

**MORPHOMETRIC DISTINCTION OF *PLATYCNEMIS PENNIPES*  
*NITIDULA* BRULLÉ, 1832 FROM *P.P. PENNIPES* PALLAS, 1771  
(ODONATA: PLATYCNEMIDIDAE)**

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The statistical examination confirmed that the males and females of *P.p. nitidula* have significantly wider hind tibiae than the males and females of the nominate subspecies *P.p. pennipes*. The ratio: maximum width of hind tibia / length of median tibial spine of the males and females of *P.p. nitidula* are significantly larger than that of the nominate subspecies. Distribution of two subspecies was discussed.

KEY WORDS: Odonata, *Platycnemis p. pennipes*, *P.p. nitidula*.

## INTRODUCTION

While surveying Odonata of Hungary, KOHAUT (1896) wrote down 20 species - including *Platycnemis pennipes* Pallas - in the south part of the Pannonian Lowland. That area is now Serbian territory, lying north of the river Sava and the Danube. The first author of the present paper listed those species, and added that [translated from Serbian]: "those 20 Odonata species were probably the first scientific records of these Insects in Serbia" (ADAMOVIĆ, 1949). That assumption has been repeated in two other papers (ADAMOVIĆ, 1956; ANDJUS, 1992). However, the author found recently a paper about an examining journey of the natural history teachers and a group of pupils of a Belgrade secondary school, that was made over W Serbia and E Bosnia in 1890. Professor Ljubomir MILJKOVIĆ collected, identified and listed insects during that journey. In addition to many other insect species, MILJKOVIĆ recorded three Odonata species, namely: "*Calopteryx splendens* (Harris, 1792) and *Platycnemis pennipes* (Pallas, 1771) between the sites of Loznica nad Krupanja; *P. pennipes* between Krupanj and Mali Zvornik, W Serbia; and, *Aeshna*

*cyanea* (Müller, 1764) between Mala Kasaba and Srebrenica, E Bosnia" (PETROVIĆ *et al.*, 1891). That happened five years before, already mentioned KOHAUT's paper. Towards the end of the 19th century, Prof. MILJKOVIĆ taught zoology at Velika Škola (Advanced School) in Belgrade, and translated from German into Serbian the well-known CLAUS' university zoology textbook.

The nominate subspecies *Platycnemis pennipes pennipes* (Pallas, 1771) was recorded in Serbia (ADAMOVIĆ, 1993; ADAMOVIĆ & VIJATOV, 1996), Macedonia (BUCHHOLZ, 1963; ADAMOVIĆ, 1990), and the continental part of Montenegro (ADAMOVIĆ *et al.*, 1996). All other records of this species in Serbia and Macedonia refer to the nominate subspecies. They will be quoted and discussed in this paper.

The subspecies *Platycnemis pennipes nitidula* was described by BRULLÉ (1832) from Morée, Peloponnesus, Greece. BARTENEV (1912) was the first to record that subspecies from Rijeka Crnojevića at the NW end of Skadar Lake, Montenegro. The subspecies was rediscovered at Virpazar, Skadar Lake, and - in addition - re-described and illustrated by DUMONT (1977). *Platycnemis p. nitidula* (BRULLÉ, 1832) (= *insularis* Selys, 1863) is a common damselfly at Skadar Lake, as well as in marshy meadows of Ulcinj District, situated more than 20 Km S of Skadar Lake, Montenegro (ADAMOVIĆ, 1996).

The scope of the present paper is a morphometric distinguishing between *Platycnemis pennipes pennipes* Pallas and *Platycnemis pennipes nitidula* Brullé, taken by the authors in Serbia and Montenegro, respectively.

## MATERIAL AND METHODS

A total of 283 adult damselfly specimens belonging to *Platycnemis pennipes pennipes* (193 ♂, 90 ♀), and 31 specimens pertaining to *Platycnemis pennipes nitidula* (24 ♂, 7 ♀) have been examined. The damselflies were taken by the authors at the following four sites in Serbia and Montenegro:

- (1) N o v i B e č e j (45°36' N 20°09' E), a town on the bank of the river Tisa, Banat, N Serbia. Canals and swamps with permanent, clean water overgrown with *Typha angustifolia*, *Sparganium erectum*, *Alisma plantago*, *Nymphoides peltata*, at the altitude of about 77 m. *Platycnemis p. pennipes*: 33 ♂, 13 ♀, taken from 24th till 28th July of 1995.
- (2) N e g o t i n (44°14' N 22°02' E), a town situated in the broad lowland of the Danube, E Serbia. Canal of the Jasenička River, with permanent, celan and slowly flowing water, lined with marshy vegetation of *Phragmites orientalis*, *Typha*

*latifolia*, *Calystegia sepium*, *Lythrum salicaria*, at about 45 m in altitude. *Platycnemis p. pennipes*: 43 ♂, 15 ♀, taken from 29th July till 1st August, 1996.

