

REVIEW OF THE ODONATA OF BELARUS

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The literature on the Belarusian Odonata is summarised and a checklist of 60 spp. is provided. The record of *Coenagrion mercuriale* is not accepted as it probably pertains to a misidentified larva. The occurrence of the listed spp. is specified for the 6 provinces of the state. The fauna contains 3 boreal elements, *Coenagrion johanssoni*, *Aeshna caerulea* and *A. crenata*. 14 spp. are listed as potential additions, some of these, almost exclusively southern spp., have been recorded so close to the border that their presence in Belarus is almost certain. Belarus is expected to be a stronghold for many spp., which are threatened in western Europe.

INTRODUCTION

Many odonate species that are on the fringe of their distribution in western Europe, range far to the East. Many are threatened in these fringes, but it is thought that important refugia are present in the centre of their ranges. Because of lower human densities, industry and agriculture have put less pressure on dragonfly populations in eastern Europe. The study of a species within its entire range does not only enhance insight into its status, but may also give valuable information as to its biogeography and ecology. This paper reviews the odonatological knowledge of Belarus. Although this is still limited, the country is likely to harbour valuable populations of Odonata.

THE COUNTRY AND ITS DRAGONFLY HABITATS

The Republic of Belarus, formerly known as Belorussia or Byelorussia, is a landlocked state in the West of the former Soviet Union (Fig. 1). Poland and Lithuania border it in the West, Latvia

pedemontanum.

In the nineties Belarus became increasingly accessible for western visitors. MAUERSBERGER (2000) visited the country in 1995 and 1996, adding two new species, *Aeshna crenata* and *A. subarctica*, and confirming the presence of *Coenagrion johanssoni*. KALKMAN & DIJKSTRA (2000) listed 31 species for Belavezhskaya National Park. During an investigation of Pripyat National Park in 1999, DIJKSTRA & KOESE (2001) added new localities for *Aeshna subarctica* and recorded *Lestes barbarus* and *Somatochlora arctica* for the first time since KIPENVARLIC (1933–1934). With the findings of SHESHURAK (1999) in 1997 and 1998, the fauna of this reserve was brought to 45 species. A case of predation by hornets on *Sympetrum* species was reported from this park by DIJKSTRA et al. (2001), while BUCZYŃSKI & MOROZ (2004) recorded the first Belarusian *Sympetrum depressiusculum* there in 2001 and confirmed the presence of *Aeshna affinis*.

Recent papers by Belarusian hydrobiologists on macrozoobenthos, mostly in protected areas, appeared about the Olmany wetlands in Polesia (MOROZ et al. 1999), lakes in the vicinity of Naroch (KARATAEV et al., 1999), running waters in the Naroch Lake drainage area (TISHCHIKOV & TISHCHIKOV, 2000), the upper and middle reaches of the Berezina River (TISHCHIKOV & TISHCHIKOV, 1999), springs in the Minskaya oblast (GOLLUBEV et al., 1999), Berezinsky Biosphere Reserve (BAICHOROV et al., 2002; MOROZ et al., 2001, in press b), “Sporovski” Reserve (MOROZ et al., 2002), “Prostyr” Reserve (MOROZ et al., 2003), and Pripyat National Park (MOROZ et al., in press a). These efforts produced two additions to the fauna: TISHCHIKOV & TISHCHIKOV (2000) recorded *Erythronma viridulum*, while MOROZ & LEVANDOVSKI (2001) found *Orthetrum brunneum* in the valley of the River Neman in 1998.

GURIN (2004) discussed 8 species in the second edition of the Belarusian Red Data Book of Animals: *Sympetma paedisca*, *Coenagrion armatum*, *Nehalennia speciosa*, *Aeshna viridis*, *Anax imperator*, *Ophiogomphus cecilia* and *Cordulegaster boltonii*.

RECORDED SPECIES

Table I lists all 60 species thus far recorded from Belarus with certainty and indicates the oblasts where they have been found. The Gomelskaya, Minskaya and Vitebskaya oblasts appear to be fairly well explored, each harbouring about fifty species. In recent years, especially the knowledge of the two southern provinces, the Brestskaya and Gomelskaya oblasts, has improved. Particularly the Grodnenskaya and Mogilevskaya oblasts require additional surveying.

