4 (2♂♂, 1♀ (Fig. 13)), 5 (1♂, 1♀), 8 (2♂♂), 9 (2♂♂), 10 (1♂), 11 (1♂), 12 (1♂).

Literature. [Trybom, 1889]: 51 (1♂), 52 (1♀, listed as *Somatochlora teeli*), 53 (1♀, listed as *Somatochlora teeli*), 54 (2♂♂, 1♀); [Valle, 1931, 1932]: Locations: 51a (2♀♀); [Kosterin, 1992]: Locations: 63 (instances not listed); [Kuvaev, 2007]: Locations: 66 (1♀), 67 (1♀), 70 (1♀).

Leucorrhinia orientalis Selys, 1887

Fig. 14.

Material. 4 (1♀), 15 (1♀), 16 (1♀), 16a (1♂), 17 (8♂♂, 1♀), 17a (1♂), 17b (1♂).

iNaturalist [2022]: 20 (♀, photo), 22 (♀, photo), 28 (♂, photo), 32 (♂, photo, Fig. 14), 41 (♂, photo), 50 (♂, photo).

Literature. [Trybom, 1889]: 53 (2♂♂, listed as *Leucorrhinia dubia*), 54 (instances not listed, listed as *Leucorrhinia dubia*), 55 (instances not listed, listed as *Leucorrhinia dubia*).

Notes. The status of a pair of similar taxa *Leucorrhinia dubia* Vander Linden, 1825 and *L. orientalis* is currently under debate [Kalkman et al., 2015a; Onishko, Kosterin, 2021]. The first of them is widely distributed in the west of Northern Eurasia, while *L. orientalis* is widespread in the east. In this work, following V.V. Onishko and O.E. Kosterin [2021], we consider these taxa as separate species.

Sympetrum danae (Sulzer, 1776)

iNaturalist [2022]: 37 (♀, photo(teneral) and exuvia), 38 (♂, photo).

Sympetrum flaveolum (Linnaeus, 1758)

Fig. 15.

iNaturalist [2022]: 42 (♂, photo, Fig. 15).

Discussion

To date, 13 species of dragonflies are known in the Taimyrskii Dolgano-Nenetskii District, a review of which, with an emphasis on their high-latitude distribution, is given below. Ten species in this area have the northernmost points of their ranges.

***Coenagrion hylas*.** The distribution of *C. hylas* is peculiar. Its main range is located in the eastern part of the Palaearctic and, at the same time, it lives locally

in the Alps. It is also locally distributed in the northern regions of Eastern Europe [Bernard, Daraž, 2010; Boudot et al., 2015; Tatarinov et al., 2015; Brockhaus, 2019; Onishko, Kosterin, 2021]. In the forest-tundra of the West Siberian Plain (including the Eastern Urals), this species is already quite common, while to the south, in the taiga zone of West Siberia, it was not found [Belyshev, Korshunov, 1976; Haritonov, 1976; Belyshev, Haritonov, 1980; Brockhaus, 2019].

It is noteworthy that *C. hylas* was described from the region under study — from the village of Plakhino on the Yenisey [Trybom, 1889] (Fig. 3, loc. 54). We found *C. hylas* in five places on small lakes along the Dudinka–Norilsk–Talnakh highway (the latitude of all these locations exceeds 69° N). According to *iNaturalist* [2022], this species was also recorded in two places in the west of the Putorana Plateau and in the Khatanga Depression (Kotuy River, 71°07'23" N) (Fig. 2, loc. 47). This location is by now the northernmost point in the range of *C. hylas*.

***Coenagrion johanssoni*.** This species is widely distributed in the boreal and temperate zones of Eurasia. In Northern Europe, it reaches up to 70° N [Boudot, Sahlén, 2015].

We did not find this species. Only three records of *C. johanssoni* are known so far from the study area. One female was caught near the village of Plakhino on the Yenisey [Trybom, 1889] (Fig. 3, loc. 54a) and, according to *iNaturalist* [2022], this species was recorded in two places on Lake Kutaramakan in the northwestern part of the Putorana Plateau. One of these locations lies at 68°46'36" N (Fig. 2, loc. 40). For *C. johanssoni* in the Russian part of the range, this is the northernmost finding.

