

New records of *Coenagrion ornatum* in the Czech Republic (Odonata: Coenagrionidae)

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Abstract

The distribution of *Coenagrion ornatum* in the Czech Republic is far more extensive than considered up to 2009. Before 2009 only one recent population from the Piletický brook watershed and five historical records from Bohemia and Moravia were known. In 2009 twenty-five new localities with *Coenagrion ornatum* were discovered. These localities are distributed in northern, central and eastern Bohemia. The new *Coenagrion ornatum* localities are situated mostly in open farmland or mining areas at altitudes below 280 m a.s.l. *Coenagrion ornatum* prefers sunny parts of brooks and amelioration ditches with lush littoral vegetation (e.g. *Sparganium erectum*, *Veronica beccabunga*, *Potamogeton* spp., *Berula erecta*). However, it also occurs along degraded and regulated sections of the streams where the vegetation is dominated by *Phalaris arundinacea* and *Urtica dioica*.

Zusammenfassung

Neue Nachweise von *Coenagrion ornatum* in der Tschechischen Republik (Odonata: Coenagrionidae) – Die Vogel-Azurjungfer *C. ornatum* ist in der Tschechischen Republik sehr viel weiter verbreitet als bisher angenommen. Vor 2009 waren nur fünf historische Nachweise aus Böhmen und Mähren und ein aktuelles Vorkommen in dem Einzugsgebiet des Baches Piletický bei Hradec Kralové bekannt. Im Jahr 2009 wurden 25 neue Lokalitäten mit Vorkommen von *C. ornatum* festgestellt. Diese Fundorte befinden sich auf 13 Meßtischblättern (MTB) in Nord-, Mittel- und Ostböhmen. Die neu entdeckten Lokalitäten liegen meist in Höhen bis zu 280 m ü.M an besonnten Abschnitten von Bächen und Meliorationsgräben in landwirtschaftlich oder bergbaulich geprägten Landschaften. *Coenagrion ornatum* bevorzugt Abschnitte mit reicher Vegetation, v.a. *Sparganium erectum*, *Veronica beccabunga*, *Potamogeton* spp. und *Berula erecta*. Allerdings kommt *C. ornatum* auch in begrädeten und ausgebauten Abschnitten von Fließgewässern vor, deren Vegetation von *Phalaris arundinacea* und *Urtica dioica* dominiert wird.

Souhrn

Nové nálezy *Coenagrion ornatum* v České republice (Odonata: Coenagrionidae) – Rozšíření šidélka ozdobného *C. ornatum* je v České republice výrazně širší, než se dříve soudilo. Do roku 2009 byl znám výskyt z pěti historických nálezů z Čech i Moravy a jedna recentní populace v povodí Piletického potoka u Hradce Králové. V roce 2009 bylo objeveno 25 lokalit s výskytem *C. ornatum* ležících v 13 čtvercích síťového mapování v severních, středních a východních Čechách. Nově objevené lokality leží většinou v nadmořské výšce do 280 m na nezastíněných úsecích potoků a melioračních kanálů v nelesní zemědělské, popř. hornické krajině. *Coenagrion ornatum* upřednostňuje úseky toků s pestrout litorální vegetací (*Sparganium erectum*, *Veronica becabunga*, *Potamogeton* spp., *Berula erecta*). Vyskytuje se ale i na degradovaných úsecích, které byly často dříve regulovány, s dominantní vegetací *Phalaris arundinacea* a *Urtica dioica*.

Introduction

The Ornate Bluet *Coenagrion ornatum* is a Ponto-Mediterranean species with the distribution centred in southeastern Europe and southwestern Asia. Its range reaches to Germany, France and Poland (DIJKSTRA 2006). This species is confined to smaller running waters such as rivulets, brooks, pond outlets and amelioration ditches in sunny, unshaded open landscape. In the Czech Republic, typical streambed substrates are fine sands with a certain calcareous proportion and mud, sometimes even clay silt with some detritus. The geological subsoils are at least partially calcareous sediments (marlstone). The flow speed reaches only lower values, mostly 1-10 cm·s⁻¹ (DOLNÝ 2007).

The species is listed in the Appendix II of the Directive No. 92/43/EHS on the Conservation of Natural Habitats and of Wild Fauna and Flora, known as the European Union Habitats Directive (FFH-Richtlinie). In the Czech Republic one habitat of European importance ("NATURA 2000" locality) for this species has been proclaimed: the Piletický and Librantický Brooks.

