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CONTRIBUTION TO ODONATA FROM FÂNTÂNELE LAKE (DOLJ, ROMANIA)

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ABSTRACT

This paper presents the Odonata taxonomic diversity of Fântânele Lake, an anthropogenic dam lake in Dolj County – Oltenia region, during the years 2023 an 2025. The faunistic account includes 5 species of Zygoptera and 4 species of Anisoptera. The Odonata diversity of Fântânele Lake is compared with that of Romanescu Park Lake, using the dichotomous similarity coefficient Jaccard.

INTRODUCTION

Fântânele Lake – Fig. 1 is an artificial reservoir located in the central-southwest part of Dolj County, in the immediate vicinity of the localities of Fântânele, Vârvoru de Jos and Radovan, within the drainage basin of Desnățui River at the confluence with Terpezița Stream (Ciuinel 2010).

Figure 1. View of Fântânele Lake, foto A.F. Babalean

The lake was created in the early 1970s by damming the Desnățui River, to combat flooding. Currently, the lake is used for recreational purposes, local tourism, fishing, and can be considered an anthropogenic dam lake.

The physical relief is characteristic of the Bălăcița Piemont, with wide interfluves and gentle slopes (Boengiu 2002-2003). The lake is situated in the forest-steppe region, in a sparsely forested area, with patches of Quercus species forest. The edge of the lake is partially bordered by cultivated poplars, at about 10 m from the shores. The lake is fed by the Desnățui River and precipitation. In the years 2023 – 2025, temporary water leaks were observed feeding the lake, with muddy areas and specific vegetation around. The lake has an area of approximately 300 ha and a maximum depth of between 2.5 and 4 m. Lacustrine vegetation is represented by species from the Cyperaceae family, Myriophyllum, Potamogeton, Typha, Phragmites, Butomus (pond lilies).

Odonata (the damselflies – Suborder Zygoptera and the dragonflies – Suborder Anisoptera) are an essential component of aquatic fauna. The Odonata diversity of this lake, both taxonomical and ecological, is poorly known, which determines the aim of this work.

MATERIAL AND METHODS

The Odonata fauna associated with the lake was monitored during 2023–2025 by collecting/sampling and visual inspection. Species identification was made based on distinctive characters provided by the specialized odonatological literature: Askew (2004), Boudot et al. (2019), Cârdei & Bulimar (1965), Dijkstra et al. (2020), Smallshire & Swash (2020), Wildermuth & Martens (2019).

RESULTS AND DISCUSSIONS

Species inventory:

Zygoptera (Fântânele Lake)

1 (a). *Calopteryx splendens* (Harris, 1780); only two individuals; characters used for identification: male wings, anal appendages

2 (a). *Platycnemis pennipes* (Pallas, 1771); rare specimens; characters: male tibiae, the rectangular discoidal cell, male abdominal appendages

3 (b). *Enallagma cyathigerum* (Charpentier, 1840); only two male specimens; characters: the mesometapleural suture with no black stripe, the abdominal dorsal pattern, male abdominal appendages

4 (a). *Ischnura elegans* (Vander Linden, 1820); the damselfly species with the most numerous specimens; characters: male pterostigma, male and female posterior edge of prothorax, male abdominal appendages

5 (b). *Ischnura pumilio* (Charpentier, 1825); specimens less numerous than *I. elegans*; characters: male pterostigma on forewing larger than that of hindwing, male abdominal appendages, female in a couple

Anisoptera (Fântânele Lake)

6 (b). *Cordulegaster sp*. – Fig. 2; only one specimen observed, associated with a muddy area near the lake; the specimen is possible attributed to the genus Cordulegaster only on few visible characters – the large lateral greenish antehumerals bands, the dorsal abdominal pattern with continuous greenish bands on S2 – S8, S10 appears to be entirely black. However, it is a distinct species which can be considered for the total number of species.

7 (a). *Orthetrum albistylum* (Selys, 1848); the representative dragonfly species for Fântânele Lake, with the most numerous specimens; characters: male general habitus, black pterostigma, male abdominal appendages.

8 (b). *Orthetrum brunneum* (Fonscolombe, 1837); very few specimens associated with a water catchment; characters: brown yellowish pterostigma, two rows of cells between IR3 and Rspl – the second row with more than 5 cells

9 (b). *Sympetrum sp. (fonscolombii?)* (Selys, 1840); only two red male specimens were observed over the shore of the lake on 05 May 2025. The species is possible attributed to *S. fonscolombii* only on phenology, as being the only Sympetrum species that appears in flight in May (all the other adult Sympetrum species fly beginning with middle June or July). This is the only Sympetrum species observed for Fântânele Lake.

