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Odonata of Aldan Ulus of Yakutia (East Siberia, Russia): 20 years later

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Abstract

Odonata of the Aldan Ulus (District) of Sakha Republic (Yakutia), East Siberia, Russia, were studied in late June – early July 2022 for the second time, 20 years after the analogous previous study (Kosterin 2004a), partly in the same localities. This time 20 species were found, that is 1.5 times more than 13 species on the previous study. This increase could be an effect of the current climate amelioration but no northward range extensions were registered, all species being known in Yakutia more northerly for quite a long time. Ten species were found in 2022 but not in 2002 (*Coenagrion armatum*, *C. glaciale*, *C. hylas*, *C. lanceolatum*, *Erythromma najas*, *Aeshna crenata*, *A. juncea*, *Ophiogomphus obscurus*, *Leucorrhinia intermedia*, *Sympetrum flaveolum*), while three species were found in 2002 but not this time (*Aeshna caerulea, Nihonogomphus ruptus and Somatochlora sahlbergi*). In total, 23 species have been registered in Aldan Ulus up to date. Variation in *Enallagma cyathigerum*, *Erythromma najas*, *Somatochlora exuberata* and *Leucorrhinia orientalis* is briefly discussed. Mass emergence of *O. obscurus* from the Aldan River on a rainy day (and even during showers) following a period of hot weather was observed and discussed.

Keywords: Russia, East Siberia, Yakutia, Sakha Republic, Odonata, fauna, long-term change, *Enallagma cyathigerum*, *Erythromma najas*, *Somatochlora exuberata*, *Leucorrhinia orientalis* *Ophiogomphus obscurus*, emergence under rain, iNaturalist.

Introduction

Republic of Sakha (Yakutia), more known as simply Yakutia, is a subject of Russian Federation situating in East Siberia, with the area of 3,083,523 km^2 but a population of just 996 thousand people (that means the average density of 0.3 persons per km^2). It extends from 55.5° to 77.1° N (islands included) and from 105.8° to 162.9° E, embracing the Pole of Cold of the Northern Hemisphere. Administratively, it is split into 34 districts, 'rayon' in Russian and 'ulus' in Yakutian (here spelled in a singular form; in Yakutia the use of both words is officially equivalent), of which Aldan Ulus is situated in the south of the Republic, extending from 56.9° to 61.0° N and from 122.7° to 132.6° E, with the area of 156,820 km^2. Its territory is shared by wavy plains clad with pine/larch taiga and gentle mountains (up to 2,306 m a.s.l.) of Aldanskoe Nagorye. It is crossed by the major Aldan River which gave its name to the ulus itself and its capital town of Aldan, which by the way is located far from the river. The relief, climate and vegetation of this area are briefly characterised in my previous report on the same subject based on the data obtained twenty years ago (Kosterin 2004a).

Due to permanent efforts of Lena Sivtseva, an odonatologist from Yakutsk, at present the dragonfly fauna of Yakutia is considerably studied (yet naturally insufficiently for such a vast territory), see Kosterin & Sivtseva (2009) for an overview and Sivtseva (2010), Sivtseva & Davydova (2019) and Sivtseva & Zykov (2022) for further updates. However, the data on the fauna of Aldan Ulus are so far limited to a sole source being the report of my trip in the second half of June 2002 (Kosterin 2004a). In summer of 2022 I revisited the area and provide below another report on the same subject. The data of both trips are not fully comparable since in 2022 I visited more locations but failed to find that left oxbow lake of the Aldan River which I examined in 2002 (but examined another one instead). Nevertheless, some preliminary conclusions are possible and the basis for further monitoring, if any, has been made.

Since dragonfly locations in the area were few (Fig. 1) and very dissimilar, it is reasonable to consider them separately and summarise the fauna in Table 1 (to consult for authorities and description years of species).

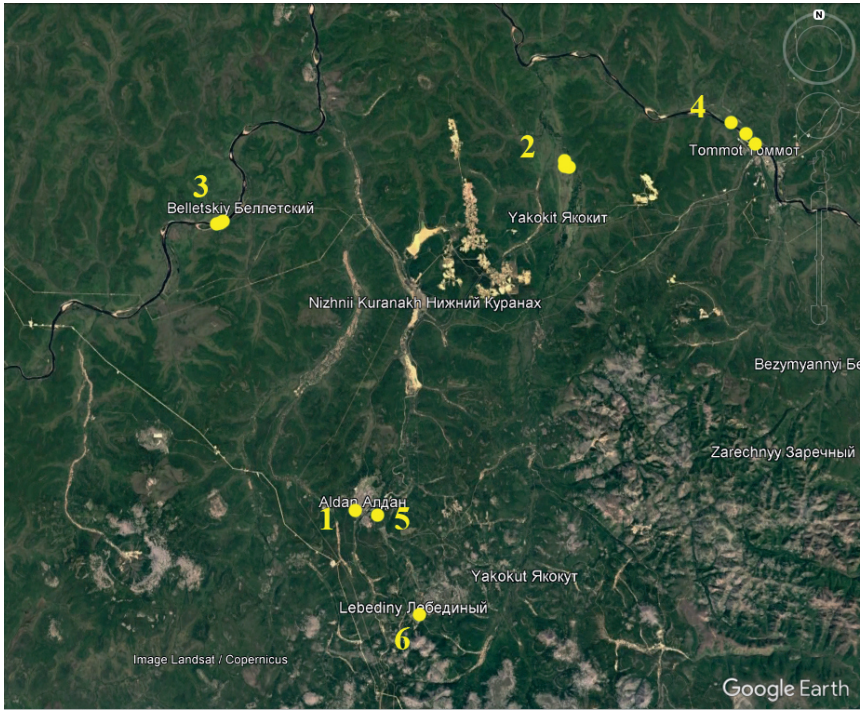

Figure 1. Disposition of locality groups examined in Aldan Ulus of Sakha Republic (Yakutia), for explanation of numerals see the text.

Below I will refer both to the Odonata specimens collected and photographic registrations (made by me and my son Valentin Kosterin) submitted to the iNaturalist (2023) platform, providing their unique numbers (x, an integer value of any but mostly nine digits) in parenthesis, so that each observation is available using the following link template: https://inaturalist.org/observations/x. Such links thus would lead to numerous external geotagged illustrations.

Most of these observations are ‘research grade’ and so have been adopted by Global Biodiversity Information Facility (GBIF), where they have to be referenced as (iNaturalist contributors, iNaturalist 2023). The dates are provided in the d(d).mm.yyyy format.

Results

The Orto-Sala River valley

Loc. 1. Aldan Town, the left swampy bank of the large pond on the Orto-Sala River (actually rather a small stream) at Drazhnyy Estate, 58.5944-58.5963° N 125.3828-125.3842° E, 621-625 m a.s.l., 4.07.2022. There was a very large area of dense, even *Equisetum fluviatile* L. emerging from water, with some participation of *Carex rhynchophysa* C.A. Mey. and other sedges (Fig. 2). Not less than two mature, red males of *Sympetrum flaveolum* (Fig. 3, 147002050, 1 collected) were confined to that horsetail area.

Figure 2. Swampy bank of the large pond on the Orto-Sala River at Drazhnyy Estate of Aldan Town (Loc. 1), with large thickets of *Equisetum fluviatile*.