The occurrence of *C. ornatum* in the Czech Republic has been known from a very limited number of localities and the knowledge has been based especially on historical data. In Bohemia it was found in the area surrounding the towns of Mladá Vožice and Písek more than a hundred years ago (KREJČÍ 1890). In Moravia it was found in Brno-Černovice (CZIŽEK 1901), in the Přerov region (SLAVÍČEK 1930) and the Osoblaha region (TEYROVSKÝ 1965). From the 1960s till the early 2000s there was no record of this species in the Czech Republic.

In 2003 a viable population of *C. ornatum* was found in the Hradec Králové region, which comprises the city of Hradec Králové and the villages of Bukovina, Divec, Librantice, Piletice, and Rusek (grid No. 5761. The regular localities belong to the watershed of the Piletický Brook and its tributaries, with the exception of a coincidental in-flight detected in the natural monument 'Na Plachtě' (grid No. 5861) in 2001 (MIKÁT & ČÍP 2004; MOCEK et al. 2006; DOLNÝ 2007).

The aim of this study is to present new surprising findings of *C. ornatum* in the Czech Republic. We would also like to point out that even in an odonatologically relatively well-researched area there are Odonata species that still may have been evading our attention. It may be expected that other *C. ornatum* localities within the Czech Republic are awaiting future surveys.

Methods

The following data was recorded: adults, epigamic behavior (copulation, oviposition, presence of juveniles) and exuviae. Flying or resting damselflies were captured with an entomological net while walking along or in the stream. In other cases, the damselflies were only observed without being caught. Captured individuals were determined at the site and released again. While looking for flying damselflies, we also looked for exuviae.

The survey was conducted at 85 stream sections that had been selected in advance (Fig. 5). The selection was based on either aerial photographs or detailed maps of northwestern, central and eastern Bohemia. The study area is circumscribed by the towns of Chomutov, Ústí nad Labem, Litoměřice, Mělník, Brandýs nad Labem, Neratovice, Slaný and Louny. A smaller separate area is situated northeast of the city of Hradec Králové, between the towns of Turnov and Mnichovo Hradiště and also the towns of Jablonné v Podještědí and Mimoň. The research took place in 2009 during the period in which the species was on the wing (25-v-2009 – 02-vii-2009). The data is completed with several still unpublished records from 2007 and 2008. This data concerns grid No. 5761 only.

The survey was conducted during suitable weather – sunny days with temperatures ranging from 23 to 30°C (a random visit to the locality No. 17 was an exception – it was cloudy with fine rain), there was no or light wind only. However, no special attention was paid to the wind speed as the streams are situated in lees.

During the flight season most of the localities were visited once. Only localities with previous records of *Coenagrion ornatum* in the years 2006 to 2008 (grid No. 5761) were visited repeatedly. In October 2009 and May 2010 larvae were searched at localities No. 5, 21, 22 and 23. A kitchen sieve was used for raking stream bed and submerged vegetation during searches for larvae.

For the mapping of localities, the ordnance survey map (BUCHAR 1982) – a grid map that corresponds to the MTB (Messtischblatt) system used in Germany – was used.

Results

In 2009 *Coenagrion ornatum* (Fig. 1) was found at 31 localities. These were situated along the tributaries of the rivers Bílina, Ohře and Labe (river Elbe) in northwestern, central and eastern Bohemia (Tab. 1).

Table 1. Localities in Czech Republic with new records of *Coenagrion ornatum*. – Tabelle 1. Gewässer in der Tschechischen Republik mit neuen Nachweisen von *Coenagrion ornatum*. Observer, Beobachter: MW Martin Waldhauser, MM Michael Mikát, PM Patrick Marek; MTB ordnance survey map grid, Messtischblatt; la larvae, Larven; ad adults, Adulti; cop copula, Paarungsrad; tan tandem, Tandem; ovi oviposition, Eiablage; imm immatures included, einschließlich immaturer Tiere.

Other Odonata species, andere Libellenarten: *Acyra Aeshna cyanea*, Aimp *Anax imperator*, Cpue *Coenagrion puella*, Cpul *C. pulchellum*, Cspl *Calopteryx splendens*, Cvir *C. virgo*, Ecy *Enallagma cyathigerum*, Enaj *Erythromma najas*, Evir *E. viridulum*, Iele *Ischnura elegans*, Ipum *I. pumilio*, Ldep *Libellula depressa*, Lqua *L. quadrimaculata*, Lspon *Lestes sponsa*, Ocec *Ophiogomphus cecilia*, Oalb *Orthetrum albistylum*, Obru *O. brunneum*, Ocan *O. cancellatum*, Ocoe *O. coerulescens*, Pnym *Pyrrhosoma nymphula*, Ppen *Platycnemis pennipes*, Sfus *Sympecma fusca*, Smet *Somatochlora metallica*, Sfon *Sympetrum fons-colombii*, Ssan *S. sanguineum*.

