
CONTRIBUTION TO THE KNOWLEDGE OF PEDOFAUNA IN ŠUMADIJA (CENTRAL PART OF SERBIA)

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ABSTRACT

Intensive investigations of some groups of soil fauna in Šumadija were permanent more than 20 years. This central part of Serbia, has an interesting geological history. It's interesting flora and fauna partially is result of continuous anthropogenic influences in the last centuries. In these investigations were included: (Insecta, Coleoptera), Lumbricidae (Oligochaeta), and Protura and Diplura (Insecta, Apterygota). The studied ecosystems were natural (forests and meadows) and anthropogenous (orchards, gardens, fiels and artificial meadows). Earthworms from family Lumbricidae, were established 14 genera with 30 taxa and 6 new species for Šumadija: Dendrobaena alpina, Helodrilus cernovitianus, Octolasion cyaneum, Octodrilus complanatus, Serbiona serbica and Serbiona paratuleskovi. From the subfamily Cryptorhynchinae (Curculionidae) founded 5 genera, 12 species and three dominant species: Ruteria hypocrita, Echinodera behnei and Acallocrates colonnellii. New records of five weevils: Acalles (Acalles) aubei, Acalles papei, Acelles petryszaki, Echinodera behnei, Echinodera valida are given for Serbia. From Protura founded 3 families, 7 genera with 16 species, from Diplura founded 2 families which belong to 7 genera with 16 species.

Keywords: Serbia, Šumadija, soil fauna

Introduction

The middle part of Serbia is Šumadia. It is located among the rivers: Great and West Morava, Danube, and Kolubara. The most important morphological characteristics are low mountains (Rudnik, Avala, Bukulja) and wide valleys. The climate is continental with microclimatic differences.

In the first papers about lumbricids in Šumadija, Šapkarev (35) and Karaman (13, 14, 15) had cited only eight taxa. But later Šapkarev (36) had found 16 taxa (with 14 species). After mentioned period, the earthworm fauna of Šumadija has been widely studied (16, 17, 18, 19, 20, 22, 24, 29, 31, 37).

Curculionidae is the biggest recent animal family in the world. It contains about 80.000 described species (1, 26). Members of this family are predominantly remarkable by the elongate rostrum (they look like the small elephants among other beetles), by the geniculate antennae, and the small (often concealed) palpi (25). Among other possibilities, some of them chose to be soil settlements. One of those soil groups

is the subfamily Cryptorhynchinae. Common morphological characteristics of these weevils are the rostrum hidden in the gutter on prothorax between fore coxae, fore tibiae finished with a curved horn on the outside angle, upper body side covered with scales, mostly brown and grey, which make light and dark design (11).

After 30 years investigation the number of species of *Diplura* and *Protura* have to increased (5, 6, 7, 8, 9, 10).

Materials and Methods

Our investigations were carried out in the area of Central part of Serbia (Šumadija). In the last investigations period (1996-2009) on all over the territory of Šumadija we had collected earthworm from various habitats which included natural (river banks, meadows, forest community: *Quercetum-confertae cerris* and *Fagetum montanum*; mountain pasteurs) and cultivated biotops. Earthworms were collected by formalin method and digging 0,4X0,4m quadrates. Specimens were immedietely fixed in 4% formalin and transferred to 90% ethanol.

The presence of adult weevils was studied during the period 1995-2007, from different types of habitats on several localities in the Central Serbia (Žeželj, Mt Gledičke planine, Mt Rudnik and Mt Bukulja). Pitfall traps with acetic-acid or red wine, sowing of the samples of superficial layer of soil (to 20 cm of depth) combined with Tulgren-Berlesse apparatus were used for collecting adult weevils' material. The identification of species was carried out in accordance with the descriptions given in the «keys» (3, 4, 11). The sex was determined for each specimen.

From the collecting entomological material individuals of *Diplura* and *Protura* (*Insecta*) were separated from samples collected and determined on usual way. The collecting of *Protura* and *Diplura* (*Insecta*) done on about more than 100 localities in Šumadija.

