

## ODONATA TAKEN AND OBSERVED IN DONJI CEKLIN, MONTENEGRO

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A total of 21 Odonata species was found in Donji Ceklin at Skadar Lake, Montenegro, in second half of July 1994. Six of these species are first records for the area. Brief biogeographical comments are added about *Platynemis p. pennipes* and *P. p. nitidula*, and two *Chalcolestes* species, *C. viridis* and *C. parvidens* in the SE Adriatic coastal zone.

KEY WORDS: Odonata, Skadar Lake, Montenegro.

### INTRODUCTION

BARTENEV (1912) was the first to examine Odonata, taken by VERESHCHAGIN at Skadar Lake, Montenegro, in June 1911. Dragonflies were collected in the area even at the end of 19th century, and preserved in the Natural History Museum in Sarajevo. ADAMOVIĆ (1948) listed, among others, these specimens and mentioned four species, which had already been recorded in BARTENEV's paper. Odonata were also collected at Virpazar, situated on SW shore of the lake (DUMONT, 1977). Altogether 23 species have been found at Skadar Lake, until now.

The present paper deals with data and specimens of Odonata collected and observed by the author in the flood plain extending from the stream Rijeka Crnojevića to the Morača River, Donji Ceklin, in July 1994.

### AREA EXAMINED

Skadar Lake, SW Montenegro and NW Albania, is situated in a composite depression, developed by karstic erosion and tectonic faulting (CVIJIĆ, 1902). The surface area of the lake fluctuates seasonally from about 370 to 600 square kilometres, as well as the average depth, from 5 m in summer to 9 m in winter.

Some deep, funnel-shaped depressions, usually with sublacustrine springs, are found in the lake bottom. The Mesozoic limestone mountains are found on NW and SW, and a vast plain of Quaternary origin on N and NE of Skadar Lake (LASCA *et al.*, 1981).

The lake receives water from many springs, and more than ten streams. The Morača River is the largest one, which provides more than 62% of the inflowing water. The Bojana River is the only outflowing stream of Skadar Lake. The pH value of water ranges from 7.2 to 8.5 (PETROVIĆ, 1981).

The area experiences the Mediterranean climate, characterized by cool, wet winters and hot, dry summers. The average annual rainfall is 2250 mm. Almost 80% of it falls from October till April. The average annual air temperature is 14.8°C; the highest av. t. is 26.6°C, in July, and the lowest 5.2°C, in January (STANKOVIĆ, 1989).

According to ČERNJAVSKI *et al.* (1949), the vegetation and flora of the Skadar Lake area are mostly of the Mediterranean type. The marshy vegetation of the lake was described in detail by LAKUŠIĆ & PAVLOVIĆ (1976), and RISTIĆ & VIZI (1981).

Odonata have been collected at five sites in Donji Ceklin (Fig. 1). The relative abundance and reproductive behaviour of the species have been observed at three of these sites situated in the area of the village Dodoši (19°09' E, 42°20' N). The village is located on the SW foot of the limestone rocky hill Bobija (432 m), with the forest *Carpinetum orientalis punicosum* Grebensčikov (in ČERNJAVSKI *et al.*, 1949). The plain stretching south of the hill is regularly flooded during the wet season. The river Karatuna, an outflowing stream of Malo Blato Lake, empties into Skadar Lake. The Karatuna receives a stream, formerly a branch of the Morača River.

- (1) Left bank of the Karatuna, upstream of Dodoši – an almost 20 m wide, notably quick stream of clean water with sandy bottom, and scanty plants of *Pycreus longus* and *Sparganium erectum* along the sandy bank with *Salix alba* trees.
- (2) Right bank of the Karatuna, downstream of Dodoši – a deep, almost 40 m wide, moderately quick stream of clean water, with sandy and silty bottom, and a narrow band of emergent and floating vegetation of *Schoenoplectus lacuster*, *Nuphar luteum*, *Pycreus longus*, *Butomus umbellatus*, along the sunny bank with scanty bushes of *Vitex agnus castus*.
- (3) Left bank of the Morača former branch – an about 20 m wide, sluggish stream of clean water, with sandy and silty bottom, overgrown with floating and submersed plants *Nuphar luteum*, *Nymphaea alba*, *Potamogeton fluitans*, *Myriophyllum spicatum*, *Ceratophyllum demersum*. The belt of emergent plants

