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ODONATA OF THE DAURSKIY STATE NATURE RESERVE AREA, TRANSBAIKALIA, RUSSIA

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Data were recorded in 1995-1997. An annotated list of species contains a full reference to the specimens collected, notes on biotope preferences, and relative abundance of spp. For some spp., taxonomic notes and data on variation are given. Among the 31 spp., there are the Manchurian *Cercion v-nigrum* Needh. and *Anisogomphus maacki* (Sel.), previously thought to range westwards up to Blagoveshchensk only. *Anax parthenope* Sel. and *Pantala flavescens* Fabr. proved to occur in Transbaikalia. The Chinese/Mongolian *Ophiogomphus spinicornis* Sel. enters the Russian territory in southern Transbaikalia, Baikal region and southern Tuva.

INTRODUCTION

Transbaikalia (in Russian "Zabaikalye") is a conventional part of Russia (East Siberia) between Lake Baikal and the Argun' (Hailar) River lower reaches (which outline the Great Hingan Mts), with a conventional southern border coinciding with that of Russia and rather indefinite northern border. It is mostly occupied by forest-steppes and steppes and harbours a number of wooded mountain ranges. The dragonfly fauna of SE Transbaikalia is insufficiently known. A paper by GORB et al. (1996) was devoted to the dragonfly fauna of the Daurskiy State Nature Reserve and the surroundings of the village Nizhniy Tsasuchey (where the office of the reserve is situated). It reported 17 species, including the first record of *Aeshna serrata* Hagen for Transbaikalia. However, this paper was based on material collected by non-odonatologists.

In 1995-1997 I had an opportunity to take part in investigations on the entomofauna of the same area, carried out by the Institute of Animal Systematics and Ecology, the Siberian Division of the Russian Academy of Sciences, in 1995 in cooperation with the Ecological Club of Novosibirsk State University. O.G. Berezina and V.V. Dubatolov also took part in the collecting, while some small but interesting collections were provided by I.I. Lyubechanskiy, A.V. Korolyuk, and V.A. Brinikh. Besides, some mate-

rial was taken into account collected by E. Maksimenko in 1989 and identified by E.I. Malikova. In August 1996, V.V. Dubatolov collected some dragonflies in the southern part of the depression of the Torey Lakes on the territory of the Mongol Daguur Nature Reserve, Mongolia. As a result, 1298 specimens of 31 species of dragonflies and damselflies were collected. Here I discuss the composition of the collection and observations made.

THE REGION STUDIED

The name Dauria or Dahuria is usually applied to all steppe regions of Transbaikalia and adjacent regions of North China and East Mongolia. The Daurskiy Biosphere State Nature Reserve is situated in southern Chita Province, on the territory of the Ononskiy and Borzinskiy Districts, and is a reserve of a cluster type, uniting a number of protected territories of different status (Fig.1). It was founded in 1987 for protection of the avifauna of the Torey Lakes and of areas of virgin steppe. The reserve is a Russian part of the Dauria International Nature Reserve, together with the Mongol Daguur Reserve (Mongolia) and Dalainor Reserve (China). Within the Daurskiy Reserve a regime of strict protection (category I in IUCN nomenclature) applies to Lake Barun-Torey (except for its small parts at the village Kulusutai, the Khotogor Bay, and the SE corner), patches of reed thickets at the Uldza River delta and steppes along the Russian/Mongolian border on the southern banks of this lake (where the breeding places of many bird species and of Mongolian gazelle, *Procapra gutturosa* Pallas, are protected), three elevations on the northern bank of Lake Zun-Torey, and a fragment of pine forest between the Torey Lakes and the Onon River (in total about 44752 ha). A buffer zone regime (totally 112 thousand ha) is given to the lands around the Torey Lakes and the coastal part of Lake Zun-Torey. The Torey Lakes and adjacent lands, including the Reserve territory, have a buffer zone regime as the Torey Lakes wetland of international importance (within the Ramsar convention). About 58 thousand hectares south of the Onon River are occupied by the zakaznik (i.e. a protected area of category IyI-IV of IUCN nomenclature) of federal importance, Tsasucheiskiy Bor. Besides, the regime of Nature Monument is applied to the rocky ridges of the Adon-Chelon elevation at the mountain Tsagan-Obo. The office of the Reserve is in the village Nizhniy Tsasuchey on the Onon River, a capitol of the Ononskiy district.

The fragmental and complicated structure of the Daurskiy Reserve makes it more convenient to consider the fauna of contiguous and homogeneous natural areas, containing protected territories. They are the Torey Lakes depression, the Tsasucheiskiy pine forest, the Onon River valley and the Adon-Chelon elevation. These areas differ much in natural conditions. In them, dragonflies were collected in a number of sites shown on Figure 1.

The region studied is situated between 49°40' and 50°30'N and 115° and 116°E on the Uldza-Torey Plain, which is a northern projection of the raised plains of Central Asia jutting out into the mountain belt of South Siberia. It has a so-called Gobi-type relief characterized by an intricate alternation of hills and small ridges and intermontane depressions of various size and shape. Most of this region has no outflow and has numerous salt and brackish lakes scattered over. It is crossed by the Onon River (the Pacific basin). The climate is of an arid continental type (annual precipitation ca 200 mm), with a weak influence of the Pacific monsoon (SUSLOV, 1954). The winter is practically snowless, the majority of precipitation (up to 70%) falling in summer. In geobotanical respect the territory (except for the Adon-Chelon massif) belongs to the Central Asian (Daur-Mongolian) Subregion of the Steppe Region of Eurasia, mostly to the Mongolian Steppe Province, East-Mongolian Subprovince (LAVRENKO et al., 1991).

At present the two Torey Lakes, Barun-Torey and Zun-Torey (597 m above sea level), connected by the Utycha strait, are large water bodies with milky-white, slightly mineralized soda water (calcium and magnesium carbonates at the current concentration of ca 1 g/l), practically lacking macrophytes. These lakes have an imperfect cyclicity with a period of about 30 years; in each cycle they disappear and turn into salines. Currently the lakes enjoy a maximum filling and minimum mineralization. They are fed by the waters of the

Uldza or Uldz-Gol River, flowing in from the South. It is from this river that recolonization with aquatic invertebrates and fish (*Carassius auratus gibelio* [Bloch], *Phoxinus* sp., *Misgurnus anguillicaudatus* [Cantor]) takes place when the lakes reappear. The SW bank of Lake Barun-Torey at the cordon Bulum-Khuduk is boggy and covered with reed thickets, the other banks of the Torey Lakes are mostly hard, locally rimmed with narrow thickets of sedge and *Iris lactea* Pallas. The lowest lands along the banks are covered by slightly saline phytocenoses with large tussocks of the grass *Achnatherum splendens* (Trin.) Nevski, but most surroundings are occupied by zonal true steppes and dry steppes. Up to middle or late June the steppe is practically lifeless, but summer rains turn it green and covered with numerous flowers.

There is a hilly ridge along the northern bank of Lake Zun-Torey, with a gentle northern and rather steep southern slope. Major hills of this ridge are called, from west to east, Chikhalan, Gydyrgun (746 m above sea level), Kuku-Khadan (745 m), Khodonyata (Erel'dzhin), covered with dry steppe, on rocks and in ravines with patches of shrubby (*Spiraea pubescens* Turcz., *Ulmus macrocarpa* Hance, *Ribes diacanthum* Pallas.) vegetation and rarely groups of *Ulmus pumila* L. trees.

10 km West of the SW corner of Lake Barun-Torey there are two small lakes, Nizhniy Mukey (on Russian territory) and Ded Mukey Nur (on the Mongolian territory). Their water is strongly mineralized (chlorides and sulfates at concentrations about 17 g/l), although some freshwater springs discharge into the lake

Fig. 1. Map of the region studied. For explanation of localities see text.

(V. Obyazov, pers. comm.). This high mineralization, however, still allows a great abundance of invertebrates (Copepoda, Corixidae, larvae of Dytiscidae and *Enallagma cyathigerum risi*).

The so-called Tsasucheiskiy Bor is a unique forest extending for 40 km longitudinally and 50 latitudinally southwards of the Onon River. It is formed by a peculiar form of the pine tree, *Pinus silvestris krylovii* (Serg. & Kondr.) Busik, adapted to an extreme arid environment. It a dense part of the forest, formed mostly by both Krylov's pine and the introduced common pine *Pinus s. silvestris* L., 18 km SW of the village Nizhniy Tsasuchey, the small mesotrophic Lake Betevken and the smaller and very shallow lake Malyi Betevken are situated. Dragonflies were collected on these lakes and in an open part of the forest along the right side of the Onon River valley.

The Onon valley was studied from 15 km upstream to 2 km downstream of the village Nizhniy Tsasuchei. The valley is mostly very wide (up to 7 km), with local rock outcrops (mostly on the left side), accompanied by shrub thickets, and hills about 100 m above the river (643 m above sea level at Nizhniy Tsasuchey). They, as well as the land adjacent to the left side of the valley, are covered with specific Daurian meadow steppes, rich in herb species. Open stand of Krylov's pine, being the edge of Tsasucheiskiy Bor, covers the land adjacent to the right valley side. The Onon is a large and fast river with a clear water and a pebble bed. Its capacity is very unstable; a powerful flood occurs in middle summer, but the dates vary greatly yearly. The river forms many arms, some of which dry up or are fed with cold ground water when the river level is low. At the village of Nizhniy Tsasuchey there are two stable arms, Staryy Onon, the left, and Novyy Onon, the right, with the Kharganay island between them. The floodlands are covered with meadow vegetation or tussock bogs, in the middle summer mostly inundated, willow thickets and, on left bank, open stands of *Populus suaveolens* Fischer. At a widened section of the right bank floodland above the embankment of the bridge on the highway Aginskoe-Nizhniy Tsasuchey (7 km upstream of the latter), there are several chains of shallow eutrophic oxbows with a rich water vegetation and invertebrate fauna. Among them, Lake Kudon, situated 12 km W of Nizhniy Tsasuchey, is remarkable. The oxbows seem to have most diverse odonatofauna among the water bodies.

Adon-Chelon is a part of the mountain massif of Sherlovaya Gora, 65 km east of Nizhniy Tsasuchey. The mountain Tsagan-Obo reaches 985 m above sea level. The massif is composed of a number of gentle ridges covered with luxuriant Dauran meadow steppes and crowned with impressive granite rocks, with bush thickest at their foots. Between the Adon-Chelon and Nizhniy Tsasuchey, the small winding Borzya rivulet flows in a wide boggy valley.

COLLECTING SITES

The main collection sites (see Fig. 1) are listed below:

- Loc. 1. The Novyi Onon arm right bank 2 km downstream of Nizhniy Tsasuchey village.
- Loc. 2. Open stand of pine trees of the forest called Tsasucheiskiy Bor, within few km South and West of Nizhniy Tsasuchey, mostly along the highway.
- Loc. 3. The right bank floodland and terrace (the latter is covered with open pine forest) of the Novyy Onon arm between Verkhniy Tsasuchey village (adjacent to Nizhniy Tsasuchey from the west) and the bridge.
- Loc. 4. Oxbows on the Onon right bank floodland just upstream of the embankment of the highway Aginskoe-Nizhniy Tsasuchey, 7 km W of the latter. During a flood of the Onon River in early June 1995, all these water bodies became arms of the Onon.
- Loc. 5. Upper Floodland: water bodies of the same type between the bridge and the hill Kuruntey (15 km W of Nizhniy Tsasuchey). Most part of the collections were made on small Lake Kudon 12 km W of Nizhniy Tsasuchey.
- Loc. 6. The Onon River left bank 5-10 km upstream of Nizhniy Tsasuchey, including the Malyi Batur hill environs.
- Loc. 7. Lake Betevken in the Tsasucheiskiy Bor pine forest 18 km SW of Nizhniy Tsasuchey.
- Loc. 8. Malyy Betevken, a small shallow lake about 1 km of Lake Betevken.
- Loc. 9. The Borzya Rivulet valley 16 km upstream of its mouth.

