

## The *Orthetrum coerulescens* complex in Bulgaria (Odonata: Libellulidae)

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### Abstract

Although there are many records of *Orthetrum coerulescens* in Bulgaria, the presence of the nominotypical subspecies is doubtful. A critical analysis of all specimens available revealed that they belong either to *O. c. anceps* or to intermediate forms, but not to *O. c. coerulescens*. The latter taxon is therefore omitted from the Bulgarian species list, bringing the number of recorded species to 66.

### Introduction

In the dragonfly fauna of Bulgaria (Beshovski 1994) *Orthetrum coerulescens* (Fabricius) as well as *O. anceps* (Schneider) are listed. *O. coerulescens* has been reported from Bulgaria as an imago (Beshovski 1964a; 1965) and as a larva (Beshovski, 1964b; 1968). Further records of this species are given by Klapalek (1894), Petkov (1921), Nedelkov (1923), and Donath (1987), but without stating whether they referred to larvae or adults. *O. anceps* has been recorded from Bulgaria by Mauersberger (1985, 1990, 1994) and Beutler (1987).

In the light of new taxonomic considerations *O. coerulescens* and *O. anceps* are considered to be closely related taxa within the so-called *coerulescens* complex. Mauersberger (1994) has published a thorough revision of both taxa. He shows that *coerulescens* and *anceps* are conspecific, but well differentiated at the subspecies level. He also demonstrates on basis of the morphology of the lamina anterior that there is a broad transition zone with intermediate forms where the ranges of *coerulescens* and *anceps* overlap. Klingenberg & Martens (1995) have also treated the taxonomic relationship within the *O. coerulescens* complex. They describe an intermediate form recorded in southern Spain. The Balkans are known as the eastern zone where the ranges of both taxa overlap (Bartenev 1930). It can therefore be expected that intermediate forms will be found in Bulgaria too. If we accept the phenotype 4, as defined by Mauersberger (1994) and reported by him from Bulgaria, as intermediate between *coerulescens* and *anceps*, this is indeed the first published confirmation of the presence of intermediate forms in this country.

Many other adult specimens were recently analysed by me, and the results are given here. The present paper summarizes the information about the occurrence of the *O. coerulescens* complex in Bulgaria.

### Material and methods

A total of 61 male specimens of the *Orthetrum coerulescens* complex available at the Institute of Zoology; National Museum of Natural History; Biological Department of the Sofia University and Forestry University, Sofia, and in the author's collection were checked. The material of Klapalek (1894), Nedelkov (1923), Beshovski (1964a, 1965) and Donath (1987) was not available for re-examination. As currently no reliable feature for larval determination is available (Gerken & Sternberg 1999 vs Butler 1992, 1993), Beshovski's (1964b; 1968) larval material is not included in this study either. The material is deposited in the author's collection (no. 1-17), in the Institute of Zoology (no. 18-34), in the Forestry Institute (no. 35), in the Biological Department of Sofia University (no. 36-58), and in the National Museum of Natural History (no. 59-61).

I reviewed the literature concerning species distribution within the current Bulgarian borders and compared it with available material and with the description of the five phenological types given by Mauersberger (1994). For differentiation between both taxa, I used the shape of the lamina anterior in the male as the key feature (Mauersberger 1994; Klingenberg & Martens 1995). Each specimen examined is shown here as an individual drawing of its lamina anterior. An UTM-grid map was used to represent the distribution of the different phenotypes in Bulgaria.

### Results

All specimens listed by Petkov (1921) as *Orthetrum coerulescens* turned out to be *O. brunneum* (Fonscolombe), and were eliminated from the analysis.

In the others, the structure of the lamina anterior showed a tendency towards an upright projection in its upper part. Its apex was never swollen, but pointed and turned upwards (sometime slightly backwards), i.e. it invariably showed the triangular form typical of *O. anceps* to at least a certain degree. A separation between typical *anceps* and intermediate forms was necessarily somewhat arbitrary because the shape of the lamina varied significantly among the individuals checked. Those individuals with a wide lamina anterior, slightly rounded in its very apical part (Fig. 1), were identified as intermediate form. I found 22 such specimens. The phenotype 1 of nominotypical *O. c. coerulescens* (as described by Mauersberger 1994), was never confirmed. Intermediate forms occur throughout the country (Table 1, Fig. 2).

