

MUZEUL JUDEȚEAN ARGEȘ

ARGESIS

Studii și comunicări
Seria Științele Naturii
XIX

EDITURA ORDESSOS
PITEȘTI
2011

ARGESIS
Seria Științele Naturii
Analele Muzeului Județean Argeș
Pitești

ARGESIS
Series Science of Nature
Annals of the District Argeș Museum
Pitești

General manager: Conf. univ. dr. Spiridon CRISTOCÉA

Founding director:

Prof. univ. dr. Radu STANCU

Eitorial Board:

Editor in chief: Dr. Daniela Ileana STANCU

Associated editors: Prof. univ. dr. Radu GAVA

Conf. univ. dr. Valeriu ALEXIU

Dr. Nicolae LOTREAN – secretary

Dr. Magdalena ALEXE – CHIRIȚOIU

Dr. Adrian MESTECĂNEANU

Advisory Board:

Dr. Dumitru MURARIU, Member of the Romanian Academy;

Prof. univ. dr. Thomas TITTIZER, University of Bonn – Germany;

Prof. univ. dr. Marin FALCĂ – University of Pitești;

Prof. univ. dr. Silvia OROIAN – University of Târgu-Mureș;

Prof. univ. dr. Anghel RICHITĂNEANU – University of Pitești

Typing and Processing: Nicolae LOTREAN
Adrian MESTECĂNEANU

EDITAT DE: MUZEUL JUDEȚEAN ARGEȘ
CU SPRIJINUL CONSILIULUI JUDEȚEAN ARGEȘ
Adresa redacției: Str. Armand Călinescu, nr. 44, 110047, Pitești
tel./fax: 0248/212561; e-mail: argesis.naturale@gmail.com
PITEȘTI - ROMÂNIA

EDITED BY THE ARGEŞ COUNTY MUSEUM
WITH THE SUPPORT OF
THE ARGEŞ COUNTY COUNCIL
Editorial Office Address: Armand Călinescu Street, no. 44, 110047, Pitești
phone/fax: 0248/212561; e-mail: argesis.naturale@gmail.com
PITEȘTI - ROMÂNIA

I. S. S. N. 1453 - 2182

Responsability for the content of scientific studies and communication belongs to the authors.

SUMMARY

MAGDALENA ALEXE-CHIRIȚOIU - Sozological categories of plants found in the megaforbs coenosis from the southern Carpathians	7
VALERIU ALEXIU - Systematic position and cenotaxonomica framing of species of the genus <i>Lythrum</i> L.	13
VALERIU ALEXIU - The Chorology of <i>Trifolium</i> species in the Argeș County	23
MIHAELA SĂMĂRGHIȚAN, SILVIA OROIAN - Meadows with <i>Fritillaria meleagris</i> L. at Lunca Mureșului – Aluniș, Mureș County	31
DANIELA ILEANA STANCU - Subalpine and Alpine Grassland Vegetation from Râiosu and Buda Mountains - Făgăraș Massif	49
ADRIANA VINTILĂ - Monitoring the impact of flora and vegetation by creating specific infrastructure in travel/tourism activities in the area Ghițu – Moliviș (Argeș County)	65
OLIVIA CIOBOIU, GHEORGHE BREZEANU - Evaluation of the Danube floodplain biodiversity (km 811 - 661) for the preservation of the natural genofond	73
RADU GAVA, ADRIAN MESTECANEANU, DENISA CONETE - Species of birds rarely observed In the Important Bird Area „The Dam lakes of the Argeș River” during of the International waterbird Count (1999 – 2012)	79
NICOLAE LOTREAN - Preliminary data on the spider fauna of the Natural Reservation Spring from Corbii Ciungi, county Dâmbovița (Romania)	87
AUGUSTIN NAE - Studies on the spider communities from Piatra Craiului Massif	99
IONUȚ POPA - On some collembolan species from the Mociar Natural Reserve. First record of <i>Isotomurus unifasciatus</i> (Borner, 1903) in Romania	113
THOMAS TITTIZER - Untersuchungen zur Isolationswirkung von Stauwehren auf das Makrozoobenthos	119

MARIUS VERNESCU - The ornithofauna from the Lacu Sărat II area (Brăila County) between 2008 and 2010	135
---	-----

NOTES

SORIN GEACU – Der Damhirsch (<i>Dama dama</i> L., 1758) auf das Territorium des Ilfov-Kreises	151
ILIE GOGA - Des notes floristiques du district de Caraș-Severin Municipie de Reșița et ses environs (VI note)	157
ILIE GOGA - Des notes floristiques du district de Caraș-Severin Municipie de Reșița et ses environs (VIII note)	163
RADU GAVA - In Memmoriam, Ion S. Băcanu	167
RADU GAVA - In Memoriam, Ion S. Băcanu	169

CUPRINS

MAGDALENA ALEXE-CHIRIȚOIU - Categorii sozologice de plante existente în cenozele de megaforbiete din Carpații Meridionali	7
VALERIU ALEXIU - Poziția sistematică și încadrarea cenotaxonomică a speciilor genului <i>Lythrum</i> L.	13
VALERIU ALEXIU - Corologia speciilor de <i>Trifolium</i> în județul Argeș	23
MIHAELA SĂMĂRGHIȚAN, SILVIA OROIAN - Pajiști cu <i>Fritillaria meleagris</i> L. la Lunca Mureșului – Aluniș, județul Mureș	31
DANIELA ILEANA STANCU - Vegetația pajistilor subalpine și alpine din munții Râiosu și Buda, Masivul Făgăraș	49
ADRIANA VINTILĂ - Monitorizarea impactului asupra florei și vegetației prin crearea infrastructurii specifice activităților de călătorie/turism în arealul Ghițu-Moliviș (județul Argeș)	65
OLIVIA CIOBOIU, GHEORGHE BREZEANU - Evaluarea biodiversității luncii inundabile a Dunării (Km 811 - 611) pentru conservarea genofondului natural	73
RADU GAVA, ADRIAN MESTECANEANU, DENISA CONETE - Specii de păsări rar observate în Aria de Importanță Avifaunistică “Lacurile de Acumulare – Argeș” în timpul Recensământului Internațional al Păsărilor de Apă (1999 – 2012)	79
NICOLAE LOTREAN - Date preliminare asupra faunei de aranee din Rezervația Naturală Izvorul de la Corbii Ciungi, județul Dâmbovița (România)	87
AUGUSTIN NAE - Studii asupra comunităților de păianjeni din masivul Piatra Craiului	99
IONUȚ POPA - Date privind fauna de colembole din Rezervația Naturală Forestiera Mociar. Prima semnalare a speciei <i>Isotomurus unifasciatus</i> in Romania	113
THOMAS TITTIZER - Investigații privind efectul de izolare a barajelor asupra macrozoobentosului	119

MARIUS VERNESCU - Ornitofauna din zona Lacu Sărat II (jud. Brăila) în perioada 2008-2010	135
NOTE	
SORIN GEACU - Cerbul lopătar (<i>Dama dama</i> L., 1758) pe teritoriul județului Ilfov	151
ILIE GOGA - Note floristice din județul Caraș-Severin, Municipiul Reșița și împrejurimile sale (nota VI)	157
ILIE GOGA - Note floristice din județul Caraș-Severin, Municipiul Reșița și împrejurimile sale (nota VIII)	163
RADU GAVA - In Memmoriam, Ion S. Băcanu	167
RADU GAVA - In Memoriam, Ion S. Băcanu	169

SOZOLOGICAL CATEGORIES OF PLANTS FOUND IN THE MEGAFORBS COENOSIS FROM THE SOUTHERN CARPATHIANS

MAGDALENA ALEXE - CHIRIȚOIU

The Argeș County Museum, Armand Călinescu Street, no. 44, 110047, Pitești, Argeș, Romania,
e-mail: magda_chiritoiu@yahoo.com

ABSTRACT: In this paper are presented the sozological categories of plants found in the megaforbs coenosis from the Southern Carpathians. Among them there are some vulnerable species and this fact requires an efficient management of the areas where they vegetate.

Key words: megaforbs, sozological categories, the Southern Carpathians.

REZUMAT: Categorii sozologice de plante existente în cenozele de megaforbete din Carpații Meridionali.

În această lucrare sunt prezentate categoriile sozologice de plante care fac parte din structura cenotică a asociațiilor de megaforbete din Carpații Meridionali. Printre acestea se regăsesc și unele specii vulnerabile ce impun un management eficient al ariilor în care acestea vegetează.

Cuvinte cheie: megaforbete, categorii sozologice, Carpații Meridionali.

INTRODUCTION

In the megaforbs coenotic structure from the Southern Carpathians were identified some taxa included in the red lists from Romania and IUCN as endemic and rare and vulnerable.

An estimate of the endangered plant species from the floral composition of the megaforbs is extremely important because the role played by their phytocoenosis for the existence of some important species is highlighted.

MATERIALS AND METHODS

The analyzed data are based upon the results of my own researches as well as upon those already existent in the literature (Alexiu, 1998; Bită-Nicolae, 2005; Borza, 1934; Boșcaiu, 1971; Coldea, 1993; Drăghici, 1980; Drăgulescu, 1995; Mihăilescu, 2001; Muică, 1995; Neblea, 2006; Niculescu et al.; 2008; Stancu, 2005).

The taxonomic nomenclature was adopted according to the **Illustrated Flora of Romania** (Ciocârlan, 2009). The identification of the zoological categories was performed based upon the **Red List of the Superior Plants of Romania** (Oltean et al., 1994) and **The Red Book of the Vascular Plants of Romania** (Dihoru & Negrean, 2009). The IUCN Categories and the actual zoological categories used in the two papers are:

E – Endangered; the taxa on the edge of extinction whose survival is improbable if the causes of that determined it remain the same;

V – Vulnerable; the taxa considered to more likely to pass to the E category if the factors that cause the problems continue their influence;

R – Rare, small populations of taxa which are not endangered for the moment but which are at risk;

A – Only one area; only the endemic species from Romania are included;

B – More than one area, but only one region; those endemic taxa in Europe are included;

b – Taxa subendemics, whose spreading area is beyond Romanian borders, but only in their vicinity;

nt – Not endangered;

CR – Critically Endangered, very high risk of extinction of the taxon into the wilderness in the near future;

EN – Endangered, when the taxon is not CR, but it risks the extinction in the wilderness in the near future;

VU – Vulnerable, when the taxon is not CR or EN, but it risks the extinction in the wilderness in the future;

LR – Lower Risk of extinction, when the taxon is not CR, EN or VU.

RESULTS AND DISCUSSIONS

In the megaflora coenosis from the Southern Carpathians about 427 taxa were identified, 70 of which are endemics, rare, vulnerable taxa etc (Tab. 1).

Because the same species is differently approached in the two papers the data were presented in the table below.

Table 1 – Zoological categories.

No.	Taxa	The Red List (Oltean et al., "94)	The Red Book (Dihoru & Negrean, "09)
1.	<i>Abies alba</i> Miller	B E	-
2.	<i>Alopecurus laguriformis</i> Schur	B E	-
3.	<i>Achillea schurii</i> Schultz-Bip.; ssp. <i>schurii</i> (Schultz-Bip.) Heimerl	B E	-
4.	<i>Allium victorialis</i> L.	B E	-
5.	<i>Campanula carpatica</i> Jacq.	B E	-

Continues.

Table 1 – Continuation.

No.	Taxa	The Red List (Oltean et al., "94)	The Red Book (Dihorū & Negrean, "09)
6.	<i>Centaurea kotschyana</i> Heuff.	B E	-
7.	<i>Chrysosplenium alpinum</i> Schur	B E	-
8.	<i>Leucanthemum waldsteinii</i> (Schultz Bip.) Pouzar	B E	-
9.	<i>Adenostyles alliariae</i> (Gouan) A. Kerner ssp. <i>hybrida</i> (DC.) Tutin	R	-
10.	<i>Carex atrata</i> L. ssp. <i>aterrima</i> (Hoppe) Čelak.	R	-
11.	<i>Centaurea uniflora</i> Turra ssp. <i>nervosa</i> (Willd.) Bonnier et Layens	R	-
12.	<i>Crepis conyzifolia</i> (Gouan) A. Kerner	R	-
13.	<i>Coeloglossum viride</i> (L.) Hartman	R	-
14.	<i>Dactylorhiza maculata</i> (L.) Soo	R	-
15.	<i>Dianthus barbatus</i> L. ssp. <i>compactus</i> (Kit.) Heuff.	R	-
16.	<i>Epilobium alpestre</i> (Jacq.) Krocker	R	-
17.	<i>Epilobium anagallidifolium</i> Lam.	R	-
18.	<i>Epilobium nutans</i> F. W. Schmidt	R	-
19.	<i>Galium lucidum</i> All.	R	VU
20.	<i>Gentiana acaulis</i> L.	R	-
21.	<i>Gentiana punctata</i> L.	R	-
22.	<i>Gymnadenia conopsea</i> (L.) R. Br.	R	-
23.	<i>Jovibarba heuffelii</i> (Schott) Å. et Löve	R	-
24.	<i>Juncus triglumis</i> L.	R	-
25.	<i>Ligularia sibirica</i> (L.) Cass.	R	-
26.	<i>Pedicularis exaltata</i> Besser	R	-
27.	<i>Phyteuma confusum</i> A. Kerner	R	-
28.	<i>Pinguicula vulgaris</i> L.	R	-
29.	<i>Pinus cembra</i> L.	R	-
30.	<i>Plantago gentianoides</i> Sibth. et Sm.	R	-
31.	<i>Platanthera bifolia</i> (L.) L. C. M. Richard	R	-
32.	<i>Polemonium coeruleum</i> L.	R	-
33.	<i>Pseudorchis albida</i> (L.) A. et D. Löve	R	-
34.	<i>Pseudorchis frivaldii</i> (Hampe ex Griseb.) F. P. Hunt	R	CR
35.	<i>Pulsatilla vulgaris</i> Mill. ssp. <i>grandis</i> (Wender.) Zämelis	R	CR
36.	<i>Ranunculus montanus</i> Willd. ssp. <i>pseudomontanus</i> (Schur) Ciocârlan	R	-
37.	<i>Rhinanthus alectorolophus</i> (Scop.) Pollich.	R	VU
38.	<i>Ribes nigrum</i> L.	R	-
39.	<i>Scorzonera purpurea</i> L. ssp. <i>rosea</i> (Waldst. et Kit.) Nyman	R	-
40.	<i>Scrophularia heterophylla</i> Willd. ssp. <i>laciniata</i> (Waldst. et Kit.) Maire et Petitmengin	R	-
41.	<i>Sedum telephium</i> ssp. <i>fabaria</i> (Koch) Kirschl.	R	-

Continues.

Table 1 – Continuation.

No.	Taxa	The Red List (Oltean et al., "94)	The Red Book (Dihorū & Negrean, "09)
42.	<i>Sempervivum montanum</i> L.	R	-
43.	<i>Senecio glaberrimus</i> (Roechel) Simonkai	R	-
44.	<i>Soldanella montana</i> Willd.	R	LR
45.	<i>Streptopus amplexifolius</i> (L.) DC.	R	-
46.	<i>Trollius europaeus</i> L.	R	-
47.	<i>Tozzia alpina</i> L. ssp. <i>carpathica</i> (Woloszczak) Hayek	R	-
48.	<i>Veronica bachsenii</i> Heuffel	R	-
49.	<i>Viola dacica</i> Borbás	R	-
50.	<i>Doronicum carpathicum</i> (Griseb. et Schenk) Nyman	b R	-
51.	<i>Festuca carpathica</i> F. G. Dietr.	b R	-
52.	<i>Geranium caeruleatum</i> Schur	b R	-
53.	<i>Hesperis nivea</i> Baumg.	b R	-
54.	<i>Phyteuma tetrapterum</i> Schur	b R	-
55.	<i>Phyteuma vagneri</i> A. Kerner	b R	-
56.	<i>Ranunculus carpathicus</i> Herbich	b R	VU
57.	<i>Scabiosa lucida</i> ssp. <i>Vill. barbata</i> Nyar.	b R	-
58.	<i>Silene nutans</i> L. ssp. <i>dubia</i> (Herbich) Zapal	b R	-
59.	<i>Thlaspi dacicum</i> Heuffel ssp. <i>dicum</i>	b R	-
60.	<i>Thymus pulcherrimus</i> Schur	b R	-
61.	<i>Trisetum fuscum</i> (Kit. ex Schultes) Sch. in Roemer et Sch.	b R	-
62.	<i>Dianthus spiculifolius</i> Schur	A nt	-
63.	<i>Dianthus tenuifolius</i> Schur	A nt	-
64.	<i>Hepatica transsilvanica</i> Fuss	A nt	-
65.	<i>Heracleum sphondylium</i> L. ssp. <i>transsilvanicum</i> (Schur) Brummitt	A nt	-
66.	<i>Thymus comosus</i> Heuff.	A nt	-
67.	<i>Angelica archangelica</i> L.	V	-
68.	<i>Aquilegia nigricans</i> Baumg.	V	-
69.	<i>Gentiana lutea</i> L.	V/R	-
70.	<i>Rhododendron myrtifolium</i> Schott et Kotschy	V/R	-

A special case is that of the taxon *Ligularia sibirica* whose relict populations have been diminishing in Europe. This species has a different state and the conservative value of the habitats, it belongs to, is big; it is included in the Anex I of the Bern Convention (cf. <http://conventions.coe.int>) and also in the Anexa II of the Directive for Habitat (cf. <http://ec.europa.eu/environment>), which refers to the animal and vegetal species which are important for the community and whose conservation needs special areas of preservation.

CONCLUSIONS

By analyzing the data results that: 8 taxa are endemics in Europe (BE), 41 are rare (R), 12 are rare subendemics (bR), 5 are endemics in Romania but not endangered (A nt), 2 are vulnerable (V), and 2 are rare/vulnerable (V/R). There are 2 more vulnerable species, 2 critically endangered and one lower risk species.

The following families have the highest percentage in zoological categories: Asteraceae (10 taxa), Ranunculaceae (6), Orchidaceae (6), Scrophulariaceae (5).

REFERENCES

- ALEXIU V., 1998 – *Vegetația Masivului Iezer-Păpușa*. Ed. Cultura, Pitești. p. 242-262.
- BITĂ-NICOLAE Claudia, 2005 – *Flora și vegetația Bazinului superior al râului Prahova*. Teză de doctorat. Inst. de Biol. al Acad. Rom., București.
- BORZA Al., 1934 – „*Studii fitosociologice în Munții Retezatului*. - Étude phytosociologiques dans les Monts du Rétézat (Résumé)”, Buletinul Grădinii Botanice și al Muzeului Botanic de la Univ. din Cluj. **XIV** (1-2): p. 1-84.
- BOȘCAIU N., 1971 – *Flora și vegetația Munților Tarcu, Godeanu și Cernei*. Ed. Acad. R.S.R., București. p. 364-389.
- CIOCÂRLAN V., 2009 – *Flora ilustrată a României*. Ed. Ceres, București. 1141 p.
- COLDEA Gh., 1993 – „*Cormofite. Sintaxonomia și descrierea asociațiilor vegetale*”. Parcul Național Retezat. Studii ecologice, Ed. West Side, Brașov. p. 38-40.
- Council of Europe. *Convention on the Conservation of European Wildlife and Natural Habitats. Bern, 19.IX.1979.* http://conventions.coe.int/Treaty/FR/Treaties/Html/104-1.htm#ANGIOSPERMAE_2. (accessed: July 25, 2012).
- DIHORU Gh., NEGREAN G., 2009 – *Cartea roșie a plantelor vasculare din România*. Ed. Acad. Române, București. 630 p.
- DRĂGHICI Bibica, 1980 – *Flora și vegetația Văii Dâmbovicioara și a versantului estic al Pietrei Craiului*. Teză de doctorat, Univ. București.
- DRĂGULESCU C., 1995 – *Flora și vegetația Văii Sadului*. Ed. Constant, Sibiu. p. 271-272, 268-269.
- European Comision, Environment, Nature & Protection. *Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora*. http://ec.europa.eu/environment/nature/legislation/habitatsdirective/index_en.htm. (accessed: July 25, 2012).
- MIHĂILESCU Simona, 2001 – *Flora și vegetația Masivului Piatra Craiului*. București, Ed. Vergiliu. p. 193-195, 271, 267-268.
- MUICĂ Cristina, 1995 – *Munții Vâlcanului. Structura și evoluția peisajului*. Ed. Acad. Romane, București. p. 93-95.
- NEBLEA Monica, 2006 – *Flora și vegetația Munților Leaota și a sectorului vestic al Munților Bucegi*. Teza de doctorat, Inst. de Biol., București. p. 240-241, 244-245, 251-252, 257-259.
- NICULESCU Mariana, IMBREA Ilinca, NICOLIN ALMA Alioara, 2008 – „*Contribution regarding the study of the Rumicion alpinii Rübel 1933 alliance in the Lotru Mountains*”. Research Journal of Agricultural Science. **XL** (3): p. 71-76.

- OLTEAN M., NEGREAN G., POPESCU A., ROMAN N., DIHORU Gh., SANDA V.,
MIHĂILESCU Simona, 1994 – *Lista roșie a plantelor superioare din România.*
Stud., Sint., Docum., Ecol., Acad. Rom., Inst. de Biol., București. I: p. 5-46.
STANCU Daniela Ileana, 2005 – *Flora și vegetația Munților Râiosu și Buda, Masivul
Făgăraș*. Ed. Univ. din Pitești, Pitești. p. 169-170, 166-167, 176-177, 179.

SYSTEMATIC POSITION AND CENOTAXONOMICA FRAMING OF SPECIES OF THE GENUS *LYTHRUM* L.

VALERIU ALEXIU

University of Pitești, Târgu din Vale Street, no. 1, 110040, Pitești, Argeș, Romania / The Argeș County Museum, Armand Călinescu Street, no. 44, 110047, Pitești, Argeș, Romania,
e-mail: alexiuv@yahoo.com

ABSTRACT: *Lythrum* is a genus commonly known as “loosestrife”. It is one of 32 genera of the family Lythraceae. The genus includes 24 species spread across all continents. In Europe there 12 species and in Romania are quoted 4 or 5 species of *Lythrum*. The 5 *Lythrum* species present in Romania are classified into 11 vegetation classes, 12 orders, 16 alliances and 29 plant associations.

Key words: *Lythrum*, coenotaxonomic, coenotic integration, plant association.

REZUMAT: Poziția sistematică și încadrarea cenotaxonomică a speciilor genului *Lythrum* L. *Lythrum* este genul cunoscut sub numele comun de “răchitan”. Este unul din cele 32 de genuri ale familiei Lythraceae. Genul include 24 de specii răspândite în toate continentele. În Europa sunt 12 specii, iar în România 4 sau 5 specii de *Lythrum*. Cele 5 specii sunt integrate în 11 clase de vegetație, 12 ordine, 16 alianțe și 29 de asociații.

Cuvinte cheie: *Lythrum*, cenotaxonomic, integrare cenotică, asociație vegetală.

INTRODUCTION

It is a plant native to Europe, but that is almost on all continents of the world, being particularly lively and adaptable.

The vernacular name of most species of *Lythrum* is “răchitan”. In some regions, *Lythrum salicaria* is called "gălbejoară" (?), probably due to the similarity of the “răchitan” leaves and those of *Lysimachia punctata*, which is also called “gălbejoară”.

In English the name of “răchitan” is "Purple loosestrife" while “gălbejoară” is called "Yellow loosestrife". Complications would be perhaps avoided if the scientific name were more rigorously took into consideration. This fact occurs, for example, in French or Italian: the plant is simply called "salicaire" and "salcerella" by taking the determinant of the Latin scientific name "*salicaria*" (due to the similarity of the leaves shape with that of the willow leaves).

Lythrum's scientific name derives from "lython", which in the ancient Greek means "bloodstained", because the "răchitan" was used by the Greek and Roman soldiers to treat the bleeding wounds which it miraculously cured.

We have inherited from Dacians knowledge about plants. It has been used since ancient times to treat the bloody sputum as well as to moderate the menstrual flow and against the nosebleeds (epistaxis). It was also used as an antiseptic for the wounds and haemorrhage. In several parts of the country, the plant was used by folk medicine for ugliness (paralysis).

In the Western Carpathians the flowers of the plant were boiled as a remedy against the insomnia. In northern Moldavia, floriferous stems are used in the treatment of quinsy (tonsillitis, angina diphtheria, scrofula). They are boiled and the resulted is used for lavages and foment of the affected part of the body. For the treatment of leucorrhoea, when the fructification is in bloom is boiled and the decoction is drunk or used by women for vaginal lavage. For the same purpose the distillation of plant fructifications was used. Nowadays the leaves are boiled and the decoctions are used as diuretics and against diarrhea.

There are also numerous scientific synonyms of the name of this plant, through which other botanists want to define the morphological characteristics of the plant or only to include it in a genre or another. Thus "răchitan" is also called: *Lythrum cinereum*, *L. tomentosum*, *Salicaria hyssopifolia*, *S. spicata*, *S. vulgaris*.

The species of *Lythrum* belong to the family *Lythraceae*, a family which includes about 450 species which are distributed in the temperate and warm regions on the world. They usually could be found at the edge of lakes, swamps, wet depressions, grooves, from flatlands to mountain (up to the beech floor). It is abundant in the Danube Meadow and Delta; it is often associated with *Carex* and *Juncus* species.

In the vernacular language it is known as: "brăileancă", "călbășoară", "cârligătea", "gălbejoară", "lemnje", "lemnüş", "lemnuşcă", "sburătoare", "sburătoare bărbătească", "sburătoare bărboasă"; French: "Salicaire"; German: "Blut-Weiderich", Hungarian: "Réti füzény", Russian: "Derbennik ivolistnai", "Plakun", Ukrainian: "Zolotneta".

Genus *Lythrum* systematic classification is as follows:

Kingdom: Plantae

Phylum: Magnoliophyta

Class: Magnoliopsida

Order: Myrtales

Family: Lythraceae

Genre: *Lythrum* L.

The genus includes 24 species spread across all continents. In Europe, **Flora Europaea** describes 12 species: *Lythrum acutangulum* Lag., *L. borysthenicum* (Schrank) Litv., *L. castellanum* Gonz. Albo ex Borja, *L. flexuosum* Lag., *L. hyssopifolia* L., *L. junceum* Banks & Sol., *L. portula* (L.) D.A. Webb, *L.*

salicaria L., *L. thymifolia* L., *L. tribracteatum* Salzm. ex Spreng., *L. virgatum* L., *L. volgense* D.A. Webb. In Romanian flora are described 4 species of *Lythrum* (Flora RPR, 1957): *Lythrum tribracteatum* Salzm. ex Sprengel, *L. hyssopifolia* L., *L. virgatum* L., *L. salicaria* L. Ciocârlan lists 5 species: *Lythrum tribracteatum* Salzm. ex Sprengel, *L. hyssopifolia* L., *L. virgatum* L., *L. salicaria* L., *L. thymifolium* L.. To these we add species *Peplis portula* L., synonymous as the *Lythrum portula* (L.) D.A. Webb (Flora ilustrată a României, 2009).

Plant associations with *Lythrum* sp. identified in Romania

The chronological analysis of the species highlighted a correlation between the size of the area of distribution of each taxa and their percentage inside the coenotic structure of the association these floral elements where identified in.

The 5 *Lythrum* species present in Romania are classified into 11 vegetation classes, 12 orders, 16 alliances and 29 plant associations (Tab. 1.).

Table 1 - Coenotic integration *Lythrum* species in coenotaxon in Romania.

Taxon	Classes	Orders	Alliances	Associations
Genus <i>Lythrum</i>	11	12	16	29
<i>Lythrum salicaria</i>	9	10	12	24
<i>Lythrum hyssopifolia</i>	4	4	6	6
<i>Lythrum tribracteatum</i>	1	1	1	1
<i>Lythrum virgatum</i>	3	3	3	3
<i>Lythrum portula</i>	1	1	1	1

1. PHRAGMITETEA Tx. et Preising 1942 (High vegetation of eutrophic waters and wetlands):

Phragmitetalia Koch 1926:

Phragmition Koch 1926:

- *Glycerietum maximae* Hueck 1931 (*L. salicaria*; in Argeș county);
- *Schoenoplectetum lacustris* Chouchard 1924 (*L. salicaria*);
- *Acoretum calami* Eggler 1933 (*L. salicaria*);
- *Thypetum angustifoliae* Pignatti 1953 (*L. salicaria*, in Argeș county);
- *Thypetum latifoliae* Lang 1973 (*L. salicaria*);

Magnocaricion elatae Koch 1926:

- *Cladietum marisci* Allorge 1922 ex Zobrist 1935 (*L. salicaria*, *L. virgatum*);
- *Caricetum inflato-vesicariae* Koch 1926 (*L. salicaria*);
- *Caricetum gracilis* (Grebn. Et Hueck 1931) Tx 1937 (*L. salicaria*);
- *Caricetum elatae* (Kerner 1958) W. Koch 1926 (*L. salicaria*);
- *Caricetum buxbaumii* Issler 1932 (*L. salicaria*);
- *Poetum palustris* Resmeriță et Rațiu 1974 (*L. salicaria*).

2. ISOETO-NANOJUNCETEA Br.-Bl. et Tx. 1943 (The low land vegetation and muddy puddles):

Nanocyperetalia Klika 1958:

Nanocyperion flavescentis W. Koch 1926:

- *Juncetum bufonii* (Felföldy 1942) Morariu 1956 (*L. salicaria*, *Lythrum portula*);
 - *Lythro thymifolii-Dichostyletum hamulosi* Dihoru et Negrean 1976 (*L. salicaria*);
 - Ass. *Lythrum tribracteatum-Lythrum hyssopifolia* Slavnić 1951;
- Verbenion supinae Slavnić 1951:
- *Pulicario-Menthetum pulegii* Slavnić 1951 (*L. hyssopifolia*).

3. MOLINIO-JUNCETEA Br.-Bl. 1949, 1951 (Grassland vegetation meso-hydrophilic):

Caricetalia davallianae Br.-Bl. 1949:

Caricion davallianae Klika 1934:

- *Caricetum davallianae* (Br.-Bl. 1924, Dutoit 1924) Koch 1928, Kulczynski 1928 (*L. salicaria*).

4. PUCCINELIO-SALICORNIETEA Țopa 1939 (Land vegetation less salty):

Puccinelietalia limosae (Soó 1968) Géhu et Rivas-Martinez 1982:

Cypero-Spergularion Slavnić 1951:

- *Heleochnloetum schoenoidis* (Soó 1933) Țopa 1939 em. I. Pop 1968 (*L. hyssopifolia*);

Beckmannion eruciformis Soó 1933:

- *Zingerietum (Agrostetum) pisidicae* Buia et al. 1959 em. D. Cârțu 1971 (*L. hyssopifolia*).

5. ORYZETEA SATIVAE Miyawaki 1960 (Vegetation of weeds in paddy fields):

Oryzo-Echinochloetalia O. de Bolós et Masclans 1955:

Oryzion sativae Koch 1954:

- *Echinochloo-Oryzetum sativae* Soó et Ubrizsy 1948 (*L. hyssopifolia*, *L. salicaria*).

6. MOLINIO-ARRHENATHERETEA R. Tüxen 1937 (Mesophilic grassland vegetation):

Molinietalia caeruleae Koch 1926:

Filipendulion Lohmeyer in Oberdorfer et al. 1967:

- *Lysimachio vulgaris-Filipenduletum ulmariae* Balátová-Tuláčková 1978 (*L. salicaria*, in Argeș county);

Calthion palustris R. Tüxen 1937:

- *Scirpo-Cirsietum cani* Balátová-Tuláčková 1973 (*L. salicaria*).

Potentillo- *Polygonetalia* R. Tüxen 1947

Potentillion *anserinae* R. Tüxen 1937

- *Dactylo-Festucetum arundinaceae* R. Tüxen 1950 (*L. salicaria*);
- *Lythro-Calamagrostetum epigei* Pop I. 1968 (*L. virgatum*, *L. salicaria*).

7. STELLARIETEA MEDIAE R. Tüxen et al. ex von Rochow 1951:

Eragrostietalia R. Tüxen ex Poli 1966:

Matricario-Chenopodion albi Timár 1954:

- *Matricarietum perforatae* (D. Cârțu 1971) Popescu et Sanda 1991 (*L. hyssopifolia*).

8. GALIO-URTICETEA Passarge 1967 em. Kopecký 1969:

Convolvuletalia sepium R. Tüxen em. Mucina 1993:

Senecion fluvialis R. Tüxen 1952:

- *Calystegietum sepium* (R. Tüxen 1947) em. Passarge 1964 corr. Soó 1957 (*L. salicaria*);
- *Glycyrrhizetum echinatae* Slavnić 1951 (*L. virgatum*).

9. EPILOBIETEA ANGUSTIFOLII R. Tüxen et Preising in R. Tüxen 1950 (Forest vegetation cuts):

Atropetalia Vlieger 1937:

Carici piliferae-Epilobion angustifolii R. Tüxen 1950:

- *Eupatorietum cannabini* R. Tüxen 1937 (*L. salicaria*).

10. SALICETEA PURPUREAE Moor 1958 (Vegetation meadows):

Salicetalia purpureae Moor 1958:

Salicion triandrae Th. Müller et Görs 1958:

- *Salicetum triandrae* Malcuit 1929 (*L. salicaria*).

11. ALNETEA GLUTINOSAE Br.-Bl. et R. Tüxen ex Westhoff et al. 1946 (Vegetation water meadows):

Salicetalia auritae Doing ex Westhoff et Den Held 1969:

Salicion cinereae Th. Müller et Görs ex Passarge 1958:

- *Alno-Salicetum cinereae* (Kobendza 1950) Passarge 1956 (*L. salicaria*, in Argeș county).

CONCLUSIONS

The paper represents a timid attempt to clarify the genus *Lythrum* in Romania. In addition to the information from nomenclature, taxonomy and coenotaxonomy there are also presented in this paper the informations from literature, collections and personal observations that are also included in a map. 5 associations with *Lythrum* species were identified in Argeș County.

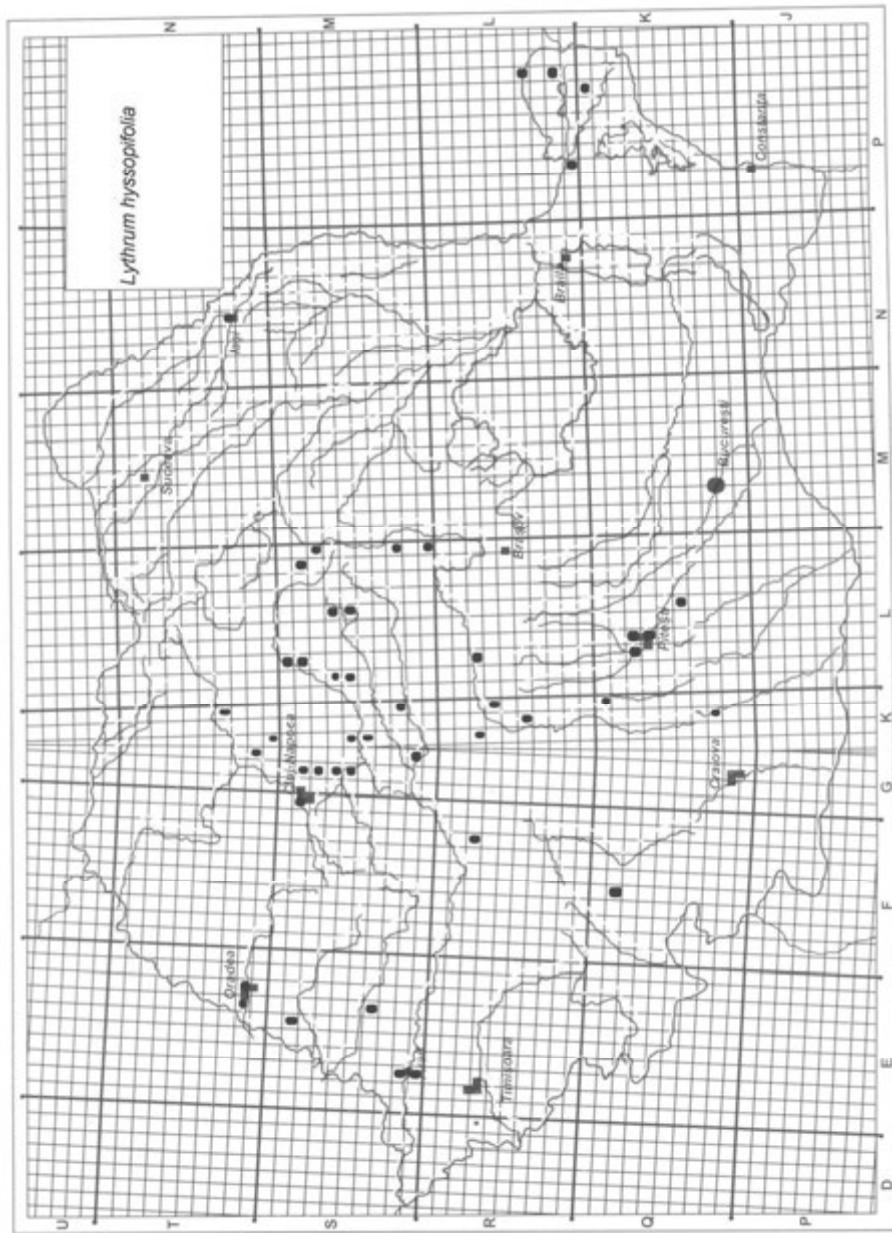


Fig. 1. – Spread of *Lythrum hyssopifolia* in Romania

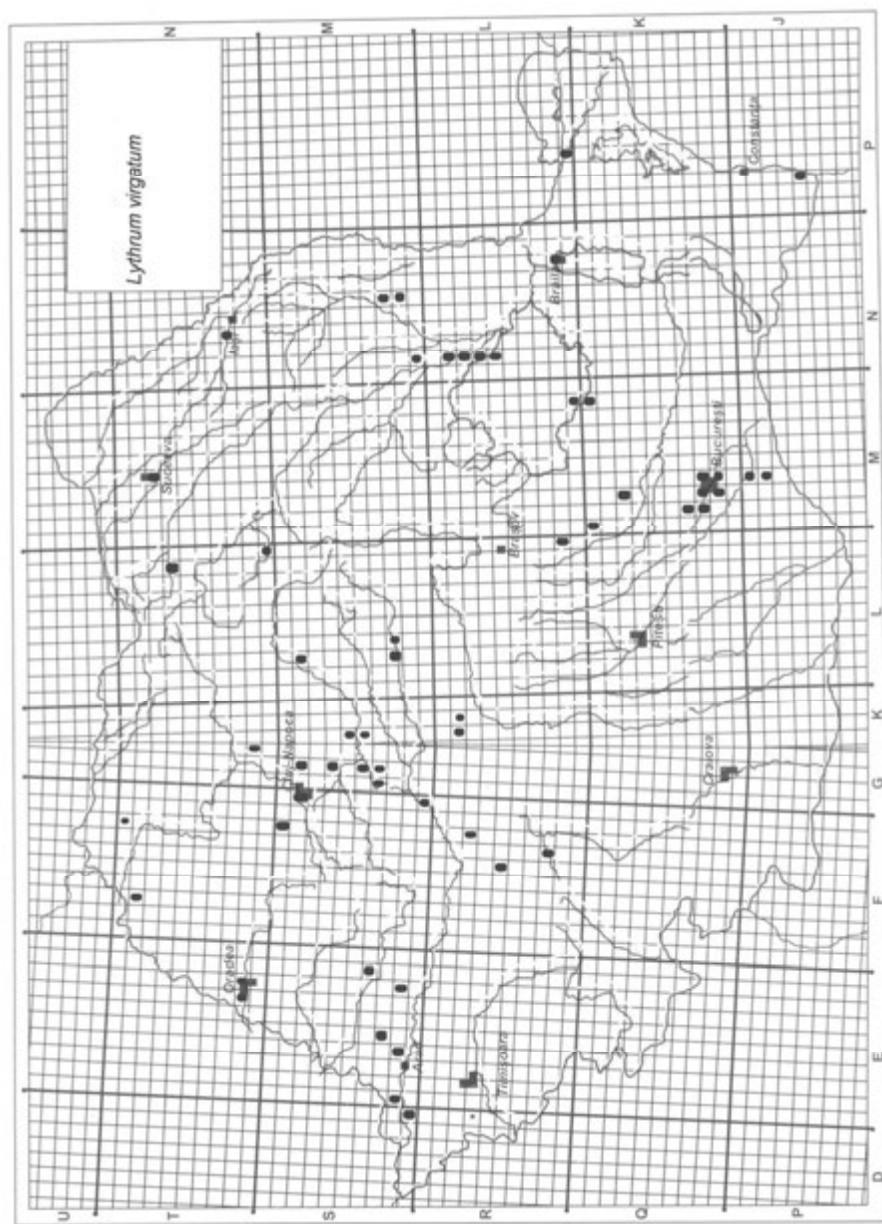


Fig. 2. – Spread of *Lythrum virgatum* in Romania

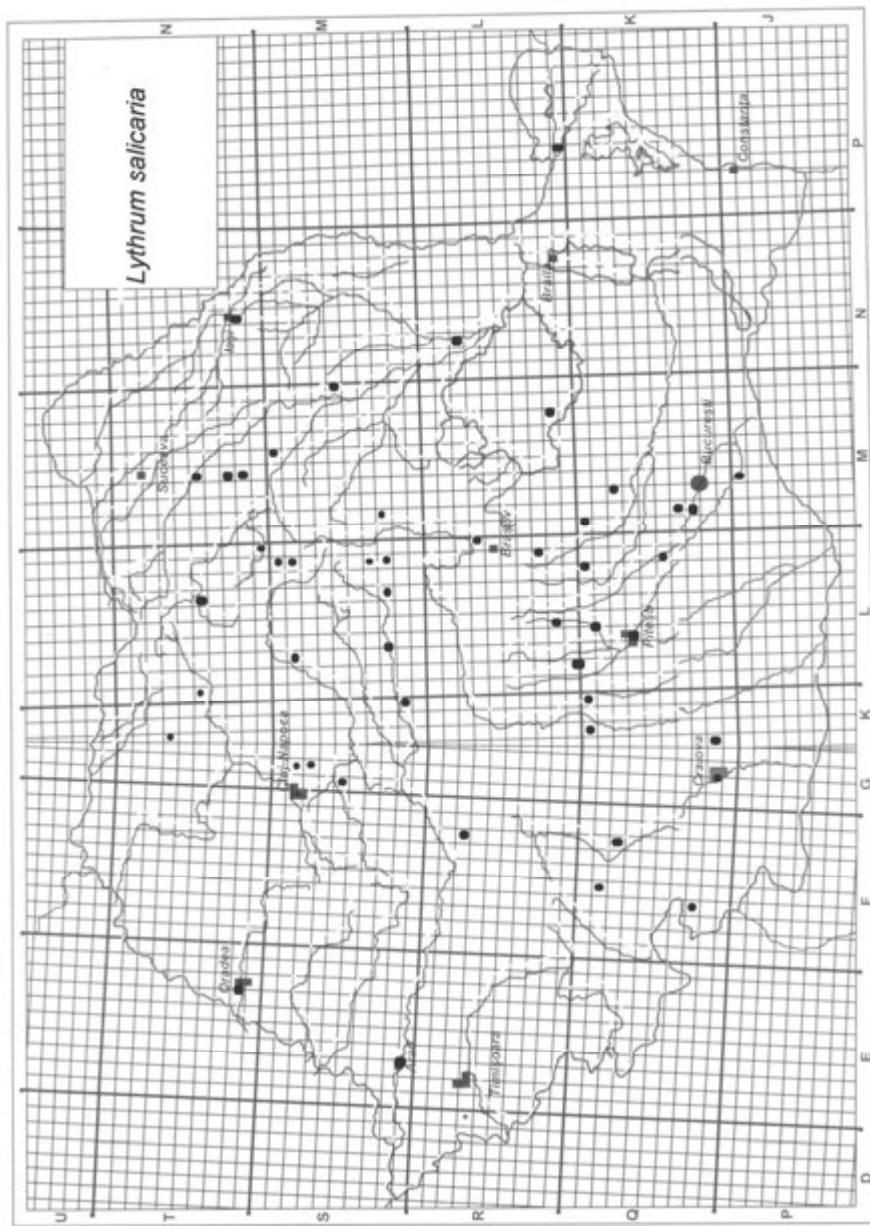


Fig. 3 – Spread of *Lythrum salicaria* in România

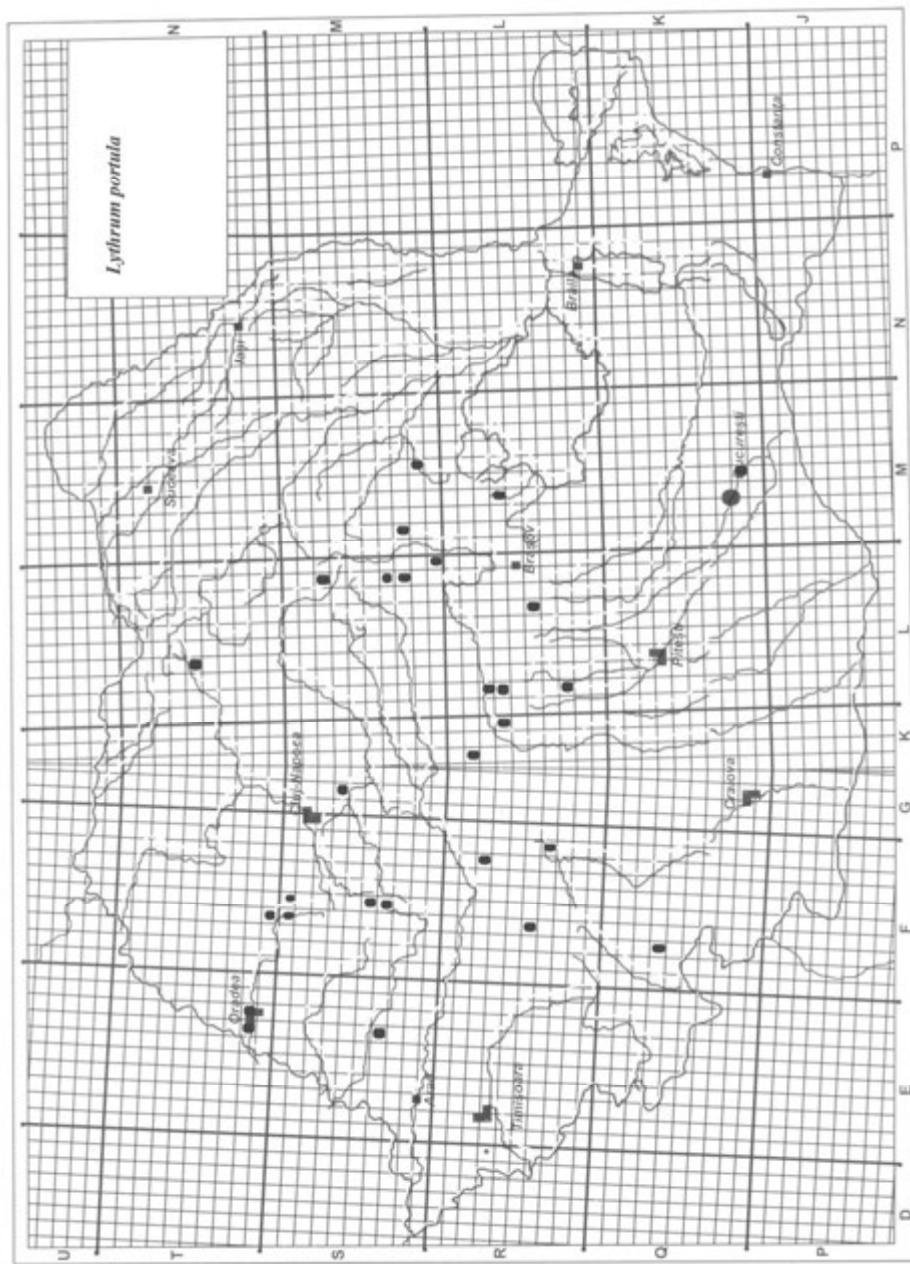


Fig. 4 – Spread of *Lythrum portula* in România

REFERENCES

- CIOCÂRLAN V., 2009 - *Flora ilustrată a României*. Edit Ceres, Bucureşti. 1041 pag.
- TUTIN T.G., HEYWOOD V.H., BURGES N.A., VALENTINE D.H., WALTERS S.M., WEBB D.A., 1964-1980 (eds.) – *Flora Europaea*, 2. Cambridge University Press. Cambridge: 206-211
- SANDA V., ÖLLERER KINGA, BURESCU P., 2008 – *Fitocenozele din România. Sintaxonomie, structură, dinamică și evoluție*. Edit. Ars Docendi, Bucureşti, 570 pag.
- SĂVULESCU T. (edit.), 1957 - *Flora Republicii Populare Române*, V, Edit. Academiei, Bucureşti, p. 457-466.

THE CHOROLOGY OF *TRIFOLIUM* SPECIES IN THE ARGEŞ COUNTY

VALERIU ALEXIU

University of Pitești, Târgu din Vale Street, no. 1, 110040, Pitești, Argeș, Romania / The Argeș County Museum, Armand Călinescu Street, no. 44, 110047, Pitești, Argeș, Romania,
e-mail: alexiuv@yahoo.com

ABSTRACT: In this paper we present *Trifolium* species in Romania and the chorology in UTM system of the *Trifolium* species in Argeș County. The information is based on the literature and the Herbarium data of the University of Pitești and that of the Argeș County Museum and also during the field researches.

Key words: *Trifolium*, chorology, UTM, therophyte

REZUMAT: Corologia speciilor de *Trifolium* în județul Argeș. În această lucrare sunt prezentate specile de *Trifolium* din România, precum și corologia, în sistemul de coordonate UTM, a speciilor prezente în județul Argeș. Informațiile se bazează, în principal, pe date culese din literatură de specialitate și din ierbarele Universității din Pitești și Muzeului Județean Argeș, dar și din cercetările personale în teren.

Cuvinte cheie: *Trifolium*, corologie, UTM, terofit.