Results and Discussion

During our investigations to 1995 total number of earthworms taxa which have been found in Šumadija were 37 (31). In our collection from this area, after that period (1996-2009) we have identified 30 taxa and 6 species which are new for the earthworm fauna in Šumadija: *Dendrobaena alpina*, *Helodrilus cernosvitovianus*, *Octolasion cyaneum*, *Octodrilus complanatus*, *Serbiona serbica* and *Serbiona paratuleskovi*. Therefore, the total number of lumbricid taxa of Šumadija has risen to 44. The complete list of earthworms species from Šumadija is given in the **Table1**.

The most abundant lumbricids in Šumadija is *A. rosea*, *L. rubellus* and *O. lacteum*. They are also very frequently met and distributed almost everywhere.

Most species belonging to the genera *Aporrectodea* (10 species, resp. 11 taxa) and *Dendrobaena* (8 species, resp. 9 taxa). Very interesting for the investigation territory is finding of two endemic species from genus *Serbiona*: *S. paratuleskovi* and *S. serbica*. Because it is their first finding in Šumadija we give their descriptions.

Allolobophora chlorotica (Savigny 1826)

Habitat: forest soils, cultivated soils, meadows

Localities: 7exp., Jastrebac, 3.06.1995; 3exp., Jastrebac, 27.08.1995.

Aporrectodea caliginosa caliginosa (Savigny 1826)

Habitat: forest soils, wet meadows

Localities: 1exp., Goč, 28.06.1999; 5exp., Goč, 01.04.1999; 13exp., Gledičke planine, 03.07.1999.

Aporrectodea caliginosa trapezoides (Duges 1826)

Habitat: forest soils, cultivated soils

Localities: 1exp., Jastrebac, 03.06.1995; 2exp., Jastrebac, 27.08.95; 5exp., Goč, 28.06.1999.

Aporrectodea georgii (Michaelsen 1890)

Habitat: forest soils, wet meadows

Localities: 1exp., Kraljevo, 05.04. 2008; 4exp., Kraljevo, 07.04.2008; 1exp., Kraljevo, 14.04.2008.

Aporrectodea rosea (Savigny 1826)

Habitat: forest soils, cultivated soils, meadows

Localities: 2exp., Jastrebac, 03.06.1995; 4exp., Jastrebac, 27.08.95; 9exp., Kalenić, 07.06.1998; 7exp., Goč, 28.06.1999; 6exp., Goč, 01.04.1999; 28exp., Gledičkeplanine, 03.07.1999; 4exp., Duleni, 17.04.2001

Apporectodea sineporis (Omodeo, 1952)

Habitat: meadows

Localities: 8 exp., Kraljevo, 23.03.2008.

Serbiona dofleini (Ude 1922)

Habitat: hill pastures

Localities: 2exp., Jastrebac, 03.06.1995.

Serbiona kosowensis kosowensis (Karaman 1968)

Habitat: meadows

Localities: 5exp., Goč, 28.06.1999.

Serbiona robusta serbica (Karaman 1983)

Habitat: pastures

Localitiy: 1exp., Gledičke planine, 03.07.1999.

Serbiona paratuleskovi (Šapkarev 1975)

Habitats: meadow

Locality: 1exp., Kragujevac, 19.04.1995.

Serbiona serbica (Šapkarev 1977)

Habitats: river banks

Locality: 1exp., Rasina, 07.04.2001.

