

**ODONATA OF YAKUTIA (RUSSIA),  
WITH DESCRIPTION OF  
*CALOPTERYX SPLENDENS NJUJA* SSP. NOV.  
(ZYGOPTERA: CALOPTERYGIDAE)**

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*Received February 1, 2009 / Revised and Accepted February 14, 2009*

A short overview of the history of odonatological exploration of Yakutia and an annotated checklist of 35 spp. currently known from its territory are provided with reference to all earlier records and lists of hitherto unpublished specimens. *Calopteryx splendens*, *Aeshna grandis* and *Ophiogomphus obscurus* were not previously known from Yakutia. *C. splendens njuja* ssp. n. is described and illustrated. Holotype ♂: Russia, Sakha Republic, Yakutia: Lena Ulus, the Nyuya river at the mouth of the Chayanda; 14-VII-2006; deposited in Institute of Animal Systematics and Ecology, Novosibirsk. It is characterised by a drastic reduction of wing pigmentation in ♂♂.

**INTRODUCTION**

The first information on the Odonata of Yakutia was provided by HAGEN (1858), who dealt with 9 species from the Vilyui river basin, gathered by r.K. Maack's 1854 expedition, and including an enigmatic "*Agrion* nov. spec. [...] dem *A. puella* nahe stehend)". BARTENEV (1911a, 1912, 1915) treated the collection of the Zoological Museum of the Imperial Academy of Sciences, which included material collected by A.L. Chekanovskii (1847-1875) and I.D. Cherskii (1891). The exact localities we have retrieved from the work of MOSTACHOV (1982). As a result, 4 species were added to the Yakutian fauna. In 1917 BARTENEV published a paper on the Odonata of the Yakutsk region, reporting 16 species, of which 7 were new for Yakutia. This material was collected by T.O. Yurinskii (Yakutsk, 1910-1914) and P.V. Olenin (Petropavlovsk on the Aldan river, 1911).

BELYSHEV (1960) recorded 9 species, 3 new for Yakutia (Verkhoyansk, Druzhina in the transpolar area), based on collections by V. Mutsetoni and N.N. Skalon from the Yana and Indigirka rivers. In 1965 and 1973 he published papers on the fauna of the 'Norda' (correct: Nuorda) river at Zhigansk, which he investigated personally in 1963. Among the 14 reported species, 4 were new for Yakutia, bringing the status of the odonata fauna of this territory up to 27 species, i.e. the figure given also in his Siberian monograph (BELYSHEV, 1974). A later paper summarised the above data from the river basins of Yana, Indigirka and the Lena lower reaches and enumerated 16 species (BELYSHEV&HARITONOV, 1980). HARITONOVA (1990) provided a table of distribution of Odonata in the mountains of southern Siberia which, including the Aldan Upland and the northern spurs of the Stanovoi Mountain Range, lists 31 species. Unfortunately, the sources of her data were not detailed. FUKUI (1992), who visited the environs of Yakutsk and the Kengkeme river in 1989, reported 17 species, including *Coenagrion ecornutum* and *Aeshna serrata*, new for Yakutia. Later, collections from SW Yakutia, made by A.I. Averenskii and the second author, added a new species to the Yakutian fauna, originally reported as *Calopteryx virgo* (L.) (POPOVA et al., 2003) but re-identified by the first author as *C. japonica* Sel. It was included into the Red Data Book of Republic of Sakha-Yakutia (VINOKUROV, 2003). In June 2002, KOSTERIN (2004) collected odonates at the towns of Aldan and Tommot and reported 13 species, with *Nichonogomphus ruptus* (Sel.) and *Somatochlora sahlbergi* Trybom, new for Yakutia. SIVTSEVA (2008) reported 18 species for NE Yakutia.

Recently, rich material was accumulated at the Institute of Biological Problems of the Cryolythozone of the Siberian Branch, Russian Academy of Sciences, Yakutsk (further in the text: IBPC). Some collections of odonates from Yakutia have also accumulated in Siberian Zoological Museum at the Institute of Animal Systematics and Ecology of the Siberian Branch, Russian Academy of Sciences, Novosibirsk (further in the text: SZMN ISEA). Its treatment, as well as the above mentioned literature data, allowed us to compile a checklist of 35 species in 15 genera and 7 families. Three of these, *Calopteryx splendens*, *Aeshna grandis* and *Ophiogomphus obscurus*, are first records for Yakutia

#### THE REGION

The territory of Sakha-Yakutia Republic, the former Yakutian Autonomous Soviet Socialistic Republic, is briefly characterised below, following SUSLOV (1954) and ZAKHAROVA et al. (2005). It occupies 3,103,200 km<sup>2</sup>, 1/5 of the area of the Russian Federation, extending for 2.5 thousand km from W to E and for 2 thousand km from S to N, and it is situated in NE Asia within 55°29'-76°46'N and 105°32'-16°55'E. This vast region is scarcely populated with about 1 million people only. About 70% is occupied by mountains (mostly in E and SE direction) and plateaus (mostly in W and S), the northern and central parts are vast lowlands. The Laptev Sea coast W of the Olenyok river mouth is occupied by North Siberian Lowland, with flat or glacial hilly (up to 150-200 m) relief. To the South

of it the vast Central Siberian Plateau is situated, in its NE part, represented by Anabar Plateau (with average elevations of 200-400 m a.s.l., 905 m being the maximum) and in the central part, in the upper and middle Vilyui river basin, represented by the Vilyui Plateau (with average elevations of 300-400 m a. s. l., 962 m maximum). South of the Central Siberian Plateau, the Prilenskoe Plateau is situated, with elevations rising from 200-400 m in the N to 500-700 m a.s.l. in the S. Southern Yakutia is occupied by the Olyokma-Chara and Aldan Uplands. The Olyokma-Chara Upland (600-1000 m, maximum 1402 m a.s.l.) has a steep rocky relief and is rimmed in the S by the Kodar and Udokan ranges. The Aldan Upland is a system of plateaus separated by depressions: the depression bottoms lie at 700-800 m a.s.l. while the highest elevations are found at the Ket-Kap (1864 m) and Aldan-Uchur (2264 m) ranges. From the South, the Aldan Upland is outlined by the Stanovoy Range. In the East the Central Siberian Plateau is gradually descending to the Central Yakutian Plain (200-300 m a.s.l.), which occupies interfluvies of the great rivers of Lena, Vilyui and Aldan in their lower and middle reaches. East Yakutia embraces the basins of the Yana, Indigirka, Alazeya and Kolyma rivers and of the right tributaries of the Lena and Aldan rivers and has complicated mountain systems. The huge meridional Verkhoyanskii Range is situated in the western part of E Yakutia, its southern sections are known as the Sette-Daban and Suntar-Khayata Ranges, the latter with the summit of the Mus-Khaya Mt, 2959 m a.s.l. East of it there is the huge mountain system of Cherskii with elevations of 2200-2500 m and the summit of Pobeda Mt, 3147 m a.s.l. These two uplands are separated by the Yana and Elga Plateaus and the less elevated Oimyakon Upland. Further East, behind the Indigirka river, there is the Alazeya Plateau (300-400 m, the maximum 954 m a.s.l.) and, East of the Kolyma river, the Yukagir Plateau (400-600 m, the maximum 1117 m a.s.l.). The northernmost E Yakutia is occupied by the Yana-Indigirka and Kolyma Lowlands. There are about 700,000 rivers in Yakutia, 15 of which are more than 1000 km long. The main one is the Lena, the 11<sup>th</sup> largest river in the world. About 709,000 lakes occupy the lowlands and plateaus; 98% of them are of a thermokarstic origin, 36 have an area of more than 50 km<sup>2</sup> and 10 of more than 100 km<sup>2</sup>.

Yakutia is characterized by a severe continental climate: the absolute annual amplitude of temperature reaches 101.8°C at Verkhoyansk. The summer is short (90-110 days without frost at Yakutsk, 30-45 days at the Arctic coast) but sunny and hot (at Yakutsk the average temperature of July is 19°C, the maximum registered being 38°C). Average annual temperature decreases from -8-10°C at Aldan, through -10-12°C at Yakutsk, to -14-15°C at the Arctic coast. Annual precipitation is low, ranging from about 150 mm in the N to 200-300 mm in Central Yakutia, occurring mostly in late summer; only the western slopes of the north-eastern mountains get up to 550 mm and the southern slopes of the Aldan Upland get 500-700 mm. Latitude provides a long daytime in June and July, hence a rapid passing of all phenological phases in the beginning of summer. Yakutia has permafrost, which is 200-1500 m thick and 300,000-1,000,000 year old. Only in the South it becomes fragmentary, its thickness decreasing to 10-400 m and the age to 10,000 years and less. Thus, the nature of Yakutia retains many features of that of North Eurasia as a whole at the late glacial time.

About 13% of Yakutian territory in the North is covered by tundra. Most of Yakutia, except for the North and high mountains of the NE, is an open taiga of low-growing larch (*Larix gmelinii* in the NE also *L. cajanderi*) with admixture of pine (*Pinus silvestris*), birch (*Betula pendula* s. l.) and asp (*Populus tremula*); spruce (*Picea obovata*) and poplar (*Populus suaveolens*) forming riparian stands. The forests exist in spite of extremely low precipitation because it is compensated by low evaporation. In the taiga of Central Yakutia there are numerous meadow patches locally called 'alas', sometimes to some extent salinated. In the warmer and humid Aldan Upland the forests are enriched with Siberian stone pine (*Pinus sibirica*), fir (*Abies sibirica*) and, rarely in the South-East, Ayan spruce (*Picea ajanensis*) and stone birch (*Betula lanata*). In the North-East, in the valleys of Yana and Indigirka, patches of steppe are found which are relics of the periglacial 'tundrosteppes' of the Pleistocene. The lower levels of the mountains are covered with the elfin wood of *Pimus pumila*, the higher elevations are occupied by vast screes.

## THE LOCALITIES

The following designations were adopted in the text and Figure 1:

**N – North Yakutia:** **loc.1:** Olenyoksky bay, Terpei-Tumsa cape, El'gen lake.

**NW – North-West Yakutia:** **loc. 2:** Arga-Sala r., right tributary of the Olenyok r., 25 km W of Olenyok; **loc. 3:** Velingna r., left tributary of the Verkhnyaya Tomba r., or Verkhnyaya Tomba r., right tributary of the Olenyok r.; **loc. 4:** Alakit r., right tributary of the Olenyok r.; **loc. 5:** mouth of the Nuorda r., downstream of the Lena r.; **loc. 6:** quite possible on the source of the Vilyui r., or tributaries of the Olenyok r.

**W – West Yakutia:** **loc.7:** Vilyuy r. basin, Toibokhoy vill., 40 km W of Suntar vill.; **loc.8:** Vilyui r. basin, Arylakh, 21 km SE Mirnyi town; **loc. 9:** Mirnyi town; **loc.10:** Chuonalyr reservoir, environs of Mirnyi town; **loc.11:** Irelyakh r., Mirnyi town, Zarechniy; **loc.12:** Melyuk r., right tributary of the Kil'lemtine r.; **loc. 13:** Kil'lemtine r., right tributary of the Chona r., 10 km upstream of the Melyuk mouth; **loc.14:** Chona r., right tributary of the Vilyui r., 20 km downstream from Yuktali rapid, Chonskiy resource reserve; **loc. 15:** Vilyui r.; **loc. 16:** Tundra, Siberia.