No.	MTB	Locality (observer)	observations of <i>C. ornatum</i>
length	altitude	GPS coordinates	
	a.s.l		
Characterisation of waterbody			other Odonata species
1	5448	pond inlet at the mining dump of Radovesice, village of Razice (MW)	
50 m	375 m	50°31'48.107"N, 13°49'42.104"E	25-v-2009: 7♂1♀, cop
ditch stabilized with gabions, dominance of <i>Typha latifolia</i> and <i>Phalaris arundinacea</i>			Cpue, Iele, Ipum, Ldep, Lqua, Pnym, Ocan, Sfus
2	5449	right tributary of the Syčivka brook W of the village of Štěpánov at the mining dump of Radovesice (MW)	
100 m	380 m	50°31'52.233"N, 13°51'24.508"E	17-vi-2009: 1♂
amelioration ditch, dominance of <i>Typha angustifolia</i>			Cpue, Iele, Ipum
3	5450	Modla brook by the bridge on the D8 motorway, town of Lovosice (MW)	
30 m	155 m	50°30'11.279"N, 14°3'7.055"E	17-vi-2009: 8♂
dominance of <i>Phragmites australis</i> , <i>Urtica dioica</i> , no macrophytes, water pH (08-i-2010): 8.4 at water temperature of 0.1°C			Cpue, Cspl
4	5547	Srpina brook between Okořín and Strupčice (MW)	
50 m	265 m	50°28'22.611"N, 13°30'40.641"E	13-vi-2009: 1♂
30 cm narrow stream shaded by a high stand of <i>P. australis</i> and <i>P. arundinacea</i>			Cpue
5	5547	Srpina brook by the bridge on the Hošnice – Strupčice road (MW; Fig. 2)	
100 m	260 m	50°27'26.631"N, 13°32'24.292"E	13-vi-2009, 100 ad, 20 tan, ovi
brook stabilized with concrete tiles, bed of fine mud, dominance of <i>Mentha</i> sp., water pH (08-i-2010): 8.3 at water temperature of 0.1°C			Cpue, Pnym
6	5547	Srpina brook by the bridge on the Hošnice – Malé Březno road (MW)	
20 m	260 m	50°27'24.575"N, 13°32'51.388"E	13-vi-2009: 4♂
brook with concrete tiles, partially shaded, bed of fine mud, <i>Potamogeton crispus</i>			Cpue, Pnym

No.	MTB	Locality (observer)	observations of <i>C. ornatum</i>
length	altitude a.s.l	GPS coordinates	other Odonata species
Characterisation of waterbody			
7	5547	Srpina brook under the village of Havraň (MW)	
30 m	230 m	50°27'18.214"N, 13°36'27.402"E	13-vi-2009: 4♂1♀
70 cm wide brook, 15 cm deep, no aquatic macrophytes, dense vegetation of <i>U. dioica</i> and <i>P. australis</i> with some sunny patches			Cpue, Cspl, Ecyia
8	5548	Srpina brook, village of Stránc (MW)	
50 m	210 m	50°28'0.656"N, 13°41'17.46"E	17-vi-2009: 5♂
3 m wide brook			Cspl, Cvir, Iele, Ocec, Sfus
9	5548	Lužický brook by the bridge on the Sedlec – Svinčice road (MW)	
50 m	215 m	50°29'41.996"N, 13°43'52.866"E	17-vi-2009: 1♂
30 cm narrow stream shaded by high stand of <i>P. australis</i> and <i>P. arundinacea</i>			
10	5548	Zaječický brook between the railway and the confluence with the Srpina brook, Zaječice (MW)	
50 m	215 m	50°28'39.263"N, 13°41'43.093"E	17-vi-2009: 13 ad, 7♂, 3 tan
30 cm wide, 15 cm deep, not shaded, dominance of <i>Carex</i> sp. and <i>U. dioica</i>			Cvir, Iele, Ppen
11	5549	Rosovka brook NW of the village of Lkáň (MW)	
30 m	215 m	50°26'42.085"N, 13°57'18.291"E	17-vi-2009: 15 ad, 3 tan
50 cm wide brook, 15 cm deep, no macrophytes, not shaded			Cpue, Ipum
12	5549	Rosovka brook at the village green of Lkáň (MW)	
30 m	210 m	50°26'35.162"N, 13°58'17.054"E	17-vi-2009: 1♂1♀
stream bed tiled with basalt, almost without any vegetation, only sporadic tufts of <i>Menta</i> sp. and <i>Rumex</i> sp.			Cpue
13	5549	Žejdlík brook, village of Solany (MW)	
20 m	220 m	50°26'50.827"N, 13°56'46.052"E	17-vi-2009: 1♂
30 cm wide brook, 15 cm deep, not shaded, dominance of <i>P. arundinacea</i> and <i>U. dioica</i>			
14	5549	Solanský brook tributary, village of Solany (MW)	
50 m	220 m	50°26'56.05"N, 13°56'0.958"E	17-vi-2009: 15 ad, 4 tan
30 cm wide brook, 15 cm deep, not shaded, dominance of <i>P. arundinacea</i> and <i>U. dioica</i>			
15	5550	Rosovka brook below the pond by the Slatina – Libochovice road (MW)	
50 m	170 m	50°25'19.798"N, 14°2'28.432"E	20-vi-2009: 10 ad, 1 cop
50 cm wide brook, 15 cm deep, partially shaded by bushes, no aquatic macrophytes, dominance of <i>P. arundinacea</i>			Aimp, Cspl, Iele, Ldep, Ppen, Sfus
16	5550	Modla brook, village of Čížkovice (MW)	
50 m	165 m	50°28'36.78"N, 14°2'22.673"E	17-vi-2009: 1♂
partially shaded stream, rather overgrown by trees and bushes			
17	5551	Čepel brook, town of Roudnice nad Labem (MW)	
100 m	180 m	50°24'35.147"N, 14°15'27.551"E	19-vi-2009: 2♂
70 cm wide brook, 25 cm deep, not shaded, no aquatic macrophytes, dominance of <i>P. australis</i>			

