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PROTURA IN SERBIA

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ABSTRACT. During the period of last 30 years, members of the order Protura were collected from the litters of different deciduous forests, such as oaks, beech, accacia and elm, as well as from the meadow soils on different localities of the teritory of Serbia. The presence of 38 species belonging to four families was registered (Hesperentomidae, Protentomidae, Acerentomidae and Eosentomidae).

Key words: Protura, Hexapoda, Serbia.

INTRODUCTION

Proturas inhabit soils in all terrestrial habitats worldwide, excepting the Arctic and Antarctic regions (PASS & URBAN SZUCSICH, 2011).

The most important lists of the world species were published by TUXEN (1931, 1964), MILLS (1933), ROSAS COSTA (1950) and PACLT (1955). Very important data about Protura are presented in regional monographs concerning Europe (NOSEK, 1973), Japan (IMADATÉ, 1974), New Zealand (TUXEN, 1986) and China (YIN, 1999). Also, fauna of Protura was investigated in Romania by IONESCU (1951), in France, Greece, Slovenia, and other parths of the World by CONDÉ (1961) and in Bosna and Herzegovina by CVIJOVIĆ (1970).

Exactly, the first knowledge about Protura on Balkan Peninsula comes from SILVESTRI (1907). Two years latter the first monography of that group was published by the other Italian zoologist, BERLESE (1909). This monography contained descriptions of the three genera and 11 species as well as many important data about morphology of the group.

Protura live in soil, moss and leaf litter. They are generally spatially restricted to the uppermost 10 centimeters of ground depth. As fungivores and detrivores, members of the order Protura have a significant role in functioning of terrestrial ecosystems (GILLOTT, 1995; CHRISTIAN and SZEPTYCKI, 2004; SZEPTYCKI, 2007).

A great deal of informations about fauna of Protura on the territory of Serbia and Former Republics of Yugoslavia are presented in studies of BLESIĆ (1993, 1998a,b, 2000, 2001, 2002, 2004, 2005), BLESIĆ *et al.* (1998), BLESIĆ and MITROVSKI (2003).

MATERIAL AND METHODS

Material was collected at different localities in Central and South-East Serbia, during the period of last approximately 30 years (Fig. 1).

Tulgren-Berlesse apparatus were used for separation of Proturas in the laboratory. Material was preserved in 70% ethanol, and after preparation specimens were identified to the species level with help of few keys (PALISSA, 1964; TUXEN, 1964; NOSEK, 1973).