**SW – South-West Yakutia:** **loc. 17:** upper reaches of the Peleduy r., left tributary of the Lena r., 130 km W of Vitim settl., the Lyuksini protected area; **loc. 18:** Peleduy r., left tributary of the Lena r., Tolon vill., 75 km W of Vitim settl.; **loc. 19:** lower course of the Vitim r., right tributary of the Lena r.; **loc. 20:** Pilka r., right tributary of the Lena r., Pilka Resource Reserve; **loc. 21:** right tributary

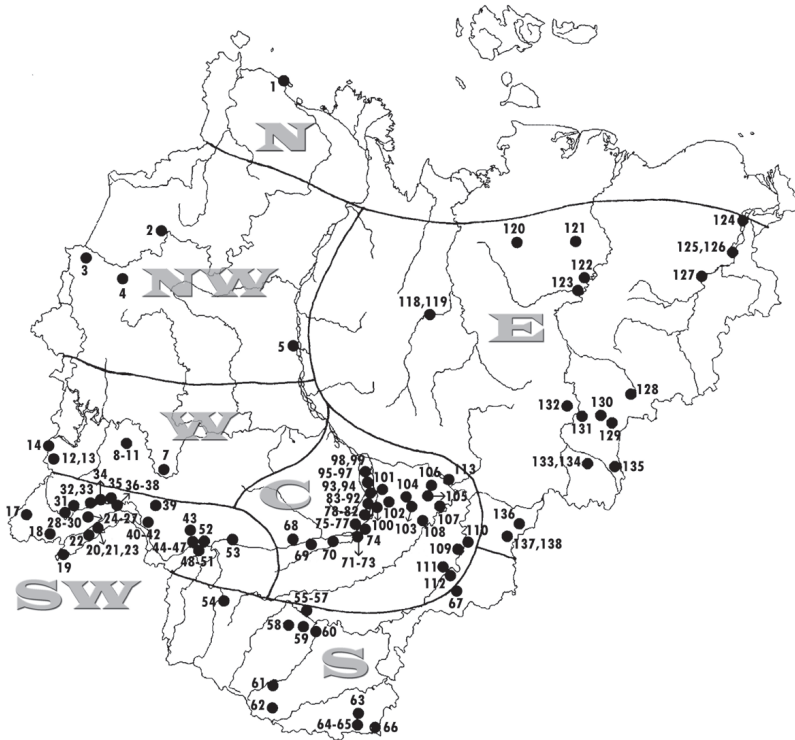


Fig. 1. A schematic map of Yakutia with the main regions and collection localities indicated. For explanation see the text.

of the Pilka r., cordon of the Pilka Resource Reserve; **loc. 22:** Ileyka r., left tributary of the Pilka r., Pilka Resource Reserve; **loc. 23:** Yukhta r., mouth of the Pilka r.; **loc. 24:** Khamra r., left tributary of the Lena r., 90 km upstream from mouth; **loc. 25:** Khamra r., left tributary of the Lena r., mouth of the Yukte r.; **loc. 26:** Khamra r., left tributary of the Lena r., 60 km upstream from mouth, Taryn-Yuryakh r.; **loc. 27:** Khamra r., left tributary of the Lena r.; **loc. 28:** Nyuya r., left tributary of the Lena r.; **loc. 29:** Nyuya r., Orgul; **loc. 30:** Nyuya r., between Orgul and mouth of the Chayanda r.; **loc. 31:** Nyuya r., mouth of the Chayanda r.; **loc. 32:** Nyuya r., Nam; **loc. 33:** Nyuya r., Irelyakh; **loc. 34:** Nyuya r., between Nam and Orto-Nakhara vill.; **loc. 35:** Nyuya r., Zakharovka vill., Khomustakh; **loc. 36:** Lena r., Lensk town; **loc. 37:** environs of Lensk town, Chanchyk r., left tributary of the Lena r.; **loc. 38:** Lena r., 34-th km of the Lensk-Bechencha Road; **loc. 39:** Ergedzhei r., left tributary of the Dzherba r., 8 km upstream from mouth; **loc. 40:** Dzherba r., left tributary of the Lena r.; **loc. 41:** Dzherba r., mouth of the Kurung-Uryakh Stream; **loc. 42:** Dzherba r., 2 km downstream from mouth of the Kyuel'-Ergelyakh r.; **loc. 43:** middle lower of Biryuk r., left tributary of the Lena r.; **loc. 44:** Biryuk r., 4 km downstream from mouth of the Melichyan r.; **loc. 45:** mouth of the Biryuk r.; **loc. 46:** Lena r., 1-th Neryuktyaynsk vill., 42 km W of Olyokminsk town; **loc. 47:** Lena r., 2-th Neryuktyaynsk vill., 38 km W of Olyokminsk town; **loc. 48:** Lena r., Abaga vill., 20 km W of Olyokminsk town; **loc. 49:** Lena r., Kyatchy vill., 17 km W of Olyokminsk town; **loc. 50:** Lena r., Yunkyr vill., 12 km W of Olyokminsk town; **loc. 51:** Zarechnyi settl., 10 km SE of Olyokminsk town; **loc. 52:** Kresty, 15 km downstream from the Lena r., from Olyokminsk town; **loc. 53:** Namana r., left tributary of the Lena r., Khatyng-Aryy Island.

**S – South Yakutia:** **loc. 54:** mouth of the Dikimdya r., right tributary of the Olekma r., cordon; **loc. 55:** Aldan r., Tommot town; **loc. 56:** Aldan r., left bank, 7-9 km W of Tommot; **loc. 57:** Aldan r., El'konka settl., 7 km N of Tommot town; **loc. 58:** Aldan plateau, Aldan town; **loc. 59:** Aldan plateau, Russkaya r., left tributary of the Bol'shoy Ylymakh r., 'Druzhnyi' (58°36'52.8" N, 126°22'14.9" E); **loc. 60:** Aldan plateau, Timpton r., right tributary of the Aldan r. (58°32'615" N, 127°05'471" E); **loc. 61:** Aldan plateau, Chul'man Sett., 30 km N of Neryungri town; **loc. 62:** Aldan plateau, Iengra settl., 45 km S of Neryungri town; **loc. 63:** Tokinsky Stanovik Range, Algama r., right tributary of the Gonam r.; **loc. 64:** Tokinsky Stanovik Range, Tuksani r., right tributary of the Algama r.; **loc. 65:** Tokinsky Stanovik Range, Tuksani r., right tributary of the Algama R., 35 km upstream from mouth; **loc. 66:** Tokinsky Stanovik Range, Maloe Toko lake, 4 km S of Bol'shoe Toko lake; **loc. 67:** Maya r., right tributary of the Aldan r., 100 km upstream from mouth, Resource Reserve 'Chabda'.

**C – Central Yakutia:** **loc. 68:** Lena r., Churan-baza, 8 km W of Isit'; **loc. 69:** mouth of the Kurannakh r., right tributary of the Lena r., Lena Pillars Nature Park; **loc. 70:** 36 km downstream Lena r. from Sinyaya r. mouth, Nature Park Lena Pillars; **loc. 71:** Buotama r., right tributary of the Lena r.; **loc. 72:** Lena r., mouth of the Buotama r.; **loc. 73:** Lena r., Kara-Ulakh lake at mouth of the Buotama r.; **loc. 74:** environs of the Kysyl-Yuryuya settl., 12 km SSW of Pokrovsk town, 'Buluus': water with permanent ice; **loc. 75:** environs of the Pokrovsk town; **loc. 76:** Yuryun-Bas, 13 km NW Ulakh-An vill.; **loc. 77:** Lena valley, 17 km NE of the Pokrovsk town, Orto-Doidu Zoo; **loc. 78:** Tekhtyur vill., 42 km S of Yakutsk; **loc. 79:** Pokrovsky Trakt road, 38 km S of Yakutsk (61°45' N, 129°33'33" E); **loc. 80:** Lena r., Tabaga, 29 km SSW of Yakutsk; **loc. 81:** Pokrovsky Trakt road, 23 km S of Yakutsk (61°52'038" N, 129°30'701" E); **loc. 82:** Pokrovsky Trakt road, 18 km S of Yakutsk (61°54'616" N, 129°31'761" E); **loc. 83:** Lena r., Yakutsk town; **loc. 84:** Yakutsk, Plemkhov (61°58'46" N, 129°36'17" E); **loc. 85:** Yakutsk, Sergelyakh lake; **loc. 86:** Kengkeme r., left tributary of the Lena r.; **loc. 87:** Vilyuisky Trakt road, 7 km SW of Yakutsk; **loc. 88:** Yakutsk, Botanical Garden; **loc. 89:** Yakutsk, Khatyng-Yuryakh lake; **loc. 90:** Yakutsk, Beloe lake (62°05'606" N, 129°42'148" E); **loc. 91:** Magan Sett., 10 km W of Yakutsk; **loc. 92:** "Markovo, T.O. Yurinskii" (?Markha), Lena valley, Markha, 12 km N of Yakutsk (Scientific Station of the Institute of Northern Meadow Cultivation); **loc. 93:** Lena valley, Kil'demtsy, 30 km N of Yakutsk (62°17'17" N, 129°49' E); **loc. 94:** Lena valley, Kapitonovka, 35 km N of Yakutsk (62°17'57" N, 129°49'25" E); **loc. 95:** Kysyl-Syr vill. (1-th Khomustakh), 19 km S of Namtsy vill.; **loc. 96:** Lena valley, Nikol'skiy vill., 8 km S of Namtsy vill. (62°38'38" N, 129°33'28"

E); **loc. 97:** Lena valley, Namtsy vill., 70 km N of Yakutsk; **loc. 98:** Lena valley, Stolby vill., 42 km N of Namtsy vill.; **loc. 99:** Lena valley, Maimaga vill., 42 km N of Namtsy vill.; **loc. 100:** “Yarmonsky Ferry, right bank of the Lena r.” (10 km N of Nizhny Bestyakh settl.); **loc. 101:** Allakh, 50 km NNE of Yakutsk; **loc. 102:** Tyungyulyu, 50 km ENE of Yakutsk; **loc. 103:** Churapcha vill., 143 km ENE of Yakutsk; **loc. 104:** Usun-Kyuel', 22 km NNW of Churapcha vill., Biyaky; **loc. 105:** Tatta r., Ytyk-Kyuel' vill.; **loc. 106:** Tatta r., Uolba vill., 33 km N of Ytyk-Kyuel' vill.; **loc. 107:** Amga r., 5 km NW of Chychymakh vill.; **loc. 108:** Amga r., Myndagai vill.; **loc. 109:** Aldan r., mouth of the Notara r.; **loc. 110:** Aldan r., Ingnyachchi Island; **loc. 111:** Petropavlovsk, 6 km S of Ust'-Maya settl.; **loc. 112:** Maya r., 5 km upper off mouth, the Island; **loc. 113:** 32 km downstream the Aldan r. from Megino Aldan vill., ‘Kocho’; **loc. 114:** “Kyuterdyakh” (?environs of Yakutsk); **loc. 115:** “Atyrajana” (?Atyyr-Ayana, environs of Yakutsk); **loc. 116:** “Lena r.”; **loc. 117:** “from Aldan to Kolyma r.” (country between Lena and Aldan rivers).