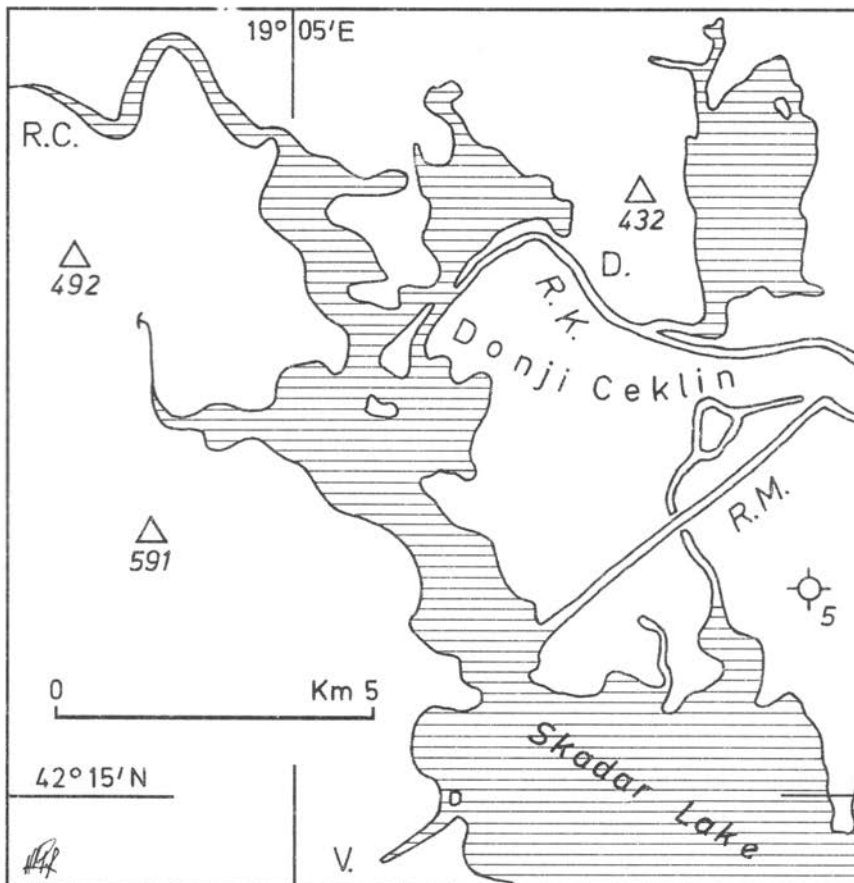


Fig. 1. The sketch map showing the NW end of Skadar Lake, Montenegro. Three sites and two rivers are marked with the following abbreviations: R.C. = Rijeka Crnojevića, the site where Odonata were collected for BARTENEV (1912); V. = Virpazar, the site where DUMONT (1977) recorded Odonata; D. = Dodoši, the village situated in the area of present examinations; R.K. = the river Karatuna; and R.M. = the river Morača.

*Schoenoplectus lacuster*, *Typha angustifolia* and some other species, stretches along the bank with *Salix alba* and *Alnus glutinosa*.

- (4) Side stream of the Morača – a narrow stream of clean water, with pebbly and sandy bottom, and scanty stands of *Pycnus longus*.
- (5) *Bolboschoenus beiti* – a belt of emergent plants growing in shallow water, along the low bank of Skadar Lake. The belt of *Bolboschoenus maritimus* stretches between the high, dense "wall" of *Phragmites australis* and marshy meadow.

## MATERIAL AND METHODS

A sum of 186 specimens of Odonata (117♂ and 69♀) belonging to 20 species, was taken, and one more species, *Hemianax ephippiger*, noticed by the author in Donji Ceklin, from 24th till 28th of July 1994. Odonata were collected and examined in the way that was previously described (ADAMOVIĆ, 1993). Nomenclature of dragonfly wing veins follows ASKEW (1988).