- (3) Krupačko Jezero (43°06' N 22°41' E), a karst lake situated 9 Km SE from the town of Pirot, E Serbia. A man-made outflowing stream with clean water, overgrown with *Potamogeton natans*, *Carex vulpina*, *Juncus glaucus*, *Galium palustre*, *Rumex conglomeratus*, at about 400 m in altitude. *Platycnemis p. pennipes*: 117 ♂, 62 ♀, collected in June and July of 1990.
- (4) Skadar Lake, Dodoši (42°20' N 19°09' E), a village on NE bank of Lake. A sluggish stream with sandy and silty bottom, and clean water overgrown with floating and submersed plants *Nuphar luteum*, *Nymphaea alba*, *Potamogeton fluitans*, *Myriophyllum spicatum*, *Ceratophyllum demersum*. The belt of emergent plants *Schoenoplectus lacuster*, *Typha angustifolia* and some other species grows along the bank with *Salix alba* and *Alnus glutinosa*. at about 6 m in altitude. *Platycnemis p. nitidula*: 24 ♂, 7 ♀, taken from 24th till 28th July of 1994.

The examinations were carried out in the way that was described and used in a previous paper (ADAMOVIĆ & VIJATOV, 1996). The mean values ± standard error were calculated on the eleven characters, separately for males and females. The one-way analysis of variance (ANOVA), and TUKEY and SNK (Student-Newman-Keuls) multiple comparison tests (ZAR, 1984) were carried out on characters which appeared to be useful in distinguishing between the two subspecies.

The nomenclature of the wing veins are used according to ASKEW (1988). - The material examined is in the collection of the Natural History Museum in Belgrade (600 BEO 95733).

## RESULTS

The detailed and comparable morphometric data on *Platycnemis pennipes pennipes* (PALLAS, 1771) from N and E Serbia, and *Platycnemis pennipes nitidula* (BRULLÉ, 1832) from SW Montenegro, are shown in Table I and Table II for males and females respectively.

The mean values of eleven characters examined in males and females of three samples of *P.p. pennipes*, collected at three sites in Serbia, are obviously very much alike. No statistically significant differences were found among them. In the same time, the mean values of a majority of characters investigated in males and females of *P.p. nitidula* taken at Skadar Lake in Montenegro are very similar to those of three samples of *P.p. pennipes* from Serbia (Tab. I and Tab. II).

Table I

Measurements (mm) in males of *Platycnemis p. pennipes* from Novi Bečej (N=33), Negotin (N=43), and Krupačko Jezero (N=117) in Serbia, and *Platycnemis p. nitidula* from Skadar Lake (N=24) in Montenegro; mean value  $\pm$  standard error.

Character	<i>P.p. pennipes</i>			<i>P.p. nitidula</i>
	Novi Bečej	Negotin	Krupačko Jezero	Skadar Lake
Abd	29.81 $\pm$ 0.21	29.60 $\pm$ 0.17	30.11 $\pm$ 0.08	31.43 $\pm$ 0.24
HW	20.18 $\pm$ 0.12	20.51 $\pm$ 0.09	21.38 $\pm$ 0.08	20.34 $\pm$ 0.14
pt HW	0.83 $\pm$ 0.02	0.79 $\pm$ 0.13	0.90 $\pm$ 0.01	0.88 $\pm$ 0.02
Pns FW	11.73 $\pm$ 0.15	11.91 $\pm$ 0.21	12.40 $\pm$ 0.10	12.17 $\pm$ 0.13
Pns HW	10.03 $\pm$ 0.14	10.19 $\pm$ 0.14	10.63 $\pm$ 0.10	10.42 $\pm$ 0.15
b R3FW	5.17 $\pm$ 0.06	5.01 $\pm$ 0.09	5.17 $\pm$ 0.05	5.08 $\pm$ 0.05
b R3HW	4.00 $\pm$ 0.06	4.03 $\pm$ 0.07	4.08 $\pm$ 0.04	4.00 $\pm$ 0.05
b IR2FW	3.27 $\pm$ 0.13	3.33 $\pm$ 0.11	3.25 $\pm$ 0.06	3.63 $\pm$ 0.16
b IR2HW	2.26 $\pm$ 0.12	2.64 $\pm$ 0.10	2.40 $\pm$ 0.06	2.75 $\pm$ 0.14
100 mw/HTl	11.85 $\pm$ 0.19	11.57 $\pm$ 0.16	11.40 $\pm$ 0.10	18.29 $\pm$ 0.40
mw/HTs	0.79 $\pm$ 0.01	0.76 $\pm$ 0.01	0.78 $\pm$ 0.01	1.52 $\pm$ 0.0

