

On the distribution of the genus *Ceriagrion* in the Balkans, including *C. georgifreyi*, a species new for the European fauna (Odonata: Coenagrionidae)

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Abstract

The distribution of *Ceriagrion* taxa occurring in the Balkans is presented. A diagnostic key for separating *C. tenellum* from *C. georgifreyi* is provided. The latter was recorded from Greece for the first time, and is an addition to the European fauna.

Zusammenfassung

Verbreitung der Gattung *Ceriagrion* auf dem Balkan, mit dem Erstdnachweis von *C. georgifreyi* für Europa (Odonata: Coenagrionidae) — Die Verbreitung der auf dem Balkan vorkommenden *Ceriagrion*-Taxa wird dargelegt. Ein Schlüssel zur Trennung von *C. tenellum* und *C. georgifreyi* ist beigefügt. Letzteres wurde erstmalig für Griechenland nachgewiesen und ist damit Bestandteil der europäischen Fauna.

Introduction

The Old World genus *Ceriagrion* Selys has its highest diversity in the Oriental and Afrotropical regions (TSUDA 1991). In Europe it was assumed to be represented only by *C. tenellum* (de Villers), which is distributed in western Europe and northwestern Africa. In the Balkans, the species has been reported from Slovenia, Croatia, Albania, and Greece (DUMONT et al. 1993, LOPAU & WENDLER 1995, KOTARAC 1997). In Turkey and further east the species is replaced by *C. georgifreyi*, which was originally described by SCHMIDT (1953) as a subspecies of *C. tenellum*, being found in Israel, Syria and Turkey (SCHNEIDER 1986, DUMONT 1991). All hitherto known localities of the sp. are within a 100 km fringe of the Mediterranean Sea. The westernmost records of *C. georgifreyi* in Turkey are from the surroundings of Lake Köyceğiz (KALKMAN et al. 2004). SCHMIDT (1953) also described another subspecies of *C. tenellum*, *C. t. nielseni*, which was said to occur in North Africa and Sicily. However, this subspecies is now regarded as a synonym of *C. tenellum* (e.g., OTTOLENGHI 1991). Records of *C. tenellum* from

Romania and Hungary (CIRDEI & BULIMAR 1965, DÉVAI et al. 1994) are certainly erroneous. The distribution of both species in Greece is still unclear. This study reports on the distribution of both species based on all available *Ceriagrion* material from Greece and adjacent countries.

Specimens studied

I tried to examine material of all published and unpublished records of *Ceriagrion* specimens from Greece and Albania. From Slovenia, Croatia and Turkey only readily available material was examined.

Abbreviations used for museum collections:

- RMNH = Nationaal Natuurhistorisch Museum Naturalis (formerly Rijks museum van Natuurlijke Historie), Leiden, The Netherlands;
- ZFMK = Zoologisches Forschungsinstitut und Museum Alexander Koenig, Bonn, Germany;
- ZMAN = Universiteit van Amsterdam, Zoölogisch Museum, Amsterdam, The Netherlands;
- ZMHB = Museum für Naturkunde der Humboldt-Universität, Berlin, Germany.

Ceriagrion tenellum from Albania (checked by H.J. Dumont)

- Elbassan district, Cërrik (41°01'N, 20°00'E), 07-VI-1993, DUMONT et al. (1991), coll. H.J. Dumont
- Kaltërt, Bistrica river (39°54'N, 20°12'E), 05-VI-1993, DUMONT et al. (1991), coll. H.J. Dumont
- Gjirokastër district, Nepravishta (39°59'N, 20°16'E), 14-VI-1993, DUMONT et al. (1991), coll. H.J. Dumont
- Spring of the Tragjas river (40°17'N, 19°31'E), 12-VI-1993, DUMONT et al. (1991), coll. H.J. Dumont
- Western edge of Tirana city (41°18'N, 19°47'E), 06-VI-1993 and 17-VI-1993, DUMONT et al. (1991), coll. H.J. Dumont

Ceriagrion tenellum from Croatia available for study

- 1 ♂, 1 ♀, Rab Island, Lopar, small stream 500 m from the ferry port at the football field (44°55'N, 14°40'E), 15-VI-1995, leg. M. Bedjanič, coll. V.J. Kalkman
- 1 ♂, 1 ♀, Krk Island, Nova Baška, stream at Baška Draga village (44°50'N, 14°40'E), 08-VI-1995, leg. M. Bedjanič, coll. V.J. Kalkman
- 1 ♂, Istra, 4 km NW of Vižinada, Mirna valley (45°20'N, 13°40'E), 12-VII-1966, leg. Entomologische Excursie Zoölogisch Museum Amsterdam, coll. ZMAN
- 2 ♂♂, Istra, 2 km ESE of Valtuna (44°50'N, 13°50'E), 14-VII-1966, leg. Entomologische Excursie Zoölogisch Museum Amsterdam, coll. ZMAN

