

## GASTROPODS DIVERSITY IN CONACU-NEGREȘTI VALLEY

AXINI Monica

**Abstract.** Conacu - Negrești Valley is located in the south-eastern part of Romania, particularly in an area with excessive continental climate. The valley is characterized by a series of specific habitats, of which the most important are the dry steppe meadows, exposed limestone rocks and Conacu-Negrești Lake. The biodiversity of the valley is very interesting, characterized by a number of rare and endemic species, specific to Dobrogea province. This paper presents the data concerning gastropod diversity identified in this area so far. The data represent the results of the research activities developed within the framework of a project from April 2003-August 2005, a continuation of the project from 2009-2010.

**Keywords:** gastropod diversity, bioelements, endemic species, xerophilous species.

**Rezumat. Diversitatea gastropodelor din Valea Conacu-Negrești.** Valea Conacu-Negrești este localizată în sud-estul României, într-o zonă cu climat continental excesiv. Prezintă o serie de habitate specifice, mai importante fiind pajiștile stepice uscate, pereții calcaroși cu calcare la zi și lacul cu același nume, cu o biodiversitate extrem de interesantă, cu multe specii rare și endemice caracteristice provinciei Dobrogea. Lucrarea prezintă datele privind diversitatea gastropodelor cunoscute până în prezent din această vale. Aceste date reprezintă rezultatele cercetărilor desfășurate în cadrul proiectelor din perioada aprilie 2003-august 2005, respectiv 2009-2010.

**Cuvinte cheie:** diversitatea gastropodelor, bioelemente, specii endemice, specii xerofile.

### INTRODUCTION

Conacu-Negrești Valley is located in the extreme south-eastern part of Romania, in the centre of Cobadin Plateau, subunit of Negru Vodă Plateau, South Dobrogea. Cobadin Plateau landscape consists of large and almost flat interfluves. There start a series of short valleys discharging into the Danube River.

The studied region has an old Proterozoic foundation, composed of crystalline and one sedimentary supra-structure that is characterized by the existence of two types of Palaeozoic-Mesozoic and Neozoic formations (AXINI, 2006, 2009, 2012; BREZEANU, 1997; COTEȚ, 1969).

Here develops a temperate-continental climate, with hot, dry summers and cold winters with strong blizzards because of the movement of cold continental air from north-eastern and eastern parts Europe or the Arctic air.

The landscape of the valley consists of gorges with limestone walls, with “limestones to day”, Conacu-Negrești Lake being located within this area (BASARABEANU, 1969; GĂȘTESCU & BREIER, 1969; GODEANU, 2002), canyons, ravines, xerophyte steppe grasslands, grassy hills and bushes.

Conacu-Negrești Valley (Figs. 1, 2, 3), part of South Dobrogea, is distinguished by spectacular landscape beauty and is characterized by rich and diverse assemblage, with many rare or endemic species specific to Dobrogea Province. Its significance also is derived from its geological, geomorphologic, and paleontological characteristics (AXINI, 2012).



Figure 1. Map of Europe (from Google Earth) emphasizing the position of Dobrogea and Conacu-Negrești Valley in Europe.  
Figura 1. Harta Europei (după Google Earth) cu poziționarea Dobrogei și a Văii Conacu-Negrești în Europa.

## MATERIAL AND METHODS

During the projects carried out between 2004 and 2010, different stations were established for field observations, identification of species and sampling both from the lake and the valley.