**E – East Yakutia:** **loc. 118:** Yana r., Verkhoyansk town.; **loc. 119:** environs of Verkhoyansk town, Apyyt; **loc. 120:** Khomoltoku, environs of Deputatskiy settl.; **loc. 121:** “Starukovo” (Suturuokha lake, source of the Suturuokha r., left tributary of the Indigirka r.); **loc. 122:** Indigirka r., Druzhdina; **loc. 123:** “Selinek r.” (Selennyakh r., left tributary of the Indigirka r.); **loc. 124:** Kolyma Nature Reserve, Verkhnie Kresty, 260 km NE of Srednekolymsk town (68°13'136" N 157°67'624" E); **loc. 125:** Kolyma Nature Reserve, Pomazkino, 126 km NE of Srednekolymsk town (67°94'14" N, 156°44'91" E); **loc. 126:** Kolyma Nature Reserve, Ruzhnikovo, 106 km NE of Srednekolymsk town (67°49'54" N, 156°08'37" E); **loc. 127:** Kolyma r., Srednekolymsk town; **loc. 128:** mouth of the Tirekhtyakh r., left tributary of the Moma r., water above ice; **loc. 129:** Khrebet Cherskogo, Nerskoe plateau, mouth of the Artyk r., right tributary of the Nera r.; **loc. 130:** Khrebet Cherskogo, Kurung-Asylyk r., gold mine “Pobeda” (64°26'40" N 144°54'75" E), 80 km E of Ust'-Nera settl.; **loc. 131:** Druzhdina, near Ust'-Nera settl. (64°18'75" N, 143°34'50" E); **loc. 132:** Uolchan r., left tributary of the Indigirka r., gold mine Oktyabr'skiy (64°48'97" N, 142°31'50" E); **loc. 133:** Oymyakonskiy plateau, mouth of the Buor-Uryakh, right tributary of the Kuidusun r., environs of Tomtor vill.; **loc. 134:** Oymyakonskiy plateau, Kuidusun r., left tributary of the Indigirka r., 12 km E of Tomtor vill.; **loc. 135:** middle lower of the Taryn-Yuryakh r., right source of the Indigirka r., Verchneindigirskiy Resource Reserve; **loc. 136:** Khrebet Sette-Daban, mouth of the Yrchakh r., tributary of the Allakh-Yun' r., Khrustal'nyi spring; **loc. 137:** Sette-Daban Range, Allakh-Yun' r., right tributary of the Aldan r.; **loc. 138:** Khrebet Sette-Daban, Allakh-Yun' r., right tributary of the Aldan r., Dzhelindzha lake; **loc. 139:** “Indigirka r. basin, Olbut lake” (?Uolbut lake, between Allaikha and Omuk-Yuryage r.); **loc. 140:** Kolyma r.

## ANNOTATED LIST OF SPECIES

Collectors' names are abbreviated as follows: (A) – A.I. Averenskii, (B) – A.K. Bagachanova, (AB) – A.P. Burnasheva, (G) – Zh.A. Gavrilova and her pupils, (MV) – M. Vinokurova, (V) – N.N. Vinokurov, (E) – T.G. Evdokarova, (AE) – A.A. Egorova, (YuE) – Yu.V. Ermakova, (K) – E.L. Kaimuk, (SN) – S.N. Nogovitsyna, (AP) – A.A. Popov, (P) – N.K. Potapova, (LS) – L.V. Sivtseva, (S) – A.D. Stepanov, (BGF) – collection of the Biological-Geographical Faculty of Yakutian State University updated by its students during their summer practice, (IBPC) – anonymous collectors of specimens in the Institute of Biological Problems of Cryolithosone.

For each species we provide literature data, with the names of taxa used by the relevant authors given in parentheses if they differ from those used by us; unpublished material studied by us; short characteristics of a species in the following order: general range – presence in main parts of Yakutia – flight period – habitat (for species rare in Yakutia the latter is given for Siberia in general). Notes are provided where deemed necessary, and subspecific names are given if beyond doubt.

## Calopterygidae

*Calopteryx japonica* Selys, 1869

POPOVA et al., 2003: **W: loc. 12, loc. 13** (19-20.VII-2002, *Calopteryx virgo* S.); VINOKUROV, 2003: **W: loc. 12, loc. 13, loc. 35, loc. 45.**

**SW: loc. 17:** 9-VII-2005, 2 ♂ (K); **loc. 22:** 7-VII-2008, 2 ♂ (MV); **loc. 30:** 11-12-VII-2006, 10 ♂, 1 ♀ (K); **loc. 31:** 12-16-VII-2006, 6 ♂, 1 ♀; **loc. 43:** 14-VII-2006, 2 ♂ (S); **loc. 44:** 12-VII-2008, 1 ♂ (YuE). **loc. 45:** 1 ♂ (A).

East palaeartic – W, SW – mid-summer – lotic.

*Calopteryx splendens* (Harris, 1782) ssp.

**SW: loc. 17:** 9-VII-2005, 1 ♂ (K); **loc. 22:** 7-VII-2008, 1 ♂ (MV); **loc. 28:** 12-VII-2006, 4 ♂, 1 ♀ (K); **loc. 30:** 13-VII-2006, 1 ♂ (K); **loc. 31:** 14-VII-2006, 1 ♂ (K).

West palaeartic – SW – mid-summer – lotic.

First record for Yakutia. Males from Yakutia show a drastic reduction in wing banding. In this respect they resemble some Crimean/ Transcaucasian/ Asia Minor taxa. Eight males are available from widely separated localities in SW Yakutia. For this reason we decided that the West Yakutian populations represent a new subspecies. Its description is provided on pp. 127-130.

## Lestidae

*Lestes dryas* Kirby, 1890

BARTENEV, 1917: **C: loc. 111** (P.V. Olenin, 7-VII-1911); FUKUI, 1992: **C: loc. 78, loc. 83, loc. 86, loc. 88, loc. 91** (26-29-VII-1989).

**SW: loc. 19:** 6-17-VIII-2002, 2 ♂, 1 ♀ (SN); **loc. 20:** 23-VIII-2002, 1 ♀ (SN); **loc. 21:** 15-VII-2008, 1 ♀ (MV); **loc. 32:** 15-VII-2006, 2 ♀; **loc. 33:** 19-VII-2006, 2 ♀ (K); **loc. 39:** 13/14-VII-2000, 1 ♂, 1 ♀ (YuE); **loc. 43:** 17-VII-2006, 1 ♂, 1 ♀ (S); **loc. 45:** 11-VII-2008, 3 ♂, 1 ♀ (YuE); **loc. 48:** 19-21-VII-2008, 2 ♂ (B, YuE). **S: loc. 61:** 2-VII-1990, 2 ♂ (V). **C: loc. 68:** 16-VII-2005, 1 ♀ (P); **loc. 70:** 28/31-VII-2006, 2 ♂, 1 ♀ (SN); **loc. 73:** 22-VII-2005, 3 ♀ (AB); **loc. 74:** 15-VII-1994, 1 ♀ (BGF); **loc. 81:** 28-VI-2007, 3 ♂, 2 ♀ (B, YuE); **loc. 88:** 10/11-VII-2007, 7 ♂, 1 ♀ (AB, B, YuE), 24-VII&2-VIII-2007, 5 ♂, 4 ♀ (LS); **loc. 92:** 31-VII-2002, 1 ♂, 6-VIII-2003, 1 ♀, 8/20-VII-2004, 8 ♂, 1 ♀, 9-VII-2006, 1 ♂ (E, YuE); **loc. 93:** 4-VII-2007, 2 ♀; **loc. 94:** 10/12-VII-2007, 3 ♂, 8 ♀ (B, YuE); **loc. 96:** 25-VII-2007, 2 ♂ (B, YuE); **loc. 98:** 18-VII-2003, 1 ♀ (A), 3-24-VII-2007, 14 ♂, 11 ♀ (BGF); **101:** 19/20-VII-1987, 3 ♀ (IB); **loc. 102:** 13-VII&24-VIII-1989, 20 ♂, 14 ♀ (B); **loc. 103:** 15-VII-1995, 2 ♀ (B); **loc. 104:** 17-VII-1995, 1 ♂ (B); **loc. 105:** 11-VIII-2003, 1 ♀ (AB); **loc. 113:** 24/27-VI-2008, 1 ♂, 1 ♀ (LS). **E: loc. 131:** 31-VII-2003, 1 ♀ (P); **loc. 136:** 10-VII-2007, 6 ♂, 4 ♀; **loc. 137:** 6-VIII-2007, 1 ♂, 1 ♀ (SN).

Holarctic – omnipresent – mid-summer – lentic, including small pools.

*Lestes sponsa* (Hansemann, 1823)

HAGEN, 1858: **W: loc. 15** (R.K. Maak); BARTENEV, 1917: **C: loc. 83** (T.O. Yurinskii, 18-VII-1910, 8-VII-1912); FUKUI, 1992: **C: loc. 78, loc. 80, loc. 86, loc. 88, loc. 91** (27/29-VII-1989); KOSTERIN, 2004: **S: loc. 55** (25-VI-2002)

**W: loc. 7:** 29-VII-1997, 2 ♂; **loc. 8:** 24-VII-1997, 1 ♂ (S). **SW: loc. 19:** 5-VIII-2002, 1 ♂, 2 ♀ (SN); **loc. 20:** 23-VIII-2002, 1 ♂ (SN); **loc. 36:** 11-VII-2000, 1 ♂ (YuE); **loc. 43:** 17-VII-2006, 1 ♂ (S); **loc. 44:** 16-VII-2008, 3 ♂, 1 ♀ (YuE); **loc. 45:** 11-VII-2008, 3 ♂, 1 ♀ (YuE); **loc. 48:** 19-VII-2008, 1 ♂ (YuE); **loc. 49:** 20/22-VII-2008, 10 ♂, 8 ♀ (B, YuE). **S: loc. 67:** 22-VII-2001, 1 ♀, 24-VIII-2001, 1 ♂

(AP). **C: loc. 72:** 17-VII-2001, 2 ♂ (P); **loc. 73:** 22-VII-2005, 3 ♀ (AB); **loc. 75:** 19-VII-2001, 1 ♂ (B); **loc. 71:** 6-VIII-2007, 1 ♂, 1 ♀ (E, YuE); **loc. 85:** 14-VIII-2007, 5 ♂, 1 ♀ (LS); **loc. 87:** 8-VIII-2007, 1 ♀ (E, YuE); **loc. 88:** 11-VII-2007, 2 ♂, 4 ♀ (AB); **loc. 92:** 18-VII-2001, 4 ♂, 9-VII-2002, 1 ♂, 1 ♀, 17-VII&6-VIII-2003, 3 ♂, 2 ♀, 19-VII&20-VIII-2004, 3 ♂, 4 ♀ (E, YuE); **loc. 95:** 15-VII-1983, 1 ♀ (IBPCLZ); **loc. 98:** 3/24-VII-2007, 2 ♂, 7 ♀ (BGF); **loc. 101:** 19/29-VII-1987, 18 ♂, 3 ♀ (IBPCLZ); **loc. 102:** 6/25-VII-1989, 4 ♂, 2 ♀, 25-VII-1990, 2 ♂, 3-VIII-2002, 4 ♂ (B); **loc. 103:** 15/16-VII-1995, 2 ♀ (B); **loc. 105:** 11-VIII-2003, 2 ♂ (AB); **loc. 107:** 10-VIII-2003, 1 ♂ (AB); **loc. 109:** 1-VIII-2006, 2 ♂, 1 ♀ (SN). **E: loc. 131:** 2-VIII-2003, 1 ♂ (P); **loc. 133:** 6-VIII-2008, 2 ♂, 1 ♀ (LS).