A very small shallow pool was found at the bank, with a turbid water, surrounded with willow bushes, with *Alisma plantago-aquatica* L. and, again *E. fluviatile* at banks. There were two males (1 collected) and a tandem of *Coenagrion hastulatum*; males of *Leucorrhinia orientalis* (Figs 4a, 5a; 146965913, 147000480, 1 collected) perched on the above-mentioned plants while males of *Cordulia aenea* (146966194, 1 collected) ranged above water along the inner margin of the sedge vegetation. Also, at least one male of *Libellula quadrimaculata* ranged over open water. A larva of *Aeshna*, most probably *A. juncea*, crawled among grasses and on stones out of water (146966331, 149730218), and an exuvia

Figure 3. A male of *Sympetrum flaveolum* (147002050) in the large thicket of *Equisetum fluviatile* on the bank of the large pond on the Orto-Sala River (Loc. 1; Fig. 2).

Figure 4. Males of *Leucorrhinia orientalis* with one yellow spot (on S7) in the distal part of the abdomen; a (147000480) – at small swamp of a pond on Orto-Sala River (Loc. 1); b-d (146472898, 146698530, 146502201) – on a left oxbow lake of the Aldan River (Loc. 4b, Fig. 28) (c – copula)

Figure 5. Males of *Leucorrhinia orientalis* with two yellow spots (on S6 and S7) in the distal part of the abdomen; a (146965913) – at small swamp of a pond on Orto-Sala River (Loc. 1); b (in copula) (145512197) – at a pond by the Yakokit River (Loc. 2a).

Figure 6. Exuvia of *Aeshna juncea* on *Dactylorhiza fuschsii* (147000116) at a small swamp by the large pond on the Orto-Sala River (Loc. 1).

of the same species on an inflorescence of *Dactylorhiza fuchsii* (Druce) Soó (Fig. 6; 147000116, 150221605). Odonata species: 6.

Twenty years ago, these ponds have been visited twice, in the evening of 21.06.2002 and in the morning of 29.06.06.2002 but, strikingly, no Odonata were found (Kosterin 2004a). Supposedly, this could be due to yet insufficient restoration of the river valley from the gold mining in the past.

The Yakokit River valley

Loc. 2. Ponds and an oxbow at the Yakokit River left bank 6.3-7,8 km NNE Yakokit village, 58.957-58.968° N 125.833-125.852° E, 322-325 m a.s.l., 24-28.06.2022. This area is a vast (ca 10x3 km) and flat terrace of the Yakokit River left bank situated to the north of Yakokit village once occupied by peat-moss bogged larch (*Larix gmelinii* (Rupr.) Kuzen. s.l.) forest (loc. 'mar'), which was cleared, drained by a network of parallel ditches and converted to secondary meadows used for cattle grazing, at the time of our visit having

the aspect of the flowering *Ranunculus acris* L., *Plantago media* L., *Dracocephalum nutans* L. and, locally *Lilium pensylvanicum* Ker Gawl. Considerable areas are still occupied by swamped damp meadows with the aspect of *Iris setosa* Pall. ex Link. In this area, numerous ponds were dug for a purpose of duck hunting in spring and autumn (no ducks in sum-

Figure 7. A pond by the Yakokit River 7.5 km NNE of Yakokit village (Loc. 2a), one of the richest localities as to Odonata.

mer), each rented by some person or group, and most having a small and low wooden hut designed for convenience of shooting (loc. 'skradok'). There was also a natural oxbow of the river, used for the same purpose. Few of these water bodies situated of Yakokit village were examined for five days. In total 13 species of Odonata were found. This area was not visited in 2002.

Loc. 2a, a roundish pond 48x40 m at coordinates 58.9662-58.9667° N 125.8484-125.8493° E, situated at a bogged larch forest margin 72 m apart from the Yakokit River bank. The pond was knee deep, with a silty/stony bottom, emerging *A. plantago-aquatica*, patches of spike-rush (*Eleocharis palustris* (L.) Roem. et Schult.) and some *Rorippa barbareifolia* (DC) Kitag., floating *Sagittaria natans* Pall.; surrounded by damp meadow and willow bushes (Fig. 7). Examined for all five days as we camped near it.

Figure 8. Teneral *Lestes dryas* by the pond at the Yakokit River (Loc. 2a; Fig. 7): a-b (145511142, 145509450) – males; c-d (145944095, 145942699) - females.

Figure 9. Males of *Coenagrion johanssoni*: above (146476253) – on a left oxbow lake of the Aldan River upstream of Tommot Town (Loc. 4b, Fig. 28); below (145942538) – under larches by the pond at the Yakokit River (Loc. 2a).

During the daytime, extremely numerous *Lestes dryas* (Fig. 8; 141547143, 142797471, 145509450, 145511142, 145511144, 145809377, 145942699, 145944095, 146060795, 146093302; 2 ♂♂, 4 ♀♀ collected) were emerging at the spikerush and flew to the surrounding meadows and bushes. The most numerous coenagrionids (listed in descending order of abundance) were *Coenagrion johanssoni* (7 ♂♂, 3 ♀♀ collected), *C. hastulatum* (5 ♂♂, 2 ♀♀ collected) and *C. hylas* (9 ♂♂, 4 ♀♀ collected), including many tandems. The two former species mostly occurred at the riparian grass and were also abundant (including tandems) on herbs and bushes under the canopy of the larch taiga by the pond (*C. johanssoni*: Fig. 9, below, 145942538, 145943749; *C. hastulatum*: Fig 10, 145481747, 145516158, 145756825, 145841553; 145942389, 145942763, 145943885). *C. hylas* kept to sparser versions of

Figure 10. A tandem (left, 145942389) and a male (right, 145943885) of *Coenagrion hastulatum* under larches by the pond at the Yakokit River (Loc. 2a).

Figure 11. Copula (above, 145845107) and tandem (below, 145872398) of *Coenagrion hylas* by the pond at the Yakokit River (Loc. 2a; Fig. 7).

Figure 12. Males of *Leucorrhinia intermedia* (146061673, 145810348, 145839178) by the pond at the Yakokit River (Loc. 2a; Fig. 7).

vegetation emerging from water (Fig. 11, 145845107, 145846289, 145872398, 145873649) and was infrequent in the taiga margin (146096199). In sparse emerging vegetation I managed to collect one female of *Coenagrion armatum* (24.06.2022) and two males of *C. lunulatum* (25 and 25.06.2022). Also, on 26.06.2022 in the nearby taiga I managed to notice and collect an obscure greyish female of *Coenagrion glaciale* (145873601).

Of anisopterans, most abundant were *Leucorrhinia orientalis* (Fig. 5b, 145484078, 145512197, 145839303; 2 ♂♂, 1 ♀ collected), the males of which perched above water on emerging vegetation, mostly on *A. plantago-aquatica* (but preferred humans for this purpose, when available) and were very active, from dawn to dusk, in chasing matches and females, with numerous couplae observed. Females could be met among bushes at some distance from water (146095444), Among *L. orientalis*, fewer *Leucorrhinia intermedia* occurred (Fig. 12, 145810348, 145839178, 145872830, 145872880, 146061673; 3 ♂♂, 3 ♀♀ collected). Few males of *L. quadrimaculata* (145513748, 145838453, 146061675; 1 collected) perched on sticks and branches. Few males of *Cordulia aenea* (1 collected) ranged low above the water surface. At 9:30-10 a.m. of 26.06.2022, not less than two males of *Somatochlora graeseri* appeared (145843610; 2 collected), which ranged, rather irregularly, at the height of 1-2 m (that is much higher than the previous species) above open water or a

Figure 13. An overgrown pond on the Yakokit River right terrace 8 km NNE of Yakokit village (Loc. 2b).

shallower bay with emerging vegetation. They were not permanently present but appeared and disappeared. The same concerned males of *A. juncea* (145942144; 1 collected), which unpredictably appeared and ranged over the water or hunted for mosquitoes among bushes not far from the pond on 25-28.06.2022. Their activity seemed still to be rather trophic than territorial.