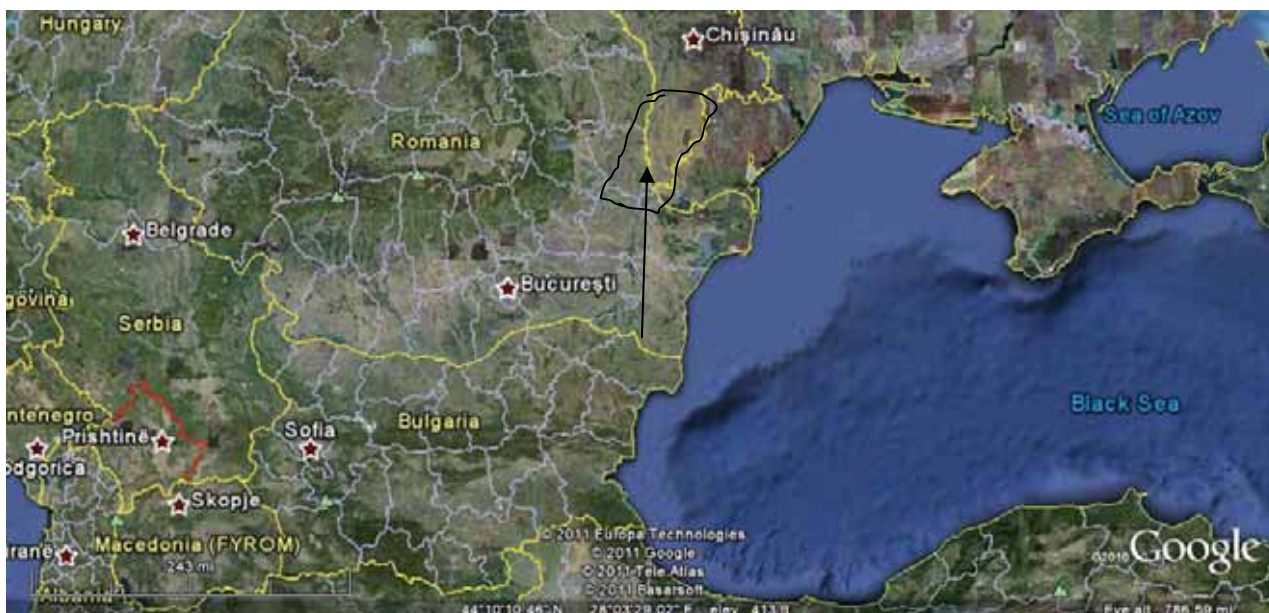


Figure 2. Geographical position of Conacu-Negrești Valley in Dobrogea region (area circled in black) (image from Google Earth).  
 Figura 2. Așezarea geografică a Văii Conacu- Negrești în regiunea Dobrogea (suprafața marcată cu negru) (imagine după Google Earth).

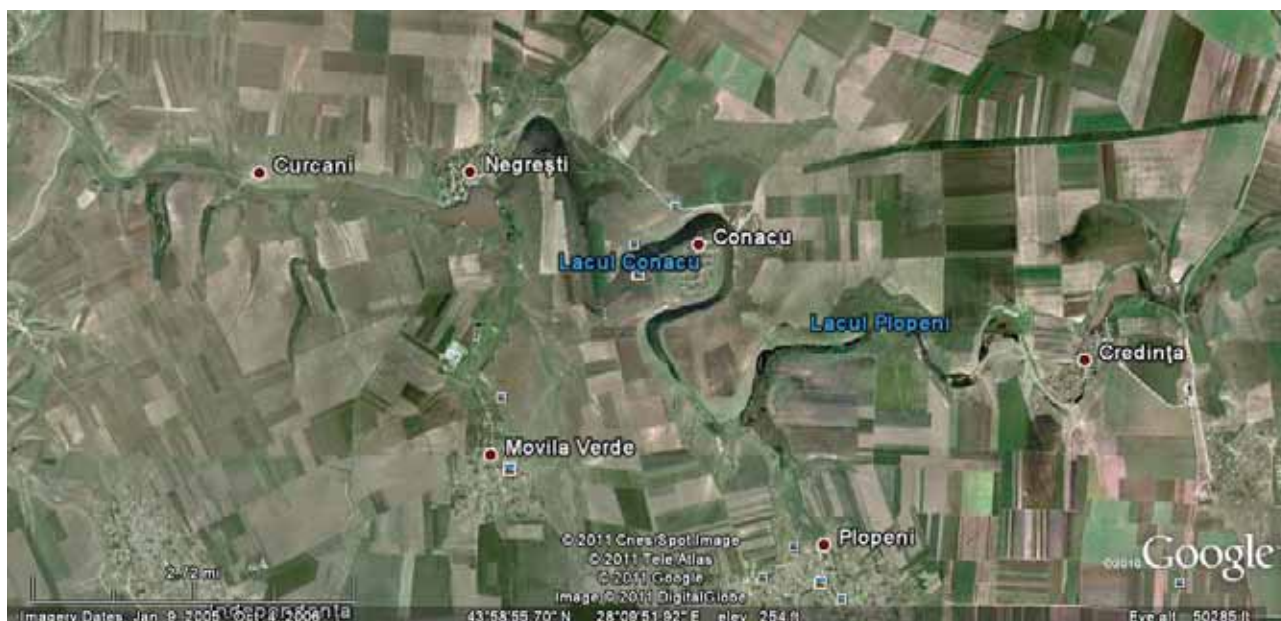


Figure 3. Conacu-Negrești Valley (from Google Earth).  
 Figura 3. Valea Conacu-Negrești (după Google Earth).