Ceriagrion tenellum from Greece available for study

- 1 ♂, Crete, Nom. Iráklion, Phaistos, Mesaras (35°00'N, 24°50'E),
24-V-1972, leg. M.C. Kruseman & G. Kruseman, coll. ZMAN
- 3 ♂♂, 1 ♀, Crete, Geropótamos between Rouméli and Pánormos
(35°20'N, 24°40'E), 30/31-VII-1992, LOPAU (2000), leg. G. Peters, coll. ZMHB
- 1 ♀ photographed, Crete, 6 km SW of Chaniá (35°20'N, 23°50'E),
13-VI-1993 (LOPAU 1999b), G. Peitzner & P. Peitzner
- 1 ♂, Crete, Agios Gheorghios [handwriting difficult to read], 25-VI-1959,
leg. ?, coll. RMNH
- 1 ♂, Crete, Chania, Georgiopolis (35°30'N, 24°00'E), 22.-30-VI-1985, leg.
W. Hurkmans, coll. ZMAN

Ceriagrion georgifreyi from Greece available for study

- 2 ♂♂, Thássos, 1 km NE of Skále Prinóu (40°40'N, 24°30'E), 22-VI-1997,
leg. & coll. W. Lopau [published in LOPAU (1999a) as *Ceriagrion tenellum*]
- 1 ♂, Zakynthos, Limni Keriou, 3 km N of Keri (37°40'N, 20°50'E),
06-V-1998, leg & coll. W. Lopau
- 2 ♂♂, 2 ♀♀, Kerkyra [Kérkira], Dassia, 5 km SE of Korakiana (39°40'N,
19°40'E), 16-30-V-1971, leg. B. van Aartsen, coll. ZMAN

Ceriagrion georgifreyi from Turkey available for study

- 1 ♂, 1 ♀, S Turkey, 3 km W of Alanya (36°30'N, 31°50'E), 08-20-VI-1979,
leg. P.J.H. van Bree & W.H. Gravestein, coll. ZMAN
- ♂♂ & ♀♀, Province of Muğla: 1-2 km W of Köyceğiz: pools/channel
near road to Hamitköy (36°50'N, 28°40'E): 22-V-2000; leg. Turkey
excursion, coll. RMNH
- ♂♂ & ♀♀, Province of Muğla: field just E of Köyceğiz, near lake
(36°50'N, 28°40'E): 22-V-2000, 24-V-2000, 30-V-2000; leg. Turkey
excursion, coll. RMNH
- ♂♂ & ♀♀, Province of Muğla: 1 km E of Köyceğiz: pool on field with
Euphorbia adjacent to *Liquidamber* forest and path along N side of Köyceğiz
lake (36°50'N, 28°40'E): 21-V-2000, 22-V-2000, 30-V-2000, 03-VI-2000;
leg. Turkey excursion, coll. RMNH
- ♂♂ & ♀♀, Province of Muğla: 1 km E of Köyceğiz: brooks in
Liquidamber forest (36°50'N, 28°40'E): 21-V-2000, 29-V-2000; leg. Turkey
excursion, coll. RMNH

Albanian records of *Ceriagrion* species not available for study

- Vorra [Vorrë between Durresi and Tirana] (41°20'N, 19°35'E), 04-VIII-1918,
PUSCHNIG (1926); material could not be traced.

Greek records of *Ceriagrion* species not available for study

Rendina, brook near Lake Volvi (40°30'N, 23°30'E), 17/18-VII-1989,

DEVOLDER (1990); no material collected

Nestos floodplain near Hrysoupoli (40°50'N, 24°10'E), June 1996, SCHNAPAUFF
et al. (1996); no material collected

Crete, Georgioupolis and Límni Kourná (both 35°20'N, 24°10'E), 11-IV-1994,
BRÄNDLE & RÖDEL (1994); no material collected

Lesbos, old mouth of River Evergétoulas (39°00'N, 26°20'E), 12-VI - 16-VII-1992,
LOPAU (1995); no material collected

Ios, 13-VI-1953 (36°40'N, 25°10'E), leg. K. Buchholz, SCHMIDT (1954), coll.
ZFMK.