The Belarusian fauna is largely composed of widespread Eurasian species. Three boreal elements, *Coenagrion johanssoni*, *Aeshna caerulea* and *A. crenata* occur in the North. The occurrence of *A. caerulea* in Gomelskaya oblast, indi-

cated by PISANENKO (1985) without further specification, needs to be verified, as it would constitute the southernmost lowland record of this species in Europe. *C. johanssoni*, *A. caerulea* and *A. crenata* are also found in Estonia and Latvia (SPURIS, 1980, 1996; BERNARD, 2003). The fraction of southern species in Belarus is very low, *Lestes barbarus* and *Anax imperator* are the most prominent representatives. This paucity can be explained by insufficient collecting and by the country's cold, continental climate. Nonetheless, it is expected that more southern species are still to turn up.

The presence of some species requires confirmation. DUNKE & SUSHKEVICH (1973) reported a larva of *Coenagrion mercuriale* from the lakes of “Cheresovo” (Vitebskaya oblast) but this record is not included in Table I as it is not credible because of habitat and locality. The nearest reported localities of this southern damselfly are situated ca. 800 km to the South and Southwest, in the southern regions of the Ukraine (GORB et al., 2000), Romania (CÎRDEI & BULIMAR, 1965) and Slovakia (STRAKA, 1990), but these too may represent misidentifications. The presence of *C. mercuriale* throughout eastern Europe requires confirmation. RADKEVICH (1957) listed *Coenagrion ornatum* from the Mogilevskaya and Vitebskaya oblasts without giving any locality details. SHESHURAK (1999) reported a single female from Pripyat National Park. The only record of this species in adjacent Poland is from the south-western part of the fairly well-studied Lublin province and is historical (BUCZYŃSKI, 1999; URBANSKI, 1948). The nearest Ukrainian localities are ca. 200 km South and Southeast of the border (GNELICYA & HROKALO, 1998; HROKALO, 2000; PAVLYUK, 1990), therefore its occurrence in Belarus would be surprising, especially so in the Vitebskaya oblast with its distinctly boreal conditions and fauna.

POTENTIAL ADDITIONS

It is likely that at least 70 species actually occur in Belarus. Table II lists fourteen potential candidates. Most of these are southern species. Many of them are known to be expanding their ranges or have been invasive in recent years. The majority has been recorded in the neighbouring parts of Poland and Ukraine. Some of them have been found so close to the border that their presence in Belarus is almost certain. Obviously, the region South of Brest has the greatest potential for finding them.

In Poland, *Lestes viridis*, *Sympetma fusca*, *Anax ephippiger*, *A. parthenope*, *Orthetrum albistylum*, *O. coerulescens*, *Sympetrum fonscolombii* and *S. striolatum* are known from the area between Lublin and the southwestern corner of Belarus (BUCZYŃSKI, 1997, 1999, 2000; BUCZYŃSKI et al., in press). *Crocothemis erythraea* and *O. albistylum* have been seen on the shores of Zbiornik Siemianowka, a barrage in the Narew River where it leaves Belarus (JÖDICKÉ, 1999; KALKMAN & DIJKSTRA, 2000). *S. fusca* and *S. meridionale* are known from

Table I

Checklist of the Odonata of Belarus. For each species the oblasts in which it has been recorded are given, based on PISANENKO (1985): "+". The oblasts are abbreviated as follows, Brest: Brestskaya Oblast, Gomel: Gomelskaya Oblast, Grodno: Grodnenskaya Oblast, Minsk: Minskaya Oblast, Mogil: Mogilevskaya Oblast, and Viteb: Vitebskaya Oblast. Additional oblast records are given only if this is new or if the species is considered scarce (i.e. has previously been reported for three or less oblasts). Sources overlooked by PISANENKO (1985) are a: FUDAKOWSKI (1932), b: KIPENVAR-LITS (1933-34), c: DRAKO (1956), d: DUNKE & SUSHKEVICH (1973). New records were obtained from e: PISANENKO (1993), f: MOLLER PILLOT (1997), g: KARATAEV et al. (1999), h: SHESHURAK (1999), i: TISHCHIKOV & TISHCHIKOV (1999), j: KALKMAN & DIKSTRA (2000), k: MAUERSBERGER (2000), l: TISHCHIKOV & TISHCHIKOV (2000), m: DIKSTRA et al. (2001), n: DIKSTRA & KOESE (2001), o: MOROZ et al. (2001), p: MOROZ & LEVANDOVSKI (2001), q: MOROZ et al. (2002), r: MOROZ et al. (2003), s: BUCZYŃSKI & MOROZ (2004), t: GURIN (2004), u: MOROZ et al. (in press a), v: MOROZ et al. (in press b), w: BUCZYŃSKI (unpublished records), x: MAUERSBERGER (unpublished records 1995 and 1996)