10 stations were established at different points in the lake, taken differently depending on the nature of the substrate, lake depth and the existence of marsh, aquatic and floating vegetation. From these stations, samples were collected monthly. All samples were taken from the shore area of the lake.

Samples were collected by dredging on the distance of two meters. Subsequently, they were stored in plastic containers with lids - in formalin. They were then examined in the Laboratory of Invertebrate Zoology, Faculty of Natural and Agricultural Sciences, Ovidius University, Constanța. Each sample taken from the field was washed through a set of four sieves, each with different mesh. Species were determined by means of IOR binocular magnifier and specimens of each species were counted.

For the terrestrial species, 12 stations were established depending on the type of the existing habitats in the valley: limestone walls with “rocks to day”, grassy hills, canyons, plateaus, ravines, debris walls, limestone walls with fossil mollusks. For species identification, it was widely used field observations and photographs taken monthly by the team, during the field trips.

The nomenclature of taxa and data processing is according to data from literature as well as to national and international legislation.

## RESULTS AND DISCUSSIONS

Conacu-Negrești Valley hosts many species of invertebrates, of which, so far, we have identified a total of 101 terrestrial and aquatic species, belonging of 17 orders and 57 families (AXINI, 2006, 2009). Of these, gastropods are second after the insects that hold the highest numerical proportion.

Of the gastropods identified thus far, the 22 species include both terrestrial and aquatic taxa among which 9 families grouped in 3 orders (AXINI, 2012; GROSSU, 1986, 1987; MÜLLER, 2002; NEGREA, 2002) (Table 1).

Within the lake basin (43°59'15.94"N, 28°09'24.52"E), benthic invertebrate fauna found in 2004-2005, is dominated by species of gastropods (*Planorbarius corneus*, *Esperiana esperi*, *E. acicularis*, *Valvata piscinalis*, *Physa acuta*), followed by Diptera and Heteroptera, of insects (GOMOIU & SKOLKA, 2001).

Gastropod populations occupy an important place in the lake biocoenoses structure, by the specific and numerical diversity and biomass (CHIRIAC & UDRESCU, 1965; CIOBOIU, 1998, 2002). They are the first organisms to be investigated when examining stagnant water. They indicate the oxygen content of the water of these basins. Their occurrence in surface water shows low levels of oxygen in water.

The presence of gastropod *Planorbarius corneus* with 464 specimens (indicator species for mesotrophic-eutrophic waters) shows that there is not a pronounced disturbance of the lake (ȚIGĂNUȘ & SAMARGIU, 2003). The presence of this species indicates the existence of high levels of calcium ions in lake water.

The Danubian and Pontic species of gastropods (*Esperiana esperi*, *E. acicularis*) shows that the valley is a former branch of the Danube River. This is demonstrated by geology and geography data, as well as by our field observations (the form of the canyons in the south - west of the valley). They are Pontian-Southeast European relicts.

Table1. The taxonomic analysis of identified gastropod species.  
Tabel 1. Analiza taxonomică a speciilor de gastropode identificate.

Order	Family	Species
Mesogastropoda	Thiaridae	<i>Esperiana esperi</i> (FÉRUSAC 1823)
		<i>Esperiana acicularis</i> (FÉRUSAC 1829)
	Valvatidae	<i>Valvata piscinalis</i> (O. F. MÜLLER 1774)
	Bithynidae	<i>Bithynia leachi</i> (SCHEPPARD 1823)
		<i>Bithynia tentaculata</i> (LINNAEUS 1758)
Basomatophora	Physidae	<i>Physa acuta</i> (DRAPARNAUD 1805)
		<i>Physa fontinalis</i> (LINNAEUS 1758)
	Planorbiidae	<i>Planorbarius corneus</i> (LINNAEUS 1758)
		<i>Gyraulus albus</i> (O. F. MÜLLER 1774)
	Lymneidae	<i>Radix ovata</i> (DRAPARNAUD 1805)
		<i>Radix peregra</i> (O. F. MÜLLER 1774)
		<i>Galba truncatula</i> (O. F. MÜLLER 1774)
		<i>Stagnicola palustris</i> (O. F. MÜLLER 1774)
Stylomatophora	Enidae	<i>Chondrula tridens</i> (O. F. MÜLLER 1774)
		<i>Zebrina detrita</i> (syn. <i>Helix detrita</i> ) (MÜLLER 1774)
		<i>Zebrina varnensis</i> (L. PFEIFFER 1847)
	Helicidae	<i>Helicella obvia dobroudschae</i> (CLESSIN 1886)
		<i>Cepaea vindobonensis</i> (A. FÉRUSAC 1821)
		<i>Helix pomatia</i> (LINNAEUS 1758)
		<i>Helix lucorum</i> (O. F. MÜLLER 1774)
	Limacidae	<i>Limax cinereo-niger</i> (WOLF 1803)
		<i>Limax flavus</i> (LINNAEUS 1758)