INTRODUCTION

Genus *Trifolium* is spread on the Euasiatic continent especially through perennial species. The growing of the height of the Alps-Carpathians-Caucasian mountain system gradually forced some populations of plants to move towards high altitudes. Here they adapted to the new conditions and gave birth to well differentiated taxa: *Trifolium alpinum*, *Trifolium badium*, *Trifolium pratense* ssp. *frigidum*). Other species have better adapted to the clime conditions of the mountains, where they got diversified, and today they do not represent an just an ornamental plant of the mountain meadows but also valuable food (*Trifolium alpestre*, *Trifolium montanum*, *Trifolium pannonicum*). Continental and subcontinental clime conditions of mesophytic biotopes led to a diversification of mesophilic species that have inhabited and inhabit grassy places in meadows and hilly regions (*Trifolium pratense*, *Trifolium repens*, *Trifolium campestre*, *Trifolium*

dubium etc.). The entire continental clime influenced by aridity during the Tertiary led to the formation steppes, deserts and salt places.

These biotopes have determined the adaptation of plants to dryness, stimulating the development of biannual (TH) or annual (Th) therophyte.

The adaptation to the mediterranean clime led to constant temperatures, but high moisture varieties, developing some species of clover therophyte especially prevalent today in the Mediterranean region (*Trifolium incarnatum*, *Trifolium angustifolium*, *Trifolium diffusum*, *Trifolium echinatum*, *Trifolium mediterraneum* etc.). *Trifolium medium* could be found at the edge of forests, shrubs or not thick woods. A number of species (e.g.: *Trifolium hybridum*, *Trifolium fragiferum*, *Trifolium resupinatum* etc.) adapted to high humidity.

MATERIAL AND METHODS

Trifolium species are distributed mainly in the steppe, the nemoral, mountain, subalpine and alpine areas of the Argeș County.

Localities were mapped using the code UTM (Universal Transverse Mercator, also known as the Gauss-Krüger), after the work of A.S. Lehrer and Mary M. Lehrer (1977) - Mapping the flora and fauna of Romania. The data was obtained using data from the literature, the herbarium of the University of Pitești and that of the Argeș County Museum and also during the field researches.

Abbreviations used: the University of Pitești Herbarium (PTHU), the Argeș County Museum Herbarium (PTHM, no. inventory), leg. = Harvest.

RESULTS AND DISCUSSIONS

Trifolium species in Romania

Trifolium genus includes about 300 species, of which there are only 39 in Romania (Ciocârlan, 2009): *Trifolium alpestre* L., *Trifolium ambiguum* Bieb., *Trifolium angulatum* W. et K., *Trifolium angustifolium* L., *Trifolium arvense* L. (with subsp. *arvense*, subsp. *gracile* (Thuill.) Nyman), *Trifolium aureum* Pollich, *Trifolium badium* Schreber, *Trifolium campestre* Schreber, *Trifolium diffusum* Ehrh., *Trifolium dubium* Sm., *Trifolium echinatum* Bieb., *Trifolium filiforme* L., *Trifolium fragiferum* L. (with subsp. *fragiferum*), *Trifolium fragiferum* L. subsp. *bonannii* (C. Presl) Soják), *Trifolium hybridum* L. (with subsp. *hybridum*, subsp. *elegans* (Savi) Ascherson et Graebner), *Trifolium incarnatum* L. (with subsp. *incarnatum*, subsp. *molinerii* (Balbis ex Hornem.) Cesati), *Trifolium lupinaster* L., *Trifolium medium* L. (with subsp. *medium*, subsp. *sarosiense* (Hazsl.) Simonkai, subsp. *banaticum* (Heuffel) Hendrych), *Trifolium michelianum* Savi, *Trifolium montanum* L., *Trifolium ochroleucon* Hudson, *Trifolium ornithopodioides* Oeder, *Trifolium pallescens* Schreber, *Trifolium pallidum* W. et K., *Trifolium pannonicum* Jacq., *Trifolium patens* Schreber, *Trifolium pratense* L. (with subsp. *pratense*, subsp. *nivale* (Koch) Cesati), *Trifolium purpureum* Loisel., *Trifolium repens* L. (with subsp. *repens*, subsp. *alpinum* (Schur) Rothm., subsp. *ochranthum* (Maly)

E.I. Nyárády, subsp. *orbelicum* (Velen.) Pawl., *Trifolium resupinatum* L. (with subsp. *clusii* (Gren. & Gordon) Ciocârlan, subsp. *suaveolens* (Willd.) Ponert), *Trifolium retusum* L., *Trifolium rubens* L., *Trifolium scabrum* L., *Trifolium spadiceum* L., *Trifolium squamosum* L., *Trifolium striatum* L. (with subsp. *striatum*, subsp. *tenuiflorum* (Ten.) Arcangeli), *Trifolium strictum* L., *Trifolium subterraneum* L., *Trifolium suffocatum* L., *Trifolium vesiculosum* Savi.

***Trifolium* species in the Argeş County**

In the Argeş County flora are mentioned 20 species of *Trifolium* (Alexiu, 2008): *Trifolium alpestre* L., *Trifolium arvense* L. subsp. *arvense*, *Trifolium arvense* L. subsp. *gracile* (Thuill.) Nyman, *Trifolium aureum* Pollich, *Trifolium badium* Schreber, *Trifolium campestre* Schreber, *Trifolium dubium* Sm., *Trifolium fragiferum* L. subsp. *fragiferum*, *Trifolium fragiferum* L. subsp. *bonannii* (C. Presl) Soják, *Trifolium hybridum* L. subsp. *hybridum*, *Trifolium hybridum* L. subsp. *elegans* (Savi) Ascherson et Graebner, *Trifolium incarnatum* L. subsp. *incarnatum*, *Trifolium incarnatum* L. subsp. *molinerii* (Balbis ex Hornem.) Cesati, *Trifolium medium* L. subsp. *medium*, *Trifolium medium* L. subsp. *sarosiense* (Hazsl.) Simonkai, *Trifolium medium* L. subsp. *banaticum* (Heuffel) Hendrych, *Trifolium montanum* L., *Trifolium ochroleucon* Hudson, *Trifolium pallescens* Schreber, *Trifolium pannonicum* Jacq., *Trifolium patens* Schreber, *Trifolium pratense* L. subsp. *pratense*, *Trifolium pratense* L. subsp. *nivale* (Koch) Cesati, *Trifolium repens* L. subsp. *repens*, *Trifolium repens* L. subsp. *alpinum* (Schur) Rothm., *Trifolium repens* L. subsp. *ochranthum* (Maly) E.I. Nyárády, *Trifolium repens* L. subsp. *orbelicum* (Velen.) Pawl., *Trifolium resupinatum* L. subsp. *clusii* (Gren. & Gordon) Ciocârlan, *Trifolium resupinatum* L. subsp. *suaveolens* (Willd.) Ponert, *Trifolium rubens* L., *Trifolium striatum* L. subsp. *striatum*, *Trifolium striatum* L. subsp. *tenuiflorum* (Ten.) Arcangeli.

***Trifolium alpestre* L.**

Argeş County

LK26/36/37 – Trivale Forest (Alexiu, 2008; Alexiu, 2005; Popescu 1966);

LL52 – Cheii Gorges, Cheiței Meadows (Alexiu, 2008; Alexiu, 2005);

LL50 – Cetățeni (Alexiu, 2008; Neblea, 2007);

LL52 – Podul Dâmboviței, Cheii Gorges, leg. V. Alexiu [PTHM 7778, 7779].

Făgăraș Mountains

LL15 – Râiosu Mountain (Buia & Todor, 1948; Stancu, 2005); Capra Budei (Alexiu, 2008; Flora RPR, 1957).

Trifolium arvense* L. subsp. *arvense

Argeş County

LK26/36/37 – Trivale Forest (Alexiu, 2008; Alexiu, 2005; Popescu, 1966);

LL21 – Vâlsan Valey (Alexiu, 2008; Sanda, Popescu, 1995);

LL21 – Stânești (com. Corbi), leg. G. Turcu, S. Gherega 1959 [PTHU];

LK22 – Bârla (Alexiu, 2008);

LK23 – Stolnici (Alexiu, 2008);

LK26 – Poiana Lacului (Alexiu, 2008);
 LK27 – Valea Ursului (Alexiu, 2008);
 LK28 – Merișani (Alexiu, 2008);
 LK31 – Miroși (Alexiu, 2008);
 LK32 – Căldăraru (Alexiu, 2008);
 LK34 – Ionești (Alexiu, 2008);
 LK35 – Suseni (Alexiu, 2008);
 LK39 – Băilești (Alexiu, 2008);
 LK42 – Popești (Alexiu, 2008);
 LK43 – Recea (Alexiu, 2008);
 LK44 – Rociu (Alexiu, 2008);
 LL50 – Cetățeni (Alexiu, 2008; Neblea, 2007);
 LL52 – Podul Dâmboviței (Alexiu, 2008);
 LK53 – Mozăceni (Alexiu, 2008);
 LK53/54 – Negrași (Alexiu, 2008);
 LK62 – Ștefan cel Mare (Alexiu, 2008).

Făgăraș Mountains

LL15 – Râiosu Mountain (Buia & Todor, 1948; Stancu, 2005)

Trifolium aureum Pollich

Argeș County

LK26/36/37 – Trivale Forest (Alexiu, 2008; Alexiu, 2005; Popescu, 1966);
 LL42 – Lerești (Alexiu, 2008; Haralamb, 1946; Flora RPR, 1957);
 LL51 – Nămăești (Alexiu, 2008; Haralamb, 1946; Flora RPR, 1957);
 LL10 – Curtea de Argeș (Alexiu, 2008; Flora RPR, 1957);
 LL12 – Corbeni (Alexiu, 2008; Flora RPR, 1957);
 LL41 – Câmpulung (Alexiu, 2008; Flora RPR, 1957);

Făgăraș Mountains

LL15 – Râiosu Mountain (Alexiu, 2008; Flora RPR, 1957); Valea Budei (Alexiu, 2008; Flora RPR, 1957);

Ghițu Mountains

LL13 – Vidraru, leg. P. Pestroiu 1970 [PTHM 127, 128]; leg. V. Alexiu 2001 [PTHM 7439]; Cumpăna (Alexiu, 2008; Flora RPR, 1957)

Trifolium badium Schreber

Făgăraș Mountains

LL05/06 – Valea Doamnei, leg. V. Ciocârlan, A. Dumitrescu, I. Todor, T. Ursu 1960 [PTHU]; [PTHM, 906, 7561, 7604, 7605];

LL15 – Râiosu Mountain (Alexiu, 2008; Flora RPR, 1957); Negoiu Mountain (Alexiu, 2008; Flora RPR, 1957).

Trifolium campestre Schreber

Argeș County

LK26/36/37 – Pitești - Trivale Forest, Papucești Hill, leg. I. Todor, A. Popescu 1969 [PTHU]; [PTHM 2792]; (Alexiu, 2008; Alexiu, 2005; Popescu, 1966);

LL52 – Podul Dâmboviței (Alexiu, 2008; Alexiu, 1998);

LL50 – Cetăteni (Alexiu, 2008; Neblea, 2007);
 LL21 – Vâlsan Valey (Alexiu, 2008; Sanda, Popescu, 1995);
 LK49 – Mihăeşti (Alexiu, 2008; Flora RPR, 1957);
 LK37 – Popii Valey (Alexiu, 2008; Flora RPR, 1957).
 LL53 – Small Gorges of the Dâmboviţa, leg. V. Alexiu [PTHM 7775, 7776,
 7777];

Iezer-Păpuşa Mountains

LL42 – Văcarea Mountain (Alexiu, 2008; Flora RPR, 1957).

***Trifolium dubium* Sm.**

Argeş County

LK25 – Lunca Corbului, leg. V. Alexiu 1991 [PTHM 6738];
 LK37 – Popii Valey (Alexiu, 2008; Flora RPR, 1957);
 LL52 – Podul Dâmboviţei (Alexiu, 2008; Alexiu, 1998).

Ghimbav Mountains

LL61 – Dumitru Teeth (Alexiu, 2008; Diaconescu, 1970).

***Trifolium fragiferum* L.**

Argeş County

LK26/36/37 – Trivale Forest (Alexiu, 2008; Alexiu, 2005; Popescu, 1966);
 LL21 – Vâlsan Valey (Alexiu, 2008; Sanda, Popescu, 1995).

Trifolium hybridum* L. subsp. *hybridum

Argeş County

LK26/36/37 – Trivale Forest, leg. V. Alexiu 1997 [PTHM 7784, 7785];
 (Alexiu, 2008; Alexiu, 2005; Popescu, 1966);

Făgăraş Mountains

LL15 – Râiosu Mountain (Alexiu, 2008; Flora RPR, 1957); Valea Budei
 (Alexiu, 2008; Flora RPR, 1957).

Piatra Craiului Mountains

LL63 – Brusturetului Gorges (Alexiu, 2008; Alexiu, Stancu, 2003).

***Trifolium incarnatum* L.**

Argeş County

LK26/36/37 – Piteşti - Dârzului Valey, leg. I. Todor 1963 [PTHU]; Trivale
 Forest, leg. V. Alexiu 1997 [PTHM 5400].

Trifolium medium* L. subsp. *medium

Argeş County

LK25 – Lunca Corbului, leg. V. Alexiu 1991 [PTHM 5996];

LK26/36/37 – Trivale Forest, Leg. P. Pestroiu 1971 [PTHM 5770]; leg. T.
 Mavrodi 1980 [PTHM 5989]; leg. V. Alexiu 1990 [PTHM 5997]; leg. V. Alexiu
 1991 [PTHM 4661]; (Alexiu, 2008; Alexiu, 2005; Popescu, 1966);

LL22 – Bahna Rusului (Alexiu, 2008);

LL53 – Small Gorges of the Dâmboviţa, leg. V. Alexiu [PTHM 7782];

LL63 – Great Gorges of the Dâmboviţa, leg. V. Alexiu [PTHM 7783].

Ghiuş Mountains

LL13 – Vidraru, leg. T. Mavrodi 1980 [PTHM 5988];

Piatra Craiului Mountains

LL64 – Cabana de Vânătoare „Piatra Craiului”, leg. M. Mătieș, T. Mihai [PTHM 1567, 1569];

LL63 – Small Gorges of the Dâmbovița (Alexiu, 2008).

Ghimbav Mountains

LL52 – Cheii Gorges (Alexiu, 2008; Neblea, 2007); Secări (Neblea, 2007).

Leaota Mountains

LL50/51 – Bădenilor Valey (Alexiu, 2008; Neblea, 2007); Marginea Domnească (Alexiu, 2008; Neblea, 2007).

***Trifolium montanum* L.**

Argeș County

LK26/36/37 – Trivale Forest (Alexiu, 2008; Alexiu, 2005; Popescu, 1966)

LL61 – Cheiței Meadows (Alexiu, 2008; Alexiu, 2005);

LL22 – Bahna Rusului (Alexiu, 2008);

LL50 – Cetățeni (Alexiu, 2008; Neblea, 2007)

***Trifolium ochroleucon* Hudson**

Argeș County

LK26/36/37 – Trivale Forest (Alexiu, 2008; Alexiu, 2005; Popescu, 1966)

***Trifolium pallescens* Schreber**

Făgăraș Mountains

LL15 – Râiosu Mountain (Alexiu, 2008; Flora RPR, 1957);

Iezer-Păpușa Mountains

LL43 – Colții lui Andrei Mari (Alexiu, 2008; Alexiu, 1998).

***Trifolium pannonicum* Jacq.**

Argeș County

LL22 – Bahna Rusului, leg. P. Pestroiu [PTHM 616, 1756]; (Alexiu, 2008);

LL22 – Nucșoara, leg. V. Alexiu, A. Richițeanu [PTHM 7114];

LK37 – Ștefănești - Florica (Alexiu, 2008; Neblea & Alexiu, 2001);

LL10 – Curtea de Argeș (Alexiu, 2008; Flora RPR, 1957);

Ghimbav Mountains

LL61 – Ghimbav Saddle (Alexiu, 2008; Diaconescu, 1970).

***Trifolium patens* Schreber**

Argeș County

LL20 – Domnești, leg. Gh. Turcu 1959 [PTHU]; [PTHM 899, 7613];

LK26/36/37 – Trivale Forest, leg. P. Pestroiu 1971 [PTHM 5399]; (Alexiu, 2008; Alexiu, 2005; Popescu, 1966)

***Trifolium pratense* L.**

Argeș County

LK26/36/37 – Trivale Forest (Alexiu, 2008; Alexiu, 2005; Popescu, 1966);

LK25 – Lunca Corbului, leg. V. Alexiu 1991 [PTHM 5398];

LL31 – Slănic - Periș, leg. T. Mavrodi 1973 [PTHM 5610];

LK37 – Ștefănești Thrush, leg. M. Mătieș, T. Mavrodi 1970 [PTHM 5933]; leg. V. Alexiu 2002 [PTHM 9267];

LL01 – Şuici, leg. V. Alexiu 1991 [PTHM 5749];

LL41 – Câmpulung - Grui, leg. V. Alexiu 1970 [PTHM 3244];

LK28 – Vărzaru, leg. V. Alexiu, A. Richițeanu 1992 [PTHM 6516];

LK45 – Căteasca, leg. V. Alexiu 1992 [PTHM 6661];

LL50 – Cetăteni (Alexiu, 2008, Neblea, 2007);

LL51 – Mateiaș (Alexiu, 2008; Neblea, 2007);

LL43 – Iezerul Mic, leg. M. Măties, T. Mihai [PTHM 1526];

LL42 – Dâmbovița, Bunia Lake, leg. M. Măties, T. Mihai [PTHM 1709];

Leoata Mountains

LL62 – Românescu Mountain (Alexiu, 2008, Neblea, 2007); Tâncaava Mountain (Alexiu, 2008, Neblea, 2007); Marginea Domnească (Alexiu, 2008, Neblea, 2007).

Iezer-Păpușa Mountains

LL53 – Bunea Lake (Alexiu, 2008; Alexiu, 1998);

LL54 – Păpușa Mountain (Alexiu, 2008; Alexiu, 1998);

LL43 – Bătrâna Valey, leg. V. Alexiu [PTHM 2350]; (Alexiu, 2008);

LL63 – Dâmboviței Gorges, leg. V. Alexiu [PTHM 6443]

Trifolium repens L.

Argeș County

LK26/36/37 – Pitești, leg. V. Alexiu 1971 [PTHM 3256]; Trivale Forest (Alexiu, 2008; Alexiu, 2005; Popescu, 1966);

LL21 – Vâlsan Valey (Alexiu, 2008; Sanda, Popescu, 1995);

LK25 – Lunca Corbului, leg. V. Alexiu, 1991 [PTHM 5397];

LL31 – Slănic-Periș, leg. T. Mavrodiin 1973 [PTHM 1982];

LL37 – Ștefănești, leg. V. Alexiu 2002 [PTHM 9626].

Iezer-Păpușa Mountains

LL43 – Bătrâna Valey, leg. V. Alexiu [PTHM 2218]; (Alexiu, 2008; Alexiu, 1998); Colților Valey (Alexiu, 2008; Alexiu, 1998); Clearing sheepfold of Colții lui Andrei (Alexiu, 2008; Alexiu, 1998);

Ghițu Mountains

LL13 – Vidraru, leg. P. Pestroiu 1970 [PTHM 1008]

Trifolium resupinatum L.

Argeș County

LK26/36/37 – Trivale Forest (Alexiu, 2008; Popescu, 1966)

Trifolium rubens L.

Piatra Craiului Mountains

LL63 – Dâmbovicioara (Alexiu, 2008; Haralamb, 1946; Flora RPR, 1957)

Trifolium striatum L. subsp. *striatum*

Argeș County

LK26/36/37 – Trivale Forest (Alexiu, 2008; Alexiu, 2005; Popescu, 1966)

CONCLUSIONS

Trifolium species of particular importance for ensuring the feed, they entered the specific composition of various natural grasslands in Romania. Along

with grasses, legumes are the most important group of plants in natural grassland vegetation.

Trifolium genus includes about 300 species of plants in the legume family, most of the temperate regions of the Northern Hemisphere. There are several species of *Trifolium* and South America and Africa.

Trifolieae tribe contains plants with trifoliate leaves, rarely four or five leaflets, or exceptionally, with pinnate leaves. Most are herbaceous perennial and annual species, but there are shrub species or semiarbustive. Romanian territory grows only 39 species of *Trifolium* (Ciocârlan, 2009).

In Argeș county flora are cited 20 species of *Trifolium* (Alexiu, 2008).

For the mapping of the localities where *Trifolium* species were identified, the code UTM (Universal Transverse Mercator) was used.

REFERENCES

- ALEXIU V., 1998 – *Vegetația Masivului Iezer-Păpușa*. Studiu cenotaxonomic. Edit. Cultura, Pitești; p. 362.
- ALEXIU V., 2005 – „*Trivale Forest*” Reservation, Pitești, Argeș County. Contribuții botanice, Cluj-Napoca; **XL**: p. 89-100.
- ALEXIU V., 2008 – *Cormoflora județului Argeș*. Edit. Ceres, București; p. 323.
- ALEXIU V., STANCU Daniela Ileana, 2003 – *Carici remotaæ-Calthetum laetae Coldea (1972) 1978 ligularietosum sibiricae nova subass. in the Brusturet Gorges (Piatra Craiului)*. Research in Piatra Craiului National Park, Edit. Phoenix, Brașov; **I**: p. 94-97.
- BUIA Al., TODOR I., 1948 – *Nouvelles contributions a la connaissance de la flore des monts Râiosul et Capra Budei (Massif Făgăraș)*. Bul. Soc. Șt., Cluj; **X**: p. 263-269.
- CIOCÂRLAN V., 2009 – *Flora ilustrată a României. Pteridophyta et Spermatophyta*. Edit. Ceres, București; p. 1041.
- DIACONESCU FLORIȚA, 1970 – *Materiale pentru flora vasculară a Masivului Leaota (II)*. Anal. Univ. Al. I. Cuza, secț. II, Biologie, Iași; **16 (1)**: p. 185-189.
- LEHRER Z. A., 1977 - *Codul biocartografic al localităților din R.S. România*. Edit. Dacia, Cluj-Napoca; p. 247.
- NEBLEA MONICA, 2007 – *Flora și vegetația Munților Leaota și al sectorului vestic al Munților Bucegi*. Teză de doctorat. Institutul de Biologie al Academiei. București; p. 336.
- NEBLEA MONICA, ALEXIU V., 2001 – *Studiu asupra biodiversității cormofitelor din Parcul dendrologic „Florica”-Ștefănești, jud. Argeș*. Analele Univ. din Craiova; **VI (XLII)**: p. 76-79.
- POPESCU A., 1966 – *Flora Pădurii Trivale și a împrejurimilor sale*. St. și Cerc. de Biologie. București; **18 (6)**: p. 549-560.
- SANDA, V., POPESCU, A. -1995 – *Caracterizarea unităților de vegetație din masivul Făgăraș (I)*. Naturalia, Pitești; **1**: p. 91-99.
- SĂVULESCU T. (edit.), 1957 - *Flora Republicii Populare Române*, V, Edit. Academiei, București; p. 145-183.
- STANCU Ileana Daniela, 2005 – *Flora și vegetația Munților Râiosu și Buda, Masivul Făgăraș*. Edit. Universitatea din Pitești; p. 226.

MEADOWS WITH *FRITILLARIA MELEAGRIS* L. AT LUNCA MUREȘULUI - ALUNIȘ, MUREȘ COUNTY

MIHAELA SĂMĂRGHİȚAN

Natural Science Museum Târgu-Mureș, 24 Horea Street, RO-540036 Târgu-Mureș
e-mail: msamarghitana@yahoo.com

SILVIA OROIAN

University of Medicine and Pharmacy, Târgu-Mureș, Faculty of Pharmacy, Pharmaceutical Botany
and Cell Biology Department, 38 Gh. Marinescu Street, RO-540139, Târgu-Mureș,
e-mail: osilvia@umftgm.ro,

ABSTRACT: This study is presenting a population of *Fritillaria meleagris* L. identified in Lunca Mureșului – Aluniș (Mureș County) and a phytosociological study of the meadows where this species occur. According to Ladislav Mucina, Georg Grabherr, Thomas Ellmauer (1993) and Gh. Coldea (1991) the *Fritillaria meleagris* populations were framed in *Agrostetum stoloniferae* (Ujvárosi 1941) Burduja et al. (1956) 1958 and *Anthoxantho-Agrostetum tenuis* (Silinger 1933) Jurko 1969 associations. The associations were ecological, chorological, on base of the floristically composition and caryological analyzed.

Key words: Lunca Mureșului Aluniș, *Fritillaria meleagris*, populations, vegetation description

REZUMAT: Pajiști cu *Fritillaria meleagris* L. la Lunca Mureșului – Aluniș, județul Mureș. Lucrarea prezintă o populație de *Fritillaria meleagris* identificată la Lunca Mureșului comuna Aluniș (județul Mureș). Populațiile au fost încadrate în asociațiile *Agrostetum stoloniferae* (Ujvárosi 1941) Burduja et al. (1956) 1958 and *Anthoxantho-Agrostetum tenuis* (Silinger 1933) Jurko 1969. Asociațiile este caracterizată din punct de vedere al preferințelor ecologice ale speciilor componente, a compozиției în bioforme, chorologic și cariologic

Cuvinte cheie: Lunca Mureșului Aluniș, *Fritillaria meleagris*, populații, descrierea vegetației.

INTRODUCTION

The overall purpose of this paper is to contribute to a better understanding of the flora and vegetation diversity of this area yet understudied from the floristic and phytosociological points of view.

The *Fritillaria meleagris* population have been identified next to Lunca Mureșului village, Aluniș commune, which is located in Eastern Transylvania, 10 km away from Mureș' river Deda – Toplița defile.

Aluniș commune is located at 365-380 m altitude, on Mureș river, at the Fițcău creek's mouth and on the county road Reghin - Rușii-Munți.

Lunca Mureșului is situated at 380 m altitude, in Mureș riverbed, on a plain surface. It is surrounded by Mureș River and the Gurghiu piedmont hills, which limit the area to SW-NE.

The meadows with the snake's head fritillary can be found on a floodplain terrace of Mureș, having a width of approximately 3 km. This terrace is the youngest stage of Mureș terraces complex, belonging to inferior Holocene.

Groundwater is very close to the ground surface; here and there it appears on the surface, forming ponds around which the soil is always wet.

The territory is placed in the Transylvanian Sub-Carpathians area, with a geological substrate made of sedimentary rocks, clays and marly clays.

The characteristic soil type is the black clino-hydromorphic (meadow black soil). It is an amphi-hydromorphic soil, the humidity excess deriving both from precipitations as well as from the suspended groundwater, with diminished fertility, due to the faulty aerohidric regime.

The studied area falls in the continental temperate climate. The annual average temperature is of 8-8.9 °C, and the annual average precipitation quantity is of 650 mm/m². This climate is responsible for the existing floristic diversity.

MATERIAL AND METHOD

This research is based on field observation and researches carried out on 2010 and 2011.

The main method of study was the most frequent and appreciable of Montpellier School, the Braun-Blanquet method.

The identified phytocoenoses have been framed in Molinio-Arrhenatheretea class, according to Ladislav Mucina, Georg Grabherr, and Thomas Ellmauer (1993) classification system (Mucina et al., 1993).

For these associations, territorial spreading, floristical composition, biological structure, phytogeographic elements and ecological behavior correlated with plants' needs for humidity, temperature and soil pH are mentioned in the paper. A diploid and polyploid species graphic distribution was made as well.

Systematic classification of taxa was made according to *The International Code of Botanic Classification* (Code de Tokyo, 1993).

The estimation of several population characteristics was also aimed, such as: effective, density, spatial distribution.

In this purpose, the squares method was used. The study was performed by placing the sample surfaces with sides of 1x1 m at distances of 10–20 m.

In each plot the individuals of *Fritillaria meleagris* species have been counted, by calculating the species density for each studied sector and correlating the results for the entire studied surface. The population size was also established.

The number of the sample surfaces was of 100 squares of 1 m².

The species density represents the number of the existing individuals on the unit surface. The average density on the squares surface was calculated and then it was reported to the surface unit (m²).

From the average density one can establish the approximate number of individuals on the entire studied surface (population size) – the density on m² is multiplied with the total surface.

RESULTS AND DISCUSSIONS

Fritillaria meleagris L. species is a wide spread plant in Europe, its spreading range reaches Caucaz and Scandinavian Peninsula.

It is known under several common names: "bibilică", "lalea pestriță", "căldărușă", "cuci", "coroană". In Mureş County the most frequently used name is "lalea pestriță".

Fritillaria meleagris L. is included in the national red lists under the vulnerable species category (V).

The studies performed in Mureş County on the spreading of this species, name a series of localities where it has been seen: Vălenii de Mureş, Aluniş, Lunca Mureşului (Aluniş commune), Apalina and Iernuțeni (near Reghin), Valea Gurghiului in Solovăstru and Gurghiu, in Pădurea Mociar Gurghiu natural reserve, Gălăteni (Păsăreni commune), Zau de Câmpie, Iernut.

The studied area is spread on a surface of 8 ha South of Lunca Mureşului, being bounded of 154 A county roads. It is noticed that on the left side of the road towards Idecu-Lunca Mureşului, the density of the population is large, the individuals forming compact clusters, while on the right side the distribution is less grouped, excepting a portion of approximately 200 m², on which the density of the individuals is significant. This distribution is determined by the soil humidity and the presence of the drainage ditches.

Taking into account the number of the individuals counted on the evidence surfaces, we can establish the dispersion of the size categories (the number of the individuals on m²), as included in table 1 and graphically represented in figure 1.

Table 1. The dispersion of the size categories

Size categories	1-5	6-10	11-15	16-20	Over 20
No. of sample surfaces	25	60	8	5	2

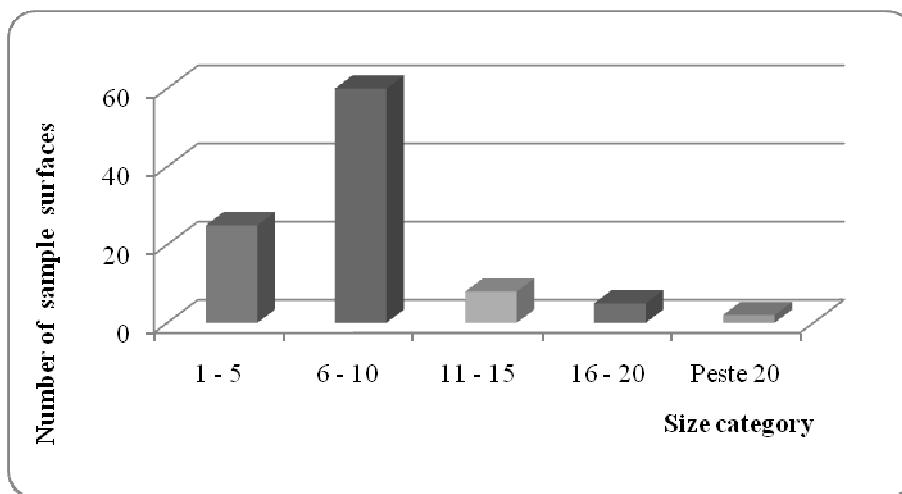


Figure 1 - The dispersion of the size categories

The population density has values between 1–6.75 individuals/m², the average density being of 3.37 individuals/m². Having in view the total surfaces, as well as the species density, we can estimate the size of the population. By multiplying the two aforementioned data, we obtained the value of 269600 individuals on the 8 ha surface.

Taking into consideration the density of the *Fritillaria meleagris* specimens and the optimal pedo-climatic conditions within the studied territory, the phytocenological study of this meadow near Aluniș has been performed.

The *Fritillaria meleagris* coenoses are spread on a surface of approximately 8 ha in the West side of Lunca Mureșului, Aluniș commune, representing a hygro-mesophilic meadow with *Agrostis stolonifera*, alternating with sectors on which phytocoenoses of *Anthoxantho-Agrostetum tenuis* association have been installed.

The pedo-climatic conditions of this area (planosol soil with acid pH), which during rainfall becomes wetland, are optimal for the development of *Fritillaria meleagris* species. In this habitat, *Fritillaria meleagris* has an homogeneous distribution and large enough density for perpetuation of the species (AD=3). This area is private property and is designated as hay, being mowed annually.

Vegetation description

Two plant associations have been identified in the studied area:

***MOLINIO-ARRHENATHERETEA* R.Tx.1937 em.R.Tx.1970**

***Molinietalia* Koch 1926**

***Agrostion stoloniferae* Soó (1943) 1971**

***Agrostetum stoloniferae* (Ujvárosi 1941) Burduja et al.1956 1958**

***Arrhenatheretalia* R.Tx.1931**

Cynosurion R.Tx.1947

Anthoxantho-Agrostetum tenuis (Silinger 1933) Jurko 1969

Agrostetum stoloniferae (Ujvárosi 1941) Burduja et al.1956, 1958

The phytocoenoses are installed on plain fields, with high humidity, with groundwater close to the ground surface, with argillaceous-loam texture. It is one of the most frequently spread association of meadows, being settled in river floodplains and groves.

Phytocoenoses are met in the studied area at 365 m altitude. Coenoses are well thickened, achieving a covering of 90-100%, and being stratified. Among the vegetal components of the analyzed association, amounting to 98 cormophytes species (Tab. 2), most of the species (44.89%) characterize the class, order and alliance which subordinate the association. The association is contaminated by transgressive species of *Festuco-Brometea* class.

Analyzing the association phytocoenoses from the ecological preferences point of view (Fig. 2), it is noticed that the mesophilic (40.81%) and xero-mesophilic (22.45%) species prevail. A significant number of meso-hygrophilic (21.43%) species is also noticed. By the temperature requirements, the most numerous species are micro-mesothermal (53.06%) and eurythermal (29.59%). With regards to the soil's reaction, the euryionic species register the highest frequencies (50.00%), being followed by weakly acid neutrophilic species (28.57%).

In the bioforms spectrum (Fig. 2), next to the majority hemicryptophytes (74.49%), there can also be found, with significant frequency, therophytes (14.28%), and geophytes (6.12%).

There are 12 categories of elements of different phytogeographic origin which participate in the floristical structure of the association in variable proportions. A great number of Euro-Siberian species (19.39%) is distinguished, over which have overlapped circumboreale species (13.26%), paleotemperate (13.26%), Euro-Asian (14.28%) and European (13.26%) and the other types of floristic elements having a reduced participation. (Fig. 4).

The caryological analysis reveals the prevalence of polyploid species (55.10%), followed by diploid (37.75%), the diplo-polyploid species having a participation of 6.12% (Fig. 5).

In terms of economic usage, the *Agrostis stolonifera* meadows are used as hay, considered as being very productive, but the hay quality is mediocre or good, based on the participation degree of Fabaceae species forage in the composition.

NATURA 2000: 6440 alluvial meadows of river valleys of *Cnidion dubii*

CLAS. PAL. : 37.23

Agrostetum stoloniferae (Ujvárosi 1941) Burduja et al.1956, 1958

Table 2 - Vegetal components of the *Agrostetum stoloniferae* association.

Relevees	1	2	3	4	5	6	7	8	9	10	
Altitude (m s.m.)	380	380	380	380	380	380	380	380	380	380	
Area (m ²)	100	100	100	100	100	100	100	100	100	100	
Vegetation coverage (%)	91	90	90	100	100	100	100	100	100	100	K
<i>Agrostis stolonifera</i>	3	3	3	5	4	3	5	5	5	4	
Molinietalia (incl. Molinion)											
<i>Carex distans</i>	-	-	+	-	-	+	-	+	+	+	
<i>Cirsium rivulare</i>	-	-	-	-	-	-	+	-	+	+	
<i>Deschampsia caespitosa</i>	-	-	-	+	-	+	-	-	+	+	
<i>Epilobium parviflorum</i>	-	-	-	+	+	+	+	-	+	+	
<i>Euphorbia villosa</i>	-	+	-	-	-	-	-	-	-	-	
<i>Filipendula ulmaria</i>	+	+	-	-	+	-	-	+	-	+	
<i>Galium uliginosum</i>	-	-	-	+	+	-	-	+	-	+	
<i>Juncus conglomeratus</i>	-	-	-	-	+	-	-	-	-	-	
<i>Lathyrus palustris</i>	-	+	+	+	-	-	-	-	-	+	
<i>Lychnis flos cuculi</i>	+	-	+	+	+	-	-	+	+	+	
<i>Lysimachia vulgaris</i>	-	-	-	-	+	-	-	+	-	-	
<i>Lythrum salicaria</i>	-	-	-	-	-	-	+	+	+	+	
<i>Mentha arvensis</i>	-	-	-	+	+	-	-	-	-	-	
<i>Myosotis scorpioides</i>	-	+	-	-	-	+	-	+	-	+	
<i>Orchis coriophora</i>	-	-	-	+	-	-	+	-	+	-	
<i>Orchis laxiflora</i> ssp. <i>elegans</i>	-	-	-	-	-	-	-	+	+	-	
<i>Sanguisorba officinalis</i>	+	+	+	-	1	3	3	+	+	+	
<i>Symphytum officinale</i>	-	-	-	+	+	-	+	-	+	-	
<i>Thalictrum simplex</i> ssp. <i>galioides</i>	+	-	-	-	+	+	+	-	-	-	
Calthion											
<i>Caltha palustris</i> ssp. <i>palustris</i>	+	-	+	-	-	-	-	+	-	-	
<i>Fritillaria meleagris</i>	3	3	3	+	+	+	+	+	+	+	
<i>Juncus effusus</i>	-	-	+	+	-	+	1	+	-	+	
<i>Trifolium hybridum</i>	-	+	-	+	+	+	+	+	+	+	

Continues.

Table 2 - Continuation.

Relevees	1	2	3	4	5	6	7	8	9	10	
Arrhetatheretalia (incl. Arrhenaterion)											
<i>Agrostis capillaris</i>	-	-	-	+	2	3	+	+	-	+	
<i>Campanula patula</i> ssp. <i>patula</i>	-	-	-	+	+	+	+	+	+	+	
<i>Centaurea nigrescens</i>	-	-	-	+	-	+	+	+	-	+	
<i>Crepis biennis</i>	-	-	-	-	-	-	+	+	+	+	
<i>Cynosurus cristatus</i>	-	-	-	-	-	+	-	+	+	+	
<i>Dactylis glomerata</i>	-	-	-	+	+	+	+	+	+	+	
<i>Galium mollugo</i>	-	-	-	-	+	+	-	+	+	+	
<i>Primula veris</i>	+	-	+	-	-	-	-	-	-	+	
<i>Rhinanthus rumelicus</i>	-	-	-	-	-	-	-	+	+	+	
<i>Rorippa pyrenaica</i>	-	-	-	+	-	-	-	+	-	+	
<i>Tragopogon pratensis</i> ssp. <i>orientalis</i>	-	-	-	-	+	-	-	-	+	+	
<i>Veronica chamaedrys</i>	-	-	-	-	+	-	+	-	+	-	
Molinio-Arrhenatheretea											
<i>Achillea millefolium</i>	-	-	-	-	-	-	+	+	+	+	
<i>Anthoxanthum odoratum</i>	-	-	-	+	+	+	+	-	-	+	
<i>Bromus commutatus</i>	-	-	-	-	-	-	-	-	+	+	
<i>Cardamine pratensis</i>	+	+	+	+	-	-	-	-	-	-	
<i>Cerastium holosteoides</i>	-	-	-	+	+	+	+	+	+	+	
<i>Cichorium intybus</i>	-	-	+	+	+	-	+	+	-	+	
<i>Danthonia decumbens</i>	-	-	-	-	-	+	+	-	-	-	
<i>Festuca pratensis</i>	-	-	-	-	+	+	-	-	-	+	
<i>Festuca rubra</i>	-	-	-	+	-	-	+	-	-	-	
<i>Genista tinctoria</i>	-	-	-	-	+	-	+	+	-	-	
<i>Holcus lanatus</i>	-	-	-	-	+	-	+	+	+	+	
<i>Lathyrus pratensis</i>	-	-	-	-	-	+	-	+	-	-	
<i>Leontodon autumnalis</i>	-	-	-	-	+	-	+	-	-	+	
<i>Leucanthemum vulgare</i>	-	-	-	+	+	+	+	+	+	+	
<i>Lotus corniculatus</i>	-	-	-	+	-	+	+	+	+	+	
<i>Medicago lupulina</i>	-	-	-	+	-	+	-	+	+	+	
<i>Ononis arvensis</i>	-	-	-	-	-	+	+	-	+	-	

Continues.

Table 2 - Continuation.

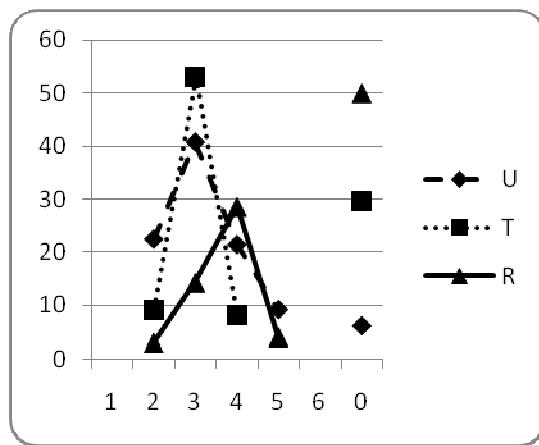
Relevees	1	2	3	4	5	6	7	8	9	10	
<i>Prunella vulgaris</i>	-	-	-	+	+	+	+	+	+	+	
<i>Ranunculus acris</i>	+	+	-	+	-	-	+	-	+	-	
<i>Ranunculus repens</i>	+	+	+	+	+	+	+	+	+	+	
<i>Stachys officinalis</i>	-	-	-	-	+	-	+	+	+	+	
<i>Taraxacum officinale</i>	+	+	-	-	-	-	+	+	+	+	
<i>Trifolium pratense</i>	+	+	+	+	1	+	+	+	+	+	
<i>Trifolium repens</i>	+	-	-	3	+	+	+	+	+	+	
<i>Vicia cracca</i>	-	-	-	-	-	+	-	-	+	-	
Festuco-Brometea											
<i>Coronilla varia</i>	-	-	-	-	-	-	+	+	+	+	
<i>Dianthus carthusianorum</i>	-	-	-	+	+	-	-	+	+	+	
<i>Erigeron acris</i>	-	-	-	-	-	+	+	-	+	+	
<i>Euphorbia cyparissias</i>	+	+	-	-	+	-	-	+	-	+	
<i>Filipendula vulgaris</i>	-	-	-	+	-	-	+	+	+	+	
<i>Galium verum</i>	-	-	-	+	+	-	+	+	+	+	
<i>Hypericum perforatum</i>	-	-	-	-	+	+	-	+	+	+	
<i>Orchis morio</i>	-	+	-	+	-	-	-	+	-	+	
<i>Plantago lanceolata</i>	-	+	-	+	+	+	+	+	+	+	
<i>Salvia nemorosa</i>	-	-	-	-	-	-	-	+	+	+	
<i>Scabiosa ochroleuca</i>	-	-	-	+	+	+	+	+	+	+	
Variae syntaxa											
<i>Adonis aestivalis</i>	-	-	-	-	-	-	-	-	+	-	
<i>Allium scorodoprasum</i>	-	-	-	+	-	+	-	+	-	+	
<i>Carex elongata</i>	+	+	+	+	-	-	+	-	-	-	
<i>Carex ovalis</i>	+	-	2	+	+	-	+	-	-	-	
<i>Chamaecytisus hirsutus</i>	-	-	-	+	-	-	-	-	-	-	
<i>Daucus carota</i>	-	-	-	+	+	+	+	-	+	+	
<i>Dianthus armeria</i>	-	-	-	+	-	-	-	+	-	+	
<i>Equisetum arvense</i>	-	-	-	+	+	-	+	+	-	+	
<i>Erigeron annus</i>	-	-	-	-	-	+	-	+	-	+	

Continues.

Table 2 - Continuation.

Relevees	1	2	3	4	5	6	7	8	9	10	
<i>Geranium palustre</i>	-	-	-	-	-	-	-	-	-	+	
<i>Geranium pratense</i>	-	-	-	-	-	+	-	-	-	-	
<i>Lathyrus latifolius</i>	-	-	-	-	-	-	-	-	+	-	
<i>Lathyrus tuberosus</i>	-	-	-	-	-	-	-	+	-	+	
<i>Luzula campestris</i>	+	-	+	-	+	+	+	+	+	+	
<i>Lysimachia nummularia</i>	-	-	-	-	-	-	+	+	+	+	
<i>Lythrum virgatum</i>	-	-	-	+	-	+	+	-	+	-	
<i>Matricaria recutita</i>	-	-	-	+	-	-	-	-	-	-	
<i>Oenanthe fistulosa</i>	-	-	-	+	-	-	+	-	-	-	
<i>Plantago media</i>	-	-	-	-	-	+	+	+	+	+	
<i>Potentilla reptans</i>	-	-	-	-	+	-	-	+	-	+	
<i>Rumex acetosa</i>	-	-	-	-	-	-	-	+	-	+	
<i>Rumex acetosella</i>	-	-	-	+	-	+	-	+	+	+	
<i>Salix alba</i>	-	-	-	-	-	+	-	+	-	-	
<i>Senecio vulgaris</i>	-	-	-	-	-	-	+	+	+	+	
<i>Stellaria aquatica</i>	-	-	-	+	-	+	-	-	-	-	
<i>Vicia sepium</i>	-	-	-	+	+	-	+	+	+	+	

Legend: place and date of relevees: 1-3 Lunca Mureşului, Aluniş 23.04.2010; 4-6 Lunca Mureşului, Aluniş 10.07.2010; 7 Lunca Mureşului, Aluniş 14.08.2010; 8-10 Lunca Mureşului, Aluniş 15.06.2011.

Figure 2 – Ecological indices of *Agrostetum stoloniferae* ass.

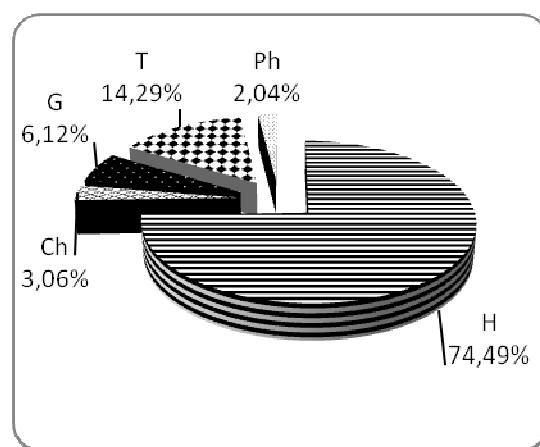


Figure 3 – Bioforms spectrum of *Agrostetum stoloniferae* ass.

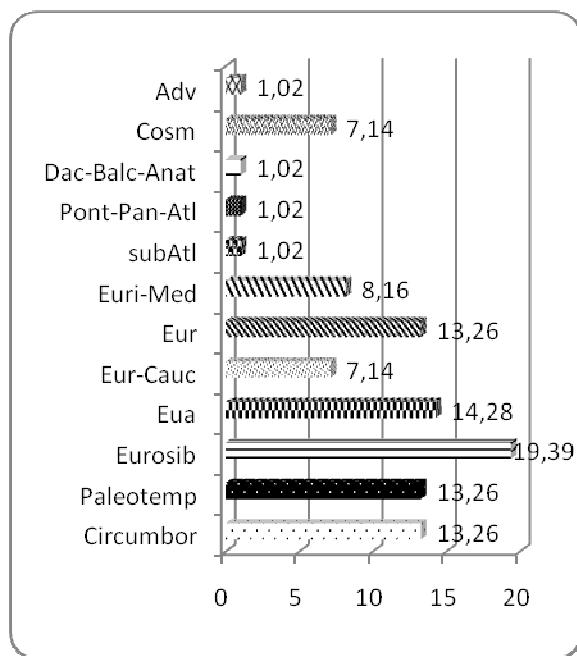
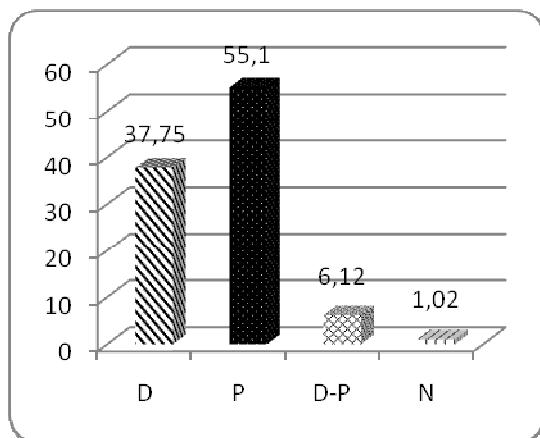


Figure 4 – Floristical elements of *Agrostetum stoloniferae* ass.

Figure 5 – Karyological spectrum of *Agrostetum stoloniferae* ass.

Anthoxantho-Agrostetum tenuis (Silinger 1933) Jurko 1969

Coenoses have very good vegetation coverage (100%), with a continuous and dense plant canopy. Along with the associations diagnose species (Tab. 3), there are many species belonging to the superior syntaxonomic units, which the association was reported to, as well a series of transgressive species of the Festuco-Brometea class.

Analyzing the species behavior towards the humidity factor, we can observe the prevalence of the mesophilic (50%) and xero-mesophilic (30%) species. The thermal conditions in which the association develops are favorable to micro-mesothermal species (48.88%). The edaphic preferences of the component species determine the existence of a high number of weakly acid neutrophils (20%) and acid neutrophilic (22.22%). Still, the euryionic species (54.44%) are prevailing (Fig. 6).

In the bioforms spectrum (Fig. 7), the majority is represented by hemicryptophytes (73.33%), followed by therophytes (20%), geophytes (3.33%) and chamephytes (3.33%).

The European species (10%), Euro-Siberian (15.55%), circumboreal (14.44%) and paleotemperate (17.77%), participate, together with the prevailing Euro-Asian (21.11%) ones, at the composition of the association's geo-elements spectrum. The Mediterranean species (4.44%) also participate with a significant frequency. The pontic Euro-Caucasian and cosmopolitan species complete the phytogeographic picture of this association, although having a reduced presence (Fig. 8).

Phytocoenoses are composed of 45.55% diploid species, 44.44% polyploid species and 7.7% diplo-polyploid species (Fig. 9).