- Loc. 10. The Adon-Chelon massif, with the mountain Tsagan-Obo, 10-15 km NNW of Tasyrkhoy village, west of Sherlovaya Gora settlement.
- Loc. 11. Lake Nizhniy Mukey on the Russian/Mongolian border 10 km W of the SW corner of Lake Barun-Torey.
- Loc. 12. Lake Uglovoe, a small lake SE of the SE corner of Lake Barun-Torey.
- Loc. 13. The SW bank of Lake Barun-Torey, at the Bulum-Khuduk cordon.
- Loc. 14. The surroundings of the border service light house Nipsei south of the Bulum-Khuduk cordon at the SW corner of Lake Barun-Torey.
- Loc. 15. The Borokholoy Rivulet, falling into the Torey Lakes at Utycha strait.
- Loc. 16. The Utycha strait between the Torey Lakes.
- Loc. 17. The banks of the isthmus between the Torey Lakes at the Teli hill and Khotogor bay.
- Loc. 18. The NW bank of Lake Zun-Torey at the foot of the Chikhalan hill.
- Loc. 19. The southern slope of the Kuku-Khadan hill and the adjacent NE bank of Lake Zun-Torey.
- Loc. 20. The surroundings of the Khodonyata (Erel'dzhin) hill at the BE bank of Lake Zun-Torey.
- Loc. 21. The surroundings of the Solovyovsk railway station.

The following sites at the Torey Lakes are situated on the territory of Mongolian Republic:

- Loc. 22. 18 km WSW of Erentsav railway station, a bank meadow at Lake Barun-Torey.
- Loc. 23. 4 km of Chulun-Khorot village, SW of Lake Barun-Torey.
- Loc. 24. Lake Duro-Nur on the Uldz-Gol River.
- Loc. 25. Shudu-Gol: the loop of the Shudu-Gol River 25-28 km S of the station Erentsav.
- Loc. 26. The western bank of Lake Khukh-Nur.
- Loc. 27. The Eltrud mountain 10 km ESE of the Duchiyn Gol River mouth.
- Loc. 28. The Avdar-Tolgoi mountain, at the Duchiyn Gol River mouth.

Collectors were as follows: August 7-15, 1989: E. Maksimenko; – June 14-17, 1995: V. Dubatolov & I. Lyubechanskiy; – June 18-26, 1995: O. Kosterin & O. Berezina, with participation of I. Lyubechanskiy and V. Smirnova; – June 28-July 5, 1995; July 16-August 10, 1997: O. Kosterin & O. Berezina; – July 25-August 9, 1995: A. Korolyuk; – August 16-24, 1995; July 18-August 23, 1996: V. Dubatolov; – June 29-July 16, 1996: O. Kosterin. Otherwise, the collectors are specified below.

ANNOTATED LIST OF SPECIES

Asterisks (*) stand for the species first recorded in Transbaikalia. Figures in parentheses at the end of the "Material" paragraph designate the total number of specimens collected. Collections made in 1995 more or less reflect relative abundance of species within suborders; collections of 1996 and 1997 were made selectively. Collections for the second half of July and August in 1995 and 1996 were made by non-odonatologists and not systematically. In some cases when variation is characterized, the number of specimens mentioned is less than the total, as some specimens had been sent to other odonatologists before analysis.

LESTIDAE

Lestes dryas Kirby, 1890

Material. – 4: 1 ♀, 5-VII-1995. – 5: 1 ♂, 19-VII-1997. – 13: 1 ♂, 3-VII-1995. – 16: 1 ♀, 7-VIII-1989. – 1 ♂, 1 ♀, "Torey Lakes", 13-VIII-1989. (6).

Rather rare. Not found on Lake Kudon, where only *L. sponsa* occurred, but both species collected on a dried up oxbow few km apart. In Siberia *L. dryas* is as a rule found on a variety of water bodies, including very small ones, while *L. sponsa* usually inhabits larger waters and with a greater abundance (BELYSHEV, 1973; KOSTERIN, 1996). Neither species is numerous in the Onon valley.

Lestes sponsa (Hansemann, 1823)

GORB et al., 1996.

Material. – 3: 1 ♂, 1 ♀, 19-VII-1997. – 4: 1 ♀, 15-VII-1996. – 5: 6 ♂, 2 ♀, 23-VIII-1996; 3 ♂, 18-VII-1997; 5 ♂, 4 ♀, 10-VIII-1997. – 11: 1 ♂, 1 ♂, 2-VIII-1996. – 16: 2 ♂, 3 ♀, 7-VIII-1989. – "Torey Lakes": 10 ♂, 1 ♀, 13-VIII-1989. – 15: 3 ♂, 1 ♀, 13-VIII-1989. – 27: 1 ♂, 1 ♀, 23-VII-1996. (46)

A teneral female collected on August 15 had a distinctly yellow occiput, with a sharp border of yellow and bronze. Such a colouration of the occiput is characteristic for *L. barbarus* (Fabricius, 1798), *L. japonicus* Selys, 1883, and *L. virens* (Charpentier, 1825). Among teneral females of *L. sponsa* one may find individuals with a yellow occiput, which has not been yet acquired a bronze colour, but with a diffuse border. All details of morphology of the female mentioned were typical for *L. sponsa*, as corroborated by Drs E.I. Malikova and R. Jödicke. Most probably that individual expressed some anomaly of colour development after hatching.

Sympecma paedisca (Brauer, 1877).

GORB et al., 1996: *Sympecma annulata* Selys.

Material. – 1: 6 ♂, 18-VI-1995, 1 ♂, 9-VIII-1997. – 2: 2 ♂, 3 ♀, 22-VIII- 1996. – 3: 1 ♂, 1 ♀, 17-VIII-1995; 1 ♂, 1 ♀, 30-VI-1996; 1 ♀, 18-VIII-1996; 1 ♂, 17-VII-1997. – 4: 2 ♀, 22-VIII-1995. – 5: 1 ♀, 16-VII-1996; 2 ♀, 23-VIII-1996; 1 ♀, 10-VIII-1997. – 7: 2 ♂, 4-VII-1996. – 8: 6 ♂, 3 ♀, 26-VI-1995. – 9: 7 ♂, 6 ♀, 21-VI-1995. – 10: 2 ♀, 19-VI-1995; 1 ♂, 21-VI-1995. – 11: few specimens visually, 24-VI-1995. – 13: 2 ♂, 23-VI-1995; 2 ♂, 23-VIII-1995. – 14: 1 ♀, 15-VI-1995. – 17: 1 ♂, 25-VI-1995; 3 ♀, 29-VI-1996. – 19: 1 ♂, 1 ♀, 24-VI-1995. – 22: 1 ♀, 22-VII-1996. (63)

In a majority of specimens there is only one small gap in the mesepisternal band in the fore part of the pterothorax, while in others the band is contiguous. Thus, our damselflies formally correspond to subspecies *braueri* Bianchi, 1905, while for the adjacent Inner Mongolia "*S. paedisca annulata* Selys, 1887" was reported (MA et al., 1991). In the latter subspecies the band should be not only split into fragments, as in the nominotypical one, but much reduced. Such specimens can hardly be expected from that area, so there might be a misidentification, as was obviously done by GORB et al. (1996). In fact, there is a cline for progressive reduction of the band in the southern directions, so JÖDICKE (1997) has synonymized all the subspecies within *S. paedisca*.

An omnipresent damselfly, the least confined to water among all, common on various water bodies as well as far away from them. Its apparent abundance together with such a wide dispersion implies it is likely the most abundant damselfly in this region as well as in Siberia in general. Besides, it hibernates in the imaginal phase, so that the imagines are observed throughout the warm season.

COENAGRIONIDAE

Coenagrion glaciale (Selys, 1872)

Material. – 4: 2 ♂, 29-VI-1995; 3 ♂, 5-VII-1996. (5)

The species is characterized by an early flight period, which was probably over before most of our observations. This may explain why it is so seemingly scarce.

Coenagrion armatum (Charpentier, 1840)

GORB et al., 1996

Material. – 5: 1 ♂, 1 ♀, 5-VII-1996; 1 ♂, 1 ♀, 16-VII-1996; 1 ♀, 18-VII-1997. – 8: 6 ♂, 4 ♀, 26-VI-1995. – 9: 3 ♂, 8 ♀, 21-VI-1995, 6 ♂, 4 ♀, 8-VII-1996. – 10: 1 ♂, 19-VI-1995; 1 ♂, 20-VI-1995. – 13: 1 ♂, 3 ♀, 23-VI-1995; 1 ♀, 3-VII-1995. – 17: 3 ♂, 6 ♀, 25-VI-1995. – 19: 2 ♂, 2 ♀, 24-VI-1995. (56)

A common damselfly on any type of water (except for a saltish Lake Mukey), found also far from water.

Coenagrion lunulatum (Charpentier, 1840)

GORB et al., 1996

Material. – 4: 21 ♂, 9 ♀, 18-VI-1995; 11 ♂, 29-VI-1995; 2 ♂, 30-VI-1996; 1 ♂, 3-VII-1996. – 5: 2 ♂, 2-VII-1996; 3 ♂, 1 ♀, 18-VII-1997. – 7: 21 ♂, 6 ♀, 25-VI-1995. – 8: 25 ♂, 3 ♀, 26-VI-1995. – 9: 19 ♂, 7 ♀, 21-VI-1995; 3 ♀, 8-VII-1996. – 10: 3 ♂, 2 ♀, 19-VI-1995. – 11: 2 ♂, 15-VI-1995; 1 ♂, 24-VI-1995; 8 ♂, 4 ♀, 2-VII-1995. – 13: 2 ♂, 2 ♀, 23-VI-1995; 2 ♂, 2 ♀, 3-VII-1995. – 17: 1 ♂, 3 ♀, 25-VI-1995; 1 ♀, 29-VI-1996. – 19: 3 ♂, 24-VI-1995. (170)

It should be noted that the legends to the figures depicting the female pronotums of *C. armatum* and *C. lunulatum* in GORB et al. (1996) have been inverted.

The most abundant damselfly species on the majority of water bodies, except for the Torey Lakes where it is less abundant than *C. ecornutum*, and Lake Mukey where few specimens were seen, probably immigrated from Lake Barun-Torey.

Coenagrion lanceolatum (Selys, 1872)

Material. – 4: 5 ♂, 4 ♀ (teneral), 18-VI-1995; 12 ♂, 8 ♀, 29-VI-95; 20 ♂, 1 ♀, 30-VI-96; 3 ♂, 16-VII-97; 4 ♂, 3 ♀, 17-VII-97. – 5: 7 ♂, 4 ♀, 2-VII-96; 1 ♂, 3 ♀, 5-VII-96; 1 ♀, 16-VII-96; 7 ♂, 7 ♀, 18-VII-97; 3 ♂, 10-VIII-97. – 8: 4 ♂, 26-VI-95. – 9: 1 ♂, 2 ♀, 8-VII-96. 10: 1 ♂, 2 ♀, 19-VI-95; 1 ♂, 20-VI-95; 1 ♂, 21-VI-95. – 19: 2 ♀, 24-VI-95. (107)

Males sometimes are found with lateral black strokes on tergite II, as in the related *C. hastulatum* (Charpentier, 1825), their identity with *C. lanceolatum* being, however, clear from the anal appendage structure.

The species is common on many water bodies (not on Lake Mukey) and seems to be most abundant in the Onon floodland. The imagines emerge in middle/late June.

Coenagrion ecornutum (Selys, 1872)

GORB et al., 1996

Material. – 4: 1 ♂, 29-VI-95; 3 ♂, 2 ♀, 30-VI-96; 1 ♀, 3-VII-96. – 5: 5 ♂, 1 ♀, 2-VII-96; 2 ♀, 5-VII-1996; 4 ♂, 2 ♀, 16-VII-1996; 8 ♂, 5 ♀, 18-VII-1997. – 9: 2 ♂, 10 ♀ (teneral), 21.VI 1995; 5 ♂, 3 ♀, 8-VII-1996. – 7: 1 ♀, 25-VI-1995. – 8: 2 ♂, 2 ♀, 26-VI-1995. – 10: 1 ♀, 19-VI-1995; 1 ♀, 20-VI-1995. – 11: 1 ♂, 1 ♀, 24-VI-1995. – 13: 23 ♂, 36 ♀ (♂ostly teneral), 23-VI-1995; 5 ♂, 3-VII-1995. – 17: 2 ♂, 3 ♀, 25-VI-1995. – 16: 1 ♂, 2 ♀, 25-VI-1995 (Lyubechanskiy leg.). – 18: 1 ♀, 12-VII-1996. 19: 3 ♂, 1 ♀, 24-VI-1995. – 26: 4 ♂, 1 ♀, 23-VII-1996. (145)

BELYSHEV (1973) considered this species to be rare east of the upper Ob' River basin, but MALIKOVA (1995) noted it is abundant in Transbaikalia and the Far East.

