

DISTRIBUTION OF THE BIVALVES FROM THE DANUBE

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Abstract. Within the Danube, there have been identified 48 species of bivalves. These represent 12 percent of the European fauna of gastropods; it is a fact that reflects the importance of the area located among the Carpathians, the Danube, and the Balkans for the fauna of bivalves.

Keywords: bivalves, the Danube, characteristic sectors.

Rezumat. Distribuția bivalvelor din Dunăre. În Dunăre au fost identificate un număr de 48 specii bivalve. Acestea reprezintă 12 % din fauna europeană de bivalve; este un fapt care reflectă importanța spațiului danubiano – carpato – balcanic pentru fauna de bivalve.

Cuvinte cheie: bivalve, Dunăre, sectoare caracteristice.

INTRODUCTION

The Danube represents one of the European areas with the richest fauna of bivalves. The distribution of the bivalves populations from the area located between the Carpathians and the Danube area and that from the upper sector of the Danube, the lower Danube and the Danube Delta create the image of the biogeographical unity of the bivalves (CIOBOIU, 2006a; GLOER & MEIER - BROOK, 2003; GROSSU, 1962) (Fig. 1).

The Danube includes the following sectors that are important from geographical-ecological point of view (ARDELEAN et al., 1964):

- The upper or alpine sector that refers to the spring area and the torrent-like course (Km 2857 – 1880);
- The middle or Pannonian sector characterized by a rapid flow of the river (Km 1879 – 1103);
- The lower or Carpathian-Balkan sector, where the river has a large bed, slow flowing speed, and variable depths (Km 1102 – 0).



Figure 1. The Danube (Km 2857 – 0) (after ICPDR, Vienna).

Figura 1. Dunărea (Km 2857 – 0) (după ICPDR, Vienna).

MATERIAL AND METHODS

According to the data rendered in the literature in the field and according to my own research, there has been made a synthesis that allowed a global evaluation of the bivalves populations from the Danube (BREZEANU & CIOBOIU, 2007; CIOBOIU, 2006b; GLOER & ZETTLER, 2005; GROSSU, 1993; LYASHENKO, 2002; JURGEN et al., 1988; NESEMANN & SCHOLL, 1988; RUSSEV, 1998; TITTIZER et al., 1997; Fauna Europaea, 2005).

RESULTS AND DISCUSSIONS

According to the ecological features of the river and to the analysis of the taxonomic composition of the bivalves populations, we may notice their specific distribution (Table 1).

Table 1. Composition of the Bivalves species from the Danube.
Tabel 1. Componența speciilor de bivalve din Dunăre.