Differentiation between *Ceriagrion tenellum* and *C. georgifreyi*

Ceriagrion georgifreyi was described on the basis of material from Syria and Turkey. The species is rather similar to *C. tenellum* but is easily separated by the following characters (SCHMIDT 1953, SCHNEIDER 1986, DUMONT 1991): Males of both *C. tenellum* and *C. georgifreyi* have S10 slightly raised terminally into a semicircular tubercle. In *C. georgifreyi* this tubercle has a crown of black spines which are absent in *C. tenellum* (Fig. 1a, b). The inferior appendages of *C. georgifreyi* are longer and more slender than in *C. tenellum* (Fig. 1a, b). In females of *C. georgifreyi* the hind margin of the carinal fork is formed by two conspicuous, upright lobes. These two upright lobes are higher than the hind rim of the pronotum (Fig. 2a). In *C. tenellum* these lobes are far less conspicuous and never exceed the hind rim of the pronotum (Fig. 2b). The characters of both male and female *C. georgifreyi* are well illustrated in SCHNEIDER (1986).

These characters were tested on a large series of both sexes of *C. tenellum* from Spain, Morocco, Portugal, France, and on a large series of both sexes of *C. georgifreyi* from Turkey. In all cases these characters were present. In the original description I also noticed that *C. georgifreyi* is larger and that the yellow spots in front of the occiput are V-shaped instead of forming a simple line. Both characters were also found to be consistent. As size and the extension of coloration are strongly influenced by, e.g., climate, these characters are of less taxonomic importance. Due to the structural differences in both sexes, there is no doubt that *C. georgifreyi* should be considered a valid species (SCHNEIDER 1986). Material from Crete belongs to *C. tenellum*. In some cases, however, the males from this island have a few, very small spines on the tubercle of S10, resembling *C. georgifreyi*. The inferior appendages of specimens from Crete are not distinguishable from *C. tenellum* as is the hind margin of the carinal fork of the females.

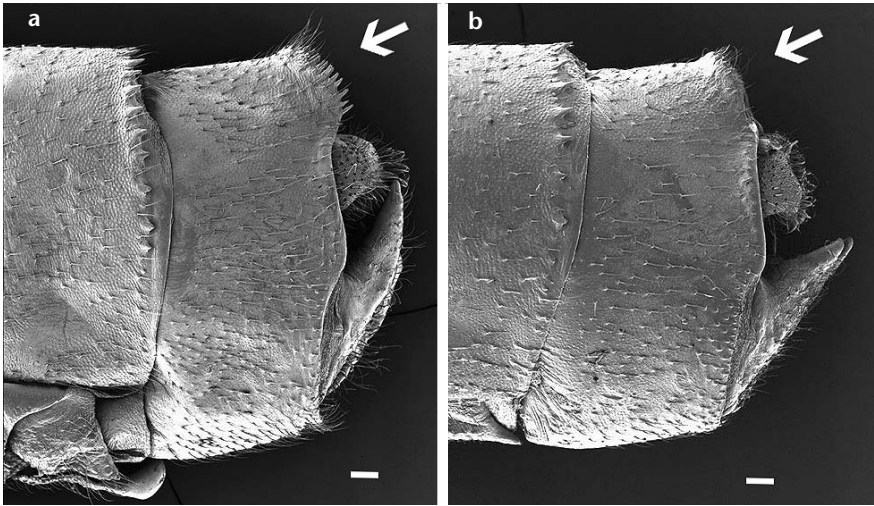


Figure 1: Scanning electron micrographs of anal appendages, lateral view. – a) male *Ceriagrion georgifreyi*; b) male *C. tenellum*. The white spines shown in a) are black in nature. Scale: 100 μm . — Abbildung 1: REM-Aufnahmen der Hinterleibsanhänge, Seitenansicht. – a) *Ceriagrion georgifreyi*, Männchen; b) *C. tenellum*, Männchen. Die weißen Dornen in Abb. 1a sind in Natur schwarz. Maßstab: 100 μm