This is the most abundant damselfly of the Torey Lakes (and, most probably, of the Borzya Rivulet valley). On 23-VI-1995 in the reed thickets at the cordon Bulum-Khuduk a mass emergence was observed, while on the next visit on 3-VI-1995 their abundance

was quite moderate. Probably the damselflies had partly emigrated from the lake. Their ability of such migrations seems to be supported by their concentration on the southern slope of the hill Kuku-Khadan facing Lake Zun-Torey.

**Cercion v-nigrum* (Needham, 1930)

Material. – 4: 1 ♂, 1 ♀, 29-VI-1995. – 5: 2 ♂, 2.VII 1996; 4 ♂, 2 ♀, 5-VII-1996; 13 ♂, 15-VII-1996; 2 ♂, 1 ♀ ,16-VII-1996; 1 ♀, 10-VIII-1997. (27)

This species ranges from China to the southern Primorye (BELYSHEV, 1973) and was found recently in the Amur valley in the surroundings of Blagoveshchensk (MALIKOVA, 1993, 1997a) but had not been reported for Transbaikalia. This record shifts the border of the known range of the species much to the west. Most probably, it coincides with the Amur (Heilongjiang) River basin.

MA et al., (1991) reported *Cercion sexlineatum* (Selys, 1883) (properly to be named *C. melanotum* (Selys, 1876) (MAY, 1997)) for the adjacent regions of Inner Mongolia, but not *C. v-nigrum*. The latter species was described from a single male by NEEDHAM (1930). Unfortunately, he differentiated them in his key by the humeral black stripe of the pterothorax, contiguous versus split by a light streak lengthwise. The type specimen had a contiguous stripe, but later it was found that this character is variable. Figures in BELYSHEV (1973) well show this variation ranging from the absence of a dividing light streak to a complete separation of the two elements of the stripe by such a streak. ASAHINA (1961, 1989) reported on specimens in which the stripe is divided in the rear part, as in *C. melanotum*. It is possible that MA et al. (1991) had in hand specimens of *C. v-nigrum* but, identifying them using Needham's key, called them *C. sexlineatum* (i.e. *melanotum*).

Our specimens fit perfectly with *C. v-nigrum* in all characters. They show the following variation of the humeral stripe: in 4 males and 4 females the stripe is divided throughout its entire length, the two elements contacting each other by a tiny anastomosis only at the hind end of the stripe; in 6 males the stripe is divided but there are anastomoses at both ends so that the light streak is isolated from the ground colour of the pterothorax; in 10 males and 1 female the stripe is divided with an isolated light streak only in its hind part.

The species is rather common on stagnant eutrophic oxbows of the Onon River right floodlands above the bridge, especially on Lake Kudon. The males tend to sit on the leaves of water plants floating on the surface. They share this feature of behaviour with *Erythromma najas*. On evidence of larval morphology, HEIDEMANN & SEIDENBUSCH (1993) synonymized *Cercion* with *Erythromma*, and behaviour seems to reinforce that position.

Erythromma najas humerale Selys, 1887.

Material. – 4: 1 ♀ (teneral), 18-VI-1995; 6 ♂, 1 ♀, 29-VI-1995; 6 ♂, 30-VI-1996. – 5: 3 ♂, 2-VII-1996; 6 ♂, 1 ♀, 5-VII-1996; 9 ♂, 3 ♀, 15-VII-1996; 1 ♂, 16-VII-1996; 3 ♂, 2 ♀, 17-VII-1997; 1 ♂, 18-VII-1997; 1 ♀, 10-VIII-1997. – 13: 2 ♂ (one teneral), 3-VIII-1996. – 18: 1 ♂, 12-VII-1996. (47)

The taxon *humerale*, ranging east of Pribaikalye (i.e. Lake Baikal area), was con-

sidered as a subspecies of *E. najas* (Hansemann, 1823), but recently it was given species rank (MALIKOVA, 1995; INOUE & TANI, 2001; etc.). MALIKOVA (1955 and pers. comm.) came to this conclusion because of the smaller size of the eastern taxon and quantitative differences in larval morphology. In contrast, she considered the presence and expression of the dark-yellow stripes on the mesepisternum in males as individually variable and, hence, of no taxonomic value, while these stripes were specified by BELYSHEV (1973) as diagnostic features of subspecies *baicalensis* Belyshev from East Siberia (synonymized with *humerale* by MALIKOVA (1995)) and "*humeralis*" (considered by him as ranging in the Far East). I think that the reasons proposed are insufficient for separation of *najas* and *humerale* at the level of species and refer at most to subspecies. R. Seidenbusch (pers. comm.) also found no differences of a species rank between European *najas* and Japanese *humerale*. Among 36 examined males collected in the area considered, in 8 the stripes were present throughout the length of the mesepisternum as they should be in *humerale* (in one male they are very broad), in 26 they are expressed only in the lower half of the mesepisternum, as they should be in *baicalensis* according to the original description (BELYSHEV, 1964), in 1 they are very short, and in 1 they are absent, as in the typical *najas*.

These damselflies were common on oxbows of the Onon right bank floodland upstream of the bridge embankment. In good weather the males almost exclusively stick to open water where they rest on emerging vegetation or floating leaves and sticks. In early July 1995 all these pools were inundated by the Onon. Occasional damselflies were observed in the grass of non-inundated plots, but no *Erythromma* were seen among them. In 1996 no changes of the Odonata community were noticed on these water bodies, stagnant throughout the season. In 1996 *E. najas* was found, although rare, also on the Torey Lakes, which seem not too suitable for this species, which needs abundant floating vegetation.

Enallagma cyathigerum risi Schmidt, 1961

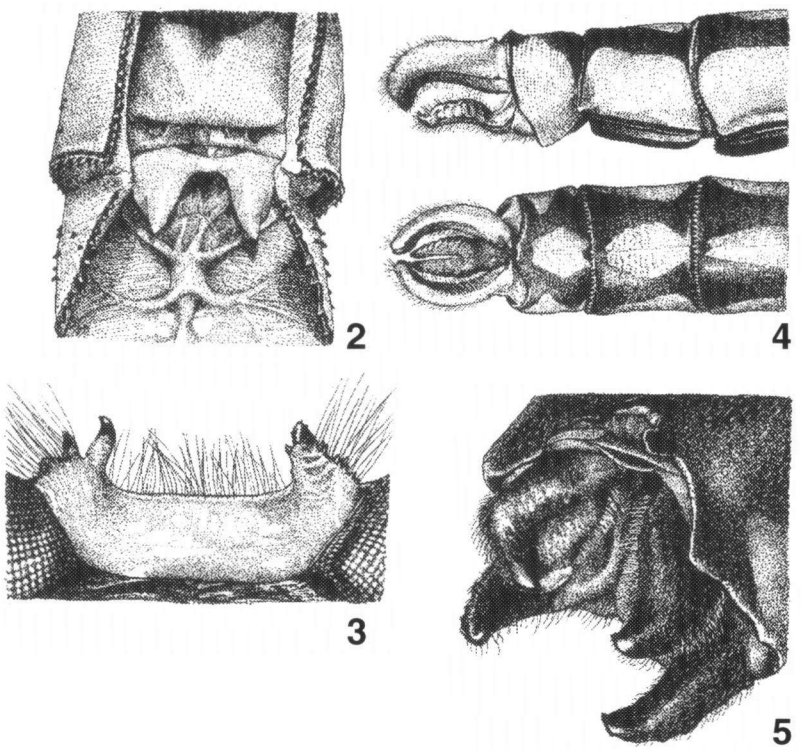
Gorb et al., 1996

Material: 1: 2 ♂, 3 ♀, 28-VI-1995. – 2: 1 ♂, 20-VII-1997. – 4: 2 ♀ (teneral), 29-VI-1995; 2 ♂ (teneral), 30-VI-1996. – 5: 1 ♂, 2-VII-1996; 1 ♀, 5-VII-1996; 1 ♂, 15-VII-1996; 2 ♂, 2 ♀, 18-VII-1997; 3 ♂, 10-VIII-1997. – 7 & 8: 10 ♂, 5 ♀, 25-VI-1995; 1 ♀, 26-VI-1995; 3 ♂, 4-VII-1996. – 9: 8 ♂, 8 ♀, 21-VI-1995. – 10: 1 ♂, 2 ♀, 19-VI-1995; 3 ♀, 20-VI-1995; 1 ♂, 9-VII-1996. – 11: 2 ♂, 5 ♀ (teneral), 15-VI-1995; 12 ♂, 5 ♀, 2-VII-1995; 1 ♂, 24-VIII-1995; 4 ♂, 5 ♀, 7-VII-1996; 2 ♂, 2 ♀, 2-VIII-1996. – 13: 1 ♀, 7-VII-1996. – 15: 1 ♂, 13-VIII-1989. – 17: 6 ♂, 3 ♀, 25-VI-1995; 1 ♀, 29-VI-1996. – 19: 4 ♂, 2 ♀, 24-VI-1995; 3 ♂, 3 ♀, 24-VII-1995; 1 ♂, 9-VIII-1997. – 18: 9 ♂, 11 ♀; 12-VII-1996. – 20: 1 ♂, 1 ♀; 15-VIII-1996. – "Torey Lakes": 11 ♂, 13-VIII-1989. – 22: 1 ♂, 24-VII-1996. – 24: 6 ♂, 6 ♀, 23-VII-1996. – 26: 3 ♂, 23-VII-1996. – 27: 1 ♂, 23-VII-1996. – 28: 1 ♀, 24-VII-1996. (174)

All male specimens have the upper anal appendages corresponding to the taxon *Enallagma risi* Schmidt, 1961, described from Afghanistan and repeatedly reported from Mongolia and South Siberia (BELYSHEV, 1973). The characteristic feature of the upper appendage is a small yellow lip situated proximally and ventrally of a robust dark terminal tooth, directed inwards and down (Fig. 5). Although there is some variation in the shape of the appendages, the feature is stable. Such characters will be referred to in

the text as "*risi*-type". Females have a more erect mesostigmal plate than in the nominotypical subspecies. SEIDENBUSCH (1997) and SAMRAOUI et al. (2002) communicated that all specimens from Central Asia belong to the same type.

All *Enallagma* specimens from Europe and Asia Minor (SEIDENBUSCH, 1997; SAMRAOUI et al., 2002), as well as those referred to as *E. cyathigerum annexum* Hagen, 1861 from North America (R. Seidenbusch and E. I. Malikova, pers. comm.), have the yellow lip situated distally of the terminal tooth, which is not so robust, its hind margin being directed behind. Europe and Asia Minor are inhabited by the nominotypical *E. c. cyathigerum* (Charpentier, 1840), so this type of appendages will further be called "*cyathigerum*-type". The same structure is exhibited by specimens from the Okhot Sea coast, Kamchatka and Yakutia, often melanistic, described by BARTENEV (1956) as *Agrion antiquum* Bartenev, 1856 and by BELYSHEV (1956) as *E. circulatum continentale* Belyshev, 1956, later referred to by Belyshev as *E. cyathigerum* ab. *desertiformis* Belyshev, 1972, and then as *E. cyathigerum* ab. *nigrolineata* [sic] Belyshev, 1973 (BELYSHEV, 1973). Later A. Haritonov and B Belyshev redescribed them as a bona



Figs 2-5. Details of morphology of *Ophiogomphus spinicornis* Selys, 1878, the Onon River (2-4) and *Enallagma cyathigerum risi* Schmidt 1961, Lake Zun-Torey (5): (2) female valvular vulvae; – (3) female horns; – (4, 5) male anal appendages.

fide species, *E. nigrolineatum* Belyshev & Haritonov, 1975 (HARITONOV, 1975), although the name *antiquum* has a priority (as proposed at a higher rank than simultaneously introduced *continentale*). The same appendage structure is found in Amurland, Primorye (MALIKOVA, 1995) and Korea (ASAHINA, 1989)

I had an opportunity to examine the rich collections of *Enallagma* from the collection of Siberian Zoological Museum at the Institute of Animal Systematics and Ecology, Novosibirsk. It turned out that all specimens from the northern Caspian region, Chelyabinsk Province, and the southern part of the West-Siberian Lowland (surroundings of Omsk, Novosibirsk, Tomsk, Biysk) invariably belong to the *risi*-type. It is this type of anal appendages that is illustrated in the monograph by BELYSHEV (1973) for "*Enallagma cyathigerum*." Among specimens from Sverdlovsk Province, the Altai Mts., Irkutsk Province and Buryatia the structure of the upper appendages varies between the two types to such an extent that at a single locality the specimens of the *cyathigerum*-type, *risi*-type, and intermediates can be found together. In northern West Siberia, NE Asia and Kamchatka all specimens belong to the *cyathigerum*-type, among which melanistic individuals with variable black stripes on the sides of the abdomen can be found (it was such specimens that acquired so many names: *antiquum, continentale, desertiformis, nigrolineatum*).