On limestone slopes with “rocks to day”, on plateaus, hills and canyons in the south-west of the valley (43°57'58.97"N, 28°10'14.88"E) is worth mentioning many individuals of the gastropods *Cepaea vindobonensis* (44°00'20.83"N, 28°08'32.99"E) (common snail in the whole Dobrogea, widespread in our country) and *Helicella obvia dobroudschae* (43°59'44.28"N, 28°10'25.59"E) (xerophilous species, endemic to Dobrogea).

*Chondrula tridens*, *Zebrina detrita* (syn. *Helix detrita*), and *Z. varnensis* are found on the limestone walls with “rocks to day”, in less numerous specimens.

The presence of two species - *Zebrina detrita*, large snail, and *Chondrula tridens* (44°00'20.83''N, 28°08'32.99''E) (relatively common species in the foliage of oak forests) previously confirmed the existence of pubescent oak forest (*Quercus pubescent*); however, it is no longer found in Conacu-Negrești Valley today. These are xerophilous species belonging to the genera of West Asian origin.

*Zebrina varnensis* (43°59'44.28''N, 28°10'25.59''E) is a xerophilous species, highly resistant to drought, found on sunny slopes covered with herbaceous vegetation, in sandy areas (SKOLKA, 2008; SKOLKA *et al.*, 2005). This species is a regional endemism spread of the Black Sea coast of Romania and Bulgaria. This demonstrates once again that the valley is a former branch of the Danube River connecting it and the Black Sea.

The analysis of the geographical elements of gastropods from Conacu-Negrești Valley (ZOLTÁN *et al.*, 2004; HUBENOV, 2007; ANIMALBASE, 2011) shows that the North Mediterranean-Turanian elements dominate with 3 species, followed by West Palearctic, Caspian Relict, Pontian-Southeast European, Holarctic, Holopaleartic, West and Central Eurosiberian and European elements, each with 2 species (Table 2).

Table 2. The zoogeographical elements, ecological data and conservation status of gastropods from Conacu-Negrești Valley. Tabel 2. Elementele zoogeografice, informații ecologice și statutul de conservare al gastropodelor din Valea Conacu-Negrești.

Species	Zoogeoelements	Ecological data/conservation status
<i>Bithynia leachi</i>	WP	L, PO, RH, SW, β
<i>Bithynia tentaculata</i>	WP	L, B, PO, SW, PH, NE, o-β
<i>Cepaea vindobonensis</i>	PM	T, XPH
<i>Chondrula tridens</i>	ET, NMT	T, XPH-ME
<i>Esperiana acicularis</i>	RC, PSEE	L, CR, RH, PO, LI
<i>Esperiana esperi</i>	RC, PSEE	L, CR, PO, LI, DD
<i>Galba truncatula</i>	H	L, EU, PE, PH, o-β
<i>Gyraulus albus</i>	WCES	L, B-8‰, PO, RH, SW, PH, R, N
<i>Helicella obvia dobroudschae</i>	ED	T, XPH
<i>Helix lucorum</i>	NMT	T, ME-HG
<i>Helix pomatia</i>	E	T, XPH-ME, EU, E, ESC, BC-3, HD-V
<i>Limax cinereo-niger</i>	E	T, ME
<i>Limax flavus</i>	RP, P, NM	T, ME, N
<i>Physa acuta</i>	NMT, SET	L, EU, PC, TX, NE, α-β
<i>Physa fontinalis</i>	TP	L, PH, R, N, α-β
<i>Planorbarius corneus</i>	WCES	L, B-8‰, SW, PO, NE, α-β
<i>Radix ovata</i>	HP	L, B-2,5‰, SW
<i>Radix peregra</i>	HP	L, EU, PH, PE
<i>Stagnicola palustris</i>	H	L, EU, PH, PC
<i>Valvata piscinalis</i>	WCP	L, RH, PO, SW, PH, NE, β
<i>Zebrina detrita</i>	CSEAN	T, XPH, CA, E
<i>Zebrina varnensis</i>	ER	T, XPH, CA, W