NATURA 2000: 6520 Mountain hay meadows
 CLAS. PAL.: 38.31

Anthoxantho-Agrostetum tenuis (Silinger 1933) Jurko 1969

Table 3 - Vegetal components of the *Anthoxantho-Agrostetum tenuis* association.

Relevees	1	2	3	4	5	
Altitude (ms.m)	380	380	380	380	380	
Area (m²)	100	100	100	100	100	
Vegetation coverage (%)	100	100	100	100	100	K
Car.ass.						
<i>Agrostis capillaris</i>	+	2	+	+	+	V
<i>Anthoxanthum odoratum</i>	4	3	4	5	4	V
Arrhenatheretalia (incl. Arrhenaterion)						
<i>Arrhenatherum elatius</i>	+	-	+	-	+	III
<i>Campanula patula</i> ssp. <i>patula</i>	+	+	+	+	+	V
<i>Carum carvi</i>	+	-	+	+	+	IV
<i>Centaurea phrygia</i>	+	-	+	+	+	IV
<i>Crepis biennis</i>	+	+	+	-	+	IV
<i>Cynosurus cristatus</i>	+	+	+	+	+	V
<i>Euphrasia rostkoviana</i>	+	-	+	+	+	IV
<i>Heracleum sphondylium</i>	+	-	+	+	-	III
<i>Knautia arvensis</i>	+	+	-	+	+	IV
<i>Primula veris</i>	+	-	+	+	+	IV
<i>Rhinanthus rumelicus</i>	+	+	+	+	+	V
<i>Rorippa pyrenaica</i>	+	-	+	-	-	II
<i>Senecio jacobaea</i>	-	-	+	-	+	II
<i>Veronica serpyllifolia</i>	-	+	-	-	-	I
Molinio-Arrhenatheretea						
<i>Achillea millefolium</i>	+	+	+	+	+	V
<i>Agrostis stolonifera</i>	+	-	-	-	+	II
<i>Alopecurus pratensis</i>	-	-	+	+	+	III
<i>Briza media</i>	+	+	+	+	+	V
<i>Bromus commutatus</i>	-	+	+	-	-	II
<i>Carex pallescens</i>	+	-	-	-	-	I
<i>Centaurium erythraea</i>	+	+	-	+	+	IV
<i>Cerastium holosteoides</i>	+	+	+	+	+	V
<i>Colchicum autumnale</i>	-	+	+	-	+	III
<i>Dactylis glomerata</i>	+	+	+	+	+	V
<i>Daucus carota</i>	+	+	+	+	+	V

Continues.

Table 3 - Continuation.

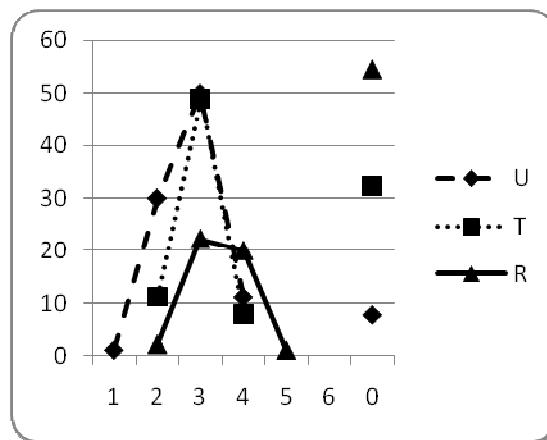
Relevees	1	2	3	4	5	
<i>Deschampsia caespitosa</i>	-	+	-	-	+	II
<i>Euphorbia villosa</i>	+	-	+	-	-	II
<i>Festuca pratensis</i>	-	-	+	-	-	I
<i>Festuca rubra</i>	-	+	-	+	-	II
<i>Filipendula ulmaria</i>	+	-	+	+	+	IV
<i>Galium mollugo</i>	+	+	+	+	+	V
<i>Holcus lanatus</i>	+	+	+	+	+	V
<i>Inula britannica</i>	+	-	+	-	-	II
<i>Juncus effusus</i>	+	-	-	-	+	I
<i>Lathyrus pratensis</i>	+	-	-	+	-	II
<i>Leontodon hispidus</i>	-	-	-	+	+	II
<i>Leucanthemum vulgare</i>	+	+	+	+	+	V
<i>Linum catharticum</i>	+	-	+	+	+	IV
<i>Lotus corniculatus</i>	+	+	+	+	+	V
<i>Luzula campestris</i>	+	-	+	+	+	IV
<i>Lychnis flos-cuculi</i>	+	+	+	+	+	V
<i>Medicago lupulina</i>	+	-	+	+	+	IV
<i>Mentha longifolia</i>	-	+	+	-	-	II
<i>Mentha verticillata</i>	+	-	-	-	-	I
<i>Ononis arvensis</i>	+	+	+	-	+	IV
<i>Phleum pratense</i>	+	-	+	-	-	II
<i>Plantago lanceolata</i>	+	+	+	+	+	V
<i>Poa pratensis</i>	+	+	-	-	+	III
<i>Polygala comosa</i>	-	+	-	+	+	III
<i>Potentilla erecta</i>	+	+	-	-	-	II
<i>Ranunculus acris</i>	+	-	+	-	-	II
<i>Sanguisorba officinalis</i>	2	+	1	+	+	IV
<i>Stachys officinalis</i>	+	+	+	+	+	V
<i>Stellaria graminea</i>	+	+	+	+	+	V
<i>Symphytum officinalis</i>	-	-	+	-	+	II
<i>Thalictrum flavum</i>	+	-	-	-	+	II
<i>Thymus pulegioides</i>	+	+	-	+	+	IV
<i>Tragopogon pratensis</i> ssp. <i>orientalis</i>	+	-	+	-	+	III
<i>Trifolium hibridum</i>	-	+	+	+	+	IV
<i>Trifolium pratense</i>	+	+	+	+	+	V
<i>Trifolium repens</i>	+	-	+	-	+	III
<i>Vicia cracca</i>	-	-	+	+	-	II
<i>Viola canina</i>	+	-	-	+	-	II
Festuco-Brometea						
<i>Echium vulgare</i>	+	-	-	-	-	I
<i>Festuca rupicola</i>	-	-	+	-	+	II
<i>Filipendula vulgaris</i>	+	-	+	+	+	IV

Continues.

Table 3 - Continuation.

Relevees	1	2	3	4	5	
<i>Galium verum</i>	+	+	+	+	+	V
<i>Gallium album</i>	+	-	+	+	+	IV
<i>Hypericum perforatum</i>	+	+	-	+	+	IV
<i>Plantago media</i>	+	+	+	+	+	V
<i>Salvia nemorosa</i>	-	-	+	+	+	III
<i>Salvia verticillata</i>	-	-	+	-	+	II
<i>Scabiosa ochroleuca</i>	+	-	+	+	+	IV
Variae syntaxa						
<i>Allium scorodoprasum</i>	+	+	-	+	+	IV
<i>Cichorium intybus</i>	+	-	+	+	+	IV
<i>Convolvulus arvensis</i>	+	+	+	+	+	V
<i>Cruciata laevipes</i>	-	-	+	+	-	II
<i>Cuscuta europaea</i>	-	-	+	-	+	II
<i>Dianthus armeria</i>	-	-	-	+	+	II
<i>Equisetum arvense</i>	-	+	-	-	+	II
<i>Erigeron acris</i>	-	-	+	-	+	II
<i>Genista tinctoria</i>	+	+	-	-	-	II
<i>Prunella vulgaris</i>	+	+	+	+	+	V
<i>Ranunculus polyanthemos</i>	-	+	-	-	+	II
<i>Rumex acetosa</i>	-	+	-	+	-	II
<i>Sonchus arvensis</i>	-	-	+	-	-	I
<i>Stellaria media</i>	+	-	+	+	-	III

Legend: place and date of relevees: 1-2 Lunca Mureșului, Aluniș 10.07.2010; 3 Lunca Mureșului, Aluniș 14.08.2010; 4-5 Lunca Mureșului, Aluniș 15.06.2011.

Figure 6 – Ecological indices of *Anthoxantho-Agrostetum tenuis* ass.

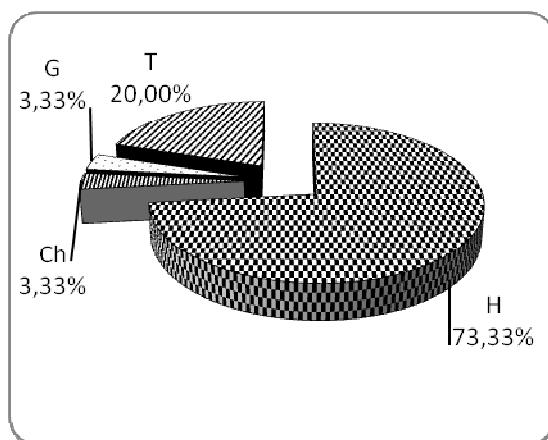


Figure 7 – Bioforms spectrum of *Anthoxantho-Agrostetum tenuis* ass.

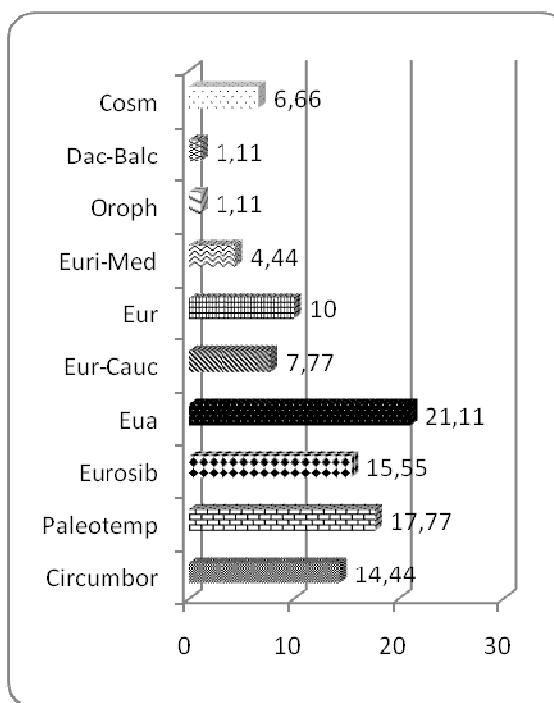


Figure 8 – Floristical elements of *Anthoxantho-Agrostetum tenuis* ass.

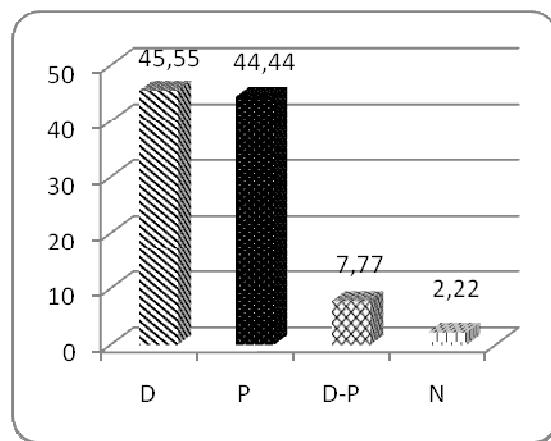


Figure 9 – Karyological spectrum of *Anthoxantho-Agrostetum tenuis* ass.

REFERENCES

- ADLER W., OSWALD K., FISCHER R., 1994 - *Excursionsflora von Österreich*. Verlag Eugen Ulmer, Stuttgart und Wien.
- BARKMAN J.J., MORAVEC J., RAUSCHERT S., 1981 - *Code der pflanzensoziologischen Nomenklatur, Vegetati*. Upssala; **67(3)**: p. 145-195.
- BOȘCAIU N., COLDEA G., HOREANU C., 1994 - *Lista roșie a plantelor vasculare dispărute, periclitante, vulnerabile și rare din flora României*. Ocrot. Nat. Med. Înconj., București: **38 (1)**: p. 45-56.
- COLDEA GH., SÂRBUI I., CRISTEA V., SÂRBUI ANCA, NEGREAN G., OPREA A., CRISTUREANU I., POPESCU GH., 2003 - *Ghid pentru identificarea importantelor arii de protecție și conservare a plantelor din România*. Ed. Allo, București.
- GAFTA D., MOUNTFORD O., 2008 - *Manual de interpretare a habitatelor Natura 2000 din România*. Ed. Risoprint, Cluj-Napoca.
- MUCINA L., GRABHERR G., ELLMAUER T., 1993 - *Die pflanzengesellschaften Österreich*, Teil I, VEB Gustav Fischer Verlag Jena, Stuttgart, New York.
- OBERDORFER E., 1970 - *Pflanzensoziologische Excursionsflora für Süddeutschland und die angrenzenden Gebiete*. Verlag Eugen Ulmer, Stuttgart.
- OLTEAN M., NEGREAN G., POPESCU A., ROMAN N., DIHORU G., SANDA V., MIHĂILESCU SIMONA, 1994 - *Listă roșie a plantelor superioare din România*, în Studii, sinteze, documentații de ecologie, **1**, Acad. Română, Institut. de Biologie, București.
- OROIAN SILVIA, 1998 – *Flora și Vegetația Defileului Mureșului între Toplița și Deda*. Casa de Editură Mureș.
- PIGNATTI S., SAULI MARIALUISA 1976 - *I tipi corologici della Flora italiana e loro distributione regionale: elaborazione con computer di 2600 specie di Angiosperme dicotiledoni*. Archivio Botanico e Biogeografico italiano; vol. **III-IV**.
- SANDA V., POPESCU A., STANCU DANIELA ILEANA, 2001 – *Structura cenotică și caracterizarea ecologică a fitocenozelor din România*. Ed. Conphis, Pitești.

- SÂRBU A. (coord.), 2003, *Ghid pentru identificarea importantelor arii de protecție și conservare a plantelor din România*. Ed. Allo, București.
- SĂMĂRGHITAN MIHAELA, 2005 – *Flora și vegetația Văii Gurghiului*. University Press, Tg-Mureș.
- SOÓ R., 1964-1980, *A magyar flóra és vegetáció rendszertani-növényfoldrajzi. I-VI*, Akadémiai Kiadó, Budapest.
- TUTIN T.G., 1991, *Flora Europaea. I*, Ed. II, Cambridge University Press.
- TUTIN ET. AL., (eds.) 1964-1980 - *Flora Europaea, 1-5*. Cambridge University Press.

MUZEUL JUDEȚEAN ARGEȘ, PITEȘTI, ROMÂNIA

ARGESIS - STUDII ȘI COMUNICĂRI - seria ȘTIINȚELE NATURII, TOM XIX, 2011

SUBALPINE AND ALPINE GRASSLAND VEGETATION FROM RÂIOSU AND BUDA MOUNTAINS - FĂGĂRAŞ MASSIF

DANIELA ILEANA STANCU

Arges County Museum, Armand Călinescu Street, no. 44, 110047, Pitesti, Argeș, Romania,
e-mail: stancuileana@yahoo.com

Abstract: Romania's vegetation has a very pronounced variability due to its location at the interface of three major floristic subregions: Euro-Siberian, Ponto-Sarmatic and Euxinical, as well as due to the influence of Carpathian chain, which determines the distribution of vegetation on various floors. In terms of phytocenological investigation of vegetation cover in studied area, there has been no research done to us. In delimiting vegetation floors, we took into consideration the potential woody vegetation and the secondary herbal one (which has a zonal character; it is installed after the forest and bushes clearings) when we delimited the vegetation floors and subfloors. The research found that the number of vascular plant species is declining as increasing altitude, with changing environmental factors and the specific climatic conditions. Seven plant associations were identified in subalpine and alpine grasslands of the two mountains study.

Keywords: plant communities, Buda and Raiosu Mountains, Fagaras Massif.

Rezumat: Vegetația pajistilor subalpine și alpine din munții Râiosu și Buda, Masivul Făgăraș.

Vegetația României prezintă o variabilitate deosebită accentuată datorită situației țării noastre la interfața a trei mari subregiuni floristice: euro-siberiană, ponto-sarmatică și euxinică, precum și datorită influenței lanțului Carpațic care determină o etajare a vegetației. În ceea ce privește investigarea fitocenologică asupra covorului vegetal din zona luată în studiu, nu au existat date până la cercetările efectuate de noi. În delimitarea etajelor de vegetație am ținut seama atât de vegetația lennoasă potentială, cât și de cea ierboasă secundară, cu caracter zonal, instalată după defrișarea pădurilor și a tufărișurilor. În urma studiilor s-a constatat că numărul speciilor de plante vasculare este în scădere pe măsura creșterii altitudinii, odată cu schimbarea factorilor ecologici și a condițiilor pedoclimatice specifice. Au fost identificate șapte asociații vegetale în pajıştile subalpine și alpine din cei doi munți luati în studiu.

Cuvinte cheie: comunități de plante, Munții Buda și Râiosu, Masivul Făgăraș.

INTRODUCTION

The vegetation of Romania is much varied because of its position in the point of intersection of three floristic subregions: Euro-Siberian, Ponto-Sarmatic and Euxinical, as well as because of the influence of the Carpathian chain, which

determines the distribution of vegetation on various floors. However, because of the anthropo-zoogenous factors which considerably modified these limits, it is difficult to establish today the natural limits of the floors of vegetation.

This is why we took into consideration the potential woody vegetation and the secondary herbal one (which has a zonal character; it is installed after the forest and bushes clearings) when we delimited the vegetation floors and subfloors (Coldea, 1991).

MATERIAL AND METHODS

The plant nomenclature follows "Flora Europaea" (cf. <http://rbg-web2.rbge.org.uk/FE/fe.html>) and Flora Ilustrată a României (Ciocârlan, 2000). The vegetation was studied using the principles of central-European geobotanical school of surveying the vegetation (Braun-Blanquet, 1964). The phytocoenologic framing of the vegetation follow various authors (Coldea, 1991, Sanda et al., 1997, Sanda et al., 2001).

RESULTS AND DISCUSSIONS

The vegetation of the two mountains where the research took place is spread as it follows: the mountain floor, the subalpine floor, and the alpine floor.

The Subalpine Floor 1400 - 2200 m

It has a large amplitude; the juniper tree and juniper bushes at the upper limit of the forest are characteristic for this floor. The juniper tree and bushes have an important role for the fixing of the soil by stopping the erosion provoked by the pasturage. They also regularized the hydrological regime.

Other important vegetation features are represented by the ericaceae bushes (*Rhododendro kotschy*-*Pinetum mugo*, *Campanulo abietinae-Vaccinietum myrtilli*) which could be found especially in clusters up to 2000 m. The characteristic vegetation of limestone detritus is also abundant here.

Grassland vegetation is represented by the association: *Violo declinatae* – *Nardetum*, *Scorzonero roseae-Festucetum nigricantis*, *Seslerio bielzii* - *Caricetum sempervirentis*.

The Alpine Floor 2200-2435 m

It includes the empty spaces of the mountain's which are situated beyond the limits of climate of the vegetation of the trees; the vegetation is mostly represented by short bushes, alpine meadows and rocks associations.

In the lower zone of this floor, above the juniper trees, mainly on the northern slopes, the short bushes are almost continuous; they could be found up to the high plateaus as clusters of *Vaccinium myrtillus* associated with *Dryas octopetala*. On these slopes and in the glacial circuses could also be found kionophylle associations belonging to the following alliances: *Salicion herbaceae* and *Salicion retusae*, as well as to the saxicolous associations of the order *Thlaspietalia rotundifolii*. The southern and eastern slopes of the two mountains

have some similar features such as the alpine meadows that belong to the Caricetalia and Seslerietalia Order which alternate with nardus (*Violo declinatae-Nardetum*).

Very various from both physiognomical and floristic viewpoints, the hygrophille vegetation is represented by the vegetation of the subalpine springs and rivulets, the vegetation of the alluvial gravel and sands. The number of species of vascular plants decreases as the altitude increases, because of the changing of the ecological factors and of the specific pedoclimate. The subalpine floor has a reduced percentage of vascular plants (23%), while the alpine one (the cold steppe) is dominated by the hemicryptophites and chamephytes which could be found in a reduced percentage here (19%) by comparison to the other floors.

Grassland vegetation is represented by the associations: Primulo-Caricetum curvulae, Potentillo ternatae-Festucetum supinae, Cetrario-Loiseleurietum procumbentis, Poëtum mediae.

CARICETEA CURVULAE Br.-Bl. 1948

(**JUNCETEA TRIFIDI** Klika et Hadač 1944 p.p.)

The primal acidophylle alpine grassland and the short shrubs of the alliance Loiseleurio-Vaccinion Br.-Bl. 1926 that vegetates on the little evolved and oligotrophic and very acid soils. They have Arctic-alpine origins and represents terminal climax status, conditioned by pedoclimate factors.

These primal phytocoenosis were largely spread during the Glacial Era (at the upper border of the shrubs), while during the Post-Glacial Era their area is considerably smaller, i.e. just a few stations on high mountains (over 2000 m).

CARICETALIA CURVULAE Br.-Bl. in Br.-Bl. et Jenny 1926

Phytocoenosis of acidophilic alpine grassland. The characteristic species of this order found on the two studied mountains: *Carex curvula*, *Campanula alpina*, *Primula minima*, *Agrostis rupestris*.

CARICION CURVULAE Br.-Bl. in Br.-Bl. et Jenny 1926

Among the characteristic species of this alliance on the researched territory: *Carex curvula*, *Luzula spicata*, *Festuca airoides*.

Primulo-Caricetum curvulae Br.-Bl. 1926 em. Oberd. 1957

A typical association for the alpine floor, where the species *Carex curvula* dominates the high plateaus of the Râiosu and Buda Mountains; they have acid soils because of the low trophicity and a kiono-mezophylle regime; it forms variably large meadows.

Other species of the associations found here: *Festuca airoides*, *Juncus trifidus*, *Primula minima*, *Hieracium alpinum*, *Phyteuma confusum*, *Campanula alpina*, and lichens and bryophytes (Tab. 1).

Potentillo ternatae-Festucetum supinae Boșcaiu 1971

(**Potentillo chrysocraspedae - Festucetum aioidis** nom. mut. propos.)

This Carpathian-Balkan association is largely spread on the alpine floor of the Buda Mountain, wher *Festuca airoides* forms meadows on the peaks and on the southern slopes that are slightly inclined. It is spread on not very profound and

little or much acid soil humus rich. The action of the anthropo-zoogenous factor due to the intensive pasturing lead to the degrading of the edified meadows pajistilor edificate of *Festuca airoides* and to their evolution to the *Nardetum strictae* (Tab. 2).

LOISELEURIO-VACCINION Br.-Bl. in Br.-Bl. et Jenny 1926

It includes the nanophanerophytes coenosis which are rich in microtherme acidophilic species. Characteristic species: *Loiseleuria procumbens*, *Vaccinium gaultherioides*, *Cetraria islandica*. The position of the alliance is unclear because the shrubs which are in contact with the alpine meadows from the Class *Cariceta curvulae* were included un the Class *Rhododendro-Vaccinietea* Br.-Bl. 1926 for which was later created the Class *Loiseleurio-Vaccinietea* Eggler 1952.

Cetratio-Loiseleurietum procumbentis Br.-Bl. in Br.-Bl. et Jenny 1926

The edified coenosis of *Loiseleuria procumbens* are met on relatively small and shadowed surfaces which are exposed to the cold wind of the alpine meadows of the Râiosu and Buda Mountains. The characteristic species are *Loiseleuria procumbens* and *Potentilla aurea* ssp. *chrysocraspeda*.

The association plays an ecoprotective role by diminishing the deflation from the alpine peaks. It also has a cryotherme character because it is extremely resistant to the freezing that follows after the disappearing of the snow layer due to the strong winds (Tab. 3).

NARDO-CALLUNETEA Prsg. 1949

It grows on the meadows and the oligotrophic and acidophylous shrubs of *Nardus stricta* and *Calluna vulgaris* which vegetates on the subalpine floor from the Romanian Carpathians, on large surfaces of over 200.000 ha (Pușcaru-Soroceanu 1963).

The phytocenosis have secondary character and their apparition contributes to the anthropo-zoogenous factor.

NARDETALIA Oberd. 1949

The characteristical species of this order found in the massif: *Nardus stricta*, *Hypericum maculatum*, *Potentilla erecta*, *Stellaria graminea*.

POTENTILLO-NARDION Simon 1959

It is an characteristical alliance for the Balkans and the South-Eastern Carpathians, and it could be found on the large meadows from the subalpine floor, on oligotrophic soils.

Violo declinatae-Nardetum Simon 1966

The wide spreading of the meadows of *Nardus stricta* from the South-Eastern Carpathians is considered to be the result of the old pastorale activity from these mountains.

Though the meadows of *Nardus stricta* do not have a geat economical value because of its low fodder value, in the latest decades they have been considered to be of great eco-protective importance. Because of the rigidity of the

leaves and stems of *Nardus stricta* the meadows' rugosity fix the snow layer during winter and thus the avalanches are avoided.

It was noticed that on some slopes of the Pirinei and the Alpes and also in some mountains from our country, after the stopping of the pasturing in the National Parks the *Nardus stricta* meadows are replaced by the *Calamagrostis villosa* ones which are curved by the weight of the snow and thus lead to the setting in the avalanches that destroy the upper skirt of the forests from the upper alpine floor (Tab. 4).

Scorzonero roseae-Festucetum nigricantis (Puşcaru et al. 1956) Coldea
1987

The edified meadows of *Festuca nigrescens* which in older papers is known as *Festuca rubra* ssp. *fallax* and *Festuca rubra* ssp. *commutata*, are developed in a secondary way on the subalpine floor of the Buda Mountain, after the clearing of the spruce stands limit and the juniper trees. These coenosis evolve toward the formation of some edified meadows of *Nardus stricta* under the pressure of the pastorale activity.

The main species are *Scorzonera rosea* and *Campanula abietina*. Beside them an important role for the edification of the coenosis play the species of the aliace *Potentillo-Nardion* (Tab. 5).

Poëtum mediae Csűros 1956

The *Poa media* phytocoenosis are found on the alpine floor of the Râiosu and Buda Mountains on the not very inclined slopes where the snow persists until late spring thus giving a moderate humidity to soil. The soils are acidic and frequently they have a big quantity of nutritive substances. The characteristic and edifying species is *Poa media* whose spreading can reach 75%. Through fallow these coenosis evolve towards the edification *Nardus stricta* meadows which have only a little fodder value (Tab. 6).

SESLERIETEA ALBICANTIS Br.-Bl. 1948 em. Oberd. 1978

In this class the subalpine and alpine meadows from the limestones from the central and southern Europe are included.

The xeromorphic adaptation of the edifiers of the groups of this class indicates "steppe" adaptations. On this basis, E. Pignatti și S. Pignatti (1975) consider that the groups of this class could be the descendants of some alpine steppe from the Paleo-Mediterranean domain and that they were differentiated when the orogenesis of the alpine system was complete. In their subsequent evolution the coenosis of this class have integrated components of populations coming from various phyto-geographical areas. Because of their oldness and isolation in various alpine systems these groups often differ from one region to another.

In the Carpathian space they have a coenotical ambiance with many rare and endemic which confer them a Carpathian regional feature.

Among the species of the class in the studied territory were identified: *Anthylis vulneraria* ssp. *alpestris*, *Biscutella laevigata*, *Euphrasia salisburgensis*, *Galium anisophyllum*, *Thesium alpinum*, *Myosotis alpestris*, *Scabiosa lucida*, *Leontopodium alpinum*, *Helianthemum nummularium* ssp. *grandiflorum*, *Ranunculus oreophilus*.

SESLERIETALIA ALBICANTIS Br.-Bl. in Br.-Bl. et Jenny 1926

Conformable to the traditional usage, one single order was established inside a class *Seslerietalia albicantis* Br.-Bl. in Br.-Bl. et Jenny 1926 whose characteristic species are the same of those of the respective class.

FESTUCO SAXATILIS - SESLERION BIELZII (Pawl. et Walas 1949) Coldea 1984

In order to individualize the coenosis with *Sesleria bielzii* from the Carpathians, Gh. Coldea (1984) delimited the alliance *Festucion saxatilis - Seslerion bielzii* based on the basionime of the regional alliance *Festucion marmarossicae* Pawl. et Wal. 1949 who is a Charpathian homologue of the Alpic alliance *Seslerion coeruleae* Br.-Bl. in Br.-Bl. et Jenny 1926.

Among the characteristic species of the alliance the following were identified in the researched territory: *Festuca rupicola* ssp. *saxatilis*, *Festuca versicolor*, *Festuca amethystina*, *Sesleria bielzii*, *Cerastium arvense* ssp. *lerchenfeldianum*, *Allysum repens*, *Thymus pulcherrimus*, *Dianthus spiculifolius*, *Linum extraaxilare*.

We underline that in the researches effectuated in our country *Sesleria bielzii* de *Sesleria coerulans* were not distinctively identified. Thus, M. Deyl (1946) considered these two species from the Carpathians as "synonym". Later, Deyl – Flora europaea V (1980) – considers the two species as distinct. In reality, their distinction in the field during the effecting the surveys is difficult and often uncertain.

Seslerio bielzii - Caricetum sempervirentis Puşcaru et al. 1956

The association is found on the steeps of Râiosu and Buda, but is more frequently met on the slopes that have a N and N-E exposure which are formed by Jurassic limes. It is a Carpathian homologue of the association from the Alpical domain *Seslerio albicantis-Caricetum sempervirentis* Br.-Bl. in Br.-Bl. et Jenny 1926. The coenosis are characterized by a floristic variety with many geoelements. It mainly populates the mountain paths from the rocks.

The characteristic species *Sesleria bielzii* is widely spread (60%). Among the rare species: *Dianthus glacialis* ssp. *gelidus*, *Achilea schurii*, *Leontopodium alpinum* (Tab. 7).

CONCLUSIONS

There have been identified phytocoenosis belonging to six associations, which have not been cited before our study in there.

That plant's communities could be framing on to five natural habitats, as they are: 3602, 3604, 3609, 3610, 3612 (Doniță et al., 2005).

Table 1 – Primulo-Caricetum curvulae Br.-Bl. 1926 em. Oberd. 1957

	Survey nr.	1	2	3	4	5	6	7	8	9	10	K
Altitude(m)	2000	2150	2000	1950	2100	2200	2000	1950	2200			
Exposure	S	S	S-E	S-E	V	V	S-E	S	S	V		
Slope	15°	30°	15°	30°	45°	30°	15°	45°	45°	45°	15°	
Coverage (%)	45	45	45	40	45	40	45	40	45	45	40	
Surface (sq. m)	100	25	25	25	100	100	100	25	100	100	100	
Opt. ass.												
<i>Carex curvula</i>	3	1	3	3	3	1	3	3	3	3	V	
<i>Primula minima</i>	1	3	+	+	1	+	3	+	1	+	V	
Caricion et Caricetalia curvulae												
<i>Juncus trifidus</i>	+	+	+	+	+	+	+	+	+	+	IV	
<i>Agrostis rupestris</i>	.	.	.	.	.	.	.	.	.	.	III	
<i>Phyteuma nanum</i>	+	+	+	+	+	+	+	+	+	+	III	
<i>Festuca arroides</i>	+	+	+	1	+	+	+	+	+	+	V	
<i>Campanula alpina</i>	.	+	+	.	+	+	+	+	+	+	III	
<i>Oreochloa disticha</i>	.	.	.	.	+	+	+	+	+	+	III	
<i>Luzula spicata</i>	.	.	.	.	.	.	.	.	.	.	III	
Variae Syntaxa												
<i>Anthemis carpatica</i>	+	.	+	.	.	.	.	.	.	+	III	
<i>Poa alpina</i>	.	+	.	+	.	.	.	.	.	+	II	
<i>Dianthus gelidus</i>	+	.	.	+	+	+	.	.	.	.	II	
<i>Potentilla terminalis</i>	+	.	.	+	+	+	.	.	.	+	III	
<i>Hieracium alpinum</i>	+	.	.	+	.	+	.	+	.	+	III	
<i>Ligusticum mutellina</i>	+	.	.	+	+	+	.	.	.	+	III	

Place and date of relevées: 1-3, Râiosu Mountain - 14.07.1995; 4-7, Buda Mountain - 3.07.1999; 8-10, Râiosu Mountain - 10.08.2000.

Table 2 – Potentillo ternatae-Festucetum supinae Boșcăiu 1971

	Survey nr.	1	2	3	4	5	6	7	8	9	10	K
	Altitude (m)	1900	1900	1950	1900	1800	1950	1900	2000	2000	1950	
	Exposure	S	S	S-E	S-E	E	V	V	S	S-E	S	
	Slope	15°	15°	35°	15°	35°	15°	15°	35°	15°	35°	
	Coverage (%)	50	60	45	45	30	55	30	45	30	30	
	Surface (sq. m.)	100	100	100	100	100	25	100	100	100	100	
Opt. ass.												
<i>Festuca airoides</i>	2	3	3	2	1	3	1	3	+	2	V	
<i>Potentilla aurea</i> ssp. <i>chrysocraspeda</i>	2	1	1	2	1	1	2	1	+	+	V	
Caricion et Carex curvulae												
<i>Primula minima</i>	+	1	+	-	-	+	1	-	+	1	-	IV
<i>Phyteuma naram</i>	+	+	-	+	-	+	-	-	+	+	-	III
<i>Agrostis rupestris</i>	1	1	-	-	+	1	-	-	-	-	-	IV
<i>Campanula alpina</i>	+	+	-	-	+	-	+	-	-	-	-	III
<i>Juncus trifidus</i>	1	+	-	-	+	-	1	-	-	1	-	IV
Potentillo-Nardion												
<i>Campanula patula</i>												
ssp. <i>abietina</i>										2		II
<i>Ligusticum mutellina</i>	+	1	+	-	-	+	-	-	+	1	-	IV
<i>Hieracium alpinum</i>	+	-	-	+	-	1	-	-	-	1	-	III
Variae Syntaxa												
<i>Oreochloa disticha</i>	+	-	-	-	-	-	1	-	-	-	-	IV
<i>Luzula spicata</i>	-	-	-	-	-	-	-	+	-	-	-	III
<i>Arenula versicolor</i>	-	-	-	-	-	-	-	-	+	-	-	II
<i>Pulsatilla alba</i>	+	-	-	-	-	-	-	-	-	-	-	III
<i>Poa alpina</i>	-	-	-	-	-	-	-	-	-	-	-	III
<i>Dianthus glacialis</i>	-	-	-	-	-	-	-	-	-	-	-	II
ssp. <i>gelidus</i>	-	-	-	-	-	-	-	-	-	-	-	II

Place and date of relevées: 1 - 5 Buda Mountain - 25.07.1997, 6 - 10 Buda Mountain - 3.07.1999.

Table 3 – *Cetrario-Loiseleurietum procumbentis* Br.-Bl. in Br.-Bl. et Jenny 1926

Survey nr.	1	2	3	4	5	6	7	8	K
Altitude (m)	2000	2000	1900	1950	2000	2100	2000	1950	
Exposure	N-E	N	N	N-E	E	E	N-V	N	
Slope	45°	60°	45°	50°	65°	50°	45°	45°	
Coverage (%)	55	80	70	65	70	55	70	45	
Surface (sq. m)	1	4	1	4	4	1	4	4	
Loiseleurio-Vaccinion									
<i>Cetraria islandica</i>	1	1	+	2	+	1	2	+	V
<i>Loiseleuria procumbens</i>	3	4	4	3	4	3	3	3	V
<i>Vaccinium gaultherioides</i>	+	+	+	+	+	+	+	+	IV
<i>Caricetia curvulae</i>									
<i>Potentilla aurea</i>									
ssp. <i>chrysocraspeda</i>									
<i>Juncus trifidus</i>									IV
<i>Carex curvula</i>									V
<i>Phyteuma confusum</i>									III
<i>Campanula alpina</i>									IV
<i>Hieracium alpinum</i>									V
<i>Agrostis rupestris</i>									V
<i>Primula minima</i>									IV
<i>Pestuca airoides</i>									V
<i>Variæ Syntaxa</i>									III
<i>Cetraria nivalis</i>									II
<i>Oreochloa disticha</i>									III
<i>Ligusticum mutellina</i>									IV
<i>Sesleria bielzii</i>									III
<i>Arenaria carpatica</i>									III

Place and date of televées: 1-3, Râiosu Mountain - 7.07.1995; 4-8, Buda Mountain - 3.07.1999.

Table 4 – *Violo declinatae-Nardetum* Simon 1966

	Survey nr.	1	2	3	4	5	6	7	8	9	K
Altitude (m)	2200	2200	1950	1950	2100	2200	2200	2100	2000	2000	
Exposure	S	S	S-E	S	S	E	S-E	S	S-E	S-E	
Slope	45°	15°	45°	45°	45°	15°	45°	-	-	15°	
Coverage (%)	35	35	50	35	35	35	35	35	50	50	
Surface (sq. m)	25	25	100	100	100	25	25	25	100	16	
Potentillo-Nardion											
<i>Mardus stricta</i>	4	4	4	3	4	4	4	3	3	3	V
<i>Viola declinata</i>	+	+	1	-	+	1	1	+	-	-	V
<i>Potentilla caerulea</i> ssp. <i>chrysocraspeda</i>	1	+	+	+	1	+	+	+	+	1	V
<i>Scorzonera rosea</i>	-	-	+	-	+	-	-	-	-	-	III
<i>Campanula abietina</i>	+	-	-	-	-	-	-	-	1	1	II
Nardetalia											
<i>Festuca nigrescens</i>	-	-	-	-	-	-	-	-	-	-	III
<i>Potentilla erecta</i>	-	-	-	-	-	-	-	-	-	-	II
<i>Geum montanum</i>	-	-	-	-	-	-	-	-	-	-	V
<i>Ligusticum murellum</i>	-	-	-	-	-	-	-	-	-	-	III
<i>Gentiana acaulis</i>	-	-	-	-	-	-	-	-	-	-	III
<i>Hieracium aurantiacum</i>	-	-	-	-	-	-	-	-	-	-	III
<i>Hypochaeris uniflora</i>	-	-	-	-	-	-	-	-	-	-	I
<i>Polygala vulgaris</i>	-	-	-	-	-	-	-	-	-	-	II
<i>Hypericum maculatum</i>	-	-	-	-	-	-	-	-	-	-	III
<i>Thymus pulegioides</i>	-	-	-	-	-	-	-	-	-	-	II
<i>Alchemilla xanthochlora</i>	-	-	-	-	-	-	-	-	-	-	V
Caricietalia curvulae											
<i>Agrostis rupestris</i>	-	-	-	-	-	-	-	-	-	-	III
<i>Festuca airoides</i>	-	-	-	-	-	-	-	-	-	-	III

Continues.

Table 4 – Continuation.

	1	2	3	4	5	6	7	8	9	K
Survey nr.	2200	2200	1950	1950	2100	2200	2200	2100	2000	
Altitude (m)	S	S	S-E	S	E	S-E	S	S-E		
Exposure										
Slope	45°	15°	45°	45°	45°	15°	45°	-	15°	
Coverage (%)	35	35	50	35	35	35	35	35	50	
Surface (sq. m)	25	25	100	100	25	25	25	100	16	
<i>Juncus trifidus</i>										II
<i>Primula minima</i>	+	+	+	+	+	+	+	+	+	III
Variae Syntaxa										
<i>Luzula luzuloides</i>	++	++	++	++	++	++	++	++	++	II
<i>Phleum alpinum</i>										III
<i>Deschampsia caespitosa</i>										
<i>Brachythalia spiculifolia</i> +										
<i>Polygonum bistorta</i>										III
<i>Vaccinium myrtillus</i>										III
<i>Rhododendron myrtifolium</i>										IV
<i>Festuca nigrescens</i>										II
<i>Achillea distans</i>										II
<i>Soldanella hungarica</i>										III
ssp. <i>major</i>										II
<i>Trifolium alpestre</i>										II
<i>Achillea millefolium</i>										II
<i>Gentra tinctoria</i>										II
<i>Deschampsia flexuosa</i>										II
<i>Centaurea nervosa</i>										III
<i>Polytrichum commune</i>										II

Place and data of relevées: 1 - 3 Buda Mountain - 25.07.1997; 4 - 7 Buda Mountain toward Poliața lui Vodă - 5.08.2000, 8 - 9 Râiosu Mountain - 10.07.2001.

Table 5 – *Scorzonero roseae-Festucetum nigricantis* (Pușcari et al. 1956) Coldea 1987

	Survey nr.	1	2	3	4	5	6	7	8	K
Altitude (m)	1700	1900	1900	1700	1700	1800	1850	1700		
Exposure	S	S	S-E	S	S	E	S-E	S		
Slope	45°	50°	15°	45°	50°	50°	30°	30°	50°	
Coverage (%)	60	60	50	45	55	35	40	35		
Surface (sq. m)	100	100	25	100	100	100	100	100	100	
Poetum-Nardion										
<i>Poa media</i>		+	+	+	+	+	+	+	+	II
<i>Scorzonera rosea</i>	1	+	2	1	+	+	1	+	+	IV
<i>Potentilla aurea</i>										
<i>ssp. chrysocraspeda</i>		2	1	+	2	+	1	+	+	IV
<i>Campanula abietina</i>	1	+	1	1	+	+	+	+	+	V
<i>Thymus balcanus</i>	+									IV
Nardetalia										
<i>Nardus stricta</i>	1	+	+	2	+	2	+	+	+	V
<i>Festuca nigrescens</i>	3	3	1	1	3	+	2	1	1	V
<i>Phleum alpinum</i>	+		+	+	+	1	+	+	+	IV
<i>Carex ovalis</i>		+	+	+	+	+	+	+	+	III
<i>Hieracium aurantiacum</i>										V
<i>Pseudorchis albida</i>										II
<i>Alchemilla xanthochlora</i>										IV
<i>Thymus pulegioides</i>										IV
<i>Hypericum maculatum</i>										IV
Caricetalia curvulae										
<i>Agrostis rupestris</i>										III
<i>Aethionanthrum alpinum</i>	+	+			+	1	+	1	1	V
<i>Festuca versicolor</i>										III
Arribatheretalia s.l.										
<i>Trifolium repens</i>		+								II

Continues

Table 5 - Continuation.

	Survey nr.	1	2	3	4	5	6	7	8	K
Altitude (m)	1700	1900	1900	1700	1700	1800	1850	1700		
Exposure	S	S	S-E	S	S	E	S-E	S		
Slope	45°	50°	15°	45°	30°	30°	30°	30°	50°	
Coverage (%)	60	60	50	45	55	35	40	35		
Surface (sq. m)	100	100	25	100	100	100	100	100	100	
<i>Prunella vulgaris</i>	+			+		+	+			III
<i>Poa pratensis</i>	-	+	+	+		-	+	1		IV
Variae Syntaxa	-	+	-	+	+	1	-	1		IV
<i>Deschampsia caespitosa</i>	-	+	+	-	+	-	+	-		III
<i>Vaccinium myrtillus</i>	-	-	+	-	+	-	-	-		II
<i>Solidanella hungarica</i>	-	-	-	-	-	-	-	-		II
<i>ssp. major</i>	-	-	-	-	-	-	-	-		
<i>Luzula hirsutoides</i>	-	+	-	-	-	-	-	-		
<i>Alpinecurus lagifoliformis</i>	-	-	-	-	-	-	-	-		

Place and date of relevées: 1 - 5 Buda Mountain - 25.07.1997; 6 - 8 Buda Mountain - 3.07.1999.

Table 6 - Poëtum mediae Csűrös 1956

	Survey nr.	1	2	3	4	5	6	7	8	K
Altitude (m)	2000	2200	2000	2150	2150	2200	2200	2150		
Exposure	S	S	S	S-E	S	S-V	V	V		
Slope	30°	15°	15°	30°	15°	-	-	-	15°	
Coverage (%)	75	70	75	60	70	60	55	40		
Surface (sq. m)	25	100	25	25	25	100	100	25		
Opt. ass.										
<i>Poa media</i>	4	3	4	3	4	3	3	1		V
Potentillo-Nardo n	1	1	1	1	1	+	1	2		
<i>Potentilla aurea</i>										
<i>ssp. chrysocraspeda</i>										

Continues

Table 6 – Continuation.

	1	2	3	4	5	6	7	8	K
Survey nr.	2000	2200	2000	2150	2150	2200	2200	2150	
Altitude (m)	S	S	S	S-E	S	S-V	V	V	
Exposure									
Slope	30°	15°	15°	30°	15°	-	-	15°	
Coverage (%)	75	70	75	60	70	60	55	40	
Surface (sq. m)	25	100	25	25	25	100	100	25	
<i>Campanula abietina</i>	+				+	+			
<i>Tymus baicalicus</i>	+		+		+				
Nardetalia									
<i>Nardus stricta</i>		2	1	2	+	2	1	1	V
<i>Festuca nigrescens</i>		+	+	+	+	+	+	+	III
<i>Ligusticum mutellina</i>		+	+	+	+	+	+	+	V
<i>Geum montanum</i>		+	+	+	+	+	+	+	III
<i>Phleum alpinum</i>		+	+	+	+	+	+	+	IV
<i>Hypericum maculatum</i>		+	+	+	+	+	+	+	III
<i>Potentilla erecta</i>		+	+	+	+	+	+	+	II
<i>Stellaria graminea</i>		+	+	+	+	+	+	+	III
Caricetalia curvulae s.l.									
<i>Juncus trifidus</i>	+				+		+		III
<i>Festuca versicolor</i>	+				+		+		II
<i>Campanula alpina</i>	+		+		+		+		IV
<i>Anthoxanthum odoratum</i>	1	1	+		+	1	1	+	V
Variae Syntaxa									
<i>Solidanella hungarica</i>									III
ssp. <i>major</i>	+		+		+		+		II
<i>Homogyne alpina</i>									III
<i>Luzula luzuloides</i>	+		+		+		+		III
<i>Polygonum vivparum</i>	+							+	

Place and data of relevées: 1 - 5 Buda Mountain - 3.07.1999; 6 - 8 Râiosu Mountain - 3.08.2000.

Table 7 – **Seslerio bielzii - Caricetum sempervirentis** Pușcaru et al. 1956

Survey nr.	1	2	3	4	5	K
Altitude (m)	1700	1750	1900	2000	2000	
Exposure	N	N	N-E	N	N	
Slope	45°	45°	35°	35°	35°	
Coverage (%)	60	35	60	35	45	
Surface (sq. m)	25	4	25	4	100	
Opt. ass.						
<i>Sesleria bielzii</i>	3	1	2	+	1	V
Festuco - Seslerion bielzii						
<i>Thymus pulcherrimus</i>	+	+	+	.	+	IV
<i>Alyssum repens</i>	.	+	+	.	+	III
<i>Carduus kernerii</i>	.	+	+	+	.	III
<i>Festuca amethystina</i>	+	.	+	+	.	III
Seslerietalia						
<i>Carex sempervirens</i>	2	2	1	2	+	V
<i>Galium anisophyllum</i>	1	+	3	+	3	V
<i>Polygonum viviparum</i>	.	.	+	+	.	II
<i>Ranunculus oreophyllos</i>	+	.	+	.	+	III
<i>Myosotis alpestris</i>	.	.	+	.	+	II
<i>Acinos alpinus</i>	.	+	+	+	.	III
<i>Helianthemum alpestre</i>	+	.	+	.	+	III
<i>Leontopodium alpinum</i>	.	+	+	.	.	II
<i>Saxifraga moschata</i>	+	.	+	+	.	III
<i>Saxifraga corymbosa</i>	.	+	.	+	.	III
<i>Cerastium alpinum</i>	+	+	+	+	+	V
<i>Artemisia eriantha</i>	+	+	+	.	+	IV
<i>Dianthus glacialis</i> ssp. <i>gelidus</i>	+	+	+	+	.	IV
Elynetalia						
<i>Dryas octopetala</i>	.	.	+	.	+	II
<i>Achillea schurii</i>	.	+	+	1	.	III
Variae syntaxa						
<i>Parnassia palustris</i>	+	.	+	.	+	III
<i>Asplenium viride</i>	+	.	+	.	.	II
<i>Poa violacea</i>	.	+	.	1	.	II
<i>Luzula luzuloides</i>	+	1	.	+	.	III
<i>Silene pusilla</i>	+	.	.	.	+	II
<i>Sedum atratum</i>	.	+	.	+	+	III
<i>Cerastium arvense</i>						
ssp. <i>lerchenfeldianum</i>	.	1	+	.	.	II
<i>Doronicum carpaticum</i>						
+	+	+	.	+		IV
<i>Saxifraga aizoides</i>	+	.	+	.	.	II
<i>Pinguicula alpina</i>	+	.	+	.	+	III

Place and data of relevees: 1,2,3,4 Râiosu Mountain - 18.08.1998; 5 Buda Mountain - 3.07.1999

REFERENCES

- BRAUN-BLANQUET J., 1964 – *Pflanzensoziologie. Grundzüge der Vegetations-kunde.* Ed. 3. Wien-New York: Springer-Verlag. 865 p.
 CIOCÂRLAN V., 2000 – *Flora ilustrată a României. Pteridophyta et Spermatophyta.* Ediția a doua revăzută și adăugită. Ed. Ceres, București. 1138 p.

- COLDEA Gh., 1991 – *Prodrome des associations végétales des Carpates du sud-est (Carpates Roumaines)*. Camerino: Docum. Phytosoc. Npuv. Sér. **13**: p. 317-539.
- DONIȚĂ N., POPESCU A., PAUCĂ-COMĂNESCU M., MIHĂILESCU S., BIRIȘ I.A., 2005 – *Habitatele din România*. Editura Tehnică Silvică, București. 496 p.
- SANDA V., POPESCU A., BARABAŞ N., 1997 – *Cenotaxonomia și caracterizarea grupărilor vegetale din românia*. Bacău. Stud. Comunic. Muz. Șt. Nat. **14**: p. 1-366.
- SANDA V., POPESCU A., STANCU Daniela-Ileana, 2001 – *Structura cenotică și caracterizarea ecologică a fitocenozelor din România*. Ed. Conphis. 359 p.
- Flora Europaea (online). 2009. *Flora Europaea*. Royal Botanic Garden Edinburgh. <http://rbg-web2.rbge.org.uk/FE/fe.html> (accesed 02.03.2011).