Transpalaeartic – W, SW, S, C, E – late summer – lentic.

### *Sympyca paedisca* (Brauer, 1877)

BARTENEV, 1917: **C: loc. 92:** (T.O. Yurinskii, 14-VI-1910, *Sympyca p. paedisca* Brauer).

**C: loc. 79:** 16-VIII-2007, 1 ♀; **loc. 81:** 6-VIII-2007, 1 ♂, 2 ♀; **loc. 82:** 9-VI-2007, 1 ♀; **loc. 84:** 14-VI-2007, 1 ♂; **loc. 85:** 14/17-VIII-2007, 2 ♂, 1 ♀; **loc. 87:** 8-VIII-2007, 1 ♂, 2 ♀; **loc. 88:** 30-VI&6-VII-2007, 3 ♂, 2 ♀; **loc. 89:** 8-VIII-2007, 1 ♀ (LS); **loc. 90:** 8-VIII-2007, 2 ♂ (E, YuE); **loc. 92:** 8-VII-2001, 1 ♂, 15-VIII-2003, 1 ♀, 20-VIII-2004, 1 ♀ (E, YuE).

Transpalaeartic – C – throughout warm season, since imagines hatch in mid-summer, hibernate, reappear in spring and fly until emergence of next generation – lentic.

## Coenagrionidae

### *Coenagrion armatum* (Charpentier, 1840)

BELYSHEV, 1965: **C: loc. 83** (16-VI-1963); FUKUI, 1992: **C: loc. 86** (29-VII-1989).

**C: loc. 81:** 28-VI-2007, 2 ♂, 1 ♀; **loc. 82:** 9-VI-2007, 1 ♂, 4 ♀ (B, YuE); **loc. 88:** 30-VI-6-VII-2007, 3 ♂, 1 ♀ (LS); **loc. 92:** 20-VI-2001, 2 ♀ (E); **loc. 101:** 29-VI&13-VII-1987, 2 ♂ (IBPCLZ); **loc. 102:** 5-VI-2000, 2 ♂ (B); **loc. 113:** 24/27-VI-2008, 1 ♂, 3 ♀ (LS).

Transpalaeartic – C – early summer - small lentic water bodies.

### *Coenagrion ecornutum* (Selys, 1872)

FUKUI, 1992: **C: loc. 91** (27-VII-1989).

**C: loc. 70:** 2-VII-2005, 2 ♂ (SN); **loc. 97:** 18/19-VII-2003, 1 ♂, 1 ♀ (A).

East palaeartic – C – late summer – lentic.

The recent records of this species in Yakutia were surprising, for it was thought to be a South-Siberian species. According to our knowledge, the Yakutian population seems isolated from the closest known localities in the Baikal area and Transbaikalia.

### *Coenagrion glaciale* (Selys, 1872)

BELYSHEV, 1973: **NW: loc. 5** (28-VI&18-VII-1963).

**SW: loc. 22:** 7-VII-2008, 1 ♂ (MV); **loc. 31:** 16-VII-2006, 1 ♀ (K). **C: loc. 98:** 7-VII-2007, 1 ♀ (BGF); **loc. 113:** 24-VI-2008, 2 ♂ (LS). **E: loc. 128:** 21-VII-1993, 1 ♂ (IBPCLZ); **loc. 130:** 13-VII-2003, 1 ♀ (P); **loc. 134:** 15-VI-2007, 1 ♀ (LS).

East palaeartic – NW, SW, C, E – late summer – lentic.

### *Coenagrion hastulatum* (Charpentier, 1825)

BARTENEV, 1911a: **C: loc. 100** (I.D. Cherskii, 1891); BELYSHEV, 1965 (18-VII-1963, as *Agrion*

*lanceolatum* S.), 1973: **NW: loc. 5** (18-VII-1963); KOSTERIN, 2004: **S: loc. 56** (24-VI-2002).

**SW: loc. 21:** 1-VII-2002, 8 ♂ (SN); **loc. 29:** 11-VII-2006, 1 ♀ (K).

Transpalaeartic – NW, W, W, S, C – mid-summer – lentic.

### *Coenagrion hylas* (Trybom, 1889)

BARTENEV, 1911a: **C: loc. 117** (I.D. Cherskii, 30-VI-1891); BELYSHEV, 1960: **E: loc. 118** (V. Mutsetoni, VI-1954); BELYSHEV, 1973: **NW: loc. 5** (12-18-VII-1963); FUKUI, 1992: **C: loc. 86** (29-VII-1989).

**NW: loc. 2:** 26-VI&1-VII-2006, 2 ♂ (AP). **W: loc. 13:** 20-VII-2002, 1 ♀ (LS); **loc. 22:** 7/8-VII-2008, 3 ♂ (MV). **SW: loc. 27:** 24-VII-2007, 1 ♂ (AB); **loc. 32:** 25-VI-2006, 2 ♂, 1 ♀ (K). **S: loc. 61:** 16-VII-1990, 1 ♂ (V). **E: loc. 128:** 21-VII-1993, 1 ♂ (IBPCLZ); **loc. 129:** 12-VII-2003, 1 ♂, 1 ♀ (P); **loc. 130:** VII-2003, 1 ♂ (P); **loc. 133:** 23-VI-2007, 1 ♀ (LS).

Transpalaeartic – NW, C, SW, S – mid-summer – lentic.

### *Coenagrion johanssoni* (Wallengren, 1894)

BELYSHEV, 1973: **NW: loc. 5** (1/16-VII-1963, *Agrion concinnum* Joh.); FUKUI, 1992: **C: loc. 86** (29-VII-1989); KOSTERIN, 2004: **S: loc. 56** (24-VI-2002).

**NW: loc. 2:** 25/28-VI-2006, 1 ♂, 2 ♀ (AP). **W: loc. 10:** 22-VII-2006, 2 ♂, 1 ♀ (G); **loc. 39:** 13/14-VII-2000, 3 ♂ (YuE). **S: loc. 57:** 8-VIII-1990, 2 ♂ (V). **C: loc. 74:** 9-VII-1998, 1 ♀ (YuE); **loc. 97:** 18-VII-2003, 3 ♂, 1 ♀ (A); **loc. 99:** 17-VII-2003, 1 ♂ (A); **loc. 113:** 24/28-VI-2008, 18 ♂, 7 ♀ (LS). **E: loc. 128:** 21-VII-1993, 3 ♂ (IBPCLZ); **loc. 132:** 24-VII-2003, 1 ♂ (P); **loc. 134:** 15-VI-2007, 1 ♀ (LS); **loc. 136:** 13-VIII-2007, 3 ♂ (SN).

Transpalaeartic – NW, W, S, C, E – mid-summer – oligotrophic lentic water bodies.

### *Coenagrion lanceolatum* (Selys, 1872)

BARTENEV, 1917: **C: loc. 83** (T.O. Yurinskii, 22-VII-1911, 20-VI-1914), **loc. 111** (P.V. Olenin, 7-VII-1911); FUKUI, 1992: **C: loc. 86** (29-VII-1989).

**C: loc. 101:** 25-VII-1987, 1 ♂.

East palaeartic – C – mid-summer – lentic.

### *Coenagrion lunulatum* (Charpentier, 1840)

BARTENEV, 1911a: **C: loc. 100** (I.D. Cherskii, 1891, *Agrion vernale* Hag.); BARTENEV, 1917: **C: loc. 83** (T.O. Yurinskii, 2-VI-1911, 9-VI-1912, 31-V&17-VI-1914, *Agrion vernale* Hag.); KOSTERIN, 2004: **S: loc. 58** (19-VI-2002).

**SW: loc. 41:** 18-VII-2000, 1 ♀ (YuE); **loc. 53:** 23-VI-1985, 2 ♂ (IBPCLZ). **C: loc. 79:** 13-VI-2007, 1 ♂, 2 ♀; **loc. 81:** 28-VI-2007, 3 ♂, 1 ♀; **loc. 82:** 9/28-VI-2007, 2 ♂, 1 ♀ (B); **loc. 88:** 30-VI&6-VII-2007, 1 ♂, 11 ♀ (LS), 11-VII-2007, 1 ♂ (AB); **loc. 92:** 20-VI-2001, 5 ♂, 28-VI-2002, 2 ♂, 28-VI-2004, 1 ♀ (E); **loc. 98:** 4/5-VII-2007, 1 ♂, 2 ♀ (BGF); **loc. 99:** VII-2003, 1 ♀ (A); **loc. 101:** 14/15-VII-1987, 1 ♂, 1 ♀ (IBPCLZ); **loc. 102:** 4-VII-1987, 3 ♂, 1 ♀, 20-VI&13-VII-1987, 3 ♂, 6 ♀, 14-VI&2-VII-1990, 37 ♂, 13 ♀, 11-VI-2002, 2 ♂, 6 ♀, 5-VII-2003, 3 ♂, 2 ♀ (B); **loc. 103:** 7-VII-2003, 4 ♂ (B); **loc. 108:** 6-VII-2003, 1 ♂ (AP). **E: loc. 128:** 21-VII-1993, 1 ♂ (IBPCLZ); **loc. 132:** 24-VI-2003, 2 ♂ (P); **loc. 133:** 17-VI-2007, 3 ♂ (LS).

Transpalaeartic – SW, S, C, E – mid-summer – lentic.

### *Enallagma cyathigerum* (Charpentier, 1840)

BELYSHEV, 1960 (N.N. Skalon, *Enallagma* sp.): **E: loc. 122** (4/26-VII-1957), **loc. 123** (21-VII-

1957); BELY SHEV, 1973: **NW: loc. 5** (16/21-VII-1963, *Enallagma c. cyathigerum* Charp.); FUKUI, 1992: **C: loc. 88** (27-VII-1989); KOSTERIN, 2004: **S: loc. 56** (24-VII-2002).