This picture convinced me that the *cyathigerum*- and *risi*-type are structural forms within the species *E. cyathigerum* and that *E. risi* can not be considered as valid species (KOSTERIN, 1999). SAMRAOUI et al. (2002) came to the same conclusion after analysis of 18 S rDNA and intergenic spacers 1 and 2. Both morphological types have clear-cut ranges. The *cyathigerum*-type inhabits Europe, Asia Minor, northern Asia, Pacific regions south to Korea, and North America. The *risi*-type occupies the arid (desert, steppe and forest-steppe) zones of Asia from the Caspian Sea to Transbaikalia and Manshuria. In the zones of their contact, which are so far recognized in such more or less humid mountain regions as the Ural and Altai mountains and the mountains of the Baikal region, which protrude into the forest-steppe and steppe zones, i.e. into the latitudes of a zonal range of the *risi*-type, intensive introgression is observed. The *cyathigerum*-type embraces subspecies *antiquum* Belyshev, 1956 from NE Asia (certainly no more than a subspecies). Two taxa described within the *risi*-type: *E. strouhali* Quentin, 1962 (Harbin, China), *E. cyathigerum mongolicum* Benedek, 1968 (Mongolia) have been synonymized with *risi* (MAY, 1997). There is, however, a probability that the priority name for the *risi*-type damselflies is *rotundatum* Bartenev, 1929. BARTENEV (1929) described his *E. cyathigerum* var. *rotundatum* from the West Caucasus (Krasnaya Polyana, the mountains above Sochi). The types are lost, the figure is poor and the description is brief, yet the characterization of the male upper appendages lateral view fits well to the *risi*-type. It was claimed (and confimed by later sources) that Transcaucasia is inhabited by typical *cyathigerum*. It is also possible that the West Caucasus is occupied by the *risi*-type indeed (or, more probably, by transitional forms), as well as the steppes of south-eastern European Russia (a specimen I have from Astrakhan' is a clear-cut *risi*-type). Therefore, the name *risi* Schmidt, 1961 is provisorily applied

to the subspecies considered, and obtaining of the topotypical material from Krasnaya Polyana is of utmost necessity.

In the region studied these dragonflies inhabit all stagnant water bodies. This species predominates on Lakes Betevken and Malyy Betevken and is the only one developing en masse in Lake Nizhniy Mukey. On Lake Zun-Torey these damselflies were observed on 12/13-VII-1996 still emerging on the leaves of *Iris lactea*.

Ischnura elegans (Vander Linden, 1823)

Material. – 5 (Lake Kudon): 1 ♂, 15-VII-1996. – 13 (in reed thickets): 1 ♀, 23-VI-1995. (2).

Abundant in the western part of its range but local and rare in East Siberia and the Far East (MALIKOVA, 1995).

AESHNIDAE

Aeshna mixta Latreille, 1805.

GORB et al., 1996.

Material. – 2: 3 ♂, 1 ♀, 10-VIII-1997. 3: 1 ♂, 18-VIII-1996; 1 ♂, 3-VIII-1996. – 10: 2 ♂, 2 ♀, 11-VIII-1995. 13: 1 ♂, 3-VIII-1996. – 19: 1 ♀, 9-VIII-1997. – 16: 1 ♂, 18-19-VIII-1995. – 15: 2 ♂, 5 ♀, 13-VIII-1989. – 21: 2 ♂, 1 ♀, VII-1989. (23).

A late-flying dragonfly that appears in August. Rather abundant at forest edges and in open tree stands in Tsasucheiskiy Bor, as well as above the upper part of the southern slope of the hill Kuku-Khadan facing Lake Zun-Torey. In contrast to *Aeshna crenata*, which usually patrols a certain individual areas with rather an even and straight flight along a more or less stable route, or *Aeshna juncea*, which flies in abundance without conflicts between individuals with even and straight flight, this species has an erratic twisting flight, as if examining tree branches, grass plots or rocks.

Aeshna crenata Hagen, 1856

Material. – 1: 2 ♂, 1 ♀; 20-VII-1996. – 3: 1 ♂, 1 ♀ (with dark wings), 31-VII-1996; 1 ♂, 18-VIII-1996; 1 ♂, 21-VIII-1996; 1 ♂, 2 ♀, 16-VII-1997; 4 & 5: 1 ♀ (teneral), 5-VII-1996; 9 ♂, 1 ♀, 15-VII-1996; 5 ♂, 1 ♀, 16-VII-1996; 1 ♂, 18-VII-1997, 1 ♀, 10-VIII-1997. – 5: 5 ♂, 11-VII-1996 (34).

Two females collected on 31-VII-1996 had darkened wings, a common feature of this species throughout Siberia.

A predominating *Aeshna* species in the Onon floodland. Its mass emergence starts in middle July on the stagnant eutrophic Onon oxbows, where numerous exuviae appear on the bank sedges and snags. Males patrol individual areas above the water or near it and are very numerous on stagnant oxbows and few on slow-current temporary arms of the Onon. Females are observed at the water as well as, most frequently, flying among sparse tree stands of riparian poplars or pines.

Aeshna serrata Hagen, 1856

GORB et al., 1996.

Material. – 6: 1 ♀, 11-VII-1996. – 13: 1 ♀, 3-VII-1995. – 17: 1 ♂, 1 ♀, 27-VII-1995 (4).

These sites seem to represent the easternmost (and not very abundant) populations of

this species in Russia (BELYSHEV [1973] thought this species to penetrate eastward to the longitude of Lake Baikal only), in good accordance with the existence here of the most eastern steppes, which this species prefers.

Aeshna juncea (Linnaeus, 1758)

GORB et al., 1996.

Material. – 2: 2 ♂, 2 ♀, 14-VII-1996; 1 ♂, 5-VIII-1996; 2 ♂, 10-VIII-1997. – 3: 1 ♂, 15-VII-1996 (V. Dubatolov leg.), 1 ♀, 19-VII-1997. (9).

Abundant in Tsasucheiskiy Bor, where it flies in glades and open pine stands from middle July onwards. The dragonflies exhibit a swarming flight behaviour, i.e. aggregated in certain places without fights among individuals. During daylight they fly several metres above the ground, gradually descending to the very ground in twilight. This species was not observed at the water where patrolling males and ovipositing females of *A. crenata* were seen. BELYSHEV (1973) thought *A. crenata* is capable of excluding *A. juncea* from water. The question is open if *A. juncea* in this region develops mostly in some other water bodies or appears at the water later in the season.

**Anax parthenope julius* Brauer, 1865.

Material. – 11: 2-VII-1995, fore and hind wings of a female.

Hitherto known from Russian Transbaikalia only by a visual observation by BELYSHEV (1973) at Lake Gusinoe, Republic Buryatia. According to venation, the wings collected at Lake Nizhniy Mukey belong undoubtedly to the genus *Anax*. It is *A. parthenope* Selys, 1839 that is known from the adjacent regions of Mongolian People's Republic (BELYSHEV & HARITONOV, 1981) and Inner Mongolia (MA et al., 1991). There is no doubt we also deal with this species. The pterostigma length is 5.5 mm in the fore wing and 6 mm in the hind wing, i.e. not less than 5 mm, and these measurements, according to BELYSHEV (1973), correspond to the subspecies *A. p. julius* Brauer, inhabiting the eastern part of the range of the species.

When visiting Lake Nizhniy Mukey on 2-VII-95 we also observed dragonflies of this family. We disturbed several very teneral individuals resting about 10 m from the water. In addition, a few dragonflies flew above the slope of a hill facing the southern bank of the lake, keeping to more or less individual areas. These dragonflies corresponded to *A. parthenope* in size, green colouration of the thorax sides and blue on the thorax dorsum at the wing bases. Unfortunately, we failed to catch specimens.

On 20-VII-1996 a just-emerged male specimen of this species was collected by V.A. Brinikh in the Alkhanay National Park on lakes near Eber-Alkhanay (150 km NW of Lake Nizhniy Mukey). This is a first specimen collected from Transbaikalia, providing evidence that this species not only occurs but also breeds in this territory.

GOMPHIDAE

**Ophiogomphus spinicornis* Selys, 1878

Material. – 1: 1 ♂, 1 ♀, 28-VI-1995; 1 ♀, 16-VIII-1996. – 2: 6 ♂, 4 ♀, 14-VII-1996; 1 ♂, 2 ♀, 5-

VIII-1996; 1 ♀, 10-VIII-1997. – 3: 1 ♀, 30-VI-1995; 5 ♂, 4 ♀, 5-VII-1995; 2 ♂, 17-VIII-1995; 3 ♂, 5 ♀, 2-VII-1996; 3 ♂, 15-VII-1996; 2 ♀, 31-VII-1996; 1 ♂, 18-VIII-1996; 1 ♂, 23-VIII-1996; 2 ♂, 16-VII-1997. – 5: 1 ♂, 18-VII-1997. – 6 (a floodland): 1 ♂, 1-VII-1995. – 1 ♂, 1 ♀, 18-VIII-1996. 6: 5 ♂, 7 ♀, 11-VII-1996 (Kosterin & Dubatolov leg.). (62)

Hitherto known from China (from Hopei in the South to Inner Mongolia in the North) and Mongolia (ASAHINA, 1979). For Russia it was mentioned only in Table I in BELYSHEV et al. (1989) from the East Asiatic (Amurian) Zoogeographic Subregion (including the Upper Amurland and Primorye), without textual references. This geographical attribution was in error (pers. comm. by S. Borisov). It was not mentioned in a later assessment of the fauna of this region (MALIKOVA, 1995). Noteworthy, it was reported from the adjacent territory of Inner Mongolia only for the basin of the Noini (Nunjian) River, a tributary of the Sungari River, i.e. at the eastern foot of the Great Hingan Mts. [Da Hinggan Ling], for the sites Yalaid Qi and Horquin Youyi Zhongqi, i.e. about 700 km SE of our territory (MA et al., 1991).

The species differs from the similar *O. cecilia* (Geoffroy in Fourcroy, 1785) in the male anal appendages (the upper ones being robust, curved inwards, 2/3 longer than the lower ones, see Fig. 4), in a more widely incised valvular vulvae in females (Fig. 2), and in a somewhat larger size (ASAHINA, 1979). By these characters it approaches to some extent to the Central Asian/Indian *O. reductus* Calvert, 1898. I found that dragonflies "combining characters of *O. serpentinus* and *O. reductus*," abundantly inhabiting the Tes-Khem River in South Tuva, mentioned in ZAIKA & KOSTERIN (1992), belonged in fact to *O. spinicornis*. BELYSHEV (1973) considered the taxa *cecilia*, *obscurus* Bartenev, 1930, *reductus*, and, presumably, *spinicornis* as subspecies of the same species *O. cecilia* while other authors provided convincing evidence that they are true species (BARTENEV, 1930; ASAHINA, 1979; HARITONOV & BORISOV, 1990). BELYSHEV (1973) noted that at Lake Gusinoe (not far from Lake Baikal) he met with "*cecilia, obscurus*, and individuals transitory between them". I failed to find these in the collection of Siberian Zoological Museum at the Institute of Systematics and Ecology of Animals, Novosibirsk, but found instead three doubtless specimens of *O. spinicornis* from the southern coast of Baikal: a male and female with the label "[Selenga River delta, Murdino]", 1-VII-1985 and 11-VII-1985, respectively (B.P. Zakharov leg.), and a male from Tankhoy village, 28-VII/3-VIII-1980 (A.V. Barkalov leg.). Thus, this Mongolian-Chinese species enters the territory of Russia in S Tuva, Buryat Republic at Baikal, and Transbaikalia following steppe landscapes of a Mongolian type (although the southern coast of Lake Baikal is covered with taiga). Noteworthy, when we visited the lowest Argun' River valley at the village Uryupino (easternmost Chita Province) in July/August 1997, which has quite woody landscapes, we found there only *O. obscurus*.