## RESULTS

Briefly described sites are marked with the bracketed figures after the name of species, in the annotated list. The morphometric data: range, mean value ± standard error, or just range and mean value, are recorded for some species.

Calopterygidae. — *Calopteryx virgo festiva* (Brullé, 1832): (4) 9♂ 6♀. — *Calopteryx balcanica* Fudakowski, 1930: (1) 13♂ 24♀.

Lestidae. — *Lestes sponsa* (Hansemann, 1823): (5) 2♀.

Platycnemididae. — *Platycnemis pennipes nitidula* (Brullé, 1832): (3) 24♂ 7♀.

MALE. — Measurements (in mm), N=24 — Abdomen: (app.incl.) 29.3 - 33.6 (31.43 ± 0.243); — hindwing: 19.0 - 21.6 (20.34 ± 0.138); — pterostigma of hindwing: 0.7 - 1.0 (0.88 ± 0.017). Other details. — Postnodal crossveins in forewing: 11 - 13 (12.17 ± 0.130); — the same in hindwing: 9 - 12 (10.42 ± 0.147); — number of cells between nodus and starting point of R<sub>3</sub> in forewing: 4.5 - 5.5 (5.08 ± 0.049); — the same in hindwing: 3.5 - 4.5 (4.00 ± 0.052); — number of cells between the starting point of IR<sub>2</sub> and the beginning of pterostigma in forewing: 2.5 - 5.0 (3.63 ± 0.157); — the same in hindwing: 1.0 - 4.0 (2.75 ± 0.138).

FEMALE. — Measurements (in mm), N=7 — Abdomen: (ovipos. incl.) 28.0 - 32.8 (30.41); — hindwing: 19.8 - 22.4 (21.44); — pterostigma of hindwing: 0.8 - 1.1 (0.96). Other details. — Postnodal crossveins in forewing: 12 - 14 (13.14); — the same in hindwing: 10 - 13 (11.14); — number of cells between nodus and starting point of R<sub>3</sub> in forewing: 5.0 - 6.0 (5.57); — the same in hindwing: 4.0 - 5.0 (4.29); — number of cells between the starting point of IR<sub>2</sub> and the beginning of pterostigma in forewing: 3.0 - 5.5 (4.21); — the same in hindwing: 2.5 - 5.5 (3.50).

Coenagrionidae. — *Ischnura elegans elegans* (Vander Linden, 1820): (3) 15♂ 6♀. — *Enallagma cyathigerum* (Charpentier, 1840): (3) 3♂. — *Erythromma viridulum* (Charpentier, 1840): (3) 5♂ 3♀.

Aeshnidae. — *Aeshna mixta* (Latreille, 1805): (5) 1♂. — *Anax imperator* Leach, 1815: (4) 2♂. — *Hemianax ephippiger* (Burmeister, 1839): (2) 5♂ seen.

Gomphidae. — *Gomphus vulgatissimus* (Linnaeus, 1758): (4) 1♂. — *Lindenia tetraphylla* (Vander Linden, 1825): (2) 1♂.

Corduliidae. — *Somatochlora meridionalis* Nielsen, 1935: (5) 1♂.

Libellulidae. — *Platetrum depressum* (Linnaeus, 1758): (4) 1♂. — *Orthetrum brunneum* (Fonscolombe, 1837): (4) 2♂ 1♀. — *Orthetrum anceps* (Schneider, 1845): (2) 18♂ 1♀.

MALE. — Measurements (in mm), N=18 — Abdomen (app. incl.) 25.2 - 29.0 (27.15); — superior appendage: 1.6 - 2.1 (1.86); — hindwing: 27.5 - 30.5 (29.54); — pterostigma of hindwing: 3.0 - 3.8 (3.54). Other details. — Antenodal crossveins in forewing: 10-13 (11.29); — the same in hindwing: 8 - 10 (8.93); — postnodal crossveins in forewing: 7 - 9 (8.36); — the same in hindwing 7 - 10 (8.79).