| No. | Species | The Danube | | |
|-----|--|--------------|---------------|--------------|
| | | Upper sector | Middle sector | Lower sector |
| 1. | <i>Margaritifera margaritifera margaritifera</i> (LINNAEUS 1758) | + | | |
| 2. | <i>Margaritifera margaritifera parvula</i> (HAAS 1911) | + | | |
| 3. | <i>Unio pictorum arca</i> HELD 1893 | + | | |
| 4. | <i>Unio pictorum gentilis</i> HAAS 1911 | | | + |
| 5. | <i>Unio pictorum latirostris</i> KUSTER 1836 | + | | |
| 6. | <i>Unio pictorum pictorum</i> (LINNAEUS 1758) | + | + | + |
| 7. | <i>Unio pictorum platyrhinchus</i> ROSSMASSLER 1835 | | + | + |
| 8. | <i>Unio pictorum proechistus</i> BOURGUIGNAT 1870 | | | + |
| 9. | <i>Unio pictorum schrenckianus</i> CLESSIN 1880 | | | + |
| 10. | <i>Unio tumidus tumidus</i> RETZIUS 1788 | + | + | + |
| 11. | <i>Unio tumidus solidus</i> ZELEBOR 1851 | | + | + |
| 12. | <i>Unio tumidus borysthensis</i> KOBELT 1879 | | | + |
| 13. | <i>Unio tumidus rostratus</i> LAMARCK 1819 | | | + |
| 14. | <i>Unio tumidus depressus</i> DONOVAN 1850 | + | | |
| 15. | <i>Unio crassus crassus</i> RETZIUS 1788 | + | + | + |
| 16. | <i>Unio crassus batavus</i> (MATON et RECKET 1807) | + | + | + |
| 17. | <i>Unio crassus cytherea</i> KUSTER 1833 | + | + | + |
| 18. | <i>Unio crassus decurvatus</i> ROSSMASSLER 1835 | | | + |
| 19. | <i>Unio crassus gontieri</i> BOURGUIGNAT 1856 | + | + | + |
| 20. | <i>Unio crassus marisaensis</i> KOBELT 1911 | | | + |
| 21. | <i>Anodonta cygnaea cygnaea</i> (LINNAEUS 1758) | + | + | + |
| 22. | <i>Anodonta cygnaea piscinalis</i> NILSSON 1822 | + | + | + |
| 23. | <i>Anodonta cygnaea cellensis</i> SCHROTER 1779 | | | + |
| 24. | <i>Anodonta anatina anatina</i> LINNAEUS 1758 | + | + | + |
| 25. | <i>Anodonta anatina attenuata</i> HELD 1893 | + | + | |
| 26. | <i>Anodonta anatina sedakowi</i> SIEMASCHKO 1848 | | | + |
| 27. | <i>Sinanodonta woodiana</i> (LEA 1834) | + | + | + |
| 28. | <i>Pseudanodonta complanata complanata</i> (ROSSMASSLER 1835) | + | + | + |
| 29. | <i>Pseudanodonta complanata elongata</i> HOLANDER 1835 | | | + |
| 30. | <i>Pseudanodonta complanata compacta</i> ZELEBOR 1835 | + | + | + |
| 31. | <i>Pseudanodonta complanata kuesteri</i> HAAS 1911 | + | | |
| 32. | <i>Pseudanodonta complanata middendorffi</i> (SIEMASCHKO 1848) | + | + | + |
| 33. | <i>Dreissena polymorpha polymorpha</i> (PALLAS 1771) | + | + | + |
| 34. | <i>Dreissena polymorpha fluviatilis</i> (PALLAS 1771) | | | + |
| 35. | <i>Corbicula fluminalis</i> (O. F. MULLER 1774) | + | + | + |
| 36. | <i>Corbicula fluminea</i> (O. F. MULLER 1774) | + | + | + |
| 37. | <i>Pisidium amnicum</i> (O. F. MULLER 1774) | + | + | + |
| 38. | <i>Pisidium casertanum</i> (POLI 1791) | + | + | + |
| 39. | <i>Pisidium moitessierianum</i> PALADILHE 1862 | | + | |
| 40. | <i>Pisidium henslowanum</i> SHEPPARD 1823 | + | + | + |
| 41. | <i>Pisidium personatum</i> MALM 1855 | + | + | + |
| 42. | <i>Pisidium obtusale</i> C. PFEIFFER 1821 | | | + |
| 43. | <i>Pisidium milium</i> HELD 1836 | | + | + |
| 44. | <i>Pisidium nitidum</i> JENYNS 1832 | + | + | + |
| 45. | <i>Sphaerium corneum</i> (LINNAEUS 1758) | + | + | + |
| 46. | <i>Sphaerium rivicola</i> (LAMARCK 1818) | + | + | + |
| 47. | <i>Sphaerium solidum</i> (NORMAND 1844) | + | | |
| 48. | <i>Musculium lacustre</i> (O. F. MULLER 1774) | | | + |

- Along the upper sector of the river, there have been identified 31 species (Table 1). The species *Margaritifera margaritifera margaritifera* (LINNAEUS 1758), *M. m. parvula* (HAAS 1911), *Unio pictorum arca* HELD 1893, *U. p. latirostris* KUSTER 1836, *U. tumidus depressus* DONOVAN 1850, *Pseudanodonta complanata kuesteri* HAAS 1911, *Sphaerium solidum* (NORMAND 1844) are characteristic to the upper sector, the rest of them displaying an ubiquitous character (GLOER & ZETTLER, 2005; JURGEN et al., 1988; NESEMANN & SCHOLL, 1988; TITTIZER et al., 1997).

- Along the middle sector, where relatively uniform biotopes with a mostly sandy-clayish benthic facies prevail, there have been identified 28 species (Table 1), the most frequent being *Unio pictorum platyrhinchus* ROSSMASSLER 1835, *U. tumidus solidus* ZELEBOR 1851, *Pisidium moitessierianum* PALADILHE 1862, *P. milium* HELD 1836 (BODIS ERIKA et al., 2010; RUSSEV, 1998).