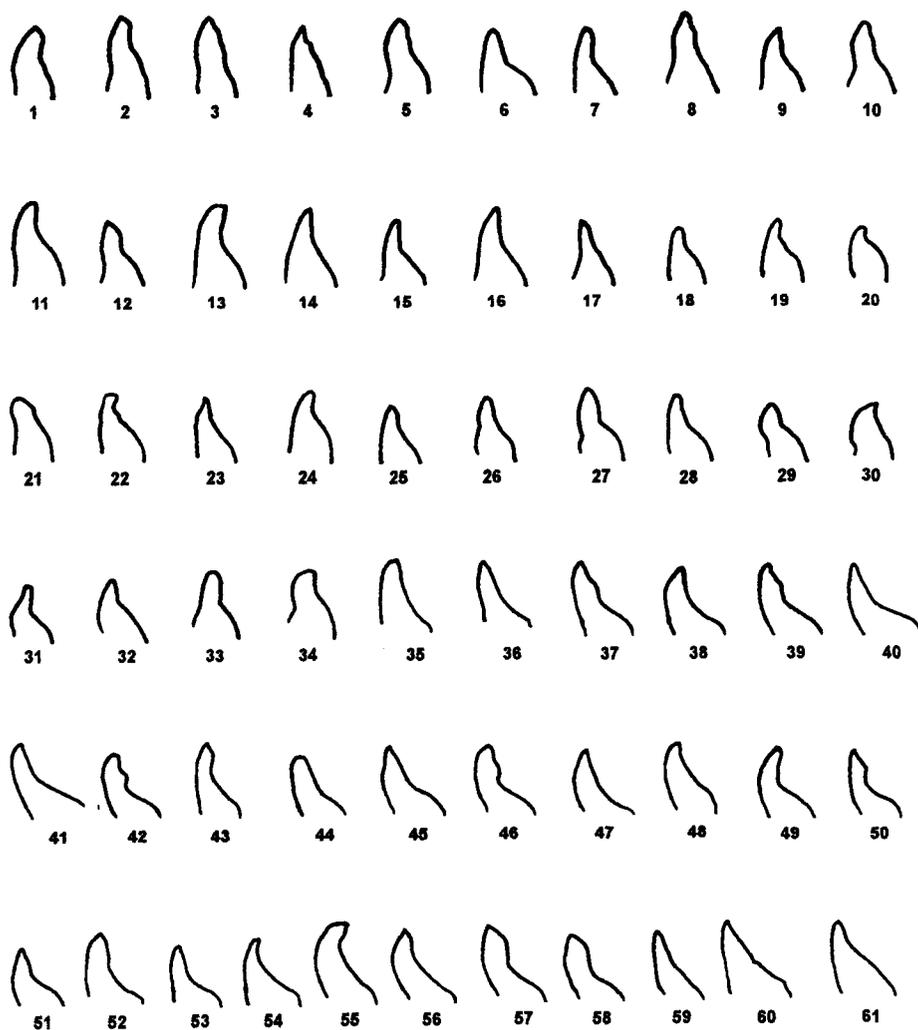


Figure 1. Shape of the lamina anterior in 61 Bulgarian males of the *Orthetrum coerulescens* complex, lateral view.

## Discussion

Much material collected in and published from Bulgaria before the 1980s was identified as *O. coerulescens* or *O. brunneum* instead of *O. anceps*. This is understandable, knowing that even one of the syntypes of *Libellula anceps* Schneider, 1845, is in fact *O. brunneum* (Schneider 1985).

