

# The earthworm fauna of the Karancs-Medves Landscape Protection Area (Oligochaeta, Lumbricidae)

T. SZEDERJESI<sup>1</sup>

**Abstract.** Researches carried out in the Karancs-Medves Landscape Protection Area resulted in recording altogether eighteen earthworm species and subspecies, of which the Central European montane *Fitzingeria platyura montana* (Černosvitov, 1932) reaches its westernmost distribution in the Karancs Mts. in Hungary. Using the recent and literature data, a hierarchical cluster analysis was carried out to reveal the zoogeographical relations of the Hungarian mountain regions.

**Keywords.** Karancs-Medves, Hungary, earthworm fauna, zoogeography.

## INTRODUCTION

Karancs-Medves Landscape Protection Area, established in 1989, is situated on the northern part of Hungary, along the Hungarian-Slovakian border. It consists of two geographically different parts. The laccolith of the Karancs was formed as a result of andesite volcanic activity. The Medves is part of the Nógrád-Gömör basaltic field, including the largest basalt plateau of Central Europe. The extension of the whole area is 6709 hectares, its highest point is the similarly called peak of the Karancs (729 m).

The invertebrate fauna of the area is imperfectly known. There are information only on certain groups like molluscs (Garami, 2003), centipedes (Dányi, 2006) and millipedes (Korsós, 1997) because the earlier researches rather focused on nature conservation goals (Harmos *et al.*, 2001). Although the earthworm fauna of Hungary is quite well known, the Karancs-Medves region seems to be an exception, we had only sporadic data from the area. The former surveys concerned only on the marginal parts of the region (Zicsi, 1968, 1991; Csuzdi & Zicsi, 2003).

The aim of the present work is on the one hand to summarize the results of the earlier and recent studies carried out in the Karancs-Medves Landscape Protection Area and on the other hand to examine the zoogeographical relations of the region.

## MATERIAL AND METHODS

Earthworms were collected by the diluted formalin method (Raw, 1959), by digging and hand-sorting and searching under the bark of fallen logs. The specimens were killed in 96% ethanol, fixed in 4% formalin and transferred into 75% ethanol several days later.

Information on the collecting sites (Fig. 1.) are given where it was possible. Unfortunately there are no accurate data on the collecting localities for many earlier samplings. Abbreviations of the collectors names are as follows: MP - Mária Pobozsny, AZ - András Zicsi, LD - László Dányi, TSZ - Tímea Szederjesi. HNHM Z/numbers refer to the registration numbers of the Hungarian Natural History Museum.

We compared the earthworm fauna of the Karancs-Medves with mountains of the Northern Hills (Börzsöny, Mátra, Bükk, Zemplén) and the Transdanubian Medium Mountains (Pilis, Bakony), Kőszeg, Sopron and Mecsek Mts. with hierarchical cluster analysis. We used the information theory method (minimum pooled entropy in new cluster) implemented in the SYN-TAX 2000 software (Podani, 2001).

Samplings were carried out at the following localities:

<sup>1</sup>Tímea Szederjesi, Department of Systematic Zoology and Ecology, Eötvös Loránd University, H-1117 Budapest, Pázmány P. sétány 1/c. E-mail: t.szederjesi@gmail.com

1. Karancslapujtó, 01.04.1967. leg. MP & AZ
2. Bárna, 21.03.1968. leg. MP & AZ
3. Cered, 21.03.1968. leg. MP & AZ, 12.12.1979. leg. AZ
4. Mátraszele, 21.03.1968. leg. MP & AZ; oak forest, 19.09.2002. leg. LD
5. Ickós Fountain, Salgótarján, Medves Mts., beech-hornbeam forest, N48°09,343' E19°53,537', 10.04.2009., 14.04.2009. leg. TSZ
6. Csoma Stream, Salgótarján, Medves Mts., beech-hornbeam forest near the Slovakian border, stream bank, N48°09,793' E19°53,754', 10.04.2009., 19.04.2009., 22.11.2009. leg. TSZ
7. Várberék Stream, Salgótarján, Medves Mts., beech-hornbeam forest, stream bank, N48°09,229' E19°51,142', 21.04.2009. leg. TSZ
8. Zagyva Spring, Salgótarján, Medves Mts., beech-hornbeam forest, N48°08,430' E19°52,233', 23.04.2009. leg. TSZ
9. Gortva Valley, Salgótarján, Medves Mts., beech forest, stream bank, N48°08,162' E19°53,488', 06.04.2010. leg. TSZ
10. Kőkút-Bükk, Salgótarján, Medves Mts., beech-hornbeam forest near the Slovakian border, N48°08,648' E19°54,630', 06.04.2010. leg. TSZ
11. Guliba Hill, Karancslapujtó, Karancs Mts., beech forest, stream bank, N48°09,995' E19°45,838', 10.09.2009., 27.10.2009. leg. TSZ
12. Leső Valley, Karancsberény, Karancs Mts., beech-hornbeam forest, stream bank, N48°11,158' E19°47,260', 28.10.2009., 06.12.2009. leg. TSZ
13. Karancs Saddle, Salgótarján, Karancs Mts., beech forest, N48°09,223' E19°47,183', 08.10.2010. leg. TSZ