Loc. 2b, a bigger (100x60 m) and perhaps older, triangular pond (Fig. 13), again with, a 'skradok', situated 190 m NW of the former one and 300 m from the river, with coordinates 58.9678-58.9687° N 125.8454-125.8467° E, surrounded by willow bushes, bogged taiga and hillock sedge swamp with cottongrass. A ca 10 m broad strip of inundated *Carex rostrata* Stokes, with participation of *E. fluviatile*, rimmed the banks, the open water with sparse emerging *E. fluviatile*, *Alisma gramineum* Lej. and floating *S. natans*, the moderately silty bottom is covered with a thick carpet of inundated *Myriophyllum verticillatum* L.. Examined on 25.06.2022.

Again, there were numerous (including tandems) *C. hastulatum* (mostly in sparse emerging vegetation upon the water) (145764151, 145765614, 145767376, 145768645, 145804898, 145805020) and *C. johanssoni* (mostly in sedge) (145763438) but no *C. hylas*. I happened to occasionally photograph a male of *C. lunulatum* (145766143) and an ovipositing tandem of *C. glaciale* (Fig. 14, below, 145805494). *L. orientalis* (145764745, 145764747, 145766000, 145805573) were even more numerous than at the previous pond, but no *L. intermedia* were found. Males of *C. aenea* (145763013) ranged low above the water along the inner margin of the sedge zone. Some *Aeshna* appeared for short time. 6 species (5 identified)

Figure 14. ***Coenagrion glaciale*****: a male (above, 146530123) at the left oxbow lake of the Aldan River 3.5 km upstream of Tommot Town (Loc. 4a, Fig. 28), and an ovipositing tandem (below, 145805494) at the overgrown pond on the Yakokit River right terrace (Loc. 2b, Fig. 13).**

Loc. 2c, a round swamp 60 m in diameter, filled with a mix of water moss, sedge and horsetail, without open water, walking not possible; surrounded by bogged larch forest. 58.9678-58.9682° N 125.8494-125.8504° E. Shortly visited on 25.06.2022. Two or three *Aeshna* sp. slowly flew over the sedge surface without any certain trajectories, and beyond the reach. Most probably they were *A. juncea* as well. No other Odonata.

Loc. 2d, a sedgy depression in place of a former pond, with only a round shallow pool of water 20 m in diameter left, surrounded by a thick rim of *C. rostrata*. 58.9576-58.9580° N 125.8333-125.8345° E. Shortly examined on 26.06.2022. There were numerous emerging *L. dryas* and many *C. hastulatum*, *C. johanssoni*, *C. hylas* and *L. orientalis*.

Loc. 2e, an oxbow lake of the Yakokit River left bank, 120 m apart from it, 130x25 m, rimmed with a thick strip of two sedge species with predomination of *C. rostrata* and abundant *Comarum palustre* L., surrounded by larch taiga. More than half of the open surface area was occupied by thick matts of brownish water moss (upon which dense congregations of the males of *Aporia crataegi* (Linnaeus, 1758) were scattered). 58.9569-58.9577° N 125.8536-125.8553° E (Fig. 15). Briefly examined on 27.06.2022.

Although this water body was purely natural and looked promising, only five species of odonates were found: the three common coenagrionids, *C. hastulatum*, *C. johanssoni* and *C. hylas* (146016169) and *L. orientalis* (146014248, 146016498) as numerous, and few *L. quadrimaculata*. No *Lestes*, no corduliids, no aeshnids. This site surely deserved a more thorough study.

Loc. 2f, another oxbow of the same chain, 95x30 m, with a ‘skradok’, mostly dried out, with water left only at its NW margin, central part occupied with a large thicket of *E. fluviatile*. 58.9583-58.9591° N 125.8525-125.8532° E. Shortly examined on 24.06.2022 and 27.06.2022, on the former day few males of *C. aenea* (145562377, 2 collected) were spotted which ranged along the shady water edge.

The Aldan River valley at Khatystyr village

Loc. 3. Khatystyr is the Yakutian name of the village meaning ‘sturgeons’, while it is inhabited mostly by Evenks, its Evenkian name is Bellet and it is the centre of the Bellet Evenkian National Nasleg (where ‘nasleg’ is a Yakutian term for ‘an area subordinate to some village). The Aldan River right bank was examined for one day of 6.07.2022, with strong rains at ca 11:20-11:40 a.m., 2:20-4 p.m. and after 7 p.m., and intervals of sunshine, from the village to the island 4 km upstream (WSW) of it, in the coordinate range of 58.900-58.920° N 125.095-125.149° E, 296-299 m a.s.l. The Aldan River is 420-440 m broad there. In the village and upstream to the brook mouth (58.910° N 125.125.136° E), the bank was a broad slanting zone of boulders with scarce herbage. For 400 m upstream of the brook mouth, up to ca 58.909° N 125.130° E, it was occupied by moist meadows, with the water edge at first swampy and then changing to an almost pure carpet of *Eleocharis palustris* (Fig. 16). Upstream of this point, up to the island, the bank was again stony but curiously was a continuous chain of cold ground water springs seeping between boulders and following immediately one to another (Fig. 17), alternating with mossy patches with such specific plants as *Primula algida* Adams, *Parnassia palustris* L. (not yet flowering) and *Pinguicula vulgaris* L.. The bank was bordered by a rocky ledge and the valley was surrounded by hills clad with larch taiga with a lot of picturesque lichens. In total six odonate species were found.

Figure 15. A left oxbow lake of the Yakokit River 6 km NNE of Yakokit village (Loc. 2e), with congregations of males of *Aporia crataegi* on moss matts.

A male of *Enallagma cyathigerum cyathigerum* (Fig. 18a, 147117242) was met with in grass. Few males of *Aeshna crenata* (Fig. 19a, 147122514, 147122237, 160846049) ranged over the springs (also a copula was observed) and were seldom seen flying by elsewhere. *Cordulia aenea* was also quite frequent along the forest margins and bluffs, females

Figure 16. A moist spikerush (*Eleocharis palustris*) meadow on the Aldan River right bank (Loc. 3) ca 600 m SE of the Khatystyr village margin, the place of mass emergence of *Ophiogomphus obscurus* on the rainy day of 6.07.2022.

(147075453, 155721544) hunted for mosquitoes (even examining us for this purpose), males ranged along trees and chased each other, both sexes rested on bushes or stones (Fig. 20, 147117635, 1 collected). Many *L. orientalis* (Fig. 21a, 147116582, 147118637,

Figure 17. The Aldan River right bank (Loc. 3) upstream of ca 600 m SE of the Khatystyr village margin, with a chain of ice-cold springs.

147118638, 147120917, 1♂, 1♀ collected), mostly females, and few *L. intermedia* (2♀♀ photographed, 147076607, 147115673, 156436862) were frequent in the spring section of the bank, less frequently elsewhere. They mostly rested on large flat stones (something I seldom observed in these species elsewhere), rarer on spikerush. However, all these

Figure 18. Males (a-c) and copula (d) of *Enallagma cyathigerum cyathigerum*: a (147117242) – on the Aldan River right bank downstream of Khatystyr village (Loc. 3): b-c (146528519, 146733063) – on a left oxbow lake of the Aldan River 3.5 km upstream of Tommot Town (Loc. 4b, Fig. 28); d (146619956) – on the Aldan River left bank 5.5 km upstream or Tommot (Loc. 4a). Variation for irregular lateral melanisation of the male abdomen is seen, from none in a-b through moderate in c to heavy in d.

lentic dragonflies and damselflies probably were not at home at the right bank but migrated from the not examined opposite left bank, which is very flat and has oxbows.