***Enallagma cyathigerum cyathigerum*.** A species widely distributed in the Palearctic, with most (northern) part of its range is occupied by the subspecies *E. c. cyathigerum*. In Scandinavia, it is distributed up to the northern limits of the mainland (up to 70° N) [Kalkman, Kitanova, 2015].

In our study area, *E. c. cyathigerum* was a very common species (5 locations). F. Trybom [1889] lists it as abundant for Plakhino on the Yenisey (Fig. 3, loc. 54). According to *iNaturalist* [2022], this species was recorded in the vicinity of Norilsk and Talnakh, as well as in the northwestern part of the Putorana Plateau on Lake Nakomyaken (Fig. 2, loc. 31). Finally, according to the materials of the Chronicle of Nature of the Taimyr Reserve [Kuvaev, 2007], *E. c. cyathigerum* was recorded on the Fomich River (former Khatanga district) at 71°37' N (Fig. 3, loc. 69). By now, this is the northernmost point of the range of *E. c. cyathigerum*.

***Aeshna caerulea*.** A circumboreal species, widespread in the boreal and temperate zones of Eurasia. Judging by the outline of the boundaries of its range [Kalkman, Monnerat, 2015], which looks rather arbitrary, it everywhere reaches the northern limits of the mainland. In Russia, the species occurs close to the northern coast of the Kola and Taimyr Peninsulas [Onishko, Kosterin, 2021].

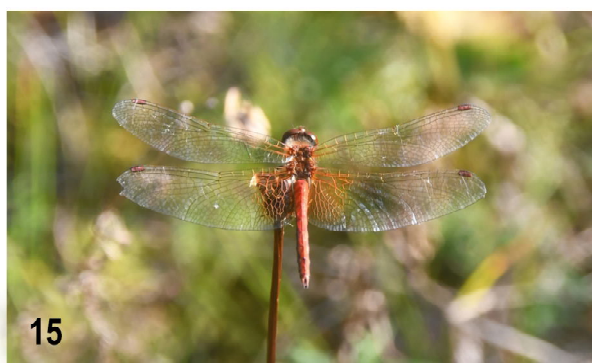
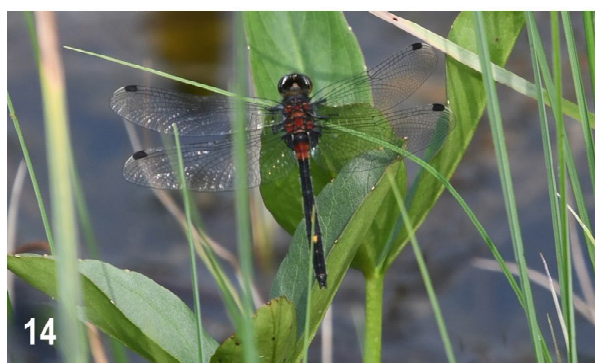


Fig. 8-15. Dragonfly species photograph from different localities: 8 — tandem of *Coenagrion hylas* (loc. 36); 9 — male of *Enallagma c. cyathigerum* (loc. 31); 10 — male of *Aeshna caerulea* (loc. 4); 11- female of *Aeshna juncea* (loc. 24); 12 — male of *C. a. aenea* (loc. 26); 13 — female of *Somatochlora sablbergi* (loc. 4); 14 — male of *Leucorrhinia orientalis* (loc. 32); 15 — male of *Sympetrum flaveolum* (loc. 42). Photograph 8, 9, 14, 15 by I. Pospelov, 10, 13 by V.V. Glupov, 11, 12 by V. Strekalovskaya.

Рис. 8-15. Избранные фото стрекоз из различных локаций: 8 — тандем *Coenagrion hylas* (loc. 36); 9 — самец *Enallagma c. cyathigerum* (loc. 31); 10 — самец *Aeshna caerulea* (loc. 4); 11- самка *Aeshna juncea* (loc. 24); 12 — самец *C. a. aenea* (loc. 26); 13 — самка *Somatochlora sablbergi* (loc. 4); 14 — самец *Leucorrhinia orientalis* (loc. 32); 15 — самец *Sympetrum flaveolum* (loc. 42). Фото 8, 9, 14, 15 — И. Поспелова, 10, 13 — В.В. Глупова, 11, 12 — В. Стрекаловской.