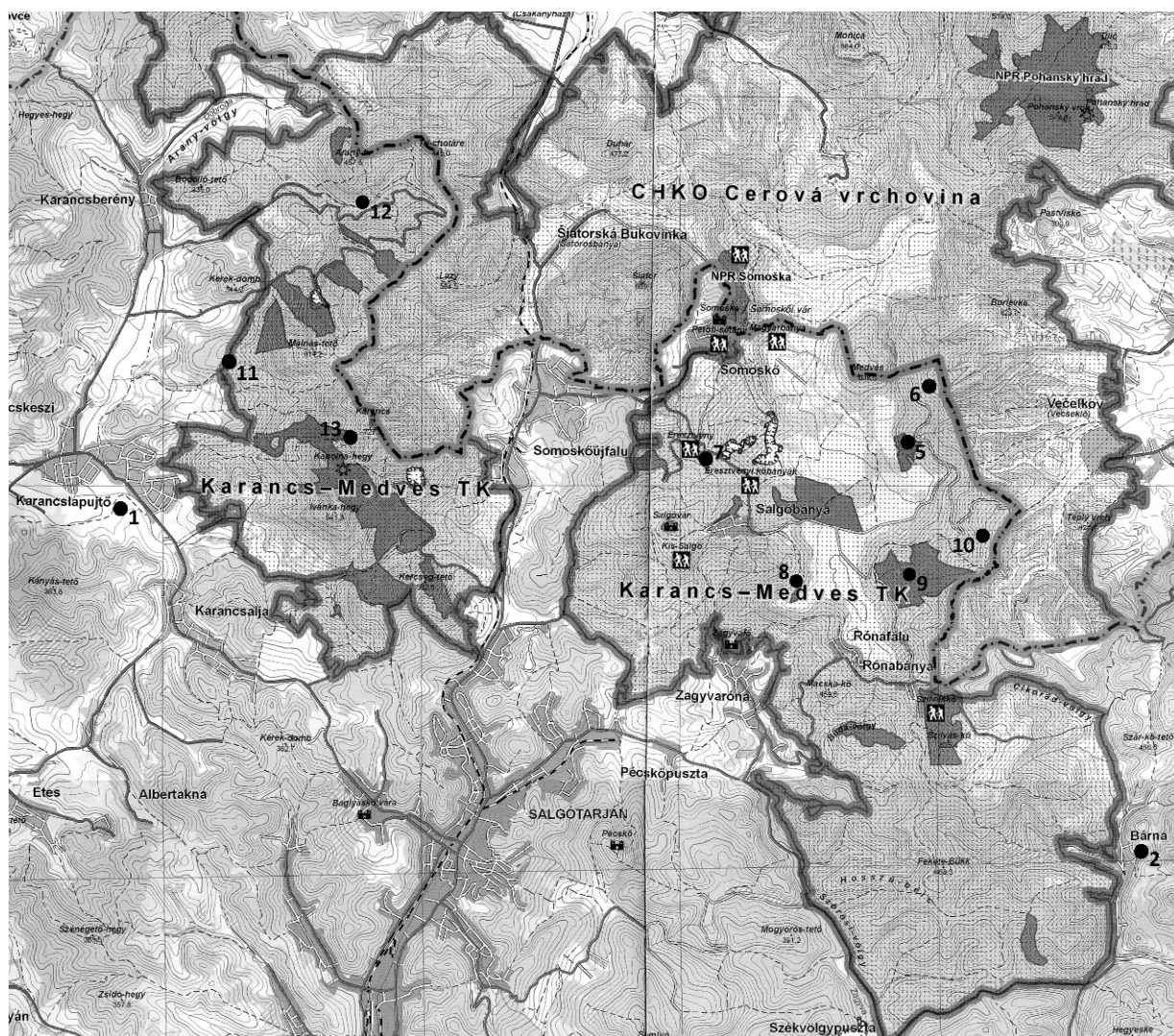


Figure 1. Sampling localities in the Karancs-Medves Landscape Protection Area (No. 3 and 4 not included).