However, most remarkable at this place was mass emerging of *Ophiogomphus obscurus* from the Aldan River (Fig. 22-25). The first striking fact that it took place on a rainy day with scarce sunshine, either under a rain or just between the rains, at least just emerged individuals, most of which were covered with raindrops and were too fresh for a maiden flight, were found between 12:00 and 12:30 a.m. immediately after a strong rain. They were very few in the village (147075886), few at the spring section of the bank (147116137) and on a shingle bank at the island (147121494). At the same time they were astonishingly numerous (Figs 22-24, 147082645, 147082646, 147083520, 147083520, 147083521, 147083777, 147083778, 147084068, 147108036, 147108210, 147108337, 147108593, 147109187, 147109584, 147109727, 147110018, 147110076, 147110626, 147111529, 147112217, 147112875, 147113890, 156231371, 156385107, 156385109, 156385817, 156385861, 160843868, 160845436, 2 ♂♂, 3 ♀♀ collected) for about 100 m of the flat bank upstream of the brook mouth formed with spikerush moist meadow (Fig. 16), ca

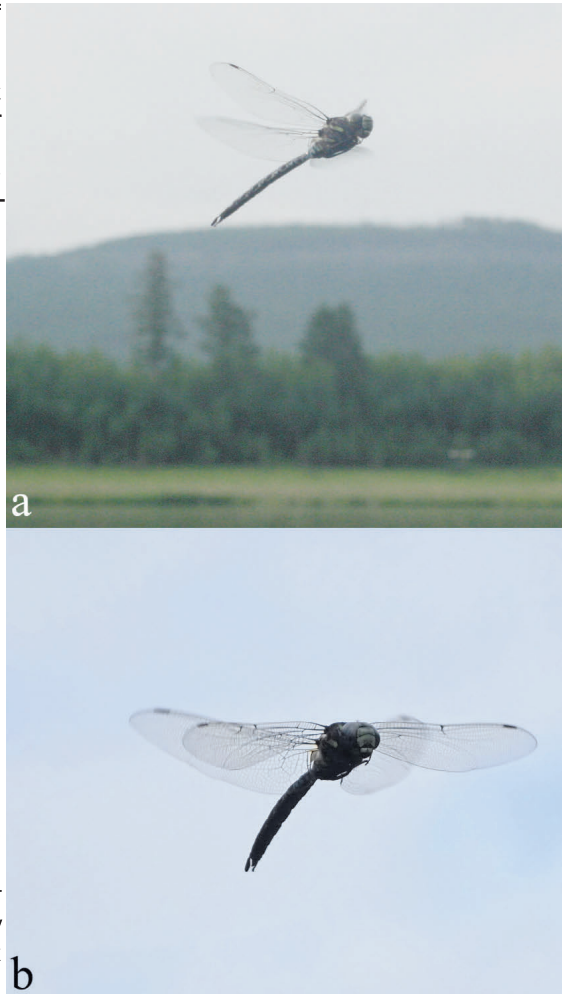

Figure 19. Patrolling males of *Aeshna crenata*: a (147122514) - on the spring part (Fig. 17) of the Aldan River right bank 0.8 km downstream of Khatystyr village (Loc. 3); b (146504836) - on a left oxbow lake of the Aldan River upstream of Tommot Town (Loc. 4b, Fig. 28).

between the points 58.9093° N 125.1304° and 58.9095° N 125.1314°. According to my rough counts there were about 40 emerging individuals per 10 m of the bank (that means ca 400 ones in the entire section), with the maximum density of 10 per square metre). Their high density ended when the meadowy bank changed to the stony bank with cold springs (Fig. 17). It may be supposed that a large amount of cold spring water entering the river make it unfavourable for the *O. obscurus* larvae. Downstream of that favourable stretch, closer to the brook mouth, the bank became more slanting, with big stones, but swampy, the condition not favourable for emergence. Quite a number of those just emerged dragonflies were damaged or failed to spread. Those who commenced maiden flight were found at bushes on the forest margin (Fig. 25, 147077275, 147077604, 147081320, 156048189, 156190405).

This place revealed in total six Odonata species. It was examined 20 years before on 28.06.2002, for the whole day with the same partly rainy weather. Strikingly, of dragonflies nothing but about six individuals of *Leucorrhinia* sp. were observed from a distance but not obtained in hand.

Figure 20. A male of *Cordulia aenea* (147117635) resting on a stone on the Aldan River right bank downstream of Khatystyr village (Loc. 3).

Figure 21. Females of *Leucorrhinia orientalis*: a (147120917) - on the spring part (Fig. 17) of the Aldan River right bank 0.8 km downstream of Khatystyr village (Loc. 3); b (146615600) - on the Aldan River left bank 5 km upstream of Tommot Town (Loc. 4a).

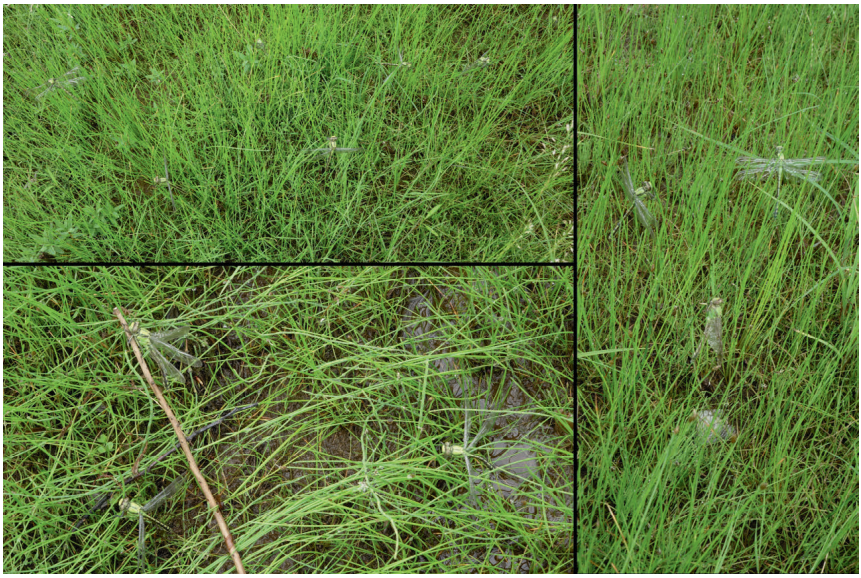

Figure 22. Numerous *Ophiogomphus obscurus* (147113890, 147110626) emerged from the Aldan River right bank, ca 600 m SE of the Khatystyr village margin, on a swampy spikerush (Eleocharis palustris) meadow (Loc. 3, Fig. 16) on the rainy day of 6.07.2022.

Figure 23. Males of *Ophiogomphus obscurus* (147077275, 147077604) emerged from the Aldan River right bank, ca 600 m SE of the Khatystyr village margin (Loc. 3, Fig. 16).

Figure 24. Females of *Ophiogomphus obscurus* (147082646, 147083520, 147114669, 147109584) emerged from the Aldan River right bank, ca 600 m SE of the Khatystyr village margin (Loc. 3, Fig. 16).