No.	MTB	Locality (observer)	observations of <i>C. ornatum</i>
length	altitude a.s.l	GPS coordinates	other Odonata species
Characterisation of waterbody			
18	5551	Čepel brook, village of Doksany (MW; Fig. 1)	
100 m	155 m	50°27'2.295"N, 14°10'6.19"E	25-vi-2009: 20 ad, 4 tan, ovi
1 m wide brook, 20 cm deep, hard bed tiled with rocks, dominance of <i>Potamogeton</i> sp. and <i>P. arundinacea</i>			Cspl, Iele, Ppen
19	5661	Smržovský brook, village of Jesenná (MM)	
100 m	265 m	50°18'23.644"N, 15°58'51.994"E	02-vii-2009: 1♂1♀
50 cm wide brook, 10 – 30 cm deep, dominance of <i>Sparganium erectum</i> , <i>Arrhenatherum elatius</i> and <i>Veronica beccabunga</i>			Cspl, Ldep, Pnym
20	5662	Jesenná brook, village of Jesenná (MM; Fig. 4)	
100 m	280 m	50°18'7.841"N, 16°0'34.364"E	02-vii-2009: 2♂
1.5 m wide brook, 10-20 cm deep, almost still, varied and well structured vegetation covers 50% of the stream bed, dominance of <i>Mentha</i> sp., <i>T. latifolia</i> , <i>Lemna minor</i> , <i>Berula erecta</i> , <i>V. beccabunga</i> , <i>Juncus inflexus</i> and <i>Carex</i> sp.			Cpue, Ipum, Pnym
21	5752	Černavka brook, village of Chlumín (MW)	
20 m	165 m	50°17'2.567"N, 14°26'47.926"E	25-vi-2009: 2♂
60 cm wide brook, 20 cm deep, eutrophic, no aquatic macrophytes, dominance of <i>P. australis</i> and <i>U. dioica</i> , water pH (15-x-2009): 8.2 at water temperature of 4.5°C.			Ppen
22	5753	stream Tuhaňská strouha, village of Větrušice (MW)	
20 m	160 m	50°17'56.673"N, 14°30'20.606"E	25-vi-2009: 2♂
1.2 m wide brook, 50 cm deep, macrophytes: <i>Calitriche</i> sp., <i>Potamogeton</i> sp., fine mud, banks: <i>U. dioica</i> , <i>T. latifolia</i> , water pH (15-x-2009): 7.6 at water temperature of 5.5°C.			Cpue, Cpul, Cspl, Iele, Ocan, Pnym, Ppen, Smet, Ssan
23	5753	Hlavenský brook, village of Dřísý (MW)	
20 m	170 m	50°14'38.561"N, 14°38'58.624"E	01-vii-2009: 15♂ 02-v-2010: 25 la
1.5 m wide brook, 25 cm deep, sandy bed, dominance of <i>Cardamine amara</i> and <i>L. minor</i> , water pH (15-x-2009): 7.9 at water temperature of 5.5°C.			Acya, Cpue, Cspl, Cvir, Iele, Ocoe, Ppen
24	5761	nameless tributary of the Librantický brook, villages of Librantice/Divec (MM; Fig. 3)	
300 m	255 m	50°14'31.51"N 15°56'21.32"E	19-vii-2007: 1♂ 09-vi-2008: 3♂3♀, imm 22-vi-2008: 2♂1♀ 02-vi-2009: 1♂
50 cm wide stream, 5-20 cm deep, partially dried up, not shaded, most of the stream bed covered with littoral vegetation, occasional 1 m stretches without vegetation, dominance of <i>P. arundinacea</i>			Aimp, Ecya, Iele, Ipum, Lspo, Ldep, Ocan, Pnym