## RESULTS

### *Allolobophora chlorotica chlorotica* (Savigny, 1826)

*Locality.* Karancslapujtó (HNHM Z/5253): 3 ex., 01.04.1967. MP & AZ (Zicsi 1968).

### *Aporrectodea caliginosa* (Savigny, 1826)

*Localities.* Karancslapujtó (HNHM Z/5254): 1 ex., 01.04.1967. MP & AZ; Bárna (HNHM Z/5895): 2 ex., 21.03.1968. MP & AZ; Cered (HNHM Z/9102): 2 ex., 12.12.1979. AZ (Zicsi, 1991).

*New records.* Leső Valley: 1 ex., 28.10.2009. TSZ; 3 ex., 06.12.2009. TSZ.

### *Aporrectodea georgii* (Michaelsen, 1890)

*Localities.* Karancslapujtó (HNHM Z/5253): 2 ex., 01.04.1967. MP & AZ (Zicsi 1968).

*New record.* Várberék Stream: 1 ex., 21.04.2009. TSZ.

### *Aporrectodea handlirschi* (Rosa, 1897)

*New records.* Leső Valley: 1 ex., 28.10.2009. TSZ; 3 ex., 06.12.2009. TSZ; Gortva Valley: 3 ex., 06.04.2010. TSZ; Karancs Saddle: 1 ex., 08.10.2010. TSZ.

### *Aporrectodea jassyensis* (Michaelsen, 1891)

*Localities.* Karancslapujtó (HNHM Z/5252): 1 ex., 01.04.1967. MP & AZ (Zicsi 1968); Mátraszele (HNHM Z/5888): 2 ex., 21.03.1968. MP & AZ (Zicsi, 1991).

### *Aporrectodea rosea* (Savigny, 1826)

*Localities.* Karancslapujtó (HNHM Z/5249): 2 ex., 01.04.1967. MP & AZ (Zicsi, 1968); Mátraszele (HNHM Z/5887): 4 ex., 21.03.1968. MP & AZ; Bárna (HNHM Z/5901, 5905, 5907): 7 ex., 1 ex., 1 ex., 21.03.1968. MP & AZ; Cered (HNHM Z/5908): 3 ex., 21.03.1968. MP & AZ;

(HNHM Z/9100) 7 ex., 12.12.1979. AZ (Zicsi 1991).

*New records.* Ickós Fountain: 1 ex., 10.04.2009. TSZ; Csoma Stream: 1 ex., 10.04.2009. TSZ; 9 ex., 19.04.2009. TSZ; 18 ex., 22.11.2009. TSZ; Várberék Stream: 2 ex., 21.04.2009. TSZ; Zagyva Spring: 5 ex., 23.04.2009. TSZ; Guliba Hill: 3 ex., 10.09.2009. TSZ; 6 ex., 27.10.2009. TSZ; Leső Valley: 8 ex., 28.10.2009. TSZ; 6 ex., 06.12.2009. TSZ; Gortva Valley: 3 ex., 06.04.2010. TSZ.

### *Dendrobaena octaedra* (Savigny, 1826)

*Localities.* Bárna (HNHM Z/5898): 1 ex., 21.03.1968. MP & AZ; (HNHM Z/5904) 1 ex., 21.03.1968. MP & AZ; Cered (HNHM Z/9104): 1 ex., 12.12.1979. AZ (Zicsi 1991).

*New records.* Csoma Stream: 11 ex., 09.04.2009. TSZ; Leső Valley: 1 ex., 06.12.2009. TSZ.

### *Dendrodrius rubidus rubidus* (Savigny, 1826)

*New records.* Ickós Fountain: 1 ex., 10.04.2009. TSZ; Csoma Stream: 1 ex., 22.11.2009. TSZ; Leső Valley: 1 ex., 28.10.2009. TSZ.