Species	Oblast					
	Brest	Gomel	Grodno	Minsk	Mogil	Viteb
Zygoptera						
Calopterygidae						
<i>Calopteryx splendens</i> (Harris, 1782)	+	+	+	+	+	+
<i>C. virgo</i> (Linnaeus, 1758)	+	+	+	+	+	+
Lestidae						
<i>Lestes barbarus</i> (Fabricius, 1798)		b n				
<i>L. dryas</i> Kirby, 1890	+	+	+	+	+	+
<i>L. sponsa</i> (Hansemann, 1823)	+	+	+	+	+	+
<i>L. viensis</i> (Charpentier, 1825)	a j	b h n s u		+	+	+
<i>Sympetma paedisca</i> (Brauer, 1877)	j x	n t x		+	+	+
Coenagrionidae						
<i>Coenagrion armatum</i> (Charpentier, 1840)	j t	c n t	+	+ g		+ d
<i>C. hastulatum</i> (Charpentier, 1825)	+	+	+	+	+	+
<i>C. johannsoni</i> (Wallengren, 1894)				+		+ k
<i>C. lunulatum</i> (Charpentier, 1840)	x	+	+	+ g		+
<i>C. ornatum</i> (Selys, 1850)		h				+
<i>C. puella</i> (Linnaeus, 1758)	+	+	+	+	+	+
<i>C. pulchellum</i> (Vander Linden, 1825)	j q x	+	+	+	+	+
<i>Enallagma cyathigerum</i> (Charpentier, 1840)	+	+	+	+	+	+
<i>Erythronma najas</i> (Hansemann, 1823)	+	+	+	+	+	+
<i>E. viridulum</i> (Charpentier, 1840)				l		
<i>Ischnura elegans</i> (Vander Linden, 1820)	+	+	+	+	+	+
<i>I. pumilio</i> (Charpentier, 1825)		n		+ g i l	i	i
<i>Nehalemia speciosa</i> (Charpentier, 1840)	q t	+ b n		+ t		+ k
<i>Pyrrhosoma nymphula</i> (Sulzer, 1776)	+	n	+	+	+	+
Platycnemididae						
<i>Platycnemis pennipes</i> (Pallas, 1771)	+	+	+	+	+	+