In addition, I examined two specimens from the the Baikal'sko-Stanovoe Upland (north-east of Baikal): a female from the Verkhnyaya Angara River (precise location, date and collector unknown) and a very similar female from the same region, collected by R. Dudko on 4-VIII-1995 in an alpine belt (!), at an elevation of 1600-1770 m, western part of the Verkhneangarskiy mountain range, 30 km NW of Kumora village. These two females can be reliably identified as *O. cecilia*. However, in this zone *O. obscurus*

would rather be expected. They have a light spot on the vertex and the face and thorax colouration and a relative distance between the horns identical to *O. cecilia* (BELYSHEV, 1930; HARITONOV & BORISOV, 1990), with the only deviation towards *obscurus* a somewhat more developed black colouration on the abdomen (it is such specimens that could have misled B.F. Belyshev). These females differ from *spinicornis* by a smaller size, less widely incised valvular vulvae, and slightly more developed black colouration on the abdomen and face. Further investigation of *Ophiogomphus* in North Transbaikalia, as well along the intricate zones of presumed contacts of the four palaearctic taxa is necessary to reveal their true ranges and relationships with each other.

This dragonfly is numerous along the Onon River and penetrates rather far into open parts of Tsasucheiskiy Bor, where they usually rest on sunny pine branches 1.5-2 m high, less frequently on the ground.

In 1995 teneral individuals appeared in late June. Numerous exuviae of this species were collected on 16-VII-97 near the water on a shingle left bank of the Onon River under the hill Malyy Batur, where the river undermines a rocky cliff. Several exuviae were found also on the right bank 12 km upstream of Nizhniy Tsasuchey, under a sandy-loam bluff. In both places the river has a powerful flow.

**Anisogomphus maacki* (Selys, 1872) (= *Gomphus m-flavum* (Selys, 1872)).

Material. – 1: 1 specimen photographed, 14-VII-1996. – 3: 1 ♀, 5-VII-1995 (O. Berezina leg.); 1 ♀, 30-VI-1996; 1 ♀, 16-VII-1996. – The Onon River right bank 1 km upstream of the bridge: 1 ♀ + several males visually, 18-VII-1997. – 6: 1 ♀, 11-VII-1996 (5).

In a specimen collected in 1995 the postclypeus has no yellow spots on its sides, being entirely black. Other specimens fit the description by NEEDHAM (1930) (as *Anisogomphus m-flavum*) and illustrations by ASAHINA (1979). The smaller yellow spots on the sides of postclypeus and widened black stripes on the frons were the main traits that caused Bartenev to describe a species *Temnogomphus amurensis* (Bartenev, 1930) from the Blagoveshchensk District as separate from "*T. m-flavum*" (BELYSHEV, 1973). It was later synonimized with *A. maacki* (ASAHINA, 1979).

The species was known from North and Central China, Korea, Japan, and the southern Amur Province (Amurland) (ASAHINA, 1979; MALIKOVA, 1993; 1995; 1997a). Our finding extends the known range of the species westward. The closest known locality is 700 km south-east, Yalaid Qi, the Noini (Nunjian) River basin, at the eastern foot of the Great Hingan Mts [Da Hinggan Ling], Inner Mongolia, reported together with *Ophiogomphus spinicornis* (MA et al., 1991). The type specimen of the species was labeled "Irkutsk," but this label indicates only the administrative centre of a vast territory. The real locality was certainly much further east.

Furthermore, on 30-VII-1997 a female of this species was caught by V. V. Dubatolov in the extreme east of Chita Province, in an open birch-larch forest with some Mongolian oak on a slope of a mountains on the Argun' River left bank 11 km S of the village Uryupino.

The absence of males in our collection is intriguing. Most probably this reflects the

behaviour of the species, as observed on the Onon River about 12 km upstream of Nizhniy Tsasuchey. In the evening of 18-VII-1997 and at about 11-12 h on 19-VII-1997, we saw several males (up to 4 simultaneously) flying low above the swiftly running water of the Onon and chasing one another upon meeting. One of them several times perched on a light-coloured rug put near the water and was very cautious. At sunrise of 18-VII--1997 we saw a female fly just above the water, collect something from the surface, and then perch on a shrub on the bank. Thus, males of this species seemed to spend most active time above the water, resting near it. Females spent more time over land but are also seen over water. I speculate that these dragonflies feed on insects floating on the surface, and their long, robust and spiny hind femora are specialized for collecting prey from the water. However, on 16-VII-1996 in a riparian part of Tsasucheiskiy Bor, I observed a female capturing a butterfly *Coenonympha amaryllis* (Stoll, 1782).

On 16-VII-1997 two exuviae were collected on the left bank of the Onon under the hill Malyy Batur among numerous exuviae of *O. spinicornis.*

Stylurus flavipes (Charpentier, 1825). New synonym: = *Gomphus flavipes sibiricus* (Bartenev, 1909)

GORB et al., 1996: *Gomphus flavipes sibirica* Bartenev

Material: 1: 2 ♂, 28-VI-1995. – 2: 1 ♂, 1 ♀, 14-VII-1996. – 3: 2 ♂, 1 ♀, 5-VII-1995; 2 ♂, 30-VI-1996; 1 ♀, 2-VII-1996; 1 ♀, 15-VII-1996; 1 ♂, 1 ♀, 19-VII-1997. – 6: 1 ♂, 5-VII-1995; 1 ♂, 1 ♀, 17-VIII-1995; 1 ♀, 22-VIII-1995; 1 ♂, 11-VII-1996. (18).

The abdomen length is 34-35 mm in males, 36 mm in females. There seem to be no reason to recognize subspecies *sibirica* [sic] Bartenev, 1909. In the original description, the black pattern of the pterothorax was mentioned as a diagnostic feature. However, this pattern is variable and BELYSHEV (1973) quite reasonably rejected its relevance and supported the subspecies based only on the abdomen being less than 36 mm, but that is surely not to be considered as a reasonable ground for subspecies separation. Among our material, the humeral and antehumeral black stripes are fused both at the anterior and posterior end in 10 specimens, only at the anterior end in 12 specimens, and not fused in 2 specimens

The species is common along the Onon River but is much less numerous than *O. spinicornis*. Imagines appear, as in *O. spinicornis*, in late June. On 16-VII-1997, an exuviae of *S. flavipes* was collected near the water on the shingle left bank of the Onon together with those of the other two gomphids present.

CORDULIIDAE

Epitheca bimaculata (Charpentier, 1825). New synonyms: = *Epitheca bimaculata sibirica* (Selys, 1887), = *Epitheca bimaculata altaica* Belyshev, 1951

Material. – 2: 1 ♀, 14-VII-1996. – 3: 1 ♂, 5-VII-1995; 1 ♂, 1 ♀, 2-VII-1996; 1 ♂, 1 ♀, 3-VII-1996; 1 ♀, 19-VII-1997. – 4: 1 ♀, 18-VI-1995; 1 ♂, 1 ♀, 29-VI-1995; 2 ♂, 30-VI-1995; 1 ♂, 1-VII-1996. – 5: 3 ♂, 2 ♀, 5-VII-1996. – 6 (Malyy Batyr hill): 1 ♂, 5-VII-1995. – 10: 1 ♀, 20-VI-1995; 1 ♀, 21-VI-1995. (21).

In all our specimens the length of the hind wing is 37-39 mm, that of the abdomen

(without the anal appendages) 34-39 mm. For both parametres, the value of 40 mm was considered pivotal by BELYSHEV (1973) in subspecies identification: in the nominal subspecies their values are over 40 mm, in the two Siberian ones less than 40 mm. In *E. b. altaica* Belyshev, 1951, the basal spot on the hind wings should reach the triangle or even occupy it, while in the East Siberian *E. b. sibirica* Selys, 1887, it does not reach the triangles. Belyshev believed that the latter ranged east of Baikal but not north of it, where the typical subspecies is distributed. Among our specimens, in 1 male and 1 female the spots occupy the entire triangle, in 1 female the spot reaches the middle of the triangle, in 1 male and 1 female the spot reaches the triangle and rests against its base, in 2 males and 1 female the basal spots just touch the triangle, and in 5 males and 2 females the spot somewhat does not reach the triangle. This variation in the development of basal spots and of the length of the hind wing and abdomen, so closely reaching the "critical value", invalidates the subspecies. I suggest synonymizing all three subspecies.

In the study region this is a common species (unlike, for instance, West Siberia) that also occurs far from water, in open stands of Tsasucheiskiy Bor and on the massif Adon-Chelon, where it keeps to the edges of dense birch and aspen groves, where up to several individuals could be seen simultaneously. The species was not met with at all in the depression of the Torey Lakes.

Somatochlora graeseri Selys, 1887

Material. – 1: 1 ♂, VII-1996 (L. Klochikhina leg.); 2: 1 ♀, 29-VI-1995. – 3: 1 ♂, 1-VII-1995; 1 ♀, 2-VII-1996. – 4: 1 ♂, 5-VII-1995 (5).

Although only five specimens were collected, in early July 1995 this species was common, together with *Epitheca bimaculata* but less frequent, in large glades and open tree stands in a pine forest. The dragonflies were in feeding flights, often very high. Also, the males were quite common on oxbows of the Onon right floodland, flying low above the water patrolling large individual areas along the banks. In 1996 the species was much less common.

Somatochlora exuberata Bartenev, 1910

Material:. – 1 ♀, 22-VIII-1996. – 6: 1 ♀, 11-VII-1996. (2).

The taxon *exuberata* had been described as a species but for a long time was considered by Russian authors (BELYSHEV, 1973; SPURIS, 1988) as a subspecies of *S. metallica* (Vander Linden, 1825). MALIKOVA (1995) again gave it species status, with the following features differentiating it from *S. metallica* (pers. comm.): two isolated yellow spots on the forehead except for a transverse yellow stripe (the main character), a dull bronze-green colouration instead of bright blue-green, and smaller size. In 2000 I found *S. metallica abocanica* Belyshev, 1955 and *S. exuberata* sympatric in the Todzha Hollow of Tyva Republic (the Yenisey River sources), showing distinct morphological and some ecological differences and hence confirming their status as separate species.

LIBELLULIDAE

Pantala flavescens (Fabricius, 1798)

Material. – 2: 1 ♂ (visually), 15-VII-1996; 1 ♀, 10-VIII-1997. – 5 (a dried up oxbow at the Onon River): 2 ♂, 1 ♀ (visually), 16-VII-1997. – 6: 3 ♂, 11-VII-1996. – 18: 1 ♀, 12-VII-1996. (5).

A circumtropical-subtropical species reaching Primorye and the former Central Asian Republics of the USSR (there is also a dubious record from Kamchatka [HAGEN, 1856]). In Transbaikalia it was reported from the village Pokrovka at the junction of the Shilka and Argun' Rivers (SELYS LONGCHAMPS, 1887). BELYSHEV (1973) doubted this report, thinking that this species cannot penetrate so far north at this longitude. On 11-VII-1996, I captured three males of this species 10 km west of Nizhniy Tsasuchey, slow and low flying above temporary pools formed on the left bank of the Onon River as a result of its high flood; on 15-VII-1996 a male was observed above a pool at the highway 5 km west of Nizhniy Tsasuchey; and on 12-VII-1996 a female was caught above a low ledge at the foot of the hill Chikhalan on the Lake Zun-Torey northern bank. On 19-VII-1997, a male and an ovipositing pair were observed above a dried-up temporary arm of the Onon right bank 13 km W of Nizhniy Tsasuchey. On 11-VIII-1997 a female was caught along the highway in Tsasucheiskiy Bor. In addition, on 24-VIII-1997 an individual was observed above the Gazimur River upstream of the settlement Gazimurskiy Zavod, i.e the eastern woody part of Chita Province. Thus, this species is indeed present in the Province.