### *Eisenia lucens* (Waga, 1857)

*New record.* Mátraszele (HNHM Z/14425): 1 ex., 19.09.2002. LD.

### *Eiseniella tetraedra* (Savigny, 1826)

*Locality.* Cered (HNHM Z/9103): 1 ex., 12.12.1979. AZ (Zicsi, 1991).

### *Fitzingeria platyura depressa* (Rosa, 1893)

*Localities.* Mátraszele (HNHM Z/5891): 3 ex., 21.03.1968. MP & AZ; Bárna (HNHM Z/5894, 5902): 1 ex., 2 ex., 21.03.1968. MP & AZ; Cered (HNHM Z/9099): 5 ex., 12.12.1979. AZ (Zicsi, 1991).

*New record.* Leső Valley: 2 ex., 29.10.2009. TSZ; 2 ex., 06.12.2009. TSZ.

***Fitzingeria platyura montana* (Černosvitov, 1932)**

*New records.* Ickós Fountain: 1 ex., 14.04.2009. TSZ; Leső Valley: 1 ex., 28.10.2009. TSZ.

***Lumbricus polyphemus* (Fitzinger, 1833)**

*New records.* Ickós Fountain: 1 ex., 04.14.2009. TSZ; Csoma Stream: 1 ex., 19.04.2009. TSZ; Zagyva Spring: 1 ex., 23.04.2009. TSZ; Leső Valley: 2 ex., 06.12.2009. TSZ; Kőkút-Bükk: 1 ex., 06.04.2010. TSZ.

***Lumbricus rubellus* Hoffmeister 1843**

*Localities.* Karancslapujtó (HNHM Z/5256): 1 ex., 01.04.1967. MP & AZ (Zicsi 1968); Mátraszele (HNHM Z/5890): 1 ex., 21.03.1968. MP & AZ (Zicsi, 1991).

*New records.* Csoma Stream: 1 ex., 19.04.2009. TSZ; Várberék Stream: 1 ex., 21.04.2009. TSZ; Guliba Hill: 1 ex., 10.09.2009. TSZ; Leső Valley: 1 ex., 28.10.2009. TSZ; 1 ex., 06.12.2009. TSZ; Gortva Valley: 1 ex., 06.04. 2010. TSZ; Karancs Saddle: 1 ex., 08.10.2010. TSZ.

***Octolasion lacteum* (Örley, 1881)**

*Localities.* Karancslapujtó (HNHM Z/5255): 1 ex., 01.04.1967. MP & AZ (Zicsi 1968); Mátraszele (HNHM Z/5893): 1 ex., 21.03.1968. MP & AZ; Bárna (HNHM Z/5900, 5906): 4 ex., 21.03.1968. MP & AZ; Cered (HNHM Z/5909): 1 ex., 21.03.1968. MP & AZ (Zicsi, 1991).

*New records.* Ickós Fountain: 1 ex., 14.04.2009. TSZ; Csoma Stream: 2 ex., 10.04.2009. TSZ; 2 ex., 19.04.2009. TSZ; 6 ex., 22.11.2009. TSZ; Várberék Stream: 7 ex., 21.04.2009. TSZ; Guliba Hill: 1 ex., 10.09.2009. TSZ; Leső Valley: 2 ex., 28.10.2009. TSZ; 1 ex., 06.12.2009. TSZ.

***Octodrilus transpadanus* (Rosa, 1884)**

*Localities.* Mátraszele (HNHM Z/5892): 1 ex., 21.03.1968. MP & AZ; Bárna (HNHM Z/5903): 21.03.1968. MP & AZ (Zicsi, 1991).

*New record.* Guliba Hill: 1 ex., 10.09.2009. TSZ.

***Proctodrilus opisthoductus* Zicsi, 1985**

*Localities.* Karancslapujtó (HNHM Z/5250): 1 ex., 01.04.1967. MP & AZ; Bárna (HNHM Z/5897): 1 ex., 21.03.1968. MP & AZ; Cered (HNHM Z/9101): 2 ex., 12.12.1979. AZ (Zicsi, 1985);

*New record.* Várberék Stream: 1 ex., 21.04.2009. TSZ.