Abd = length of abdomen (including male appendages),

HW = length of hindwing,

pt HW = pterostigma costal length of hindwing,

Pns FW = number of postnodal crossveins in forewing,

Pns HW = number of postnodal crossveins in hindwing,

b R3FW = number of cells between subnodal crossvein and the separation of R3 in forewing,

b R3HW = number of cells between subnodal crossvein and the separation of R3 in hindwing,

b IR2FW = number of cells between the beginning of IR2 and the beginning of pterostigma in forewing,

b IR2HW = number of cells between the beginning of IR2 and the beginning of pterostigma in hindwing,

100mw/HTl = relative width of hind tibia (% maximum width of hind tibia length)

mw/HTs = ratio: maximum width of hind tibia / length of median tibial spine.

Table II

Measurements (mm) in females of *Platycnemis p. pennipes* from Novi Bečej (N=13), Negotin (N=15), and Krupačko Jezero (N=62) in Serbia, and *Platycnemis p. nitidula* from Skadar Lake (N=7) in Montenegro; mean value  $\pm$  standard error.

Character	<i>P.p. pennipes</i>			<i>P.p. nitidula</i>
	Novi Bečej	Negotin	Krupačko Jezero	Skadar Lake
Abd	30.35 $\pm$ 0.38	30.01 $\pm$ 0.27	30.55 $\pm$ 0.12	30.41 $\pm$ 0.76
HW	21.12 $\pm$ 0.33	22.25 $\pm$ 0.10	23.22 $\pm$ 0.12	21.44 $\pm$ 0.38
pt HW	0.92 $\pm$ 0.04	0.95 $\pm$ 0.04	1.02 $\pm$ 0.02	0.96 $\pm$ 0.04
Pns FW	12.00 $\pm$ 0.23	12.53 $\pm$ 0.20	12.82 $\pm$ 0.15	13.14 $\pm$ 0.26
Pns HW	10.46 $\pm$ 0.19	10.93 $\pm$ 0.26	10.98 $\pm$ 0.12	11.14 $\pm$ 0.41
b R3FW	5.15 $\pm$ 0.11	5.37 $\pm$ 0.17	5.10 $\pm$ 0.07	5.57 $\pm$ 0.13
b R3HW	3.77 $\pm$ 0.09	4.23 $\pm$ 0.11	4.10 $\pm$ 0.06	4.29 $\pm$ 0.15
b IR2FW	3.27 $\pm$ 0.17	3.47 $\pm$ 0.14	3.55 $\pm$ 0.10	4.21 $\pm$ 0.31
b IR2HW	2.38 $\pm$ 0.17	2.60 $\pm$ 0.19	2.62 $\pm$ 0.08	3.50 $\pm$ 0.44
100mw/HTI	11.13 $\pm$ 0.31	11.33 $\pm$ 0.22	10.91 $\pm$ 0.12	14.83 $\pm$ 0.62
mw/HTs	0.72 $\pm$ 0.02	0.70 $\pm$ 0.03	0.70 $\pm$ 0.01	0.98 $\pm$ 0.0

Abd = length of abdomen (including ovipositor),

HW = length of hindwing,

pt HW = pterostigma costal length of hindwing,

Pns FW = number of postnodal crossveins in forewing,

Pns HW = number of postnodal crossveins in hindwing,

b R3FW = number of cells between subnodal crossvein and the separation of R3 in forewing,

b R3HW = number of cells between subnodal crossvein and the separation of R3 in hindwing,

b IR2FW = number of cells between the beginning of IR2 and the beginning of pterostigma in forewing,

b IR2HW = number of cells between the beginning of IR2 and the beginning of pterostigma in hindwing.