Figure 25. Teneral males of *Ophiogomphus obscurus* (147082646, 147083520, 147114669, 147109584) resting on bushes of the forest marging after their maiden flight from the Aldan River right bank ca 600 m SE of the Khatystyr village margin (Loc. 3).

The Aldan River valley at Tommot Town

Observations were made along the left bank of the major Aldan River upstream of Tommot Town on 1-3.07.2022. In total, 14 species of Odonata were found.

Loc. 4a. The Aldan River left bank was examined, for two and half days, for 7.5 km upstreams (north-west) of the Ukulan River mouth in Tommot Town. The Aldan River width varies from 315 to 520 m there. The examined left bank is broadly open and made of boulders, with scarce to medium herbs and grasses (with the aspect of the flowering *Hedysarum branthii* Trautv. et C.A. Mey and *I. setosa* with noticeable traces of recent inundation), some bank sections with grassy bogs. Then a strip goes of lush meadows (with the aspect of *Anemonastrum dichotomum* (L.) Mosyakin, *Thalictrum aquilegiifolium* var. *sibiricum* Regel et Tiling, *L. pensylvanicum*, *I. setosa* etc.) (Fig. 26), partly with rows of willow bushes; the terrace is occupied by taiga of a variable mix of pine (*Pinus sylvestris* L.), spruce (*Picea obovata* Ledeb.) and larch (*Larix gmelinii*), partly bogged. Behind the terrace there were SW slopes of a flat plateau ca 100 m above the river level, clad with pine forest and with a chain of batten large-stone screes on steeper slopes. 58.969-59.0135° N 126.187-126.286° E, 272-276 m a.s.l. Examined on 1-3.07.2022, mostly on 2.07.2002.

Males and couplae of *Enallagma cyathigerum cyathigerum* (Fig. 19d, 146619956; 5 ♂♂, 2 ♀♀ collected) occurred on meadows and at forest margin, they were very rare close to the Ukulan River and for some reason appeared more and more frequent with distance from it. Also, a female of *C. johanssoni* (146586335) was found. Infrequent females of *L. orientalis* (Fig. 21b, 146615600, 146624559) and one female of *L. quadrimaculata* (146589323) were also met there. Two immature males of *S. flaveolum* was ob-

Figure 26. A meadow at the Aldan River left bank 5 km upstream of Tommot Town (Loc. 4a).

served (but missed) at ca 5:30 p.m. on 3.97.2022, at willow bushes and at a swampy spike-rush patch at the bank. Both sexes of *C. aenea* (146544026, 146589792) were rather frequently met with at strips of willows growing amidst the meadow parallel to the bank; they flew between willows, examined their branches and rested on them. Two teneral females of *Somatochlora exuberata* were captured, at 2:19 p.m. of 2.07.2022 (Fig. 27a, 146544798) and at 9:55 a.m. of 3.07.2022 (Fig. 27b, 146773443). Both were slowly and broadly ranging at a man's height over the meadowy bank. All those corduliids met at the river bank obviously exhibited only trophic behaviour and were there foraging. Also, the

Figure 27. Immature females of *Somatochlora exuberata* captured on 2.07.2022 (top, 146544798) and 3.07.2022 (bottom, 146773443) while ranging above the meadow on the Aldan River left bank 3.5 and 4 km upstream of Tommot Town, respectively (Loc. 4a).

prevalence at the Aldan bank of females in all species but *E. cyathigerum* could have the same explanation. At 10 a.m. of 3.07.2022, the last instar larva of *O. obscurus* (146774105) was found on the bank on a wet stone. When taken and placed in shallow water, it did not proceed ascending for emerging but remained immovable between stones, then disappeared.

The same bank stretch was examined before on 23-25.06.2002 (Kosterin 2004a). There were the same *E. cyathigerum cyathigerum*, but gomphids were represented by few teneral *Nihonogomphus ruptus* (Selys, 1858) instead of *O. obscurus* found this time; no other Odonata being seen.

Loc. 4b. A very nice long Aldan River left bank oxbow lake on its low terrace, 470x40 m, 170 m from the river, surrounded by pine/larch taiga (Fig. 28). The bottom is silty, the water ca 1.5 m deep above it, warm, brownish because of humic acids, the banks with a floating peat moss bog mat bordered with *Carex lasiocarpa* Ehrh., with abundant *Chamaedaphne calyculata* (L.) Moench, *E. fluviatile*, *Menyanthes trifoliata* L., frequent *Comarum palustre*, *Lysimachia thyrsiflora* L., *Scutellaria galericulata* L., *Drosera rotundifolia* L., *Triglochin maritima* L., *Eriophorum gracile* W.D.J. Koch, *Iris setosa*, and few *I. laevigata* Fisch. On the water surface there were floating and flowering *Nymphaea tetragona* Georgi and *Utricularia macrorhiza* Leconte; submerged sticks were overgrown with some freshwater sponge. 58.990-58.993° N 126.242-126.248° E, 285 m a.s.l., 3.5 km NW of Tommot Town. Examined briefly on 1.07.2022 and thoroughly on 2-3.07.2022. Overlooked in 2002.

Damselflies were represented by numerous and diverse Coenagrionidae (while Lestidae were missing). Of these:

Figure 28. A left oxbow lake of the Aldan River 3.5 km upstream of Tommot Town (Loc. 4a), one of the localities richest in Odonata.

- *C. johanssoni* (Figs 9, below, 32, 146476253, 146528322, 146764608, 146768734; 8 ♂♂, 2♀♀ collected) was most numerous (including tandems) in any vegetation (tandems oviposited to slime algae: 146764608), but on 3.07.2022 it was noticed that they appeared only after 11 a.m.; while other damselflies were already present since ca 9 a.m.
- Also, numerous *Erythromma najas humerale* (Fig. 29, 146465332, 146472255, 146529326, 146765495; 2 ♂♂, 1♀ collected), as usual for this species, occupied leaves of floating vegetation, mostly *N. tetragona*.

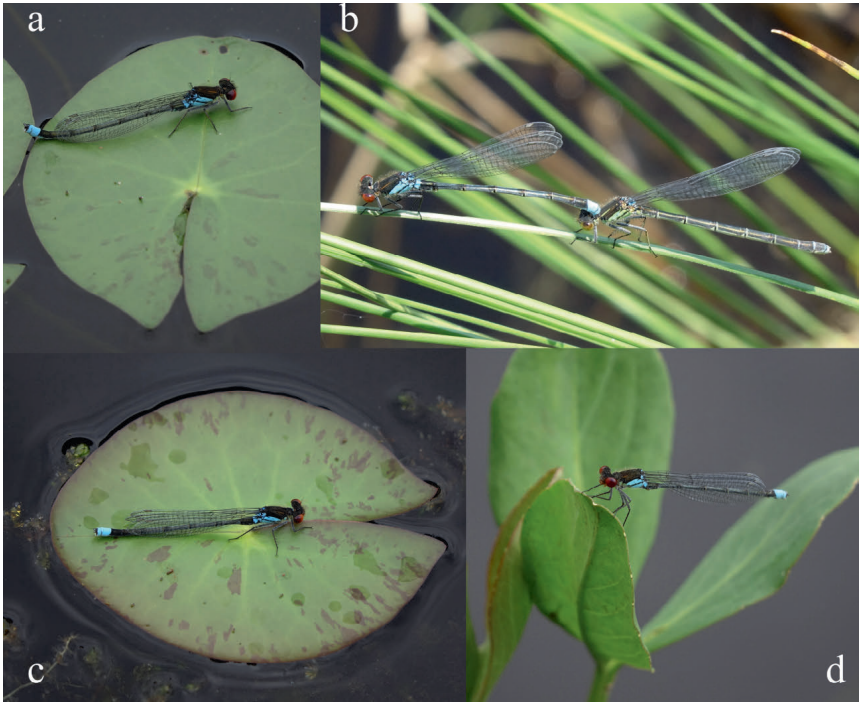

Figure 29. Males (a, c-d) and tandem (b) of *Erythromma najas humerale* at the left oxbow lake of the Aldan River 3.5 km upstream of Tommot Town (Loc. 4a, Fig. 28).