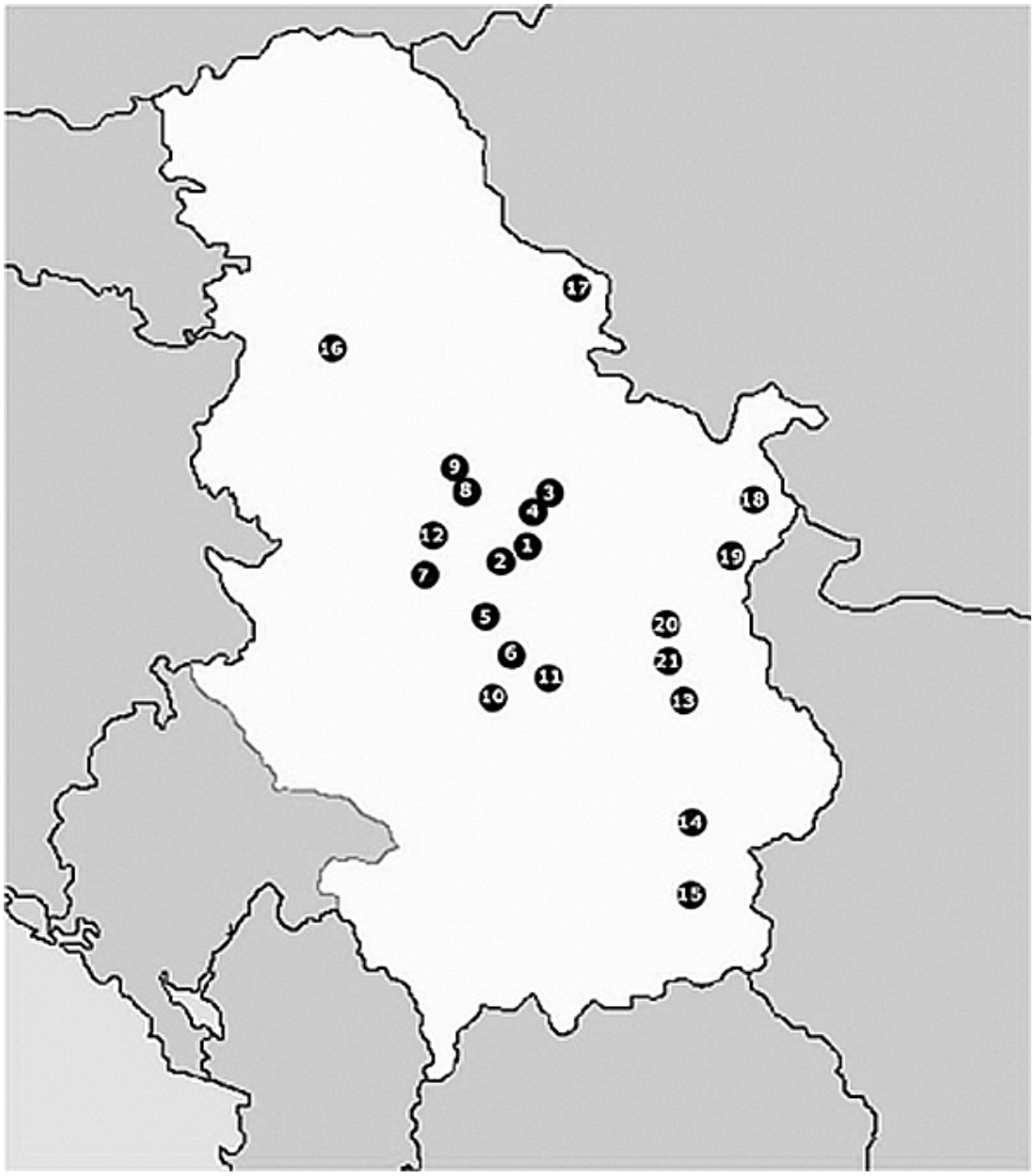

Figure 1. - Map of Serbia with sampling localities: 1 - Kragujevac and surrounding, 2 - Knić, 3 - Lapovo, 4 - Batočina, 5 - Kraljevo, 6 - Goč, 7 - Čačak, 8 - Topola, 9 - Aranđelovac, 10 - Kopaonik, 11 - Jastrebac, 12 - Gornji Milanovac, 13 - Niš, 14 - Leskovac, 15 - Vranje, 16 - Obedska bara, 17 - Vršac, 18 - Negotin, 19 - Zaječar, 20 - Rtanj, 21 - Ozren.

RESULTS AND DISCUSSION

SZEPTYCKI (2007) lists a total of 748 described species worldwide. The European Protura is presented with 177 species, and within this order 95 species and two subspecies belong to the family Acerentomidae, 60 species and six subspecies from the family Eosentomidae and 14 species of Protentomidae (SZEPTYCKI, 2005).

From the Protura material collected on the teritory of Serbia, 38 species from four families. A list of them is given in Table 1.

On the basis of obtained results it can be concluded that the family Acerentomidae with 29 registered species was the most diverse. The most of Protura individuals was collected in litters of woods, while they were much less present in the meadows' soil (BLESIĆ, 2004).

The most abundant and most frequent in different ecosystems was *Eosentomon transitorium* (BLESIĆ 1993, 1998, 2000, 2001, 2002, 2004). These results could be explained by its cosmopolitan character (TUXEN, 1964).

Table 1. List of Serbian Protura species registered during the last three decades.