100mw/HTI = relative width of hind tibia (% maximum width of hind tibia length)

mw/HTs = ratio: maximum width of hind tibia / length of median tibial spine.

The length of abdomen in males, the relative width of hind tibia, and the ratio: maximum width of hind tibia / length of median tibial spine in both males and females of *P.p. pennipes* and *P.p. nitidula* – appeared to be useful in the morphometric distinguishing between these two subspecies. An one-way analysis of variance (ANOVA), TUKEY, and SNK multiple comparison tests were carried out only on these characters. The ANOVA indicated that there were significant differences among the means of the three characters examined (Tab. III). All of the F-values were highly significant ( $P < 0.001$ ).

Table III

Results of the one-way ANOVA of the three selected characters of *Platycnemis p. pennipes* and *Platycnemis p. nitidula*. A total of eight samples (groups) are examined: m a l e s - Novi Bečej (N=33), Negotin (N=43), Krupačko Jezero (N=117), Skadar Lake (N=24); and, f e m a l e s = Novi Bečej (N=13), Negotin (N=15), Krupačko Jezero (N=62), Skadar Lake (n=7). - [Degrees of freedom m a l e s : between groups 3, within groups 213; - f e m a l e s : between groups 3, within groups 93]

Characters	M a l e s				Females			
	Groups	/	Error	F	Groups	/	Error	F
Abd	18.67	/	0.98	19	-	/	-	-
100mw/HT1	328.00	/	1.33	247	32.33	/	0.97	33
mw/HTs	3.93	/	0.01	393	0.17	/	0.01	17

All F - values highly significant,  $P < 0.001$ .

Abd = length of abdomen (including male appendages),

100mw/HT1 = relative width of hind tibia (% maximum width of hind tibia length),

mw/HTs = ratio: maximum width of hind tibia / length of median tibial spine.

An analysis of the relative width of hind tibia (100mw/HT1) of females of the both subspecies, using SNK multiple comparison test is shown as an example (Tab. IV). In these comparisons, the null hypothesis were rejected according to the SNK test, as well as the TUKEY test which is more robust. In conclusion, *Platycnemis p. pennipes* females from Novi Bečej, Negotin and Krupačko Jezero in Serbia were not different from each other, but they were significantly different from the females of *Platycnemis p. nitidula* from Skadar Lake, Montenegro. In other words, the females of the subspecies *nitidula* have significantly wider hind tibiae than the females of the nominate subspecies *pennipes*.

The overall results of the multiple comparison TUKEY-test and SNK-test applied on the means of the three characters are summarized in Table V. In the same time, they were significantly shorter than the abdomen length of *Platycnemis p. nitidula* males from Skadar Lake, Montenegro. This is not valid for females of *Platycnemis p. nitidula* from Skadar Lake. This may be due to a small sample (7 ♀) of the subspecies *nitidula* from Lake. Anyhow, the examinations of a sufficiently large sample of the *nitidula* females from the same area are necessary.

The males and females of the subspecies *nitidula* have significantly wider hind tibiae than the males and females of the nominate subspecies *pennipes* from Serbia.

The ratio: maximum width of hind tibia / length of median tibial spine of the males and females of *Platycnemis p. pennipes* from Novi Bečej, Negotin and

Krupačko Jezero were very much alike (Tab. V). That ratio of the males and females of *Platycnemis p. nitidula* from Skadar Lake was significantly larger than that of the nominate subspecies *Platycnemis p. pennipes* from Serbia. In other words, the median tibial spines of *Platycnemis p. nitidula* from Montenegro, are relatively shorter than those of *Platycnemis p. pennipes* from Serbia (Tab. I, II, and V).

Table IV

The SNK multiple comparison test with unequal sample sizes, applied on the mean values of the relative width of hind tibia (100mw/HTI), of the following four samples of females: *Platycnemis p. pennipes* from Krupačko Jezero (KJ), Novi Bečej (NB), Negotin (N) in Serbia, and *Platycnemis p. nitidula* from Skadar Lake (SL) in Montenegro. [The probability,  $P < 0.001$ ]

Samples ranked by means:	KJ	NB	N	SL
Ranked sample means:	10.91	11.13	11.33	14.83
Sizes of samples:	62	13	15	7

Comparison	Difference of means	SE	q	p	Q	The null hypothesis
SL – KJ	3.92	0.28	14.00	4	5.653	Reject
SL – NB	3.70	0.33	11.21	3	5.365	Reject
SL – N	3.50	0.32	10.94	2	4.894	Reject
N – KJ	0.42	0.20	2.10	3	5.365	Accept
N – NB	0.20	0.26	0.74	2	4.894	Accept
NB – KJ	0.22	0.21	1.05	2	4.894	Accept

Overall conclusion: NB N KJ SL

Table V

Results of the TUKEY and SNK multiple comparison tests applied on the means of three morphometric characters of *Platycnemis p. pennipes* from Novi Bečej (NB), Negotin (N), Krupačko Jezero (KJ) in Serbia, and *Platycnemis p. nitidula* from Skadar Lake (SL) in Montenegro.

