First records of remarkable damselfly species *Nehalennia speciosa* (Odonata: Coenagrionidae) from the Republic of Karelia (Russia)

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**ABSTRACT**: Several local populations of remarkable Odonata species *Nehalennia speciosa* (Coenagrionidae) are reported for the first time from the Republic of Karelia. *N. speciosa* is considered a threatened species in Europe even though it is widespread throughout the Palaearctic region. The species was found within several nature protected areas of Karelia, where entomological studies were conducted. The biology and distribution of *N. speciosa* are briefly observed.

**Introduction**

The order Odonata is a relatively small group of insects with aquatic larvae, comprising 43 species known for Karelia: 14 species of damselflies (Zygoptera) and 29 species of dragonflies (Anisoptera). The Odonata fauna is relatively well studied in Karelia, largely due to the works of Finnish researchers who, from the end of the nineteenth century, published faunistic lists, mainly based on materials collected in the southern regions of the republic [Djakonov, 1922; Tiensuu, 1933; Valle 1920–1952]. However, since that time no special Odonata study was conducted in Karelia. Recent publications on Odonata in Karelia contain several new regional records including rather rare species [Humala, 2006; Humala, Polevoi, 2009, 2015; Jakovlev et al., 2014], as well as additions to the Karelian list of dragonflies and damselflies [Polevoi et al., 2009].

During the expedition in 2017, we drew attention on unusually small and slender damselfly, which was identified as *Nehalennia speciosa* (Charpentier, 1840) — a rare Palaearctic species. In the following years *N. speciosa* was observed in several other localities. In this paper, we provide the data on the finds of this rare damselfly, representing a remarkable addition to the Karelian Odonata fauna.

**Material and methods**

This communication is based on authors’ observations in South Karelia made during the field seasons 2017–2019 (Fig. 1). Several specimens were collected (stored in the collection of Forest Research Institute KarRC RAS, Petrozavodsk), while the others were just recorded, and some of them photographed in nature.

**Results and discussion**

**Order ODONATA**

**Family Coenagrionidae**

*Nehalennia speciosa* (Charpentier, 1840)

**SPECIES CHARACTERISTIC.** *Nehalennia speciosa* (Charpentier, 1840) or ‘pygmy damselfly’, ‘sedgeling’ or ‘sedgling’, is an Odonata species from the family Coenagrio-
Nehalennia speciosa is a stenotopic, low numbered species. Larvae live in the coastal zone of small water bodies, within bogs of various types. It is characterized as “an oligotrophic and acidophilous, occurring on peat bogs or along shallow bogged margins of glacial lakes formed by floating Sphagnum mats and covered with medium-dense stands of narrow-leaved sedges (Carex limosa, C. pauperica and C. lasiocarpa; thickets 30–80 cm high), and other plants of similar appearance such as Rhynchospora, Schenckherzia etc.”, in the thickets of which adult dragonflies are occurring [Bernard, Kosterin, 2008, etc.]. Less commonly, the species is observed in “secondary” biotopes in ponds, swampy meadows [Bernard, Wildermuth, 2005; Kalninš et al., 2011, etc.] and semi-aquatic thickets. One generation developing per year. Adults occur from June to early August and as a rule do not fly far away from the habitats, where its larvae develop [Bernard, Wildermuth, 2005, Schmidt, Sterneck, 1999].

DISTRIBUTION. *N. speciosa* is distributed throughout the whole Palaearctic region from Portugal to Japan [Doucet, Jacquot, 2012, GBIF.org, 2020]. It occurs mainly on the plains and only within a relatively narrow latitudinal stripe in Europe, limited between 39°N and 62°N [Bernard, Wildermuth, 2005, etc.]. The range is strongly fragmented and represented by separate isolated localities, confined mainly to the Pleistocene glaciation sites [Bernard, Wildermuth, 2005].

It is known in Russia from a number of regions in the middle zone of the European part [Kirov, Nizhny Novgorod, Pskov, Smolensk, Ivanovo, Tula Prov., Mordovia] [Bernard, Wildermuth, 2005; Skvortsov, 2010; GBIF.org, 2020, etc.], in the Southern Urals [Haritonov, Eremina, 2010], in the southern part of Western Siberia, and in the south of the Far East [Bernard, Wildermuth, 2005; Kosterin et al., 2001; Bernard, Kosterin, 2008]. In the Leningrad Province, it is known by single imago specimen collected in the first half of the 20th century in the Tosno District and also reported from the vicinity of Petrozavodsk at the beginning of the 20th century [Przhiboro, Wildermuth, 2005; Kalninš et al., 2011, etc., and several Red Data Books of Russian regions: Leningrad Province [Przhiboro, 2018], Ivanovo Province [Tikhomirov, 2007], Tula Province [Bolshakov, 2014].