No.	MTB	Locality (observer)	length altitude a.s.l	GPS coordinates	observations of <i>C. ornatum</i>	other Odonata species
25	5761	nameless tributary of the Librantický brook, villages of Divec/Černilov (MM)	300 m	250 m	50°14'34.72"N 15°56'34.03"E	09-vi-2008: 2♂, imm 22-vi-2008: 1♂
50 cm wide stream, 10-20 cm deep, not shaded, overgrown with <i>P. arundinacea</i>					Aimp, Cpue, Ecy, Iele, Ldep, Oalb, Ocan, Pnym, Sfon	
26	5761	nameless tributary of the Librantický Brook, village of Černilov (MM)	200 m	260 m	50°15'9.754"N 15°55'46.216"E	19-vi-2008: 2♂1♀
50 cm wide stream, 0-15 cm deep, only separate puddles, dominance of <i>Glyceria fluitans</i> , <i>Lycopus euopaeus</i> , <i>U. dioica</i> , <i>P. arundinacea</i> , <i>Carex</i> sp. and <i>V. beccabunga</i>					Iele, Ipum, Ldep	
27	5761	Librantický brook, village of Černilov (MM, MW, PM)	250 m	250 m	50°14'44.49"N 15°56'35.13"E	19-vi-2007: 2♂ (MM) 09-vi-2008: 8♂2♀ (MM) 15-vi-2008: 1♂ (PM) 17-vi-2008: 30 ad (PM) 22-vi-2008: 16♂ (MM) 29-vi-2008: 40 ad (MW) 02-vii-2009: 1♂ (MM)
50-100 cm wide stream, 15-50cm deep, vegetation covered 70% of the stream bed, dominance of <i>P. arundinacea</i>					Aimp, Cpue, Cspl, Cvir, Ecy, Enaj, Evir, Iele, Ipum, Ldep, Lqua, Lspo, Obru, Ocan, Ppen, Pnym, Smet	
28	5761	Librantický brook, village of Černilov (MM)	250 m	250 m	50°14'40.667"N 15°56'22.912"E	25-vi-2009: 6♂, imm 09-vi-2008: 4♂ 19-vi-2007: 3♂3♀
50-100 cm wide stream, 30-50 cm deep, vegetation covered 90% of the stream bed, dominance of <i>P. arundinacea</i> and <i>U. dioica</i>					Cpue, Cspl, Cvir, Ecy, Evir, Iele, Ipum, Lspo, Ldep, Ocan, Oco, Pnym, Ppen, Sfon, Ssan	
29	5761	Librantický brook, village of Librantice (MM)	100 m	270 m	50°14'15.136"N 15°58'39.369"E	09-vi-2008: 1♀, imm
0-15 cm deep, separate puddles, dominance of <i>P. arundinacea</i> , <i>P. australis</i> , <i>Equisetum</i> sp. and <i>J. inflexus</i>					Pnym	
30	5761	nameless tributary of the Malostranský brook, village of Libřice (MM)	100 m	250 m	50°17'2.029"N 15°57'15.493"E	29-vi-2009: 5♂1♀
50 cm wide brook, 10-30 cm deep, vegetation covered 75% of the stream bed, dominance of <i>P. arundinacea</i> , <i>U. dioica</i> and <i>V. beccabunga</i>					Cpue, Cspl, Ldep, Pnym	
31	5762	Hařský brook, town of České Meziříčí (MM)	100 m	255 m	50°17'28.366"N, 16°0'51.9"E	02-vii-2009: 2♂
50 cm wide stream, 10-30 cm deep, vegetation covered 70% of the stream bed, dominance of <i>P. australis</i> , <i>B. erecta</i> , <i>Filipendula ulmaria</i> , <i>L. minor</i> and <i>V. beccabunga</i>					Cpue, Iele, Pnym	

The *C. ornatum* localities were situated in open, historically deforested landscape. It was either farmland or landscape modified by mining activities like mining dumps, or streams dislocated to the edges of mining areas. Most of the localities were situated at altitudes below 280 m above sea level, the altitudinal maximum was at 380 m a.s.l. at the Radovesice mining dump on the northern slope of the České středohoří Mts.