- Dendrobaena. alpina* (Rosa 1844)
Habitat: forest soil
Locality: 1exp., Kalenić, 16.05.1995.
- Dendrobaena. attemsi* (Michaelsen 1903)
Habitat: forest soils, meadows
Localities: 3 exp., Jastrebac, 3.06.1995; 12exp., Stolovi, 3.10.2002.
- Dendrobaena. byblica* (Rosa 1893)
Habitat: forest soils, meadows, river bank
Locality: 2exp., Jastrebac, 3.06.1995.
- Dendrobaena hortensis* (Michaelsen, 1890)
Habitat: forest soils, hill meadows
Locality: 3exp., Kalenić, 07.06.1998.
- Dendrobaena jastrebensis* Mršić Šapkarev 1987
Habitat: forest soils, hill meadows
Localities: 2exp., Jastrebac, 03.06.1995; 10exp., Jastrebac, 27.08.1995.
- Dendrobaena octaedra* (Savigny 1826)
Habitat: forest soils, meadows
Localities: 3exp., Kalenić, 27.08.95; 8exp., Goč, 28.06.1999; 1exp., Rasina, 07.04.2001.
- Dendrobaena vejdvovskyi* (Cernosvitov 1935)
Habitat: forest soils, meadows
Localities: 3exp., Kalenić, 27.08.95; 4exp., Goč, 28.06.1999; 1exp., Stolovi, 02.10.2002.
- Dendrodrilus rubidus rubidus* (Savigny 1826)
Habitat: forest soils
Localities: 4exp., Jastrebac, 3.09.1995.
- Dendrodrilus rubidus tenuis* (Eisen 1874)
Habitat: hill meadows
Localities: 1exp., Jastrebac, 27.08.1995.
- Eisenia lucens* (Waga 1857)
Habitat: forest soils, pastures
Localities: 1 exp., Jastrebac, 03.09.1995; 2exp., Stolovi, 2.10.2002.
- Eiseniella tetraedra tetraedra* (Savigny 1826)
Habitat: wet meadows, river bank
Localities: 7 exp., Jastrebac, 3.06.1995; 3exp., Jastrebac, 27.08.1995.
- Fitzingeria platyura platyura* (Fitzinger 1883).
Habitat: wet forest soils, river bank, meadows
Localities: 10 exp., Jastrebac, 03.09.1995; 1exp., Goč, 28.06.1999; 4exp., Stolovi, 2.10.2002.
- Helodrilus cernosvitovianus* (Zicsi 1967)
Habitats: forest soil
Lokalitij: 1exp., Bukulja, 10.05.2003.
- Lumbricus rubellus* Hoffmeister 1843
Habitat: forest soils, cultivated soils, meadows
Localities: 7exp., Jastrebac, 3.06.1995; 11exp., Jastrebac, 27.08.1995; 11exp., Kalenić, 07.06.1998; 6exp., Goč, 28.06.1999; 9exp., Goč, 01.04.1999; 6exp., Gledićkeplanine, 03.07.1999; 7exp., Stolovi, 02.10.2002; 12exp., Stolovi, 03.10.2002; 1exp., Rasina, 07.04.2001; 17exp., Duleni, 17.04.2001; 12exp., 26.04.2001, Baljkovac.
- Octolasion lacteum* (Oerley 1891)
Habitat: forest soils, cultivated soils, meadows
Localities: 4exp., Jastrebac, 03.06.1995; 15exp., Jastrebac, 27.08.95; 3exp., Kalenić, 07.06.1998; 2exp., Goč, 28.06.1999; 2exp., Goč, 01.04.1999; 16exp., Gledićkeplanine, 03.07.1999; 11exp., Stolovi, 2.10.2002; 2exp., Duleni, 17.04.2001; 4exp., 26.04.2001, Baljkovac.
- Octolasion cyaneum* (Savigny 1826)
Habitat: forest soils
Locality: 2exp., Stolovi, 03.10.2002.
- Octodrilus complanatus* (Duges 1828)
Habitat: forest soils
Localities: 2exp., Kalenić, 08.06.1998.
- Panionia leoni* (Michaelsen 1881)
Habitat: wet meadows
Localities: 1exp, Jastrebac, 3.06.1995; 61exp, Jastrebac 27.08.95; 1exp., Stolovi, 2.10.2002; 3exp., Stolovi, 3.10.2002.

Proctodrilus antipae antipae (Michaelsen 1891)
Habitat: forest soils
Localities: 1 exp, Kraljevo, 05. 04. 2008.