Character	Males				Females			
	<u>NB</u>	<u>N</u>	<u>KJ</u>	<u>SL</u>	<u>NB</u>	<u>N</u>	<u>KJ</u>	<u>SL</u>
Abd	<u>NB</u>	<u>N</u>	<u>KJ</u>	<u>SL</u>				
100mw/HTI	<u>NB</u>	<u>N</u>	<u>KJ</u>	<u>SL</u>	<u>NB</u>	<u>N</u>	<u>KJ</u>	<u>SL</u>
mw/HTs	<u>NB</u>	<u>N</u>	<u>KJ</u>	<u>SL</u>	<u>NB</u>	<u>N</u>	<u>KJ</u>	<u>SL</u>

There is no significant difference among the samples which are underlined together.

Abd = length of abdomen (including male appendages),

100mw/HTI = relative width of hind tibia (% maximum width of hind tibia length),

mw/HTs = ratio: maximum width of hind tibia / length of median tibial spine.

## DISCUSSION

JACOBSON & BIANCHI (1905) based distinction between *P. pennipes* (PALLAS, 1771) and *P. insularis* Selys 1863, mainly upon the shape and pattern of tibiae of the middle and hind legs. According to those authors, males and females of *P. pennipes* are with "moderately expanded tibiae, marked with a long median black stripe", while those of *P. insularis* "are very much expanded and marked with just a vestige of the median black stripe at the proximal end of tibia."

That remained the main distinction between the two subspecies, *P.p. pennipes* and *P.p. nitidula* (= *insularis*). That was proved morphometrically in the present paper.

HEYMER (1968) considered *P.p. nitidula* as a good species, but he added that: "par conséquent, il faut attirer l' attention sur le fait que *Platycnemis hyalinata* ne peut être une sous-espèce de *Platycnemis pennipes*. Bien entendu, les conditions de répartition précises que la position systématique de cette espèce restent à examiner".

DUMONT (1977) added some valuable details about colour, pattern, flight and distribution of *P.p. nitidula*, and he made some interesting comments about "absence de reproduction entre *pennipes* et *nitidula*, par séparation des populations respectives" as well as "la danse nuptiale du mâle, les tibias aplatis qui sont offerts à la femelle." However, "ther is no evidence to suggest the function of the dilated tibiae during courtship" - pointed out MARTENS (1997). - All that have to be taken into consideration in future examinations.

As already mentioned, the records of this species in Serbia, Macedonia, and the continental part of Montenegro refer to the nominate subspecies *Platycnemis pennipes pennipes* (Pallas, 1771). They are as follows:

Serbia - Loznica, Krupanj, Mali Zvornik (MILJKOVIĆ, in PETROVIĆ *et al.*, 1891); Banat and Bačka (KOHOUT, 1896); Mitrovica, Peć, Djakovica (PONGRACZ, 1923); Ruma, Požarevac (ADAMOVIĆ, 1948); Beograd and the country surrounding that town, Pančevo, Obrenovac, Zrenjanin, Apatin, Debeli Lug, Brđani, Gornji Milanovac, Sveta Petka, Staničenje, Rogot, Ferizović in Kosovo, Zaječar, Pirot (ADAMOVIĆ, 1949; specimens from two latest sites have been taken and identified by Kosta MARIĆ at the beginning of this century); Mramorak (ADAMOVIĆ, 1956); Obedska Bara, Srem (TRIPKOVIĆ-ČUBRILOVIĆ, 1960); Jarak and Fenek in Srem, Šalinac, Kuluč, Ljig, Rajac Mt., Divčibare, Zlatibor Mt., Vlasina, Donji Dušnik, Zaplanje, Kremna, Bela Palanka (ANDJUS, 1992); Petnica near Valjevo (BRANKOVIĆ, 1996); Sikole near Negotin, and Svinjarska Reka at Rtanj Mt. (MLADENOVIĆ, 199 ); Novi Bečej (ADAMOVIĆ & VIJATOV, 1996).