Coenagrion ornatum inhabited mostly upper reaches of brooks, ditches, amelioration ditches, pond inlets or outlets (Figs 2-4). The stream width usually ranged from 30 to 100 cm, the depth from 10 to 30 cm. The habitats were not overshadowed by tall continuous vegetation like trees, shrubs or continuous tall herb vegetation such as reed. At least part of the water surface was sun-exposed most of the day. Typical bed substrates were fine clay sediments, only exceptionally sand (Hlavenský brook west of Brandýs nad Labem). Water pH values ranged from 7.6 to 8.6, according to either our own measurements or data accessible from the IS Arrow (ČHMÚ 2010).

At the sites with *C. ornatum* populations other Odonata species occurred only sporadically. *Coenagrion ornatum* was often dominant or the only species at the locality. Together with *C. ornatum* the following species were found most fre-



Figure 1: *Coenagrion ornatum* tandem, Čepel brook, village of Doksany, Czech Republic (25-vi-2009). – Abbildung 1: Tandem von *Coenagrion ornatum* am Čepel-Bach bei Doksany, Tschechische Republik (25.06.2009). Photo: MW

quently: *Calopteryx splendens*, *Ischnura elegans*, *Pyrrhosoma nymphula*, *Coenagrion puella* and *Platycnemis pennipes*. Other species were much less common. Larvae were found only at the locality No. 23. They were present within a surface layer of detritus among vegetable remains, approximately 5 cm below the water level.

Negative findings: *Coenagrion ornatum* was not recorded at 54 localities where the survey was also targeted at this particular species. Out of these, two localities on the Piletický brook – Piletice/Rusek and Rusek/Bukovina – are special cases: the species was detected here from 2003 to 2006 (MOCEK et al. 2006). From 2007 to 2009 an intensive monitoring was conducted here, however, during that time *C. ornatum* was not found.

Discussion

Distribution

Before 2009, *Coenagrion ornatum* was ever recorded in seven grids in the Czech Republic (DOLNÝ 2007) with only one stable recent population in the Hradec Králové region (MOCEK et al. 2006, MIKÁT 2009). *Coenagrion ornatum* has been



Figure 2: Srpina brook by the bridge on the Hošnice-Strupčice road, Czech Republic, the locality with the highest recorded abundance of *Coenagrion ornatum* during this study (13-vi-2009). – Abbildung 2: Srpina-Bach zwischen Hošnice und Strupčice, Tschechische Republik, der Fundort mit der höchsten nachgewiesenen Abundanz von *Coenagrion ornatum* in dieser Arbeit (13.06.2009). Photo: MW



Figure 3: Librantický brook, between the villages of Librantice and Divec, Czech Republic, habitat of *Coenagrion ornatum* (09-vi-2008). – Abbildung 3: Librantický-Bach zwischen Librantice und Divec, Tschechische Republik, Habitat von *Coenagrion ornatum* (09.06.2008). Photo: MM



Figure 4: Jesenná brook, village of Jesenná, Czech Republic, habitat of *Coenagrion ornatum* (02-vii-2009). – Abbildung 4: Jesenná-Bach bei Jesenná, Tschechische Republik, Habitat von *Coenagrion ornatum* (02.07.2009). Photo: MM

newly found in 13 grids. The larvae were recorded in the country for the first time. Including historical sites, its distribution now covers 20 grids within the Czech Republic (Fig. 6). The new localities are situated mostly at altitudes below 280 m a.s.l. An occurrence above 400 m a.s.l. is known only from historical data (KREJČÍ 1890).

It is obvious that the species has been overlooked in the Czech Republic for a long time. There are two most likely reasons for this: (a) *C. ornatum* is a very inconspicuous species and looks very similar to other damselfly species; (b) *C. ornatum* prefers habitats which, from an odonatological point of view, can be considered rather charmless, viz upper reaches of lowland brooks mostly in mining or agricultural landscape. Even the habitats themselves are inconspicuous at first sight. Therefore, the species could have been missed as odonatologists usually direct their attention to stagnant waters or streams with more natural looking and attractive surroundings.