- In the lower sector, due to the connectivity between the river and its floodplain and to the influence of its numerous tributaries, the species diversity of the gastropods is higher (39 species) (Table 1). We mention the following specific species for this sector – *Unio pictorum gentilis* HAAS 1911, *U. p. proechistus* BOURGUIGNAT 1870, *U. p. schrenckianus* CLESSIN 1880, *U. tumidus borysthensis* KOBELT 1879, *U. t. rostratus* LAMARCK 1819, *U. crassus decurvatus* ROSSMASSLER 1835, *U. c. marisaensis* KOBELT 1911, *Anodonta cygnaea cellensis* SCHROTER 1779, *A. anatina sedakowi* SIEMASCHKO 1848, *Pseudanodonta complanata elongata* HOLANDER 1835, *Dreissena polymorpha fluviatilis* (PALLAS 1771), *Pisidium obtusale* C. PFEIFFER 1821, *Musculium lacustre* (O. F. MULLER 1774) (BREZEANU

& CIOBOIU, 2007; CIOBOIU, 2006a, b; GROSSU, 1993; LYASHENKO, 2002).

In the river, we can find lentic species characteristic of the eutrophic lacustrine ecosystems - *Pseudanodonta complanata complanata* (ROSSMASSLER 1835), *Corbicula fluminalis* (O. F. MULLER 1774), *Pisidium moitessierianum* PALADILHE 1862, *Musculium lacustre* (O. F. MULLER 1774), as well as lotic (reophilic) species that are better adapted to the conditions of stream ecosystems - *Margaritifera margaritifera margaritifera* (LINNAEUS 1758), *Unio pictorum latirostris* KUSTER 1836, *U. tumidus tumidus* RETZIUS 1788, *U. crassus cytherea* KUSTER 1833, *Pisidium amnicum* (O. F. MULLER 1774), *P. casertanum* (POLI 1791). Thus, it results that the variable environmental factors of the Danube (the flow velocity, the bed structure, the trophic state) influence this distribution of bivalves.

Of course, we cannot draw strict limits between these sectors in terms of bivalve distributions (Fauna Europaea, 2005); this is why we notice an interference of species from the three sectors of the Danube, the most numerous ones appearing along the lower sector (Fig. 4).

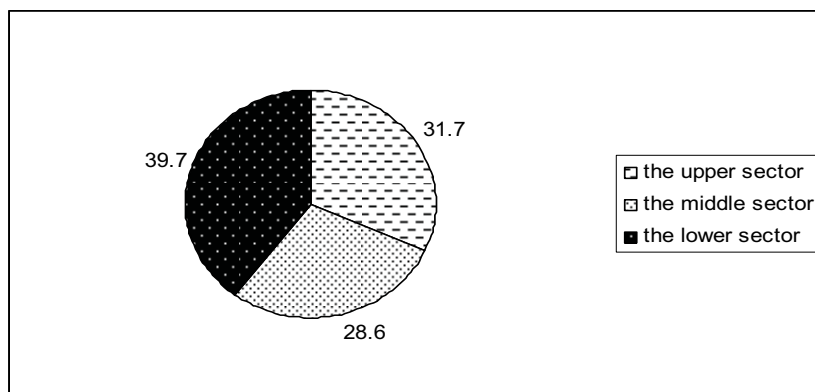


Figure 4. The distribution of the bivalves species in the Danube.

Figura 4. Distribuția speciilor de bivalve în Dunăre.

CONCLUSIONS

There have been identified 48 species of bivalves in the Danube. When analysing their distribution along the upper sector, it results that the characteristic species are *Margaritifera margaritifera margaritifera* (LINNAEUS 1758), *M. m. parvula* (HAAS 1911), *Unio pictorum arca* HELD 1893, *U. p. latirostris* KUSTER 1836, *U. tumidus depressus* DONOVAN 1850, *Pseudanodonta complanata kuesteri* HAAS 1911, *Sphaerium solidum* (NORMAND 1844); along the middle sector we mention *Unio pictorum platyrhynchus* ROSSMASSLER 1835, *U. tumidus solidus* ZELEBOR 1851, *Pisidium moitessierianum* PALADILHE 1862, *P. milium* HELD 1836, while along the lower sector, the characteristic species are *Unio pictorum gentilis* HAAS 1911, *U. p. proechistus* BOURGUIGNAT 1870, *U. p. schrenckianus* CLESSIN 1880, *U. tumidus borystheniensis* KOBELT 1879, *U. t. rostratus* LAMARCK 1819, *U. crassus decurvatus* ROSSMASSLER 1835, *U. c. marisaensis* KOBELT 1911, *Anodonta cygnaea cellensis* SCHROTER 1779, *A. anatina sedakowi* SIEMASCHKO 1848, *Pseudanodonta complanata elongata* HOLANDER 1835, *Dreissena polymorpha fluviatilis* (PALLAS 1771), *Pisidium obtusale* C. PFEIFFER 1821, *Musculium lacustre* (O. F. MULLER 1774). The other species display an ubiquist character.