In the study area, *Ae. caerulea* is fairly widespread (17 locations). On the Nizhnyaya Taimyra River, this species was recorded at 75°20' N (Fig. 3, loc. 61) [Gorodkov, 1956]. This site is located approximately 140 km southeast of the coastline of the Karskoe Sea and is the northernmost point of the range for the species.

***Aeshna juncea*.** A circumboreal species. In Northern Europe, it is distributed up to the coasts of the northern seas [Kalkman et al., 2015b]. In Russia, it is distributed almost everywhere. To the north goes up to 70° N (Kola Peninsula, Yenisey and Lena valleys) [Onishko, Kosterin, 2021].

In the study area, the species was common in the areas of Dudinka, Norilsk and Talnakh. According to iNaturalist [2022], it was recorded on the Putorana Plateau on the Nakomyaken and Kutaramakan lakes and in the Khatangskaya Depression on the Kotui River. The northernmost location was established on the Fomich River in the former Khatangskii district — 71°37' N (Fig. 3, loc. 68) [Kuvaev, 2007]. It is currently the northernmost point throughout the range of *Ae. juncea*.

***Aeshna subarctica*.** A circumboreal species, widespread in the boreal and temperate zones of Eurasia.

We have not found this species. According to literature data, it was recorded in the northern part of Taimyr up to the coast, including at the northernmost point of the mainland — Cape Chelyuskin (77°43' N). This is the northernmost location, both for this species and for dragonflies in general [Belyshev, 1953; Gorodkov, 1956]. According to iNaturalist [2022], this species is also known from the Putorana Plateau at the mouth of the Kutaramakan River (Fig. 2, loc. 44).

***Cordulia aenea aenea*.** Eurasian boreal-temperate species. Europe and Western Siberia are inhabited by the nominative subspecies [Onishko, Kosterin, 2021]. In Scandinavia, *C. a. aenea* is known up to the northern coast (approximately 70° N) [Kalkman, Lohr, 2015]. In the European part of Russia, it was recorded in the Malozemelskaya tundra (Golodnaya Guba, 67°40' N) [Tatarinov et al., 2015]. In the northwest of Yakutia, *C. a. aenea* was found near the village of Olenek (68°30' N) [Kosterin, Sivtseva, 2009; Onishko, Kosterin, 2021].

We have not found this species. In the study area, *C. c. aenea* is known from only two findings. F. Trybom [1889] gives it for the village of Potapovo on the Yenisey — 68°41' N (Fig. 3, loc. 52). According to iNaturalist [2022], a male of this species was photographed on June 21, 2021 in the vicinity of Talnakh — 69°28' N (Fig. 2, loc. 26). In the Russian part of the range, this is the northernmost location of *C. c. aenea*.

***Somatochlora alpestris*.** The species is fragmentarily distributed in the Palearctic. In Central and Northern Europe, the Boreo-Alpine distribution is well expressed. In Fennoscandia, it reaches the northern limits of the mainland [Boudot, 2015]. In the European part of Russia, *S. alpestris* is distributed in the north up to the coast of the Barentz Sea (Teriberka, 69.1705° N,

35.1242° E, 15.07.2022, G. Shapoval) [<https://www.inaturalist.org/observations/126382259>] and on east to the Subpolar Urals, and south to approximately 62° N [Tatarinov et al., 2015; Onishko, Kosterin, 2021]. In Russia, this species is more common in the mountains of southern Siberia.

Only three records of *S. alpestris* were previously known in the West Siberian Plain [Onishko, Kosterin, 2021]. The northernmost of them is near the village of Plakhino on the Yenisey. It should be noted that this was the only female from the type series *Somatochlora sahlbergi* Trybom [1889]. As established by K.J. Valle [1931], this female actually belongs to *S. alpestris*. This is the only location of this species in the study region so far (Fig. 3, loc. 54).