The new *C. ornatum* localities are situated near an imaginary line that links current localities in southeastern Poland (MICHALCZUK 2007; BERNARD et al. 2009; MICHALCZUK et al. 2009; MICHALCZUK & BUCZYŃSKI 2010) and Germany – Saxony-Anhalt, Thuringia and Saxony (BUTTSTEDT & ZIMMERMANN 1999; ZIMMERMANN & BUTTSTEDT 2003; BROCKHAUS 2005; BURBACH & ELLWANGER 2006; SCHMIDT et

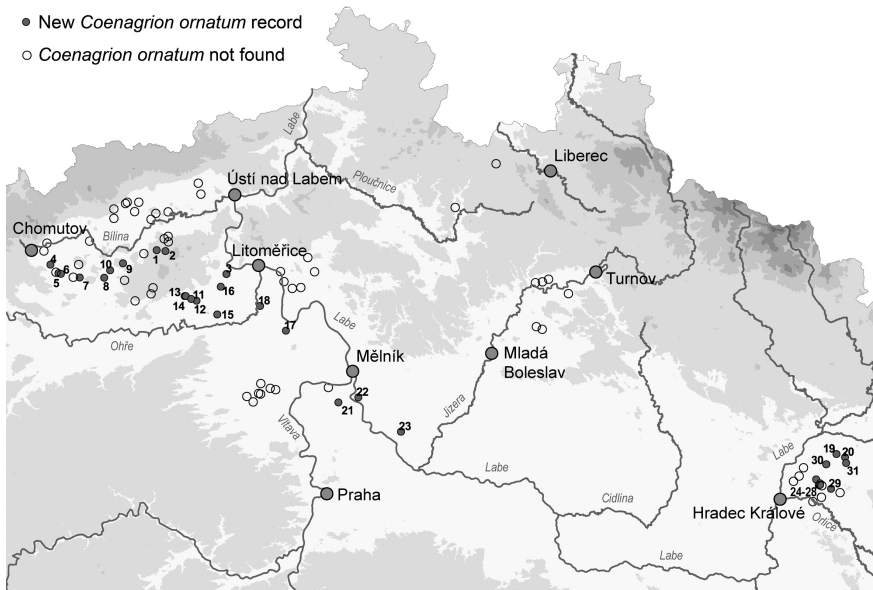


Figure 5: Map of the Czech Republic with the *Coenagrion ornatum* records presented in this study. – Abbildung 5: Karte der Tschechischen Republik mit den aktuellen Fundorten von *Coenagrion ornatum*.

al. 2008). These Polish and German localities are situated at the northern border of the species' range (DIJKSTRA 2006). In other neighbouring countries the species occurs in Austria (HÖTTINGER 2006; RAAB et al. 2006), in the southern half of Slovakia including borderline regions (ŠÁCHA & ŠÍBL 1999; BULÁNKOVÁ & DAVID 2003; ŠÁCHA 2009; ŠÁCHA et al. 2009) and in Bavaria (BURBACH et al. 1996; BURBACH & KÖNIGSDORFER 1998; MESSLINGER & FALTIN 2003).

Habitats

Most of the newly discovered localities may be characterized as regulated streams in open farmland. This fact corresponds with the character of current localities in neighbouring countries such as Slovakia (ŠÁCHA & ŠÍBL 1999; BULÁNKOVÁ & DAVID 2003), Austria (HÖTTINGER 2006) and Poland (MICHALCZUK & BUCZYŃSKI 2010). In Saxony and Bavaria the localities are mainly characterized as meadow ditches. Another suitable habitat for *C. ornatum* currently described in Central Europe is an outlet ditch of the spring peat bog of carbonate character (STERNBERG 1999; MICHALCZUK 2007; MICHALCZUK et al. 2009; ŠÁCHA 2009). Similar habitat – a calcareous fen – is rare in the Czech Republic and such a locality was not found in the study area. However, an occurrence of *C. ornatum* in coal mining dumps as recorded during our study has not been published yet.