SUBORDO **A C E R E N T O M A T A**
FAMILIA: **HESPERENTOMIDAE** Price, 1960
Genus *Ionescuellum* Tuxen, 1960
Ionescuellum carpaticum (Ionesco, 1930) (=*Paraentomon carpaticum* Ionesco, 1930) [BLESIĆ, 2000]
FAMILIA: **PROTENTOMIDAE** Ewing, 1936
Genus *Protentomon* Ewing, 1921
Protentomon thienemanni Strenzke, 1942 - [BLESIĆ, 2002b]
P. tuxeni Nosek, 1966 - [BLESIĆ, 2002b]
Genus *Proturentomon* Silvestri, 1909
Proturentomon condei Nosek, 1967 - [BLESIĆ, 2002b]
P. minimum (Berlese, 1908) (=*Acerentomon minimum* Berlese, 1808) - [BLESIĆ 2002b, 2005]
FAMILIA: **ACERENTOMIDAE** Silvestri, 1907
Berberentulinae Yin, 1983
Genus *Acerentulus* Berlese, 1908
Acerentulus alpinus Gisin, 1945 - [BLESIĆ, 2002b]
A. carpaticus Nosek, 1967 - [BLESIĆ, 2002b]
A. catalanus Condé, 1951 - [BLESIĆ 2002b, 2005]
A. confinis (Berlese, 1908) - [BLESIĆ 1998a, 2002b, 2005]
A. exiquus Condé, 1944 - [BLESIĆ, 2005]
A. gerezianus da Cunha, 1952 - [BLESIĆ 2002b, 2005]
A. rafalskii, Szeptycki, 1979 - [BLESIĆ, 2002b]
A. seabrai da Cunha, 1952 - [BLESIĆ, 2005]
A. traegardhi Ionesco, 1937 - [BLESIĆ 1998a, 1998b, 2000, 2001, 2002a, 2002b, 2004, 2005]
A. tuxeni Rusek, 1966 - [BLESIĆ, 2002b]
A. xerophylus Szeptycki, 1979 - [BLESIĆ, 2002b]
Genus *Gracilentulus* Tuxen, 1963
Gracilentulus gracilis (Berlese, 1908) - [BLESIĆ, 2000]
G. meridianus (Condé, 1945) - [BLESIĆ 2000, 2002b]

Genus *Maderentulus* Tuxen, 1963
Maderentulus maderensis (Condé,1975) - [BLESIĆ, 2002b]
Acerentominae Silvestri, 1907
Genus *Acerentomon* Silvestri, 1907
Acerentomon balcanicum Ionesco, 1933 - [BLESIĆ 1993, 1998a, 2000, 2002a, 2002b, 2004, 2005]
A. brevisetosum Condé, 1945 - [BLESIĆ, 2002b]
A. gallicum Ionesco, 1933 - [BLESIĆ, 2002b]
A. hilophylum Rusek, 1966 - [BLESIĆ, 2002b]
A. imadatei Nosek, 1967 - [BLESIĆ, 2002b]
A. meridionale Nosek, 1960 - [BLESIĆ 1998a, 2002b]
A. mesorchinus Ionesco, 1930 - [BLESIĆ, 2002b]
A. microrinchus Berlese, 1909 - [BLESIĆ, 2002b]
A. parvum Szeptycki, 1980 - [BLESIĆ, 2005]
A. quercinum Ionesco, 1932 - [BLESIĆ, 2002b, 2005]
A. tenuisetosum Nosek, 1973 - [BLESIĆ, 2002b]
Acerellinae Yin, 1983
Genus *Acerella* Berlese, 1909
A. muscorum (Ionesco, 1930) - [BLESIĆ, 2002b]
A. remyi (Condé,1944) - [BLESIĆ, 2002b]
A. tiarnea (Berlese, 1908) - [BLESIĆ, 2002b]
Nipponentominae Yin, 1983
Genus *Nosekiella* Rusek, 1974
Nosekiella danica (CONDÉ, 1947) (=*Acerentulus danicus* Condé, 1947) - [BLESIĆ, 2002b]

SUBORDO **E O S E N T O M A T A**

FAMILIA: **EOSENTOMIDAE** Berlese, 1909
Eosentominae Berlese, 1909
Genus *Eosentomon* Berlese, 1908
Eosentomon coiffaiti Condé,1961 - [BLESIĆ, 2000]
E. delicatum Gisin, 1945 - [BLESIĆ 2002b, 2005]
E. germanicum Prell, 1912 - [BLESIĆ 2005]
E. transitorium Berlese, 1908 - [BLESIĆ 1993, 1998a, 1998b, 2001, 2002a, 2002b, 2004, 2005]

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