Regarding the zoogeographical position of the lumbricid fauna in Šumadija, it could be said that taxa (25%) eleven are Peregrine:

Allolobophora chlorotica
Aporrectodea caliginosa caliginosa
Aporrectodea caliginosa trapezoides
Aporrectodea rosea
Dendrodrilus rubidus rubidus
Dendrodrilus rubidus subrubicundus
Eiseniella tetraedra tetraedra
Lumbricus terrestris
Octolasion lacteum
Octolasion cyaneum
Eisenia foetida

Five taxa (11,4%) are Transaegean:

Aporrectodea georgii
Panoniona leoni
Aporrectodea handlirchi
Aporrectodea jassiensis
Dendrobaena byblica

Seven taxa (15,9%) are Holarctic:

Dendrobaena veneta veneta
Dendrobaena hortensis
Dendrobaena octaedra
Dendrodrilus rubidus tenuis
Dendrobaena attemsi
Lumbricus rubellus
Dendrobaena veneta zebra

Two taxa (4,5%) are Palearctic:

Octodrilus transpadanus
Proctodrilus tuberculatus

Six taxa (13,6%) are European:

Dendrobaena alpina
Aporrectodea rosea bimastoides
Aporrectodea rosea interposita
Fitzingeria platyura platyura
Eisenia lucens

Three taxa (6,8%) are Central European:

Dendrobaena vejdvovskyi
Proctodrilus antipae
Lumbricus polyphemus

Two taxa (4,5%) are Alpino-Dinaro-Carpathian:

Aporrectodea sineporis
Aporrectodea smaragdina

One taxon (2,3%) is South European:

Octodrilus complanatus

Three taxa (6,8%) are larger endemite:

Serbiona dofleini dofleini
Helodrilus cernosvitovianus
Serbiona kosowensis kosowensis

Four taxa (9,1%) are endemic:

Dendrobaena. jastrebensis
Serbiona paratuleskovi
Serbiona robusta serbica
Serbiona serbica

It could be said that the peregrine, holarctic and mainly european species make more than the half of the total lumbricid species in Šumadija. Endemic species take part with only 9,1% in the total number of the species. But, on the territory of wide area of Serbia (31) there are 30% endemic species. Territory of Šumadija have only four endemic species (9,1%). The real reason for this situation is that the area of Šumadija is in the strong influence by man. The low presence of endemic species indicates destroy of the forest (as the strongest influence), accelerating the stepification of this area, also destroy microclimatic habitats.

Totally 139 adult weevils' specimens (79 males, 60 females) were collected and analyzed. After identification 12 species from five genera of Cryptorhynchinae were confirmed. Until now, five species (*Acalles (Acalles) aubei* Boheman, 1837, *Acalles papei* A.&F. Solari, 1905, *Acelles petryszaki* Dieckmann, 1982, *Echinodera behnei* Stüben, 1998, *Echinodera valida* (Hampe, 1864)) were completely unknown in Serbia. There is one species, *Ruteria graeca*, endemic to the Balcan Peninsula which find was reported for Serbia 2008 (28), but to these days that information was not noted on the site www.faunaeur.org.

Systematic part was formed according to Alonso-Zarazaga & Lyal (1) and Alonso-Zarazaga (2).

Subfam. **Cryptorhynchinae** Schönherr, 1825

Trib. **Cryptorhynchini** Schönherr, 1825

Subtrib. **Tylodina** Lacordaire, 1866

Acalles Schönherr, 1825

(*Acalles* Schönherr, 1825)

1. *Acalles (Acalles) aubei* Boheman, 1837

Habitat: Forest soil

Localities: 10.28.06.2000. Rudnik, 800 m a.s.l., 1 male; 20.04.-17.05.2000. Rudnik, 758 m a.s.l., 1 m

Distribution: Europe and Near East

2. *Acalles (Acalles) camelus* Fabricius, 1792

Habitat: Forest soil

Localities: 02.07.1995. Bukulja, 1 m; 10-28.06.2000. Rudnik, 800 m a.s.l., 1 female; 10.-28.06.2000. Rudnik, 600 m a.s.l., 1 f