In most cases it was found above temporary pools. It is noteworthy that BELYSHEV (1973) also wrote that "the species was observed by us repeatedly in the Monkhukhay River valley in the southern part of Primorye but always far from water bodies where it could breed". Since this dragonfly is famous for its powerful flight, they most probably are migrants from more southern regions. Another peculiarity of this species is an extremely rapid (55-100 days) larval development mostly in temporary rainpools (VAN DAMME & DUMONT, 1999). As a result, migrant species can breed and produce a next brood in zones where permanent populations are impossible due to low winter temperatures. In southern Transbaikalia temporary pools are noteworthy for the exceptional abundance of Notostraca, Anostraca, and Conchostraca, which can offer abundant food for larvae. However, they appear only in late June when the very dry spring ends. All specimens were observed in mid July and were obviously vagrants. Their progeny, if any, would hardly withstand the first frosts in late August.

Leucorrhinia rubicunda intermedia Bartenev, 1910

GORB et al., 1996: *Leucorrhinia intermedia* Bart.

Material. – 2: 2 ♂, 1 ♀, 30-VI-1995; 1 ♀, 30-VI-1996; 1 ♂, 1-VII-1996. – 5: 3 ♂, 4 ♀, 5-VII-1996; 2 ♂, 15-VII-1996; 1 ♀, 18-VII-1997. – 8: 1 ♂, 2 ♀, 26-VI-1995. – 10: 1 ♀, 19-VI-1995; 1 ♂, 21-VI-1995. – 19: 3 ♂, 4 ♀, 14-VI-1995; 1 ♂, 24-VI-1995. (28).

The differences by which BELYSHEV (1973) in his key distinguished *L. rubicunda* (occurring East to the Altai Mts.) from *L. intermedia* (occurring West to the Yenisey River basin and, again, Altai), seem vague: the presence of lateral carinae on the IV-VIII

abdominal segments in the former and on the (V) - VI -VII - (VIII) segments in the latter. Indeed, in our specimens these carinae are either not present or hardly noticeable on the VI-VII segments. Besides, Belyshev wrote: "anyway, it doesn't matter at all... either they are well differentiated subspecies or weakly formed close species with prevailing of only quantitative differences..." However, he then mentioned (but did not explain) some qualitative morphological differences most probably concerning the male secondary genitalia. E.I. Malikova (pers. comm.) considers the carinae as unreliable characters but the differences in the male genitalia as reliable. However, the shape of the hamules in Japanese specimens, considered as *intermedia*, resemble western *rubicunda* rather than Siberian *intermedia*, as was mentioned by BELYSHEV (1973) and shown in his figure. The solution for the problem should be sought in the zone of contact of *intermedia* and *rubicunda*. Considering the basis for species status of *intermedia* to be insufficient at present, I provisionally consider it as a subspecies of *rubicunda*.

This is a numerous spring species, flying up to mid-July (in 1996, it had already disappeared at this time, in contrast with *Libellula quadrimaculata*).

Libellula quadrimaculata orientalis Belyshev, 1956.

GORB et al., 1996.

Material. – 2: 1 ♀, 30-VI-1995. – 3: 1 ♂, 30-VI-1995; 1 ♂, 16-VII-1997. – 5: 1 ♂, 15-VII-1996; 1 ♂, 18-VII-1997. – 8: 2 ♂, 26-VI-1995. – 10: 1 ♀, 19-VI-1995; 1 ♀, 21-VI-1995. – 19: 1 ♂, 2 ♀, 14-VI-1995; 1 ♂, 24-VI-1995; 17: 1 ♀ (an aberrant individual, the nodal spots being much enlarged reaching the vein M and extending for 5 mm along the wings), 25-VI-1995. (14).

According to the characters enumerated by BELYSHEV (1956; 1973), I attribute our specimens to the eastern subspecies *L. q. orientalis* Belyshev, 1956. These include the prevailing yellow colour of the labrum and lobes of the labium and the light-coloured costal and subcostal veins. Only in 3 males and 3 females of our material does the costal vein become dark distal to the nodus. However, the characteristic presence of additional small yellow spots, besides the two large ones, on the rear of the head is seen in only 2 males, which have one tiny additional spot on either side, of 14 specimens: they have one tiny additional spot. BELYHSEV (1973) reported the eastern subspecies only from Primorye and wrote that in specimens from Khabarovsk "all the characters of the subspecies are already very obscured", but MALIKOVA (1995) reported it also for Amurland.

All our specimens lack basal spots on the forewings. In five specimens collected in 1995, that is on 14-VI at Kuku-Khadan (1 ♂, 2 ♀), on 19-VI and 21-VI on Adon-Chelon (2 ♀), and in a aberrant ♀ from Tsasucheiskiy Bor of 15-VI, the yellow colouration expands from the wing base along the costal margin of wings up to their apices. In other specimens it is present only at wing bases, not including the triangles.

This species, numerous up to mid July, prefers small water bodies and can be found on very small ones, for example, those on a pasture at the village Verkhniy Tsasuchey.

Sympetrum danae (Sulzer, 1776).

GORB et al., 1996: *S. d. matrix* Bartenef, 1915.

Material. – 2: 1 ♂, 22-VIII-1996; 2 ♂, 1 ♀, 10-VIII-1997. – 3: 1 ♂, 17-VIII-1995; 1 ♂, 4 ♀, 18-VIII-

1996. – 4: 1 ♀, 15-VII-1996. – 5: 1 ♀, 16-VII-1996; 4 ♀, 10-VIII-1997. – 11: 1 ♀, 24-VIII-1995. – 12: 2 ♂, 2 ♀, 24-VIII-1995. – 13: 1 ♀, 23-VIII-1995. – 17: 1 ♀, 19-VIII-1995. – 20: 1 ♀, 18-VII-1996; 1 ♀, 15-VIII-1996. – 21: 2 ♂, 18-VIII-1995. – 22: 1 ♂, 1 ♀, 24-VII-1996. – 25: 1 ♂, 1 ♀, 22-VII-1996. (31).

Three females have a smoky darkening at the nodus and pterostigma that was known as aberration *matrix* Bartenev, 1915 and characterizes specimens from Mongolia and adjacent regions (BELYSHEV & DOSHIDORZHI; 1958). BELYSHEV (1973) elevated it to subspecies *S. scoticum matrix* Bartenev, 1915. Eleven other females have no darkening such as this. So, either our region lies in a transition zone between subspecies or the subspecies *matrix* was wrongly based on environmental modification resulting from larval development at rather high temperatures (as ab. *praenubila* in *Libellula quadrimaculata*).

The species appears in mid June and is common, especially on temporarily inundated sedge tussock in floodland areas.

Sympetrum depressiusculum (Selys, 1841).

GORB et al., 1996.

Material. – 2: 1 ♂, 9-VIII-1997. – 19: visually 9-VIII-1997. (1).

Our specimen has yellow patches on the fore femora. BELYSHEV & DOSHIDORZHI (1960) found specimens with legs entirely black in Gobi-Altay Aimak of Mongolia and considered them as *S. frequens* Selys, 1883. However, they in fact were also *S. depressiusculum* since the true *S. frequens* is confined to Japan (INOUE & TANI, 2001) from where it just penetrates to the coasts of Primorye and Korea to probably hybridize with *S. depressiusculum* (INOUE et al., 2002).

The species was reported by GORB et al. (1996) for the Borokholoy Rivulet, and we collected one specimen in Tsasucheiskiy Bor. In addition, one specimen was observed on a rocky southern slope of the hill Kuku-Khadan. Most probably this is a rare species with a late flight period.

Sympetrum flaveolum (Linnaeus, 1758)

GORB et al., 1996.

Material. – 2: 1 ♂, 4 ♀, 10-VIII-1997. – 3: 1 ♂, 17-VIII-1995; 5 ♂, 2 ♀, 19-VII-1997. – 5: 2 ♂, 4 ♀, 15-VII-1996; 1 ♂, 1 ♀, 16-VII-1996; 1 ♂, 1 ♀, 18-VII-1997; 6 ♂, 1 ♀, 10-VIII-1997. – 10: 2 ♂, 1 ♀, 8-VII-1996; 5 ♂, 4 ♀, 9-VII-1996. – 12: 1 ♂, 24-VIII-1995. – 13: 3 ♀, 3-VII-1995. – 20: 2 ♀, 18-VII-1996. – "Torey Lakes": 1 ♂, 1 ♀; 13-VIII-1989. – 25: 1 ♀, 22-VII-1996. (51).

The species is famous for variation in wing colouration. Among the collected specimens, 41 correspond to forma *typica* (the females are *typica heterochroma*). In 2 males, the basal spots on the hind wings almost reach the nodes (this does not fit the aberrations as characterized by BELYSHEV [1973]), 2 females are ab. *flaveolata* Selys (with the yellow colouration extending almost halfway between the node and pterostigma), and 1 female is ab. *hyalinata* Rodz. (yellow spots absent).

This species, very common in Europe and West Siberia, is less numerous in Dauria. In the Onon valley it is most common on temporarily inundated sedge tussock floodland and on temporary river arms, which it prefers for breeding.

Sympetrum pedemontanum intermedium Belyshev, 1955.

GORB et al., 1996.

Material. – 1: 2 ♀, 16-VIII-1995; 2 ♀, 16-VIII-1996. – 3: 1 ♂, 1 ♀, 17-VIII-1995; 1 ♀, 31-VII-1996; 1 ♀, 18-VIII-1996; 1 ♀, 21-VIII-1996; 2 ♀, 23-VIII-1996; 1 ♂, 16-VII-1997, 1 ♀, 17-VII-1997, 1 ♀, 18-VII-1997; 4 ♂, 10-VIII-1997. – 4: 1 ♀, 22-VIII-1995. – 6: 1 ♂, 18-VIII-1996. – 11: 1 ♀, 24-VIII-1995. – 12: 2 ♂, 24-VIII-1995. – 19: 1 ♀, 21-VII-1995; 1 ♀, 9-VIII-1997. – 20: 1 ♀, 15-VIII-1996. (26).

As expected from the literature (BELYSHEV, 1973), our specimens correspond to *S. p. intermedium* (Mueller in Allioni, 1766), ranging from the Altay to Middle Amurland: the wing band is 4-5 mm wide along the costal margin, and it starts closer to the pterostigm than to the node and ends at the middle of the pterostigma.

Few specimens were seen in Tsasucheiskiy Bor, at the Torei Lakes and in the Onon floodland. It was found to be abundant on terraces of the right bank of the Onon River valley at temporary arms, stagnant and partly dried up almost throughout the year but nevertheless oligotrophic due to infiltration of cold ground water. They become current only during the summer flood. Such water bodies are preferred by *S. pedemontanum* all over Siberia (BELYSHEV, 1973).

Sympetrum vulgatum imitans (Selys, 1886)

GORB et al., 1996.

Material. – 2 ♂, 3 ♀, "Daurian Reserve", 1989 (collector unknown). – 1: 1 ♀, 16-VIII-1995; 2 ♀, 9-VIII-1997. – 2: 1 ♂, 2 ♀, 20-VII-1996; 1 ♂, 1 ♀, 29-VII-1996 (V. A. Brinikh leg.), 3 ♂, 3 ♀, 1-VIII-1996; 2 ♀, 22-VIII-1996; 2 ♂, 2 ♀, 20-VII-1997; 9 ♂, 4 ♀, 10-VIII-1997. – 3: 2 ♂, 4 ♀, 17-VIII-1995; 1 ♀, 15-VII-1996; 1 ♂, 16-VII-1997; 2 ♀, 17-VII-1997. – 4: 2 ♀, 22-VIII-1995. – 5: 1 ♀, 15-VII-1996; 1 ♀, 16-VII-1996; 2 ♀, 10-VIII-1997. – 6: 1 ♀, 11-VII-1996. – 10: 3 ♂, 1 ♀, 11-VIII-1995. – 13: 1 ♂, 3-VIII-1996. – Teli: 3 ♂, 3 ♀, 19-VIII-1995. – 19: 1 ♂, 3 ♀, 21-VII-1995. – 18: 1 ♂, 2 ♀, 12-VII-1996. – 20: 1 ♀, 15-VIII-1996. – "Southern end of Lake Zun-Torey": 1 ♂, 4 ♀; 9-VIII-1995. – 21: 1 ♂, 1 ♀, 17-VIII-1995. – "The road along the Torey Lakes": 4 ♂, 4 ♀, 12-VIII-1989. – "In a truck radiator, from Solovyovsk to Batukha" [i.e. shepherd Batukha's stand at Kuku-Khadan]: 10 ♂, 11 ♀, 14-VIII-1989. – 28: 1 ♀, 24-VII-1996. 22: 1 ♂, 24-VII-1996. – 25: 2 ♂, 1 ♀, 22-VII-1996. – 23: 1 ♂, 25-VII-1996. (111).