Other damselflies were mostly found in the narrow strip of *C. lasiocarpa* rimming the bank. These were rather frequent:

- *C. lunulatum* (Fig. 30, 146527426, 146698699, 146734174; 5 ♂♂, 4♀♀ collected)
- *E. cyathigerum cyathigerum* (Fig. 18b-c, 146528519, 146733063; 3 ♂♂ collected),

and the following were rare:

- *C. glaciale* (2 ♂♂ collected: 146529054; 1 more ♂ photographed: Fig. 14, above, 146530123),
- *C. lanceolatum* (Fig. 31, 146732427; 146734500; 2 ♂♂ collected) (but not a single *C. hastulatum*), and

Figure 30. A male of *Coenagrion lunulatum* (146734174) at the left oxbow lake of the Aldan River 3.5 km upstream of Tommot Town (Loc. 4a, Fig. 28).

Figure 31. A male of *Coenagrion lanceolatum* (146732427) at the left oxbow lake of the Aldan River 3.5 km upstream of Tommot Town (Loc. 4a, Fig. 28).

Figure 32. A male of *Coenagrion armatum* (146768672) just after attacking an ovipositing tandem of *C. johanssoni* (146768734) at the left oxbow lake of the Aldan River 3.5 km upstream of Tommot Town (Loc. 4a, Fig. 28).

- *C. armatum* (Fig. 32, 146768672; 1 ♂ found and collected). The male found was remarkably active and 'aggressive': it flew rather fast and erratically in the sedge at the waterfront, rested for only a little while and repeatedly attacked tandems of *C. johanssoni*, targeted to the female synthorax, and once even landed on it.

Dragonflies were represented by:

- many males of *A. crenata* as usual for this species steadily ranging to and fro at a man's height above vegetation at rather short bank sections being their individual territories (Fig. 19b, 146504836, 146526854; 1 ♂ collected);
- numerous males of *C. aenea* (146466078, 146466080; ranged low above the water surface along the sedgy bank) and few females (146466081; oviposited at the very water edge, at the base of *C. lasiocarpa* sedges) (2 ♂♂ , 1 ♀ collected)
- extremely numerous males of *L. orientalis* (perched mostly on emerging vegetation with large leaves, such as *M. trifoliata*) (Fig. 4b-d, 146472783, 146472852, 146472898, 146501451, 146698530, 146733423; 146502201) and few copulae (Fig. 4c, 146764177, 146767348) and females (146731729) (3 ♂♂ , 1 ♀ collected);
- quite a few males of *L. quadrimaculata* (perched on dry branches, flew actively) (Fig. 33, 146466140, 146474343, 146510167; 1 ♂ collected).

Figure 33. A male of *Libellula quadrimaculata* (146474343) at the left oxbow lake of the Aldan River 3.5 km upstream of Tommot Town (Loc. 4a, Fig. 28).

Curiously, no *C. hylas*, *L. intermedia*, *A. juncea* and *S. graeseri* were found, although expected.

In contrast to the Aldan River bank, here these were males which predominated in all species, obviously being at their breeding place.

Loc. 4c. A small (36x20 m) but deep oval-shaped pool, densely overgrown with bushes and trees, at the very margin of the Aldan River terrace 7.5 km NW of the Ukulan River mouth, 59.0135-59.0138° N 126.1876-126.1882° E, 278 m a.s.l. Examined shortly from at 5:30-6 p.m. on 2.07.2022.

There were *C. aenea*, *L. orientalis* and a single female of either *C. hastulatum* or *C. lanceolatum* (146660294) (females of these two species cannot be reliably distinguished).

This pool was examined before on 24-25.06.2002, when it was less overgrown and more exposed. There were *C. aenea*, *S. graeseri* and *L. orientalis*.

Most of my dragonfly observations and collections at the Aldan River left bank, and in Aldan Ulus in general, in 2002 were made on a small (190x40 m) taigous oxbow lake near the left bank of a brook flowing on the Aldan left terrace, 59.0150-59.0163° N 126.1821-126.1845° E, 281 m a.s.l., 275 m from the river (let it be Loc. 4d), at the most far place of our reach, 7.6 km NW of the Ukulan River mouth at Tommot Town. Because this time we carelessly forgot a powerbank cable at our base so that a smartphone got out of charge, we were unable to find this lake again by an aerial photo, while the Aldan River bank got so much overgrown with willows for the twenty years passed that we failed to recognise the place and find the brook, now hidden in thickets, and hence the lake. Instead, we found the above discussed and somewhat analogous lake of Loc. 4c, which appeared rich in Odonata, yet the data of 2002 and 2022 concerned different taigous lakes on the Aldan left terrace and so are not so comparable. That lake of Loc. 4d examined in 2002 provided the following 10 species: *C. hastulatum*, *C. johanssoni*, *E. cyathigerum cyathigerum*, *Aeshna caerulea* (Ström, 1783) (more in peat moss larch stand than at water), *C. aenea*, *S. graeseri*, *S. exuberata* (1 ♂ was collected), *Somatochlora sahlbergi* Trybom, 1899 (1 ♀ was collected), *L. orientalis* and *L. quadrimaculata* (Kosterin 2004a), of which *A. caerulea* and *S. sahlbergi* were not found in 2022.

Miscellaneous

Loc. 5; a forest pond E of Aldan Town. On 7.07.2022, Valentin Kosterin and Nataiya Priydak examined an artificial round pond ca 35 m in diameter in a glade amidst dense taiga 3 km SE of the Aldan Town centre (58.587° N, 125.426° E, 734 m a.s.l.) and photographically registered *C. hastulatum* (161253411), *E. cyathigerum cyathigerum* (16118371) and *L. orientalis* (161182207).

Loc. 6: Lebedinyy Settlement. On 5.07.2022, a male of *A. juncea* (147074354) patrolled, by flying to and fro low above the ground and water, a very small stream of water flowing along a ground road at the eastern settlement margin (58.49219° N, 125.506709° E, 793 m a.s.l.). In the evening, another aeshnid probably of the same species ranged above the road crossing taiga S of the settlement, and obviously accompanied us walking. This locality was examined before on 20.06.2002 but no Odonata were found.