Distribution: Europe

3. *Acalles echinatus* Germar, 1824

Habitat: Forest soil

Localities: 06.04.1997. Rudnik, 4 m; 13.07.1997. Rudnik, 1 m

Distribution: Europe and Near East

4. *Acalles fallax* Boheman, 1844 (= *commutatus* Dieckmann, 1982)

Habitat: Forest soil

Localities: 23.05.-15.06.2000. Bukulja, 550 m a.s.l., 1 f; 20.04.-17.05.2000. Rudnik, 600 m a.s.l., 1 m; 10.-28.06.2000. Rudnik, 800 m a.s.l., 3 f, 2 m; 10.-28.06.2000. Rudnik, 600 m a.s.l., 3 f

Distribution: Europe

5. *Acalles papei* A.&F. Solari, 1905

Habitat: Forest soil

Localities: 10.-28.06.2000. Rudnik, 600 m a.s.l., 1 f; 10-28.06.2000. Rudnik, 800 m a.s.l., 1 m; 02.01.1996. Žeželj, 450 m a.s.l., 1 m

Distribution: Southeastern Europe

6. *Acelles petryszaki* Dieckmann, 1982

Habitat: Forest soil

Localities: 20.04.-17.05.2000. Rudnik, 600 m a.s.l., 1 f

Distribution: Southeastern Europe

Acallocrates Reitter, 1913

7. *Acallocrates colonnellii* Bahr, 2003)

Habitat: Forest soil

Localities: 26.01.1997. Rudnik, 1 f; 23.05.-15.06.2000. Bukulja, 550 m a.s.l., 1f, 1 m, 28.04.-23.05.2000. Bukulja 550 m a.s.l., 2m, 5 f; 10.-28.06.2000. Rudnik, 800 m a.s.l., 1 m, 1 f; 20.04.-17.05.2000. Rudnik, 600 m a.s.l., 5 m, 6 f; 20.04.-17.05.2000. Rudnik, 600 m a.s.l., 3 m, 2 f; 05.01.2005. Žeželj, 1 f; 06.01.2007. Žeželj 1 m, 1 f

Distribution: Southeastern Europe

Echinodera Wollaston, 1863

8. *Echinodera behnei* Stüben, 1998

Habitat: Forest soil

Localities: 06.04.1997. Rudnik, 1 f; 13.06.-14.07.1999. Gledičke planine, 1 m; 20.06.1999. Gledičke planine, 2 m; 06.01.2007. Žeželj, 3 m, 6 f; 05.01.2005. Žeželj, 3 m, 1 f; 22.05.2005. Gledičke planine 1 f; 05.01.1997. Žeželj, 450 m a.s.l., 1 m

Distribution: Southeastern Europe

9. *Echinodera valida* (Hampe, 1864)

Habitat: Forest soil

Localities: 02.01.1996. Žeželj, 450 m a.s.l., 1 m

Distribution: Southeastern Europe

Kykliocalles Stüben, 1999

10. *Kykliocalles suturatus* Dieckmann, 1983

Habitat: Forest soil

Localities: 23.05.-15.06.2000. Bukulja, 550 m a.s.l., 1 m

Distribution: Southeastern Europe

Ruteria Roudier, 1954

11. *Ruteria graeca* Caldara, 1973

Habitat: Forest soil

Localities: 28.04.-23.05.2000. Bukulja, 550 m a.s.l., 1 m, 3 f; 10.-28.06.2000. Rudnik, 800 m a.s.l., 9 m, 5 f; 20.04.-17.05.2000. Rudnik, 600 m a.s.l., 2 m, 3 f; 10.-28.06.2000. Rudnik, 600 m a.s.l., 7 m, 4 f Distribution: Western, Eastern and Southern Europe

12. *Ruteria hypocrita* Boheman, 1837

Habitat: Forest soil

Localities: 02.07.1995. Bukulja, 1 f; 26.01.1997. Rudnik, 3 m, 1 f; 13.06.-14.07.1999. Gledičke planine, 1 m, 1 f; 28.04.-23.05.2000. Bukulja, 550 m a.s.l., 1 m; 10.-28.06.2000. Rudnik, 800 m a.s.l., 5 m, 2 f; 20.04.-17.05.2000. Rudnik, 600 m a.s.l., 3 m, 2 f; 10.-28.06.2000. Rudnik, 600 m a.s.l., 10 m,