**MONITORING THE IMPACT OF FLORA AND VEGETATION BY
CREATING SPECIFIC INFRASTRUCTURE IN
TRAVEL/TOURISM ACTIVITIES IN THE AREA GHIȚU-MOLIVIȘ
(ARGEȘ COUNTY)**

ADRIANA VINTILĂ

School Grup Câmpulung, Șoseaua Națională Street, 108, 115100, Câmpulung, Argeș, Romania,
e-mail: adrianapreda57@yahoo.com

ABSTRACT: The present paperwork is doing a inventory of the floristic area Ghițu-Moliviș, an abridgement ceno-taxonomic of the vegetation and holds forth a set of measures to ensure the conservation and protection of sozologic valuable plant species from the studied range, identifying, describing and evaluate significant potential effects on the implementation environment A.U. P (Area Urban Plan), as the reduction measures of these in order to advise the legal provisions, taking into consideration the objectives and geographical area position.

Key words: monitoring the impact, tourism activities, Area Ghițu-Moliviș.

REZUMAT: Monitorizarea impactului asupra florei și vegetației prin crearea infrastructurii specifice activităților de călătorie/turism în arealul Ghițu-Moliviș (județul Argeș).

Lucrarea de față face un inventar floristic al zonei Ghițu-Moliviș, un conspect cenotaxonomic al vegetației și propune un set de măsuri care să asigure conservarea și protecția speciilor de plante de valoare sozologică din arealul cercetat, pentru identificarea, descrierea și evaluarea potențialelor efecte semnificative asupra mediului ale implementării PUZ (Planul Urbanistic Zonal), precum și măsurile de reducere a acestora în vederea încadrării în prevederile legale, luând în considerare obiectivele și aria geografică de amplasare.

Cuvinte cheie: monitorizarea impactului, activități de turism, arealul Ghițu Moliviș.

INTRODUCTION

Environmental impact assessment unfolds in early stages of every technical planning process or taking a decision and leads to identifying specific measures to improve effects establishing a framework for the assessment of projects from the point of view of environmental protection. Thus, the assessment becomes a method of ensuring the sustainable development. This way, one can focus on "the source" of the environmental impact and not on "solving" the symptoms arising as a result of impact. Arefu commune, City Hall, on the radius of which lies the territory

taken in the study made the Area Urban Plan concerning "The creation of General and specific travel/tourism activities infrastructure from the climate of Ghițu-Moliviș range", Arefu commune.

In the development of the village, for this area, provision is made, in particular about specific tourism infrastructure development (ski slope, hotel, motel, boards, restaurant, chalet), construction of cottages /holiday houses and apartments, with the related ancillary functions, technical infrastructure-utilities and ways of access/ routes, the establishment of a non-polluting areas, hydroelectric power generation, service agreement, storage spaces with adjacent investment (sports equipment rental centers), recreation area, stadiums, greens.

The area in which to build the touristic/travel complex, is located on the territory of the Arefu commune, tourist potential and socio-economic area, on the southern slope of the Southern Carpathians, in the mountain floor. Access can be done in the area from the main highway DN 7C (Transfăgărășan/Viciously Nice), through forest road Moliviș-Poienile Vâlsanului (Fig. 1).

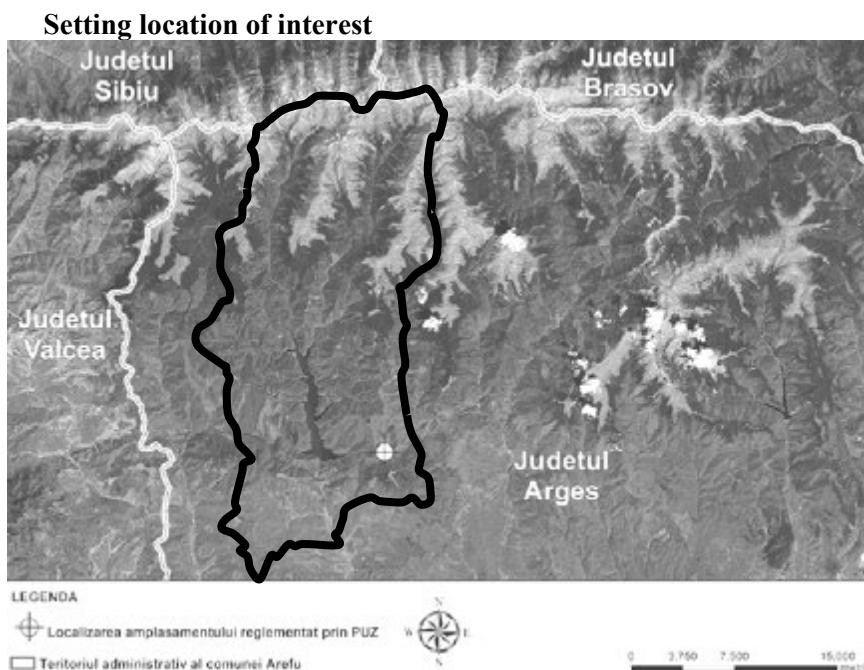


Figure 1 - The location of the area of interest for the construction of the tourist complex. (Source: <http://ebookbrowse.com/rospa0098-piemontul-fagaras-formular-standard-pdf-d32827119>). — the border of the considered area.

On the territory took in question there is also a nature reserve of County, "Moliviș" Turbăria, with an area of about 82.50 ha, nature reserve little investigated and service life in travel.

The territory taken into study was included on the site of Community importance Făgăraș Mountains (ROSCI0122), natural protected area in the area of 198.512 ha is on the administrative territory of Argeș, Brașov, Sibiu and Vâlcea Counties. The Făgăraș Mountains, in area of 198.495 ha, includes the highest and most wildly sector of the Romanian Carpathians, with one of the largest extensions of the glacial and periglacial landscape, with a vast suite of unique landscape units and with specific ecological conditions as a result of geological, soil and climate diversity reflected in very high biodiversity of the area.

This site preserves representative fragments of virgin and evasivirgine natural forests (today virtually missing in Europe) that polarizes the ground a great biological diversity and it is an invaluable natural heritage. (Doniță et al., 2005)

The Făgăraș Mountains provides excellent Habitat for viable populations of bear, wolf, stag and chamois.

For this site have been carried out scientific studies Foundation in view of the Făgăraș Mountains Declaration as National Park. Currently inside the Nature 2000 site there are more protected areas, of which we recall Alpine reserves of Făgăraș Mountains Gap, Suru and Podragu contents between, Alpine Capra-Moldoveanu Gap, Bâlci Valley, Vâlsanului Valley, Arpășel, etc.

MATERIALS AND METHODS

The summary and vascular flora analysis from the Făgăraș Mountains range have been made on the basis of personal field and laboratory research, of information in the botanical literature, taken in critically, according to the taxonomy of the conception from "Flora ilustrată a României" (Ciocârlan, 2009), and „Flora României" (1952-1976). A taken percentage represents the identified and published by Alexiu, 2006, Stancu, 2005, Buia & Todor, 1948.

Every scientific name affairs identified taxon, the bio-shape, the floristic element, ecological indices for moisture (M), the temperature (T) and the soil reaction (R), the diffusion in solid and altitude.

RESULTS AND DISCUSSION

Systematic analysis: In Ghițu-Moliviș area have been identified 358 species, grouped into 75 families. The families with most species (202 species in total) are: *Asteraceae*, *Rosaceae*, *Ranunculaceae*, *Poaceae*, *Lamiaceae*, *Scrophulariaceae*, *Fabaceae*, *Orchidaceae*, *Boraginaceae*, *Rubiaceae*, *Aspidiaceae*, *Caryophyllaceae*, *Onagraceae*, and *Primulaceae*. Other 156 species are grouped in 67 families (Fig. 2).

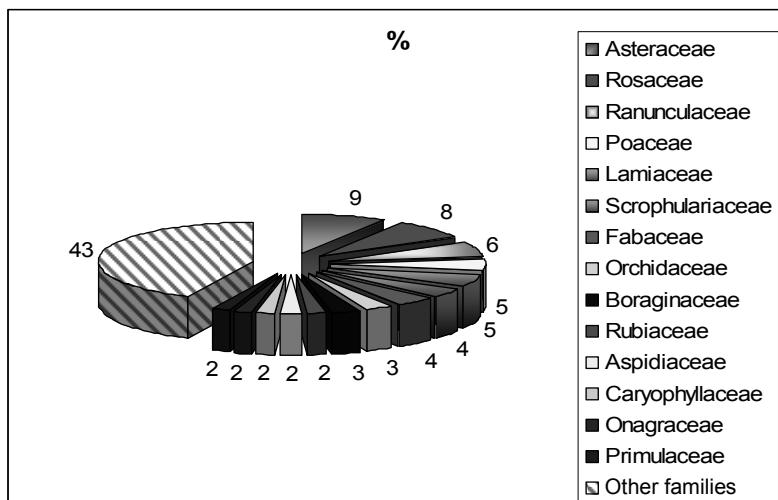


Figure 2 – Analysis of Ghițu-Moliviș taxonomical flora.

Analysis of bioshapes: In the identified in the territory of the future Tourist Complex flora it has been observed the predominance of hemicryptofite species (54%), followed by fanerofite (17%) and geofite (16%). The presence of terofite (7%) denote the existence of anthropogenic influences, that will increase along with the start of landscaping works. The chamefite (6%) underlines the extent of the territory until subalpin/ under-alpin floor of the Ghițu Mountains (Fig. 3).

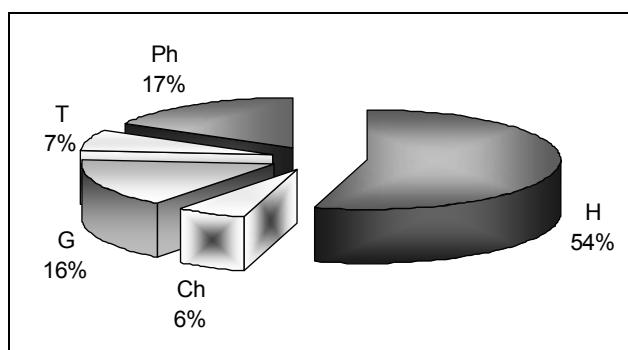


Figure 3 – Bio-shapes share/ weight/average in the territory of the Ghițu-Moliviș. (H - hemicryptofite species, Ph - fanerofite species, T - terofite species, G - geofite species, Ch - chamefite species).

Analysis of geoelements: The main fund of geo-elements from the taken in question range it is represented by The Eurasian (30%). It joins the European species (18%), the Circumpolar Representatives (16%) and the Central European ones (16%), (Fig. 4).

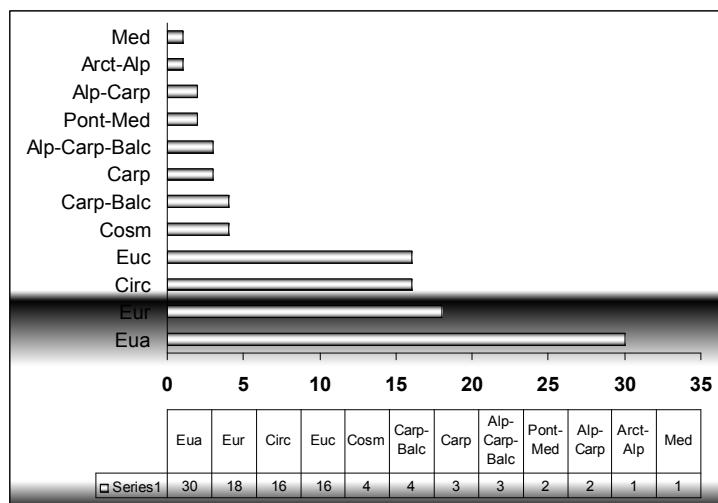


Figure 4 – Spectrum of geoelements in Ghițu -Moliviș range.

The private note of this territory is given by Carpathian, Carpatho-Balkan, Alpino -Carpatho-Balkan, Alpic-Carpathian species. This has led to their inclusion in the area of European interest Făgăraș Mountains.

Ecological analysis: In the researched territory prevails adapted to the environment species adapted to the mezofil, mezoterm, weak-acid-neutrofil environment (Tab. 1, Fig. 5).

Table 1 – The share/average of ecological categories in Ghițu – Moliviș range.

	1-1,5	2-2,5	3-3,5	4-4,5	5-5,5	0
U	0.6	20.7	58	17.3	0.8	2.5
T	5.9	27	51.7	1.4	0	14
R	3.9	9.8	30.4	31.8	2	22

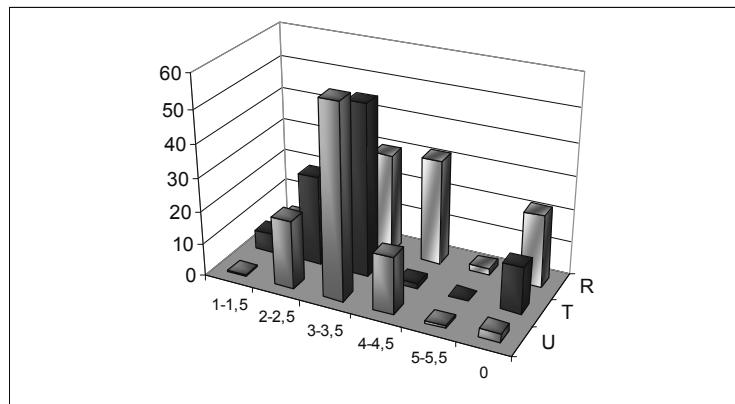


Figure 5 - The share/average of organic categories in Ghițu – Moliviș range.

Cenotaxonomical analysis: In the sought territory were identified 9 associations, espoused in 5 alliances, 3 order and 2 classes of vegetation:

QUERCO-FAGETEA Br.-Bl. in Vlieg. 1937

FAGETALIA SYLVATICAЕ Pawl. 1928

Sympphyto - Fagion Vida 1959

Sympphyto- Fagenion Boșcăiu et al. 1982

Sympphyto cordati- Fagetum sylvaticae Vida (1959) 1963 (Fig. 6)

Pulmonario rubrae- Fagetum sylvaticae (Soó 1964) Täuber 1987

Festuco drymeiae- Fagetum sylvaticae Morariu et al. 1968

Leucanthemo waldsteinii- Fagetum sylvaticae (Soó 1964) Täuber 1987

Calamagrostio- Fagenion Boșcăiu et al. 1982

Hieracio rotundati- Fagetum sylvaticae (Vida 1963) Täuber 1987

Asperulo taurinae- Fagenion Popescu et Sanda 2003

Galio schultesii-Fagetum sylvaticae (Burduja et al. 1972) Chifu et řtefan 1994

VACCINIO-PICEETEA Br.-Bl. Et al. 1939

PICEETALIA EXCELSAE Pawłowski in Pawłowski et al. 1928

Piceion excelsae Pawl. in Pawl. et al. 1928

Soldanello majori-Picenion Coldea 1991

Soldanello majori- Piceetum abietis Coldea et Wagner 1998

Hieracio transsilvanico- Piceetum abietis Pawl. et Br.-Bl. 1939

ATHYRIO PICEETALIA Hadač 1962

Chrysanthemo rotundifolii- Piceion (Krajina 1933) Březina et Hadač 1962

Leucanthemo waldsteinii- Piceetum abietis Krajina 1933



Figure 6 – *Sympphyto-Fagetum sylvaticae* (original photo).

CONCLUSIONS

In order to build a Sports Complex in the Ghițu-Moliviș, Argeș County, there is a risk of damage some habitats and of the disappearance of some species of Community interest from this area of the SCI Făgăraș Mountains. In this respect, was undertaken a feasibility study of the project. The data obtained from the Environmental Protection Agency Argeș and personal observations collected in the four personal travels on the ground/in the area, resulted in the shaping of some negative influences on habitats and species of Community interest in the area.

REFERENCES

- ALEXIU V., 2006 - *Completări la flora județului Argeș*. Argesis. Studii și Comunicări, Pitești. XIV: p. 53-66.
- BUIA Al., TODOR I., 1948 - *Nouvelles contributions a la connaissance de la flore des monts Râiosul et Capra Budei (Massif Făgăraș)*. Bul. Soc. Șt. Cluj. p. 263-269.
- CIOCÂRLAN V., 2009 - *Flora ilustrată a României. Pteridophyta et Spermatophyta*, Ed. Ceres, București. 1141 p.
- DONIȚĂ N., POPESCU A., PAUCĂ-COMĂNESCU Mihaela, MIHĂILESCU S., BIRIȘ A., 2005. *Habitatele din România*. Edit. Tehnică Silvică, București. 496 p.
- STANCU Illeana-Daniela, 2005 - *Flora și vegetația Munților Râiosu și Buda, Masivul Făgăraș*. Edit. Universității din Pitești. 226 p.
- *** 1952-1976 - *Flora Republicii Populare Române (Flora Republicii Socialiste România)*. Edit. Acad., București. I-XIII.
- *** *Formularul Standard Natura 2000 - Piemontul Făgăraș ROSPA0098*. Available on: <http://ebookbrowse.com/rosipa0098-piemontul-fagaras-formular-standard-pdf-d328271119>. (Accessed on: July 20, 2012).

**EVALUATION OF THE DANUBE FLOODPLAIN BIODIVERSITY
(KM 811 – 661) FOR THE PRESERVATION OF THE NATURAL
GENOFOND**

OLIVIA CIOBOIU

The Oltenia Museum, Nature Sciences Craiova, Popa Șapcă Street, no. 8, 200410, Dolj, Romania,
e-mail: cioboiu.olivia@yahoo.com, oliviacioboiu@gmail.com

GHEORGHE BREZEAU

The Romanian Academy, Institute of Biology, Splaiul Independenței Street, no. 296, 060031,
Bucharest, Romania, e-mail: aurelia.brezeanu@yahoo.com

ABSTRACT: The Danube floodplain (Km 811 – 661) represents an area displaying a wide biodiversity. The wealth of plant and animal species is a natural patrimony that must be protected if taking into account its ecogenetic importance.

Key words: the Danube, floodplain, biodiversity.

REZUMAT: Evaluarea biodiversității luncii inundabile a Dunării (Km 811 - 611) pentru conservarea genofondului natural. Lunca inundabilă a Dunării (Km 811 - 661) reprezintă o zonă care etalează o mare biodiversitate. Sănătatea speciilor de plante și animale este un patrimoniu natural care trebuie să fie protejat dacă luăm în considerare importanța sa ecogenetică. De verificat traducerea

Cuvinte cheie: Dunărea, luncă inundabilă, biodiversitate.

INTRODUCTION

The Danube floodplain (Km 811 – 661), also known as the Oltenian sector of the river, covers a surface of 104,543 hectares (Cioboiu & Brezeanu, 2008). It is well known that floodplains are areas displaying a wide biodiversity. The Danube floodplain represents one of the most important wet areas from Europe.

The studied sector displays all the features that make this part of the floodplain to be considered an etalon (Fig. 1).

This fact is reflected by the diversity of the structures and functions of the ecosystems specific to floodplains. There are integrated specific terrestrial ecosystems – dunes, interdunes, meadows, dune, forests, hayfields and aquatic ecosystems represented by lakes, pools, brooks, swamps etc. Thus, there develop characteristic flora and fauna structures that underline this ecosystem diversity.

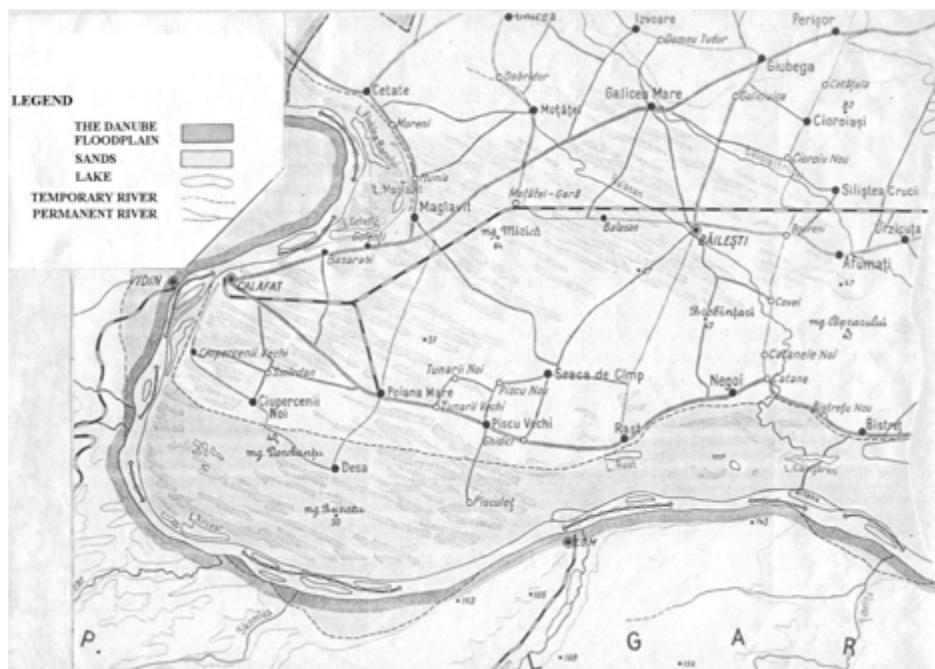


Figure 1 – The Danube floodplain (Km 811 – 661).

RESULTS AND DISCUSSIONS

After evaluating the biodiversity specific to this area, there can be established which are the plant and animal species characteristic of each type of ecosystem. Thus, the terrestrial ecosystems (dunes, interdunes, meadows, forests, hayfields) display the following characteristic species: plants – *Salix* sp., *Populus* sp., *Ulmus minor* Mill., *Fraxinus excelsior* L., *Acer campestre* L., *Rosa canina* L., *Chrysopogon gryllus* (L.) Trin., *Salsoa kali* L., *Plantago scabra* Moench., *Centaurea arenaria* Bieb., *Secale sylvestre* Host., *Festuca vaginata* Waldst et Kit., *Euphorbia cyparissias* L., *Silene conica* L., *S. trinervia* L., *Trifolium arvense* L., *Dianthus kladovianus* Degen., *Bassia laniflora* (S. G. Gmelin) A. J. Scott., *Corispermum nitidum* Kit., *Polygonum arenarium* Waldst et Kit., *Puccinellia distans* (Jacq.) Parl., *Salicornia europaea* L., *Juncus gerrardi* Lois. (Tită & Năstase, 1997); animals *Helicella candidans* L. Pfeiffer, *Cepaea vindobonensis* (Fer.), *Helix pomatia* L., *Cerambyx cerdo* L., *Lucanus cervus* L., *Nimphalis vaualbum* L., *Bombina variega* (L.), *Bufo bufo* (L.), *Natrix natrix* L., *Testudo hermanni* Gmelin, *Accipiter nisus* (L.), *Buteo buteo* (L.), *Coturnix coturnix* (L.), *Phasianus colchicus* (L.), *Cuculus canorus* (L.), *Asio flammeus* (Pontopp.), *Upupa epops* (L.), *Picus viridis* (L.), *Galerida cristata* (L.), *Anthus campestris* (L.), *Lanius excubitor* (L.), *Garrulus glandarius* (L.), *Pica pica* (L.), *Corvus monedula* (L.), *Citellus citellus* Pal., *Cricetus cricetus* L., *Vulpes vulpes* L., *Canis aureus* L.

The flora and fauna structure of the aquatic ecosystems is quite diverse. The greatest diversity is displayed by the algae represented by the groups Cyanophyceae, Euglenophyceae, Pyrrophyceae, Heterokontae, Bacillaryophyceae, and Chlorophyceae; the highest number of species is registered by Cyanophyceae, Bacillaryophyceae, and Chlorophyceae (Nicolescu et al., 1999).

The paludous and aquatic macrophytes hold an important place in the bioeconomy of the ecosystems (Tab. 1).

Table 1 – Species of paludous and aquatic macrophytes.

SPECIES	
PALUDOUS	AQUATIC
<i>Phragmites communis</i> Trin.	<i>Lemna minor</i> L.
<i>Typha angustifolia</i> L.	<i>Nymphaea alba</i> L.
<i>Typha latifolia</i> L.	<i>Nuphar luteum</i> L.
<i>Scirpus lacustris</i> L.	<i>Polygonum amphibium</i> L.
<i>Heleocharis palustris</i> L.	<i>Potamogeton natans</i> L.
<i>Juncus effusus</i> L.	<i>Potamogeton crispus</i> L.
<i>Mentha aquatica</i> L.	<i>Potamogeton perfoliatus</i> L.
<i>Mentha longifolia</i> L.	<i>Potamogeton pectinatus</i> L.
<i>Iris pseudacorus</i> L.	<i>Salvinia natans</i> L.
<i>Carex riparia</i> L.	<i>Stratiotes aloides</i> L.
<i>Carex hirta</i> L.	<i>Schoenoplectus mucronatus</i> L.
<i>Ranunculus aquatilis</i> L.	<i>Myriophyllum spicatum</i> L.
<i>Ranunculus repens</i> L.	<i>Ceratophyllum submersum</i> L.
<i>Polygonum hydropiper</i> L.	<i>Hydrocharis morsus-ranae</i> L.
<i>Pastinaca sativa</i> L.	<i>Glyceria maxima</i> L.
<i>Vicia peregrina</i> L.	<i>Roripa amphibia</i> L.
<i>Equisetum arvense</i> L.	
<i>Euphorbia palustris</i> L.	

Fauna comprises the following groups and species:

Protozoa: *Carchesium lachmanni* Kent., *Vorticella* sp.;

Rotatoria: *Polyarthra trigla* Ehrbg., *Filinia longiseta* Ehrbg., *Trichocerca pussila* (Laut), *Brachionus angularis* Gosse, *B. calyciflorus* Pallas, *Keratella cochlearis* (Gosse), *K. quadrata* (Muller);

Copepoda: *Acanthocyclops vernalis* L., *Cyclops leuckarti* Claus;

Cladocera: *Bosmina longirostris* Fish., *Ceriodaphnia pulchella* Muller, *Moina brachiata* Jurine (Parpală et al., 2002);

Coelenterata: *Cordylophora lacustris* Allm., *Hydra* sp.;

Turbellaria: *Polycelis cornuta* Johnson;

Polychaeta: *Hypania invalida* (Grube), *Hypaniola kowalewskii* Grimm., *Manayunkia caspica* Ann.;

Oligochaeta: *Eiseniella tetraedra* (Sav.), *Nais simplex* Pig., *Tubifex barbatus* (Grube), *T. tubifex* (Mull.), *Stylaria lacustris* (Mull.), *Branchiobdella parasita* Henle;

Hirudinea: *Glossosiphonia complanata* (L.), *Erpobdella* sp.;

Gastropoda: *Theodoxus (Th.) danubialis* C. Pfeifer, *Th. fluviatilis* L., *Viviparus acerosus* Bourg., *Valvata (C.) piscinalis* Mull., *Lithoglyphus naticoides* C. Pfeifer, *Bithynia (B.) tentaculata* L., *Esperiana esperi* Fer., *Amphimelania holandri* Fer., *Physa fontinalis* L., *Physella (Costatella) acuta* Drap., *Lymnaea stagnalis* L., *Stagnicola palustris* Mull., *Stagnicola corvus* Gmelin, *Radix ampla* W. Hartmann, *Galba truncatula* Mull., *Ancylus fluviatilis* Mull., *Planorbis (P.) planorbis* L., *Anisus (A.) spirorbis* L., *Gyraulus (G.) albus* Mull., *Segmentina nitida* Mull., *Planorbarius corneus* L. (Cioboiu, 2008);

Bivalvia: *Unio tumidus* Philip., *U. pictorum* L., *Anodonta cygnea* L., *A. c. piscinalis* Nils., *Sphaerium riviculum* Lam., *S. corneum* L., *Dreissena polymorpha* Pall.;

Mysidacea: *Limnomysis benedeni* Czern.;

Isopoda: *Jaera sarsi sarsi* Valk.; **Amphipoda:** *Corophium curvispinum* Sars, *C. maeoticum* Sow., *C. robustum* Sars, *Chaetogammarus tunellus* Mart., *Dikerogammarus haemobaphes fluviatilis* Mart., *D. villosus bispinosus* Mart., *Pontogammarus obesus* Mart.;

Decapoda: *Astacus leptodactylus* (Eschr.);

Bryozoa: *Plumatella repens* L., *Cristatella mucedo* L.;

Kamthozoa: *Urnatella gracilis* Leidy;

Ephemeroptera: *Polymitarcis virgo* (Oliv.), *Baetis bioculatus* (L.), *Oligoneuriella rhenana* Imh., *Ametrops fragilis* Albarda, *Heptagenia coerulans* Rostock, *Heptagenia sulfuraea* (Mull.);

Odonata: *Ghamphus flavipes* (Charp.);

Trichoptera: *Leptocerus aureus* Pict., *Oligotricha ruficrus* Scop., *Hydropsiche ornatula* Mel.;

Chironomidae: *Pelopia punctipennis* Mg., *Cricotopus silvestris* F., *Diamesa campestris* Edw., *Prodiamesa olivacea* (Mg.), *Cryptochironomus demeijeri* Krus., *Tanytarsus exiguus* Joh.;

Pisces: *Alosa pontica* Eich., *Esox lucius* L., *Sardinus erythrophthalmus* L., *Aspius aspius* L., *Chondrostoma nasus* L., *Misgurnus fossilis* L., *Cobitis taenia* L., *Lepomis gibbosus* L., *Gobius fluviatilis* Pall., *Silurus glanis* L., *Huso huso* L., *Gobio kessleri* Gunther, *Umbra krameri* L.;

Reptilia: *Natrix tessellata* L., *Emys orbicularis* (L.);

Aves: *Pelecanus onocrotalus* L., *P. crispus* L., *Nycticorax nycticorax* L., *Ardea cinerea* L., *Ardeola ralloides* (Scop.), *Egretta garzetta* (L.), *E. alba* (L.), *Podiceps cristatus* L., *Platalea leucorodia* L., *Ciconia nigra* (L.), *C. ciconia* (L.), *Cygnus olor* (Gm.), *Anas platyrhynchos* L., *A. querquedula* L., *Fulica atra* L., *Haliaetus albicilla* L., *Circus cyaneus* (L.), *Crex crex* (L.), *Recurvirostra avosetta* (L.), *Himantopus himantopus* (L.) (Cioboiu & Brezeanu, 2008; Tomescu, 1998).

CONCLUSIONS

As a conclusion, the flora and fauna diversity of the Danube floodplain (Km 811 – 661) reveals that the area in question belongs to the category of wet areas. The richness of plant and animal species represents a natural patrimony that must be protected taking into account its ecogenetic importance.

REFERENCES

- CIOBOIU Olivia. 2008 – *The distribution of the Gastropoda populations from the Danube and Danube Delta*. Verh. Internat. Verein. Limnol., Stuttgart. **30(2)**: p. 295-296.
- CIOBOIU Olivia, BREZEANU Gh., 2008 – *The premises of the ecological reconstruction of the Danube floodplain (rKm 811 – 661)*. Proceedings of the 37th IAD Conference, Chisinau, Moldova. p. 55-56.
- NICOLESCU N., CIOBOIU Olivia, BREZEANU Gh., 1999 – *Date preliminare asupra structurii comunităților algale fitoplanctonice din lacuri mici de acumulare din Câmpia Olteniei*. Lacurile de acumulare din România, Edit. Univ. A. I. Cuza, Iași. p. 135-142.
- PARPALĂ Laura, ZINEVICI V., CIOBOIU Olivia. 2002 – *Contributions to the Study of the Zooplankton within the small Basins from the Oltenia Plain*. Proceedings of the Institute of Biology, Annual Scientific Session, Bucharest. **IV**: p. 115-120.
- TIȚĂ I., NĂSTASE A., 1997 – *Flora și vegetația din sudul Olteniei*. Edit. Scrisul Românesc, Craiova. p. 1-150.
- TOMESCU Viorica, 1998 – *Lunca Dunării – sectorul oltean*. Edit. Sitech, Craiova. p. 1-210.

**SPECIES OF BIRDS RARELY OBSERVED IN THE IMPORTANT
BIRD AREA „THE DAM LAKES OF THE ARGEŞ RIVER” DURING
OF THE INTERNATIONAL WATERBIRD COUNT
(1999 – 2012)**

RADU GAVA

University of Pitești, Târgu din Vale Street, no. 1, 110040, Pitești, Argeș, Romania, e-mail:
gavaradu@yahoo.com

ADRIAN MESTECANEANU

The Argeș County Museum, Armand Călinescu Street, no. 44, 110047, Pitești, Argeș, Romania,
e-mail: mestecaneanua@yahoo.com

DENISA CONETE

University of Pitești, Târgu din Vale Street, no. 1, 110040, Pitești, Argeș, Romania, e-mail:
denisa_conete@yahoo.com

ABSTRACT: In this paper, the authors show the situation of the 29 accidental species registered in the basins Vâlcele, Budeasa, Bascov, Pitești and Golești from the Important Bird Area, part of the Nature 2000 network, “The Dam Lakes of the Argeș River” during 1999–2012. Seven of these species (generally represented by few individuals) are protected by the Birds Directive – *Gavia arctica* (Linnaeus, 1758), *Pelecanus crispus* Bruch, 1832, *Aythya nyroca* (Guldenstadt, 1770), *Haliaeetus albicilla* (Linnaeus, 1758), *Alcedo atthis* Linnaeus, 1758, *Picus canus* Gmelin, 1788, and *Dendrocopos syriacus* Hemprich & Ehrenberg, 1833. *Pelecanus crispus*, *Aythya nyroca* and *Haliaeetus albicilla* are in the Red Book of the Vertebrates of Romania and *Pelecanus crispus* is declared Monument of Nature in Romania, too.

Keywords: Waterbird Count, “The Dam Lakes of the Argeș River”, Nature 2000 network, Important Bird Area, protected species, *Pelecanus crispus* Bruch, 1832.

REZUMAT: Specii de păsări rar observate în Aria de Importanță Avifaunistică “Lacurile de Acumulare – Argeș” în timpul Recensământului Internațional al Păsărilor de Apă (1999 – 2012).

In această lucrare, autorii prezintă situația celor 29 de specii accidentale înregistrate pe lacurile de acumulare Vâlcele, Budeasa, Bascov, Pitești și Golești din Aria de Importanță Avifaunistică, parte a rețelei Natura 2000, “Lacurile de Acumulare - Argeș”, în perioada 1999–2012. Șapte dintre aceste specii (în general reprezentate prin puține exemplare) sunt protejate de Directiva Păsări – *Gavia arctica* (Linnaeus, 1758), *Pelecanus crispus* Bruch, 1832, *Aythya nyroca* (Guldenstadt, 1770), *Haliaeetus albicilla* (Linnaeus, 1758), *Alcedo atthis* Linnaeus, 1758, *Picus canus* Gmelin, 1788 și *Dendrocopos syriacus* Hemprich & Ehrenberg, 1833. *Pelecanus crispus*, *Aythya nyroca* și *Haliaeetus albicilla* sunt în Cartea Roșie a Vertebratelor din România iar *Pelecanus crispus* este declarat, de asemenea, Monument al Naturii în România.

Cuvinte cheie: Recensământul Păsărilor de Apă, „Lacurile de Acumulare – Argeș”, rețeaua Natura 2000, Arie de Importanță Avifaunistică, specii protejate, *Pelecanus crispus* Bruch, 1832.

INTRODUCTION

The International Waterbird Count is a long term programme. Its main goal is to evaluate each year at the global level the population of the waterbirds from a network of waterlands. It was started in 1967 by Wetlands International. In Romania, the counting is organised by the Romanian Ornithological Society since 1990 (currently, together with the Milvus Group). It takes place every year between 10 and 20 January (cf. http://www.sor.ro/index_IWC.htm).

In the Argeș County, the first data were gathered beginning in 1994 (Gava, 1997) and they were collected rigorously starting with 2000. The results of this research showed the diversity of the avifauna registered here in middle of the winter (Gava et al., 2004, Conete et al., 2005, Gava et al., 2005, Mestecăneanu et al., 2005, Conete et al., 2006, Mestecăneanu et al., 2006, Conete, 2011).

MATERIAL AND METHODS

The Argeș River has the sources in the Făgăraș Mountains. It covers the southern versant of the Făgăraș Mountain, the homologous Sub-Carpathian area, the eastern part of the Getic Piedmont and, partially, the Romanian Plain. Because of size of its hydrographic basin (12590 km^2) its course was considered favourable for building of dam lakes. These determined a strong change of the landscape and of the qualitative and quantitative structure of the avifauna.

The vegetation of the dam lakes is characteristic for the wetlands from the south of Romania, with the genera: *Phragmites* Adanson, 1763, *Typha* Linnaeus, 1753, *Carex* Linnaeus, 1753, *Juncus* Linnaeus, 1753, *Salix* Linnaeus, 1753, *Alnus* Miller, 1754, *Populus* Linnaeus, 1753, etc.

The studied area belongs to the land of the hilly continental climate. The annual temperature average of the water changes between $6.4 \text{ }^{\circ}\text{C}$, in the Argeș Gorges and $9 \text{ }^{\circ}\text{C}$, at Pitești. In winters with accentuate continental influence, in January, when the continental influence appears intensely, the temperature decreases in the low areas below $0 \text{ }^{\circ}\text{C}$ and the bridge of ice is formed (Barco & Nedelcu, 1974).

The researches were performed in the dam lakes: Golești (649 ha), Pitești (122 ha), Bascov (162 ha), Budeasa (412 ha) and Vâlcele (408 ha). These basins are part of the Nature 2000 network and of the Important Bird Area “The Dam Lakes of the Argeș River” (Fig. 1).

We visited all basins in the same day between 10 and 20 January (1999 - 2012) using the itinerary method. Each year, we walked on the same shore of every dam lake – the most favourable for the birds’ observation. The species were identified visually, with the scope and binoculars, and auditory.

In this paper we refer only to the accidental species, as they are considered taking into account the constancy (species that appeared below 25% of the years of observations).

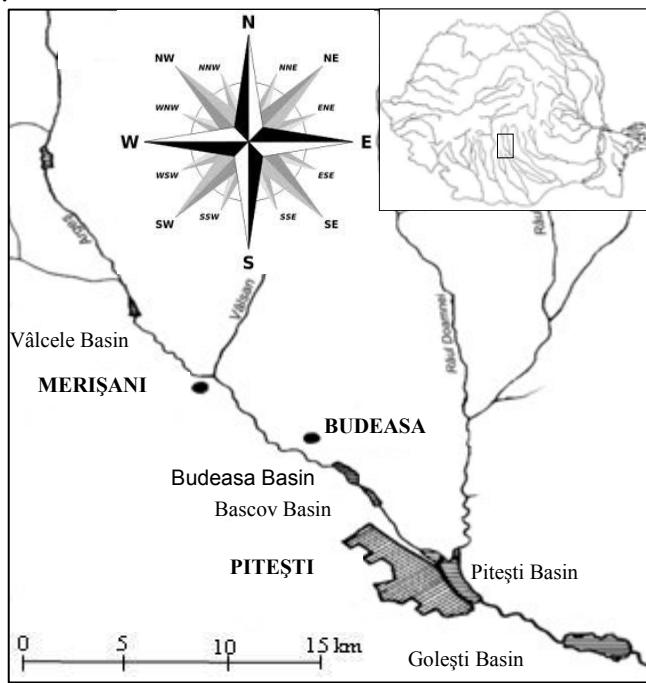


Figure 1 – The area of “The Dam Lakes of the Argeş River“

RESULTS AND DISCUSSIONS

During 1999 – 2012, at the International Waterbird Count, we recorded 29 accidental species.

1. *Gavia arctica* (Linnaeus, 1758). 1 individual, observed on 15.01.2005 in the Vâlcele basin. In Romania it is considered a winter visitor. On the studied dam lakes of the Argeş River it has the same status. It was observed here from October to March in all basins. The species is on the Annex I of the Birds Directive (cf. <http://ec.europa.eu>).

2. *Podiceps grisegena* (Boddaert, 1783). 1 individual, observed on 15.01.2000 in the Piteşti basin. In Romania it is considered a summer visitor and scarce in winter. On the studied dam lakes of the Argeş River it is considered a summer visitor and a passage migrant. Here, it was observed from March to August and in October and November in all basins, without Bascov.

3. *Pelecanus crispus* Bruch, 1832. 1 individual, observed on 15.01.2011 in the Goleşti basin. In Romania it is considered a summer visitor. In the studied dam lakes of the Argeş River, it was also observed in June, August and September, only in the Goleşti basin. It is considered to be here principally a summer visitor. It is on

the Annex I of the Birds Directive (cf. <http://ec.europa.eu>), included in the Red Book of the Vertebrates of Romania and declared Monument of Nature (Munteanu, 2005).

4. *Anas acuta* Linnaeus, 1758. 3 individuals, observed on 15.01.2005 in the Pitești basin and 1 individual, observed on 14.01.2007 in the Budeasa basin. In Romania it is considered a passage migrant and a winter visitor. On the studied dam lakes of the Argeș River, it was observed from November to March in all basins. As a result, the species has here the status of winter visitor and passage migrant.

5. *Aythya marila* (Linnaeus, 1761). 3 individuals, observed on 11.01.2002 inn the Golești basin. In Romania it is considered a winter visitor. Similarly it is in the studied dam lakes of the Argeș River, where it was observed each month of the hiemal season in all basins.

6. *Aythya nyroca* (Guldenstadt, 1770). 2 individuals, observed on 15.01.2005 in the Pitești basin, 2 individuals, observed on 14.01.2007 in the Pitești basin, and 2 individuals, observed on 16.01.2010 in the Golești basin. In Romania (and in the studied dam lakes of the Argeș River) it is considered a summer visitor and scarce in winter. Recorded all year round in all basins where it probably breeds. It is on the Annex I of the Birds Directive (cf. <http://ec.europa.eu>) and included in the Red Book of the Vertebrates of Romania (Munteanu, 2005).

7. *Haliaeetus albicilla* (Linnaeus, 1758). 1 individual, observed on 15.01.1999 in the Budeasa basin. In Romania it is considered a partial migrant. In the studied dam lakes of the Argeș River, it is considered a winter visitor and a passage migrant. Here, it was observed from December to March, being recorded in Vâlcele and Budeasa basins. It is on the Annex I of the Birds Directive (cf. <http://ec.europa.eu>) and included in the Red Book of the Vertebrates of Romania (Munteanu, 2005).

8. *Buteo lagopus* (Pontoppidan, 1763). 1 individual, observed on 13.01.2008 in the Budeasa basin. In Romania it is considered a winter visitor. In the studied dam lakes of the Argeș River, it was observed from November to March, being considered a winter visitor. Recorded in all basins.

9. *Accipiter gentilis* (Linnaeus, 1758). 1 individual, observed on 15.01.2000 in the Vâlcele basin, 1 individual, observed on 11.01.2003 in the Pitești basin, and 1 individual, observed on 11.01.2003 in the Vâlcele basin. In Romania it is considered a sedentary species. In the studied dam lakes of the Argeș River it has the same phenological status. It was observed each month of the year in all basins. Breeds in the forests from vicinity where come here from in search of food.

10. *Phasianus colchicus* Linnaeus, 1758. 1 individual, observed on 15.01.2009 in the Vâlcele basin. In Romania it is considered a sedentary species and also in the studied area where it was observed in all basins each month of the year. It is certain a breeding species in the area. Because it has a hidden life, probably it is more frequent than it was observed by us.

11. *Gallinago gallinago* (Linnaeus, 1758). 3 individuals, observed on 11.01.2003 in the Pitești basin, 2 individuals, observed on 17.01.2004 in the Vâlcele basin, and 1 individual, observed on 13.01.2008 in the Pitești basin. In

Romania it is considered a passage migrant and a summer visitor (uncertainly). Except February, in the studied dam lakes of the Argeş River, it was observed from September to April. In this area (where it was recorded in all basins) the species can be deemed as a passage migrant and a winter visitor.

12. *Alcedo atthis* (Linnaeus, 1758). 1 individual, observed on 13.01.2008 in the Budeasa basin. In Romania it is considered a partial migrant. In the studied dam lakes of the Argeş River it is also considered a partial migrant. Here it was observed all year round. Recorded in all basins where it breeds, too. It is on the Annex I of the Birds Directive (cf. <http://ec.europa.eu>).

13. *Picus viridis* Linnaeus, 1758. 1 individual, observed on 14.01.2012 in the Bascov basin. In Romania is considered a sedentary bird. The species has the same status in the interest area where it was observed all year round on all basins. It is certain brooder in the mature trees of the area.

14. *Picus canus* Gmelin, 1788. 1 individual, observed on 11.01.2003 in the Vâlcele basin. In Romania it is considered a sedentary species. In the studied dam lakes of the Argeş River it is also a sedentary species being observed all year round. Recorded in all basins. Breeds rarely. It is on the Annex I of the Birds Directive (cf. <http://ec.europa.eu>).

15. *Dendrocopos major* (Linnaeus, 1758). 1 individual, observed on 14.01.2007 in the Bascov basin. In Romania it is considered a sedentary species. It is similarly in the area of the dam lakes where it was observed all year round. Recorded in all basins. It certainly breeds in many kind of trees from the area.

16. *Dendrocopos syriacus* (Hemprich & Ehrenberg, 1833). 1 individual, observed on 14.01.2012 in the Budeasa basin. In Romania it is considered a sedentary species. Same status has in the perimeter of the studied dam lakes of the Argeş River where it was observed all year round in all basins. Probably it is more frequent than it appears in our observations and breeds mainly in the fruit trees. It is on the Annex I of the Birds Directive (cf. <http://ec.europa.eu>).

17. *Motacilla alba* Linnaeus, 1758. 1 individual, observed on 15.01.2005 in the Piteşti basin, 3 individuals, observed on 15.01.2005 in the Goleşti basin and 1 individual, observed on 15.01.2011 in the Piteşti basin. In Romania it is considered a summer visitor. In the studied dam lakes of the Argeş River, it was observed all year round. It is considered here as summer visitor, passage migrant and species scarce in winter. Recorded in all basins where it commonly breeds.

18. *Sturnus vulgaris* Linnaeus, 1758. 1 individual, observed on 11.01.2003 in the Piteşti basin and 2 individuals, observed on 17.01.2004 in the Budeasa basin. In Romania (and also in the studied dam lakes of the Argeş River) it is considered a partial migrant. It was observed here all year round in all basins. Breeds in holes of the diverse species of trees.

19. *Garrulus glandarius* (Linnaeus, 1758). 1 individual, observed on 15.01.2005 in the Piteşti basin. In Romania it is considered a sedentary species. In the studied dam lakes of the Argeş River it has the same status, being observed all year round. Recorded in all basins. It is breeding species.

20. *Troglodytes troglodytes* (Linnaeus, 1758). 1 individual, observed on 15.01.2005 in the Pitești basin and 1 individual, observed on 14.01.2012 in the Pitești basin. In Romania it is considered a summer visitor and scarce in winter and likewise in all studied basins of the Argeș River where it was observed all year round. Probably it is breeder in the dense vegetation.

21. *Prunella modularis* (Linnaeus, 1758). 2 individuals, observed on 15.01.2005 in the Pitești basin and 1 individual, observed on 13.01.2008 in the Pitești basin. In Romania it is considered a summer visitor and scarce in winter. In the area of the basins, it was observed in September, October, December, January, March, April and May. Therefore, it is considered a species of passage and a species scarce in winter. Recorded in all basins.

22. *Regulus regulus* (Linnaeus, 1758). 2 individuals, observed on 14.01.2012 in the Bascov basin. In Romania it is considered a partial migrant and a winter visitor. In the studied dam lakes of the Argeș River it has only the status of winter visitor. It was observed also in November, December and February. Recorded in all basins.

23. *Phoenicurus ochruros* (Gmelin, 1774). 1 individual, observed on 16.01.2010 in the Vâlcele basin. In Romania it is considered a summer visitor. Except this observation, in all studied dam lakes of the Argeș River, it was observed from March to October. Here, it is considered a summer visitor and a passage migrant. It certainly breeds on buildings (dams, concreted canals, bevels, etc.).

24. *Turdus viscivorus* Linnaeus, 1758. 1 individual, observed on 13.01.2006 in the Vâlcele basin. In Romania it is considered a partial migrant and equally in the area of the studied dam lakes of the Argeș River where it was observed each month of the year. Recorded in all basins. It breeds rarely in the area.

25. *Fringilla montifringilla* Linnaeus, 1758. 1 individual, observed on 13.01.2006 in the Pitești basin and 9 individuals, observed on 13.01.2006 in the Golești basin. In Romania it is considered a winter visitor. In the studied dam lakes of the Argeș River, it was observed in all basins each month of the hiemal season, being winter visitor.

26. *Pyrrhula pyrrhula* (Linnaeus, 1758). 11 individuals, observed on 16.01.2010 in the Vâlcele basin. In Romania it is considered a sedentary species. Except May, in the studied dam lakes of the Argeș River, it was observed all year round in all basins. As a result, it has the status of sedentary species.

27. *Coccothraustes coccothraustes* (Linnaeus, 1758). 1 individual, observed on 11.01.2003 and 1 individual, observed on 15.01.2005, both in the Pitești basin. In Romania it is considered a sedentary species. In the area of the studied dam lakes of the Argeș River it is also considered sedentary species; here, it was observed in all basins each month of the year. It certainly breeds here.

28. *Carduelis spinus* (Linnaeus, 1758). 4 individuals, observed on 15.01.2005 in the Pitești basin, 1 individual, observed on 13.01.2006 in the Vâlcele basin, and 80 individuals, observed on 14.01.2012 in the Bascov basin. In Romania it is considered a partial migrant and a winter visitor. In the studied dam lakes of

the Argeş River, it was observed from November to March. Here, it has the phenological status of winter visitor and passage migrant. Recorded in all basins.

29. *Carduelis cannabina* (Linnaeus, 1758). 6 individuals, observed on 13.01.2008 in the Piteşti basin and 5 individuals, observed on 15.01.2009 in the Goleşti basin. In Romania it is considered a partial migrant and also in the studied dam lakes of the Argeş River where it was observed each month of the year. Recorded in all basins. Breeds in the open area or shrubs.