This taxon ranges across Transbaikalia, the Amur River basin, Primorye, and China (MALIKOVA, 1995). *S. imitans* (Selys, 1886) was described from a single female from Peking and then redescribed from both sexes from Pokrovka village at the junction of Shilka and Argun' Rivers (SELYS LONGCHAMPS, 1887). BARTENEV (1915) and later BELYSHEV (1973) and SPURIS (1988) considered it as a subspecies of *S. vulgatum* (Linnaeus, 1758), but MALIKOVA (1995) elevated it to species rank based on the absence of dorsal spines in the larva. Later it turned out that the number and expression of the dorsal spines varies greatly and continually in this taxon, up to their disappearance. This was shown by R. Seidenbusch (pers. comm., 1997) who examined a series of exuviae collected by O. Berezina in 1997 on a derelict mine on the Gazimurskiy mountain range between the villages Kurleya and Budyumkan, the eastern Chita Province, and by E.I. Malikova (pers. comm., 1998) on material from Amur Province. Thus, the reasons to consider *imitans* as a full species seem to have disappeared.

In our imagines the diagnostic features of the taxon are very well expressed, viz. a large size (the length of the abdomen is 27-30 mm, of the hind wing 31-34 mm) and, in females, presence of yellow colouration at the base and along the costal margin of the

wings, poorly expressed only in 6 of 34 studied females.

The most numerous and omnipresent dragonfly in Dauria.

DISCUSSION

DISTRIBUTION OF ODONATES ON WATER BODIES

The dragonfly community most rich in species was found in the Onon River valley (29 species), where only *A. parthenope* and *S. depressiusculum* of the entire fauna were not found. Only the three gomphid species are strict rheophilic. Among them *O. spinicornis* scatters rather far from the river to Tsasucheiskiy Bor pine forest up to 1-2 km away, *S. flavipes* is seldom seen in the forest, and *A. maacki* quite near the river, males flying above the surface or sitting near the water and only females being found 100-200 m away from the bank. The complete absence of representatives of the genus *Calopteryx* on the Onon River is worth mentioning (the closest records are at Baikal [BELYSHEV, 1973] and in the Darkhan Hollow in Mongolia [MALIKOVA, 1997b]). Other species are found on stagnant water bodies of the floodland, first of all of the right bank floodland upstream of the bridge embankment of the highway Nizhniy Tsasuchey - Aginskoe. These are eutrophic, shallow, and well-warmed oxbows that can become inundated by the Onon for a short time during highest floods. Most rich in dragonflies is Lake Kudon, situated near the terrace foot 12 km upstream of Nizhniy Tsasuchey. Imagines of one species, *S. pedemontanum*, were abundant on oligotrophic temporary arms of the Onon. Other dragonflies were scarce here. On the pasture in the Onon floodland at Verkhniy Tsasuchey there are small pools, some of which have abundant *Ceratophyllum*. Here, *S. paedisca* and *C. lunulatum* occurred in great numbers in June, with fewer *C. armatum*, *L. rubicunda*, *L. quadrimaculata*, and *Sympetrum* spp.

The Borzya River was examined only twice but supported a substantial diversity of damselflies: *S. paedisca, C. armatum, C. lunulatum, C. lanceolatum, C. ecornutum,* and *E. cyathigerum*.

On Lake Betevken. 8 species were found: *S. paedisca, C. armatum, C. ecornutum, C. lanceolatum, C. lunulatum, E. cyathigerum, L. rubicunda* , and *L. quadrimaculata.*

The fauna of the Torey Lakes is not especially rich, with 20 species known so far: *L. dryas, L. sponsa, S. paedisca, C. armatum, C. lunulatum, C. lanceolatum, C. ecornutum, E. najas* (quite surprising for a mineralized lake), *E. cyathigerum, I. elegans, A. serrata, A. mixta, P. flavescens, L. rubicunda , L. quadrimaculata, S. danae, S. vulgatum, S. depressiusculum, S. flaveolum,* and *S. pedemontanum*. Nevertheless, it is quite diverse in view of the lakes being both mineralized and cyclic, drying at intervals.

The presence of Odonata on Lake Nizhniy Mukey is very interesting. It has a salinity of 17 g/l but is fed also by freshwater springs (V. Obyazov, pers. comm.). The five dragonfly species encountered were *S. paedisca, C. ecornutum, C. lunulatum, E. cyathigerum,* and *A. parthenope*. Among them *E. cyathigerum* breeds here in great abundance, as proved by the presence of larvae and teneral specimens. Ability of this species

to breed in mineralized water was recognized by BELYSHEV (1973). Three teneral specimens of Aeshnidae (most probably *A. parthenope*) disturbed by us from the banks hatched certainly from this lake too.

Dragonflies reach the elevation of Adon-Chelon from distant water bodies, small steppe lakes and the Borzya River. They are abundant and rather diverse there (12 species, including *S. paedisca, C. armatum, C. lunulatum, C. lanceolatum, C. ecornutum, E. cyathigerum, A. mixta, E. bimaculata, L. rubicunda, L. quadrimaculata, S. flaveolum,* and *S. vulgatum*, more than were found in the same season on Lakes Betevken and Malyy Betevken). A prevalence of females in the material collected here can be noted, while in collections made at the water males predominate.

COMPARISON OF THE FAUNA OF THE DAURIAN RESERVE AND THE ONON RIVER VALLEY WITH THAT OF ADJACENT TERRITORIES

It is interesting to compare the fauna of the Daurian Reserve and the Onon River valley at Nizhniy Tsasuchey with the species composition of some adjacent regions. Table I contains the fauna of "the mountains of Transbaikalia" (i. e. the whole Transbaikalia except for its southernmost rather flat steppe regions) following HARITONOVA (1990), fauna of Mongolia (BELYSHEV & DOSHIDORZHI, 1958; 1960; BELYSHEV, 1961; KRYLOVA, 1974; BELYSHEV & HARITONOV, 1981; PETERS, 1981; FUKUI, 1995; MALIKOVA, 1997b) and the fauna (after MA et al., 1991) of the lowland part of Inner Mongolia (a province of China) adjacent to the Russian territory and bordered on the southeast by the Da-Hinggan-Ling Mts. It embraces the basins of Lake Dalainor (Hulunchi) and River Argun' (Hailar) and shares common environmental conditions with the Daurian Reserve (this territory is occupied with the Chinese nature reserve Dalainor).

In Table I, no subspecies are indicated, for Mongolia includes transitory zones still not studied for some of them. *Sympetrum vulgatum* is accepted in a broad sense, i.e. including the taxon *imitans*, the western limit of which crosses Mongolia but is not studied yet. *Leucorrhinia rubicunda* and *L. dubia* are also presented in a broad sense, that is including the taxa *intermedia* and *orientalis*, respectively (although for some reason, probably in error, both *dubia* and *orientalis* were reported for Transbaikalia [HARITONOVA, 1990]).

In the list of the mountains of Transbaikalia (HARITONOVA, 1990) I replace *Somatochlora metallica* with *S. exuberata*, and *Calopteryx virgo* (Linnaeus, 1758) with *C. japonica* Selys, 1869, as MIYAKAWA (1983) and MALIKOVA (1995) showed convincingly that *japonica* (which inhabits Transbaikalia) is not a subspecies of *C. virgo* but a clear-cut species. I also add *Ophiogomphus cecilia* (basing on the two females mentioned above). *Gomphus epophthalmus* (now considered as *Shaogomphus postocularis epophthalmus*) was also included in Haritonova's table, most probably in error, for no report or specimen of this species from that region is known, so I consider this record as dubious. I update the list with *Anax parthenope* due to the findings at Lake

Table I

Comparison of the odonate faunas of the Daurian Reserve (with surroundings), the adjacent regions of Inner Mongolia (China), "the mountains of Transbaikalia" (for explanation see text), and Mongolia

Species	Daurian Reserve	Adjacent regions of Inner Mongolia	Mountains of Transbaikalia	Mongolia
Calopteryx virgo (Linnaeus, 1758)				+
Calopteryx japonica Selys, 1869		+	+	
Calopteryx splendens (Harris, 1782)			+	+
Sympecma paedisca (Brauer, 1877)	+	+	+	+
Sympecma gobica Foerster, 1900				?
Lestes dryas Kirby, 1840	+		+	+
Lestes sponsa (Hansemann, 1823)	+	+	+	+
Lestes macrostigma Eversmann, 1836				+
Lestes barbarus (Fabricius, 1798)				+
Cercion v-nigrum (Needham, 1930)	+			
Cercion melanotum (Selys, 1876)		?		
Coenagrion armatum (Charpentier, *1840)*	+		+	+
Coenagrion glaciale (Selys, 1872)	+		+	
Coenagrion lunulatum (Charpentier, 1840)	+		+	+
Coenagrion lanceolatum (Selys, 1872)	+		+	+
Coenagrion puella (Linnaeus, 1758)				+
Coenagrion hylas (Trybom, 1889)			+	+
Coenagrion johanssoni (Wallengren, 1894)			+	+
Coenagrion ecornutum (Selys, 1872)	+		+	+
Erythromma najas (Hansemann, 1823)	+		+	+
Enallagma cyathigerum (Charpentier, 1840)	+	+	+	+
Ischnura elegans (Van der Linden, 1823)	+			+
Ischnura pumilio (Charpentier, 1825)				+
Ischnura senegalensis (Rambur, 1842)		+		
Aciagrion migratum (Selys, 1876)		+		
Nehalennia speciosa (Charpentier, 1840)			+	
Aeshna mixta Latreille, 1805	+			+
Aeshna affinis Van der Linden, 1825				+
Aeshna grandis (Linnaeus,1758)			+	+
Aeshna crenata Hagen, 1856	+		+	+
Aeshna serrata Hagen, 1856	+			+
Aeshna juncea (Linnaeus, 1758)	+		+	+
Aeshna subarctica Walker, 1908			+	
Aeshna caerulea Stroem, 1783			+	+
Anax parthenope Selys, 1839	+	+	+	+
Shaogomphus postocularis (Selys, 1869)			?	
Ophiogomphus obscurus Bartenev, 1909			+	
Ophiogomphus reductus Calvert, 1898				+
Ophiogomphus spinicornis Selys, 1878	+			+
Ophiogomphus cecilia (Fourcroy, 1758)			+	
Anisogomphus maacki (Selys, 1872)	+			

Table I, continued

Stylurus flavipes (Charpentier, 1825)	+			+
Nihonogomphus ruptus (Selys, 1857)			+	
Macromia amphigena Selys, 1871				+
Epitheca bimaculata Belyshev, 1951	+		+	
Somatochlora alpestris (Selys, 1840)			+	
Somatochlora arctica (Zetterstedt, 1865)			+	
Somatochlora sahlbergi Trybom, 1889			+	
Somatochlora graeseri Selys, 1887	+		+	+
Somatochlora metallica (Van der Linden, 1825)				+
Somatochlora exuberata Bartenev, 1910	+		+	
Cordulia aenea (Linnaeus, 1758)			+	
Pantala flavescens (Fabricius, 1798)	+			
Leucorrhinia rubicunda (Linnaeus, 1758) s. l.	+		+	+
Leucorrhinia dubia (Van der Linden, 1825) s. l.			+	+
Libellula quadrimaculata Linnaeus, 1758	+		+	+
Orthetrum cancellatum (Linnaeus, 1758)				+
Orthetrum albistylum (Selys, 1842)		+	+	
Orthetrum brunneum (Fonscolombe, 1837)				+
Sympetrum danae (Sulzer, 1776)	+	+	+	+
Sympetrum flaveolum (Linnaeus, 1758)	+		+	+
Sympetrum sanguineum (Mueller, 1764)				+
Sympetrum depressiusculum (Selys, 1883)	+	+	+	+
Sympetrum pedemontanum (Mueller in Allioni, 1766)	+	+	+	+
Sympetrum vulgatum (Linnaeus, 1758) s. l.	+	+	+	+
Sympetrum striolatum (Charpentier, 1840)				+
Sympetrum tibiale (Ris, 1897)				+
Sympetrum meridionale (Selys, 1841)				+
Sympetrum fonscolombii (Selys, 1840)				+

Gusinoe and Alkhanay (see above).