**Abbreviation used:**

**Zoogeoelements:** CESEAN-Central and South European-Anatolian, E-European, ED-Dobrogean Endemic, ER-Regional Endemic, ET-European-Turanian, H-Holarctic, HP-Holopaleartic, NM-North Mediterranean, NMT-North Mediterranean-Turanian, ML-Mediterranean-Lusitanian, P-Pontian, PM-Ponto-Mediterranean, PSEE-Pontian-Southeast European, RC-Caspian Relict, RP-Preglacial Relict, SET-South European-Turanian, TP-Transpalearctic, WCES-West and Central Eurosiberian, WCP-West and Central Palearctic, WP-West-Palearctic.

**Ecological data,** conservation status (COUNCIL DIRECTIVE, 1992; IUCN, 2011): B-brackish, B-‰-limiting freshwater level for marine and salinity level for the freshwater form, BC, 3-Bern Convention, CA-calciphilous, CR-crenobiont, DD-data deficient (IUCN), E-European importance, ESC-the Red List of Threatened Animals and Plants in Europe, EU-eurybiont, HD, V-Habitats Directive, HG-hygrophilous, L-freshwater, LI-lithophilous, ME-mesophilous, NE-not-evaluated, PE-pelophilous, PH-phytophilous, PO-pomatophilous, R-rare, RH-rhithrophilous, SC-stenoepibathic, SW-stagnant water, T-terrestrial, TX-trogloxene, XPH-xerophilous, W-world importance, α-β - α-β-mesosaprobic, β - β-mesosaprobic, o-β - o-β-mesosaprobic.

Across the valley, fossil marine species are present (*Maetra* sp.) (in the rocks from the lake, the canyons and ravines, on limestone walls and coasts with “limestone rocks to day”, Sarmatian) and unidentified species so far.

## CONCLUSIONS

Data presented in this work were compiled from field and laboratory studies conducted in 2003 - 2010. This research is part of a program developed by the Monachus Group for Research and Environmental Education in Constanța in partnership with the Faculty of Natural and Agricultural Sciences, Ovidius University in Constanța,

Romania; it aimed at identifying the biodiversity of Conacu-Negrești Valley, the biology and ecology of which have not been well-known until 2003.

A total of 22 species of gastropods was identified in this time. Of these Mollusca, two are endemic, seven are relicts, and two are rare. One species (*Helix pomatia*) is of European importance and included on the Habitats Directive and Bern Convention lists.

At present, the valley does not have designated conservation status. Human impacts on different aspects may contribute to future declines and even disappearance of some gastropods species in Conacu-Negrești Valley, many species important to science and human well-being, some of which have not been described yet.