— *Orthetrum cancellatum* (Linnaeus, 1758): (2) 1♂ 1♀. — *Orthetrum albistylum* (Sélys, 1848): (2) 15♂ 3♀.

MALE. — Measurements (in mm), N=15 — Abdomen: (app.incl.) 34.2 - 37.8 (35.31); — superior appendage: 1.8 - 2.4 (2.17); — hindwing: 36.6 - 41.0 (38.17); — pterostigma of hindwing: 3.4 - 3.8 (3.58). Other details. — Antenodal crossveins in forewing: 12 - 15 (13.33); — the same in hindwing: 8 - 11 (9.47); — postnodal crossveins in forewing: 10 - 13 (11.33); — the same in hindwing: 9 - 13 (11.53). — *Crocothemis erythraea* (Brullé, 1832): (3) 3♂ 13♀. — *Sympetrum striolatum* (Charpentier, 1840): (2) 1♀ teneral. — *Sympetrum meridionale* (Sélys, 1841): (4) 2♂ 1♀.

Data about the distribution, relative abundance and reproductive behaviour of adult dragonflies recorded at three minor habitats near Dodoši, during this short field examinations are summarized in Table I.

## DISCUSSION

Only two (8.33%) heterochromatic females of *Calopteryx balcanica* have been found among the total of 24 females collected at the river Karatuna in Donji Ceklin, during the present examination. BARTENEV (1912) examined the specimens of the species taken at Skadar Lake, and indentified them as *C. ancilla*. The question upon *C. balcanica* and *C. ancilla* will be discussed elsewhere.

According to the illustrations offered and features described by DUMONT (1977), all the *Platycnemis pennipes* males and females taken at Skadar Lake this time, pertain to the subspecies *nitidula* (Brullé). It is a common damselfly at the Skadar Lake, previously recorded (BARTENEV, 1912; DUMONT, 1977). This subspecies was also found by the author in marshy meadows at the village of Donji

Table I

Distribution, relative abundance and reproductive behaviour of Odonata examined in three appropriate minor habitats at two streams of Donji Ceklin, Montenegro, in July 1994: (1) Left bank of the Karatuna, (2) Right bank of the Karatuna and (3) Left bank of the Morača former branch stream. [- A, common species; - M, moderately common; - R, rare; - E, extremely rare; - —, presence of species not established; - c, copulation noticed; - o, oviposition observed; - t, teneral specimens collected]

Species	Minor habitats		
	(1)	(2)	(3)
<i>Calopteryx balcanica</i>	M	—	—
<i>Orthetrum anceps</i>	E	A co	—
<i>Orthetrum albistylum</i>	E	A co	—
<i>Lindenia tetraphylla</i>	—	M c	—
<i>Hemianax ephippiger</i>	—	M	—
<i>Orthetrum cancellatum</i>	—	E	—
<i>Sympetrum striolatum</i>	—	E t	—
<i>Crocothemis erythraea</i>	—	M co	E
<i>Enallagma cyathigerum</i>	—	E	R
<i>Ischnura e. elegans</i>	—	R	M c
<i>Platycnemis p. nitidula</i>	—	—	A co
<i>Erythromma viridulum</i>	—	—	A co

Štoj (19°20' E, 41°55' N), situated about 20 km S of Skadar Lake. Eight species were present at Donji Štoj, on 30-VIII-1971 (=A), and 25-VI-1972 (=B), namely: *Chalcolestes parvidens* (Artobolevski, 1929) 5 ♂ (A); *Lestes barbarus* (Fabricius, 1798), 2 ♀ (A); *L. virens vestalis* Rambur, 1842, 1 ♀ (A); *L. macrostigma* (Evermann, 1836), 2 ♀ (B); *Platycnemis pennipes nitidula* (Brullé, 1832), 2 ♂ (B); *Ischnura elegans elegans* (Vander Linden, 1820), 2 ♂ (A); *Somatochlora meridionalis* Nielsen, 1935, 3 ♂ 1 ♀ (B); *Sympetrum meridionale* (Sélys, 1841), 3 ♂ 8 ♀ (A) and (B) (ADAMOVIĆ, unpublished data).