From the fauna of Mongolia I exclude *Enallagma strouhali* Quentin, 1962 (a synonym of *E. cyathigerum risi*), *Sympetrum frequens* Selys, 1883 (continental specimens belong in fact to *S. depressiusculum*) and *Aeshna lucia* Needham, 1930. ASAHINA (1988) believes that the latter is a synonym of *A. mixta:* the species was described from a single specimen with a black face. This main diagnostic feature might be either an anomaly or result from postmortem changes. It is on this feature that a cautious identification of a Mongolian specimen was based (BELYSHEV & DOSHIDORZHI, 1958). E.I. Malikova re-examined this specimen and found it to be *A. juncea* (pers. comm.). After BELYSHEV (1961), Russian sources, including Belyshev's, did not mention for Mongolia *A. mixta, Sympetrum meridionale* and *Somatochlora graeseri.* The first two were later reported by PETERS (1985), but mention of *S. graeseri* seems to have had no basis. However, I found it in Tuva on the very Mongolian border (ZAIKA & KOSTERIN, 1992), and the species must be present in Mongolia at least in the valleys of Onon and Tes-Khem. *Sympecma gobica* is included in table 6 in BELYSHEV & HAR-

ITONOV (1981) but absent from the text devoted to Mongolia. With no clear reports known, I consider its presence questionable. *Sympetrum sanguineum* was reported only in BELYSHEV & HARITONOV (1981), without any specimens and localities mentioned; its presence is, however, very probable. Included are *Calopteryx virgo* s.str. and *C. splendens* (Harris, 1782), which were discovered recently in the Darkhan Depression (MALIKOVA, 1997b), and *Ophiogomphus reductus* and *O. spinicornis*. "*Ophiogomphus cecilia reductus*" was mentioned by BELYSHEV & HARITONOV (1981) (for some reason it is absent from their list but mentioned in the text), but, as found out by KRYLOVA (1974), that communication was based on a report by K. Valle for "Khemchik", which presently is situated in Tuva Republic within Russia. Most probably it was in fact *O. spinicornis*. *O. spinicornis* was reported for Mongolia by Chao H.-f. (cited by ASAHINA, 1979), but I am not sure this did not refer to Inner Mongolia. However, I can confirm the presence of both species in Mongolia basing on photographs provided by R. Seidenbusch, of specimens collected in Mongolia by Prof. G. Peters and mentioned in PETERS (1985) as *Ophiogomphus cecilia*. The specimens from SW Mongolia (Bulgan, Dzhungarian Gobi) and W Mongolia (Uljastain-Go, Chovd gol tributary) are undoubtedly *O. reductus*, while the female from N Mongolia (Selenga, Ich-nul steppes) is *O. spinicornis*. Also, PETERS (1985) for the first time reported for Mongolia *Erythromma najas*, *Coenagrion puella* (Linnaeus, 1758), *Stylurus flavipes*, *Aeshna grandis* (Linnaeus, 1758), *Macromia amphigena fraenata* (as *M. sibirica* Djakonov, 1926; the synomymy was established by ASAHINA [1964] and MALIKOVA [1995]), *Libellula quadrimaculata*, *Leucorrhinia dubia orientalis* and *Somatochlora metallica*. The latter cannot be *S. exuberata*, as found in the westernmost Mongolia, at the western foot of Altay Mts. Lastly, FUKUI (1995) added for the Mongolian fauna *Coenagrion johanssoni* and *Aeshna caerulea*.

Since the book "The Grassland Insects of Inner Mongolia" (MA et al., 1991) is little known, I reproduce here its records for the above-mentioned territory adjacent to the Russian Transbaikalia steppe. In all, 14 species were reported, evidently a very incomplete list (their full list of species mentioned for the entire Inner Mongolia contains 33 species, of which many are Manchurian elements). *Lestes sponsa* is reported for Xin Barag Youqi, "*Sympycna paedisca annulata* Selys" for Xin Barag Zuoqi, Xin Barag Youqi, Ergun Zuoqi, "*Agrion virgo*" (most probably *Calopteryx japonica*) for Xin Barag Zuoqi, Chen Barag Qi, *Aciagrion hisopa* Selys (from geographical considerations it must have been *Aciagrion migratum*) for Xin Barag Zuoqi, Xin Barag Youqi, Chen Barag Qi, Ergun Zuoqi, "*Coenagrion sexlineatum* Selys" (now *Cercion melanotum*) for Ergun Zuoqi, *Enallagma cyathigerum* for Xin Barag Youqi, *Ischnura senegalensis* (Rambur) for Xin Barag Zuoqi, *Anax parthenope julius* Brauer for Xin Barag Youqi, *Orthetrum albistylum* for Xin Barag Youqi, *Sympetrum danae* for Chen Barag Qi, "*S. frequens*" (i. e. *S. depressiusculum*) for Xin Barag Zuoqi, Xin Barag Youqi, Chen Barag Qi, "*S. imitans*" for Xin Barag Zuoqi, Xin Barag Youqi, *S. pedemontanum* for Xin Barag Zuoqi, Chen Barag Qi. *Cercion melanotum* is included with "?" – since it is not excluded it was in fact *Cercion v-nigrum*. Identifications of *Aciagrion* and *I. senegalensis* could be

erroneous as well and require confirmation.

The four territories considered are very uneven in area, diversity of natural conditions, and depth of study. Surely, new entries will appear in all four columns with time. Which species are expected to be found in the Daurian Reserve and the Onon valley?

The dragonflies of "the mountains of Transbaikalia" (the mountainous regions of East Siberia east of Baikal) contain the following species not found by us (HARITONOVA, 1990): *Calopteryx japonica* (reported as *C. virgo*, see MALIKOVA, 1995), *C. splendens*, *Nehalennia speciosa*, *Coenagrion johanssoni*, *C. hylas*, *Aeshna grandis*, *A. caerulea*, *A. subarctica*, *Shaogomphus postocularis epophthalmus* (a doubtful report), *Nihonogomphus ruptus*, *Ophiogomphus obscurus*, *Somatochlora alpestris*, *S. arctica*, *S. sahlbergi*, *Cordulia aenea*, *Orthetrum albistylum*, *Leucorrhinia dubia* (reported both as *L. dubia* and *L. orientalis*). Some of these (*S. alpestris*, *S. sahlbergi*, and, to a lesser extent, *S. arctica*) are associated with highlands, they can hardly be found in the Daurian Reserve. *O. albystilum* is known in Siberia only from hot springs at the eastern bank of Lake Baikal (BELYSHEV, 1973) and the Chara Depression (BELYSHEV et al., 1978) but has been reported for a site in Inner Mongolia close to the Russian border (MA et al., 1991) and so is to be expected . Thanks to their wide ecological amplitude, we can expect *A. grandis* (if it occurs so far eastward), *C. aenea*, and even *N. speciosa*, although the latter species is local and rare. In the Onon valley, with tree vegetation, or at Lake Betevken in the Tsasucheiskiy Bor pine forest, one can expect *C. johannsoni*, *C. hylas*, *A. subarctica*, *A. caerulea* (not very probable), *C. aenea*, and *L. dubia orientalis*. (It should be noted that *C. johannsoni*, *C. aenea* and *L. dubia orientalis* were found by us on 17-VI-1995 and 6-VII-1995 on a small pool with boggy banks in an open larch/birch forest on pass the Mogoituiskiy range 100 km NW of Nizhniy Tsasuchey). The following rheophiles could inhabit the Onon River: *C. japonica*, *C. splendens*, *S. postocularis* (a species with a very local distribution), and *N. ruptus*; but not *O. obscurus*, which should be replaced by its close relative *O. spinicornis*. However, none of these was encountered in three seasons. On the map in BELYSHEV (1973), there is a point for *N. ruptus* on the Onon River just about Nizhniy Tsasuchey. I did not find the source of this record or proof of its preciseness, nor the species itself at Onon, while it was common in woody areas of the Argun' River lower reaches in the easternmost Transbaikalia. It seems to prefer forested areas.

Of species reported for Mongolia, future finding of *S. striolatum* and *S. meridionale* seems quite possible, the presence of *I. pumilio*, *M. amphigena*, *O. brunneum*, and *S. fonscolombiy* is questionable, since their range is insufficiently known, while other species not found in Dauria (*Lestes macrostigma*, *Coenagrion puella*, *Aeshna affinis*, *A. grandis*, *Ophiogomphus reductus*, *Orthetrum cancellatum*, *Sympetrum tibiale*, *S. sanguineum* are present only in West Mongolia. Of species reported for the above-mentioned part of Inner Mongolia (MA et al., 1991), *C. japonica*, *A. migratum C. melanotum*, *I. senegalensis*, and *O. albistylum* were not found in Dauria. It is hard to judge whether some of them can penetrate into this territory, and there is also doubt about the correctness of their identification.

It may be concluded from Table 1 that the fauna of the Daurian Reserve and surroundings of the village Nizhniy Tsasuchey resembles that of Mongolia without its westernmost part. Among dragonflies found on the Onon River and Torey Lakes there are some species not reported so far for the Mongolian Republic, namely, *Cercion v-nigrum, Coenagrion glaciale, Erythromma najas, Anisogomphus maacki, Epitheca bimaculata,* and *Pantala flavescens*. However, all these species must penetrate the north of this country along the Mongolian section of the Onon River. BELYSHEV & HARITONOV (1981) characterized the odonatofauna of East Mongolia as poor. They thought it lacks these species found in Dauria: *E. bimaculata, S. graeseri, C. lanceolatum,* and *C. glaciale*. Their inference would remain true if one includes the Onon basin in Dauria and considers as Mongolian the fauna of the endorheic steppe plains of Mongolia (in which the depression of Torey Lakes should also be included). Note that some species known from Mongolia only from the Altay Mts or the region of Lake Hubsugul should also be excluded from a "Mongolian fauna" per se.

It may be noted that the dragonfly fauna of the northern Ubsu-Nur Depression, situated in South Tuva, also at the Mongolian/Russian border but in its western part, resembles that of the Daurian Reserve and its environs (ZAIKA & KOSTERIN, 1992), although in the latter case fewer species are found, thanks to the major Onon river belonging to the Pacific basin. Among species collected in South Tuva only *Aeshna affinis* was not found in Dauria.

The following species were not reported for the mountains of Transbaikalia HARITONOVA (1990): *Cercion v-nigrum, Ischnura elegans, Aeshna mixta, A. serrata, Anax parthenope, Ophiogomphus spinicornis, Anisogomphus maacki, Stylurus flavipes,* and *Pantala flavescens*. To my mind, Transbaikalia cannot be naturally subdivided into lowland and mountainous parts (in large areas it is just a hilly country), so it would be better to speak about Transbaikalia in general, from which we now know as many as 49 species.

In Dauria, we found no representatives of the genera *Calopteryx* and *Orthetrum*, although both are present in Transbaikalia (HARITONOVA, 1990), Mongolia (BELYSHEV & HARITONOV, 1981), and Inner Mongolia (MA et al., 1991). The Onon River was investigated thoroughly, and the presence of some *Calopteryx* within the section studied is therefore unlikely. Some *Orthetrum*, as well as some other species, may be still found on some lakes of the Torey depression.

CONCLUSION

We collected 1298 specimens of 31 species of dragonflies and damseflies. The dragonfly fauna of the Daurskiy State Nature Reserve and its surroundings appears to be rich and interesting. Two Manchurian species, namely, *Cercion v-nigrum* and *Anisogomphus maacki*, penetrate here from the East (and we extend their known ranges to the west); the steppe species *Aeshna serrata* from the West, and *Ophiogomphus spinicornis, Anax parthenope, Pantala flavescens*, and *Sympetrum depressiusculum* from the South. *O.*

spinicornis is for the first time reliably recorded from the territory of Russia, and the presence in Transbaikalia of *Pantala flavescens* is confirmed. The Onon River valley exhibits the largest species richness, with water bodies of various types present besides the river valley itself, with its intrazonal biotopes. The river presents a channel through which a diverse dragonfly fauna penetrates into the steppe zone from the North-East.

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