**W: loc. 11:** ?2006, 1 ♂, 2 ♀ (G). **SW: loc. 26:** 24-VII-2007, 2 ♂ (AB); **loc. 31:** 15-VII-2006, 1 ♂, 1 ♀ (K); **loc. 49:** 20/22-VII-2008, 2 ♂, 1 ♀ (YuE). **C: loc. 73:** 22-VII-2005, 1 ♂ (AB); **loc. 75:** 12/19-VII-2001, 3 ♂, 1 ♀ (B); **loc. 85:** 14-VIII-2007, 1 ♂, 1 ♀ (LS); **loc. 88:** 10-VII-2007, 1 ♂ (B); **loc. 92:** 6-VIII-2004, 1 ♀ (YuE); **loc. 93:** 4-VII-2007, 1 ♀ (B); **loc. 98:** 21-VII-2007, 1 ♀ (BGF); **loc. 102:** 30-VI&5-VII-1989, 1 ♂, 2 ♀, 21-VII-1995, 2 ♂, 11-VI-2002, 1 ♂ (B). **E: loc. 138:** 6-VIII-2007, 1 ♂ (SN).

Transpalaeartic – W, SW, S, C, E – mid-summer – lentic and slightly lotic water bodies.

Adults exhibit a varying environmentally-dependent abdominal melanisation expressed in irregular development of black lateral stripes.

### *Erythromma najas humerale* (Selys, 1887)

BARTENEV, 1917: **C: loc. 83** (T.O. Yurinskii, 22-V.1912, *Erythromma najas* Hans.); FUKUI, 1992: **C: loc. 86, loc. 88** (27/29-VII-1989).

**SW: loc. 52:** 17-VII-2006, 2 ♀ (S). **C: loc. 74:** 15-VII-1994, 1 ♀, 9-VII-1998, 1 ♀ (BGF, IBPCLZ); **loc. 89:** 8-VIII-2007, 1 ♂ (LS); **loc. 102:** 5-VII-2003, 1 ♀ (B); **loc. 109:** 1-VIII-2006, 1 ♀ (SN).

Transpalaeartic – C – mid-summer – lentic and slightly lotic water bodies.

## Aeshnidae

### *Aeshna caerulea* (Ström, 1764)

HAGEN, 1858: **W: loc. 15** (R.K. Maak, *A. borealis* Zett.); BARTENEV, 1911a: (A.L. Chekanovskii, *A. borealis* Zett.): **W: loc. 16, C: loc. 116** (12-VI-1875); BELY SHEV, 1960: **E: loc. 122** (N.N. Skalon, 6-VII-1957, *A. s. squamata* Müll.); BELY SHEV, 1973: **NW: loc. 5** (11/20-VII-1963, *A. s. squamata* Müll.); KOSTERIN, 2004: **S: loc. 56** (24-VI-2002).

**N: loc. 1:** 14-VII-2001, 1 ♀ (AE). **SW: loc. 32:** 19-VII-2006, 1 ♂ (K). **C: loc. 98:** 22-VII-2007, 1 ♀ (BGF). **E: loc. 124:** 29-VII-2006, 1 ♂ (AP); **loc. 135:** 26-VII-2008, 1 ♂ (LS); **loc. 136:** 10-VII-2007, 3 ♂ 1 ♀ (SN).

Holarctic – omnipresent – late summer – small oligotrophic, mostly peaty water bodies.

### *Aeshna crenata* (Hagen, 1856)

HAGEN, 1858: **W: loc. 15** (R.K. Maak); BARTENEV, 1911a: **NW: loc. 16** (A.L. Chekanovskii, *A. gigas* Bart.); BARTENEV, 1917: **C: loc. 83** (T.O. Yurinskii, 1/9-VII-1910, 28-VI-1914, *A. gigas* Bart.); BELY SHEV, 1960 (N.N. Skalon, *A. clepsydra crenata* Hag.): **E: loc. 122** (6/10-VII-1957), **loc. 121** (21-VII-1957), **loc. 139** (26-VII-1957); BELY SHEV, 1973: **NW: loc. 5** (12/13-VII-1963, *A. crenata wnikowskii* Belyshev ssp. nova); FUKUI, 1992: **C: loc. 88** (27-VII-1989).

**W: loc. 10:** 22-VII-2006, 1 ♂ (G). **SW: loc. 42:** 25-VII-2000, 1 ♂ (YuE); **loc. 44:** 16-VII-2008, 1 ♂ (YuE). **S: loc. 64:** 20-VII-2000, 1 ♀ (S); **loc. 66:** 22/25-VII-1990, 2 ♂ (V). **C: loc. 98:** 3/23-VII-2007, 7 ♂, 8 ♀ (BGF); **loc. 107:** 10-VIII-2003, 1 ♂ (AB); **loc. 110:** 5-VIII-2006, 2 ♂ (SN). **E: loc. 136:** 13-VIII-2007, 1 ♂ (SN).

Transpalaeartic – everywhere except for N – late summer – lentic.

### *Aeshna grandis* (Linnaeus, 1758)

**SW: loc. 34:** 23-VII-2006, 1 ♀ (K); **loc. 39:** 14-VII-2000, 1 ♀ (YuE).

West palaeartic – SW – late summer – lentic and slightly lotic waters.

For the first time reported for Yakutia.

*Aeshna juncea* (Linnaeus, 1758)

BARTENEV, 1911a: **NW: loc. 3** (A.L. Chekanovskii, 17/27-VI.1874); BARTENEV, 1912: **NW: loc. 16** (A.L. Chekanovskii); BARTENEV, 1917: **C: loc. 83** (T.O. Yurinskii, 18-VI-1911, 24-VI-1914), **loc. 85** (T.O. Yurinskii, 13-VI-1910); BELYSHEV, 1973: **NW: loc. 5** (14/20-VII-1963, *Aeshna juncea orientalis* Bart.); FUKUI, 1992: **C: loc. 86, loc. 88** (27/29-VII-1989).

**W: loc. 9:** 19-VIII-1990, 1 ♀; **loc. 10:** 22-VII-2006, 1 ♀ (G); **loc. 12:** 18-VII-2002, 1 ♂ (LS). **SW: loc. 21:** 15/17-VII-2008, 5 ♂, 2 ♀ (MV); **loc. 23:** 30-VII-2007, 2 ♀; **loc. 24:** 21-VII-2007, 1 ♀; **loc. 26:** 23/24-VII-2007, 2 ♂(AB); **loc. 29:** 11-VII-2006, 1 ♂ (K); **loc. 41:** 17/19-VII-2000, 1 ♂, 1 ♀ (YuE); **loc. 43:** 15-VII-2006, 1 ♀ (S); **loc. 44:** 12/16-VII-2008, 2 ♂, 1 ♀ (YuE); **loc. 45:** 23-VII-2000, 2 ♂ (A); **loc. 48:** 20-VII-2008, 1 ♂ (B); **loc. 49:** 19/20-VII-2008, 2 ♂, 1 ♀ (YuE). **S: loc. 60:** 15-VII-1990, 1 ♂ (V); **loc. 67:** 22-VIII-2001, 1 ♂ (AP). **C: loc. 75:** 12-VII-2001, 1 ♀ (B); **loc. 98:** 3/23-VII-2007, 12 ♂, 19 ♀ (BGF); **loc. 102:** 3-VIII-2002, 1 ♂; **loc. 106:** 21-VIII-2007, 1 ♂ (V); **loc. 107:** 10-VIII-2003, 2 ♂, 1 ♀ (AB); **loc. 113:** 24/28-VI-2008, 2 ♂, 4 ♀ (LS). **E: loc. 120:** 1-VII&8-VIII-1999, 5 ♂, 1 ♀ (S); **loc. 125:** 1-VIII-2006, 1 ♀; **loc. 126:** 2-VIII-2006, 1 ♀ (AP); **loc. 133:** 6-VIII-2008, 1 ♂, 1 ♀ (LS); **loc. 137:** 6-VIII-2007, 1 ♂ (SN).

Holarctic - everywhere except for N – late summer – small lakes on meadowy river valleys and other lentic habitats.

*Aeshna serrata* (Hagen, 1856)

FUKUI, 1992: **C: loc. 88** (27-VII-1989).

**W: loc. 7:** 10-VIII-1997, 1 ♂ (S). **SW: loc. 46:** 12-VII-2008, 1 ♀ (YuE); **loc. 48:** 19-20-VII-2008, 2 ♀ (B, YuE). **C: loc. 69:** 3-VII-2001, 1 ♂ (P); **loc. 85:** 14-VIII-2007, 1 ♂ (LS); **loc. 88:** 10-VII-2007, 5 ♂ (AB); **loc. 98:** 5/23-VII-2007, 2 ♂, 1 ♀ (BGF).

Transpalaeartic – W, C – late summer – lentic, tolerates some salinity.

*Aeshna subarctica* Walker, 1908

BELYSHEV, 1960: **E: loc. 118** (V. Mutsetoni, VI-1954, *A. subarctica* sub. sp.), **loc. 122** (N.N. Skalon, 10-VII-1957); BELYSHEV, 1973: **NW: loc. 5** (17/20-VII-1963).

**S: loc. 59:** 15/16-VII-2007, 1 ♂, 1 ♀ (LS).

Holarctic – NW, S, E - late summer – narrowly specialised to peaty habitats.

## G o m p h i d a e

*Nichonogomphus ruptus* (Selys, 1857).

KOSTERIN, 2004: **S: loc. 56** (25-VII-2002).

**SW: loc. 30:** 12/16-VII-2006, 2 ♂, 1 ♀; **loc. 32:** 19-VII-2006, 1 ♂ (K).

East palaeartic – SW, S – mid-summer – rivers.

*Ophiogomphus obscurus* Bartenev, 1930

**W: loc. 12:** 19-VII-2002, 2 ♂ (LS). **SW: loc. 16:** 14-VII-1987, 1 ♂ (SN); 1 ♂ (YuE); **loc. 21:** ?-VII-2007, 1 ♀ (AB); **loc. 25:** 23-VII-2005, 1 ♂, 1 ♀ (IBPCLZ); **loc. 30:** 12-VII-2006, 1 ♂ (K); **loc. 40:** 28-VII-2000, **S: loc. 60:** VII-2007, 1 ♀ (SN).

East palaeartic – W, SW, S – late summer – rivers.

For the first time reported for Yakutia.

## Corduliidae

*Cordulia aenea* (Linnaeus, 1758)

HAGEN, 1858: **W: loc. 15** (R. K. Maak); BARTENEV, 1911a: **W: loc. 15** (R.K. Maak), **C: loc. 117** (I-D. Cherskii, 30-VI-1891); BARTENEV, 1917: **C: loc. 83** (T.O. Yurinskii, 20-VI-1914), **loc. 85** (T.O. Yurinskii, 13-VI-1910); BELYSHEV, 1960 (*Cordulia aenea amurensis* S.): **E: loc. 118** (V. Mutsetoni, VI-1954), **loc. 122** (N.N. Skalon, 26-VI-14-VII-1957); BELYSHEV, 1973: **NW: loc. 5** (29-VI&20-VII-1963, *Cordulia aenea amurensis* S.); KOSTERIN, 2004: **S: loc. 56** (24-VI-2002).