*P. p. nitidula* is distributed in W and S Greece (GALLETTI & PAVESI, 1983), and Albania (DUMONT *et al.*, 1993). Marshy plains in SW Montenegro appear to be the north limit of this subspecies distribution in the E Adriatic coastal zone. A total of 37 males and 17 females of *P. pennipes* collected in Župa and Konavli (18°11' - 18°25' E, 16° 31' - 16°39' N), situated about 65 km NW of Skadar Lake belong to the typical subspecies *P. p. pennipes* (Pallas, 1771) (ADAMOVIĆ, 1967, 1993). However, as pointed out by DUMONT *et al.* (1993), the "exact boundary" between *P. p. pennipes* and *P. p. nitidula* in SW Montenegro "remains to be identified".

A similar case is noticed about the distribution of two *Chalcolestes* species in the area. As already mentioned, *C. parvidens* (Artobolevski, 1929) was found at Donji Štoj, Ulcinj, SW Montenegro. However, *C. viridis* (Vander Linden, 1825) has been recorded in Konavli, Dubrovačka Rijeka and Island of Mljet (ADAMOVIĆ, 1967; and, recently reexamined by the author).

According to LOHMANN (1993), *C. viridis* is an Atlantomediterranean faunal element, while *C. parvidens* is a Caspian faunal element. Both species are found in Italy; and, the occurrence of *C. parvidens* in two SE regions of the country, namely: Puglia and Basilicata, is particularly interesting (UTZERI *et al.*, 1994).

It seems opportune to mention here ILLIES' "Gebietseinteilung für Limnofauna Europaea", and his separation "Dinarischer Westbalkan" from "Hellenischer Westbalkan" (SCHMIDT, 1978). Some details about the distribution of Odonata in the contact zone between these two "Gebiete" have just been discussed.

DUMONT (1977) took a male of *Hemianax ephippiger* at the town of Podgorica, situated about 14 km N of Skadar Lake. At least five mature males of *H. ephippiger* flying about 2 m above the water surface, and chasing each other along the littoral belt of *Schoenoplectus lacuster*, were observed at minor habitat (2), near Dodoši during the present examinations. Two breeding populations of the species have been recently discovered in Italy (UTZERI *et al.*, 1987), and Spain (MUNOZ-POZO & TAMAJON-GOMEZ, 1993). The author assumes that Skadar Lake offers suitable circumstances for breeding of *H. ephippiger*.

*Orthetrum anceps* is a common dragonfly at Skadar Lake. The species was formerly recorded in Konavli (ADAMOVIĆ, 1967). Data about range and mean value of the abdomen length, 24.1 - 28.7 (26.94), hindwing 27.1 - 32.5 (30.03), and pterostigma of hindwing 3.0 - 3.9 (3.58) of the *O. anceps* males collected in Konavli and other sites in Dubrovnik District, are very similar to those found among the species males from Donji Ceklin. The corresponding figures recorded for *O. anceps* from Donji Ceklin are: Abd 25.2 - 29.0 (27.15), HW 27.5 - 30.0 (29.54), and Pt 3.0 - 3.8 (3.54).

*Orthetrum albistylum* was a common species in Donji Ceklin in July of 1994. Males and females of the species from Skadar Lake appear to be larger in size than the specimens in Central Europe. Range and mean values of males: Abdomen (app. incl.) 34.2 - 37.8 (35.31), hindwing 36.6 - 41.0 (38.17), and pterostigma of hindwing 3.4 - 3.8 (3.58); and females: Abd. 34.5 - 37.2 (36.00), HW 36.8 - 40.2 (38.97), and Pt 3.9 - 4.1 (4.00) of the *O. albistylum* taken at Donji Ceklin, SW Montenegro, are obviously larger than the corresponding figures of the Central European males (Abd 32 - 34, HW 34 - 36, and Pt 3.0 - 3.5) and females (Abd 31 - 33, HW 34 - 38, and Pt 3.5 - 3.8) recorded by SCHMIDT (1929).