Macedonia - Ohrid Lake (FILEVSKA, 1954); Drenovo in Golešnica Mt., Matka, Vratnica in Šara Mt. (BUCHHOLZ, 1963); Skoplje, Kotlanovo, Kozjak Mt., Probištip (KARAMAN, 1969); Dojran Lake (KARAMAN, 1981); Demir Kapija, Prespa Lake, "an allen stagnierenden und fliessenden Gewässern Mazedoniens gegenwärtig" (PETERS & HACKETHAL, 1986); Strumica (ADAMOVIĆ, 1990).

Montenegro, the continental part of the country - Korita in Lovćen Mt. (PONGRACZ, 1923); Žugića Bare (1400 m) in the mountain Durmitor (ADAMOVIĆ *et al.*, 1996).

The subspecies *Platycnemis pennipes nitidula* (BRULLÉ, 1832) was recorded just in the Mediterranean part of Montenegro, namely: - Rijeka Crnojevića (BARTNEV, 1912); Virpazar (DUMONT, 1977); Dodoši (ADAMOVIĆ, 1996); these three sites are situated at the bank of the NW end of Skadar Lake; Donji Štoj near Ulcinj, more than 20 kilometres south from Skadar Lake (ADAMOVIĆ, 1996).

PETKOV (1921) recorded both subspecies, *pennipes* and *hyalinata* (= *nitidula*), in Bulgaria. However, BESCHOVSKI (1991, 1993) announced that PETKOV's *hyalinata* was "one of several misidentifications". The nominate subspecies *Platycnemis pennipes pennipes* is to be found in Bulgaria.

*Platycnemis p. pennipes* was found also in NE Greece (GALLETTI & PAVESI, 1983), and in Thracia and W Anatolia (DUMONT, 1977).

*Platycnemis p. nitidula* is distributed in S and W Greece, in Peloponnesus, Epyrus and Tessalia (GALLETTI & PAVESI, 1983), the island Korfu (SCHMIDT, 1950), and Adriatic part of Albania, "in Albania, it is one of the most widespread insects on running waters and its populations are homogeneous throughout the country" (DUMONT *et al.*, 1993).

MARTENS (1996) figured correctly the map of distribution of *P.p. nitidula*. However, he added that: "An der dalmatinischen Adriaküste ist die Nordwestgrenze von *nitidula* noch nicht genau bekannt."

Marshy plains in SW Montenegro appear to be the north limit of *P.p. nitidula* distribution in the E Adriatic coastal zone (ADAMOVIĆ, 1996).

The Dinaric Mountains stretch from NW towards SE almost paralele with the Adriatic Sea coast, and at a relatively short distance from the Sea. The Mediterranean climate, that is characteristic of the Adriatic coast and islands, penetrates deeper inland just through the valleys of the rivers emptying into the Sea. Two main areas relevant to the distribution of *Platycnemis* subspecies are: (1) the valley of the river Neretva in Herzegovina, and (2) the valley of the river Bojana, the plain of Skadar Lake, and the valley of the river Morača in Montenegro (Fig. 1). CVIJIĆ

(1918) designated those two areas “Golfes de climat méditerranéen modifié”. Far back, on the very beginning of the 19th century, BECK-MANNAGETTA described the vegetation - “a mixture of the Mediterranean and karstic plant species” - and mapped those areas, pointing out the similarity between “the transitional regions” of (1) Hercegovina and (2) Montenegro (BECK-MANNAGETTA, 1901).