***Proctodrilus tuberculatus* (Černosvitov, 1935)**

*Locality.* Mátraszele (HNHM Z/5889): 2 ex., 21.03.1968. MP & AZ (Zicsi, 1991).

**DISCUSSION**

Out of the 58 earthworm species and subspecies known in Hungary (Csuzdi, 2007), altogether 18 were recorded from the Karancs-Medves Landscape Protection Area. Following the distribution types given by Csuzdi & Zicsi (2003), eight of the species found (*A. chlorotica*, *Ap. caliginosa*, *Ap. rosea*, *D. octaedra*, *Dd. rubidus rubidus*, *Eis. tetraedra*, *L. rubellus*, *O. lacteum*) are peregrine, widely introduced. *Ap. georgii* shows an Atlanto-Mediterranean distribution. The remaining species form two characteristic groups. *Ap. handlirschii*, *Ap. jassyensis*, *Oc. transpadanus* and *P. tuberculatus* possess a Trans-Aegean distribution. The other group is formed by the Central-European species. The presence of *P. opisthoductus* and the subspecies *F. platyura depressa* was previously demonstrated from the area, while *L. polyphemus* and *F. platyura montana* are new records for the Karancs-Medves. *F. platyura montana* shows a Central European montane distribution, it occurs in the Western and Eastern Carpathians. In Hungary it is found only in the higher regions of the Northern Middle Mountains, and reaches the westernmost point of its range in the Karancs Mts. This subspecies was also recorded from the Cerová Vrchovina, Slovakia (Janičina, 1995) which forms a continuous geographical unit with the Medves Mts. *E. lucens* also possesses a Central European montane distribution. This species prefers a special habitat it lives under the bark of fallen logs. The only *E. lucens* data is from the southern part of the Karancs-Medves

LPA, and despite of the intensive search, this species hasn't been found from other regions. The most probable reason for this can be the lack of deadwood in the area.

According to the results of the hierarchical cluster analysis (Fig. 2), the earthworm fauna of the Karancs-Medves shows highest similarity with the neighbouring Mátra Mts. The cluster of the Börzsöny and Pilis Mts. can be explained with their common history. These mountains formed a geographically continuous region until the change of the flow direction of the ancient Danube that reached its current location with breaking through the Visegrád Mts. at the end of the Pleistocene (Karátson, 2002). The presence of the Eastern-Alpine *Octolasion montanum* (Wessely, 1905) and the endemic *Allolobophora gestroides* Zicsi 1970 can be emphasized from both areas. The nearby position of the Bükk and Zemplén Mts. is probably due to their relative geographical

closeness and common presence of such species like *F. pl. montana*.

The other clade is formed by the western-southwestern mountains. The earthworm fauna of the Bakony and Mecsek Mts. proved to be very similar, sharing numerous collective species of which the Atlanto-Mediterranean *Dendrobaena cognettii* (Michaelsen, 1903) reaches its northernmost distribution in the Bakony Mts. in Hungary. The closeness of the Alps has its influence on the Sopron and Kőszeg Mts. that can be well characterized with the Eastern-Alpine (*Dendrobaena vej dovskyi* (Černosvitov, 1935)) and the Southern-Alpine (*Aporrectodea sineporis* (Omodeo, 1952)) elements and with the presence of the Illyric *Dendrobaena ganglbaueri* (Rosa, 1894).