CONCLUSIONS

During the International Waterbird Count, performed between 1999 and 2012 on the basins from the Important Bird Area “The Dam Lakes of the Argeş River”, part of the Nature 2000 network, 29 accidental species were recorded: *Gavia arctica*, *Podiceps grisegena*, *Pelecanus crispus*, *Anas acuta*, *Aythya marila*, *Aythya nyroca*, *Haliaeetus albicilla*, *Buteo lagopus*, *Accipiter gentilis*, *Phasianus colchicus*, *Gallinago gallinago*, *Alcedo atthis*, *Picus viridis*, *Picus canus*, *Dendrocopos major*, *Dendrocopos syriacus*, *Motacilla alba*, *Sturnus vulgaris*, *Garrulus glandarius*, *Troglodytes troglodytes*, *Prunella modularis*, *Regullus regulus*, *Phoenicurus ochruros*, *Turdus viscivorus*, *Fringilla montifringilla*, *Pyrrhula pyrrhula*, *Coccothraustes coccothraustes*, *Carduelis spinus*, and *Carduelis cannabina*. Generally, they were represented by few individuals. *Gavia arctica* is on the Annex I of the Birds Directive, *Pelecanus crispus* is on the Annex I of the Birds Directive, included in the Red Book of the Vertebrates of Romania and declared Monument of Nature, *Aythya nyroca* is on the Annex I of the Birds Directive and included in the Red Book of the Vertebrates of Romania, *Haliaeetus albicilla* is on the Annex I of the Birds Directive and included in the Red Book of the Vertebrates of Romania, *Alcedo atthis* is on the Annex I of the Birds Directive, *Picus canus* is on the Annex I of the Birds Directive, and *Dendrocopos syriacus* is on the Annex I of the Birds Directive.

REFERENCES

- BARCO A., NEDELCU E., 1974 – *Judeşul Argeş*. Editura Academiei, Bucureşti; p. 168.
CONETE DENISA, 2011 – *Cercetări ecologice asupra avifaunei unor lacuri de baraj din zona mijlocie a văii Argeşului*. Teză de doctorat. Academia Română, Institutul de Biologie: p. 370.
CONETE DENISA, GAVA R., MESTECĂNEANU A., 2005 – *Observaţii de tip monitoring asupra păsărilor de baltă de pe lacul de acumulare Bascov – râul Argeş, în perioada 2000 – 2004*. Studii şi Comunicări, Știinţele Naturii, Muzeul Olteniei, Craiova. **21**: p. 181-185.
CONETE DENISA, MESTECANEANU A., GAVA R., 2006 – *The census of the waterbirds from the Vâlcele Reservoir in January 2000 – 2004*. Studii şi Comunicări, Seria Biologie, Universitatea din Bacău. **11**: p. 105 – 108.

- European Comision. Environment. Nature & Biodiversity. Birds Directive. http://ec.europa.eu/environment/nature/legislation/birdsdirective/index_en.htm. (accessed: August 15, 2012).
- GAVA R., 1997 – *Acumulările hidroelectrice de pe râul Argeș, posibile ARII de Importanță Avifaunistică*. Lucrările Simpozionului de Importanță Avifaunistică din România. Publicațiile SOR, Cluj-Napoca. **3**: p. 39-42.
- GAVA R., MESTECĂNEANU A., CONETE Denisa, 2005 – *Observații de tip monitoring asupra păsărilor de apă de pe lacul Pitești (bazinul Argeșului)*. Scripta Ornithologica Romaniae, Cluj Napoca. **2**: p. 21-25.
- GAVA R., MESTECĂNEANU A., CONETE Denisa, MESTECĂNEANU F., 2004 – *Recensământul păsărilor de bală din ianuarie de pe lacurile din bazinul mijlociu al râului Argeș, în perioada 2000 – 2004*. Argessis, Studii și Comunicări, Științele Naturii, Muzeul Județean Argeș, Pitești. **12**: p. 125-132.
- MESTECĂNEANU A., CONETE Denisa, GAVA R., 2005 – *Observations of Monitoring Type about the Water Birds from the Golești Accumulation Lake – Argeș River*. Muzeul Regiuni Porților de Fier, Drobeta, Seria Științele Naturii, Editura Universitaria, Craiova. **15**: p. 114-121.
- MESTECĂNEANU A., CONETE Denisa, GAVA R., 2006 – *Observații de tip monitoring asupra păsărilor de apă de pe lacul Budeasa (bazinul Argeșului)*. Academia Română, Filiala Iași, Analele Bucovinei, Editura Academiei Române, Centrul de Studii „Bucovina”, Rădăuți. **13 (1)**: p. 289-296.
- MUNTEANU D., 2005. *Pelecanus crispus* (Bruch, 1832). p. 87. *Aythya nyroca* (Linnaeus, 1758). p. 102. *Haliaeetus albicilla* (Linnaeus, 1758). p. 110. În: BOTNARIUC N., TATOLE Victoria (eds.). Cartea Roșie a Vertebratelor din România. Academia Română, Muzeul Național de Istorie Naturală „Grigore Antipa”, București.
- Societatea Ornitologică Română. Recensământul Păsărilor de Apă (International Waterbird Count - IWC). http://www.sor.ro/index_IWC.htm. (accessed: August 15, 2012).

**PRELIMINARY DATA ON THE SPIDER FAUNA OF THE
NATURAL RESERVATION SPRING FROM CORBII CIUNGI,
COUNTY DÂMBOVIȚA (ROMANIA)**

NICOLAE LOTREAN

Argeș County Museum, Armand Călinescu Street, no. 44, 110 047, Pitesti, Argeș, Romania,
e-mail: lotrean_n@yahoo.com

ABSTRACT: The article presents the preliminary results of the research carried out on the spider's fauna of the Natural Reservation Spring from Corbii Ciungi, County Dâmbovița, during April-July 2012. There were identified 49 species of spider belonging to 39 genera and 13 families, of which only five species can be considered relatively rare for the Romanian fauna. The family Lycosidae, as number of specimens and number of species and genera is the dominant family. There are presented data on: sex ratio, the biogeographical features of the spider fauna from this area and the originality of habitat.

Key words: spiders, fauna, Natural Reservation Spring from Corbii Ciungi, sex ratio, zoogeographical structure, originality of habitat.

REZUMAT: Date preliminare asupra faunei de aranee din Rezervația Naturală Izvorul de la Corbii Ciungi, județul Dâmbovița (România). Articolul prezintă rezultatele preliminare ale cercetărilor întreprinse asupra faunei de aranee din Rezervația Naturală Izvorul de la Corbii Ciungi, județul Dâmbovița, în perioada aprilie-iulie 2012. Au fost identificate 49 de specii de aranee încadrate în 39 de genuri și 13 familii, dintre care numai cinci specii pot fi considerate relativ rare pentru fauna României. Familia Lycosidae, atât ca număr de exemplare cât și ca număr de specii și genuri, este familia dominantă. Sunt prezentate date cu privire la raportul numeric al sexelor, caracteristicile biogeografice ale faunei de aranee din această zonă și originalitatea habitatului.

Cuvinte cheie: aranee, faună, Rezervația Naturală Izvorul de la Corbii Ciungi, raportul sexelor, distribuție zoogeografică, originalitatea habitatului.

INTRODUCTION

Onwards 1959, L. Botoșaneanu and Șt. Negrea performed a systematic study on springs and groundwater fauna of the Romanian Plain, especially in the area bounded to west of the Vedeș River, to east of the Dâmbovița River, to south of the Danube and to north of an imaginary line connecting the villages Potcoava on Plapcea River, Recea on Teleorman River, Gratia on Dâmbovnic River and Corbii Marii on Neajlov River (Botoșaneanu & Negrea, 1961; Botoșaneanu &

Negrea, 1962). The most interesting discovery made during this research was the finding on Neajlov valley, near the village Corpii Ciungi, a complex of springs, a marshes and streams collection. This complex of springs hosting a remarkable fauna through its large number of endemic and relict species, which provides valuable information about the evolution of aquatic fauna of the Romanian Plain. For the complex of springs from Corpii Ciungi are citations 73 over individual taxa, most hydrobionts (aquatic macroinvertebrates), that indicating a very rich fauna, located on a small area (Motaş et al., 1962; Botoşaneanu, 1998; Negrea & Negrea, 1999).

These faunal data complete by the floristic data have led the authorities to declare the springs complex from Corpii Ciungi reservation, on 24 June 1966, by the People's Council decision of Argeş Region, under the title: *Natural Reservation Spring from Corpii Ciungi* (Pop & Sălăgeanu, 1965).

It is the first study made about the riparian spider's fauna in this area, a reason to be considered a first step in the investigation, from arachnological point of view, of this protected areas. Data obtained regarding the spiders fauna are part of a larger study which aims to prepare a management plans to stop the decline of the biodiversity on long term, through conservation of some species and habitats.

This work aims to present a partially inventory of the riparian spiders fauna from the Natural Reservation Springs from Corpii Ciungi and some of its structural particularities; reason for which during the research were especially seen the qualitative aspects of the fauna, and less the quantitative ones.

MATERIALS AND METHODS

The complex of springs is located in Romanian Plain, in the lower basin of the Argeş River, on the left bank of the Neajlov valley, about 800 m from the Neajlov River, at approx. 2 km after leaving the village Corpii Mari, towards Izvoru village (former village Corpii Ciungi), on the right side of the road (at approx. 200 m from the road), at an altitude of approximately 120 m. The complex consists of a large number of springs: reocren, limnocren and helocren springs, that forming two creeks with a length of about 800-1000 m each; they are close to their front sections then have a divergent path, defining between them an area of about 90.000 m², then close again for shedding the River Neajlov.

Temperature of the groundwater that feeds the springs varies between 10.2 °C during the spring and 14.5 °C summers, in cases of the powerful springs well protected by shrubs and tree vegetation. The springs with high flow and well protected by vegetation are stenoterm throughout the day; the temperature variations of water are more pronounced in case of small springs and unprotected by vegetation. Normally, the pH of the water of the Corpii Ciungi complex oscillates around 7; he never indicated a pronounced acidity.

For the collection of the material there were used more catching techniques: Barber traps, manual collection and collection with the entomological net. For the Barber traps there were used plastic glasses of 500 ml with a height of

11.5 cm and an opening by 9 cm. As preservative liquid for the traps was used a formaldehyde solution 4% (1/4 of the bowl). In each collection station were placed five traps, arranged in line, to a distance of five meters apart; to prevent the penetration rainwater and impurities, at about six inches above the traps was placed a small tin roof, square, with dimensions of 14 x 14 cm.

The traps worked in field 124 days, from April until August; the sampling have made in average 30 days; manual collection was made directly or with tweezers from substrate: under logs, rocks, on and under the bark of trees, on plants, etc.; sweeping with an entomological net for herbaceous and shrub layer species. Biological material collected by the pitfall traps represented over 90% by all individuals captured and over 80% of all species identified.

For catching of spiders were established three collecting stations: first stationary (SR1) was located in an open area with herbaceous vegetation and the shrub layer poorly individualized, near a creek; second stationary (SR2) was located on the edge a selvage of shrubs, in close proximity to a spring; third stationary (SR3) was located in a cluster of bushes, in the immediate proximity of a spring.

RESULTS AND DISCUSSIONS

After the collection, sorting and determination of the arachnological material were obtained 714 exemplars of which 687 could be identified until species level, 479 males, and 208 females. The rest, 27 immature were identified only until the level of genus because the impossibility to exactly establish the species in the case of some very young specimens. From the fauna point of view, the studied arachnological material is represented by 49 species grouped in 39 genera and 13 families (Tab. 1). For this work were taken into consideration only the exemplars determined at a species level.

Table 1 - List of spiders species identified in the Natural Reservation Spring from Corbii Ciungi.

Taxon	Stationary			Sum	Originality of habitat
	SR1	SR2	SR3		
FAM. DYSDERIDAE					
<i>Dysdera crocata</i> C. L. Koch, 1838	4m	21m, 1f		25m, 1f	CL, SN
FAM. LINYPHIIDAE					
<i>Bathyphantes gracilis</i> (Blackwall, 1841)			1m, 1f	1m, 1f	CL, SN, DI
<i>Dicymbium nigrum</i> (Blackwall, 1834)		2m		2m	CL, SN, DI
<i>Diplostyla concolor</i> (Wider, 1834)	4m	1m, 5f	1m	6m, 5f	CL, SN
<i>Meioneta rurestris</i> (C.L.Koch, 1836)		2m, 1f		2m, 1f	CL, SN, DI

Continues.

Table 1 - Continuation.

Taxon	Stationary			Sum	Originality of habitat
	SR1	SR2	SR3		
<i>Oedothorax apicatus</i> (Blackwall, 1841)			4m, 1f	4m, 1f	CL, SN, DI
<i>Oedothorax fuscus</i> (Blackwall, 1841)	6m			6m	CL, SN, DI
<i>Tenuiphantes tenuis</i> (Blackwall, 1852)			1m	1m	CL, SN, DI
FAM. TETRAGNATHIDAE					
<i>Pachygnatha degeeri</i> Sundevall, 1830	23m, 22f	8m, 4f	1m, 1f	32m, 27f	CL, SN, DI
<i>Tetragnatha extensa</i> (Linnaeus, 1758)	1m		2f	1m, 2f	CL, SN
FAM. ARANEIDAE					
<i>Araneus quadratus</i> Clerck, 1757	1m			1m	CL, SN
<i>Argiope bruennichi</i> (Scopoli, 1772)		5f		5f	CL, SN, DI
<i>Larinoides cornutus</i> (Clerck, 1757)	1m, 1f		1m	2m, 1f	CL, SN
<i>Nuctenea umbratica</i> (Clerck, 1757)		1f	1m, 1f	1m, 2f	CL, SN, A
<i>Singa nitidula</i> C. L. Koch, 1844		1f	1f	2f	CL, SN
FAM. LYCOSIDAE					
<i>Alopecosa pulverulenta</i> (Clerck, 1757)	4m, 1f	4m, 3f		8m, 4f	CL, SN, DI
<i>Arctosa leopardus</i> (Sundevall, 1833)	1f	1m, 2f	1m, 1f	2m, 4f	CL, SN
<i>Aulonia albimana</i> (Walckenaer, 1805)	12m, 3f	24m, 4f		36m, 7f	CL, SN
<i>Pardosa agrestis</i> (Westring, 1861)		1f		1f	SN, DI
<i>Pardosa paludicola</i> (Clerck, 1757)		4m, 1f	1f	4m, 2f	CL, SN
<i>Pardosa prativaga</i> (L. Koch, 1870)	28m, 17f	46m, 24f	7m, 8f	81m, 49f	CL, SN
<i>Piratula hygrophila</i> (Thorell, 1872)	13m, 2f	12m, 1f	37m, 3f	62m, 6f	CL, SN
<i>Piratula latitans</i> (Blackwall, 1841)	23m, 3f	1f	1m	24m, 4f	CL, SN
<i>Trochosa robusta</i> (Simon, 1876)	2m, 1f	2m, 1f	1f	4m, 3f	CL, SN
<i>Trochosa ruricola</i> (De Geer, 1778)	31m, 9f	35m, 25f	34m, 14f	100m, 48f	CL, SN, DI
<i>Trochosa</i> sp.	10im	6im	3im	19 im	
<i>Pardosa</i> sp.	1im	7im		8 im	
FAM. PISauridae					
<i>Pisaura mirabilis</i> (Clerck, 1757)	1m			1m	CL, SN, DI
FAM. ZORIDAE					
<i>Zora spinimana</i> (Sundevall, 1833)	1m	1f		1m, 1f	CL, SN, DI
FAM. HAHNIIDAE					
<i>Hahnia nava</i> (Blackwall, 1841)	2m			2m	CL, SN

Continues.

Table 1 - Continuation.

Taxon	Stationary			Sum	Originality of habitat
	SR1	SR2	SR3		
FAM. CORINNIDAE					
<i>Phrurolithus festivus</i> (C.L.Koch, 1835)	1m			1m	CL, SN
FAM. GNAPHOSIDAE					
<i>Drassodes pubescens</i> (Thorell, 1856)	1m			1m	CL, SN
<i>Drassyllus pusillus</i> (C.L.Koch, 1833)	2m, 1f	2m, 1f		4m, 2f	CL, SN, DI
<i>Micaria pulicaria</i> (Sundevall, 1831)	1m	1f		1m, 1f	CL, SN
<i>Trachyzelotes pedestris</i> (C. L. Koch, 1837)	3m	9m, 2f	4m, 2f	16m, 4f	CL, SN
<i>Zelotes apricorum</i> (L. Koch, 1876)	1m		1f	1m, 1f	CL, SN
<i>Zelotes gracilis</i> (Canestrini, 1868)	2m			2m	CL, SN
<i>Zelotes latreillei</i> (Simon, 1878)		1m, 3f	1f	1m, 4f	CL, SN, DI
FAM. PHILODROMIDAE					
<i>Thanatus arenarius</i> L. Koch, 1872	1m			1m	CL
<i>Thanatus vulgaris</i> Simon, 1870		1m		1m	CL
<i>Tibellus oblongus</i> (Walckenaer, 1802)			1f	1f	CL, SN
FAM. THOMISIDAE					
<i>Ozyptila praticola</i> (C. L. Koch, 1837)	3m, 3f	19m, 2f	2m	24m, 5f	CL, SN
<i>Xysticus acerbus</i> Thorell, 1872		1f		1f	CL
<i>Xysticus kochi</i> Thorell, 1872		1m		1m	CL, SN, DI
FAM. SALTICIDAE					
<i>Euophrys frontalis</i> (Walckenaer, 1802)	1m	3m	1m	5m	CL, SN
<i>Evarcha arcuata</i> (Clerck, 1757)		2f		2f	CL, SN
<i>Evarcha falcata</i> (Clerck, 1757)		1m, 2f		1m, 2f	CL, SN
<i>Myrmarachne formicaria</i> (De Geer, 1778)		1f		1f	CL
<i>Neon levis</i> (Simon, 1871)	1m, 2f	2m	1m	4m, 2f	CL
<i>Pseudeuophrys erratica</i> (Walckenaer, 1826)		3m, 3f		3m, 3f	CL, SN
<i>Talavera aequipes</i> (O. P.-Cambridge, 1871)		3m, 2f		3m, 2f	CL, SN
Sum	174m, 66f, 11 im	207m, 102f, 13im	98m, 40f, 3im	479m, 208f, 27im	

Legend: m - male, f - female, im - immature; CL - climax, habitats unchanged or minimally affected by human action; SN - seminatural habitats, moderately modified; DI - disturbed habitats, strongly affected by human intervention; A - artificial habitats.

From the fauna point of view, spider species collected from the Natural Reservation Spring from Corbii Ciungi are generally common species, not cited in any of the categories: species of community interest, IUCN species, endemic species and species mentioned in the Annex OUG 57/2007 or species present on red lists in Romania. However, we want to draw attention on some species of spider we can consider relatively rare for the Romanian fauna:

Zelotes gracilis (Canestrini, 1868) from the family Gnaphosidae, is a rare species, which prefer steppes, sandy zones with scrubby patch; found at ground level, in open or partially shaded areas, in dry places. On altitude, the species can be found from 100 m to 500 m altitude. Adults are active from May to August. In Czech it is considered an endangered species and near threatened in Slovenia. Collected personally on Lecșoare hill (near Ștefănești city, Argeș), from a sunny slope with south-western exhibition, about 400 altitude (Lotrean, 2008).

Thanatus arenarius L. Koch, 1872 from the family Philodromidae. It is a relatively rare species, found in sandy areas, rocky and heathland, on or near the ground, at altitudes between 100 m and 500 m. It prefers dry, semi-open or open places. Adults are found from April to August. It is considered a vulnerable species in Germany and Poland and near threatened in Czech. Collected personally on Lecșoare hill (near Ștefănești city, Argeș), from a sunny slope with south-western exhibition, about 400 altitude (Lotrean, 2008).

Thanatus vulgaris Simon, 1870, from the family Philodromidae. It is a relatively rare species, found in rock steppes and heathland, on or near the ground, at altitudes between 200 m and 500 m. It prefers dry and open areas. Adults are found from April to August. It is considered an endangered species in Germany and near threatened in Czech.

Myrmarachne formicaria (De Geer, 1778), from the family Salticidae. It is a relatively rare species, present usually in some type of grassland, especially in chalk grassland, but also under rocks, cliff ledges, saltmarsh and fens, until 500 m altitude. It is an ant-mimic, usually found in company with ants, either running among grass or under stones. Adults are found from May to September. The species is vulnerable in Czech and Poland. Collected personally on Lecșoare hill (near Ștefănești city, Argeș), from a sunny slope with south-western exhibition, about 400 altitude (Lotrean, 2008).

Neon levis (Simon, 1871), from the family Salticidae. It is a relatively rare species that prefers open and dry locations with little vegetation. Species found to the ground level in sunny places. On altitude, the species can be found from 100 m until 400 m. Adults are active from April to August. The species is endangered in Czech and Germany, vulnerable in Slovenia and near threatened in Austria.

For Romania, due to incomplete data, the criterion which was the basis for the classification of the aforementioned species as relatively rare is the small number of collected specimens or specimens present in different collections and the reduced number of citations in the specialized literature in our country.

From the quantitative point of view, most of the collected specimens belonged to the family Lycosidae (65.36%), followed, at long distance, by the families: Tetragnathidae (9.02%), Gnaphosidae (5.53%), Thomisidae (4.51%), Linyphiidae (4.37%) and Salticidae (4.08). The rest of the spider families had weights less than 4% (Fig. 1).

Most specimens collected belong to the species *Trochosa ruricola* (20.73%), *Pardosa prativaga* (18.21%), *Piratula hygrophila* (9.52%), all of the family Lycosidae, *Pachygnatha degeeri* (8.26%) of family Tetragnathidae and *Aulonia albimana* (6.02%) of family Lycosidae. The rest of the spider families had lower weights 5%.

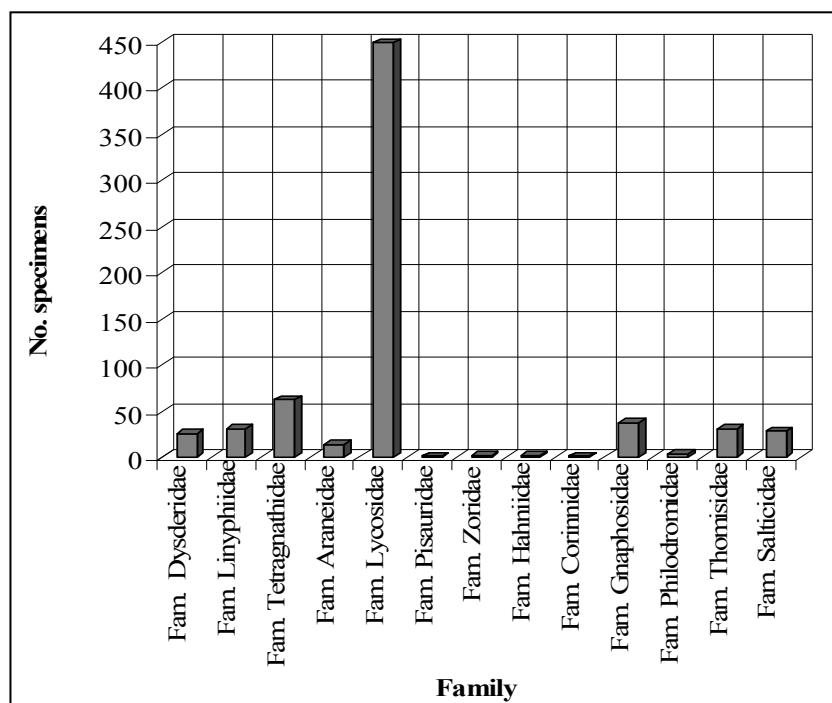


Figure 1 - Number of specimens collected from each family.

The hierarchy changes, from the second position, when we take into consideration the number of genera and species. From this point of view, most genera and species belonged to the family Lycosidae (15.38%, respectively 20.41%), followed by the families: Linyphiidae (15.38% for genera and 14.29% for species), Salticidae (15.38% for genera and 14.29% for species), Gnaphosidae (12.82% for genera, 14.29% for species) and Araneidae (12.82% for genera and 10.20% for species).

The rest of the spider families had weights below 10%, as well as the number of genera and the number of species (Fig. 2).

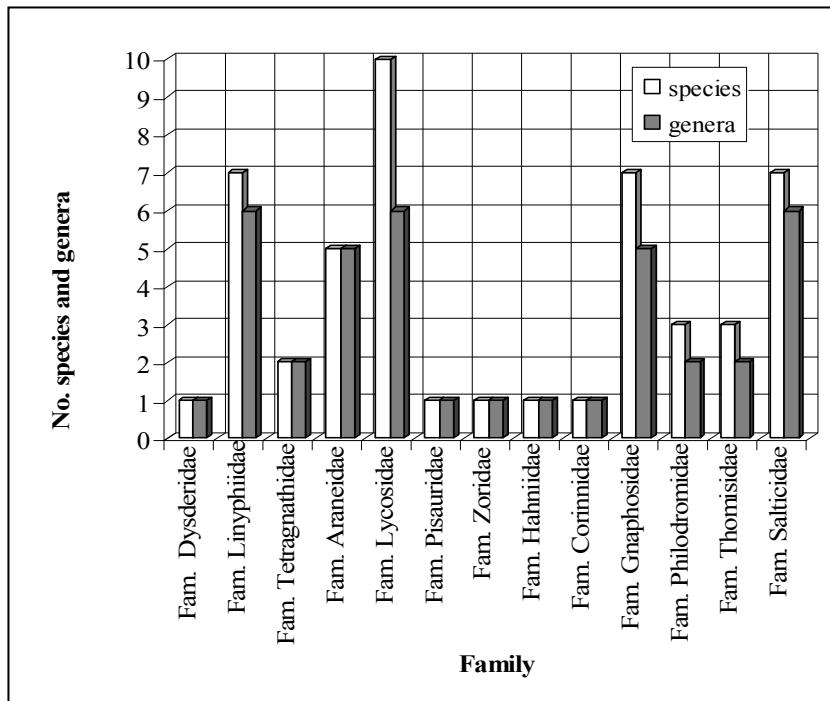


Figure 2 - Number of genera and species identified for each family.

In terms of the sex ratio, in the collected material, 69.72% were male and 30.28% were females, the sex ratio being approximately 2:1 in favour of males. If we consider juvenile individuals, the sex ratio changes very little, the weight of immature specimens being small, only 4% of the total collected specimens (67% - male and 29% - female) (Fig. 3).

The sex ratio, for the 29 spider species for which both sexes were collected, in 14 cases, it was favourable for males, for one species it was favourable to females and for 14 species it was relatively balanced, being very close to the theoretical value of 1:1. For the rest of the species (20 species), there were collected either males, in most cases, or females.

In accordance with their current spreading, the 49 species of spider identified in the reservation Spring from Corbii Ciungi, were classified into 6 zoogeographical groups (Deltshev, 2005).

In terms of number of spider species for each zoogeographical groups, I found the presence of large numbers of Palearctic species, more than half (61.22%) of the identified species belonging to this category. Then follow by: the Holarctic species (18.37%), European-Turanian species (10.20%), European-Siberian species and European Central-Asian species (4.08% each). The rest of the zoogeographical elements had weights less than 4% (Fig. 4).

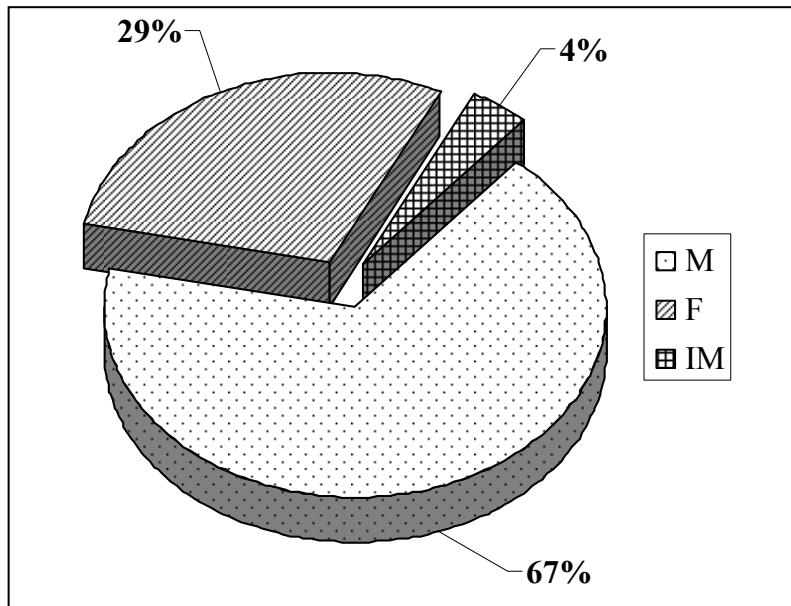


Figure 3 - The ratio between: males - M, females - F, immature - IM.

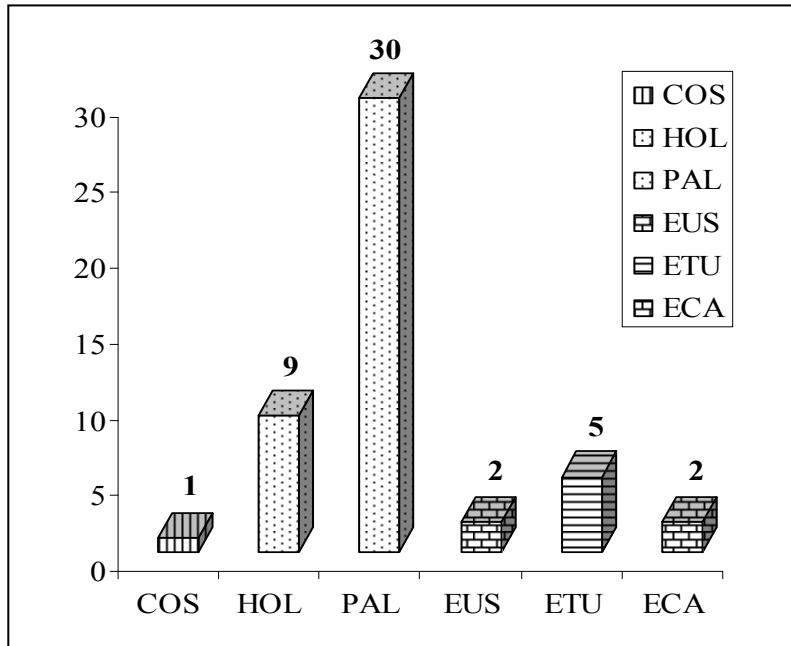


Figure 4 - Distribution of the identified species on zoogeographical groups (COS - Cosmopolitan, HOL - Holarctic, PAL - Palearctic, EUS - European-Siberian, ECA - European Central-Asian, ETU - European-Turanian).

For a relative evaluation of the degree of conservation of the studied area I considered useful a group of the spider species identified according to their tolerance to the degree of degradation of the studied perimeter (originality of habitat), according to the classification proposed by Buchar and Ruzicka (Buchar & Ruzicka, 2002). Large share of species of groups CL, SN (55.10%) and CL, SN, DI (34.69%), which together sums for nearly 90% (89.79%) from all species identified, shows that the investigated area is subject to strong anthropogenic pressures.

A small number of species (Fig. 5) is included into the category of species with low tolerance to degradation of habitat they occupy, share of this category being only 10.21%. These data show the unsatisfactory state of riparian habitat conservation in this territory.

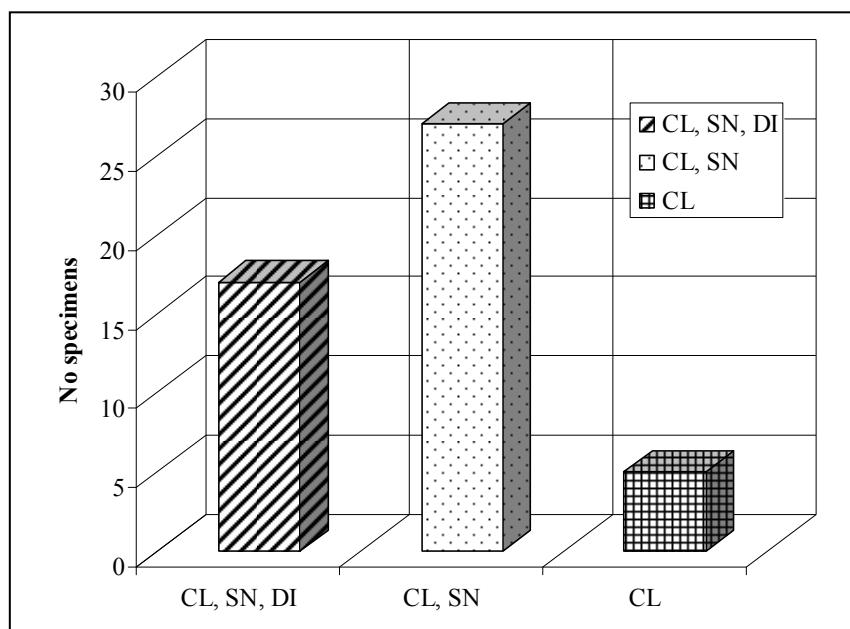


Figure 5 - Spider faunal composition according to well preserved habitat stage (CL - climax, habitats unchanged or minimally affected by human action; SN - seminatural habitats, moderately modified; DI - disturbed habitats, strongly affected by human intervention; A - artificial habitats).

CONCLUSIONS

This is the first study of the spider fauna of the Reservation Spring from the Corbii Ciungi; the study led to the identification of 49 species of spider, grouped in 39 genera and 13 families. Five species are excepted: *Zelotes gracilis*, *Thanatus arenarius*, *Thanatus vulgaris*, *Myrmarachne formicaria* and *Neon levis*, all species are common, most frequently found in wetlands. All species are mentioned for the first time this area.

From the point of view of number of individuals and the number of genera and species the family Lycosidae is dominant family; four species of this family (*Trochosa ruricola*, *Pardosa prativaga*, *Piratula hygrophila* and *Aulonia albimana*) representing more than half of all specimens collected.

The analysis of data on sex ratio showed that it is not balanced, most of the times being in favour of males; overall ratio is to 2:1 in favour of males.

Grouping species of spiders according to their distribution area showed the net dominance of widely spread elements, Palearctic and Holarctic species, which totalized nearly 80% of the identified species, species associated with lowlands.

According to the originality of the habitat nearly 90% of the spider species are species found in semi-natural, degraded or artificial habitats. These indicate that this habitat is not well-preserved. The main causes of degradation of the riparian habitat are represented by expansion of agricultural land accompanied by deforestation of riverside coppice.

REFERENCES

- BOTOȘĂNEANU L., NEGREA ȘT., 1961 - *Une oasis aquatique à faune relicte dans la Plaine du Danube*. Hydrobiologia, București; **18** (3): p. 199 – 218.
- BOTOȘĂNEANU L., NEGREA ȘT., 1962 - *Complexul de izvoare de la Corbii Ciungi – oază acvatică relictă în Câmpia Română*. Ocrotirea Naturii, București; **6**: p. 93 – 110.
- BOTOȘĂNEANU L. (ed.), 1998 - *Studies in Crenobiology. The Biology of Springs and Springbrooks*. Backhuys Publishers, Leiden; p. 261.
- BUCHAR J., RUZICKA J., 2002 - *Catalogue of spiders of the Czech Republic*. Peres Publ., Praha; p. 351.
- DELTSHEV C., 2005 - *Fauna and zoogeography of spiders (Araneae) of Bulgaria*. Journal of Arachnology; **33**: p. 306-312.
- LOTREAN N., 2008 - *Preliminary data regarding the arachnid fauna from the Ștefănești area (Argeș District)*. Drobeta. Seria Științele Naturii. Muzeul Regiunii Porților de Fier. Edit. Universitaria Craiova; **18**: p. 124 -136.
- MOTAȘ C., BOTOȘĂNEANU L., NEGREA ȘT., 1962 - *Cercetări asupra biologiei izvoarelor și apelor freaticе din partea centrală a Câmpiei Române*. Ed. Academiei R.P.R., București; p. 1-366.
- NEGREA ȘT., NEGREA A., 1999 - *Problema conservării rezervației naturale - Complexul de izvoare de la Corbii Ciungi – oază acvatică de faună relictă în Câmpia Română*. Ocrot. Nat. Med. Înconj, București; tom. **42-43**, p. 33-45.
- POP E., SĂLĂGEANU N., 1965 - *Monumente ale naturii din România*. Ed. Meridiane, București; p. 1-174.

STUDIES ON THE SPIDER COMMUNITIES FROM PIATRA CRAIULUI MASSIF

AUGUSTIN NAE

“Emile Racoviță” Institute of Speleology, Calea 13 Septembrie Street, no. 13, sect. 5, 050711, Bucharest,
Romania, e-mail: augustin.iser@gmail.com

ABSTRACT: Less studied in arachnological terms and representing one of the main karstic regions from de Meridional Carpathians, Piatra Craiului Massif offers for study numerous types of subterranean environments, including both caves and several types of mesovoid shallow substratum (MSS) (colluvial, fixed and mobile). Our study is based on the data collected between years 2002-2010, regarding the spider communities and their relations with the edaphic and subterranean environments. 79 species were identified from the three investigated environments, and 53 are new for the studied area.

Key words: cave, mesovoid shallow substratum (MSS), Araneae, Piatra Craiului area, characteristic species, zoogeography.

REZUMAT: Studii asupra comunităților de păianjeni din masivul Piatra Craiului. Puțin studiat din punct de vedere arachnologic și reprezentând una din principalele regiuni carstice din Carpații Meridionali, Masivul Piatra Craiului oferă pentru studiu mai multe tipuri de medii subterane, incluzând atât peșteri cât și diferite tipuri de MSS (coluvial fixat și mobil). Studiul nostru se bazează pe informațiile culese între anii 2002-2010, privind comunitățile de păianjeni și relațiile acestora cu mediile subterane și edafic. Au fost identificate 79 de specii în cele trei medii investigate, din care 53 de specii sunt noi pentru zona studiată.

Cuvinte cheie: peșteri, mediu subteran superficial (MSS), Araneae, Piatra Craiului, specii caracteristice, zoogeografie.

INTRODUCTION

Laing in the Meridional Carpathians, Piatra Craiului Massif is orientated towards NNE – SSW, between Zărnești (in the North) and Podu Dâmboviței (in the South), being the longest and highest limestone ridge from the Rumanian Carpathians.

The Massif is surrounded by intramountain couloires, with altitudes lowerd by 500-1000 m, like Rucăr-Bran Passage (in the East) and Rucăr-Zărnești Passage (in the West and North), and has in the close proximity some of the highest massifs in the country Făgăraș and Iezer Mountains in the West, Bucegi Massif in the East and Leaota Massif in the South-East.

First informations regarding the spider fauna from Piatra Craiului are given by I.E. Fuhn and F. Niculescu-Burlacu (1971), followed by M. Dumitrescu (1979) who descibes the first cave spider species – *Nesticus constantinescui*, endemic for the area. More recently, a series of articles regarding the epigean spider fauna are published (Sterghiu & Dobre, 2003; Adam, 2006; Lotrean, 2006) and also with some data regarding the spider fauna from caves (Nae et al., 2005; Nae & Giruginca, 2006; Nae, 2010 and Nitzu et al., 2010).

Our study completes the informations about the Araneae fauna from Piatra Craiului Massif, bringing the first data about the spider species from MSS (mesovoid shallow substratum) from this part of the Carpathians.

MATERIAL AND METHODS

The main goal of our study was the species inventory of the fauna from subbteranean profound and superficial environments from Piatra Craiului, takeing into consideartion de lack of data regarding the spiders from this area. Also, we made a first evaluation of the edaphic spider fauna from Piatra Craiului Massif, necessary for a comparison with that from the profound subterranean environment (caves) and MSS. As sampling areas we chosed several study areas:

- **Area 1 covers Padina Lăncii Valley with Marele Grohotiș and Cerdacul Stanciului and Valea lui Ivan.** We post 2 stations for the MSS: Station 1 Cerdacul Stanciului and Station 2 Marele Grohotiș (nude MSS), each with 2 drillings: -0,50 m, respectively -0,75 m and 7 stations for the edaphic environment. Also, we made some bio-speleological investigations here in Stanciului Cave and Avenul de la Cerdacul Stanciului.

- **Area 2. Valea Seacă.** We investigate both MSS (Station 3 with one drilling – 0, 50 m colluvial covered MSS), the edaphic environment and several caves from the area: Peștera cu Tortiță de Piatră (1262/21), Peștera lui Grig (1262/48), Peștera din Seaca Pietrelor (P. Spiralei) (1262/13) and other 6 small caves, unmarked. In this same area lies Peștera Dobreștilor that geographically is a part of the Rucăr-Bran Passage.

- **Area 3. Cheile Mici ale Dâmboviței - Sătic.** Here we investigated the following caves: Peștera de la Colțul Surpat (P.Urșilor), Peștera Decolmatată (P. Bursucilor), Peștera Arvaților, Tunelul cu Cabluri, Peștera Socului, Peștera Lupului, Pestera Vulpilor, Tunelul cu Lilieci and Peștera Padina Calului.

- **Area 4. Cheile Dâmboviciarei.** With one important cave : Peștera Despicătura.

- **Area 5. Dâmbovicioara – Valea Rea.** We studied this caves: Peștera Dâmbovicioara, Peșterica Dâmbovicioarei, Peștera de Sus and Peștera de Jos din Valea Rea, Peștera Vacilor, Peștera cu Ciuperci (P. Hoților) and Peștera Dracilor. Also here we collected ripic fauna from Valea Muierii.
- **Area 6. Cheile Brusturelui.** We collected especially epigeous fauna from some small caves.
- **Area 7 . Gura Râului – Prăpăstile Zărneștilor – Peștera.** This area is included in the Bran-Rucar Passage. We studied some caves: Tunelul din Carieră, Peștera Doranca, Peștera Mică and Peștera Mare de la Prepeleac, Peștera Lilieciilor din Satul Peștera.
- **Area 8. Colțul Chililor.** Only one cave was investigated here: Peștera de la Colțul Chililor.

The spiders were captured both directly (using tweezers and exhauster) and using Barber traps. It must be taken into consideration the fact that the Barber traps are more efficient for the study of the mobile invertebrate fauna in the soil, litter or grass and inefficient in trapping the sedentary species (like spiders that develop a web for haunting) and who's soil level activity is limited, or for the species that are more active in bushes, logs, tree branches or tree head. To make a more accurate inventory of spider populations from the edaphic level, from litter and grass we also used the grid.

For sampling the MSS fauna we used perforated drillings. These drills are similar to those used by Gers in 1992, with some modifications.

The drills were, basically, PVC tubes (Fig. 1), 8 cm in diameter, buried in the MSS at depths of 0.5 and 0.75 m. Inside each drill a Barber trap was put at its base with an olfactory attractant. As liquid fixative we used antifreeze. The PVC tubes were perforated at the base, within 10 cm distance from the level of the Barber trap (with a diameter of 8 cm and a height of 10 cm), and each perforation had 8 mm in diameter. In its upper part the tube was covered with a plastic lid and the traps were taken out using a hook.

We collected temperature ($T^{\circ}\text{C}$) and relative humidity (UR%) values using a ColeParmer thermo-hygrometer.

RESULTS AND DISCUSSIONS

The list of spider species identified from the Piatra Craiului Massif during our study is given in Table 1. Along with the species list, the chorology types may be found. For this, we used the geographical species distribution after Platnick (2010) and the classification of chorology types by A.V. Taglianti (1999).

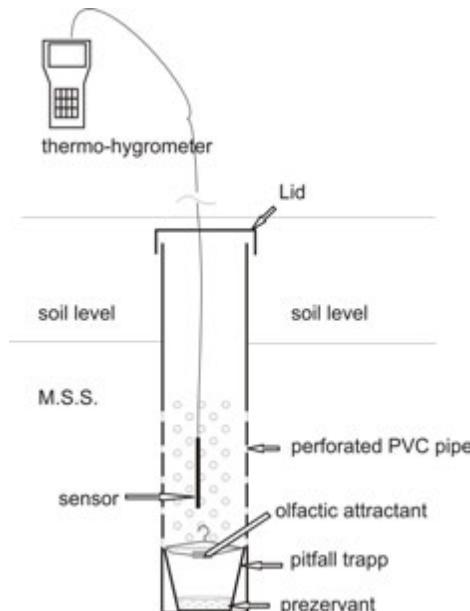


Figure 1 – Perforated drillings used for the capture of invertebrate fauna from Piatra Craiului MSS (Nitzu et al., 2010)

Table 1 - Araneae species identified from the tree studied environments in Piatra Craiului Massif .

TAXON	CAVES	MSS	EDAPHIC	CHOROLOGY TYPES
Fam. Nesticidae				
1. <i>Nesticus cellulanus</i> (Clerck, 1757)	+		+	Holarctic
2. <i>Nesticus balacescui</i> Dumitrescu, 1979	+			Endemic
3. <i>Nesticus constantinescui</i> Dumitrescu, 1979	+	+		Endemic
Fam. Theridiidae				
4. <i>Crustulina guttata</i> (Wider, 1834)		+		Palearctic
5. <i>Rugathodes bellicosus</i> (Simon, 1873)		+		European
Fam. Linyphiidae				
6. <i>Agyneta conigera</i> (O.P.- Cambridge, 1872)			+	Palearctic
7. <i>Agyneta subtilis</i> (O.P.- Cambridge, 1863)			+	Palearctic
8. <i>Anguliphantes angulipalpis</i> (Westring, 1851)	+		+	Palearctic
9. <i>Ashtenargus sp.</i>		+		
10. <i>Bolephthyphantes index</i> (Thorell, 1856)	+			Palearctic

Continues

Table 1 – Continuation.

TAXON	CAVES	MSS	EDAPHIC	CHOROLOGY TYPES
11. <i>Centromerita bicolor</i> (Blackwall, 1833)			+	Paleartic
12. <i>Centromerus arcanus</i> (O.P.-Cambridge, 1873)		+		Paleartic
13. <i>Centromerus cavernarum</i> (L. Koch, 1872)			+	European
14. <i>Centromerus silvicola</i> (Kulczynski, 1887)		+	+	Est European
15. <i>Centromerus sylvaticus</i> (Blackwall, 1841)			+	Holarctic
16. <i>Ceratinella brevis</i> (Wider, 1834)			+	Paleartic
17. <i>Diplocephalus cristatus</i> (Blackwall, 1833)	+		+	Holarctic
18. <i>Diplocephalus latifrons</i> (O.P.-Cambridge, 1871)			+	European
19. <i>Diplocephalus picinus</i> (Blackwall, 1841)			+	Paleartic
20. <i>Diplostyla concolor</i> (Wider, 1834)			+	Holarctic
21. <i>Donacochara speciosa</i> (Thorell, 1875)			+	Paleartic
22. <i>Entelecara acuminata</i> (Blackwall, 1833)		+	+	Holarctic
23. <i>Gonatium rubellum</i> (Blackwall, 1833)	+		+	Paleartic
24. <i>Improphanes improbulus</i> Simon, 1929	+			European
25. <i>Leptyphantes leprosus</i> (Ohlert, 1865)	+			Holarctic
26. <i>Leptyphantes notabilis</i> Kulczynski, 1887		+		Central European
27. <i>Macrargus rufus</i> (Wider, 1834)			+	Paleartic
28. <i>Mansuphanes arciger</i> (Kulczynski, 1882)	+			European
29. <i>Maso sundevalli</i> (Westring, 1851)			+	Holarctic
30. <i>Meioneta rurestris</i> (C.L. Koch, 1836)	+			Paleartic
31. <i>Micrargus herbigradus</i> (Blackwall, 1854)	+		+	Paleartic
32. <i>Microneta viaria</i> (Blackwall, 1841)			+	Holarctic
33. <i>Neriene montana</i> (Clerck, 1757)			+	Holarctic
34. <i>Neriene peltata</i> (Wider, 1834)			+	Holarctic
35. <i>Neriene radiata</i> (Walckenaer, 1842)			+	Paleartic
36. <i>Obscuriphantes obscurus</i> (Blackwall, 1841)	+			Paleartic
37. <i>Palliduphanes pallidus</i> (O.P.-Cambridge, 1870)		+	+	Central European
38. <i>Pelecopsis radicicola</i> (L.Koch, 1872)		+		Paleartic
39. <i>Porrhomma convexum</i> (Westring, 1851)	+			Paleartic
40. <i>Porrhomma montanum</i> Jackson, 1913	+			Paleartic
41. <i>Saloca diceros</i> (O.P.- Cambridge, 1871)			+	European
42. <i>Sintula corniger</i> (Blackwall, 1856)		+		European (Europe to Azerbaidjan)
43. <i>Taranucnus bihari</i> Fage, 1931		+	+	Est European
44. <i>Tenuiphantes alacris</i> (Blackwall, 1853)	+	+	+	Paleartic

Continues.

Table 1 – Continuation.

TAXON	CAVES	MSS	EDAPHIC	CHOROLOGY TYPES
45. <i>Tenuiphantes flavipes</i> (Blackwall, 1854)	+		+	Palearctic
46. <i>Tenuiphantes tenebricola</i> (Wider, 1834)	+		+	Palearctic
47. <i>Tenuiphantes tenuis</i> (Blackwall, 1852)		+	+	Euro-Mediterranean
48. <i>Tenuiphantes zimmermanni</i> (Bertkau, 1890)			+	European
49. <i>Thyreostenius parasiticus</i> (Westring, 1851)			+	Holarctic
50. <i>Troxochurus nasutus</i> Schenkel, 1947			+	European
51. <i>Walckenaeria capito</i> (Westring, 1861)		+		Holarctic
52. <i>Walckenaeria cuspidata</i> Blackwall, 1833	+			Palearctic
Fam. Tetragnatidae				
53. <i>Meta menardi</i> (Latreille, 1804)	+			Palearctic
54. <i>Metellina mengei</i> (Blackwall, 1869)			+	European
55. <i>Metellina merianae</i> (Scopoli, 1763)	+			European
56. <i>Metellina segmentata</i> (Clerck, 1757)	+		+	Palearctic
Fam. Araneidae				
57. <i>Araneus diadematus</i> Clerck, 1757			+	Holarctic
Fam. Lycosidae				
58. <i>Alopecosa aculeata</i> (Clerck, 1757)			+	Holarctic
59. <i>Pardosa amentata</i> (Clerck, 1757)			+	European (Europe, Russia)
60. <i>Pardosa lugubris</i> (Walckenaer, 1802)			+	Palearctic
61. <i>Pardosa morosa</i> (L. Koch, 1870)		+		Palearctic
62. <i>Pardosa nigra</i> (C.L. Koch, 1834)		+	+	Palearctic
Fam. Agelenidae				
63. <i>Tegenaria parietina</i> (Fourcroy, 1785)	+		+	Palearctic
64. <i>Tegenaria silvestris</i> L. Koch, 1872	+			European (Europe, Russia)
Fam. Cybaeidae				
65. <i>Cybaeus angustiarum</i> L. Koch, 1868		+	+	European (Europe to Azerbaidjan)
Fam. Hahniidae				
66. <i>Cryphoeca silvicola</i> (C.L. Koch, 1834)	+	+	+	Palearctic
67. <i>Hahnia montana</i> (Blackwall, 1841)			+	European (Europe, Russia)

Continues.