The ecologic conditions (nature of benthic facies, food structure) determine the distribution of the species. *Pisidium amnicum* (O. F. MULLER 1774), *P. casertanum* (POLI 1791) are reophilic, *Pseudanodonta complanata complanata* (ROSSMASSLER 1835), *Pisidium nitidum* JENYNS 1832, and *Musculium lacustre* (O. F. MULLER 1774) are stagnophile, while the rest of them are fluvial-lacustrine.

REFERENCES

- ARDELEAN I., BANU C. A., BREZEANU GH., BUȘNIȚĂ TH. 1964. *Limnology of the Romanian sector of the Danube*. Romanian Academy Publishing House. Bucharest. 420 pp (In Romanian).
- BODIS ERIKA, NOSEK N. J., OERTEL N., TOTH B. 2010. *Effects of environmental variables on mussel assemblages along a second order stream-large river continuum in North Hungary*. *Limnological Reports*. Dresden. **38**: 58-60.
- BREZEANU GH. & CIOBOIU OLIVIA. 2007. *Creșterea dirijată și valorificarea speciei Dreissena polymorpha (Pall.)* - Conferința a VI-a a Zoologilor din Republica Moldova. Edit. Academiei de Științe a Moldovei. Chișinău: 248-250.
- CIOBOIU OLIVIA. 2006a. *The distribution of the bivalves from the Danube, the flooded area and the Danube Delta (preliminary data)*. *Oltenia. Studii și comunicări. Științele Naturii*. Edit. Sitech. Craiova. **22**: 309-311 (In Romanian).
- CIOBOIU OLIVIA. 2006b. *Aquatic Malacofauna within the Romanian Sector of the Danube*. *Proceedings ISEM 2 of the Republic of Montenegro*: 33-38.

- GLOER P. & MEIER-BROOK C. 2003. *Subwassermollusken* 13. Aufl. Deutscher Jugendbund für Naturbeobachtung. Hamburg: 191-203.
- GLOER P. & ZETTLER M. L. 2005. *Kommentierte Artenliste der Subwassermolluschen Deutschlands*. Malakologische Abhandlungen. Hamburg. **23**: 3-26.
- GROSSU AL. V. 1962. *Fauna R. P. R. Mollusca, Bivalvia*. Edit. Academiei Române. București. **3**. 423 pp.
- GROSSU AL. V. 1993. *The catalogue of the molluscs from Romania*. Travaux du Museum d'Histoire Naturelle „Grigore Antipa”. București. **33**: 291-366.
- JURGEN H. J., GERBER J., LEUCHS H. 1988. *Beiträge zur Molluskenfauna der Donau 1*. Mitteilungen Deutsche malakozoologischen Gewässerkundliche. Frankfurt a. Main. **43**: 1-18.
- LYASHENKO A. V. 2002. *Macrozoobenthos of the Lower Danube's Ukrainian Part*. Limnological Reports. Edit. Academiei Române. București. **34**: 309-316.
- NESEMANN H. & SCHOLL F. 1988. *Zum Vorkommen von Sphaerium solidum (NORMAND, 1844) im Rhein und Loire – Gebiet*. Mitteilungen Deutsche malakozoologischen Gewässerkundliche. Frankfurt a. Main. **43**: 33-34.
- RUSSEV B. 1998. *Das Makrozoobenthos der Donau - Dynamik der Veränderungen durch anthropogenen Einflub Plankton und Benthos der Donau Ergebnisse der Donau - Forschung Band. Österreich. Viena. 4*: 257-364.
- TITTIZER TH., LEUCHS H., BANNING M. H. 1997. *Das Makrozoobenthos der Donau im Abschnitt Kehlheim – Jochenstein (Donau Km 2414 - 2202)*. Limnologie aktuele. Verlag. Stuttgart - Jena - NewYork. **2**: 173-188.
- ***. Fauna Europaea. www.Faunaeur.org. (accessed: April 20, 2010).
- ***. ICPDR. International Commission for the Protection of the Danube River. www.icpdr.org. (accessed: April, 25 2010).

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