**NW: loc. 2:** 1-VII-2006, 1 ♀ (AP). **W: loc. 10:** 22-VII-2006, 2 ♂, 1 ♀ (G). **SW: loc. 21:** 23-VII-1999, 1 ♂ (K); **loc. 22:** 7-VII-2008, 2 ♂, 1 ♀ (MV). **C: loc. 72:** 6-VII-1993, 1 ♂ (A); **loc. 74:** 15-VII-1994, 1 ♂, 1 ♀ (BGF), 9-VII-1998, 2 ♀ (YuE); **loc. 98:** 4/23-VII-2007, 2 ♂, 4 ♀ (BGF); **loc. 113:** 24/26-VI-2008, 2 ♂, 1 ♀ (LS). **E: loc. 134:** 15-VI-2007, 2 ♀ (LS); **loc. 136:** 13-VIII-2007, 1 ♂, 1 ♀ (SN).

Transpalaeartic – NW, W, S, C, E – emerges in early July – lentic, mostly peaty habitats.

*Eitheca bimaculata* (Charpentier, 1825)

HAGEN, 1858: **W: loc. 15** (R.K. Maak); BARTENEV, 1911a: **W: loc. 15** (R.K. Maak); BARTENEV, 1917: **C: loc. 83** (T.O. Yurinskii, 1-VII-1910, 29-V-1912, 9-VI-1914), **loc. 85** (T.O. Yurinskii, 13-VI-1910); BELYSHEV, 1960: **E: loc. 118** (V. Mutsetoni, VI-1954, *Eitheca bimaculata altaica* Belyshev).

**SW: loc. 45:** VII-2000, 1 ♂ (A); **loc. 43:** 17-VII-2006, 1 ♂ (S). **C: loc. 69:** 5-VII-2001, 1 ♀ (P); **loc. 70:** 3-VII-2005, 1 ♂ (SN); **loc. 74:** 15-VII-1994, 2 ♂, 4 ♀ (BGF), 9-VII-1998, 2 ♂, 6 ♀ (YuE); **loc. 98:** 7-VII-2007, 1 ♀ (BGF).

Transpalaeartic – W, SW, C, E – mid-summer – lentic.

*Somatochlora arctica* (Zetterstedt, 1840)

BELYSHEV, 1973: **NW: loc. 5** (E. Stepanchuk, 20-VII-1963).

**SW: loc. 20:** 16-VII-2008, 1 ♂ (MV); **loc. 22:** 6-VII-2008, 1 ♂, 1 ♀ (MV).

Transpalaeartic – NW – mid-summer – lentic.

*Somatochlora exuberata* Bartenev, 1911

BELYSHEV, 1973: **NW: loc. 5** (20-VII-1963, *S. metallica exuberata* Bart.); KOSTERIN, 2004: **S: loc. 56** (24-VI-2002).

**W: loc. 12:** 16/19-VII-2002, 9 ♂, 1 ♀ (LS). **SW: loc. 22:** 6/8-VII-2008, 6 ♂, 3 ♀ (MV); **loc. 25:** 23-VII-2005, 1 ♀ (IBPCLZ); **loc. 24:** 21/22-VII-2007, 2 ♂ (AB); **loc. 28:** 6-VII-2006, 1 ♀; **loc. 34:** 23-VII-2006, 1 ♂ (K); **loc. 40:** 18/19-VII-2000, 3 ♂; **loc. 41:** 19-VII-2000, 1 ♂; **loc. 42:** 25-VII-2000, 2 ♂ (YuE); **loc. 45:** 22-VII-2000, 1 ♀ (A). **C: loc. 98:** 3/22-VII-2007, 1 ♂, 3 ♀ (BGF).

East palaeartic – NW, W, SW, S, C – mid-summer – mostly rivers.

*Somatochlora graeseri* Selys, 1887

BELYSHEV, 1960: **E: loc. 122** (N.N. Skalon, 10-VII-1957, *Somatochlora g. graeseri* S.); BELYSHEV, 1973: **NW: loc. 5** (13-VII-1963, *Somatochlora g. graeseri* S.); KOSTERIN, 2004: **S: loc. 56** (24-VI-2002).

**W: loc. 10:** 22-VII-1990, 2 ♂ (G). **SW: loc. 22:** 6/8-VII-2008, 1 ♂, 1 ♀ (MV). **S: loc. 60:** 15-VI&16-VII-1990, 4 ♂ (V); **loc. 66:** 22/26-VII-1990, 2 ♂, 1 ♀ (V). **C: loc. 74:** 9-VII-1998, 1 ♀ (YuE); **loc. 98:** 4/23-VII-2007, 2 ♀ (BGF).

East palaeartic – NW, W, S, C, E – mid-summer – various lentic water bodies.

*Somatochlora sahlbergi* (Trybom, 1889)KOSTERIN, 2004: **S: loc. 56** (24-VI-2002).**E: loc. 133:** 6-VIII-2008, 1 ♀ (LS).

Holarctic – S – mid-summer - small oligotrophic pools.

## Libellulidae

*Libellula quadrimaculata* (Linnaeus, 1758).BARTENEV, 1917: **C: loc. 83** (T.O. Yurinskii, 7-VII-1912), **loc. 85** (T.O. Yurinskii, 13-VI-1910), **loc. 114** (T.O. Yurinskii, 13-VI-1911); FUKUI, 1992: **C: loc. 80** (28-VII-1989).**W: loc. 10:** 22-VII-2006, 1 ♀ (G); **SW: loc. 31:** 15-VII-2006, 3 ♂; **loc. 32:** 19-VII-2006, 1 ♀ (K); **S: loc. 60:** 15/16-VII-1990, 3 ♂ (V); **C: loc. 70:** 11-VI-1990, 1 ♀ (SN); **loc. 71:** 5-VII-1992, 1 ♀ (K); **loc. 72:** 5/8-VII-1993, 5 ♀, 5-VII-1996, 1 ♂ (A); **loc. 74:** 10-VII-1998, 1 ♀ (YuE); **loc. 85:** 14-VIII-2007, 1 ♂ (LS); **loc. 98:** 18/24-VII-2007, 6 ♂, 18 ♀ (BGF); **loc. 113:** 24/26-VI-2008, 4 ♀ (LS).

Transpalearctic – W, SW, S, C - mid-late summer – lentic.

*Leucorrhinia (rubicunda) intermedia* (Bartenev, 1911)HAGEN, 1858: **W: loc. 15** (R.K. Maak, *Libellula rubicunda* L.); BARTENEV, 1911a: **C: loc. 116** (A.L. Chekanovskii, 8-9-VI-1875, *Leucorrhinia intermedia* Bart.); BARTENEV, 1917 (*Leucorrhinia intermedia* Bart.): **C: loc. 83** (T.O. Yurinskii, 13-VI-1910, 25-V&22-VII-1912, 28-V&8-VI-1914), **loc. 85** (T.O. Yurinskii, 13-VI-1910), **loc. 114** (T.O. Yurinskii, 13-VI-1911).**NW: loc. 2:** 1-VII-2006, 1 ♀ (AP); **SW: loc. 21:** 9-VII-2000, 1 ♀ (V), 1-VII-2002, 1 ♀ (SN), 15/16-VII-2008, 4 ♀ (MV); **loc. 22:** 7/8-VII-2008, 1 ♂, 1 ♀ (MV); **loc. 31:** 14-VII-2006, 1 ♀ (K); **C: loc. 70:** 11-VI-2005, 1 ♂, 2 ♀ (AP); **loc. 71:** 27-VI-1996, 1 ♂, 1 ♀ (A); **loc. 74:** 15-VII-1994, 1 ♂ (BGF); **loc. 76:** 17-VI-1976, 2 ♂, 1 ♀ (IBPCLZ); **loc. 84:** 14-VI-2007, 1 ♂ (B); **loc. 88:** 30-V&6-VI-2007, 1 ♂, 4 ♀ (LS); **loc. 92:** 28-VI-2002, 1 ♀ (E); **loc. 97:** 19-VII-2003, 1 ♂ (A); **loc. 98:** 3/7-VII-2007, 7 ♂, 16 ♀ (BGF); **loc. 102:** 2-VII-1997, 1 ♂, 1 ♀, 11-VI-2002, 2 ♂, 1 ♀ (B); **loc. 113:** 24/27-VI-2008, 9 ♂, 16 ♀ (LS); **E: loc. 131:** 2-VIII-2003, 1 ♀ (P); **loc. 133:** 17-VI-2007, 2 ♀; **loc. 134:** 15-VI-2007, 1 ♂ (LS).

East palearctic – NW, SW, C, E – mid-late summer – lentic.

*Leucorrhinia dubia orientalis* (Selys, 1887)BARTENEV, 1917: **C: loc. 83** (T.O. Yurinskii, 29-VI-1912), **E: loc. 140** (?T.O. Yurinskii, 1912); BELYSHEV, 1960: **E: loc. 122** (N.N. Skalon, 4-VII-1957); BELYSHEV, 1973: **NW: loc. 5** (1/20-VII-1963, *Leucorrhinia orientalis* S.); FUKUI, 1992: **C: loc. 86** (29-VII-1989); **S: KOSTERIN, 2004: loc. 56** (24-VI-2002).**NW: loc. 4:** 9-VII-2002, 4 ♂ (S); **W: loc. 10:** 22-VII-2002, 2 ♂, 1 ♀ (G); **loc. 14:** 26-VII-2002, 1 ♀ (LS); **SW: loc. 21:** 9-VII-2000, 2 ♂ (V), 1-VII-2002, 1 ♀ (SN), 10/17-VII-2008, 3 ♂, 8 ♀ (MV); **loc. 23:** 30-VII-2007, 1 ♀ (AB); **loc. 26:** 24-VII-2007, 3 ♀; **loc. 32:** 19-VII-2006, 2 ♀ (K); **loc. 39:** 13-VII-2000, 2 ♂, 1 ♀ (YuE); **loc. 51:** 26-VII-1975, 1 ♂ (P); **S: loc. 60:** 12/16-VII-1990, 2 ♂, 1 ♀ (V); **loc. 63:** 16-VIII-2000, 1 ♀; **loc. 64:** 7-VIII-2000, 1 ♀ (S); **loc. 67:** 22-VIII-2001, 4 ♂ (AP); **C: loc. 70:** 29-VII-2006, 1 ♂ (SN); **73:** 22-VII-2005, 2 ♂ (AB); **loc. 74:** 9/10-VII-1998, 1 ♂, 1 ♀ (YuE); **loc. 88:** 30-V-2007, 2 ♀ (LS); **loc. 92:** 1 ♀ (E); **loc. 98:** 3/23-VII-2007, 1 ♂, 13 ♀ (BGF); **loc. 112:** 22-VIII-2001, 1 ♀ (AP); **loc. 113:** 26/27-VI-2008, 2 ♂ (LS); **E: loc. 134:** 15-VI-2007, 1 ♂, 1 ♀ (LS).

East palearctic – NW, W, SW, S, C, E – mid-late summer – lentic.