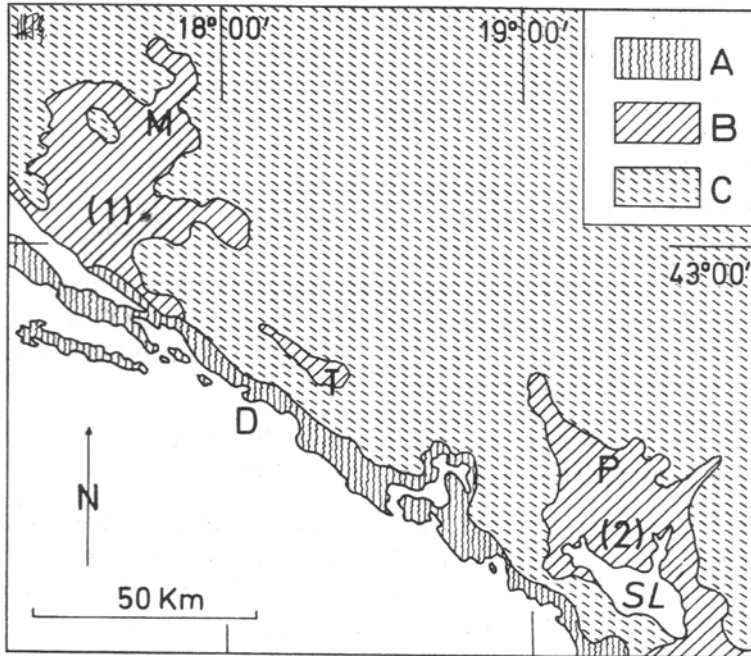


Fig. 1. A sketch map showing the vegetation types of the South Adriatic Coast (after: BECK-MANNAGETTA, 1901): A - the macchie of the narrow coastal belt and the islands experiencing Mediterranean climate; B - two main “Bays of the Mediterranean climate, slightly modified” in the valleys of the rivers emptying into the Adriatic Sea (after: CVIJIĆ, 1918); BECK-MANNAGETTA designated them “The transitional regions” overgrown with “a mixture of the Mediterranean and karstic plant species” situated in: (1) Hercegovina, the valley of the river Neretva, and (2) Montenegro, the valley of the river Bojana, the plain of Skadar Lake, and the valleys of the rivers Morača and Zeta; C - the vegetation of the Dinarids, high limestone mountains. This vegetation is over-simplified in the present sketch map because the “Bays of the Mediterranean climate” are relevant for distribution of *Platycnemis* subspecies. *Platycnemis p. pennipes* is a common damselfly in the “Bay” (1), that is the valley of the Neretva, as well as in Dubrovnik District. It is absent in the “Bay” (2) in Montenegro, where *Platycnemis p. nitidula* is a common damselfly. - Some other marks are: - M = Mostar; - T = Trebinje; - D = Dubrovnik; - P = Podgorica; - SL = Skadar Lake.

*Platycnemis p. nitidula* is found just in the second area, Montenegro. The nominate subspecies, *Platycnemis p. pennipes* is a common damselfly in the first area

that is the valley of the Neretva in Hercegovina, as well as in Dubrovnik District, stretching from the Neretva Delta to the Bay of Kotor (ADAMOVIĆ, 1967). STEIN (1863) recorded a male and three females of *Platycnemis p. pennipes* at Herceg-novi (Castelnuovo) in the Bay of Kotor. However, *P. p. pennipes* was absent in the second "bay of the Mediterranean climate" in SW Montenegro (Fig. 1) (ADAMOVIĆ, 1996).

The distribution of *Platycnemis p. nitidula* (Brullé, 1832) in S and W Greece, W Albania and SW Montenegro is similar to the distribution of *Calopteryx balcanica* Fudakowski, 1930. The latter species was described as a subspecies *Calopteryx splendens balcanica* from Trebinje, Mostar and Metković in the Neretva Delta. LOHMANN (1992) considered *C. balcanica* a good and "endemic species with broad wings and blue-coloured females, ranging from the Peloponnesus, southern and southwestern Greece, Albania, Montenegro and Herzegovina, to southern Dalmatia."

*Platycnemis p. nitidula* appears to remain in the Mediterranean part of Montenegro, and it did not reach the Dubrovnik District and the Neretva Delta.

DUMONT *et al.* (1993) pointed out another interesting detail about the distribution of *Platycnemis p. nitidula* in Albania, namely; "The range of *Pyrrhosoma nymphula elisabethae* appears even more limited than that of *Platycnemis pennipes nitidula*, together with which it constitutes a small, but significant element of damselfly endemism in the southern Balkan." - *Pyrrhosoma elisabethae* was described as a new species from Peloponnesus, Greece, by SCHMIDT (1948).

The distribution of the two *Chalcolestes* species in the South Adriatic shore indicated that the SW end of Montenegro - "Bay (2)" - is biogeographically very interesting. The species *Chalcolestes parvidens* (Artobolevski, 1929) was found at Donji Štoj, a village near the town of Ulcinj, SW end of Montenegro (ADAMOVIĆ, 1996); while *Chalcolestes viridis* (Vander Linden, 1825) was recorded in Konavli, Ombla, and the Island of Mljet in Dubrovnik District (ADAMOVIĆ, 1967).