According to the contemporary nomenclature, BARTENEV (1912) recorded 16 species of Odonata from the NW end of Skadar Lake; they are: *Calopteryx virgo festiva*, *C. balcanica*, *Platycnemis pennipes nitidula*, *Ischnura elegans*, *Coenagrion lindeni*, *C. puella*, *Gomphus vulgatissimus*, *Stylurus flavipes*, *Onychogomphus forcipatus*, *Lindenia tetraphylla*, *Caliaeschna microstigma*, *Platetrum depressum*, *Orthetrum brunneum*, *O. anceps*, *O. cancellatum*, and *Crocothemis erythraea*. DUMONT (1977) found 17 species near Virpazar, located on SW shore of the lake. Seven of those were new for the fauna of the lake, namely: *Lestes barbarus*, *Enallagma cyathigerum*, *Aeshna mixta*, *Anax imperator*, *Sympetrum fonscolombi*, *S. meridionale*, and *S. sanguineum*. Put all together, 23 Odonata species have been known at Skadar Lake up to now.

Six of 21 species found in Donji Ceklin, and listed in the present paper, are new for the fauna of Odonata of Skadar Lake. Including these species: *Lestes sponsa*, *Erythromma viridulum*, *Hemianax ephippiger*, *Somatochlora meridionalis*, *Orthetrum albistylum* and *Sympetrum striolatum*, the number of the Odonata species found at Skadar Lake, Montenegro, amounts to 29. DUMONT (1977) collected *H. ephippiger* in the town of Podgorica, and *S. meridionalis* at a sluggish stream between the towns Podgorica and Nikšić, situated more than 15 km N of Skadar Lake. The species *O. albistylum* has been recently found at SE end of Skadar Lake in Albania (DUMONT *et al.*, 1993). Odonata inhabiting Skadar Lake are unsatisfactorily known. Anyhow, 29 species found at Skadar Lake, Montenegro, make up 46.8% of the total number of Odonata species recorded both in Serbia and Montenegro until now.

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ODONATA SAKUPLJENE I POSMATRANE U DOĀEM CEKLINU,  
CRNA GORA

Ж. Р. АДАМОВИЋ

## И з в о д

Са Скадарског језера у Црној Гори биле су до сада познате 23 врсте Odonata (BARTENEV, 1912; DUMONT, 1977). У овом раду утврђено је, између осталог, постојање још 6 врста нових за фауну овог краја. То су: *Lestes sponsa*, *Erythromma viridulum*, *Hemianax ephippiger*, *Somatochlora meridionalis*, *Orthetrum albistylum* и *Sympetrum striolatum*.

Фауна Odonata – као и клима и вегетација – овог краја показује медитеранска обележја. Истовремено, цео југозападни део Црне Горе, истакнуто је у овом раду, чини прелазну зону између "Хеленског западног Балкана" и "Динарског западног Балкана" – како су ове области означене у познатој ILLIES-овој биогеографској подели лимнофауне Европе.

Сви прикупљени примерци врсте *Platycnemis pennipes* (24♂ 7♀) припадају подврсти *nitidula* (Brullé). Подврста је била позната и раније на Скадарском језеру (BARTENEV, 1912). Распрострањена је у Грчкој и Албанији (DUMONT, 1977). У овом раду су поменута и 2 мужјака ове подврсте што их је аутор нашао код Улциња 1972 године. Међутим, сви примерци нађени у Конавлима и Дубровачкој жупи, око 65 км северозападно од Скадарског језера, припадају типичној подврсти *P. p. pennipes* (Pallas) (ADAMOVIĆ, 1967, 1993).

У овом раду је утврђено слично распрострањење и за две врсте рода *Chalcolestes*. Врсту *C. parvidens* (Artobolevski, 1929) аутор је нашао код Улциња 1971 године. Међутим, сви примерци овог рода сакупљени раније у Конавлима, Дубровачкој ријечи и на острву Мљету припадају врсти *C. viridis* (Vander Linden) (ADAMOVIĆ, 1967).

Врста *Chalcolestes parvidens*, коју је аутор нашао у селу Доњи Штој код Улциња 1971, и коју објављује у овом раду, нова је за фауну Odonata на територији раније Југославије.

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