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#### REFERENCES

- AXINI MONICA. 2006. *Lake and Conacu - Negrești Valley – Study made to their proposal for entry in the list of protected areas in Romania*. Thesis, Faculty of Agricultural Sciences and Natural Sciences. Ovidius University Constanța. Romania. 128 pp. [In Romanian].
- AXINI MONICA. 2009. *Conacu-Negrești Valley. The ecological reevaluation*. Dissertation, Faculty of Natural Sciences and Agricultural Sciences. Ovidius University Constanța. Romania. 130 pp. [In Romanian].
- AXINI MONICA. 2012. *Rare and Endemic Species in Conacu - Negrești Valley, Dobrogea, Romania*. In: Stevens (Ed.) *Global Advances in Biogeography*. Tech Published House. California: 219-254.
- AXINI MONICA. 2012. *Rare and Endemic Species in Conacu - Negrești Valley, Dobrogea, Romania*. Available online at: <http://www.intechopen.com/books/global-advances-in-biogeography> (accessed: March 25, 2012).
- BASARABEANU N. 1969. *Rolul apelor torențiale asupra modelării reliefului actual din Dobrogea*. Studii Geografice asupra Dobrogei. Lucrările Primului Simpozion de Geografie a Dobrogei. Edit. Pontica. Constanța: 65-70.
- BREZEANU D. G. 1997. *Monografia Comunei Cobadin*. Primăria Comunei Cobadin. Județul Constanța. Edit. Pontica. Constanța. 95 pp.
- CHIRIAC E. & UDRESCU M. 1965. *Ghidul Naturalistului în Lumea Apelor Dulci*. Edit. Științifică. București: 126-141.
- CIOBOIU OLIVIA. 1998. *Structura și dinamica unor populații de gasteropode din lacuri mici de acumulare din Câmpia Olteniei. 1 - Viviparus acerosus Bourg.* Argessis. Studii și comunicări - Seria Științele Naturii. Edit. Universității Pitești: 23-28.
- CIOBOIU OLIVIA. 2002. *Gasteropodele lacurilor mici de baraj din Câmpia Olteniei*. Edit. Sitech. Craiova. 120 pp.
- COTEȚ P. 1969. *Dobrogea de Sud - Geneză și Evoluție*. Studii Geografice asupra Dobrogei, Lucrările Primului Simpozion de Geografie a Dobrogei. Edit. Pontica. Constanța: 51-56.
- GĂȘTESCU P. & BREIER A. 1969. *Lacurile din Dobrogea*. Studii Geografice asupra Dobrogei. Lucrările Primului Simpozion de Geografie a Dobrogei. Edit. Pontica. Constanța: 97-104.
- GODEANU S. 2002. *Apele continentale, prezentare generală*. In: Godeanu (Ed.) *Diversitatea lumii vii. Determinatorul ilustrat al florei și faunei României*. Vasile Goldiș University Press. Arad. 2: 1-24.
- GOMOIU M. T. & SKOLKA M. 2001. *Ecologie. Metodologii pentru studii ecologice*. Ovidius University Press. Constanța: 62-64.
- GROSSU AL. V. 1986. *Gastropoda Romaniae. 1. Subclasa Prosobranchia și Opisthobranchia*. Edit. Litera. București. 525 pp.
- GROSSU AL. V. 1987. *Gastropoda Romaniae. 2. Subclasa Pulmonata I. Ordo Basommatophora II. Ordo Stylommatophora*. Edit. Litera. București. 445 pp.
- HUBENOV Z. 2007. *Fauna and zoogeography of marina, freshwater and terrestrial mollusks (Mollusca) in Bulgaria*. In: Fet & Popov (Eds.). *Biogeography and ecology in Bulgaria*. Springer: 82: 141-198. Available from the world wide web: <http://www.springerlink.com/content/n36xj8q7g70v3842/> (accessed: March 25, 2012).
- MÜLLER G. I. 2002. *Phylum Mollusca. Moluște*. In: Godeanu (Ed.) *Diversitatea lumii vii. Determinatorul ilustrat al florei și faunei României*. Vasile Goldiș University Press. Arad. 2: 334-337.
- NEGREA ALEXANDRINA. 2002. *Class Gastropoda. Melci*. In: Godeanu (Ed.). *Diversitatea lumii vii. Determinatorul ilustrat al florei și faunei României*. Vasile Goldiș University Press. Arad. 2: 338-343.
- SKOLKA M. 2008. *Invertebrate diversity in the western part of Black Sea coast: Cape Midia - Cape Kaliakra*. In: Făgăraș (Ed.) *Volum cu lucrările Conferinței de la Constanța „Studii comparative privind biodiversitatea habitatelor costiere, a impactului antropic și a posibilităților de conservare și restaurare a habitatelor de interes comunitar dintre Capul Midia (România) și Capul Kaliakra (Bulgaria)”*. Mamaia: 153-157.
- SKOLKA M., FĂGĂRAȘ M., PARASCHIV GABRIELA-MIHAELA. 2005. *Biodiversitatea Dobrogei*. Ovidius University Press, Constanța: 140-152.
- ȚIGĂNUȘ V. & SAMARGIU MANUELA. 2003. *Principiile metodelor biologice de evaluare a stării calitative a apelor*. In: Tofan (Ed.) *Noi Profesii de Mediu - Educație Ecologică*. Ovidius University Press. Constanța: 37-58.

ZOLTÁN F., MAJOROS G., VARGA A. 2004. *A scoring method for the assessment of rarity and conservation value of the Hungarian freshwater molluscs*. Acta Oecologica. Heldia. Hungary. **6**: 1-14.

\*\*\*. ANIMALBASE. 2011. [http://www.animalbase.uni-goettinger.de/...](http://www.animalbase.uni-goettinger.de/) (accessed: April 30, 2011).

\*\*\*. COUNCIL DIRECTIVE 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora. Available online at: <http://ec.europa.eu/environment/nature/legislation/habitatsdirective> (accessed: April 30, 2011).

\*\*\*. IUCN 2011. <http://iucn.org/> (accessed: April 30, 2011).

**Axini Monica**

"Monachus" Group of Scientific Research and Ecological Education,  
8, Hortensiei Alley, Constanța, Romania, 900518  
E-mail: monicaaxini@yahoo.com; monica.gceem@gmail.com

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