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МОРФОМЕТРИЈСКО РАЗЛИКОВАЊЕ *PLATYCNEMIS PENNIPES*  
*NITIDULA* BRULLÉ 1832, OD *P.P. PENNIPES* PALLAS 1771 (ODONATA:  
PLATYCNEMIDIDAE)

Ж.Р. АДАМОВИЋ И С.Т. ВИЈАТОВ

И з в о д

Приказујући Одоната Мађарске, КОНАУТ (1896) пописао је и 20 врста - укључујући *Platycnemis pennipes* Pallas - за јужни део Панонске низије, који данас припада Србији. Први аутор овог рада наводећи списак тих врсти у једном ранијем раду додао је следећи коментар: "ових 20 врста представљају вероватно и прве научне податке о овим инсектима у Србији" (АДАМОВИЋ, 1949). Међутим, аутор је недавно утврдио да је професор Љубомир Миљковић нашао и одредио низ инсекатских врста - међу њима и три врсте Одоната, од којих је једна била *Platycnemis pennipes* Pallas - између Лознице, Крупња и Малог Зворника у западној Србији, и Сребренице у источној Босни, 1890 године. Миљковић је свој списак нађених инсеката објавио у једном заједничком раду (PETROVIĆ *et al.*, 1891) дакле - пет година пре КОНАУТ-а.

BARTENEV (1912) је први нашао подврсту *Platycnemis pennipes nitidula* (Brullé, 1832) код Ријеке Црнојевића на Скадарском Језеру у Црној Гори. Подврста *nitidula* нађена је и на мочварним ливадама између Улциња и Бојане у Црној Гори (АДАМОВИЋ, 1996).

У овом раду су три серије примерака *P.p. pennipes*, из Новог Бечеја, Неготина и Крупачког Језера код Пирота, морфометријским поступком упоређене међусобно као и са једном серијом примерака *P.p. nitidula* са Скадарског Језера - што су их аутори прикупили у Србији и Црној Гори. Анализом варијансе и одговарајућим тестовима (TUKEY и SNK) у овом раду је утврђено да одрасли мужјаци и женке *P.p. nitidula* имају статистички сигнификантно шире тибије задњих ногу од мужјака и женки основног облика *P.p. pennipes*. Истовремено, размера: максимална ширина задње тибије/дужина медијалне чекиње, сигнификантно је већа код оба пола подврсте *P.p. nitidula* него код основног облика *P.p. pennipes*. - Утврђено је такође да мужјаци *P.p. nitidula* имају сигнификантно дужи абдомен од оног код *P.p. pennipes*. Ово није установљено код женки, што се можда

може приписати малом узорку женки *P.p. nitidula* (7 ♀). - Примерци *P.p. pennipes* сва три узорка из Србије показали су велику хомогеност (Таб. I, II). Нису нађене сигнификантне разлике ни у једној од 11 испитаних карактеристика.

У раду је коментарисано и распрострањење *P.p. pennipes* и *P.p. nitidula*. - Основној форми, *P.p. pennipes* припадају сви до сада објављени налази ове врсте у Србији, Македонији и континенталном делу Црне Горе. *P.p. pennipes* је распрострањен и у Бугарској, северној Грчкој, и западној Анатолији. - Подврста *P.p. nitidula* распрострањена је на Пелопонезу, у јужној и западној Грчкој, на острву Крфу, у западној Албанији, и у југозападном, приморском делу Црне Горе.

Распрострањење подврсте *P.p. nitidula* слично је распрострањењу балканске ендемске врсте *Calopteryx balcanica* Fudakowski 1930. Ова последња врста распрострањена је исто као и *P.p. nitidula*, почев од Пелопонеза. Међутим, *C. balcanica* је нађена и у Дубровачком Подручју и медитеранском делу Неретвљанске долине у Херцеговини (ADAMOVIĆ & VIJATOV, 1996). - Подврста *P.p. nitidula* није нађена у Дубровачком Подручју нити делти Неретве (ADAMOVIĆ, 1967). Ова подврста је, изгледа, стварно ограничена на приморски, југозападни део Црне Горе (ADAMOVIĆ, 1996). - Трећа ендемска подврста јужног Балкана "*Pyrrhosoma nymphula elisabethae* Schmidt 1948, изгледа да је још више ограничена у свом распрострањењу" - од Пелопонеза, где је и описана, нађена је у јужном, приморском делу Албаније (DUMONT *et al.*, 1993).

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