Neryungri Town

This locality is situated 220 km S of Aldan Town, beyond Aldan Ulus but in Neryungri Ulus, so is not considered in Table 1. On 8.07.2022, a large (ca 350 x 200 m) water reservoir was examined in the S environs of Neryungri Town (56.645-56.648° N, 124.741-124.761° E, 760 m a.s.l.). It was surrounded by pine/larch taiga and secondary meadows, with rather steep banks overgrown with willow bushes and young birches. It was probably connected to a power station but currently not heated. There were:

- quite a few *E. cyathigerum cyathigerum* - males perched on grasses emerging from water, copulae found in grass (147159132), tandems oviposited in slim algae (147158481), teneral individuals were found among grass (147123845);
- few males of *A. crenata* (ranging over the water);
- many males of *C. aenea* (147125224) and
- fewer males (one collected) of *S. graeseri* (147124414, 147155238; 147157747) (this and previous species ranged along the water edge or grass nearby, penetrating inside bush crowns and flew among branches);
- few males of *Epitheca bimaculata* (Charpentier, 1825) (147155739) ranged to and fro regularly over the water along the banks, alike *A. crenata*, higher and for longer distances than other corduliids (and unlike the same species *E. bimaculata* in the southern Far East where they flew all over entire surface of water bodies without preferring trajectories, unpubl. observations);
- many males of *L. quadrimaculata* (perching at water and among bushes) (147155405, 147158390, 147157098);
- a cautious male of *Leucorrhinia ?orientalis* (visually)

(in total 7 species).

Notes on specimens

Males of ***Leucorrhinia orientalis*** may have either one (on S7) (Fig. 4) or two (on S6 and S7) (Fig. 5) yellow spots in the distal part of the abdomen (Kosterin & Zaika 2010; Onishko & Kosterin 2021). Here the former morph predominated: among photos of males taken at random nine (145484078, 145764745, 145839303; 146698530, 146472783, 146733423, 146767348, 146472898, 146501451, 146502201) showed one spot and five (145512197, 145766000, 145805573, 146016498, 146472852) two spots. This score 9:5 was for the united sample, while in the males photographed in the Yakokit River valley (Loc. 2) this ratio was 3:4 while in those photographed in the Aldan River left oxbow (Loc. 4c) it was 6:1. This may indicate that the morph frequencies may vary among populations.

Of three males of ***Coenagrion lanceolatum*** collected and photographed at the Aldan River oxbow (Loc. 4b), one had a pair of black strokes anteriorly and laterad of the arrow-like central spots on S2. Such strokes are present (rarely absent) in the close species *C. hastulatum* but rarely appear in *C. lanceolatum*, being so far registered in Transbaikalia (Kosterin 2004b). That specimen, however, had the central spot arrow-like, as it should be in *C. lanceolatum*, rather than mushroom-like as in *C. hastulatum*, and, of course, the long cerci typical for *C. lanceolatum*.

Kosterin & Sivtseva (2009) attributed specimens of ***Erythromma najas*** (Hansemann, 1823) from Yakutia to the subspecies *humerale*, which is on average smaller but overlapping in size with the nominotypical subspecies (thus, in Tuva abdomen was 24-29 mm long in *E. n. humerale*, while 26-28 mm in *E. najas najas*, see Kosterin & Zaika 2010) and pale antehumeral stripes present in most males, although variable in length (Kosterin 2004b; Kosterin & Zaika 2010). This species was found only in Loc. 4b but in great numbers; the specimens were fairly small (hindwing 18-19 mm, abdomen 23-24 mm, total length 30-31 mm) and pale antehumeral stripes present in most, but not in all males (Figs 29, 34). One individual even had a stripe on the right side (Fig. 34b) but missed it on the left side (Fig. 34c, see also Fig. 29). These conditions more or less fit *humerale*, but this taxon is by no means well separated from *najas* s. str.

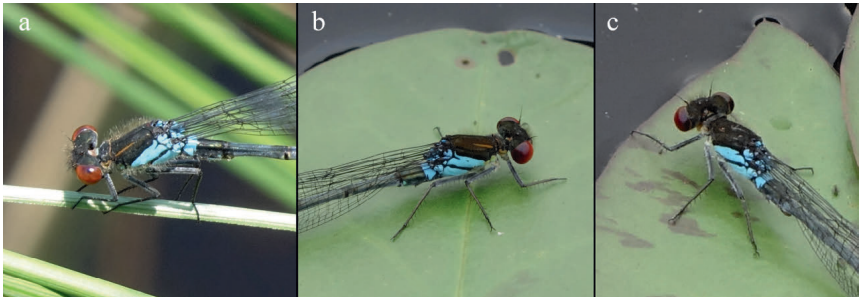

Figure 34. Male synthoraces of *Erythromma najas humerale* at the left oxbow lake of the Aldan River 3.5 km upstream of Tommot Town (Loc. 4a, Fig. 28): a (146765495) - with the antehumeral stripes well expressed; c-d – left (d) and right (c) side of the synthorax of the same individual (146472255) with different expression of the stripe (see Fig. 29).

Males of ***Enallagma cyathigerum*** had the cerci with the yellow subventral lobe protruding caudad behind the terminal sclerotised spine, thus corresponding to the nominotypical subspecies (Kosterin 2004b; Kosterin & Zaika 2010; Kosterin 2023). The males exhibited a trend of lateral melanisation of the abdomen (the presence of black stripes and spots, often irregular or asymmetric), varying from none (Fig. 18a-b) through medium (Fig. 18c) to considerable (Fig. 18d), which frequently occurs in this subspecies in the taiga zone (Kosterin & Zaika 2010; Onishko & Kosterin 2021), The same was observed in 2002 (Kosterin 2004a). By the way, three of the specimens collected in 2002 were involved into sequencing of the fragment of the mitochondrial DNA from *COI* to *COII* genes and AFLP analysis by Turgeon et al. (2005). Surprisingly, both analyses revealed their being most close to specimens of "*E. risi* Schmidt, 1961" from Inner Mongolia! (I should make a reservation that I treat the latter taxon as the subspecies *E. cyathigerum risi* (Kosterin 2004b; Kosterin & Zaika 2010).) According to the AFLP data, the Yakutian specimens clustered with these specimens rather than with specimens of *E. cyathigerum cyathigerum* from Europe and Kamchatka. According to mtDNA, their next close relative, after *risi* from Inner Mongolia, was a specimen of *cyathigerum* s. str. from Kamchatka. These results suggest that clear morphological difference between *cyathigerum* s. str. and *risi* is not paralleled by divergence of molecular clock, hence supporting their treatment as subspecies

One of the two collected young females of ***Somatochlora exuberata*** had clear wing bases (Fig. 27, above), while the other had an extensive basal amber (Fig. 27, below). Such females as the latter were known to occur in the Far East of Russia (Malikova 1995; Onishko & Kosterin 2021) (but not yet from West and Central Siberia) and were even termed ab. *graeserioides* (Malikova 1995).

One leg from the *A. juncea* male from Lebedinyy Settlement (Loc. 5), from the *A. crenata* male from the Aldan left oxbow (Loc. 4b), and from all collected specimens of *L. orientalis* were sent to different colleagues for their **molecular analyses**.

Discussion

Fauna 20 years later

On my trip to the same region in approximately the same season and of the same duration, 20 years before, in 2002, I revealed 13 species in total. Now I re-checked the specimens collected in Aldan Ulus in 2002 and reported in Kosterin (2004a) and, unfortunately, found one error: the female of *L. dryas* collected in Tommot Town (the only lestid for that trip) was misidentified as *Lestes sponsa* (Hansemann, 1823) and so reported. The total number of species did not change.