5 f; 05.01.2000. Žeželj, 1 m; 06.01.2001. Žeželj, 1 f; 06.01.2007. Žeželj, 1 m

Distribution: Eastern Europe

Investigations in Šumadija were (among more others groups of invertebrates) made on hexapod (*Protura* and *Diplura*). *Protura* species prefer forest ecosystems (litter of oak, beech, elm, mixed deciduous and conifers trees) while *Diplura* (as omnivores) wide spread (in forest, in meadow, in agroecosystems) which depend from the food.

From *Protura* found 16 species, which belong to 3 families:

Family *Acerentomidae*:

Acerentomon balcanicum Ionescu, 1933;
Acerentomon parvum Szeptycki, 1980;
Acerentomon quercinum Ionescu, 1932;
Acerentulus traegardhi Ionescu, 1937;
Acerentulus catalanus Condé, 1951;
Acerentulus exiguus Condé, 1944;
Acerentulus gerezianus da Cunha, 1952;
Acerella muscorum (Ionescu, 1930);
Gracilentulus gracilis Berlese, 1908;
Gracilentulus meridianus Condé, 1945.

Family *Eosentomidae*:

Eosentomon delicatum Gisin, 1945;
Eosentomon germanicum Prell, 1912;
Eosentomon transitorium Berlese, 1908;
Eosentomon coiffaiti Condé, 1961.

Family *Protentomidae*:

Hesperentomon carpaticum Ionescu, 1930;
Proturentomon minimum Berlese, 1908.

From *Diplura* fauned 16 species, which belong to two families:

Family *Campodeidae*:

Campodea (Campodea) colladoi Silvestri, 1939;
Campodea (Campodea) silvestrii Baagnall, 1932;
Campodea (Campodea) wallacei Baagnall., 1918;
Campodea (Dicampa) campestre Ionescu, 1955;
Campodea (Dicampa) frenata Silvestri, 1931;
Campodea (Dicampa) malphigii Silvestri, 1912;

Campodea (Dicampa) silvicola Wygodzinsky, 1940;
Campodea (Paurocampa) rocasolanoi Silvestri, 1932;
Campodea (Paurocampa) suenisoni Tuxen, 1930;
Podocampa serbica Karaman & Blesić 1983;
Plusiocampa rudnica Blesić, 1992.

Family *Japygidae*:

Catajapyx confusus Silvestri, 1932;
Japyx solifugus Silvestri, 1903;
Metajapyx gojkovici Pages, 1953;
Metajapyx seratus Stach 1929;
Protojapyx maior Silvestri, 1932.

TABLE 1

Complete list of the earthworm species of Šumadija

<i>Fam. LUMBRICIDAE</i> Udekem, 1855
gen. <i>Allolobophora</i> Eisen, 1874 - <i>A. chlorotica</i> (Savigny 1826)
gen. <i>Aporrectodea</i> Oerley 1856 - <i>A. caliginosa caliginosa</i> (Savigny 1826) - <i>A. caliginosa trapezoides</i> (Duges 1826) - <i>A. georgii</i> (Michaelsen 1890) - <i>A. handlirchi</i> (Rosa 1897) - <i>A. jassiensis</i> (Michaelsen, 1891) - <i>A. leoni</i> (Michaelsen 1881) - <i>A. rosea</i> (Savigny 1826) - <i>A. rosea bimastoides</i> (Cognetti 1906) - <i>A. rosea interposita</i> (Plisko 1965) - <i>A. sineporis</i> (Omodeo 1952) - <i>A. smaragdina</i> (Rosa 1892)
gen. <i>Serbiona</i> Mršić and Šapkarev, 1988 - <i>S. dofleini</i> (Ude 1922) - <i>S. kosowensis kosowensis</i> (Karaman 1968) - <i>S. paratuleskovi</i> (Šapkarev 1975) - <i>S. robusta serbica</i> (Karaman 1983) - <i>S. serbica</i> (Šapkarev 1977)
gen. <i>Dendrobaena</i> Eisen 1874 - <i>D. alpina</i> (Rosa 1844) - <i>D. attemsi</i> (Michaelsen 1903) - <i>D. byblica</i> (Rosa 1893) - <i>D. hortensis</i> (Michaelsen, 1890) - <i>D. jastrebensis</i> Mršić Šapkarev 1987 - <i>D. octaedra</i> (Savigny 1826) - <i>D. vejdvovskyi</i> (Cernosvitov 1935)