Table 1 – Continuation.

TAXON	CAVES	MSS	EDAPHIC	CHOROLOGY TYPES
Fam. Dictynidae				
68. <i>Cicurina cicur</i> (Fabricius, 1793)		+	+	Paleartic
69. <i>Lathys humilis</i> (Blackwall, 1855)	+			Paleartic
Fam. Amaurobiidae				
70. <i>Callobius claustrarius</i> (Hahn, 1833)	+		+	Paleartic
71. <i>Coelotes atropos</i> (Walckenaer, 1830)			+	European
72. <i>Coelotes terrestris</i> (Wider, 1834)		+	+	Paleartic
Fam. Clubionidae				
73. <i>Clubiona alpicola</i> Kulczynski, 1881		+		Paleartic
Fam. Gnaphosidae				
74. <i>Drassodes lapidosus</i> (Walckenaer, 1802)		+	+	Paleartic
Fam. Zoriidae				
75. <i>Zora spinimana</i> (Sundevall, 1833)		+		Paleartic
Fam. Thomisidae				
76. <i>Ozyptila atomaria</i> (Panzer, 1801)			+	Paleartic
77. <i>Ozyptila rauda</i> Simon, 1875			+	Paleartic
78. <i>Xysticus audax</i> (Schrank, 1803)		+	+	Paleartic
Fam. Salticidae				
79. <i>Evarcha falcata</i> (Clerk, 1757)			+	Paleartic

We identified a total of 79 spider species: 28 species from the subteranean profound environment (caves), 25 from the mesovoid shallow substratum (MSS) and 53 from the edaphic environment.

As you can see in Fig. 2, the dominant species are those from Paleartic (52.56%), followed by European ones (20.51%) and Holarctic (17.95%). The endemic elements are only represents by 2.56%.

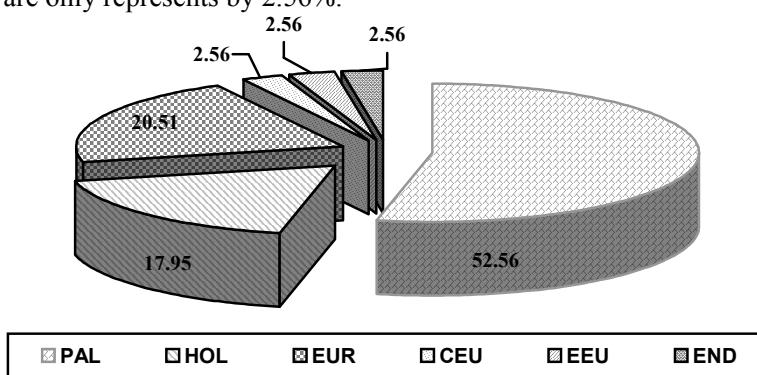


Figure 2 - Percentage of chorological types (Spiders species) in Piatra Craiului Mountains.

The most frequent species in the Piatra Craiului caves is *Meta menardi* with a frequency of 64.86% (found in 24 from the 37 investigated caves), followed by *Nesticus constantinescui* with a 29.72% frequency (11 caves), *Micrargus herbigradus*, *Tegenaria silvestris* with 24.32% frequency (9 caves) and *Porrhomma convexum* with 18.91% frequency (7 caves). *Lepthyphantes leprosus* was found in just 5 caves (13.51% frequency), followed by *Diplocephalus cristatus* and *Metellina segmentata* with 10.81% frequency (4 caves), and a number of 9 species (*Nesticus cellulanus*, *Bolyphantes index*, *Gonatium rubellum*, *Improphanes improbulus*, *Obscuriphantes obscurus*, *Tenuiphantes alacris*, *Tenuiphantes tenebricola*, *Tegenaria parietina* and *Callobius claustrarius*) were found in only 2 caves (5.4% frequency). A number of 11 species (*Nesticus balacescui*, *Anguliphantes angulipalpis*, *Mansuphanates arciger*, *Meioneta rurestris*, *Palliduphanates pallidus*, *Porrhomma montanum*, *Tenuiphantes flavipes*, *Walckenaeria cuspidata*, *Metellina meriana*, *Cryphoeca silvicola* și *Lathys humilis*), were found just in one cave and they represented 40.47% from the total of identified species.

From the 27 species of spiders identified in the caves from this area, 2 species *Nesticus constantinescui* and *Nesticus balacescui* are characteristic for caves (troglobionts), 6 species: *Nesticus cellulanus*, *Improphanes improbulus*, *Micrargus herbigradus*, *Porrhomma convexum*, *Meta menardi* and *Metellina meriana* are preferencial (troglophile) and a group of 7 species are frequent for caves. Furthermore, this species are frequent for MSS (scree). Another group of 7 species: *Diplocephalus cristatus*, *Lepthyphantes leprosus*, *Mansuphanates arciger*, *Tenuiphantes alacris*, *Tegenaria silvestris*, *Cryphoeca silvicola* and *Callobius claustrarius* are frequent for caves, but are also found under rocks in scree, both nude and covered by forest and cold gorges as is the case for *Mansuphanates arciger* (Buchar & Růžička, 2002), microcave. As for *Lepthyphantes leprosus*, after Buchar & Růžička, 2002, the species is found both in scree and cellars. We found this species also in caves in Closani area (Nae & Ilie, 2004), while Negrea & Negrea, 1968, consideres that species *Lepthyphantes leprosus* and *Tegenaria silvestris* are troglophile and among the most frequente species from the parietal associations beeing found in 14, respectiely 18 caves from Banat.

Bolyphantes index was mentioned for the first time in Rumanian fauna by I. Urák & K. Fetykó, 2006 in Retezat Mountains and we found the species only in caves.

The rest of 10 species preffer forest habitats and were found in litter, moss, under rocks, in vegetal debris, big rocks covered by vegetation, etc., although some of them were found in caves also, as is the case for *Lathys humilis*, mentioned by us in a cave from Aninei Mountains (Nae, 2008) and *Metellina segmentata* from Cobășel Cave, Rodna Mountains (Nitzu et al., 2008).

Most of the species identified from the edaphic environment are euritope, being found in various types of habitats and various altitudes. Only a number of 8 species may be considered stenotope: *Agyneta subtilis*, *Agyneta conigera*, *Troxochurus*

nasutus, *Hahnia montana* (characteristic for wetlands from spruce and beech forests), collected only from Padina Lăncii Valley and *Donacochara speciosa*, *Centromerus cavernarum*, *Tenuiphantes zimmermanni*, *Ozyptila rauda*, collected from Valea Seacă (Seacă Valley). *Centromerus cavernarum* and *Tenuiphantes zimmermanni* are species that prefer forest covered screes as those from Valea Seacă.

For the mesovoid shallow substratum (**MSS**) the station with the highest species richness is Marele Grohotiș with 18 species from 10 families. Related to the total species number from this station it results that 72% of the species were found here, while in Cerdacul Stanciului station the number of species was only 8. For Valea Seacă station we registered the lowest specific diversity, only 5 species from 4 families.

At Marele Grohotiș and Cerdacul Stanciului stations where we placed drilling at different depths (0.50 and 0.75 m) we registered differences between the two, regarding the specific diversity. Thus, at Marele Grohotiș station in the -0,50 m drill we captured a total of 13 species, while in the - 0,75 m drill we captured 16 species. A number of 11 species (*Rugathodes bellicosus*, *Centromerus silvicola*, *Leptyphantes notabilis*, *Tenuiphantes alacris*, *Pardosa morosa*, *Pardosa nigra*, *Cybaeus angustiarum*, *Cryphoeca silvicola*, *Coelotes terrestris*, *Clubiona alpicola* și *Drassodes lapidosus*) are common for both drillings, while *Cicurina cicur* and *Zora spinimana* species are present only in the -0.50 m drillings, and *Crustulina gutata*, *Asthenargus sp.*, *Entelecara acuminata*, *Walckenaeria capito* and *Xysticus audax* at - 0.75 m.

For Cerdacul Stanciului station we registered 5 species for each depth, the difference between the drilling being given by the number of captured individuals and species. Hence, species *Rugathodes bellicosus* and *Leptyphantes notabilis* are common for both drilling, while *Centromerus arcarius*, *Leptyphantes pallidus* and *Drassodes lapidossus* species are present only at - 0.50 m depth, and *Pelecopsis radicicola*, *Sintula corniger* *Cybaeus angustiarum* just in the - 0.75 m depth.

Another important aspect is the difference between Valea Seacă station (where we placed just one drilling at 0.5 m) and the other 2 stations. Here the species diversity is different from that of Marele Grohotiș and Cerdacul Stanciului stations. One species, *Cybaeus angustiarum* is common to the 3 stations, while *Cicurina cicur* was captured only in - 0.75 m drilling at Marele Grohotiș, and the other 3 species *Nesticus constantinescui*, *Taranucnus bihari* and *Tenuiphantes tenuis* are present only in Valea Seacă station.

Nesticus constantinescui is the only troglobiont species found in MSS and was not found ar Valea Seaca species.

Among the 25 species identified in the MSS only 14 have habitat preferences: *Rugathodes bellicosus*, *Leptyphantes notabilis*, *Centromerus arcarius*, *Walckenaeria capito*, *Taranucnus bihari*, *Tenuiphantes alacris*, *Pardosa morosa*, *Pardosa nigra*, *Cybaeus angustiarum*, *Cryphoeca silvicola*, *Coelotes terrestris*, *Clubiona alpicola*, *Drassodes lapidossus* and *Cicurina cicur*. A number of 10 species are considered

accidental and they are characteristic for forest habitats and one species is characteristic for caves (troglobiont): *Nesticus constantinescui*.

Three species: *Palliduphantes pallidus*, *Tenuiphantes alacris* and *Cryphoeca silvicola* were found in the 3 studied environments (caves, superficial subterranean environment and edaphic).

The evaluation of dominance according to the values of relative abundance (A%) showed that, for each station there are dominant species. So, for Marele Grohotiș and Cerdacul Stanciului stations the dominant species is *Lepthyphantes notabilis* (57.57%; 79.66%) and the sub-dominant species are *Cybaeus angustiarum*, *Rugathodes bellicosus*, *Pardosa nigra* for Marele Grohotiș and *Rugathodes bellicosus* for Cerdacul Stanciului. The dominant species for Valea Seacă is *Cybaeus angustiarum* ($A = 58.33\%$) and the sub-dominant species is *Taranucnus bihari*.

Regarding the species frequency from Marele Grohotiș and Cerdacul Stanciului we determined that a large number of species have a small frequency (Fig. 3). Therefore, from the total number of species collected from each station, 33.33% from Marele Grohotiș species and 62.5% of Cerdacul Stanciului species have frequency values smaller than 10%. However, in the case of Marele Grohotiș and Valea Seacă stations the species from the **II** class of frequency have the highest balance (10-20%), with 55.5% and 60%. In the case of Cerdacul Stanciului station this class has 25% balance.

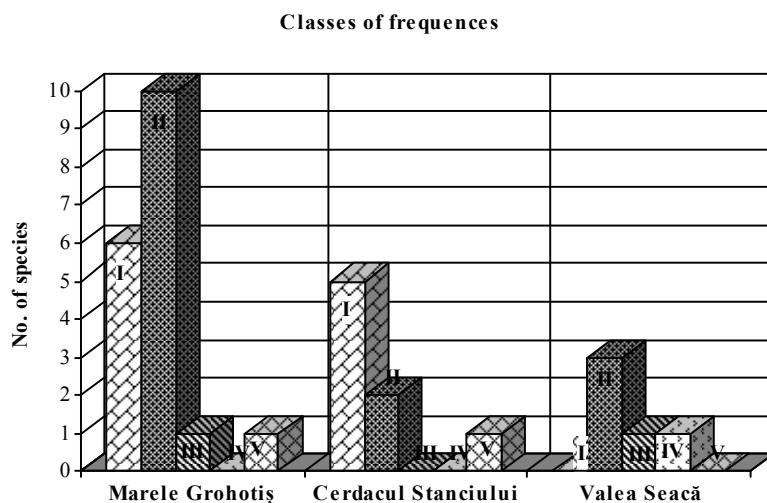


Figure 3 - Class species distribution for Araneae collected from the tree stations: Marele Grohotiș, Cerdacul Stanciului and Valea Seacă (class frequency: 1-10% - **I**, 10-20% - **II**, 25% - **III**, 30-40% - **IV**, 75% - **V**).

Analyzing the values of frequency (F%) obtained in the 3 stations, *Leptyphantes notabilis* is the constant species ($F = 75\%$) for Marele Grohotiș and Cerdacul Stanciului stations, while *Pardosa nigra* ($F = 25\%$) is an accessory species. For Valea Seacă station we registered no constant species *Cybaeus angustiarum* ($F = 37\%$) and *Taranucnus bihari* ($F = 25\%$) being accessory species. The rest of species from the I category frequency (1-10%) represent rare and accidental species.

Taking in consideration the number of individuals and the number of species we can observe that in the case of spiders the highest values of cumulate abundance for Marele Grohotiș station are registered in June, July and May, while the highest species richness is registered in June and May (Fig. 4 and Fig. 5).

For Cerdacul Stanciului station the maximal values for cumulate abundance are reached in June and September, while the maximum values for species richness are registered in June and July.

For Valea Seacă station both cumulate abundance and species richness registered very low values, the biggest number of individuals being recorded in July and the highest number of species in June.

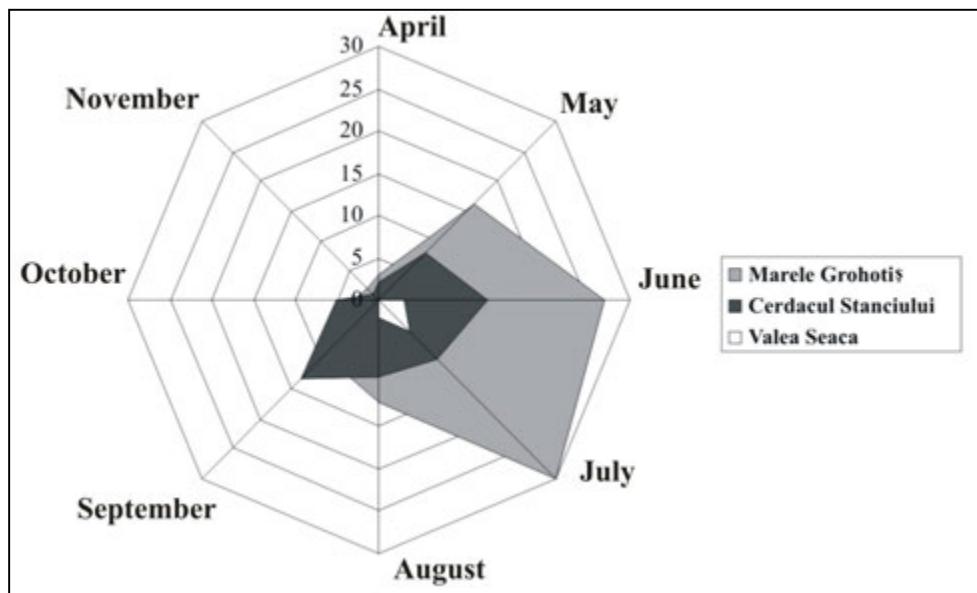


Figure 4 - The radar diagram of the cumulate abundance of spider species by month and sectors in Piatra Craiului.

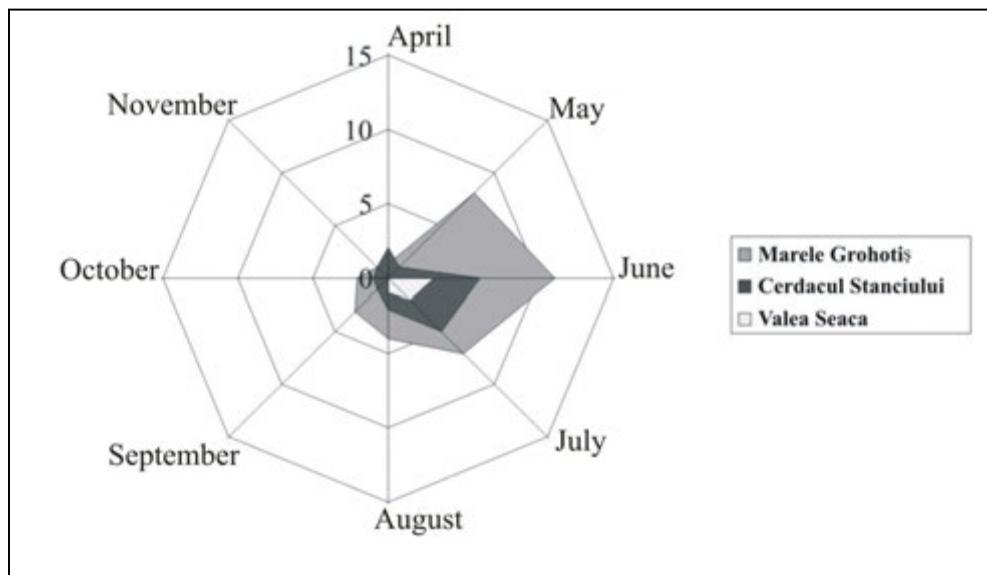


Figure 5 - The radar diagram of the spider species diversity by month and sector in Piatra Craiului.

The highest values of cumulate abundance for Marele Grohotis and Cerdacul Stanciului stations are given by the presence of *Lepthyphantes notabilis* (Marele Grohotiș A = 56,43%; Cerdacul Stanciului A = 77,04%), the dominant species, while for Valea Seaca, the abundant species is *Cybaeus angustiarum* (A = 50%).

From the 79 identified species in our study, 52 are new for the area, 23 species are rare for the Roumanian fauna, and 6 species are mentioned for the second time: *Rugathodes bellicosus*, *Agyneta subtilis*, *Bolyphantes index*, *Sintula corniger*, *Walckenaeria capito* and *Hahnia montana*.

The identification of *Walckenaeria capito* (Westring, 1861) species in Piatra Craiului reconfirms its presence in the Rumanian fauna, the first mention was given by Chyzer & Kulczynski in 1900.

Improbantes improbulus Simon, 1929 is first mentioned in the roumanian fauna, being collected from Urşilor Cave (Cheile Dâmbovicioarei). The species was described in an earlier paper (Nae, 2010).

CONCLUSIONS

We investigated 37 caves, 3 types of MSS (with 3 sampling stations) and the edaphic environment (8 sampling stations). The MSS samples were collected each

month, during 2 years, except the winter, and the samples from the edaphic environment were collected seasonal.

The zoogeographic analisys showed that the biggest numer of species are Palaearctic, followed by European elements and Holarctic species.

We present for the first time the characteristic species for MSS (*Rugathodes bellicosus*, *Leptyphantes notabilis*), the constant and dominant species (*Leptyphantes notabilis*) and, also the preferential species (*Centromerus arcanus*, *Walckenaeria capito*, *Clubiona alpicola*).

From 79 spider species, 28 are from caves (2 troglobutes), 25 species were collected from MSS and 53 from edaphic environment.

Nesticus constantinescui is the only troglobyont species of spiders found in the MSS at Valea Seacă station. The presence of this species in the mesovoid shallow substratum from Valea Seacă explains the path of collonization from cave to cave, knowing that the drilling was placed in an area with numerous caves, where we identified this species many times during the study.

Improbantes improbulus Simon, 1929 is mentioned for the first time in Rumania fauna. Other 53 species are also mentioned for the first time in the studied area and 23 species are considered rare for the romanian fauna (les than 6 quotations), 6 of them (*Rugathodes bellicosus*, *Bolyphantes index*, *Sintula corniger*, *Troxochurus nasutus*, *Walckenaeria capito* and *Hahnia montana*) being mentioned for the second time in the country fauna.

REFERENCES

- ADAM C., 2006 – *New data on the spider fauna (Arachnida: Araneae) of Piatra Craiului National Park*. Research in the Piatra Craiului National Park. **III**: p. 177-183.
- BUCHAR J., RŮŽIČKA V., 2002 – *Catalogue of spiders of the Czech Republic*. Peres publishers, Praha. p. 1-349.
- DUMITRESCU M., 1979 – *La monographie des représentants du genre Nesticus des grottes de Roumanie, I-ère Note*. Travaux de l’Institut de Spéologie „Emile Racovitza”. **18**: p. 53- 84.
- FUHN I. E., NICULESCU-BURLACU F., 1971 – *Fam. Lycosidae. Fauna Republicii Socialiste România*. Ed. Acad. R.S.R., Arachida. **5 (3)**: p. 1-251.
- GERS CH., 1992 – *Ecologie et Biologie des arthropodes terrestres du Milieu Souterrain Superficiel. Fonctionnement et ecologie evolutive*. Phd thesis. Paul Sabatier University, Toulouse. France.
- LOTREAN N., 2006 – *Contribuții la studiul faunei de aranee din Munții Piatra Craiului*. Muzeul Județean Argeș, Studii și comunicări, Argesis, Pitești. **XIV**: p. 67-77.
- NAE A., ILIE V., 2004 – *Data concerning the spider diversity (Arachnida, Araneae) from the Cloșani karstic area (Oltenia, Romania), with special reference to the Superficial Subterranean Environment*. Trav. Mus. Nat. d’Hist. Nat. „Gr. Antipa”. **XLVII**: p. 31-41.

- NAE A., VLAICU M., POPA I., CONSTANTINESCU T., IAVORSCHI V., NITZU E., 2005 – “First note on the invertebrate fauna of caves in the Piatra Craiului National Park”. Travaux de l’Institut de Spéléologie “Emile Racovitza”. **XLIII – XLIV**: p. 133- 164.
- NAE A., GIURGINCA A., 2006 – Preliminary data on the spiders from caves of Piatra Craiului Park. Researches in the Piatra Craiului National Park. **II**.
- NAE A. 2008 – Data regarding the Araneae fauna from Resita – Moldova Noua Karstic Region. Trav. Inst. Spéol. “E. Racovitza”. **XLVII**: p. 53- 63.
- NAE A., 2010 – *Improphanes improbulus* (Simon, 1929) (Araneae, Linyphiidae) new record for the Roumanian fauna. Travaux de l’Institut de Spéléologie “Emile Racovitza”. **XLIX**: p. 81- 85.
- NEGREA Șt., NEGREA A., 1968 – Contribuții la studiul asociației parietale a peșterilor din Banat. Lucr. Inst. Speol. „E. Racoviță”. 7: p. 79-148.
- NITZU E., POPA I., NAE A., IUSAN C., 2008 – Faunal researches on the invertebrates (Coleoptera, Orthoptera, Collembola, Araneae) in the Rodnei Mountains Biosphere Reservation. Trav. Inst. Spéol. “E. Racovitza”. **XLVII**: p. 3- 52.
- NITZU E., NAE A., GIURGINCA A., POPA I., 2010 – Invertebrate communities from the mesovoid shallow substratum of the Carpatho-Euxinic area: Eco-faunistic and zoogeographic analysis. Travaux de l’Institut de Spéléologie “Emile Racovitza”. **XLIX**: 41-79.
- PLATNICK N. I., 2010 – *The world spider catalog, version 7.5*. American Museum of Natural History. On line from: <http://research.amnh.org/entomology/spiders/catalog/index.html>.
- STERGHIU Cl., DOBRE A., 2003 – Researches on spider fauna of Piatra Craiului Massif. p. 170-177. In : O. Pop, M. Vergheleț (eds), Research in Piatra Craiului National Park, Edit. Phoenix. **1**.
- TAGLIANTI A. V., AUDISIO P. A., BIONDI M., BOLOGNA M. A., CARPANETO G. M., DE BIASE A., FATTORINI S., PIATELLA E., SINDACO R., VENCHI A., ZAPPAROLI M., 1999 – A proposal for a chorotype classification of the Near East fauna, in the framework of the Western Palearctic region. Biogeografia. **XX**: p. 32-58.
- URÁK I., FETYKÓ K., 2006 – Arachnological Studies in the Retezat National Park (Romania). Transylv. Rev. Syst. Ecol. Res. **III**: p. 79- 87.

**ON SOME COLLEMBOLAN SPECIES FROM THE
MOCIAR NATURAL FOREST RESERVE. FIRST
RECORD OF *ISOTOMURUS UNIFASCIATUS*
(BORNER, 1903) IN ROMANIA**

IONUȚ POPA

Speleological Institute "Emil Racovitză" Bucharest, Department of Biospeleology and Soil Biology,
Calea 13 Septembrie Street, no 13, sect. 5, 050711, Bucharest, Romania,
e-mail: ionutpopaag@yahoo.com

ABSTRACT: In this paper, the author presents new data about the collembolan species collected from the Mociar Natural Forest Reserve. Thirty-one species of Collembola were identified from the faunistic material sampled from soil (Barber method) and leaf litter (Winkler method). *Isotomurus unifasciatus* (Borner, 1903) is reported for the first time for the Romanian fauna.

Key words: Collembola, Mociar Natural Forest Reserve, Romania, first record.

REZUMAT: Date privind fauna de colembole din Rezervația Naturală Forestieră Mociar. Prima semnalare a speciei *Isotomurus unifasciatus* în România.

In aceasta lucrare, autorul prezintă date noi privind speciile de colembole colectate din Rezervația Naturală Forestieră Mociar. Au fost identificate treizeci și unu specii de colembole, utilizându-se metoda capturării cu capcane Barber și metoda cernerii lăptierei cu fileul Winkler. *Isotomurus unifasciatus* (Borner, 1903) este semnalată pentru prima dată în fauna României.

Cuvinte cheie: Collembola, Rezervația Naturală Forestieră Mociar, Romania, prima semnalare.

INTRODUCTION

The Mociar Natural Forest Reserve is a protected area situated in the pre-mountainous zone of Gurghiu Mountains, the Oriental Carpathians, Mures County ($46^{\circ} 45' 20''$ N, $24^{\circ} 49' 26''$ E). The Mociar Forest has a surface of 48 ha, being a highly valuable scientific area because of its very old oaks (*Quercus robur* Linnaeus, 1753) (400-500 years' old or 700 years old, according to other specialists). The density is of 10 multisecular oaks per hectare, with diameters of between 1.5 to 2 m and heights of 23 m (Sămărghițan, 2001).

Until now, there are no studies concerning the collembolan fauna from the Mociar Forest. Therefore, our purpose was to have a first evaluation of the

Collembolan fauna in this habitat, taking into consideration that this is a protected area included the 4th IUCN category.

MATERIAL AND METHODS

Our study was carried out in July 2008. The specimens were captured using Barber method (9 pitfall traps with olfactory attractant and ethyl alcohol) and Winkler extractor. The traps were emptied after 4 days (18-21.07.2008) and the specimens transferred in 70% ethyl alcohol. Near the places where the pitfall traps were operated, nine 1-m² samples of leaf litter were taken. The samples were sieved through a Winkler extractor.

This study was supported by Grant CEEX-NATFORMAN, in partnership with I.C.A.S. Bucharest. The faunistic material was collected by a research team consists of dr. E. Nitzu, dr. I. Popa, dr. A. Nae, I. Nae and A. Dragu ("Emil Racovita" Institute of Speleology of Romanian Academy).

In this paper we used the systematic system and taxonomy according to Bellinger et al. (1996-2012).

RESULTS AND DISCUSSIONS

We identified 31 species of Collembola, belonging to 9 families and 21 genera, on a total number of 182 specimens. Among them, 20 species were collected using pitfall traps and 18 species using Winkler extractor. 7 species are common to both methods (Tab. 1).

Table 1 - The list of collembolan species.

Species	Sampling methods		Distribution
	Pitfall traps	Winkler extractor	
Ord. Poduromorpha			
Fam. Neanuridae			
1. <i>Morulina verrucosa</i> (Borner, 1903)	8	2	European
2. <i>Neanura muscorum</i> (Templeton, 1835)		1	Cosmopolitan
3. <i>Pseudachorutes dubius</i> Krausbauer, 1898	4		Palaearctic
Fam. Odontellidae			
4. <i>Superodontella empodialis</i> (Stach, 1934)	1		Palaearctic
Fam. Hypogastruridae			
5. <i>Ceratophysella armata</i> (Nicolet, 1842)	7		Cosmopolitan
6. <i>Ceratophysella engadinensis</i> (Gisin, 1949)	1		European
7. <i>Ceratophysella silvatica</i> Rusek, 1964	2	1	European
Fam. Onychiuridae			
8. <i>Protaphorura armata</i> (Tullberg, 1869)		1	Cosmopolitan
9. <i>Tetrodontophora bielanensis</i> (Waga, 1842)	2	6	Central-East European

Continues.

Table 1 – Continuation.

Species	Sampling methods		Distribution
	Pitfall traps	Winkler extractor	
Ord. Entomobryomorpha			
Fam. Tomoceridae			
10. <i>Plutomurus carpaticus</i> Rusek et Weiner, 1979		1	Central-East European
11. <i>Pogonognathellus flavesiensis</i> (Tullberg, 1871)	2	8	Holarctic
12. <i>Pogonognathellus longicornis</i> (Muller, 1776)	5	7	Palaearctic
13. <i>Tomocerus minor</i> (Lubbock, 1862)	1	10	Holarctic
Fam. Isotomidae			
14. <i>Desoria olivacea</i> (Tullberg, 1871)	3		European
15. <i>Folsomia inoculata</i> (Stach, 1947)		1	Palaearctic
16. <i>Isotomurus unifasciatus</i> (Börner, 1901)*	3		Central-South European
17. <i>Pseudisotoma sensibilis</i> (Tullberg, 1876)	2		Holarctic
Fam. Entomobryidae			
18. <i>Lepidocyrtus cyaneus</i> Tullberg, 1871		6	Cosmopolitan
19. <i>Lepidocyrtus lignorum</i> (Fabricius, 1775)	8	5	Holarctic
20. <i>Lepidocyrtus paradoxus</i> Uzel, 1891	1		Holarctic
21. <i>Lepidocyrtus serbicus</i> Denis, 1933		8	Central-East European
22. <i>Orchesella disjuncta</i> Stach, 1960	20		Central-East European
23. <i>Orchesella pontica</i> Ionescu, 1915		27	Central-East European
24. <i>Orchesella pseudobifasciata</i> Stach, 1960		5	Central-East European
25. <i>Orchesella spectabilis</i> (Tullberg, 1871)		3	European
Ord. Symphyleona			
Fam. Sminthuridae			
26. <i>Allacma fusca</i> (Linnaeus, 1758)		1	Holarctic
27. <i>Lipothrix lubbocki</i> (Tullberg, 1872)		2	Euro-Mediterranean
Fam. Dicyrtomidae			
28. <i>Dicyrtoma fusca</i> (Lubbock, 1873)	2		Euro-Mediterranean
29. <i>Dicyrtomina minuta</i> (Fabricius, 1783)	1		Euro-Mediterranean
30. <i>Dicyrtomina ornata</i> (Nicolet, 1842)	7		Palaearctic
31. <i>Ptenothrix atra</i> Börner, 1906	7		European
Number of species	20	18	
Number of specimens	87	95	

* the first record for the Romanian fauna.

Isotomurus unifasciatus (Börner, 1901) (3 i., 21.07.2008, pitfall traps) is a new species for the Romanian fauna.

At present, three species of *Isotomurus* Börner, 1803, occur in Romania (Fiera, 2007): *Isotomurus alticulus* (Carl, 1899), *Isotomurus palliceps* (Uzel, 1891) and *Isotomurus palustris* (Muller, 1776).

According to Fjellberg (2007), *Isotomurus unifasciatus* (Börner, 1901) belongs to the 'palustris' group, including also: *Isotomurus maculatus* Agren, 1903, *Isotomurus graminis* Fjellberg, 2007, *Isotomurus italicus* Carapelli, Frati, Facciulli, Dallai, 1995, *Isotomurus fuciculus* Axelson, 1906, *Isotomurus antennalis*

(Bagnall, 1940) and *Isotomurus palustris* (Muller, 1776). These species are characterised by: ventral tube with three setae on each side and mucro without lateral setae.

According to Carapelli et al. (2001) and Fjellberg (2007), pigmentation patterns represent the most used and straightforward character for species diagnosis. *I. unifasciatus* has a yellowish or greenish colour of body background. Tergites with longitudinal dark band sometimes weakly interrupted on abdomen IV and V. A dark pigmented spot is present on lateral sides of abdomen VI. Antennal segment slightly violet (Fig. 1-D).

Four European species of *Isotomurus* have a longitudinal stripe: *I. alticulus*, *I. palustris*, *I. pseudopalustris* and *I. unifasciatus*.

In *I. alticulus*, the longitudinal stripe is broader than in the other three species (about 1/3 width of tergites), and sometimes tends to diffuse laterally (Fig. 1-A).

In the remaining three species with a longitudinal stripe, each tergite is coloured with more or less diffuse pigmentation. Thus, it is the presence and shape of the lateral accessory pigmentation which should be taken into account to tell them apart. *I. palustris* and *I. unifasciatus* have in common a yellowish or greenish background with a longitudinal stripe, usually fainter on the last abdominal tergites and generally with dark lateral spots on abdomen VI. When compared with *I. unifasciatus*, *I. palustris* shows a weaker longitudinal stripe that is usually fainter, especially on abdomen III, and with net-like ornaments on the last abdominal segments (Fig. 1-B). *I. unifasciatus* has no additional markings (Fig. 1-D).

I. pseudopalustris has a dark median dorsal stripe and lateral brownish spots, frequently coalescing on each side of the tergits, forming additional stripes (Carapelli et al., 2001) (Fig. 1-C).

Distribution and ecology. European species. According to Fjellberg (2007), a typical inhabitant along ponds and puddles in forests, rarely in open land. The species is certainly mixed up with *I. palustris* in the records of old authors.

CONCLUSIONS

As a result of the study carried out on the fauna from the Mociar Natural Forest Reserve, 31 species of Collembola were identified. Among these, *Isotomurus unifasciatus* (Borner, 1903) is reported for the first time for the Romanian fauna.

This is the first faunistic study conducted in the Mociar Natural Forest Reserve. The result includes only preliminary data on the collembolan fauna, further studies being necessary in order to complete the list of collembolan species.

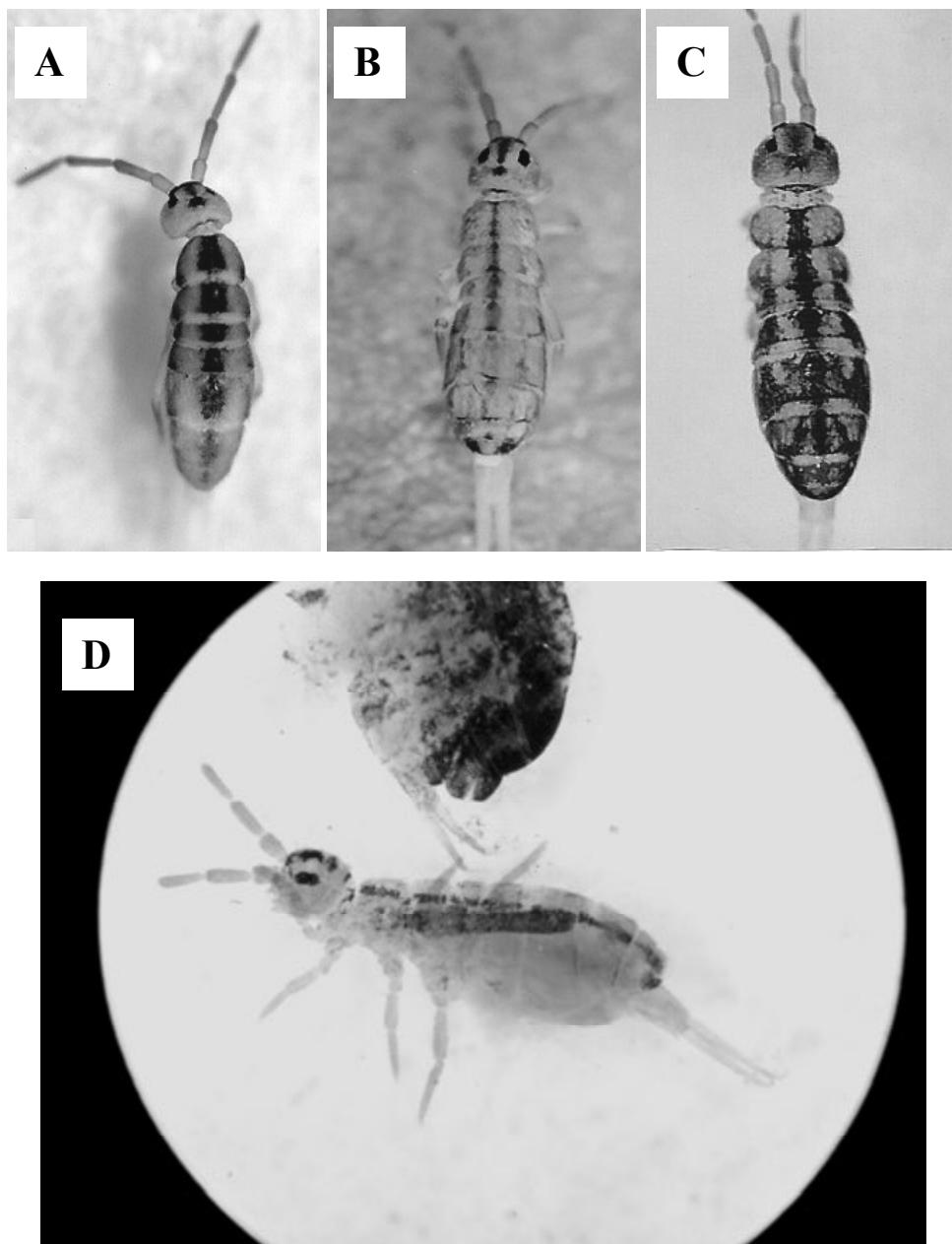


Figure 1. A – *Isotomurus alticulus* (Carl, 1899) (Foto. Carapelli et al., 2001);
B – *Isotomurus palustris* (Muller, 1776) (Foto. Carapelli et al., 2001); C – *Isotomurus pseudopalustris* Carapelli, Frati, Fanciulli & Dallai 2001 (Foto. Carapelli et al., 2001);
D - *Isotomurus unifasciatus* (Borner, 1901) (Foto. E. Nitzu).

REFERENCES

- BELLINGER P. F., CHRISTIANSEN K. A., JANSSENS, F., 1996-2012 – *Checklist of the Collembola of the World*. On line from: <http://www.collembola.org/>
- CARAPELLI A., FRATI F., FANCIULLI P.P., DALLAI R., 2001 – *Taxonomic revision of 14 southwestern European species of Isotomurus (Collembola, Isotomidae), with description of four new species and the designation of the neotype for I. palustris*. *Zoologica Scripta*. **30**: p: 115-143.
- FIERA C., 2007 – *Checklist of Romanian springtails (Collembola)*. *Folia Entomologica Hungarica*. **68**: p. 5-40.
- FJELLBERG A., 2007 – *Collembola of Fennoscandia and Denmark. Part II: Entomobryomorpha and Symphyleona*. *Fauna Entomologica Scandinavica*. **42**: p. 266.
- SĂMARIGHIȚAN M., 2001 – *Flora și vegetația Văii Gurghiului*. PhD Thesis, Institute of Biology of the Romanian Academy, Bucharest.

UNTERSUCHUNGEN ZUR ISOLATIONSWIRKUNG VON STAUWEHREN AUF DAS MAKROZOOBENTHOS

THOMAS TITTIZER

Institut für Zoologie der Universität Bonn, Poppeldorfer Schloß, D- 53115 Bonn,
e-mail: tittizer@uni-bonn.de

ZUSAMMENFASSUNG: Aufstau bedingte Veränderungen der hydrologischen und morphologischen Verhältnisse in einem Fließgewässer haben gravierende Folgen für die mengen- und artenmäßige Zusammensetzung der aquatischen Biozönose. Als eine der gravierendsten Folgen wird die Unterbrechung des Fließwasserkontinuums angesehen, wodurch das Migrationsverhalten aquatischer Arten stark beeinträchtigt wird. Diese Gewässer entsprechen nicht den Forderungen der Europäischen Wasserrahmenrichtlinie (WRRL-EU), und müssen daher „saniert“ werden. Dabei werden die durch Untersuchungen festgestellten ökologischen Defizite durch gezielte wasserbauliche Maßnahmen kompensiert. Durch Erhebungen der Faunenbestände in den Oberwasser- und Unterwasserbereichen der Stauwehre der Lahn wurde versucht die Isolationswirkung von Wehren zu ermitteln. Dabei zeigte sich, dass Stauwehre eine deutliche Isolation der benthischen Fauna zur Folge haben. Auch Fischpässe und Schleusen können nur wenig zum Austausch der Organismen über die Staumauern hinweg beitragen. Drift und Gegenstromwanderung in den Fischtreppen und Schleusen findet nur im geringen Maße statt. Diese Ausbreitungsmechanismen werden insbesondere von Gammariden genutzt. Zur Wiederherstellung des Fließwasserkontinuums in den staugeregelten Fließgewässern wird der Bau von rauen Gleiten empfohlen.

Schlagwörter: Makrozoobenthos, Stauregulierung, Fließwasserkontinuum, Fischpässe, Drift, Gegenstromwanderung, rauhe Gleiten

REZUMAT: Investigații privind efectul de izolare a barajelor asupra macrozoobentosului.

Modificarea condițiilor hidrologice și morfologice în urma regularizării cursurilor de apă curgătoare, au consecințe multiple asupra biocenozelor acvatice. Ca una din consecințele cele mai grave a masurilor hidrotehnice, se numără întreruperea continuității apei curgătoare, prin care comportamentul de migrare a multor specii acvatice este mult afectat. Apele astfel modificate nu mai corespund cerințelor Directivelor de Apă ale Uniunii Europene (WRRL-EU), și prin urmare trebuie renaturate. Deficietele ecologice constatate în aceste râuri urmează să fie compensate prin amenajări hidrotehnice corespunzătoare. Prin investigații faunistice efectuate în zona de amonte și de aval a barajelor a râului Lahn, urmează o evaluare a efectelor de izolare a barajelor asupra biocenozelor. Rezultatele acestor investigări arată în mod foarte concret, efectul de izolare a barajelor. Treptele piscicole precum și ecluzele în aceste râuri contribuie numai în mică măsură la schimbul de specii între zonele de amonte și de aval ale barajelor. Mecanismele de răspândire în aceste construcții hidrotehnice sunt folosite în special de grupa de gamaride. În vederea restabilirii continuității apei curgătoare în râurile barate, se recomandă construirea de rampe acvatice.

Cuvinte cheie: faună bentonică, amenajări hidrotehnice, continuitatea apelor curgătoare, treaptă piscicolă, driftul organismelor, migrarea contra curentului, rampă acvatică.

EINLEITUNG UND PROBLEMSTELLUNG

Der Aufstau der Fließgewässer führt zwangsläufig zur Verringerung der Fließgeschwindigkeit, Reduktion der Erosion, Intensivierung der Sedimentation und damit verbunden zur Akkumulation von feinkörnigen Sediment im Gewässerbett (Tittizer & Schleuter, 1989). Diese hydrologischen und morphologischen Veränderungen haben eine Umstrukturierung der benthalen Fauna zur Folge: strömungsliebende (rheophile) Arten als typische Bewohner der Fließgewässer werden durch Organismen, die strömungsarme Gewässer bevorzugen (limnophile Arten), verdrängt. In Bereichen mit erheblicher Sedimentation werden die für ein Fließgewässer typischen Hohlräume im Substrat der Gewässersohle mit feinkörnigem Sediment zugesetzt. Die für die Fließgewässer typische lithophile Fauna verschwindet somit und an ihre Stelle treten psammo- und pelophile Arten (Tittizer, 1989, Tittizer et al., 1995).

Als gravierendste Folge der Stauregulierung wird die Unterbrechung des Fließwasserkontinuums angesehen, wodurch das Migrationsverhalten der Fischfauna und des Makrozoobenthos stark eingeschränkt oder gänzlich unterbunden wird. Somit entsprechen staugeregelte Fließgewässer nicht mehr den Forderungen der Europäischen Wasserrahmenrichtlinie (WRRL-EU) (RAT DER EUROPÄISCHEN UNION 2000). Um auch staugeregelte Fließgewässer in einem guten ökologischen Zustand zu versetzen, müssen Maßnahmen zur Wiederherstellung des Fließwasserkontinuums getroffen werden.

Ziel der vorliegenden Untersuchungen war die Besiedlung im Oberwasser- und Unterwasserbereich der Stauwehre zu ermitteln, um durch deren Vergleich die Isolationswirkung von Stauwehren auf die Biozönose (aquatische Makroinvertebraten) nachzuweisen.

Zudem sollte die Besiedlung als auch die Drift in den Schleusenkammern und Fischpässen ermittelt werden, um die Auswirkung dieser Bauwerke auf das Makrozoobenthos aufzuzeigen. Besonderem Augenmerk wurde dabei auf die Effektivität der Fischpässe für das Migrationsverhalten der aquatischen Makroinvertebraten gelegt. Zu diesem Zweck wurden Gegenstromwanderung und Drift im freien Wasser ermittelt und die dabei gewonnenen Ergebnisse mit den Daten aus den Fischtreppen verglichen.

Beschreibung des Untersuchungsgebietes

Das Einzugsgebiet der Lahn ist mit einer Fläche von 5.947 km² das größte des rechtsrheinischen Schiefergebirges. Die Lahn entspringt 628 m ü. NN am Südhang des Rothaargebirges und mündet nach 242 km bei Lahnstein in den Rhein.

Schon im 13. Jh. herrschte reger Schiffsverkehr auf der Lahn. So wurde z.B. der Kalkstein, der zw. 1276 und 1289 für den Bau der Koblenzer Stadtmauer verwendet wurde, über die Lahn aus Diez versandt.

Die ersten Versuche, die Lahn zwischen Diez und Lahnstein schiffbar zu machen, datieren aus dem 16. Jh. Eine vollständige Stauregulierung erfolgte jedoch später, zwischen 1905 und 1964. Die Frachtschifffahrt an der Lahn endete 1971. Seitdem ist sie ein reines „Freizeitgewässer“ und wird neben Fahrgastschiffen hauptsächlich von Sportbooten befahren.

Das Untersuchungsgebiet erstreckt sich vom Oberwasser Cramberg (Lahn-km 91) bis zur Mündung unterhalb der Schleuse Niederlahnstein (Lahn-km 135). In diesem Abschnitt befinden sich 10 Stauwehre von denen 5 mit Fischaufstiegsanlagen versehen sind. Vier davon sind einfache Beckenpässe (Cramberg, Scheidt, Kalkofen, Ahl), während sich in Bad Ems eine rauhe Gleite befindet (Abb. 1).

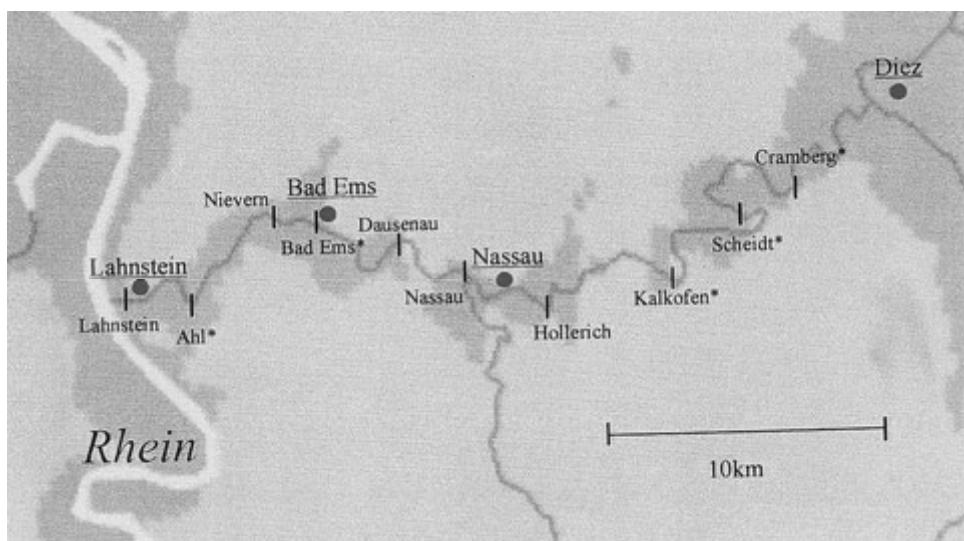


Abbildung 1 - Lage der Stauwehre an der Lahn. Stauwehre mit einer Fischtreppen sind mit einem (*) gekennzeichnet.

MATERIAL UND METHODEN

Um den Makroinvertebratenbestand im Ober- bzw. Unterwasser der Stuhaltung zu ermitteln, wurden jeweils zehn Steine aus einer Tiefe von 20-40 cm aus dem Uferbereich entnommen. Dabei wurden möglichst rauhe und bewachsene Steine ausgewählt.

Der Bestand in den Fischtreppen wurde mit Hilfe eines Pfahlkratzers erhoben, wobei sowohl die Wände als auch der Boden abgesammelt wurde. Der Artenbestand in den Schleusenkammern wurde mit Hilfe einer Dredge erfasst, die

vom Hand 5 bis 10 m am Boden und während des Hochziehens an der Wand entlang gezogen wurde (Abb. 2).



Abbildung 2 - Gesamtansicht einer Fischtreppen des Typus „einfacher Beckenpass“.

Die Erhebung in der rauen Gleite Bad Ems geschah mit Hilfe eines Surber-samplers. Dabei wurden große Steine eingesammelt, abgebürstet und das verbliebene feine Substrat mit der Hand verwirbelt.

Um die Drift in den Fischtreppen zu ermitteln, wurde in regelmäßigen Abständen ein Netz mit einer Maschenweite von 400 µm über das gesamte Querschnitt der Fischtreppen exponiert. Die Expositionsduer betrug jeweils 24 Stunden.