***Somatochlora arctica*.** The species has an extensive range covering mainly the boreal and temperate zones of the Palearctic. Local findings are known from the southern mountains [Boudot, Karjalainen, 2015a; Onishko, Kosterin, 2021; Borisov et al., 2022]. This generally northern dragonfly is distributed over most of the territory of Russia and reaches its northern coasts [Onishko, Kosterin, 2021].

The species was not found in the region under study. It is known there from single specimens in only 4 places. F. Trybom [1889] indicates it in 9 versts south of Plakhino (Fig. 3, loc. 55). According to iNaturalist [2022], *S. arctica* was recorded on Lake Nakomyaken in the northwestern part of the Putorana Plateau (Fig. 2, loc. 30). K.B. Gorodkov [1956] reported this species for Konus Island near Dikson (73°30' N) and Russkii Island (77°02' N) in the Karskoe Sea (Fig. 3, loc. 56, 57). The latter locations are the northernmost ones throughout the range of *S. arctica*.

***Somatochlora sahlbergi*.** *S. sahlbergi* is very popular among odonatologists as «the northernmost dragonfly» and is considered one of the rarest and least studied species both in Russia and in other parts of its range [Kosterin, 1992; Schröter, 2011; Hämäläinen, 2015; Onishko, Kosterin, 2021].

S. sahlbergi was described by F. Trybom [1889, p. 7–8] from the lower reaches of the Yenisey. Another new species, *Somatochlora theeli*, was also described from there [Trybom, 1889, p. 8–10]. Later K.J. Valle [1931] studied the type specimens of *S. sahlbergi* and *S. theeli* kept in the Swedish Museum of Natural History in Stockholm, as well as two females of *S. sahlbergi* collected by Y. Vuorentaus in 1915 in Dudinka. As a result, he found out that the only female from the type series *S. sahlbergi* actually belonged to *S. alpestris* (see above), and both *S. theeli* females are *S. sahlbergi*. So K.J. Valle [1931] made *S. theeli* synonym of *S. sahlbergi*, most probably since only the type series of *S. sahlbergi* had males and perhaps since *S. sahlbergi* was described a page higher than *S. theeli*.

The circumboreal (or «beringian» [Schröter, 2011; Schröter et al., 2012]) species *S. sahlbergi* has a vast transcontinental range in the arctic and subarctic regions of Eurasia, as well as in Alaska and northwestern

Canada. At the same time, this species is locally, but generally very widespread, distributed in the south and east of Siberia. Here its range reaches the border of Mongolia and the Japanese island of Hokkaido [Kosterin, 1992; Schröter, 2011; Budo, Karjalainen, 2015b; Onishko, Kosterin, 2021]. In this way, in Europe this species is known not south of 67° N, in North America — not south of 63° N, and in Asia *S. sahlbergi* is distributed to 43°55' N. [Onishko, Kosterin, 2021].

For a long time, *S. sahlbergi* was known in the study area only from old data from the lower reaches of the Yenisey [Trybom, 1889; Valle, 1931, 1932]. Later B.F. Belyshev and A.Yu. Haritonov [1981, p. 232] mentioned that «as a rule, *S. sahlbergi* is found even among random collections of dragonflies, containing solitary specimens made in Yamal, Gydan, and Taimyr», but these authors did not provide any specific data on finds in Taimyr. O.E. Kosterin [1992, p. 23] indicated the point «Taimyr, Khatanga» on the distribution map of *S. sahlbergi*, but also without reference to the original source. Later, A. Schröter [2011] also referred to this «Khatanga» point. The village of Khatanga is located at 71°58' N (Fig. 3, loc. 63). Finally, according to the materials of the Chronicle of Nature of the Taimyr Reserve [Kuvaev, 2007], *S. sahlbergi* was recorded in three locations (one female each) located 130–140 km east-southeast of Khatanga (Fig. 3, loc. 66, 67, 70). The northernmost of these points is located at 71°37' N (Fig. 3, loc. 70). Up to now, information on the distribution of *S. sahlbergi* in the study area has been limited only to these data.

Our research in July 2022 showed that *S. sahlbergi* is quite common, but not numerous, on small lakes along the Dudinka-Norilsk-Talnakh highway (13 specimens collected in 8 locations). Of particular note is a previously unpublished record of this species near the village of Nosok at the mouth of the Yenisey (70°09'51" N) (Fig. 1, loc. 1). Two females were collected on July 15 and 20, 1977 by A.V. Barkalov (ISEA).