- <i>D. veneta veneta</i> (Rosa 1886) - <i>D. veneta zebra</i> Michaelsen 1902
gen. <i>Dendrodrilus</i> Omodeo 1956 - <i>D. rubidus rubidus</i> (Savigny 1826) - <i>D. rubidus subrubicundus</i> (Eisen 1874) - <i>D. rubidus tenuis</i> (Eisen 1874)
gen. <i>Eisenia</i> Malm, 1874 - <i>E. foetida</i> (Savigny 1826) - <i>E. lucens</i> (Waga 1857)
gen <i>Eiseniella</i> Michaelsen 1990 - <i>E. tetraedra tetraedra</i> (Savigny 1826)
gen. <i>Fitzingeria</i> Zicsi 1978 - <i>F. platyura platyura</i> (Fitzinger 1883).
gen <i>Helodrilus</i> Hoffmeister 1845 - <i>H. cernosvitovianus</i> (Zicsi 1967)
gen. <i>Lumbricus</i> Linnaeus 1758 - <i>L. polyphemus</i> (Fitzinger 1883) - <i>L. rubellus</i> Hoffmeister 1843 - <i>L. terrestris</i> Linnaeus 1758
gen <i>Octolasion</i> Oerley 1885 - <i>O. lacteum</i> (Oerley 1891) - <i>O. cyaneum</i> (Savigny 1826)
gen <i>Octodrilus</i> Omodeo, 1956 - <i>O. transpadanus</i> (Rosa 1884) - <i>O. complanatus</i> (Duges 1828)
gen <i>Proctodrilus</i> Zicsi 1985 - <i>P. antipai</i> (Michaelsen 1891) - <i>P. tuberculatus</i> (Černosvitov 1935)

Conclusions

In the last investigations period (1996-2009) on all territory of Šumadija authors collected earthworm from various habitats on plane, hill and partly mountain regions in Šumadija. We have found 30 taxa and six species which are new for the earthworm fauna in Šumadija: *Dendrobaena alpina*, *Helodrilus cernosvitovianus*, *Octolasion cyaneum*, *Octodrilus complanatus*, *Serbiona serbica* and *Serbiona paratuleskovi*.

The greatest number of species belongs to the genera: *Apporectodea* (10 species, resp. 11 taxa), *Dendrobaena* (8 species, resp. 9 taxa), *Serbiona* (5 species). The most frequent species were *Aporrectodea rosea*, *Lumbricus rubellus* and *Octolasion lacteum*.

Zoogeographically it could be said that in the composition

on the lumbricid fauna from Šumadija are eleven taxa (25%) are Peregrine, five (11,4%) are Transaegean, seven (15,9%) are Holarctic, two (4,5%) are Palearctic, six taxa (13,6%) are European, three (6,8%) are Central European, two (4,5%) are Alpino-Dinaro-Carpathian, one taxon (2,3%) is South European, three taxa (6,8%) are larger endemite and four taxa (9,1%) are endemic. Low presence of endemic species indicated strong antropogenic influence and a very few presence of a real natural biotopes in Šumadija.

The first data about finding of five weevil's species *Acalles (Acalles) aubei*, *Acalles papei*, *Acelles petryszaki*, *Echinodera behnei*, *Echinodera valida* on the territory of Serbia are recorded.

After 30 years investigation *Protura* and *Diplura* the number of species have to increased on 32 species, from *Protura* found 16 species and from *Diplura* also 16 species.

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