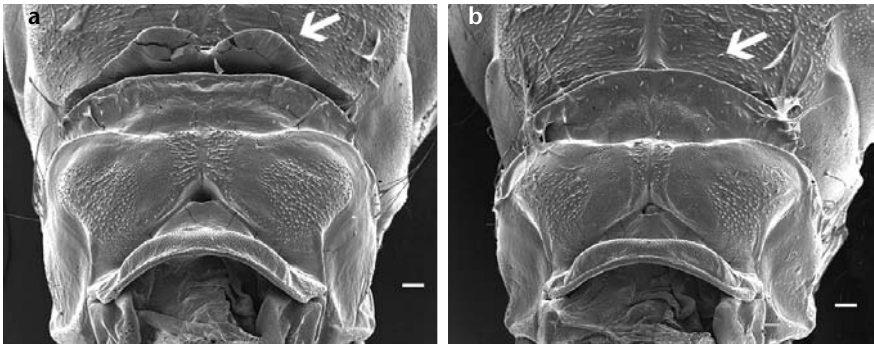


Figure 2: Scanning electron micrographs of prothorax and part of the thorax, dorsal (slightly anterior) view. – a) female *Ceriagrion georgifreyi*, b) female *C. tenellum*. Scale: 100 μm . — Abbildung 2: REM-Aufnahmen des Prothorax und eines Teils des Thorax, Seitenansicht (leicht von Vorne) – a) *Ceriagrion georgifreyi*, Weibchen; b) *C. tenellum*, Weibchen. Maßstab: 100 μm

Key to the European species of *Ceriagrion*

- | | |
|---|---------------------------------------|
| 1. Males | 2 |
| 1'. Females | 3 |
| | |
| 2. The slightly raised tip of S10 bears a crown of black spines (Fig. 1a). Inferior appendages slender (Fig. 1a) | <i>C. georgifreyi</i> Schmidt, 1953 |
| 2'. The slightly raised tip of S10 bears no black spines (Fig. 1b). Inferior appendages less slender (Fig. 1b). Specimens from Crete (and from Ios?) sometimes with a few small spines on S10. In these, the shape of the inferior appendages is diagnostic | <i>C. tenellum</i> (de Villers, 1789) |
| | |
| 3. The two upright lobes on the thorax just behind the pronotum are conspicuous and are higher than the hind rim of the pronotum (Fig. 2a) | <i>C. georgifreyi</i> Schmidt, 1953 |
| 3'. The two upright lobes on the thorax just behind the pronotum are inconspicuous and never exceed the hind rim of the pronotum (Fig. 2b) | <i>C. tenellum</i> (de Villers, 1789) |

The distribution of *Ceriagrion tenellum* and *C. georgifreyi* in the Balkans

Examination of Greek *Ceriagrion* specimens showed that those collected on the islands of Thásos, Zákynthos and Kérkira (Corfu) all belong to *C. georgifreyi*, thus constituting the first records of this species for both Greece and Europe. Unfortunately, material was collected at neither of the three *Ceriagrion* localities known from continental Greece. The five Albanian records published by DUMONT et al. (1993) all belong to *C. tenellum* (H.J. Dumont pers. comm.). Further north in the Balkans, the genus *Ceriagrion* is found only in the coastal area of Croatia and Slovenia (KOTARAC 1997). Specimens hitherto checked were found to be *C. tenellum* (M. Bedjanič pers. comm.). All specimens examined from Crete pertain to *C. tenellum*.

Discussion

Ceriagrion tenellum and *C. georgifreyi* are without doubt closely related, and are likely to be sibling species. A possible explanation for their distribution is that their ranges became separated during a glacial period, *C. tenellum* having its refuge in western Europe or northwestern Africa, and *C. georgifreyi* in southwestern Asia. After the last ice age *C. tenellum* spread northwards reaching as far as southern England and northern Germany, and eastwards to the coastal area of the eastern Adriatic Sea. *Ceriagrion georgifreyi* occupied a remarkably

small fringe along the eastern Mediterranean coast and a few islands in the Ionian and Aegean Sea.

The record from Ios, 170 km north of Crete, published by SCHMIDT (1954) could not be checked. He states that the specimens belong to *C. tenellum* and not to *C. georgifreyi*, but that they probably belong to a undescribed subspecies but he gives no further details. The occurrence of *C. tenellum* on Crete – and probably on Ios – within the area of distribution of *C. georgifreyi* and well south of the range of *C. tenellum* – is noteworthy. The Odonata fauna of Crete is also remarkable in other respects: It has three endemics, *Calopteryx splendens cretensis*, *Coenagrion intermedium* and *Boyeria cretensis*, and lacks a few genera present in the rest of the eastern Mediterranean, e.g., *Gomphus*, *Cordulegaster* and *Caliaeschna*. This can not be explained by the absence or presence of habitats, and is therefore likely to be caused by its geological history. A thorough study of the biogeography of Odonata and other freshwater organisms in this part of the Mediterranean would therefore be highly informative.

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