Thus, in the studied region, *S. sahlbergi* is distributed only in a narrow forest-tundra zone between 67°56' N (Plakhino) in the south and the latitude of Khatanga (71°58' N) in the north. It should be noted a giant latitudinal gap in the range of this species in most of Siberia, almost 2000 km. In the north, it is distributed in arctic and subarctic regions and, at the same time, it lives in the mountains of southern Siberia [Kosterin, 1992; Schröter, 2011; Onishko, Kosterin, 2021]. The northernmost point of the range of *S. sahlbergi* is currently the Khatanga location at 71°58' N [Kosterin, 1992].

***Leucorrhinia orientalis*.** The range of this species covers Siberia and the Russian Far East south to East Kazakhstan, northern Mongolia, northeastern China, North Korea, and northern Japan [Kalkman et al., 2015; Onishko, Kosterin, 2021].

In the article by F. Trybom [1889] this taxon is given, for the lower reaches of the Yenisey, as *L. dubia* (see taxonomic note to *L. orientalis* above). Further studies showed that *L. orientalis* is widespread in the

north of Asia [Belyshev, Haritonov, 1980; Onishko, Kosterin, 2021].

In the study area, *L. orientalis* is one of the most common species of dragonflies. It is known here from 16 locations. The location in Talnakh (loc. 17, 17a, 17b) — 69°28'35" N, is currently the northernmost point of the range of this species.

***Sympetrum danae*.** A Holarctic species widespread in Eurasia and North America [Kalkman et al., 2015c]. In Russia, this is one of the most common species of dragonflies throughout its territory, and in the north its range covers the Arctic zone. F. Trybom [1889] did not mention this species for the lower reaches of the Yenisey, but V.V. Onishko and O.E. Kosterin [2021], without referring to the original source, indicated the northernmost location of *S. danae* in Khantayka — 68°25' N. It should be clarified that in fact the former settlement of Khantayka was located at 68°15'35" N (see the list of locations in this work).

According to iNaturalist [2022], this species was recorded in two places northwest of the Putorana Plateau at the mouth of the Irkinda River at its fall to Lake Kutaramakan (Fig. 2, loc. 37, 38). These findings were later mentioned by T. Brockhaus [2022]. The northernmost location is at 68°45'53" N. This is by far the northernmost point in the range of *S. danae*.

***Sympetrum flaveolum*.** A boreal-temperate species widespread in Eurasia [Kalkman, Kulijer, 2015]. In Russia, it inhabits almost the entire territory. In the European part, it occurs up to about 66–68° N; in Eastern Siberia, it is known in the middle reaches of the Indigirka River up to 66°27' N [Onishko, Kosterin, 2021].

In the study area, *S. flaveolum*, like the previous species, is known only from the data of iNaturalist [2022]. The only photographic observation was made on August 13, 2020 in the northwestern part of the Putorana Plateau on Lake Kutaramakan (near the mouth of the Irkinda River) at 68°47'10" N (loc. 42). The same finding was later reported by T. Brockhaus [2022]. At present, this is the northernmost point of the range of *S. flaveolum*.