Figure 2. *Cordulegaster sp.* at Fântânele lake, foto A.F. Babalean

The Odonata diversity of Fântânele Lake is compared with the diversity of Romanescu Park Lake (RPL), which is a different type of habitat. RPL is an urban lake (https://ro.wikipedia.org/wiki/Parcul_Nicolae_Romanescu and the included reference: Hayward, Jeff (1989), Altman, Irwin; Zube, Ervin H., ed., „Urban Parks", *Public Places and Spaces*, Human Behavior and Environment, Springer US, pp. 193–216, doi:10.1007/978-1-4684-5601-1_9, ISBN 978-1-4684-5601-1). Ciobotea et al. (1999) indicate a natural origin of the actual lake, in a former lake at the outskirts of the park, derived and fed from several natural sources – Gioroc and Valea Fetii Streams now extinct, and from Bibescu pond fed by numerous springs. The Lake is subjected to a much higher anthropic impact than Fântânele Lake. RPL is much smaller, with the area of the body water (lakes and connecting streams) estimated around 10 hectares. Summatively, Fântânele Lake is an artificial lake conquered by nature, RPL is a natural lake anthropically managed. The Odonata fauna of the Romanescu Park Lake includes 14 species (Babalean 2023) to which are added one species of Chalcolestes observed in the fall of 2024, and one species of Aeshna – *Aeshna mixta* observed in the summer and early fall between 2022 – 2025, identified in September 2025. Thus, the final list reaches 7 species of Zygoptera and 9 species of Anisoptera, as follows:

Zygoptera (Romanescu Park Lake):

1 (c). *Chalcolestes sp.*
2 (a). *Calopteryx splendens* (Harris, 1780)
3 (a). *Platycnemis pennipes* (Pallas, 1771)
4 (c). *Coenagrion puella* (Linnaeus, 1758)
5 (c). *Erythromma viridulum* (Charpentier, 1840) (collected and identified in 2025)
6 (a). *Ischnura elegans* (Vander Linden, 1820)
7 (c). *Pyrrhosoma nymphula* (Sulzer, 1776)

Anisoptera (Romanescu Park Lake)

8 (c). *Aeshna isoceles* (O.F. Müller, 1767)
9 (c). *Aeshna mixta* (Latreille, 1805)
10 (c). *Onychogomphus forcipatus* (Linnaeus, 1758)
11 (c). *Crocothemis erythraea* (Brullé, 1832)
12 (c). *Libellula fulva* Müller, 1764
13 (a). *Orthetrum albistylum* (Selys, 1848)
14 (c). *Orthetrum coerulescens* (Fabricius, 1798)
15 (c). *Sympetrum sanguineum* (Müller, 1764)
16 (c). *Sympetrum striolatum* (Charpentier, 1840)

Numerous indices for presence-absence data have been developed for measuring beta diversity (Koleff et al. 2003). For the comparison of the two communities (Fântânele Lake and Romanescu Park Lake) it was chosen the dichotomous Jaccard coefficient (J S3), as similarity index, according to Sîrbu & Benedek (2012). Beta diversity shows the differences between the compared units (1 – the value of the index). Sîrbu & Benedek (2012) consider that the use of the dichotomous Jaccard coefficient is sufficient to reveal the similarity between specific compositions. The two authors recommend the construction and use of a contingency plate for the two space units/habitats being compared. The plate records how many species occur in both compared units (habitats) or only in one unit (habitat). The plate takes the general form presented below, where:

- the investigated/compared units (habitats) are denoted by F (Fântânele) and R (Romanescu Park Lake),
- 1 = species present, 0 = species absent
- a = the number of species present in F and R
- b = the number of species present in F, absent in R
- c = the number of species present in R, absent in F (a, b, c – in brackets in the lists of species)
- d = the number of species absent in F and R, only for other coefficients.

		R	
		1	0
F	1	a	b
	0	c	d

The dichotomous Jaccard coefficient proposed by Sîrbu & Benedek (2012) is calculated using the equation

$$J = \frac{a}{a + b + c}$$

and takes values in the standardized range [0, 1].

For the entire **Odonata** group, the contingency plate and the similarity Jaccard index are:

		R	
		1	0
F	1	4	5
	0	12	d

$$J\ Odonata = \frac{4}{4 + 5 + 12}$$

J S3/Odonata = 4 / 21 = **0, 19**

For the **Zygoptera**, the contingency plate and the similarity Jaccard index are:

		R	
		1	0
F	1	3	2
	0	4	d

$$J\ Zygoptera = \frac{3}{3 + 2 + 4}$$

J S3/Zygoptera = 3 / 9 = **0, 33**

For the **Anisoptera**, the contingency plate and the similarity Jaccard index are:

		R	
		1	0
F	1	1	3
	0	8	d

$$J\ Anisoptera = \frac{1}{1 + 3 + 8}$$

J S3/Anisoptera = 1 / 12 = **0, 089**

The index value between 0.089 and 0.33 shows a low degree of similarity (large difference) of the Odonata species composition between the two compared habitats. This low similarity seems not to be determined by the anthropogenic factor. It rather seems to be determined by the characteristics of the habitat that can be populated/visited/used by a certain number of Odonata species, according to their biological requirements. Romanescu Park Lake, although much more intensely subject to the anthropogenic factor, has a greater taxonomic diversity of Odonata.

The Jaccard similarity coefficient will have a different value when we exclude the occasional species (species that appears occasionally into the habitat) and species connected to microhabitats associated with the lake (muddy areas, water catchments, pits, …). In this study, the species that can be put into this category are *Calopteryx splendens*, *Cordulegaster sp.* and *Orthetrum brunneum* for Fântânele Lake. In this case, the contingency plate and the similarity Jaccard index for the entire Odonata group take the following form and value:

		R	
		1	0
F	1	3	3
	0	12	d

$$J\ Odonata = \frac{3}{3+3+12}$$

J S3/Odonata = 3 / 18 = **0, 25**

CONCLUSIONS

At the current state of knowledge, the taxonomic diversity of Odonata of Fântânele Lake is not completely known. The Jaccard coefficient used for the two compared units suggests a correlation with habitat characteristics and less with the intensity of the anthropogenic factor.

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