Die Erfassung der Drift in den Schleusenkammern erfolgte mit Hilfe eines Reusenschlittens (Abb. 3 und 4). Durch die turbulente Strömung, die durch den Schraubenstrahl der Schiffe erzeugt wird, sollten die vom Oberwasser her eingespülten Organismen in der Reuse festgehalten werden.

Die Drift im „freien Wasser“ wurde ebenfalls mit Hilfe des Reusenschlittens erfasst. In regelmäßigen Zeitabständen wurde der Reusenschlitten für 24 Stunden exponiert.

Um die Gegenstromwanderung der Makroinvertebraten in der rauen Gleite Bad Ems zu erfassen, wurde eine Falle nach Thiele et al. (1998) konstruiert (Abb. 5).

Diese Falle („Benthosbox“) besteht aus fünf Kammern, die jeweils 50 x 50 cm groß sind. Die Stirnseite (Öffnung) ist gegen die Strömung gerichtet und ist mit einer Gaze bespannt, sodass nur vom Unterstrom her (also gegen die Strömung) Organismen in die Falle gelangen können. Vor der Exposition der Falle wurde der Boden mit unbesiedeltem Substrat verschiedener Korngrößen vollständig bedeckt. Die Expositionszeit betrug jeweils eine Woche. Um ein Verschieben des Substrates in der Falle und somit eine Verfälschung der Ergebnisse zu verhindern, wurden kurz vor der Bergung der Falle Trennwände eingeschoben.

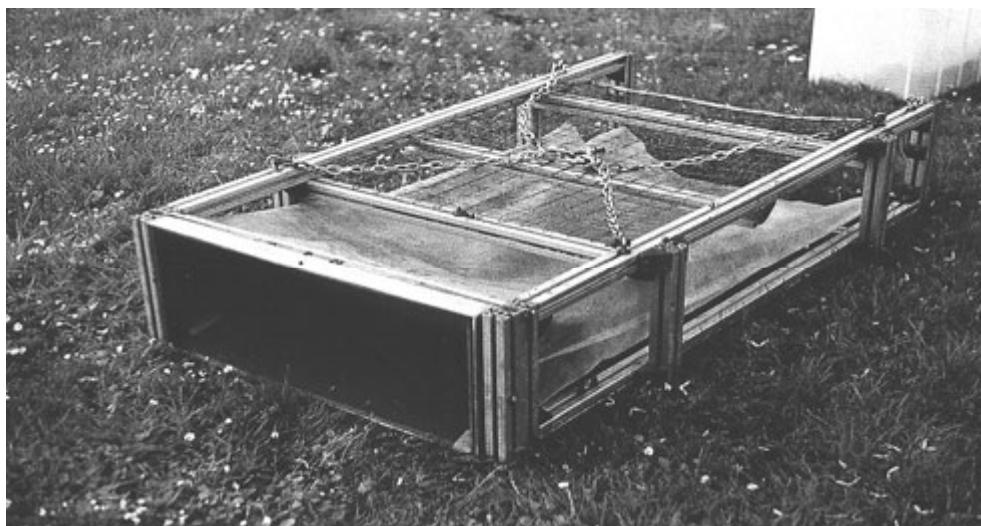


Abbildung 3 - Der Reusenschlitten. An der Öffnung befindet sich eine Reusenkehle, die das Entkommen eingespülter Organismen verhindert.

An allen Entnahmestellen der Ober- und Unterwasserbereiche sowie in der Fischtreppen wurde eine Korngrößenanalyse durchgeführt. Die Strömungsgeschwindigkeit wurde nach Mutz (1989) an der Sohle gemessen, da die sohlennahe Strömungsgeschwindigkeit ein prägender Faktor für die Besiedlung durch benthische Makroinvertebraten ist. In den Fischtreppen wurde die Strömung in der Mitte gemessen und dabei auch die Bereiche mit der höchsten bzw. niedrigsten Strömungsgeschwindigkeit ermittelt.



Abbildung 4 - Bergung des Reusenschlittens in der Schleusenkammer Niederlahnstein.

Insgesamt wurden vier Erfassungen (April, Juni, August, Oktober) an allen Standorten durchgeführt. Alle erfassten Organismen wurden in Alkohol konserviert und später im Labor determiniert. Hierbei wurden alle Individuen, außer den Chironomiden und Oligochaeten, bis zur Art bestimmt. Diese Funde sind mit ihrem Familie- oder Gattungsnahmen bezeichnet.

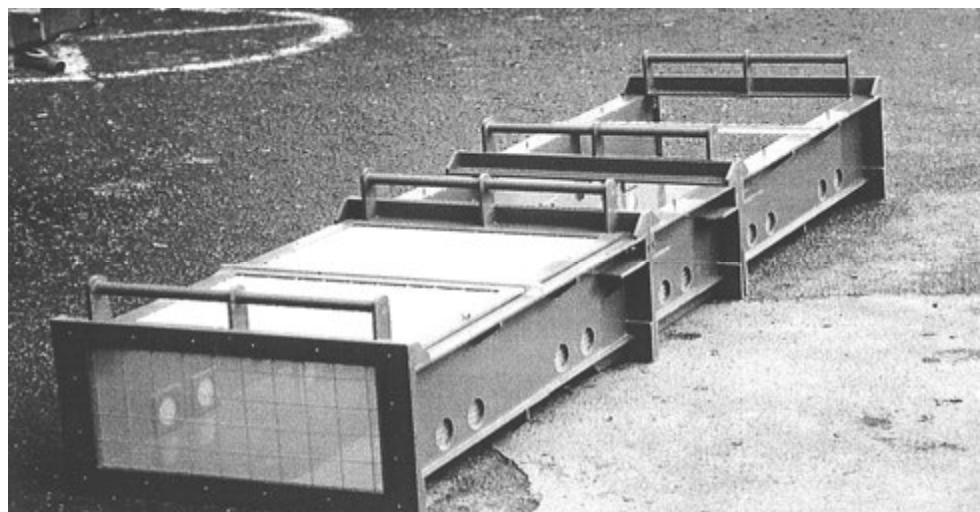


Abbildung 5 - Benthosbox nach Thiele et al. (1998) zur Ermittlung der Gegenstromwanderung von Maroinvertebraten.

Zur Beschreibung der Biozönose wurden Artenzahl und Besiedlungsdichte sowie der Rheo-Index und Ernährungstypenindex errechnet.

Der Rheo-Index nach Banning (1998) drückt die Strömungstoleranz der Biozönose aus und errechnet sich nach der Formel:

$$RI = \frac{\sum(a_i FWA \times g_i)}{\sum(a_i FWA \times g_i) + \sum(a_i SWA \times g_i) + \sum(a_i U)}$$

RI = Rheo-Index
 a_i = Abundanz der Art i (Ind./m²)
 g_i = Gewichtungsfaktor der Art i

FWA = Fließwasserart
 SWA = Stillwasserart
 U = Ubiquist.

Die Einteilung nach Fließwasserarten (zu 90 % im Rhital), Stillwasserarten (zu 90 % im Litoral/Profundal) und Ubiquisten erfolgte nach Moog et al. (1995).

Die Berechnung der Ernährungstypenindex nach Moog et al. (1995) erfolgte nach der Formel:

$$E_{WDG} = \frac{\sum wdg_i \times h_i}{\sum h_i} \times 10[\%]$$

E_{WDG} = prozentualer Anteil des Ernährungstyps Weidegänger
 wdg_i = Ernährungstypenindex der Art i (Zehnstufig nach MOOG *et al.* (1995))
 h_i = Abundanz der Art i.

Folgende Ernährungstypen wurden berechnet:

ZKL	=	Zerkleinerer	DET	=	Detritusfresser
WDG	=	Weidegänger	MIN	=	Mineralisierer
AFIL	=	aktive Filtrierer	HOL	=	Holzfresser
PFIL	=	passive Filtrierer	RÄU	=	Räuber
PAR	=	Parasiten	SON	=	Sonstige.

Sowohl die Ergebnisse der einzelnen Erfassungen als auch die Mittelwerte aller Erhebungen an einem Standort wurden nach folgender Formel standardisiert:

$$y_{st} = \frac{\mu - y}{\sigma}$$

y_{st} = standardisierter Wert σ = Standardabweichung
 y = Wert μ = Mittelwert

Die so erhaltenen Daten wurden mit Hilfe von Cluster-Analysen der euklidischen Distanzen (Neighbour-joining-Verfahren), Hauptkomponentenanalyse (PCS, Pearson, 1901) und MANOVA (Multiple Analysis of Variance, Fisher, 1954) verglichen.

Da oben genannte Analysen Einzelfunde nicht berücksichtigen, wurden zusätzlich die erfassten Daten in eine 0/1-Matrix überführt (Taxon nicht vorhanden/Taxon vorhanden) und ebenfalls Cluster- und Hauptkomponentenanalysen unterworfen (Rohlf, 1990).

ERGEBNISSE

Insgesamt zeigte die Erfassung der Biozönosen starke jahreszeitliche Schwankungen. Ein direkter Vergleich der Einzelerfassungen der Jahreszeiten wurde dadurch erschwert, da keine Normalverteilung der Abundanzen von Januar bis Oktober vorlag. Dies ist in erster Linie damit zu erklären, dass manche Organismen, wie etwa Eintagsfliegen und Köcherfliegen als Larven im Gewässer überwintern und im Frühjahr zur Fortpflanzung den Fluss verlassen. Andere Invertebraten, wie etwa Gammariden, vermehren sich im Frühjahr und Sommer

und zeigen zu diesen Jahreszeiten eine hohe Abundanz, die ab Herbst wieder abnimmt. Aus diesem Grund wurde neben den Vergleichen innerhalb einer Jahreszeit der standardisierte Mittelwert aller Erfassungen pro Untersuchungsort benutzt.

Um eine Hauptkomponentenanalyse sinnvoll durchzuführen, wurden seltene Organismen oder Einzelfunde nicht berücksichtigt. In dieser Analyse gingen nur Arten ein, die in dem Flusssystem an allen Untersuchungsorten vorkamen. Aus diesem Grund wurde eine 0/1-Matrix erstellt, die alle erfassten Arten berücksichtigt und diese analysiert. Dabei ergaben sich aber keine grundlegend abweichenden Ergebnisse zu den Vergleichen mit den Hauptkomponenten- und Clusteranalysen.

1. Fischtreppen

In den Fischtreppen (Beckenpässe) dominierten Chironomiden und Crustaceen, hier insbesondere *Gammarus pulex*, *G. roeseli* und *Asellus aquaticus*. Die Wandermuschel *Dreissena polymorpha* sowie der Höcker-Flohkrebs *Dikerogammarus villosus* treten hingegen nur in geringen Abundanzen auf.

Insgesamt zeigen die Fischtreppen eine deutliche Auf trennung der Besiedlung bei Cluster- und Hauptkomponentenanalysen, wobei sich insbesondere die rauhe Gleite Bad Ems hervorhebt.

Aufgrund der unterschiedlichen Konstruktion dieser Anlage im Vergleich mit den Beckenpässen findet sich hier eine grundlegend andere Lebensgemeinschaft. Auffallend sind hier die hohe Artenzahl und Abundanz der Köcherfliegenlarven, die sonst an keiner anderen Untersuchungsstelle auftrat.

Die drei Beckenpässe sind sich untereinander ähnlich, wobei die weiter flussaufwärts gelegenen Anlagen Cramberg und Kalkofen ein eigenes Cluster bilden (Abb. 6).

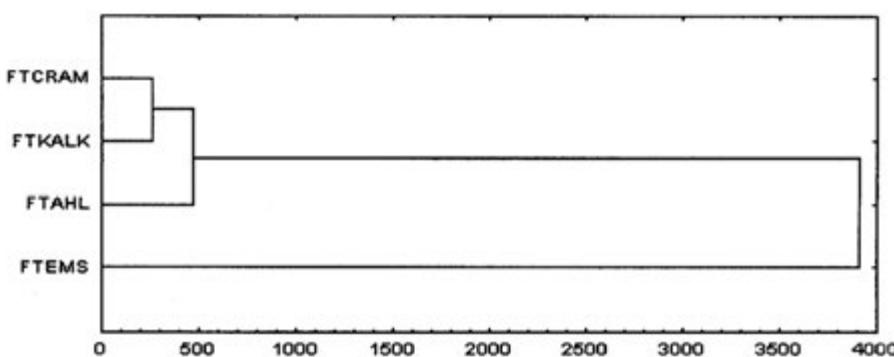


Abbildung 6 - Clusteranalyse der Fischtreppen an der Lahn. Die rauhe Gleite Bad Ems (FTEMS) unterscheidet sich stark von den in sich ähnlichen Beckenpässen Cramberg (FTCRAM), Ahl (FTAHL) und Kalkofen (FTKALK).

2. Schleusen

Die Besiedlung in den Schleusenkammern zeigte sich relativ einheitlich, es konnten lediglich geringe Unterschiede festgestellt werden (Abb. 7). Dies zeigt sich in den geringen Distanzen der Clusteranalyse. Wie auch bei den Fischtreppen ergab sich durch die statistischen Analysen keine Auf trennung nach Ober- und Unterwasser.

In vielen Schleusen fand sich die Schwebgarnele *Hemimysis anomala*, die sonst nur bei Erfassung der Drift nachgewiesen werden konnte. Das Fehlen dieser Art bei anderen Erhebungen ist vermutlich durch ihre pelagische Lebensweise erklärbar. Die Verteilung von *Dreissena polymorpha* ist hingegen auf anthropogene Ursachen (Verschleppung durch Schiffe) zurückzuführen: sechs von acht Fundstellen waren Schleusenkammern.

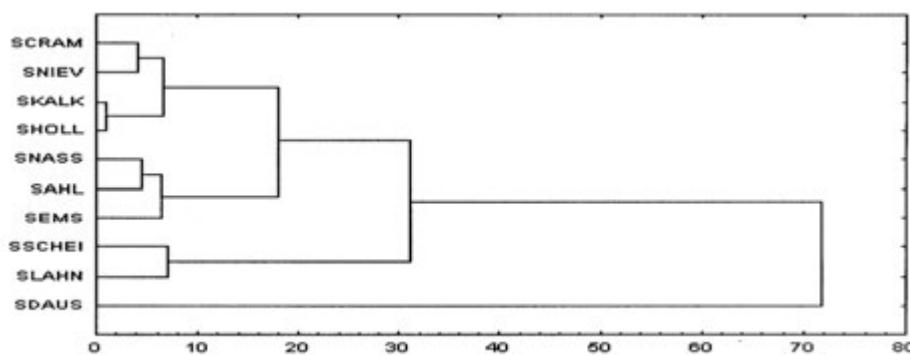


Abbildung 7 - Clusteranalyse der Besiedlung von Schleusenkammern. Zu beachten ist die geringe Distanz (im Durchschnitt 4,4 km) zwischen den Untersuchungsstellen.

3. Ober- und Unterwasserbereiche

Der statistische Vergleich der Ober- und Unterwasserbereiche aller Analysen zeigte keine Zonierung der Besiedlung entlang des Flusses (Abb. 8 u. 9).

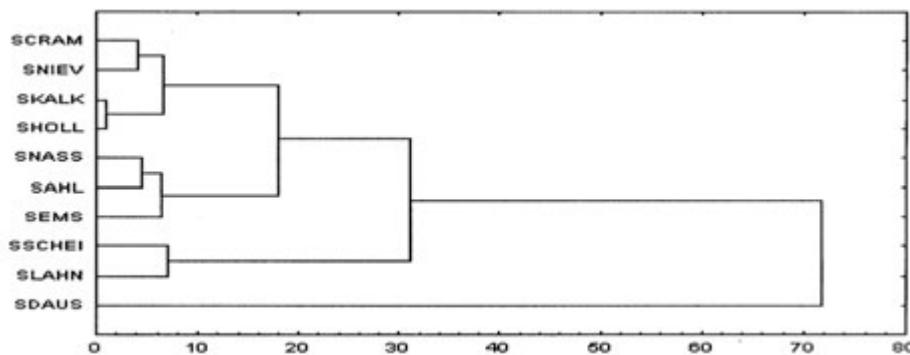


Abbildung 8 - Clusteranalyse der Oberwasserbereiche

(OCRA=Oberwasser Cramberg, OHOLL=OW Hollerich, OAHL=OW Ahl, ODAU=OW Dausenau, ONAS=OW Nassau, OKAL=OW Kalkofen, OEMS=OW Bad Ems, OLAH=OW Lahnstein, ONIE=OW Nievern, OSCH=OW Scheidt.

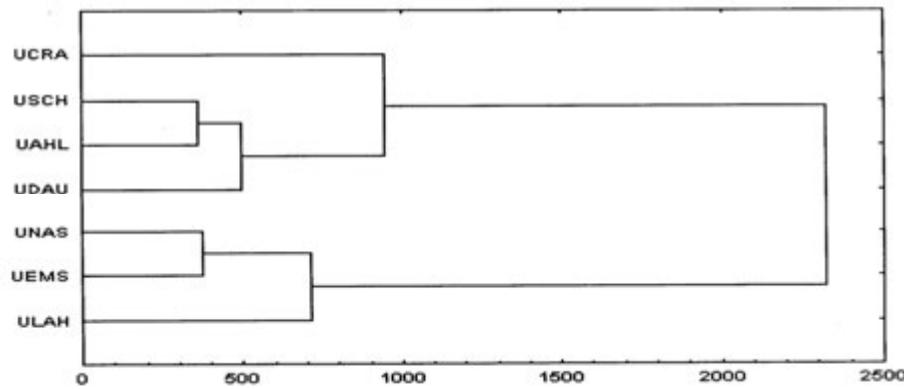


Abbildung 9 - Clusteranalyse der Unterwasserbereiche.

4. Versuche zur Drift und Gegenstromwanderung

4.1. Organismische Drift

Beim Vergleich der Drifterfassungen zeigte sich, dass die Drift durch Schleusen und im freien Strom sehr ähnlich ist, während die Drift durch die Fischtreppen sich davon deutlich abgrenzt. Die Ergebnisse der Hauptkomponentenanalyse legen zusätzlich hohe Ähnlichkeiten der Drift in den Fischtreppen nahe. Die Zusammensetzung der Drift in den Beckenpässen zeigte eine hohe Ähnlichkeit zu der Besiedlung dieser Anlagen. Somit scheint die Besiedlung dort durch die Drift gesteuert zu sein; eine Aufwärtswanderung vom Unterwasser her ist wegen der Verschiedenheit der Biozönosen von Unterwasser und Fischtreppen unwahrscheinlich.

Im Vergleich der Drift zu den Schleusen zeigte sich wieder die geringe Variabilität der Besiedlung der Schleusenkammern. Gleichzeitig ist die Drift durch die Schleuse wie auch die Drift im Strom der Biozönose der Schleusen ähnlicher als die Drift durch die Fischtreppen (Abb. 10).

4.2. Gegenstromwanderung

Die Gegenstromwanderungsfalle nach Thiele et al. (1998) wurde 7 Tage exponiert. Insbesondere die Gammariden (*Gammarus pulex*, *G. roeseli* und *Dikerogammarus villosus*) konnten die Falle in dieser Zeit in ihrer ganzen Länge besiedeln. Dies gelang außerdem den Eintagsfliegen *Baetis rhodani* und *Caenis luctuosa* sowie der Köcherfliege *Ecnomus tenellus* und einem Individuum des amerikanischen Flusskrebses *Orconectes limosus*. In den beiden ersten Fächern fanden sich die meisten Organismen (Tab. 1).

Tabelle 1 - Wanderleistung von Makroinvertebraten in der rauen Gleite Bad Ems.

	Fach 1	Fach 2	Fach 3	Fach 4	Fach 5
<i>Dugesia sp.</i>	0,5	0,5	0	0	0
<i>Erpobdella octoculata</i>	0	0,5	0	0,5	0
<i>Asellus aquaticus</i>	0	0	0,5	0	0
<i>Dikerogammarus villosus</i>	2	0	0	0,5	0,5
<i>Gammaridae</i>	28,5	17,5	1	0	0,5
<i>Gammarus pulex</i>	43,5	44	13,5	26	17,5
<i>Gammarus roeseli</i>	1	5,5	1	2,5	0,5
<i>Orconectes limosus</i>	0	0	0	0	0,5
<i>Baetis rhodani</i>	0	0	1,5	0	0,5
<i>Baetis sp.</i>	0	0,5	0	0	0
<i>Caenis luctuosa</i>	1	2	1	0,5	0,5
<i>Cyrnus trimaculatus</i>	0	0	0	0,5	0
<i>Ecnomus tenellus</i>	1	1	0,5	0,5	0,5
<i>Hydropsyche contubernalis</i>	0,5	0	0	0	0
<i>Psychomyia pusilla</i>	0,5	0	0	0	0
Mittelwerte	5,23	4,77	1,27	2,07	1,40

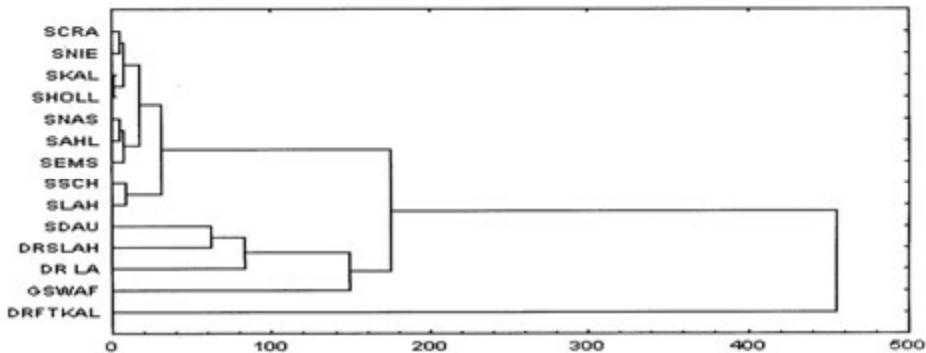


Abbildung 10 - Clusteranalyse der Schleusen und der Driftversuche (0/1-Matrix, alle Arten). Die Distanz zwischen den Schleusen ist sehr gering. Die 0/1-Matrizes zeigen geringere Distanzen als die Clusteranalyse der Hauptarten.

Aus diesen Untersuchungen ergeben sich Wanderleistungen von maximal 36 cm pro Tag. Für andere Makroinvertebraten, wie etwa *Asellus aquaticus*, konnten nur Wanderleistungen von 21 cm pro Tag nachgewiesen werden. Im Vergleich mit Literaturangaben (Pechlaner, 1986, Borchard, 1993, Lancaster et al., 1996) sind dies relativ geringe Werte. Dies könnte folgende Ursachen haben:

- Die Steine, die in der Falle als Substrat dienten, wurden längere Zeit trocken aufbewahrt und waren dementsprechend nicht bewachsen. Dadurch waren sie für einwandernde Organismen unattraktiv.
- Um die Falle an das angrenzende Sohlsubstrat anzubinden, wurde mit Steinen aus der näheren Umgebung eine Substratbrücke am unteren Ende gebildet. Dies könnte eine massive Störung der dort befindlichen Lebensgemeinschaft zur Folge gehabt haben.

- Um Drift in die Falle zu verhindern, war ein Netz mit der Maschenweite 300 µm an der Einströmöffnung montiert. Dies könnte die Nahrungsversorgung zusätzlich verschlechtert haben.

- Durch die glatte Außenfläche könnten am Eingang der Falle ungünstige Strömungsverhältnisse entstanden sein, die eine Einwanderung verhinderten.

Bei Exposition der Falle wurden Strömungsgeschwindigkeiten innerhalb und außerhalb der Falle gemessen. Es zeigte sich, dass in der Falle eine bedeutend geringere Strömung herrschte als außerhalb (0,21 m/s gegenüber 0,46 m/s außerhalb). Diese verringerte Fließgeschwindigkeit hätte die Besiedlung der Falle eigentlich erhöhen sollen, da Invertebraten dort Schutz vor der Strömung finden konnten.

5. Ernährungstypenindex und abiotische Faktoren

Der Vergleich der Ernährungstypenindices der verschiedenen Untersuchungsstellen unter Verwendung einer MANOVA ergab keine Abweichungen von den bisher genannten Ergebnissen. Im Vergleich der Ernährungstypenindices mit Substraten und Fließgeschwindigkeiten zeigte sich, dass die sohlennahe Strömung keine Unterschiede ergab, während das Substrat in Ober- und Unterwasserbereichen wie auch in den Fischtreppen signifikanten Einfluss auf die Verteilung der Ernährungstypen hat.

Ein Vergleich der Substrate und Fließgeschwindigkeiten aller Untersuchungsstellen belegt die Ähnlichkeit der Untersuchungsorte. Insbesondere zeigte sich die Ähnlichkeit aller Beckenpässe in Bezug auf diese Parameter. Dies erklärt auch die vergleichbare Besiedlung.

DIKUSSION

1. Fischtreppen

Durch die vorliegende Untersuchung konnte gezeigt werden, dass Beckenpässe ein recht einheitliches Habitat darstellen, das nur von bestimmten Organismen besiedelt wird. Entsprechend der diskontinuierlichen Verteilung aller Makroinvertebraten in dem untersuchten Flusssystem finden sich auch hier abweichende Besiedlungsmuster, die aber keine Einteilung dieser Anlagen nach Standorten oder anderen Kriterien zulassen.

Einzig die rauhe Gleite Bad Ems zeigte eine stark abweichende Besiedlung, was aufgrund ihrer Bauweise auch zu erwarten war. Die hohe

Diversität insbesondere der Köcherfliegenlarven belegt nachdrücklich die Vorteile dieser Konstruktion für das Makrozoobenthos.

Im Vergleich der Biozönosen der Beckenpässe mit Ober- und Unterwasserbereichen konnte gezeigt werden, dass diese Anlagen nur wenig zum Austausch über die Staumauern hinweg beitragen können. Da in Beckenpässen durchweg hohe Fließgeschwindigkeiten vorherrschen und der Untergrund nicht geeignet ist um Makroinvertebraten vor der Strömung zu schützen, können sich die meisten Organismen nicht in der Fischtreppen halten und werden abgedriftet. Eine

Gegenstromwanderung durch diese Anlage ist also unwahrscheinlich, da zusätzlich zu vermuten ist, dass ein Substratanschluss der Fischtreppen an das Unterwasser fehlt.

Bei Vergleich der Driftversuche untereinander zeigte sich eine genereller Unterschied zwischen der Drift durch Fischtreppen gegenüber der Drift in den Schleusenkammern und im freien Strom. Bei den letztgenannten Untersuchungen wurde die Drift jeweils am Boden erfasst, während die Fischtreppen ihre Öffnung im Oberwasser an der Wasseroberfläche haben. Dadurch bedingt können nur Organismen in eine Fischtreppen gelangen, die sich in geringer Tiefe vor dem Stauwehr aufhalten. Bei allen Analysen zeigte die Drift durch Fischtreppen eine hohe Ähnlichkeit zu deren Besiedlung. Dieser Umstand legt nahe, dass die Besiedlung durch die Drift gesteuert wird, und könnte die verhältnismäßig gleichartige Besiedlung dieser Anlagen erklären.

Zusammenfassend erscheinen Beckenpässe als Maßnahme zur Erhöhung der Durchgängigkeit staugeregelter Flüsse für das Makrozoobenthos als unzureichend. Eine Substratanbindung an das Unterwasser und die Einbringung von Steinen und Kies in die Anlagen selbst, um ein strömungsberuhigtes Lückensystem zu schaffen, sind denkbare Maßnahmen, um die Effizienz von Beckenpässen für das Migrationsverhalten von Makroinvertebraten zu erhöhen. Diese Maßnahmen verändern allerdings nicht die Drift vom Oberwasser her, die für die Besiedlung ausschlaggebend scheint. Lediglich der Neubau von anderen Aufstiegsanlagen, wie beispielsweise ein Bypass, könnte befriedigende Ergebnisse liefern.

2. Schleusen

Die Besiedlung in den Schleusenkammern war sehr gering und zeigte sich im Flusssystem weitgehend einheitlich. Aufgrund der hohen, turbulenten Strömung können nur wenige Makroinvertebraten hier existieren. Der Vergleich der Drift und Besiedlung der Schleusen zeigte große Ähnlichkeiten, sodass auch hier davon ausgegangen werden muss, dass die meisten Organismen durch die Drift in die Schleusen gelangen. Hinweise für eine Gegenstromwanderung von Makroinvertebraten durch Schleusen, wie sie beispielsweise für Fische nachgewiesen werden konnte, gaben sich nicht. Aufgrund der Strömungsverhältnisse in und unterhalb dieser Anlagen erscheint dies unmöglich, da selbst Gammariden nur bis zu einer Fließgeschwindigkeit von 44 cm/s (Borchard, 1993) wandern können.

3. Ober- und Unterwasserbereiche

Die Verteilung der Organismen in Ober- und Unterwasserbereichen zeigte sich stark unterschiedlich und diskontinuierlich. Da beispielsweise eine Art oberhalb eines Stauwehres in hoher Abundanz auftreten konnte und trotz ähnlicher Strömungs- und Substratverhältnisse unterhalb desselben Stauwehrs nur in geringer Anzahl vorkam, könnte ein indirekter Hinweis auf eine Isolationswirkung sein. Zusätzlich traten einige Neozoa nur in bestimmten Stauhaltungen auf, wie etwa *Potamopyrgus antippodarum* und *Cordylophora caspia* in den Stauhaltungen

Cramberg und Scheidt sowie *Dreissena polymorpha* in den Schleusenkammern. Diese Vorkommen weisen auf eine Verschleppung durch Schiffe hin.

Andere Organismen, wie *Jaera istri*, *Hypania invalida* und *Hemimysis anomala* zeigen ein Verbreitungsmuster, das eine Besiedlung vom Rhein nahelegen.

Die Überlagerung der Effekte Standort, Stauhaltung und Ober/Unterwasser konnte durch die vorliegenden Untersuchungen nicht abschließend beantwortet werden. Es liegt jedoch die Vermutung nahe, dass durch die schnelle Abfolge von Stauwehren sich keine schnell fließende Unterwasserbereiche herausbilden können, da der Rückstau bis an das flussaufwärts gelegenen Wehr zurückreicht. Durch die Stauregulierung wird der Fluss in den untersuchten Abschnitt stark vereinheitlicht. Zur Vermeidung dieser Uniformität wäre die Errichtung weiterer rauer Gleiten im Fluss wünschenswert.

4. Drift und Gegenstromwanderung

Gegenüber der Drift durch Fischtreppen war die Drift in den Schleusenkammern und im freien Wasser verhältnismäßig ähnlich. Unabhängig vom Flusssystem scheinen immer die gleichen Organismen die Drift als Ausbreitungsmechanismen zu nutzen. Hierzu gehören in erster Linie die Gammariden. Da durch die Stauwehre ein Faunenaustausch nur noch in einer Richtung möglich ist, wird ein großer Teil der Fauna isoliert. Hiervon sind nur diejenigen Taxa nicht betroffen, die als adulte Kompensationsflüge durchführen können. Andere Invertebraten, wie z. B. Mollusken, sind auf den Menschen als Transportvektor angewiesen. Insofern kann die Schifffahrt eine wichtige Rolle bei der Verbreitung dieser Organismen haben.

Auch bei der Erfassung der Gegenstromwanderung erwiesen sich die Gammariden als die beweglichsten Makroinvertebraten. Daneben fanden sich aber auch Eintagsfliegen- und Köcherfliegenlarven. Dies unterstützt die Ergebnisse von Williams & Williams (1993), wonach das Verhältnis von Drift zu Aufwärtswanderung etwa gleich ist. In der Drift finden sich i.d.R. diejenigen Organismen die auch eine flussaufwärts gerichtete Wanderung zeigen, wodurch die Verdriftung ausgeglichen wird.

LITERATUR

- BANNING M., 1998 – *Auswirkungen des Aufstaus größerer Flüsse auf das Makrozoobenthos dargestellt am Beispiel der Donau*. Essener ökologische Schriften. **9**: 1-296.
- BORCHARD D., 1993 – *Effects of flow and refugia on drift loss of benthic macroinvertebrates: implications for habitat restoration in lowland streams*. Freshwater Biol. **29**: 221-227
- FISHER R. A., 1954 – *Statistical Methods for Research Workers*. 12th Edition. Oliver & Boyd, Edinburgh, 356 S.
- LANCASTER J., HILDREW A.G., GJERLOV C., 1996 – *Invertebrate drift and longitudinal transport processes in streams*. Can. J. Fish. Aquat. Sci. **53**: 572-582.

- MOOG O. (Hrsg.), 1995 – *Fauna Aquatica Austriaca*. Wasserwirtschaftskataster, BMLF, Wien.
- MUTZ M., 1989 – *Muster der sohlennahen Strömungsgeschwindigkeit und deren Bedeutung für kleinräumige Verteilung des Makrozoobenthos auf der Gewässersohle*. Deutsche Gesellschaft für Limnologie (DGL), Mitteilungen I/89.
- PEARSON R., 1901 – *On Lines and Planes of closest Fit to a System of Points in Space. Philosophical Magazine*. **2**: 557-572.
- PECHLANER R., 1986 – “*Driftfallen*” und Hindernisse für die Aufwärtsbewegung von wirbellosen Tieren in rhithralen Fließgewässern. *Wasser und Abwasser*. **30**: 431-463.
- RAT DER EUROPÄISCHEN UNION 2000 – Richtlinie 2000/607EG des Europäischen Parlaments und des Rates zur Schaffung eines Ordnungsrahmens für Maßnahmen der Gemeinschaft im Bereich der Wasserpolitik. Amtsblatt der Europäische Gemeinschaft L327 vom 22. Dezember 2000, Brüssel.
- ROHLF F.J., 1990 – NTSYS-PC Version 2.1. *Numerical Taxonomy and Multivariate Analysis System*. Applied Biostatistics Inc., New York.
- THIELE V., MEHL D., BERLIN A., HUIJSSON L., 1998 – *Untersuchungen zur Gegenstromwanderungsverhalten aquatischer und Gegenstromflug merolimnischer Evertebraten im Bereich von Fischaufstiegsanlagen in Mecklenburg-Vorpommern*. Limnologica. **28 (2)**: 167-182.
- TITTIZER T., 1989 – *Die Rolle des Makrozoobenthos in der Fließgewässerökologie und seine Bedeutung für die Ökosystemforschung*. In: Kommunikation im Ökosystem, Ekopan-Verlag. 67-88.
- TITTIZER T., SCHLEUTER A., 1989 – *Über die Auswirkung wasserbaulicher Maßnahmen auf die biologischen Verhältnisse in den Bundeswasserstraßen*. Deutsche Gewässerkundliche Mitteilungen (DGM). **33**: 91-97.
- TITTIZER T., LEUCHS H., BANNING M., 1995 – *The consequences of the river impoundment for the macrozoobenthos – demonstrated at the exemple of the Danube River in Germany*. Miscellanea Zoologica Hungaria. **10**: 73-84.
- WILLIAMS D. D., WILLIAMS W. E., 1993 – *The upstream/downstream movement paradox of lotic invertebrates: Quantitative evidence from a Welsh Mountain Stream*. Freshwater Biol. **30**: 199-218.

THE ORNITHOFAUNA FROM THE LACU SĂRAT II AREA (BRĂILA COUNTY) BETWEEN 2008 AND 2010

MARIUS VERNESCU

The Museum of Brăila, Department of the Natural Science, Șoseaua Parcului Street, no. 15, 810296,
Brăila, Brăila County, România, e-mail: vmarius71@yahoo.com

ABSTRACT: In this paper, the author shows data related to the history of Lacu Sărăt, some details regarding the emplacement and topography of the area, water resources, climate and air quality information, as well as general data regarding the flora and fauna of the area mentioned above. The main idea of the article relates to the monitoring of the birds catalogued in the Lacu Sărăt II Brăila during the time from 2008 to 2010. The conclusion of the article is: in the studied area we experience natural parameters disturbing birds living; we remind here the dry season of the summer, the icing of the lake during hard winter time, as well as human influence involving grazing (sheeps and cattle), which affects species that are nesting on the lake shore (limicoles, etc.).

Key words: aquatic birds, terrestrial birds, wild birds monitoring program, area of avifauna importance.

REZUMAT: Ornitofauna din zona Lacu Sărăt II (jud. Brăila) în perioada 2008-2010.

Lucrarea prezintă câteva detalii de amplasament, date referitoare la topografia zonei, la resursele de apă, informații referitoare la clima și calitatea aerului, calitatea apei și a nămolului sapropelic, dar și generalități privind flora și fauna din zona Lacu Sărăt II. Articolul aduce informații referitoare la populațiile de păsări observate în zona Lacu Sărăt II Brăila (2008-2010) în cadrul Programului anual de Monitorizare a Păsărilor Comune. Factorii antropici care perturbă viața speciilor de păsări din zona Lacu Sărăt II sunt: păsunatul, având de suferit mai ales specii care cuibăresc pe malul apei (*Vanellus vanellus*, Linnaeus, 1758; *Recurvirostra avosetta*, Linnaeus, 1758; *Himantopus himantopus*, Linnaeus, 1758; *Charadrius dubius*, Scopoli, 1786; etc.) (Bruun et al., 1999), turismul și braconajul.

Cuvinte cheie: păsări de apă, păsări terestre, monitorizarea păsărilor sălbaticice, zonă de importanță avifaunistică.

INTRODUCTION

Location: Lacu Sărăt II ("Salt Lake II") is located near the spa of the same name and can be identified with the following GPS coordinates: 45°12'26" N; 27°53'45" E (Fig. 1).

Brăila County Lakes are of three categories: clastocarstic, river estuaries and lakes meadow. The first category includes lakes Ianca, Plopă, Movila Miresii,

Secu, Lutu Alb, Tătaru, Colțea, etc. The second category includes lakes Jirlau, Câineni, Ciulnița and the third category includes the lakes from Danube Valley (Avedic, unpublished data).

Lacu Sărăt II is located in the north-east of the Romanian Eastern Plains, bordered by Călmățui valleys, Siret and Danube. There is a chain of lakes in this area, some of which are rich in easy soluble salts, these having therapeutic qualities, for which some of them are used to treat certain diseases and others are just a stop place for birds (Băncilă, 1937).

Lacu Sărăt II - Brăila is positioned in an old abandoned Danube flow, at the river terrace level, which was covered with loess deposits (Băncilă, 1937).

The lake originates from an elongated form of 2.5 km, with a width of 400 m. At the end of the 19th century it divided into two pools with a total area of 2.5 km², forming an approximate 1.5 km long northern lake and an elongated south lake (Lacu Sărăt II), with the length of 1 km. They are now connected through underground channels, but also by the means of pipes.



Figure 1 – The map of Lacu Sărăt I and II – Brăila (www.googleearth.com)

Studies in this area of literature revealed the lack of data regarding Lacu Sărăt II in terms of ornithofauna. Most of the scientific work was focused on analysing salinity of the water in the lake, while others have focused on vegetation in the area. The work of Ms. D. Albu entitled “Nature reserves, protected areas and natural monuments of Braila lands” contains some information about lakes salinity,

vegetation and “*Artemia salina*” - the only crustacean that lives in the two lakes. Important data regarding danubian eastern migration corridor were found in “Ecology and ethology of waterbirds in Small Island of Braila”, where the limits of the migration routes are presented; this study is a landmark work for the Lacu Sărat II because this lake is close to the Danube. Information about birds in Lacu Sărat II area were also found in “Salt Lake area ornithofauna” work (Vernescu & Matetovici, 2010), as in several articles published in the Despre păsări (“About Birds”) magazine - 2008 to 2010 numbers - (Romanian Ornithological Society publication), articles signed by N. Onea, M. Avedic, M. Vernescu and forthcoming article founded by M. Avedic “Ecology and bird migration on danubian eastern migration corridor, Salt Lake area, 2001-2002 (Avedic & Vernescu, 2008; Avedic 2003; Onea et al., 2009).

Regarding the importance of research conducted by me in the Lacu Sărat II area I can say that: Common Birds Monitoring Program aims to identify population changes of common brooding birds in Romania; at the same time we can have a picture of birds population status in the country, because it not only selects areas with many birds but areas with fewer birds too.

MATERIALS AND METHODS

Materials: Observation of bird species was done using Nikon Monarch 10X42DCF binoculars and a 40 x 60 (Kenko - Pro Field 63) scope, identifying birds where it was the case with the Identification Manual "Birds in Romania and Europe" by Dan Munteanu, Romanian version published by the Romanian Ornithological Society (Munteanu, 1992). The photos were taken with a Sony Cyber-shot digital camera.

Data related to equipment used:

1. Nikon Monarch 10X42DCF has the following technical characteristics:

- Magnification (x) – 10;
- Objective diameter (mm) – 42;
- Angular field of view (Real/degree) – 5.5;
- Angular field of view (Apparent/degree) – 51.3;
- Field of view at 1,000m (m) – 96;
- Relative brightness – 17.6;
- Eye relief (mm) – 18.5;
- Close focusing distance (m) – 2.5;
- Weight (gr.) – 620;
- Length (mm) – 146;
- Width (mm) – 129 ;

2. Kenko PRO FIELD 63 scope has the following characteristics:

- Tube type;
- Motor – not;
- Objective lens (mm) – 63;
- Angular field of view (degrees) - 9.0;
- Weight (gr.) – 900;
- Cordless – no;
- Digital camera - not attached;

3. Digital Camera Sony Cyber-shot DSC-H9, 8.1MP

- Effective Pixels (Mega Pixels) – 8.1;
- High Definition output for displaying still images on a HD TV (using optional cable);
- Optical Zoom – 15x;
- Precision Digital Zoom – 30x;
- Smart Zoom – 25.5x HD, up to 76x (with VGA);
- NightShot for shooting in complete darkness using infra-red technology;
- Super large tilting 3-inch (7.5cm) LCD screen, and electronic viewfinder;
- Carl-Zeiss Vario-Tessar lens;
- 1 cm macro for ultra close-up shooting;
- BIONZ processor for improved picture quality and high speed operation;
- MPEG Movie VX (VGA 30fps movie mode with audio);
- DRO technology to automatically correct contrast and exposure.

Water resources: The lake is fed by the following water sources: groundwater and the water layer from precipitation, and more recently, pumped water from the Danube in times of major drought. After 1990, when the irrigation system was almost destroyed, additional underground water intake was reduced. The power of the underground lake is reduced and because of droughts in recent years (Avedic, 2003).

Hydrogeological data reveals that Lacu Sărăt - Braila is fed by water from the aquifer water and precipitation (Gâștescu, 1971).

Like most places in the country, the man put his imprint on this area, altering the structure of the lake. Configuration of the lake, with two compartments - Lacu Sărăt I and II - is a result of both natural evolution and human intervention, by marking the 1957-1958 period with the building of industrial railways and roads that connects Lacu Sărăt and Chiscani areas (Matetovici 2009).

Currently Lacu Sărăt II is much changed in size, if we refer to the years 2008-2009, he now has a larger area by at least 30% (Fig. 2).

Climate: The climate in Lacu Sărăt – Braila area is characterized by a continental climate with steppe issues. The average annual temperature is 10.3 ° C in January and 21.6 ° C in July. On average, in the summer the maximum temperature recorded is in July (40 ° C, 41.5 ° C), and the minimum in winter can reach -26.5 ° C, with an annual average of 23 ° C (Matetovici, 2009).

Winters are cold, with cold and strong blizzards, slightly enhanced by the presence of the Danube, and summers are hot, also moderated by the presence of the Danube. The pressure of the atmosphere is characterized by a maximum of 757.3 mm in winter due to anticyclone fields and a minimum of 754 mm in summer when the temperature is high. Minimum average variation is characterized by a morning peak and an afternoon minimum. Sunshine totals around 2,000 hours during the year, period exceeded only by that of the coast and in some localities in the south of the Romanian Plain. Maximum is reached in July with about 300 hours; the average duration of sunshine in a day varies from 10 hours per day during June-July and less than 4 hours per day during December-January (Morariu et al., 1968).



Figure 2 – Lacu Sărăt II – photo Marius Vernescu 2010

Overview of Lacu Sărăt II flora and fauna: In the Lacu Sărăt II area, in terms of vegetation we find shrubs like *Hippophae rhamnoides* (Linnaeus, 1758) and *Rosa canina* (Linnaeus, 1758) and type of plants like *Anthemis nobilis* (Linnaeus, 1758) and *Euphorbia cyparissias* (Linnaeus, 1758), as well as a forest predominant with *Robinia pseudoacacia* (Linnaeus, 1758), but where we also find *Quercus robur* (Linnaeus 1758), *Carpinus betulus* (Linnaeus 1758), etc. (Albu, 1993).

The forest near the lake acts like a wind barrier, but also as a filter for the particle matter liberated by the Chiscani factory, as well as recreational space for tourists. In terms of aquatic ecology, the Lacu Sărăt with therapeutic mud presents as a closed ecosystem which consists of the following: surface deposits, lake water, underwater deposits, lacustrine fauna and flora (Gâștescu & Gruiescu, 1973).

Organic and inorganic nitrogen compounds are of interest to assess the decomposition and mineralization bioprocesses of the organic matter (Saabner, 1906). In the following table we present some data that we have received from the Environmental Protection Agency, data resulting from water and sludge analysis in Lacu Sărăt II (Tab. 1).

Table 1 - Analysis of water and sludge from Lacu Sărăt II in 2008.

<i>Ph</i>	<i>R.fix</i>	<i>O.D.</i>	<i>CBO₅</i>	<i>CCO-Mn</i>	<i>Cl⁻</i>	<i>SO₄²⁻</i>	<i>HCO₃⁻</i>
8,77	41348	4,23	41	99,2	11360	6500	164,7
<i>NO₂⁻</i>	<i>NO₃⁻</i>	<i>NH₄⁺</i>	<i>Pt</i>	<i>Ca</i>	<i>Mg</i>	<i>Na</i>	<i>K</i>
0,034	0	0,089	0,067	400	1370	7462	32

- Ph – hydrogen ion concentration;
- R.fix – fixed residue;
- O.D. – dissolved oxygen;
- CBO₅ – biochemical oxygen demand in 5 days;
- CCO-Mn – chemical consumption of oxygen, potassium permanganate method;
- Cl⁻ – chlorine;
- SO₄²⁻ – sulphate;
- HCO₃⁻ – bicarbonate (www.apmbraila.ro).

Lacu Sărăt flora: Flora is composed of bacteria, cyanophicee, diatoms, algae and volvacee, flora that adapted to harsh conditions of the lake and contributes to the phenomenon of peloidogenesis (Gheorghievici, 2005).

The lake water and mud contains aerobic bacteria which are optionally anaerobic and which, in addition to their primary role to decompose organic substances, also constitutes of food source for protozoa, rotiferi, artemisis.

Algae, with their work and death fattens the black mud, but it should not be used irrationally, rather than nature can form (Matetovici, 2009).

Around Lacu Sărăt are concentric belts of vegetation from light-silver-green to brown-red.

Thus we have *Midicago lupulina* (Linnaeus, 1758), *Verbascum blattaria* (Linnaeus, 1758), *Lappula echinata* (Linnaeus, 1758), which forms the third strip; then *Artemisia maritime* (Linnaeus, 1758), *Lepidium perfoliatum* (Linnaeus, 1758), *Trigonella coerulea* (Linnaeus, 1758) and *Delphinium consolida* (Linnaeus, 1758) form the second strip and *Salicornia herbacea* (Linnaeus, 1758) with *Aster tripolium* (Linnaeus, 1758) form the first strip (Matetovici, 2009).

Lacu Sărat area fauna: At the shore and the water surface layer (about 1m thick) we meet red crustaceans of the *Artemia salina* species (Linnaeus, 1758). This species is a primitive crustacean, with feet turned into gills, which lives in salty and very salty water. Class crustacea arthropod, Anostraca Ord., Artemiidae Fam. is related to freshwater crustaceans (ex: *Daphnia* ex Copepode and sp.) (Albu, 1993).

Near Lacu Sărat we also meet several species of mammals such as *Vulpes vulpes* (Linnaeus, 1758), *Lepus europaeus* (Pallas, 1778), *Apodemus sylvaticus* (Linnaeus, 1758), possibly *Sus scrofa* (Linnaeus, 1758) and *Capreolus capreolus* (Linnaeus, 1758), especially since ones hunt on this land. Most, however, is the species of seabirds in this area, whether migratory or sedentary, some of them nesting here (Vernescu & Matetovici, 2010; Bruun et al., 1999).

The most important part of this article is dedicated to Lacu Sărat II ornithofauna monitored in 2008-2010. Located a short distance from the Danube, Lacu Sărat II is part of the eastern danubian migration corridor as a place for feeding and resting for many species of wild birds, which makes the area of great scientific interest (Onea, 2002; Hagemeijer et al., 2000).

Common bird monitoring program was launched in 2006 by Romanian Ornithological Society and is designed to detect changes in populations of the common brooding birds. Since 2007 in addition to ROS, also joined as organizers The Association for Bird and Nature Protection "Milvus Group" and the Faculty of Biology and Geography of Babes - Bolyai University (www.sor.ro).

Obtaining data is voluntary, requiring only two days of field trips, a day in May and one in June. The advantage of this program is that volunteers can choose to monitor an area in the town or the town vicinity.

The method used is called squares method; in this study we made two trips per year for 3 years (2008-2010), squares having a 2 km side, thus making the selection: the volunteer indicates the area where he wants to monitor, and project managers, by lot, show a 2x2 km square. Using squares method, we can have an accurate picture about the population status of birds in the country, because it not only selects areas with many birds but fewer birds areas too. Using these criteria for selection of squares is likely to cover in a large proportion of the habitats.

The volunteer receives a map of the area where he has to do monitoring (Fig. 3), the map that is superimposed with the 2x2 km square, and 25 points of observation indicated, from which we must choose 10 points to be monitored each year. It is recommended that before the monitoring, one should go and mark on the GPS the 10 points, so the next day the field trips will be made quickly. Besides the map, the volunteer is also given a diary of land with diagrams and tables where you note the birds seen and the main habitat type.