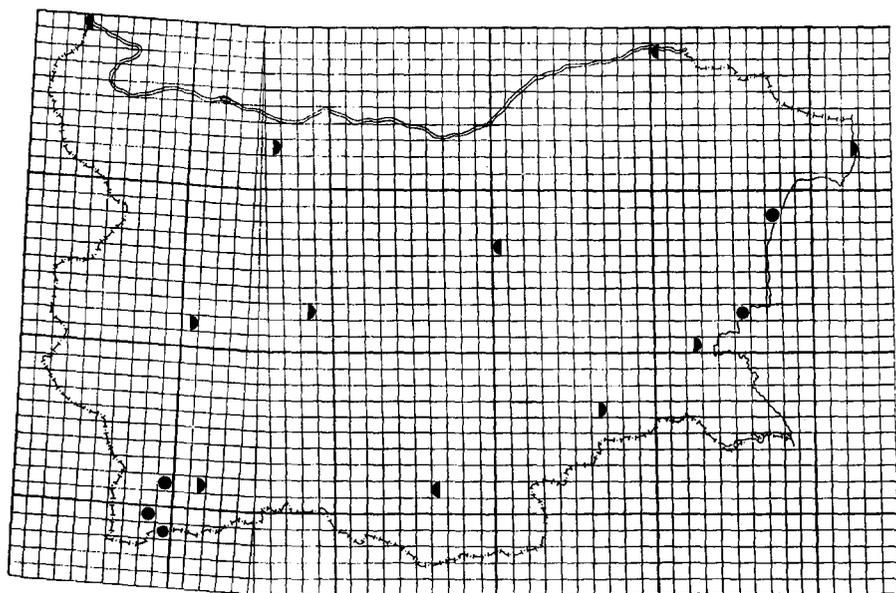


Figure 2. Distribution map of the *Orthetrum coerulescens* complex in Bulgaria. ▲ - typical *anceps* form; ■ - intermediate form; ● - both forms together.

My results are in line with Seidenbusch's (1997) suggestion about an "overlapping of *O. coerulescens* along the northern Mediterranean coast and the Black Sea coast...". They also conform with the distribution scheme of Dumont (1977) and Mauersberger (1994) for *O. anceps*.

There appears to be no occurrence of typical *O. c. coerulescens* in Bulgaria: only typical *O. c. anceps* and intermediate forms occur in many different sites across the country (Fig. 2). The more abundant records of the latter from the Black Sea coast simply reflect the fact that more material was available from that area. The whole of Bulgaria is therefore part of the hybrid zone. This is not surprising, taking into account the geographical situation of the country in a faunal transition area. This hybrid zone is possibly maintained by immigration of the two typical forms (phenotypes 1 and 5), which occupy its western and eastern border areas (Mauersberger 1994). In view of this massive hybridisation, and the fact that subspecies by definition replace each other in space, I agree with the assumption that a subspecific rank is more appropriate for the taxon *anceps* than a full species rank. Undoubtedly *O. c. anceps* is well established in Bulgaria. This leads to the conclusion that *O. coerulescens* *sensu stricto* should be eliminated from the Bulgarian Odonata species check-list. Thus a total of 66 species has been reported so far for the country.

Table 1. Collection data, sample sites and phenotype of Bulgarian males of the *Orthetrum coerulescens* complex. Each individual number refers to the numbers in Fig. 1.

no.	date	sample site	phenotype
1-3	18.07.1994	Varna Botanical garden	intermediate
4	-	-	<i>anceps</i>
5	21.05.1994	Kardjali	intermediate
6-9	28.07.1997	Rupite	<i>anceps</i>
10	04.08.1997	2 km W of Elchovo	<i>anceps</i>
11	31.08.1994	Srebarna	intermediate
12-13	17.06.1995	Pomorie lake – canal	intermediate
14-15	17.06.1995	Pomorie lake – canal	<i>anceps</i>
16	17.08.1997	Shabla – tuzlata	<i>anceps</i>
17	15.07.1996	Vaya fish farms	<i>anceps</i>
18-20	27.07.1973	Kulata	<i>anceps</i>
21	27.07.1973	Kulata	intermediate
22	12.06.1985	Rupite	<i>anceps</i>
23	18.06.1975	Breznitza	<i>anceps</i>
24	11.07.1986	Kneja	<i>anceps</i>
25-28	06.07.1988	Sandanski – Liljanovo	<i>anceps</i>
29	07.07.1988	Sandanski – Liljanovo	intermediate
30	08.08.1986	Bregovo	intermediate
31-32	01.07.1987	Passarel	<i>anceps</i>
33	12.08.1987	Varna	intermediate
34	09.07.1987	Zlataritzza	intermediate
35	05.08.1997	NW volcanic hill Kojuch	intermediate
36-49	15.-25.07.1998	Varna Botanical garden	<i>anceps</i>
50-58	15.-25.07.1998	Varna Botanical garden	intermediate
59	05.08.1918	Koprivstizza	<i>anceps</i>
60	12.06.1938	Sandanski	<i>anceps</i>
61	19.05.1917	Sandanski	<i>anceps</i>

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