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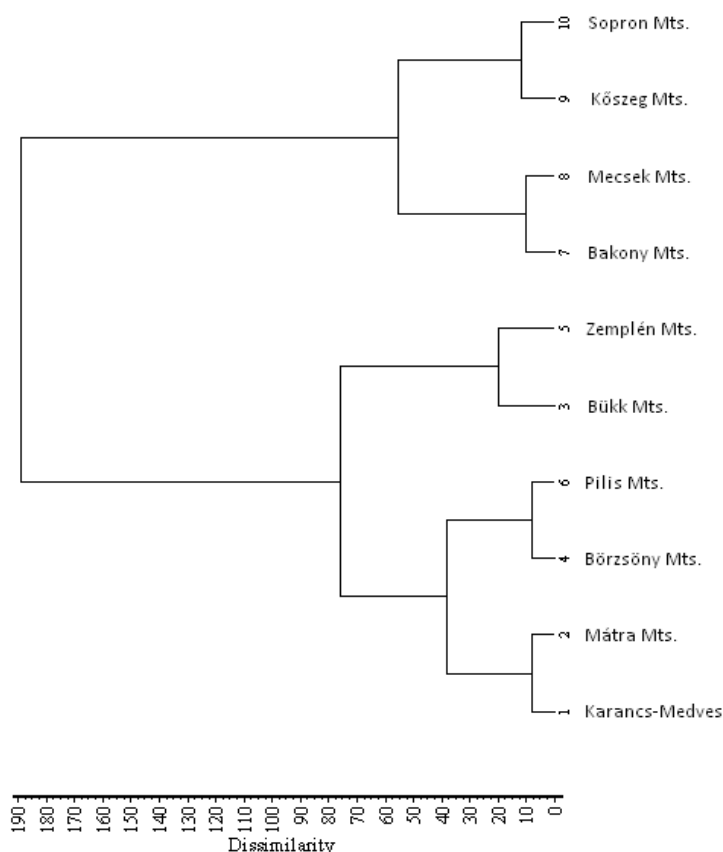


Figure 2. Faunistic similarity of the Hungarian Middle Ranges on the basis of the earthworm fauna

**Table 1.** Earthworm fauna of the investigated Middle Ranges in Hungary

	Karancs-Medves	Mátra	Bükk	Börzsöny	Zemplén	Pilis	Bakony	Mecsek	Kőszeg	Sopron
<i>A. chlorotica</i>	+	+	+	+	+	+	+	+	+	+
<i>A. gestroides</i>	0	+	+	+	0	+	0	0	0	0
<i>A. leoni</i>	0	0	0	+	+	+	0	0	0	0
<i>A. mehadiensis</i>	0	0	+	0	0	0	0	0	0	0
<i>Ai. eiseni</i>	0	0	0	0	0	0	0	+	0	0
<i>Ap. caliginosa</i>	+	+	+	+	+	+	+	+	+	+
<i>Ap. georgii</i>	+	+	+	+	+	0	0	0	0	0
<i>Ap. handlirschi</i>	+	+	+	+	+	+	+	+	0	0
<i>Ap. jassyensis</i>	+	+	+	+	0	0	+	+	0	0
<i>Ap. rosea</i>	+	+	+	+	+	+	+	+	+	+
<i>Ap. sineporis</i>	0	0	0	0	0	0	0	0	0	+
<i>Ap. dubiosa</i>	0	+	0	0	+	0	0	0	0	0
<i>D. auriculata</i>	0	0	+	+	+	+	+	+	+	0
<i>D. cognettii</i>	0	0	0	0	0	0	+	+	0	0
<i>D. ganglbaueri</i>	0	0	0	0	0	0	0	0	+	0
<i>D. octaedra</i>	+	+	+	+	+	+	+	+	+	+
<i>D. vejdvoskyi</i>	0	0	0	0	0	0	0	0	+	0
<i>Dd. r. rubidus</i>	+	+	+	+	+	+	+	+	+	+
<i>E. lucens</i>	+	+	+	+	+	0	0	0	0	0
<i>E. spelaea</i>	0	0	0	0	0	0	0	0	+	+
<i>Eis. t. tetraedra</i>	+	+	+	+	+	+	+	+	+	+
<i>F. pl. platyura</i>	0	0	+	+	0	0	+	0	+	+
<i>F. pl. depressa</i>	+	+	+	+	+	+	0	+	+	+
<i>F. pl. montana</i>	+	0	+	0	+	0	0	0	0	0
<i>L. baicalensis</i>	0	0	0	0	0	0	0	0	+	0
<i>L. polyphemus</i>	+	+	+	+	0	+	+	+	+	+
<i>L. rubellus</i>	+	+	+	+	+	+	+	+	+	+
<i>O. lacteum</i>	+	+	+	+	+	+	+	+	+	+
<i>O. montanum</i>	0	0	+	+	0	+	0	0	0	0
<i>Oc. compromissus</i>	0	0	0	0	+	0	0	0	0	0
<i>Oc. transpadanus</i>	+	+	+	+	+	+	+	0	0	0
<i>P. antipai</i>	0	+	0	+	+	+	0	0	+	0
<i>P. opisthoductus</i>	+	+	0	+	0	+	+	+	0	0
<i>P. tuberculatus</i>	+	+	+	+	+	+	0	+	+	+

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