This time, in 2022, I found as many as 20 species (Table 1), adding the following 10 species: *C. armatum*, *C. glaciale*, *C. hylas*, *C. lanceolatum*, *E. najas*, *A. crenata*, *A. juncea*, *O. obscurus*, *L. intermedia*, *S. flaveolum*. This time, however, I failed to find 3 species: *A. caerulea*, *N. ruptus* and *S. sahlbergi* which were found in 2002. This gain in odonate diversity can only in part be ascribed to the involving into examination of the rich habitats in the Yakokit River valley (Locs 2), which actually provided only 4 of 10 additional species, *C. glaciale*, *C. hylas*, *A. juncea* and *L. intermedia*. Actually 12 of 13 species (minus *C. lunulatum*) were found in 2002 in the Aldan River left bank downstream of Tommot Town (Locs 4) (Kosterin 2004a), and the local fauna of that place now (in 2022) contained 15 species, with 8 species added (*C. armatum*, *C. glaciale*, *C. lanceolatum*, *C. lunulatum*, *E. najas*, *A. crenata*, *O. obscurus*, *S. flaveolum*) and 5 species missed (*L. dryas*, *C. hastulatum*, *A. caerulea*, *N. ruptus*, *S. sahlbergi*).

Twenty years ago, I was perhaps even more eager in searching Odonata as being younger, so the fauna of Odonata of Aldan Ulus appears as if to became about one and half time richer at present. If this is true at least to some extent, this may be ascribed to the current amelioration of the climate. However, neither of the species was found in its northernmost locality in Yakutia. Already up to 2009, all species now found in Aldan Ulus except for *O. obscurus* were known from the conventional region Central Yakutia, which is situated to the north of South Yakutia to which Aldan Ulus belongs (Kosterin & Sivtseva 2009). Also, six of the seven localities of *O. obscurus* reported in the above referenced paper were situated northerly of the Aldan River at Khatystyr and Tommot, where it was recorded in this study. Hence, I did not record expansion of any species to the north. Hence, if it was the climate change which enriched Odonata in the region studied, it was rather an indirect positive effect on general abundance and occurrence of dragonflies rather than via range expansions. In this respect the cases are of interest of places where Odonata were seemingly absent in 2002 - the Orto-Sala pond in Aldan Town, or nearly absent (one

Table 1. Presence and conventional abundance of Odonata species in localities examined in Aldan Ulus of Yakutia (the data from Neryungri Ulus are not included). For explanation of localities see the text (Loc. 2c is not included since the only species found there remained unidentified), the abundance scores correspond to orders of magnitude as follows: - – not found, 1 – single individual found, 2 – few (up to ten) observed, 3 –tens observed, 4 – above hundred observed.

Species	1	2a	2b	2d	2e	2f	3	4a	4b	4c	5	6
1. *Lestes dryas* Kirby, 1890	-	4	-	4	-	-	-	-	-	-	-	-
2. *Coenagrion armatum* (Charpentier, 1840)	-	1	-	-	-	-	-	-	1	-	-	-
3. *Coenagrion glaciale* (Hagen in Selys & McLachlan, 1872)	-	1	2	-	-	-	-	-	2	-	-	-
4. *Coenagrion hastulatum* (Charpentier, 1825)	2	4	4	3	3	-	-	-	-	-	1	-
5. *Coenagrion hylas* (Trybom, 1889)	-	3	-	3	3	-	-	-	-	-	-	-
6. *Coenagrion johanssoni* (Wallengren, 1894)	-	4	4	3	3	-	-	1	4	-	-	-
7. *Coenagrion lanceolatum* (Selys in Selys & McLachlan, 1872)	-	-	-	-	-	-	-	-	2	-	-	-
8. *Coenagrion lunulatum* (Charpentier, 1840)	-	2	1	-	-	-	-	-	2	-	-	-
9. *Enallagma cyathigerum cyathigerum* (Charpentier, 1840)	-	-	-	-	-	-	1	3	2	-	2	-
10. *Erythromma najas humerale* Selys, 1887	-	-	-	-	-	-	-	-	4	-	-	-
11. *Aeshna crenata* Hagen, 1856	-	-	-	-	-	-	2	-	3	-	-	-
12. *Aeshna juncea* (Linnaeus, 1758)	2	2	-	-	-	-	-	-	-	-	-	2
13. *Ophiogomphus obscurus* Bartenev, 1909	-	-	-	-	-	-	4	1	-	-	-	-
14. *Cordulia aenea* (Linnaeus, 1758)	-	2	3	-	-	2	3	3	4	2	-	-
15. *Somatochlora exuberata* Bartenev, 1910	-	-	-	-	-	-	-	2	-	-	-	-
16. *Somatochlora graeseri* Selys, 1887	-	2	-	-	-	-	-	-	-	-	-	-
17. *Leucorrhinia intermedia* Bartenev, 1910	-	2	-	-	-	-	2	-	-	-	-	-
18. *Leucorrhinia orientalis* Selys, 1886	2	4	4	3	3	-	3	2	4	2	2	-
19. *Libellula quadrimaculata* Linnaeus, 1758	-	2	-	-	2	-	-	1	2	-	-	-
20. *Sympetrum flaveolum* (Linnaeus, 1758)	2	-	-	-	-	-	-	2	-	-	-	
totally species found	**4**	**13**	**6**	**5**	**5**	**2**	**6**	**8**	**11**	**2**	**3**	**1**

unidentified species) - the Aldan River at Khatystyr village, but where they were found in 2022 (in both cases 6 species).

The fauna revealed is the typical boreal one. Of 23 species recorded in total (Kosterin 2004a; this study), only *C. lanceolatum*, *N. ruptus*, *O. obscurus* and *L. intermedia* do not reach Europe or at least the Ural Mts (Onishko & Kosterin 2021).

Habitats and habits

Lestes sponsa was found only in the Yakokit River valley and only in shallow artificial water bodies made not so long ago (Locs 2a, 2d) but not at a natural oxbow lake (Loc. 2e) or an artificial pond which approached the natural conditions (Loc. 2b). It remains unclear why *C. hylas*, *A. juncea*, *S. graeseri* and *L. intermedia* were not found in the Aldan River valley, in particular in the rich habitat of Loc. 4b, which was thoroughly examined for two days.

C. hastulatum and *C. lanceolatum* are very close species which almost exclude each other, so that the only case of their co-occurrence is known from Primorskiy Kray, the Russian Far East (Onishko et al. 2023). The same holds true for the area considered, where only *C. hastulatum* was recorded at the ponds in the Yakokit River valley (Locs 2) but only *C. lanceolatum* of the Aldan River left oxbow or Loc. 4b. Curiously, in 2002 it was *C. hastulatum* which occurred at the Aldan River left bank, but on a different oxbow lake (Loc. 4d) not examined this time. The female collected in 2022 at the pool of Loc. 4c, close to the latter, could be of either species.

It is usually assumed that dragonfly avoid emerging in bad weather but the larvae ready for eclosion accumulate in water and wait for the good weather. From this point of view the mass emerging of *O. obscurus* on a rainy day of 6.07.2022, even under the rain, seemed paradoxical. It should be noted, however, that several previous days the weather was sunny and very hot, e.g. for the period from 2.07.2022 to 5.07.2022 the day aerial temperature in Khatystyr village varied from +25°C to +31°C (http://russia.pogoda360.ru/473683/july/). The *O. obscurus* larva observed on 3.07.2022 looked ready for emerging and appeared from water but seemingly abstained from commencing eclosion. An impression arises that too hot weather is unfavourable for eclosion of this perhaps somewhat psychrophylous dragonfly species ranging in boreal zone, so that its larvae ready for this, contrary to the above general assumption, accumulated in water during the hot weather and rushed for eclosion on the first humid, overcast and rainy day. This day was still quite warm, ca +24.5°C, but the rainy front followed by the temperature drop to +21°C already next day.

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