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References

- Belyshev B.F. 1953. [Dragonfly at Cape Chelyuskin] // Priroda. No.4. P.40. [In Russian].
- Belyshev B.F., Haritonov A.Yu. 1980. Arctic odonatofauna (Insecta, Odonata) of the Northern Hemisphere and probable ways of its forming // Izvestiya SB AN USSR. Seriya biologicheskikh nauk. Vol.3. No.15. P.35–38. [In Russian, with English summary].
- Belyshev B.F., Haritonov A.Yu. 1981. [Geography of dragonflies (Odonata) of the Boreal Faunal Kingdom]. Violovich N.A. (Ed.). Novosibirsk: Nauka. 280 p.
- Belyshev B.F., Korshunov Yu.P. 1976. [New materials for the knowledge of odonatofauna (Insecta, Odonata) in Polar Siberia] // [Fauna of Helminths and Arthropods of Siberia]. Novosibirsk. P.151–156. [In Russian].
- Bernard R., Daraz B. 2010. Relict occurrence of East Palaearctic dragonflies in northern European Russia, with first records of *Coenagrion glaciale* in Europe (Odonata: Coenagrionidae) // International Journal of Odonatology. Vol.13. P.39–62.
- Borisov S.N., Kazenas V.L., Borisov A.S. 2022. Dragonflies (Odonata) of the Syrdarya Karatau and the Arys River valley (southern Kazakhstan) with notes on seasonal latitudinal and altitudinal migrations // Euroasian Entomological Journal [Evraziatskii Entomologicheskii Zhurnal]. Vol.21. No.2. P.78–90. doi 10.15298/euroasentj.21.2.04.
- Brockhaus T. 2019. Der Ural — Grenze und Leitlinie für die pleistozäne Ausbreitung paläarktischer Libellen (Odonata) // Libellula Supplement. No.15. P.11–33.
- Brockhaus T. 2022. The Palaearctic dragonfly (Insecta: Odonata) fauna of the lands north of the Arctic Circle — a critical synopsis // Euroasian Entomological Journal [Evraziatskii Entomologicheskii Zhurnal]. Vol.21. No.3. P.142–152. doi 10.15298/euroasentj.21.3.02.
- Boudot J.-P. 2015. *Somatochlora alpestris* (Selys, 1840) // Boudot J.-P., Kalkman V.J. (Eds): Atlas of the European Dragonflies and Damselflies. Netherlands: KNNNV Publishing. P.236–237.
- Boudot J.-P., Karjalainen S. 2015a. *Somatochlora arctica* (Zetterstedt, 1840) // Boudot J.-P., Kalkman V.J. (Eds): Atlas of the European Dragonflies and Damselflies. Netherlands: KNNNV Publishing. P.237–239.
- Boudot J.-P., Karjalainen S. 2015b. *Somatochlora sahlbergi* Trybom, 1889 // Boudot J.-P., Kalkman V.J. (Eds): Atlas of the European Dragonflies and Damselflies. Netherlands: KNNNV Publishing. P.101–103.
- Boudot J.-P., Raab R., Bernard R. 2015. *Coenagrion hylas* (Trybom, 1889) // Boudot J.-P., Kalkman V.J. (Eds): Atlas of the European Dragonflies and Damselflies. Netherlands: KNNNV Publishing. P.101–103.
- Boudot J.-P., Sahlén G. 2015. *Coenagrion johanssoni* (Wallengren, 1894) // Boudot J.-P., Kalkman V.J. (Eds): Atlas of the European Dragonflies and Damselflies. Netherlands: KNNNV Publishing. P.247–249.
- Gorodkov K.B. 1956. [Zur Geographischen Verbreitung von Odonaten in [der] Arctis] // Revue d'Entomologie de l'URSS. Vol.35. No.1. P.120–123. [In Russian, with French and German titles].
- Hämäläinen M. 2015. The first collectors of *Somatochlora sahlbergi* — a story of an arduous expedition to Siberia in 1876 // Agrion. Vol.22. No.2. P.22–31.
- Haritonov A.Yu. 1976. [Dragonfly fauna (Insecta, Odonata) of the Urals and Eastern Urals] // [Fauna of Helminths and Arthropods of Siberia]. Novosibirsk. P.157–161. [In Russian].
- iNaturalist contributors, iNaturalist. 2022. iNaturalist Research-grade Observations. iNaturalist.org. Occurrence dataset. <https://doi.org/10.15468/ab3s5x>. Internet resource. Accessed on 30.10.2022.
- iNaturalist. 2022. Internet resource. <https://www.inaturalist.org>. Accessed on 30.10.2022.