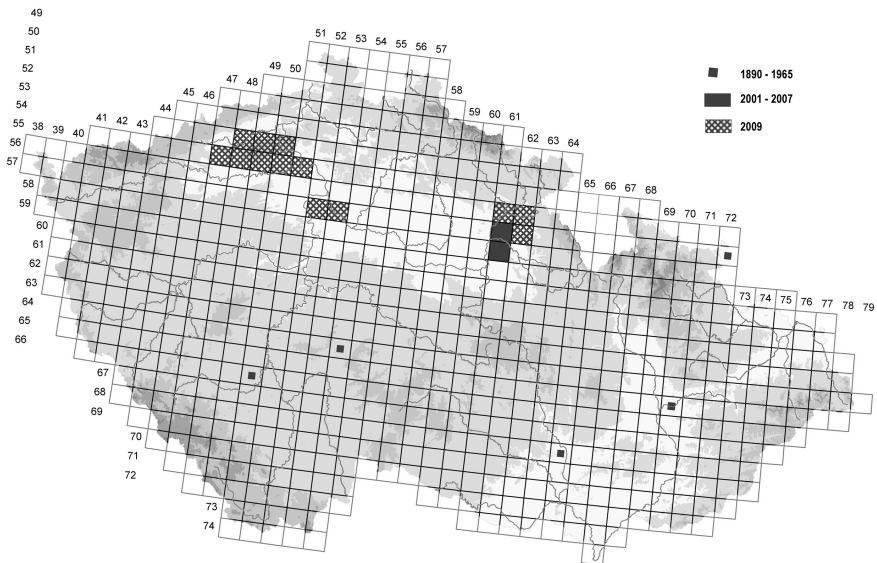


Figure 6: Map of the Czech Republic, grids with historical and recent records of *Coenagrion ornatum*. – Abbildung 6: Karte der Tschechischen Republik. Dargestellt sind die Quadranten mit früheren und aktuellen Vorkommen von *Coenagrion ornatum*.

Physical and chemical water characteristics

BERNARD (2004) summarizes important ecological requirements of *C. ornatum* in Poland, as do BURBACH et al. (1996) and BURBACH & ELLWANGER (2006) for Germany. These summaries note especially relatively high water temperatures during the whole year. As for the new localities in the Czech Republic, they are situated in lowlands in the warmest parts of the country. The streams are sun-exposed, shallow and slow, and get warm very fast. Hence, we may presume that this condition of high water temperature is accomplished for all new localities. We did not measure the water temperature, however, concrete data may be acquired from the IS Arrow (ČHMÚ 2010). Water pH shows alkaline values in accordance with previously published data, e.g. BURBACH et al. (1996), STERNBERG (1999), SCHMIDT et al. (2008) and MICHALCZUK & BUCZYŃSKI (2010).

Vegetation

From our findings it may be concluded that *C. ornatum* prefers stream sections with diverse littoral vegetation including e.g. *Sparganium erectum*, *Mentha* sp., *Veronica beccabunga* and *Berula erecta*. The presence of submerged vegetation such as *Potamogeton crispus* makes the habitats even more *C. ornatum* -friendly as higher abundance of the species or egg-laying were recorded there. However, the commitment to well-preserved stream sections is probably not strict, as the species was recorded – though in lower numbers or only individuals – within degraded localities with dominant *Phalaris arundinacea* and *Urtica dioica* or even at almost naked artificially stabilized streambeds inside villages. SCHMIDT et al. (2008) also mention the presence of ruderal vegetation like *U. dioica* or *Galium aparine* at the *C. ornatum* localities.

SCHMIDT et al. (2008) found a significant negative influence of streams overgrown with *Phragmites australis* on *C. ornatum* occurrence. We did not find *C. ornatum* at the most degraded localities overgrown with continuous stand of *P. australis* either. Therefore we believe that streams overgrown with *P. australis* are probably much worse for *C. ornatum* than those overgrown with other tall grasses like *P. arundinacea* or *Glyceria maxima*.

Except for the dominance of *P. australis*, other reasons for negative findings were probably locality characteristics and not corresponding with the species requirements such as stream speed, bed substrate or degree of shading. In some cases the reasons for the absence of the species were not apparent.

Endangerment and Conservation

According to the Red List of Threatened Species in the Czech Republic (HANEL et al. 2005) and also according to DOLNÝ (2007), *C. ornatum* is classified as a critically endangered species. However, this evaluation is based on the data available before 2009. In the European context, the species is labeled as receding, especially as a result of recession of suitable habitats (SAHLÉN et al. 2004). In the European Red List of Dragonflies (KALKMAN et al. 2010) *C. ornatum* is classified as «Near Threatened».

According to our field surveys, we can describe the degradation of the habitats as the biggest threat for *C. ornatum* populations. Possible degradation of a suitable stream consists mainly of overgrowing with *P. arundinacea* and especially *P. australis*, or invasive neophytes, or trees and shrubs. This is a result of eutrophication or inconvenient management of the localities. Other important risks also come from stream regulations, bed-stabilizing measures and intense bed scouring accompanied by significant change in vegetation and hydrological conditions.

Indeed, detailed mapping of the *C. ornatum* distribution is essential for effective preservation. We may consider taking some steps in management of the perspective stream sections in order to support *C. ornatum* populations. In particular: (a) Avoiding planting trees on the banks or cutting out the trees growing on the banks; (b) mosaic cutting of the vegetation growing in the stream bed resulting in lower coverage of less suitable vegetation – *P. australis* and *P. arundinacea* – and enabling alternation of more dense and thin types of vegetation. Suggested management steps are described in detail by MIKÁT (2009).

As almost all the presented data was acquired during a single season, we need to await further research for a more general discussion concerning e.g. prospective influence of the new records on changing the category of *C. ornatum* in the Red List of dragonflies in the Czech Republic.

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