Table I, continued

Anisoptera						
Aeshnidae						
<i>Aeshna affinis</i> Vander Linden, 1820				+ s u		
<i>A. caerulea</i> Ström, 1783				+		+
<i>A. cyanea</i> (Müller, 1764)	+			+		+
<i>A. crenata</i> Hagen, 1856				+		+
<i>A. grandis</i> (Linnaeus, 1758)	+			+		+
<i>A. isocetes</i> (Müller, 1767)	x			+ h n u	p	+
<i>A. juncea</i> (Linnaeus, 1758)	+			+		+
<i>A. mixta</i> Latreille, 1805	j q			+ h n		+
<i>A. subarctica</i> Walker, 1908				n		k
<i>A. viridis</i> Eversmann, 1836	+			+		+
<i>Anax imperator</i> Leach, 1815				n u t		+
<i>Brachytron pratense</i> (Müller, 1764)	t x			+		+
Gomphidae						
<i>Gomphus flavipes</i> (Charpentier, 1825)	f w			+	p	+ i v
<i>G. vulgatissimus</i> (Linnaeus, 1758)	+			+	+	+
<i>Onychogomphus forcipatus</i> (Linnaeus, 1758)					+	+
<i>Ophiogomphus cecilia</i> (Fourcroy, 1785)	+			+	+	+ b
Cordulegastridae						
<i>Cordulegaster boltonii</i> (Donovan, 1807)				n		+ v t
Corduliidae						
<i>Cordulia aenea</i> (Linnaeus, 1758)	+			+	+	+
<i>Epiheba bimaculata</i> (Charpentier, 1825)	+			+	+	+
<i>Somatochlora arctica</i> (Zetterstedt, 1840)				n		b
<i>S. flavomaculata</i> (Vander Linden, 1825)	+			+	p	+
<i>S. metallica</i> (Vander Linden, 1825)	+			+	+	+
Libellulidae						
<i>Leucorrhinia albifrons</i> (Burmeister, 1839)				n u		+ k
<i>L. caudalis</i> (Charpentier, 1840)	j			+		+
<i>L. dubia</i> (Vander Linden, 1825)	+			+	+	+
<i>L. pectoralis</i> (Charpentier, 1825)	+			+	+	+
<i>L. rubicunda</i> (Linnaeus, 1758)	+			+	+	+
<i>Libellula depressa</i> Linnaeus, 1758	+			+	+	+
<i>L. fulva</i> Müller, 1764				+	+	+ b
<i>L. quadrimaculata</i> Linnaeus, 1758	+			+	+	+
<i>Orthetrum brunneum</i> (Fonscolombe, 1837)					p	
<i>O. cancellatum</i> (Linnaeus, 1758)	j			h n u		+ x
<i>Sympetrum danae</i> (Sulzer, 1776)	+			+	+	+
<i>S. depressiusculum</i> (Selys, 1841)				s u		
<i>S. flaveolum</i> (Linnaeus, 1758)	+			+	+	+
<i>S. pedemontanum</i> (Allioni, 1766)	q			+ h w	e	+ v x
<i>S. sanguineum</i> (Müller, 1764)	a j q	b h m n s u		+ p		+ o
<i>S. vulgatum</i> (Linnaeus, 1758)	+	+		+	+	+

the Polish part of Puszcza Białowieska, a nature reserve extending on both sides of the border (KALKMAN & DIJKSTRA, 2000; THEUERKAUF & ROUYS, 2001). *A. ephippiger* and *O. albistylum* were recorded near Białystok (BURBACH, 1995; JÖDICKÉ, 1999). Remarkable is the record of *A. parthenope* near Suwalki in the extreme northeastern corner of Poland (SUMIŃSKI, 1924, 1925). The species was also recorded in this region in 2000, as was *Lestes viridis* (BUCZYŃSKI et al., 2001). Larvae of *O. albistylum*, *S. fonscolombii* and possibly *S. meridionale* and *S. striolatum* have been found at extremely northerly localities (almost 54°N) in the Mazurian Lake District in northeastern Poland (BUCZYŃSKI & PAKULNICKA, 2000).

Orthetrum albistylum is known from the northwestern corner of Ukraine, only a few kilometres South of the Belarussian border (PAVLYUK, 1979), and there are about 30 records of the species from the border region in total (BUCZYŃSKI et al. 2002). GORB et al. (2000) list two further localities of *Sympetrum striolatum* in northern Ukraine, in the Volynska and Charnihivska oblasts. SHESHURAK

Table II

Potential additions for the dragonfly fauna of Belarus. — For each species the approximate distance (d) in kilometres to the nearest foreign locality and the source of this record is given. The presence of each species is indicated for the adjacent parts of Ukraine (Ukr), Poland (Pol), Lithuania (Lit) and Latvia (Lat), as well as for Estonia (Est)