*Sympetrum danae* (Sulzer, 1776)HAGEN, 1858: **W: loc. 15** (R.K. Maak, *Libellula scotica* Don.); BARTENEV, 1912, 1915: **W: loc.**

**15** (R.K. Maak, (*Sympetrum scoticum* Don.); BARTENEV, 1917: **C: loc. 83** (T.O. Yurinskii, 1-VIII-1910, (*Sympetrum scoticum* Don.)); FUKUI, 1992: **C: loc. 78, loc. 86, loc. 88** (27/29-VII-1989).

**SW: loc. 20:** 21-VIII-2002, 2 ♀ (SN); **loc. 46:** 12/18-VII-2008, 1 ♂, 1 ♀ (YuE). **C: loc. 70:** 29-VII-2006, 1 ♀ (SN); **loc. 73:** 22-VII-2005, 1 ♂ (AB); **loc. 85:** 14/17-VIII-2007, 2 ♂, 1 ♀; **loc. 88:** 24-VII&2-VIII-2007, 8 ♂, 3 ♀; **loc. 89:** 8-VIII-2007, 2 ♂ (LS); **loc. 103:** 26-VII-1996, 1 ♀ (B); **loc. 106:** 21-VIII-2007, 2 ♂, 1 ♀ (V); **loc. 107:** 10-VIII-2003, 1 ♂ (AB). **E: loc. 131:** 3-VI&2-VIII-2003, 3 ♂, 4 ♀ (P).

Holarctic – W, SW, C, E – late summer – lentic.

### *Sympetrum flaveolum* (Linnaeus, 1758)

HAGEN, 1858: **W: loc. 15** (R.K. Maak, *Libellula flaveola* L.); BARTENEV, 1912, 1915: **W: loc. 15** (R.K. Maak), **C: loc. 115** (A.L. Chekanovskii, 4-VII-1875); **loc. 117** (I.D. Cherskii); BARTENEV, 1917 (T.O. Yurinskii, *Sympetrum f. flaveolum* L. trans. ad. ab. *flaveolata* S.); **C: loc. 83** (2-VII&1-VI-II-1910, 20-VI-1914, 2-VII-1910, 22-VII-1912), **loc. 85** (1-VIII-1910); FUKUI, 1992: **C: loc. 78, loc. 83, loc. 86, loc. 88** (26-29-VII-1989).

**W: loc. 10:** 22-VII-2006, 1 ♂, 1 ♀ (G); **loc. 11:** VII-2006, 1 ♀ (G). **SW: loc. 17:** 6-VIII-2002, 2 ♂, 1 ♀, 17-VIII-2002, 2 ♀ (SN); **loc. 18:** 21/23-VIII-2002, 4 ♀ (SN), 27/31-VIII-2007, 1 ♂, 1 ♀ (AB); **loc. 19:** 23/28-VII-1999, 6 ♀ (K); **loc. 20:** 29-VII-2007, 1 ♀ (AB); **loc. 21:** 15/17-VII-2008, 7 ♂, 13 ♀ (MV); **loc. 24:** 24-VII-2007, 1 ♂; **loc. 28:** 16-VII-2006, 1 ♂; **loc. 29:** 19-VII-2006, 1 ♂; **loc. 30:** 24-VII-2006, 2 ♀ (K); **loc. 34:** 14-VII-2000, 1 ♂, 1 ♀ (YuE); **loc. 42:** 26-VII-1975, 1 ♀ (P); **loc. 44:** 15/16-VII-2008, 1 ♂, 1 ♀ (YuE); **loc. 45:** 11-VII-2008, 1 ♂, 1 ♀ (YuE); **loc. 46:** 18-VII-2008, 1 ♀ (YuE); **loc. 48:** 19/20-VII-2008, 1 ♂, 1 ♀ (B, YuE); **loc. 49:** 22-VII-2008, 1 ♂ (B); **loc. 50:** 26-VII-2008, 1 ♀ (B). **S: loc. 51:** 29-VII-2001, 1 ♂, 3 ♀ (A); **loc. 54:** 8-VIII-1990, 2 ♀ (V); **loc. 58:** 15/16-VII-1990, 2 ♀ (V); **loc. 59:** 18-VII-1995, 1 ♂, 4 ♀ (V); **loc. 67:** 22-VIII-2001, 1 ♀ (AP). **C: loc. 70:** 29-VII-2006, 1 ♂ (SN); **loc. 72:** 5-VII-1993, 1 ♀ (A), 18-VII-2001, 1 ♀ (P), 21-VII-2005, 1 ♂ (AB); **loc. 73:** 22-VII-2005, 1 ♂ (AB); **loc. 74:** 9-VII-1998, 1 ♀ (IBPCLZ); **loc. 75:** 19-VII-2001, 1 ♀ (B); **loc. 85:** 17-VIII-07, 1 ♂; **loc. 88:** 24-VII&2-VIII-2007, 4 ♂, 2 ♀; **loc. 89:** 8-VIII-2007, 1 ♂, 1 ♀; **loc. 92:** 31-VII-2002, 1 ♂, 1 ♀ (E); **loc. 93:** 4-VII-2007, 1 ♂ (YuE); **loc. 95:** 15-VII-1983, 1 ♀ (IBPCLZ); **loc. 98:** 3/23-VII-2007, 7 ♂, 10 ♀ (BGF); **loc. 101:** 23-VII-1987, 1 ♂; **loc. 102:** 5-VII&24-VIII-1989, 2 ♂, 3 ♀, 21-VIII-1990, 1 ♀ (K), 3-VIII-2002, 1 ♂ (B); **loc. 103:** 15/16-VII-1995, 3 ♀, 2-VII-1997, 1 ♂ (B); **loc. 104:** 17-VII-1995, 1 ♂, 2 ♀ (B); **loc. 108:** 28-VII-2003, 2 ♂, 1 ♀ (AP); **loc. 113:** 24/28-VI-2008, 1 ♂, 6 ♀ (LS). **E: loc. 136:** 10-VII-2007, 1 ♂; **loc. 137:** 6-VIII-2007, 1 ♀ (SN).

Transpalearctic – W, SW, S, C – late summer – lentic, including small pools and tussock bogs.

### *Sympetrum vulgatum* (Linnaeus, 1758)

BARTENEV, 1917: **C: loc. 83** (T.O. Yurinskii, 1-VI-1910, *Sympetrum vulgatum vulgatum rossicum* Bart.); FUKUI, 1992: **C: loc. 87, loc. 88** (27/28-VII-1989).

**SW: loc. 42:** 25-VII-2000, 1 ♀ (YuE); **loc. 44:** 16-VII-2008, 1 ♂, 1 ♀ (YuE); **loc. 47:** 23-VII-2008, 1 ♂ (B); **loc. 48:** 20-VII-2008, 1 ♀ (B). **C: loc. 77:** 26-VIII-2007, 1 ♀; **loc. 85:** 14/17-VIII-2007, 2 ♂, 1 ♀; **loc. 88:** 24-VII-2007, 2 ♂ (LS); **loc. 101:** 25-VII-1987, 2 ♀ (K); **loc. 102:** 23-VII-1987, 1 ♀ (B).

Transpalearctic – SW, C – late summer – lentic.

## ***CALOPTERYX SPLENDENS NJUJA* SSP. NOV.**

Figure 2a-d

**Material.** – **Holotype** ♂: RUSSIA, Sakha Republic-Yakutia, Lena Ulus, the Nyuya river at the Chayanda river mouth (**loc. 31**); 14-VII-2006, 1 ♂ (Fig. 2a), E.L. Kaimuk leg. (preserved at SZMN ISEA). – **Paratypes** (7 ♂, 1 ♀): RUSSIA, Sakha Republic – Yakutia, Lena Ulus, the Nyuya river

(loc. 28); 12-VII-2006, 4 ♂ (Fig. 2b, c), 1 ♀, E.L. Kaimuk leg. (2 ♂ in ISEA; 1 ♂, 1 ♀ in IBPC, 1 ♂ to be forwarded to the National Museum of Natural History Naturalis, Leiden); RUSSIA, Sakha Republic-Yakutia, Lena Ulus, the Nyuya river, between Orgul and the Chayanda river mouth (loc. 30); 13-VII-2006, 1 ♂ (with O. Kosterin, not set), E.L. Kaimuk leg.; RUSSIA, Sakha Republic-Yakutia, Lena Ulus (in modern Yakutia the Turcic word "Ulus" is used to officially denote its districts), 130 km W of Vitim settlement, upper reaches of the Peledui r., a left tributary of the Lena, the Lyuksini protected area (loc. 17), 9-VII-2005, 1 ♂ (Fig. 2d), E.L. Kaimuk leg. (in IBPC); RUSSIA, Sakha Republic-Yakutia, Lena Ulus, the Ileyka river, a left tributary of the Pilka river, the Pil'ka Resource Reserve (loc. 22), 7-VII-2008, 1 ♂, M. Vinokurova leg. (not set, in IBPC).

**Etymology.** – The name is toponymical, the Latin transliteration of the name of the river, Nyuya; a noun in apposition.

**MALE.** – Head, thorax and legs not different from nominate subspecies. Metallic colour violet blue rather than blueish green, but this is common for dried specimens in contrast to live ones or those preserved in alcohol. Black pattern of labrum not a contiguous central stripe, interrupted, forming a triangle with base at labrum proximal margin and apex, directed towards black stripe along distal margin of labrum. Legs black. Abdomen identical to nominate subspecies; underside of S8 and S9 ochraceous with diffuse black marking, this melanisation is variable and on average more expressed than in the nominate subspecies. Upper surface of inferior appendages black, underside with apices darkened for a distance equal to 1-1.5 of appendage width at tip, with indistinct border of melanisation. Among 5 studied males from loc. 28, 30 and 31, in 3, including the holotype, the apices of gonapophyses black, in 2 not darkened.

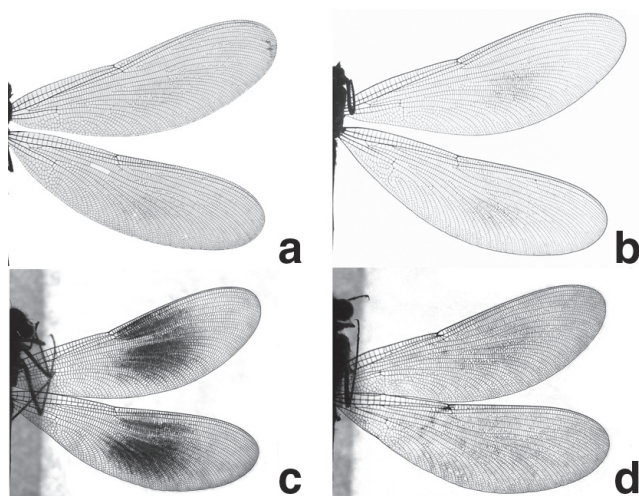


Fig. 2. Males *Calopteryx splendens njuja* ssp. n.: (a) holotype, loc. 31 (the Nyuya river at the Chayanda mouth); – (b, c) paratypes from loc. 28 (the Nyuya river); – (d) paratype from loc. 17 (the Peledui river, the Lyuksini protected area).