MATERIAL STUDIED. Russia, Karelia: Medvezh’egorskiy District, Kizhi Reserve, Dolgii Island, swampy lake shore, 62.104°N, 35.279°E, 4 VII, 2017, 1 ♀; Kondopozhskiy District, 2 km SE of Tereki, 62.215°N, 33.869°E, herb-rich mixed forest, 25.VI, 2018, 1 ♀; Pudozhskiy District, near the mouth of Chernaya Rechka River, forest glade (road side), 61.670°N, 36.055°E, 3 VII, 2018, 1 ♀; Pudozhskiy District, Besov Nos, abandoned meadow, 61.673°N, 36.053°E, 4 VII, 2018, 1 ♀; Pudozhskiy District, Mikhailovets Island, rocky lake shore, 61.729°N, 36.013°E, 7 VII, 2018, 1 ♀; Pudozhskiy District, Bol’shoy Golets Island, meadow along the lake shore, 61.744°N, 35.896°E, 8.VII.2018, 2 ♀; Pudozhskiy District, Solosnovets Island, rocky lake shore, 61.792°N, 35.929°E, 8.VII.2018, 1 ♀; Pudozhskiy District, 1.5 km E of Muromskiy monastery, abandoned meadow, 61.484°N, 36.268°E, 7 VII, 2019, 1 ♀.

Thus there are at least several probably isolated populations of *N. speciosa* on the territory of Southern Karelia. The Karelian localities are the northernmost
points, so the northern range limit of the species has changed considerably (up to 62°N) in comparison with previous records from Fennoscandia [GBIF.org 2020]. Almost all localities are situated within nature protected areas: Kizhsky State Nature Reserve (1), State complex (landscape) regional reserve “Muromskiy” (39) which will undoubtedly be a benefit for preserving habitats and subsequent populations monitoring of this species.

Our observations also reveal some interesting peculiarities of *N. speciosa* populations in Karelia. The collecting locality near Tereki (2) is situated in the forest biotope, more than 1 km from the nearest waterbody with an elevation exceeding 100 m above lake water level. Another location (the meadow east of Muromskiy monastery) is over 300 m distant from the nearest lake or river. This indicates a potentially higher dispersal ability of *N. speciosa* than was initially thought.

Other interesting observations are the findings of *N. speciosa* on small islands in Onego Lake. And if Mikhailovets Island (3) is located 1.75 km from the mainland, the Bol’shoy Golets Island (4) is 6.8 km away from the mainland. It is difficult to imagine, that these tiny damselflies with weak flight ability could cover such distances even under favourable weather conditions. So it seems more probable that this species occurs there permanently and larvae development is also taking place close to the coastal zone or maybe in the puddles or small ponds forming after strong lake storms. It is also noteworthy that
another relict Odonata species Coenagrion armatum (Charpentier, 1840) was also recorded by us on the Onego Lake islands in the same habitats as *N. speciosa*.

In neighbouring Finland, all known findings of *N. speciosa* are located in extreme South-West of the country, along Baltic Sea shore [Valtonen, 1980; Karjalainen, 2007]. According to the GBIF data, the species was reported from Finland since 1934 [GBIF.org, 2020], however, then it has not been observed in the country during 21 years and found again only in 2002 [Aramboldi, 2003]. The species was also considered extinct in Sweden and Italy, but then was rediscovered [Karlsson, 2011, Aguuzzi et al., 2017]. In Sweden, North-East Germany and to a lesser extent Finland *N. speciosa* became more common during the recent years (Fig. 4) and the number of its observations increased.

Being relatively small, *N. speciosa* attracts the observer attention in nature, looking as something unusual comparing to more common species like e.g. *Leses* spp. Considering long flight period (since mid-June till the end of August), there is only little chance that it was overlooked during rather intensive entomological studies conducted in Karelia in the last 30 years. We hence believe this species is a real newcomer. Basing on our data it is reasonable to assume, that *N. speciosa* arrived in Karelia from the South-East, however this species was not reported from the neighbouring areas, such as the Arkhangelsk and Vologda Provinces, where the fauna of Odonata is poorly known.

**CONCLUSIONS.** Nowadays altogether there are 44 species of Odonata known for the territory of Karelia and 15 species of them are damselflies (Zygoptera). The recently discovered species *N. speciosa* should be included in the regional Red Data Book and all revealed populations need to be monitored. The newly found Karelian localities are the northernmost points, expanding the range of this species. It would be interesting to clarify the origin of the Karelian populations and to confirm the presence of this species in the adjacent territories South-East of Karelia.

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