- Kalkman V.J., Aagaard K., Dolmen D. 2015a. *Leucorrhinia dubia* (Vander Linden, 1825) // Boudot J.-P., Kalkman V.J. (Eds): Atlas of the European Dragonflies and Damselflies. Netherlands: KNNNV Publishing. P.262–264.
- Kalkman V.J., Iversen L.L., Nielsen E. 2015b. *Aeshna juncea* (Linnaeus, 1758) // Boudot J.-P., Kalkman V.J. (Eds): Atlas of the European Dragonflies and Damselflies. Netherlands: KNNNV Publishing. P.159–160.
- Kalkman V.J., Martin M., Bernard R. 2015c. *Sympetrum danae* (Sulzer, 1776) // Boudot J.-P., Kalkman V.J. (Eds): Atlas of the European Dragonflies and Damselflies. Netherlands: KNNNV Publishing. P.293–294.
- Kalkman V.J., Kitanova D. 2015. *Enallagma cyathigerum* (Charpentier, 1840) // Boudot J.-P., Kalkman V.J. (Eds): Atlas of the European Dragonflies and Damselflies. Netherlands: KNNNV Publishing. P.116–118.
- Kalkman V.J., Kulijer D. 2015. *Sympetrum flaveolum* (Linnaeus, 1758) // Boudot J.-P., Kalkman V.J. (Eds): Atlas of the European Dragonflies and Damselflies. Netherlands: KNNNV Publishing. P.297–298.
- Kalkman V.J., Lohr M. 2015. *Cordulia aenea* (Linnaeus, 1758) // Boudot J.-P., Kalkman V.J. (Eds): Atlas of the European Dragonflies and Damselflies. Netherlands: KNNNV Publishing. P.232–233.
- Kalkman V.J., Monnerat C. 2015. *Aeshna caerulea* (Ström, 1783) // Boudot J.-P., Kalkman V.J. (Eds): Atlas of the European Dragonflies and Damselflies. Netherlands: KNNNV Publishing. P.150–151.
- Kosterin O.E. 1992. New distribution records of *Somatochlora sahlbergi* Trybom (Odonata, Corduliidae) // Acta hydroentomologica lativica. No.2. P.22–26.
- Kosterin O.E., Sivtseva L.V. 2009. Odonata of Yakutia (Russia) with description of *Calopteryx splendens njuja* ssp. nov. (Zygoptera: Calopterygidae) // Odonatologica. Vol.38. P.93–202.
- Kosterin O.E., Zaika V.V. 2010. Odonata of Tuva // International Journal of Odonatology. Vol.13. No.2. P.277–328.
- Krasnoyarskii Kray, Taymyrskii (Dolgano-Nenetskii) and Evenkiiskii Avtonomnye Okruga. Altas. 2007. Novosibirsk: FGUP Novosibirskaya Kartograficheskaya fabrika. 104 p. [In Russian].
- Kuvaev A.V. 2007. [Invertebrates] // [Chronicle of nature of the state natural biosphere reserve «Taimyrskii»]. Book XXII. Khatanga. P.234–252. [In Russian].
- Onishko V.V., Kosterin O.E. 2021. Dragonflies of Russia. Illustrated Photo Guide. M.: Phytos XXI. 476 p. [In Russian].
- Schröter A. 2011. Review of the distribution of *Somatochlora sahlbergi* (Odonata: Corduliidae) // International Dragonfly Fund — Report. No.41. P.1–27.
- Schröter A., Schneider T., Schneider E., Karjalainen S., Hämäläinen M. 2012. Observations on adult *Somatochlora sahlbergi* — a species at risk due to regional climate change? (Anisoptera: Corduliidae) // Libellula. Bd.31. P.41–60.
- Tatarinov A.G., Kulakova O.I., Loskutova O.A. 2015. The structure of the fauna, ecological and geographical feature of dragonflies (Insecta, Odonata) of the East European Hypoarctic // Euroasian Entomological Journal [Evraziatskii Entomologicheskii Zhurnal]. Vol.14. No.6. P.505–510.
- Trybom F. 1889. Trollsländor (Odonater), insamlade under Svenska Expeditionen till Jenisei 1876 // Bihang till Kongliga Svenska vetenskaps-akademiens handlingar. Vol.15. No.4. P.1–21.
- Vallé K.J. 1931. Materialien zur Odonatenfauna Finnlands. II. *Somatochlora Sahlbergi* Trybom // Notulae Entomologicae. No.11. P.41–51.
- Vallé K.J. 1932. Nordasiatische Odonaten // Annales Botanici Societatis Zoologicae-Botanicae Fennicae Vanamo. 1(2). S.1–22.

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