Species	d	Source	Ukr	Pol	Lit	Lat	Est
<i>Lestes macrostigma</i> (Eversmann, 1836)	50	SHESHURAK & PADALKO, 1996	+				
<i>L. viridis</i> (Vander Linden, 1825)	3	BUCZYŃSKI et al., (in press)	+	+			
<i>Sympetma fusca</i> (Vander Linden, 1820)	1	KALKMAN & DIJKSTRA, 2000	+	+			
<i>Coenagrion scitulum</i> (Rambur, 1842)	50	SHESHURAK & PADALKO, 1996	+				
<i>Aeshna serrata</i> Hagen, 1856	50	SHESHURAK & PADALKO, 1996	+	+			
<i>Anax ephippiger</i> (Burmeister, 1839)	20	BURBACH, 1995	+	+			+
<i>A. parthenope</i> (Selys, 1839)	15	BUCZYŃSKI, unpubl. data	+	+			
<i>Crocothemis erythraea</i> (Brullé, 1832)	2	KALKMAN & DIJKSTRA, 2000	+				
<i>Orthetrum albistylum</i> (Selys, 1848)	3	BUCZYŃSKI, unpubl. data	+	+			
<i>O. coerulescens</i> (Fabricius, 1798)	15	BUCZYŃSKI, 2000	+	+			+
<i>Sympetrum eroticum</i> (Selys, 1883)	30	STANIONYTE, 1989					+
<i>S. fonscolombii</i> (Selys, 1840)	20	BUCZYŃSKI, 2002	+	+			+
<i>S. meridionale</i> (Selys, 1841)	20	THEUERKAUF & ROUYS, 2001	+	+			+
<i>S. striolatum</i> (Charpentier, 1840)	25	BUCZYŃSKI, 1999(2000)	+	+			+

& PADALKO (1996) reported a very rich fauna (60 species), with many southern species, in the Chernigov region Northeast of Kiev and only 50 km South of Belarus. Their list includes *Lestes macrostigma*, *L. viridis*, *Coenagrion scitulum*, *Aeshna serrata*, *Anax parthenope*, *Sympetrum fonscolombii* and *S. meridionale*. Some of these records are very surprising and therefore require confirmation. *A. serrata*, for example, is known from southern Sweden, southern Finland, Estonia and further East. In the West of its range it appears to be restricted to somewhat brackish (and therefore generally coastal), reedy lakes (PETERS, 1988). Being landlocked, Belarus lacks such habitats, but with *Aeshna serrata* occurring inland further east and following the unexpected discovery of *Aeshna crenata* in Belarus (which has a similar distribution, although a different habitat) the species should be watched for.

STANIONYTE (1989) reported *Sympetrum eroticum* from Lithuania. This discovery is extremely surprising, as the species is otherwise known to be restricted to eastern Asia (BELYSHHEY, 1973). One can only speculate about the origin of the specimen, but if the species would occur in Lithuania, it might just as well appear in Belarus.

CONSERVATION

The relatively undisturbed character of the Belarussian landscape implicates a high conservation responsibility for the country. The value of Belarus' reserves for threatened insects, including dragonflies, was recognised by SHESHURAK & MISAN (1999). Many species that are under threat in western Europe are common and widespread in Belarus. Examples are *Coenagrion armatum*, *C. hastulatum*, *Aeshna viridis*, *Brachytron pratense*, *Gomphus flavipes*, *Ophiogomphus cecilia*, *Epiheca bimaculata*, *Somatochlora flavomaculata* and *Leucorrhinia pectoralis*. It is likely that Belarus holds important populations of such endangered species as *Nehalennia speciosa*, *Somatochlora arctica*, *Leucorrhinia albifrons* and *L. caudalis*. Only few of these species are included in the national Red Book (GURIN, 2004). Based on the limited knowledge of the Belarussian fauna, the selection of threatened species seems rather haphazard and subjective, although the second edition of the Red Book is better in this respect than the first (PISANENKO, 1993). Nonetheless, the compilers appear to have seen no imminent concern for many of these internationally vulnerable species. Recent surveys have indeed indicated that strongholds for species endangered throughout Europe exist in Belarus (DIJKSTRA & KOESE, 2001; KALKMAN & DIJKSTRA, 2000).

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* Most of the references were published in languages using the Cyrillic alphabet. The authors have attempted to transliterate these into Latin script. Personal names were not transliterated if stated in the summary. An additional difficulty are the presence of Russian, Belarussian and Ukrainian texts, in which names of persons and localities can have different spellings. Along with the original title, its translation is provided in the language of the summary (given after a slash) or in English (between square brackets). If not in a congress language, the language of the publication is also stated.

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