Wings: of 6 males from the Nyuya river (loc. 28, 30 and 31); in 4, including the holotype (Fig. 2a), coloration reduced from almost completely to a hardly noticeable shade in the central part of the wing, distally of nodus, beneath R4+5; in 1 male (Fig. 2b) there is a shade at R3 in forewing; in 1 male (Fig. 2c) pigmentation is developed as a diffuse remnant of a band, starting at nodus and ending halfway between nodus and wing tip, nearly split in two fragments by an almost translucent gap between R3 and IR3. A male from loc. 22 resembles 4 males from the Nyuya river but has a slightly more expressed diffuse shade of pigmentation. A male from loc. 17 (Fig. 2d) has only a faint irregular shade of pigmentation. Wing venation (the two paratypes left unset, since they are to be used for DNA extraction, and were not accounted for venation): Antenodals 27-34 (mean 29.9; 33 and 29 [left and right] in holotype) in forewing, 23-30 (mean 26.8; 27 and 28 in holotype) in hindwing; postnodals 77-90 (mean 80.7; 78 and 79 in holotype) in forewing, 75-83 (mean 77.0; 81 and 78 in holotype) in hindwing. (Since there is some irregularity and branching transversals between C and R1, only those antenodals and postnodals (before R1 joins the wing margin) were counted which contact immediately with C). Cells between Sc and R before RS sprout 2.5-4 (3 and 3 in holotype) in forewing, 2.5-4 (3.5 and 3 in holotype) in hindwing; cells in q 7-9 (mean 8.2; 7 and 8 in holotype) in forewing, 7-11 (mean 8.7; 7 and 8 in holotype) in hindwing; ac 11-14 (mean 12.3; 12 and 11 in holotype) in forewing, 11-15 (mean 12.8; 13 and 12 in holotype) in hindwing. Cells in anal field: total cells 42-64 (mean 49.1; 44 and 43 in holotype) in forewing, 43-73 (mean 58.9; 57 and 58 in holotype) in hindwing; cells along A 14-20 (mean 17.3; 17 and 17 in holotype) in forewing, 16-22 (mean 18.7; 18 and 17 in holotype) in hindwing; of them basic cells (proximal ones extending from A to wing margin) 4-6 (mean 4.9; 6 and 5 in holotype) in forewing, 3-6 (mean 4.3; 4 and 3 in holotype) in hindwing; inner cells 9-25 (mean 14.8; 10 and 12 in holotype) in forewing, 13-31 (mean 20.6; 19 and 19 in holotype) in hindwing; peripheral cells 25-36 (mean 29.2; 29 and 25 in holotype) in forewing, 30-40 (mean 34.5; 35 and 37 in holotype) in hindwing. (Terminology after BARTENEV, 1911b). The male from loc. 17 has significantly more cells in anal field.

**Measurements** (mm). – Total length (without appendages) 43-46 (45 in the holotype); abdomen (without appendages) 33-36 (34 in the holotype); Fw: length 30-33 (31 in the holotype), width 9; Hw: maximum length 29-32 (30 in the holotype), maximum width 9.

**FEMALE.** – In body structure and coloration not different from the nominate subspecies. Wings hyaline. Wing venation: antenodals 22 and 24 in forewing, 22 and 24 in hindwing; postnodals 50 and 63 in forewing, 50 (one wing apex lost) in hindwing. False pt occupies 4 cells. Cells between Sc and R before RS sprout 2.5 in forewing, 3.5 in hindwing; cells in q 8 and 9 in forewing, 8 and 9 in hindwing; ac 11 and 11 in forewing, 13 and 11 in hindwing. Cells in anal field: totally cells 31 and 37 in forewing, 39 and 36 in hindwing; cells along A 13 and 14 in forewing, 16 and 16 in hindwing; of them basic cells 4 on all wings; inner cells 7 and 8

in forewing, 9 and 9 in hindwing; peripheral cells 22-24 in forewing, 28 and 26 in hindwing.

**M e a s u r e m e n t s** (mm). – Total length 45; abdomen 35; Fw: length 33, maximum width 9; Hw: length 32; maximum width 9.

**DISTRIBUTION.** – All specimens were collected in Lena Ulu, in the basin of medium-sized left tributaries of the Lena river; perhaps the new subspecies inhabits all Lena tributaries in their upper reaches, South of 62°N. *C. splendens* has not hitherto been recorded from the Lena basin. The closest populations, characterised by normally coloured male wings, are known from the upper basin of the Angara river, West of southern Baikal.

**DIFFERENTIAL DIAGNOSIS.** – The body shows no significant differences from *C. s. splendens*. The main peculiarity of the new subspecies is a drastic reduction of the wing coloration in males. A somewhat similar reduction is observed in some subspecies of *C. splendens* from eastern Mediterranean sensu lato; and despite the great geographical distance the new subspecies has to be formally compared with them. *C. s. waterstoni* Schneider, 1984 from the Black Sea coast of Turkey is characterised by totally decolorate male wings (SCHNEIDER, 1984; KALKMAN et al., 2003; KALKMAN, 2006). *C. hyalina* Martin, 1909 from Syria and Lebanon, also with decolorate wings, once considered a subspecies of *C. splendens*, differs from it by two teeth on each inferior appendage, the absence of black marking on S8 and S9 and by broader male wings (KALKMAN, 2006) and could be a distinct species. The new subspecies differs from *C. s. waterstoni* by the presence of at least slight pigmentation in male wings. Our male from loc. 28, with the most expressed coloration, somewhat resembles the less coloured specimens of *C. s. taurica* Selys, 1853 from Crimea and *C. s. tshaldirica* Bartenev, 1909 from NE Anatolia, in which the band is strongly reduced and does not reach the wing hind margin (BARTENEV, 1911b; DUMONT et al., 1987; KALKMAN, 2006). But in these taxa the spot of coloration is contiguous and has rather an even inner margin, while in our most pigmented males it is split into two parts by a diffuse gap between R3 and IR3 (Fig. 2b, c), or its fore part is missing (Fig. 2a). It is clear that in our specimens, reduction of coloration took place on the basis of *C. s. splendens* in which, at least in all its Siberian representatives, the inner margin of the band is uneven, jugged and protrudes in proximal direction in its fore part – the trait considered by BARTENEV (1911) as one of the features of the males of *C. s. ancilla* Selys, 1853 sensu Bartenev. This may account for confusing ascribing this subspecies to the entire Siberia by LOHMANN (1992). At the same time, the shape of the spot in *C. s. taurica* and *C. s. tshaldirica* results from reduction of the band with an even inner margin, as in more pigmented taxa from the Mediterranean region: *C. s. mingrelica* Bartenev, 1930 from Georgia, *C. s. amasi-na* Bartenev, 1911 from most of Turkey and *C. s. intermedia* Selys, 1887, ranging from the southern coast of Asia Minor to Afghanistan (enumerated according to the increase of wing pigmentation) (BARTENEV, 1911b; DUMONT et al.,

1987; KALKMAN, 2006). Probably, *S. s. taurica* and *S. s. tshaldirica* represent transitions from the totally decolorated *C. s. waterstoni* to the well-coloured *S. s. mingrelica* and *C. s. amasina*. Such transitions may be confined to very short clines with very variable populations or to extended areas where the 'transitory phenotype' is rather stable (DUMONT et al., 1987).

REMARKS. – In the new subspecies, melanisation of the end of abdomen is somewhat enhanced as compared to the nominotypical subspecies: in all male specimens of the latter from Novosibirsk and from Tuva the inferior appendages are lighter above, brownish-yellow at their inner margins and beneath, only their apices are rather narrowly (length less than their width) darkened. In the Novosibirsk specimens the apices are never darkened, in Tuva they are either darkened or not. This enhanced pigmentation may be conditioned environmentally, or it is even the result of ageing. At the same time, the black pigmentation of the labrum is somewhat less than in males from Novosibirsk and Tuva, which have a contiguous central black stripe on it. But on average the body pigmentation in our type series is somewhat increased as compared to other Siberian *C. splendens* specimens, while the wing pigmentation is decreased almost to absence. The irregular shades of pigmentation in the wings of the male from loc. 17 (Fig. 2d) leave an impression that the wing had a potential for pigmentation but lacked a specific signal to pigment formation. It should be noted that, in spite of reduction, the wing coloration shows variation. Thus, the new subspecies is characterised by a drastic reduction of wing pigmentation but not that of the body; despite some variation, this should have a genetic basis. Probably, genes reducing wing banding have been fixed via a bottleneck effect in a small propagule which gave rise to the present Yakutian population, presently being north-westernmost population known in *C. splendens*, during recolonisation of Siberia in the Holocene. Since the coloration reduction is variable, there is most probably more than one gene responsible for it (DUMONT et al., 1987), some of the coloration modifiers still segregating in the Yakutian population. But there cannot be many of these, since in this case a drastic reduction of the character would demand a much longer evolution than the 5-10 thousand years of the recolonisation of Siberia. The allele(s) fixed in Yakutia may be of the same loci, the alleles of which have been fixed in the Mediterranean populations with hyaline or weakly pigmented male wings.

## DISCUSSION

The enormous territory of Yakutia supports an odonate fauna of only about 35 species. It is almost entirely boreal; only 4 lotic species, two calopterygids and two gomphids, found in the South and South-West could be considered as temperate. This is not surprising, considering that this territory has a severe continental climate and resides mostly in the taiga zone and partly in the forest-tundra and tundra zone. As to the longitudinal ranges, among the 34 species found

6 are holarctic, 18 are transpalearctic, 9 east palaeartic and only 2 (*Calopteryx splendens* and *Aeshna grandis*) are west palaeartic having in SW Yakutia the easternmost border of their range. We also consider *Coenagrion ecornutum*, *Somatoclora graeseri* and *Leucorrhinia orientalis* as east palaeartic species although they reach the Ural Mts in the West. Taking into account this circumstance, we note that out of the 35 species found in Yakutia only 6 do not reach Europe, at least its eastern border, and only 2 do not reach the Pacific coast. We cannot indicate any species which could still be expected. Only some more southern taxa may be found unexpectedly, or may penetrate Yakutia in future owing to global warming. In such high latitudes, cold rivers do not provide suitable habitats for odonates, so only 4 representatives of the lotic families, Calopterygidae and Gomphidae, were recorded in SW Yakutia.

The male phenotype of *Calopteryx splendens njuja*, described here as a new subspecies, strikingly resembles that of some taxa from Anterior Asia. We cannot assume any relatedness between the Yakutian and West Asian calopterygids and suppose that the pigmentation reduction in Yakutia resulted from independent mutation of some genes, perhaps the same loci which are involved in wing decoloration in western Asia.

#### ACKNOWLEDGEMENTS

The authors are grateful to Professor A. Yu. HARITONOV (Novosibirsk) for treatment of some material from Chul'man, lake Maloe Tokko, Tyungyulyu (material of 1990) and El'konka, to ZHANNA GAVRILOVA (Mirnyi) for offering her specimens for examination, to Dr ELENA MALIKOVA (Blagoveshchensk) for help with treatment of the material and fruitful discussions and to Professor HENRI DUMONT (Belgium) for critically reading the manuscript.

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