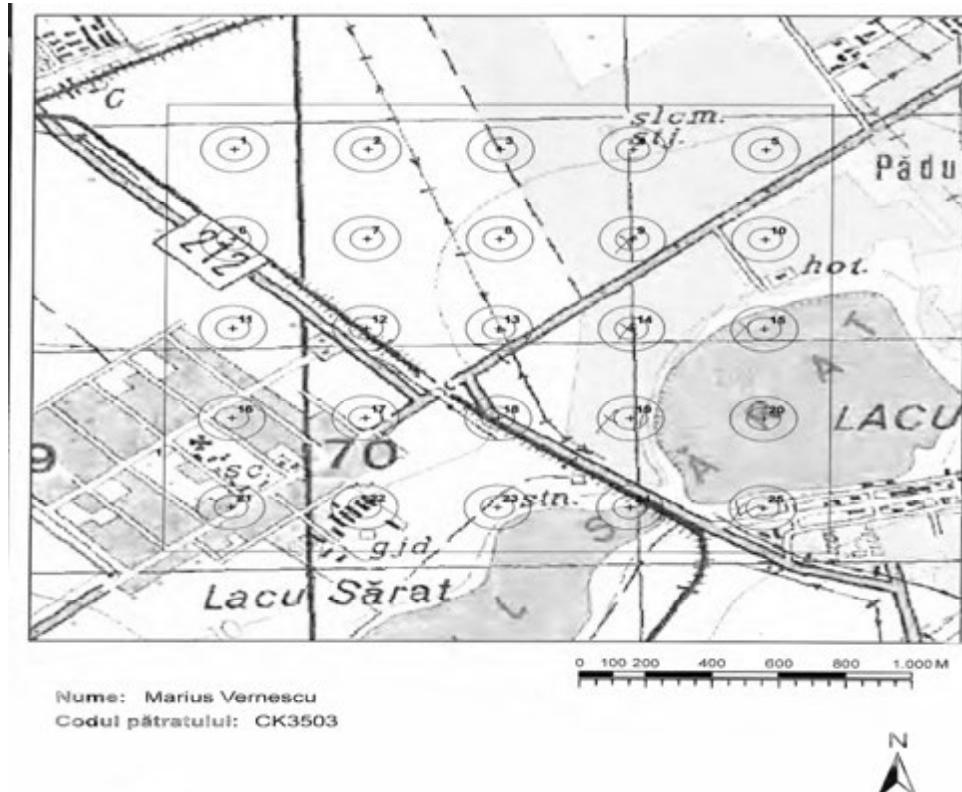


Figure 3 - The map points of the Lacu Sărat II (by Romanian Ornithological Society).

Method of counting birds is easy because the volunteer has to stay at each point 5 minutes and record the species, number of birds seen or heard near that point on three categories:

-in the circle with a radius of 100 m will be noted birds observed on the ground, on vegetation or in flight;

-birds that were observed in flight over the monitored area but not down to the ground;

-birds observed outside the circle of 100 m.

Volunteer will be at the point indicated by the GPS, not to move in the circle for 5 minutes, but can rotate and can use binoculars and camera. In the field log we note the exact time we arrive in each point, we estimate wind speed by Beauford scale (with the specification that should not exceed scale No. 3, because monitoring is not correct, mainly in terms of detecting birds by song), bird species and names under the Euring Code.

Volunteer has to make observations alone. If more people are out on the field is important that the person who offered to take care of that area to record only what species he saw and the choice of the 10 points will be made in the order presented on the "Point selection form". If a point is not accessible it will

automatically switch to the next one, recording the reason for that. The 10 points will remain the same in the following years, if the volunteer wishes to continue this study.

Ornithological observations are made twice a year, with the first period between April 15 to May 15, and 16 May to 15 June the second period, provided that between the two outputs we are required at least a 14 day period. Monitoring is recommended starting at 5 a.m., but it might also start later, as long as it ends by 10 a.m., for this time period the birds are most active. After the volunteer has completed the two field trips and noted all in the field logs, information is stored by the Romanian Ornithological Society (Cluj), processed and entered into the database. It is very important for the volunteer to repeat year after year these field trips for the accuracy of the information even if the habitat changes (www.sor.ro).

RESULTS AND DISCUSSION

After monitoring this area during 2008-2010, there were observed birds that were not identified in years before this time period and here we can mention: *Aythya nyroca* (Guldenstadt, 1770), *Tadorna ferruginea* (Pallas, 1764), *Himantopus himantopus* (Linnaeus, 1758), *Recurvirostra avosetta* (Linnaeus, 1758), *Acrocephalus arundinaceus* (Linnaeus, 1758), *Vanellus vanellus* (Linnaeus, 1758), *Nycticorax nycticorax* (T. Forster, 1817), *Charadrius dubius* (Scopoli, 1786), etc. Certain nesting species in the area of Lacu Sărat shore II are: *V. vanellus*, *R. avosetta*, *C. dubius*, *H. himantopus*.

I want to specify that species monitored and listed in the following tables are only the ones which were observed during the common birds monitoring program period, every year from April to June, hence the two per year mandatory field trips.

In 2008 most of the species identified in the monitored area belong to the following Orders: **Passeriformes** (13), **Charadriiformes** (7), **Anseriformes** (2), **Ciconiiformes** (2), **Falconiformes** (1), **Piciformes** (1), **Columbiformes** (3), and the Family who stands out from **Passeriformes** is Corvidae (6). By quantity, in 2008 the highest number was represented by *Passer domesticus* (Linnaeus, 1758), with 93 members (Tab. 2).

Phenological sub-groups representation in 2008 is as follows: we have 15 species of summer guests, 9 sedentary species, 3 partially migratory species and 2 summer guests species which we sometimes encounter during winter (Fig. 4).

In 2009 most species identified in the study area belong to the orders **Passeriformes** (10), **Charadriiformes** (3), **Anseriformes** (2), **Phalconiformes** (1), **Piciformes** (1), **Columbiformes** (1), **Galliformes** (1) and of **Passeriformes**, the most represented is the Corvidae family (3). In terms of quantity in 2009 higher numbers belong to *Cygnus olor* (Gmelin, 1789) species - 106 pieces (Tab. 3).

Table 2 – Species of birds observed at Lacu Sărat II during April - June 2008.

No.	Scientific name	0-50 m	50-100 m	Over 100 m	In flight	Phenological subgroups FEN	Total number of birds
1	<i>Acrocephalus arundinaceus</i>	2	0	0	0	OV	2
2	<i>Charadrius alexandrinus</i>	2	0	0	0	OV	2
3	<i>Charadrius dubius</i>	2	1	0	0	OV	3
4	<i>Chlidonias niger</i>	0	0	0	5	OV	5
5	<i>Ciconia ciconia</i>	4	0	0	0	OV	4
6	<i>Cygnus olor</i>	4	0	0	0	MP	4
7	<i>Columba livia domestica</i>	0	0	0	12	S	12
8	<i>Corvus corone cornix</i>	18	0	0	1	S	19
9	<i>Corvus monedula</i>	25	2	2	2	S	31
10	<i>Cuculus canorus</i>	0	0	1	0	OV	1
11	<i>Dendrocopos major</i>	1	0	0	0	S	1
12	<i>Falco subbuteo</i>	0	0	0	1	OV	1
13	<i>Garrulus glandarius</i>	3	2	0	2	S	7
14	<i>Hirundo rustica</i>	0	2	0	72	OV	74
15	<i>Lanius collurio</i>	1	1	0	0	OV	2
16	<i>Larus cachinnans</i>	0	0	0	3	S	3
17	<i>Melanocorypha calandra</i>	11	12	3	24	MP	50
18	<i>Nycticorax nycticorax</i>	4	0	0	1	OV	5
19	<i>Numenius arquata</i>	5	0	0	0	OV	5
20	<i>Oriolus oriolus</i>	0	1	0	0	OV	1
21	<i>Passer domesticus</i>	48	3	2	40	S	93
22	<i>Phalacrocorax carbo</i>	0	0	0	4	OV-RI	4
23	<i>Pelecanus onocrotalus</i>	0	0	0	32	OV	32
24	<i>Pica pica</i>	32	3	4	30	S	69
25	<i>Recurvirostra avosetta</i>	15	0	4	3	OV	22
26	<i>Sturnus vulgaris</i>	46	5	6	21	MP	78
27	<i>Streptopelia decaocto</i>	0	0	0	5	S	5
28	<i>Tadorna tadorna</i>	8	9	0	4	OV-RI	21
29	<i>Vanellus vanellus</i>	17	3	0	23	OV	43

LEGEND: FEN – Phenological subgroups (S - sedentary; MP – partially migratory; OV – summer guests; P – species in the passage; MP-OI - partially migratory end / or winter guests; OV-RI - summer guests / rare winter).

Phenological sub-groups representation in 2009 is as follows: we have 8 summer guests species, 8 sedentary species, 3 partially migratory species (Fig. 5).

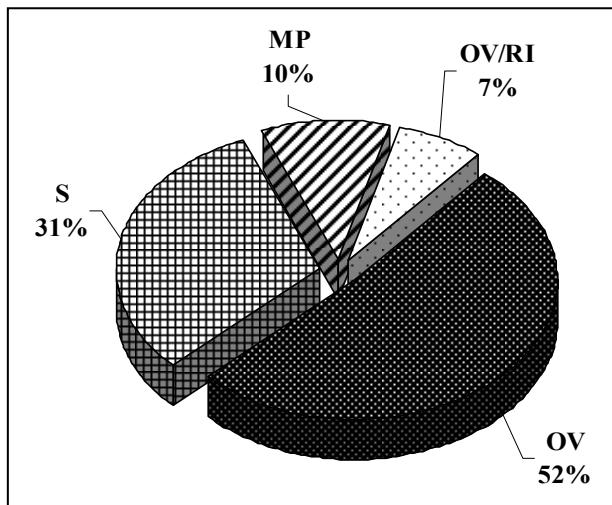


Figure 4 - Representation of phenological sub-groups in 2008. Legend: OV- summer guests species; S - sedentary species, MP - partially migratory species, OV / RI - species guests summer / winter rarely encountered.

Table 3 – Species of birds observed at Lacu Sărăt II during April - June 2009.

No.	Scientific name	0-50 m	50-100 m	Over 100 m	In flight	Phenological subgroups FEN	Total number of birds
1	<i>Charadrius dubius</i>	23	0	2	0	OV	25
2	<i>Cygnus olor</i>	35	20	45	6	MP	106
3	<i>Corvus corone cornix</i>	3	0	0	0	S	3
4	<i>Corvus frugilegus</i>	3	0	0	4	S	7
5	<i>Dendrocopos major</i>	1	0	0	0	S	1
6	<i>Falco subbuteo</i>	0	0	0	1	OV	1
7	<i>Hirundo rustica</i>	3	3	0	12	OV	18
8	<i>Luscinia megarhynchos</i>	3	3	0	1	OV	7
9	<i>Melanocorypha calandra</i>	1	0	0	1	MP	2
10	<i>Passer domesticus</i>	12	3	3	14	S	32
11	<i>Phasianus colchicus</i>	1	0	0	2	S	3
12	<i>Parus major</i>	1	0	0	1	S	2
13	<i>Pica pica</i>	14	1	0	5	S	20
14	<i>Recurvirostra avosetta</i>	6	9	12	3	OV	30
15	<i>Sylvia atricapilla</i>	2	0	0	1	OV	3
16	<i>Streptopelia decaocto</i>	1	0	0	3	S	4
17	<i>Sturnus vulgaris</i>	9	0	0	9	MP	18
18	<i>Tadorna tadorna</i>	20	4	5	15	OV	44
19	<i>Vanellus vanellus</i>	8	0	0	5	OV	13

LEGEND: FEN – Phenological subgroups (S - sedentary; MP – partially migratory; OV – summer guests; P – species in the passage; MP-OI - partially migratory end / or winter guests; OV-RI - summer guests / rare winter).

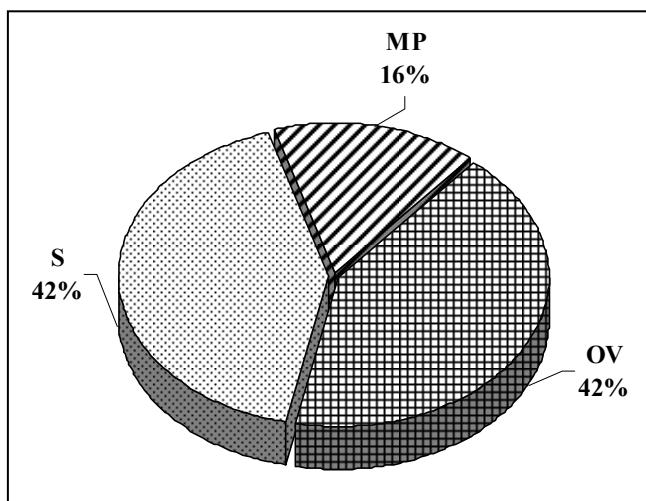


Figure 5 - Representation of phenological sub-groups in 2009. Legend: OV - summer guests species; S - sedentary species, MP - partially migratory species.

In 2010 most species identified in the study area belong to the orders **Passeriformes** (12), **Charadriiformes** (5), **Anseriformes** (5), **Coraciiformes** (2) **Piciformes** (1), **Columbiformes** (1), **Galliformes** (2), **Ciconiiformes** (1) and of the **Passeriformes**, the most represented is the Corvidae family (3). In terms of quantity in 2009 most copies belong to the *Cygnus olor* (Gmelin, 1789) species, with 31 pieces (Tab. 4).

Table 4 - Species of birds observed at Lacu Sărăt II during April - June 2010.

No.	Scientific name	0-50 m	50-100 m	Over 100 m	In flight	Phenological subgroups FEN	Total number of birds
1	<i>Acrocephalus arundinaceus</i>	0	0	1	0	OV	1
2	<i>Aythya nyroca</i>	13	0	0	0	OV-RI	13
3	<i>Anas platyrhynchos</i>	2	0	0	4	MP-OI	6
4	<i>Chardrius dubius</i>	5	4	1	0	OV	9
5	<i>Chlidonias niger</i>	3	4	0	8	OV	15
6	<i>Cygnus olor</i>	21	9	1	0	MP	31
7	<i>Columba livia domestica</i>	3	0	0	8	S	11
8	<i>Corvus corone cornix</i>	2	1	0	4	S	7
9	<i>Corvus frugilegus</i>	2	0	0	0	S	2
10	<i>Egretta garzetta</i>	3	0	0	0	OV	3
11	<i>Hirundo rustica</i>	0	0	4	15	OV	19
12	<i>Lanius collurio</i>	2	0	0	1	OV	3
13	<i>Lanius minor</i>	5	1	2	0	OV	8
14	<i>Luscinia megarhynchos</i>	1	1	0	0	OV	2

Continues

Table 4 – Continuation.

No.	Scientific name	0-50 m	50-100 m	Over 100 m	In flight	Phenological subgroups FEN	Total number of birds
15	<i>Melanocorypha calandra</i>	2	1	0	8	MP	11
16	<i>Merops apiaster</i>	0	0	0	2	OV	2
17	<i>Motacilla flava</i>	0	3	0	1	OV	4
18	<i>Passer domesticus</i>	13	2	0	10	S	25
19	<i>Phasianus colchicus</i>	3	2	1	0	S	6
20	<i>Pica pica</i>	8	5	0	4	S	17
21	<i>Picus viridis</i>	0	0	0	1	S	1
22	<i>Recurvirostra avosetta</i>	4	5	1	0	OV	10
23	<i>Sturnus vulgaris</i>	3	4	0	9	MP	16
24	<i>Tadorna ferruginea</i>	0	0	0	4	OV	4
25	<i>Tadorna tadorna</i>	4	4	9	4	OV	21
26	<i>Tringa glareola</i>	1	0	0	0	P	1
27	<i>Upupa epops</i>	1	0	1	3	OV	5
28	<i>Vanellus vanellus</i>	9	10	0	8	OV	27

LEGEND: FEN – Phenological subgroups (S - sedentary; MP – partially migratory; OV – summer guests; P – species in the passage; MP-OI - partially migratory end /or winter guests; OV-RI - summer guests / rare winter.

Phenological sub-groups representation in 2010 is as follows: we have 14 species of summer guests, 8 sedentary species, 3 partially migratory species, one summer guest who sometimes appears during winter, one species in the passage and one partially migratory species but also encountered during winter (Fig. 6).

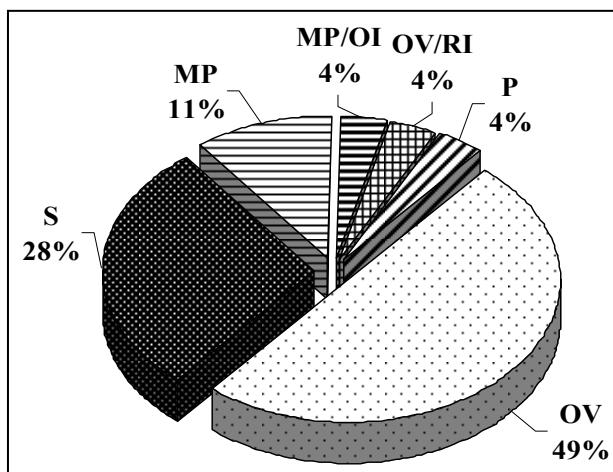


Figure 6 - Representation of phenological sub-groups in 2008. Legend: OV- summer guests species; S – sedentary species, partially migratory species MP, MP / IB - partially migratory species / winter guests, OV / RI - summer guests species / winter rarely encountered; P – passage species.

CONCLUSIONS

Given that the inventory of species is between April to June we conclude that the factors which disrupt natural life of wild birds during this period in the area, are drought and rains accompanied by hail and wind which are increasingly frequent in the area and that can destroy both clock and hatched chicks.

Regarding anthropogenic factor here we remind grazing (especially sheep and cattle), especially to the detriment of nesting species in the bank (*V. vanellus*, *R. avosetta*, *H. himantopus*, *C. dubius*, etc.) and poaching that has gained momentum in recent years and tourism especially from May to September.

The area near Lacu Sărăt II, including the lake should be declared Important Bird Area, due to species of migratory birds that come here (like *A. Nyroca*), but also to European protected species nesting here (like *V. vanellus*, *H. Himantopus*), species that are disturbed by human presence, especially during nesting, knowing that in this period we have many tourists at Lacu Sărăt, and the nesting area is in the vicinity of Lacu Sărăt resort and spa.

For species observed in the area is enforced the protection and rehabilitation measures, both populations and the habitats that provide needed food, shelter and reproduction.

Danube Valley is a known migration route for wild birds (Ridiche & Kiss 2011), moving in search of favorable living conditions and Lacu Sărăt II is close to the Danube, as a staging area for them, which is found in recent years, after repeated trips here.

REFERENCES

- ALBU D., 1993 - *Nature reserves, protected areas and natural monuments of lands Braila*. Alma Publishing, Galați. 128 p.
- AVEDIC M., unpublished article - *Study birds from Salt Lake in 2002-2003*.
- AVEDIC M., VERNESCU M., 2008 - *European Birdwatch at Salt Lake - Braila County*. About Birds, Romanian Ornithological Society. 2: p. 11.
- BRUUN B., DELIN H., SVENSSON L., SINGER A., ZETTERSTROM A., MUNTEANU D., 1999 - Birds in Romania and Europe, determined Illustrated (Hamlyn Guide), published by Romanian Ornithological Society, Cluj. 320 p.
- BĂNCILĂ I., 1937 - *The Braila physical frame*. Extract from the study and local research journal "Annals of Braila", Edited by Printing Braila. p. 16.
- GÂȘTESCU P., GRUIESCU I., 1973 – *Romania countyes - Braila county*. RSR Academy, Bucharest. 152 p.
- GÂȘTESCU P. 1971 - *Lakes of Romania. Regional Limnology*. Romanian Academy, Bucharest. 372 p.
- GHEORGHEVICI S., 2005 - *Physical-chemical analysis and pharmacodynamic of water and mud for Salt Lake Braila*. Trajan Publishing House. p. 25.
- HAGEMEIJER W., BLAIR M., 1997 – *The EBCC Atlas of European Breeding Birds: Their Distribution and Abundance*. T & A. D. Poyser, London. p. 160.
- MUNTEANU D., 1992 - *Birds in Romania and Europe*. Edited by Romanian Ornithological Society, Bucharest. 320 p.

- MATETOVICI G., 2009 - *Anthropogenic impact on Salt Lake ecosystems* (paper license), Ecological University of Bucharest, Faculty of Natural Science and Environmental. p. 42.
- MORARIU T., MORARIU E., SAVU A., 1968 - *Lakes of Romania - the resort and tourist importance*. Scientific Publishing House, Bucharest. p. 188.
- ONEA N., VERNESCU M., AVEDIC M., 2009 - *Salt Lake area ornithological observations in Braila*. About Birds, Romanian Ornithological Society. **2**: p. 22.
- ONEA N., 2002 - *Waterfowl Ecology and Ethology in Small Island of Braila*. Braila Museum, Istros Publishing, Braila. 282 p.
- RIDICHE Mirela Sabina, BOTOND J.K., 2011 – *Data regarding the species of ringed birds found within the Danube's meadow in-between Calafat and the river Jiu (Dolj County, România)*. Braila Museum, Braila county, Romania, Department of natural Science, Journal of Wetlands Biodiversity. **1**: 130. Available on <http://www.muzeulbrailei.ro/index.php?pn=2&idn=15625815583004>.
- SAABNER-TUDURI Al., 1906 - *Mineral waters and spas in Romania*. Ed Tourism, Bucharest. 680 p.
- VERNESCU M., MATETOVICI G., 2010 - *Salt Lake area ornithofauna, Braila County*. Ed. Euro Academy, Bucharest University Bioterra. 354 p.
- [www.apmbr.anpm.ro](http://apmbr.anpm.ro) – Environmental Protection Agency, Braila county, Romania. <http://apmbr.anpm.ro>. (Accessed: November 16, 2011).
- www.googleearth.com – Google Earth Database. (Accessed: October 17, 2011).
- www.sor.ro – Romanian Ornithological Society, Bucarest, Romania. <http://www.sor.ro> (Accessed: December 20, 2011).

MUZEUL JUDEȚEAN ARGEȘ, PITEȘTI, ROMÂNIA

ARGESIS - STUDII ȘI COMUNICĂRI - seria ȘTIINȚELE NATURII, TOM XIX, 2011

NOTES

NOTE

DER DAMHIRSCH (*DAMA DAMA* L., 1758) AUF DAS TERRITORIUM DES ILFOV-KREISES

SORIN GEACU

Institut für Geographie der Rumänischen Akademie, București, Romania

Zusammenfassung: Die Einführung dieses Säugtiers im Ilfov-Kreis wurde sich mit Exemplare aus dem Şarlota-Park (Kreis Timiş) durchgeführt. Diese wurden in den Snagov (1950)-, Malu Roşu (1954)-, Buriaş (1955)- und Brânzeasca (1960)- Wälder mitgebracht. Mit der Zeit, weil die Wälder sich nahe befanden, hat sich diese Art sein Areal mehr erweitert. Im Scroviştea-Wald sind die ersten Damhirsche am Ende der 50` Jahren von Buriaş-Wald gekommen, nachher wurden Exemplare auch aus anderen Kreise (Olt, Arad u.a.) mitgebracht. Im Frühling 2011 waren auf das Territorium des Ilfov-Kreises 240 Damhirsche, von denen 223 (46 Männchen und 177 Weibchen) im Scroviştea-Wald, 12 (5 Männchen und 7 Weibchen) im Snagov-Park und 4 (1 Männchen und 3 Weibchen) im Buriaş-Wald.

Schlüßwörter: Damhirsch, Ilfov-Kreis, Rumänien.

Rezumat: Cerbul lopătar (*Dama dama* L., 1758) pe teritoriul județului Ilfov.

Popularea cu acest mamifer s-a realizat cu exemplare din parcul Şarlota (jud. Timiş). Acestea s-au adus în pădurile Snagov (1950), Malu Roşu (1954), Buriaş (1955) și Brânzeasca (1960). De-a lungul timpului, pădurile regiunii fiind apropiate, specia și-a extins arealul. La Scroviştea primii cerbi lopătari au ajuns la sfârșitul anilor '50, veniți de la Buriaş, ulterior aducându-se și din alte județe (Olt, Arad, s.a.). În primăvara anului 2011 pe teritoriul ilfovean erau 240 cerbi lopătari, din care: 223 (46 masculi și 177 femele) în pădurea Scroviştea, 12 (5 masculi și 7 femele) în pădurea Snagov-Parc și 4 (un mascul cu 3 ciute) în pădurea Buriaş.

Cuvinte cheie: cerb lopătar, județul Ilfov, România

Die Naturbedingungen

Das Areal dieses Säugtieres befindet sich im Norden des Kreises, in der Snagov-Ebene bei 90-120 m Höhe ü. M. In diesem Gebiet sind mehrere Seen, u. z. Bălteni (50 ha), Scroviştea (150 ha) und Snagov (575 ha).

Die Mittelwerte der Temperatur bei Bucureşti-Băneasa (22 km Süd) ist 11,2°C und bei Tâncaşu die jährliche Mittelwerte der Niederschläge sind 579,7 mm/Jahr.

Die vorherrschenden Bestände in der großen Wälder (cca. 20 000 ha) sind *Quercus robur* Linnaeus, 1753, *Carpinus betulus* Linnaeus, 1753, *Tilia tomentosa* Moench.

Die gegenwärtigen Populationen

Die ersten Exemplare wurden im Jahre 1950 (aus dem Şarlota-Park, Timiş-Kreis) im Snagov-Wald mitgebracht, wo in 1949 ein Hirschpark von 110 ha im Sektor vom Dorfe Siliștea Snagovului dieses Waldes, bei 35 km nördlich von Bukarest (Călinescu, 1962) entstanden wurde. Die einigen Damhirsche sind frei nach der Abschaffung des Parks in 1960 geblieben. Der Zweck war „einer zur Erziehung und zum Vertrieb der Jagdkenntnisse“ gemeint (Cotta, 1962).

Später wurden in 1955 in Buriaş-Wald (Gemeinde Periş) die ersten 15 Damhirsche, auch vom Şarlota-Park, mitgebracht. Diese wurden ein paar Wochen in einem Drahtgehege im Mittenwald gehalten, nach dem sie frei gelassen wurden.

Entlang der Zeit hat sich die Art sein Areal ausgedehnt, weil die Wälder sehr nahe waren.

Die ersten Damhirsche sind bei Scroviştea gegen Ende des 50` Jahren vom Buriaş-Wald hingekommen. Scroviştea wurde „Jagdrevier“ in 1958 erklärt und mit Stacheldrahtzaun von 2 m hoch umzäunt, sodass seine Population von Damhirsche vergrößert wurde, die auch andere Exemplare im verschiedenen Jahren mitgebracht wurden. Zum Beispiel wurden von Socodor-Chișineu Criş (Arad-Kreis) 23 Exemplare in 1985, dann 56 in 1986 und 64 in 1987 mitgebracht. Andere 10 Exemplare wurden hier in den 70`-80` Jahren von Reşca (Olt-Kreis) mitgebracht.

Im Frühling 1967 sind in Buriaş-Wald fast 150 Exemplare beobachtet (Cotta, 1968).

Im März 1969 sind 60 Exemplare (25 Männchen und 35 Weibchen) bei Buriaş-Scroviştea und 15 Exemplare (6 Männchen und 9 Weibchen) im Snagov-Park gezählt. In diesem letzten Wald waren in 1976 - 26 Exemplare.

Der natürliche Zuwaschs und die durchgeführte Populationen haben das Bestehen in 1978 von 441 Damhirsche in den Wälder von Buriaş und Scroviştea bestimmt und nach einen Jahrzehnt waren dort cca 2000 Exemplare. Die damalige Populationen hat nicht nur große Vegetationsschaden, sondern auch eine starke Verminderung der Rehezahl bestimmt.

Ein wesentlicher Faktor, der die Populationswachstum von Damhirsche bestimmt hat, war das Bestehen in der Zeitspanne 1977-1989 einer Jagdeinheit von Nationalinteresse Scroviştea-Vlăsia.

Die Zeitspanne 1989-1992 hat sich durch einen starken Wilddieberei gekennzeichnet, haben aber auch Migration in anderen Gebiete stattgefunden. Aus diesem Grund waren in 1991 nur cca 150 Exemplare in den Wälder Snagov-Park und Buriaş (Tab. 1).

Der schwere Winter 1991/1992 hat die Verminderung der Bestände bei Buriaş zur Hälfte bestimmt.

Wegen des Umgebungsverfalls von Scroviștea aus den letzten Jahren haben viele Damhirsche diesen Wald verlassen und sind nach anderen Gebiete ausgewandert. Wir erinnern hier nur die Tatsache, dass in Vlădiceasca-Wald, der sich 3 km Süd-Ost befand, 96 Exemplare in 1999 hergekommen sind und in den nächsten Jahren waren hier 23 Exemplare, der Rest sind aber bei Scroviștea zurückgekommen.

Tabelle 1 – Die Bestandddynamik in der Zeitpanne 1991-2000 (Exemplare)

Wald/Jahr	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Snagov Parc	50	49	44	50	13	-	-	-	20	5
Buriaş	100	50	36	37	8	8	8	9	20	9

In der Zeitspanne 1995-2010 hat sich bei Buriaş jährlich 6-16 Damhirsche besopchtet und bei Snagov-Park sind in der letzten Jahren die meisten Exemplare (19) im Frühling 2008 gesehen.

Das spezifische Charakter des Scroviștea-Waldes hat das Bestehen eines großen Bestandes von 433 Exemplare im Frühling 1996 und 390 in 2005 begünstigt.

Im Frühling 2011 waren auf das Territorium des Ilfov-Kreises cca 240 Damhirsche zu sehen, aus denen 223 Exemplare (46 Männchen und 177 Weibchen) im Scroviștea-Wald, 12 Exemplare (5 Männchen und 7 Weibchen) im Snagov Park-Wald und 4 Exemplare (1 Männchen und 3 Weibchen) im Buriaş-Wald.

Im Jahre 1991 sind bei Scroviștea-Wald ein sehr wertvoller Trophäe von 202 CIC-Punkten erlangt.

Die ausgelöschten Populationen

Bis im Jahre 2009 wurde dieser Säugtier auch in anderen Wäldern des Ilfov-Kreises begegnet, von wo er wegen der Jagddieberei und der Ruhemangel verschwunden ist. Die Hauptgründe waren der rege Verkehr, die Grundbesitzänderungen und die Bauvermehrung, weil dieses Gebiet sich in der Hauptstadtnähe befindet.

Wir erwähnen, dass im Ilfov-Kreis noch zwei Kolonisierungen mit dieser Art stattgefunden sind.

Die erste wurde im Malu Roșu-Balta Neagră-Wald gemacht, der südlich vom Dorfe Lipia (Gemeinde Gruiu), 40 km nord-östlich von Bukarest entfernt ist. Der Wald liegt zwischen der Ialomița-Fluss am Norden und der Căldărușani-See im Süden. Hier wurde im Herbst 1954 18 Damhirsche vom Șarlotă-Park mitgebracht (Constantinescu, 1960). Diese Exemplare wurden ursprünglich in einem Gehege gehalten und sind nach 12 Monaten, im Herbst 1995, befreit (Mircea, 1956).

Im Jahre 1960 wurden im Forstrevier Urziceni, mit einem experimentellen Zweck, ein paar Exemplare in Brânzeasca-Wald (Gemeinde Moara Vlăsiei) kolonisiert, die auch vom Șalota-Park mitgebracht wurden, die später frei gelassen wurden.

Ursprünglich wurden diese Exemplare im ganzen Malu Roșu-Wald und erst nachher im Balta Neagră-Wald bis in der Nähe des Căldărușani-Klosters verbreitet. Später hat sich diese Art ihr Areal nach Westen verbreitet, sodass in 1963-1964 sie in Corniș- und Surlari-Wald und in 1966 auch in Barboși-Wald und im Walde von der Nähe des Dorfes Ghermănești beobachtet wurde.

Im Brânzeasca-Wald babten sich die Damhirsche eine Zeitweile (in 1963 waren 4 Familien) beibehalten, die nachher diese nach Norden in den Căldărușani-Malu Roșu-Balta Neagră-Wälder ausgewandert sind.

Im Frühling 1969 wurden 14 Exemplare (3 Männchen und 11 Weibchen) im Brânzeasca-Wald, 10 Exemplare (4 Männchen und 6 Weibchen) im Balta Neagră-Wald und 5 (2 Männchen und 3 Weibchen) im Ghermănești-Wald beobachtet.

In 1976 wurden im Ghermănești-Wald 28 Damhirsche und in 1978 im Balta Neagră-Wald 60 Exemplare beobachtet.

Im Brânzeasca-Wald wurden nur 3 Weibchen in 1975 und 2 Weibchen in 1976, dann 5 Exemplare (2 Männchen und 3 Weibchen) in 1977 und 6 Exemplare (2 Männchen und 4 Weibchen) in 1979 beobachtet. Auch in 1980 wurden im Brânzeasca-Wald Weibchen mit Hirschkälbe beobachtet und zwei Zehntel nachher (1981-2001) wurde diese Art nicht mehr beobachtet. In 1974 haben die Wölfe zwei Damhirsche in diesem Wald umgebracht.

Im März 1991 waren in den Balta Neagră-Barboși-Ghermănești und Surlari-Corniș-Wälder cca 240 Exemplare (Tab. 2).

Tabelle 2 – Die Zahl der Damhirschen (auf Geschlechte) in einigen Wälder in den Jahren 1991 und 1997 (Exemplare)

Wald / Jahr	Balta Neagră Total (M/W)	Barboși Total (M/W)	Ghermănești Total (M/W)	Surlari-Corniș Total (M/W)
1991	80 (30 / 50)	70 (30/40)	20 (10 / 10)	70 (25 / 45)
1997	27 (5 / 22)	-	-	4 (1 / 3)

Der schwere Winter 1991/1002 hat große Schäde bestimmt: mit 50% im Ghermănești-Wald, mit 38% im Balta Neagră-Wald, mit 18% im Barboși-Wald und mit 15% im Surlari-Corniș-Wald.

Die leichte Bewegung der Damhirsche von einen zum anderen Wald machte, dass in einigen Jahren diese Art in manchen Wälder nicht mehr beobachtet zu sein.

Im Frühling 1994 wurden die letzte Exemplare im Ghermănești-Wald gesehen und zwei Jahre nachher wurde der letzte Exemplar im Barboși-Wald beobachtet.

Der schwere Winter 1995/1996 bat eine Verminderung mit 30% des Bestandes im Surlari-Corniș-Wald bestimmt.

In den Surlari- und Balta Neagră-Wälder waren 32 Exemplare in 1998 und 9 Exemplare (2 Männchen und 7 Weibchen) im März 2000 zu sehen. Aus 2001 wurde in Balta Neagră-Wald kein Exemplar mehr von dieser Art beobachtet, nach fast ein halber Jahrhundert bestehende Zeit.

Im Gegenteil, im Surlari-Wald waren noch 10 Exemplare (2 Männchen und 8 Weibchen), die bis zum Beginn des Jahres 2001 beobachtet wurden, die nachher diese im Brânzeasca-Wald vorübergegangen sind. In diesem Wald sind vom 2001 bis 2008 nur 10-12 Damhirsche beibehalten.

Literatur

- CĂLINESCU R., 1962 – *Excursii în împrejurimile Capitalei*. Edit. Uniunii de Cultură Fizică și Sport, București.xxxxxxxxxxxxxx
- CONSTANTINESCU V., 1960 – *Tot mai mult vânat*. Vânătorul și Pescarul Sportiv, București. **5**.
- COTTA V., 1952 – *Economia cinegetică în zona verde a Capitalei*. Revista Pădurilor, Supliment, București. **12**.
- COTTA V., 1968 – *Lopătarul. Analiza situației actuale*. Vânătorul și Pescarul Sportiv, București. **8**.
- COTTA V., BODEA M., MICU I., 2008 – *Vânatul și vânătoarea în România*. Edit. Ceres, București. xxxxxxxxxxxx
- MIRCEA N. D., 1956 – *Malul Roșu*. Vânătorul și Pescarul Sportiv, București. **8**.
- MURARIU D., 2004 – *Fauna României. Mammalia. Lagomorpha, Cetacea, Artiodactyla, Perissodactyla (fără specii actuale)*. Edit. Academiei Române, București. **XVI (4)**.
- VASILIU G., 1961 – *Verzeichnis der Säugetiere Rumäniens*. Säugetierkundliche Mitteilungen, München. **9 (2)**.
- * * *, 1990-2005. *Arhiva Direcției Silvice Ilfov*. București.

**DES NOTES FLORISTIQUES DU DISTRICT DE CARAŞ-SEVERIN
MUNICIPE DE REŞIȚA ET SES ENVIRONS (VI NOTE)**

ILIE GOGA

Rue Republicii, Reșița, Caraș-Severin Département, Romania

Résumé: L'auteur présente dans son article une nouvelle séries de plantes vasculaires recherches dans le département Caras-Severin parmi des rares espèces dont il cite : *Muscaris tenuiflorum* Tausch et *Orchis coriophora* L. de la zone étudiée.

Mots clé: *Muscaris tenuiflorum* Tausch, *Orchis coriophora* L., Caraș-Severin

Rezumat: Note floristice din județul Caraș-Severin, Municipiul Reșița și împrejurimile sale (nota VI).

Autorul prezintă în această comunicare o nouă serie de plante vasculare cercetate în județul Caraș-Severin. Printre acestea se află și specii rare cum ar fi *Muscaris tenuiflorum* Tausch și *Orchis coriophora* L. întâlnite în zona studiată.

Cuvinte cheie: *Muscaris tenuiflorum* Tausch, *Orchis coriophora* L., Caraș-Severin.

Liste des espèces:

Fam. POLYPODIACEAE

Asplenium septentrionale (L.) Hoffm. – Globu Craiovei, dans les gorges sur les rochers.

Polypodium vulgare L. – Reșița, roches calcaires dans la forêt.

Fam. RANUNCULACEAE

Ranunculus ficaria L. – Reșița, dans Stârnici forêt.

Thalictrum minus L. – Băile Herculane, Pecinișca village, les prairies à proximité de l'usine de chaux.

Fam. FUMARIACEAE

Corydalis cava (L.) Schweigg. et Koerte – Reșița, Ranchina forêt.

Corydalis solida (L.) Clairv. – Anina, les collines dans les buissons.

Fam. CARYOPHYLLACEAE

Dianthus armeria L. – Câlnic village, dans les pâturages, sur la colline Tâlva Mare.

Dianthus carthusianorum L. – Reșița, Cârșiei colline, dans les prairies et bosquets.

Stellaria holostea L. – Reșița, Cocoșului colline, dans la forêt.

Fam. AMARANTHACEAE

Amaranthus crispus (Lesp. et Thev.) N. Terracc. – Reșița, en prairie Bârzava, par endroits abandonnées.

Amaranthus deflexus L. – Reșița, en ville.

Fam. ROSACEAE

Cotoneaster nebrodensis (Guss.) C. Koch – Băile Herculane dans la Croix Blanche sur des roches calcaires.

Potentilla argentea L. – Câlnic village.

Potentilla inclinata Vill. – Globu Craiovei dans les gorges, les côtes herbeuses, rocheuses.

Potentilla recta L. – Mont Semenic, dans le foin.

Potentilla supina L. – Reșița, en ville.

Potentilla thuringiaca Bernh. ex Link – Globu Craiovu dans le gorges, les côtes rocheuses, dans la forêt.

Pyrus pyraster (L.) Burgsd. – Reșița, Stârnica vallée.

Fam. FABACEAE

Genista ovata W. et K. – Globu Craiovei, endroits herbeux dans le Globului Gorges.

Ononis spinosa L. - Globu Craiovei, endroits herbeux dans le Globului Gorges.

Trifolium aureum Pollich – Reșița, dans la forêt la colline Chica.

Trifolium montanum L. – Reșița, dans la vallée Stârnica, dans la forêt.

Fam. ONAGRACEAE

Epilobium hirsutum L. – Globu Craiovei, dans les gorges.

Epilobium montanum L. – Reșița, Stârnica vallée, dans la forêt.

Epilobium roseum Schreber – Reșița, dans la forêt, sur la route forestière.

Fam. ACERACEAE

Acer platanoides L. – Reșița, en ville, planté.

Fam. APIACEAE

Arabis hirsuta (L.) Scop. – Globu Craiovei dans les gorges.

Caucalis platycarpos L. ssp. *muricata* (Celak.) Holub – Băile Herculane, dans le Prolaz Gorges, sur le éboulis calcaires.

Lithospermum purpureocaeruleum L. – Reșița, en ville.

Oenanthe banatica Heuff. – Reșița, dans le Țerova vallée.

Oenanthe silaifolia Bieb. – Reșița, des endroits humides dans les prairies.

Peucedanum carvifolium Vill. – Reșița dans les buissons.

Fam. PRIMULACEAE

Lysimachia numularia L. – Reșița, dans la colline Dealu lui Stan.

Fam. BORAGINACEAE

Anchusa officinalis L. – Reșița, dans la vallée Slatini par des prairies.

Myosotis discolor Pers. – Mont Semenic, dans les marais et dans les prairies.

Myosotis ramosissima Rochel – Reșița, dans la colline Țerova.

Myosotis scorpioides L. – Mont Semenic dans les marais.

Pulmonaria officinalis L. – Reșița, Stârnici vallée, dans le forêt.

Pulmonaria rubra Schott. – Reșița, dans la colline Cârșiei, sur le calcaire.

Symphytum tuberosum L. – Reșița, Stârnici foret et sur le monastère de Brebu Nou dans la forêt.

Fam. LAMIACEAE

Ajuga genevensis L. – Băile Herculane, Croix Blanche, dans les bois sur des roches calcaires.

Fam. SCROPHULARIACEAE

Digitalis grandiflora Mill. – Reșița, dans la forêt Capu Baciului.

Linaria genistifolia (L.) Miller – dans les Globului Gorges, Globu Craiovei, dans les prairies.

Linaria vulgaris Miller – Reșița, dans la vallée Țerova.

Melampyrum barbatum L. – Reșița, dans la forêt près de Dealul Gol.

Melampyrum bihariense A. Kerner – Oravița ville dans la forêt, Reșița dans la Doman vallée, bord de la route.

Melampyrum cristatum L. – Reșița, dans la colline Țerova dans les prairies bord de la route; dans la Moroasa colline dans les prairies.

Melampyrum nemorosa L. – Reșița, dans la vallée de la Doman rivière, la forêt.

Verbascum chaixii Vill. – Reșița, Cuptoare village, dans la colline Cârșiei.

Verbascum glabratum Friv. – Reșița, dans la Haute Vallée de la rivière, dans la forêt.

Verbascum lychnitis L. – Reșița, dans la Doman vallée sur les côtes rocheuses dans la forêt.

Verbascum nigrum L. – Reșița, dans la forêt Budinic et dans la colline Cârșiei.

Verbascum phlomoides L. – Reșița, dans la Croix colline, dans les prairies; Carașova village, bord de la route dans la roches calcaires.

Verbascum speciosum L. – Schrader. – Băile Herculane, près de la gare, près de route; Moldova Noua près de la route.

Verbascum thapsus L. – Reșița, dans la vallée Doman, bord de la route.

Verbascum vandasii (Rohlena) Rohlena - dans la Haute Vallée de la rivière, dans la forêt.

Veronica arvensis L. – Reșița, dans la Croix colline, par le pâturage.

Veronica chamaedrys L. – Reșița, dans la forêt Ranchina, par des prairies.

Veronica officinalis L. – Reșița, bord de la route.

Veronica persica Poiret – Reșița, dans la colline par le pâturage.

Fam. OROBANCHACEAE

Orobanche caryophyllaceae Sm. – Anina village dans les prairies entre Anina et Carasova.

Fam. RUBIACEAE

Asperula arvensis L. – Reșița, dans les prairies.

Asperula cynanchica L. – Globu Craiovei, Globului Gorges, dans les côtes herbeuses.

Galium odoratum (L.) Scop. – Reșița, dans la forêt Ranchina, les buissons.

Fam. DIPSACACEAE

Knautia arvensis (L.) Coulter – Băile Herculane, Pecinișca village, dans les prairies sur la colline.

Knautia arvensis (L.) Coulter ssp. *rosea* (Baumg.) Soó – Reșița, dans la colline Lumpacului dans les prairies.

Scabiosa columbaria L. ssp. *banatica* (Wald. et Kit.) Diklić - Globu Craiovei, Globului Gorges, dans les côtes herbeuses.

Scabiosa ochroleuca L. – Reșița, dans la colline près de la ville, dans les prairies.

Fam. ASTERACEAE

Ambrosia artemisiifolia L. – Carașova localité, bord de la route.

Anthemis tinctoria L. – Reșița, dans la colline Gol.

Aster linosyris (L.) Bernh. – Băile Herculane, sur la prairie de la Mont Domogled.

Carlina biebersteinii Bernh. ex Homem ssp. *brevibracteata* (Andrae) Werner – Reșița, dans la Haute Vallée de la rivière, dans la forêt.

Carthamus lanatus L. – Reșița, Cuptoare village, par des prairies.

Chondrilla juncea L. – Reșița, dans la colline Țerova.

Crepis setosa Hall. – Reșița, Stârnic vallée sur la côte rocheuse.

Helichrysum arenarium (L.) Moench – Reșița, dans la colline Țerova, bord de la route.

Hieracium bifidum Kit ex Hornem. – Reșița, a travers les buissons sur les Ciorii colline.

Hieracium pilosella L. – Reșița, dans la forêt Budinic sur la côte rocheuse.

Hypochaeris maculata L. – Reșița, dans le foret dans la vallée Stârnici.

Hypochaeris radicata L. - Reșița, Țerovei colline avec des pâturages et des arbustes.

Inula ensifolia L. – Reșița, dans la Haute Vallée de la rivière, dans la forêt.

Inula hirta L. – Reșița, sur les prairies dans la vallée Stârnici.

Inula salicina L. – Reșița, dans la vallée de la rivière Doman, sur les prairies.

Leontodon autumnalis L. ssp. *pratensis* (Koch) Greml – Reșița, bord de la forêt.

Picris hieracioides L. – Reșița, Cuptoare village, bord de la route forestière.

Solidago virgaurea L. – Reșița, dans la vallée Stârnici.

Taraxacum officinale Weber ex Wiggers – Reșița, dans la forêt - Cioaca Budinicului.

Fam. LILIACEAE

Muscari tenuiflorum Tausch. – Băile Herculane, dans les prairies sur la colline près de l'usine de chaux.

Polygonatum odoratum (Miller) Druce – Băile Herculane dans les prairies près de la Pecinisca village.

Fam. ORCHIDACEAE

Anacamptis pyramidalis (L.) L.C.M. Richard – Reșița, dans la colline Gol, dans la forêt sur la cote rocheuse.

Dactylorhiza maculata (L.) Soó – Anina, dans la forêt, sur les sols calcaires.

Orchis coriophora L. – Reșița, Cuptoare village dans les prairies; dans la colline Arșilor, près du monastère par des prairies.

Orchis morio L. – Reșița, dans la prairie de fauche Ranchina.

Fam. CYPERACEAE

Eleocharis palustris (L.) Roemer et Schultes – Reșița, Câlnic village, dans la forêt.

Eriophorum scheuchzeri Hoppe. – Reșița, Cuptoare village, dans les zones humides, sur la colline Cârșiei.

Fam. POACEAE

Sesleria filifolia Hoppe. – Moldova Nouă, Valea Mare sur les rochers.

Fam. SPARGANIACEAE

Sparganium erectum L. ssp. *erectum* – Zervești village, dans les zones humides, près du village.

BIBLIOGRAPHIE

- CIOCÂRLAN V., 2000 – *Flora ilustrată a României*. Ed. a II-a.
- GOGA I. .D., RÖSLER R., 2008 – *Doi taxoni noi pentru Flora României*. Analele Gr. Bot. Univ. Macea. (2): p. 123.
- NIMIS P. L., POLDINI L., MARTELLOS S., 2006 – *Flora della Val Rosandra*. Trieste. Edizioni Galiardiche.
- SĂVULESCU T., 1966 – *Flora României*. Ed. Acad. României, Bucureşti, **XI**.

**DES NOTES FLORISTIQUES DU DISTRICT DE CARAŞ-SEVERIN
MUNICIPE DE REŞIȚA ET SES ENVIRONS (VIII NOTE)**

ILIE GOGA

Rue Republicii, Reșița, Caraș-Severin Département, Romania

Résumé: L'auteur présente d'autres matériaux floraux étudiés dans Caras Severin et Resita. Parmi les espèces les plus intéressantes sur devis: *Euonymus europaeus* L., *Thymus dacicus* Borbas nouvelles espèces pour Banat et *Bidens frondosa* L.

Mots clé: *Thymus dacicus* Borbas, *Euonymus europaeus* L., *Bidens frondosa* L., Caraș-Severin

Rezumat: Note floristice din județul Caraș-Severin, municipiul Reșița și împrejurimile sale (nota a VIII-a).

Autorul prezintă alte materiale floristice studiate în județul Caraș-Severin și în municipiul Reșița. Dintre speciile mai interesante cităm pe *Euonymus europaeus* L., *Thymus dacicus* Borbas specie nouă pentru Banat și *Bidens frondosa* L.

Cuvinte cheie: *Thymus dacicus* Borbas, *Euonymus europaeus* L., *Bidens frondosa* L., Caraș-Severin

Liste des espèces:

Fam. RANUNCULACEAE

Thalictrum lucidum L. - dans la prairie, près du village Zervești, comté Caraș Severin.

Thalictrum simplex L. ssp. *galioides* (Nestl.) Korsh. – Reșița, Lupac colline avec du foin.

Fam. CARIOPHYLLACEAE

Silene heuffelii Soó – Reșița, dans la forêt Ranchina.

Silene saxifraga L. – Băile Herculane, sur des roches calcaires.

Fam. AMARANTHACEAE

Amaranthus albus L. – dans la station de Reșița.

Amaranthus blitoides S. Watson – Câlnic village.

Amaranthus deflexus L. – Caransebeș, dans le parc.

Fam. CHENOPODIACEAE

Atriplex rosea L. – Câlnic village bord de la route.

Chenopodium ambrosioides L. – Reșița, rivières Bârzava.

Fam. ROSACEAE

Rosa agrestis Savi. – Cuptoare village, dans les prairies.

Fam. FABACEAE

Anthyllis vulneraria L. - Reșița, Dealul Gol dans les prairies.

Anthyllis vulneraria ssp. *vulneraria* – Doman Vallée, près de la route forestière.

Cytisus nigricans L. – Reșița, dans le foin colline Lupac ; Mehadia, Mont Strajoț dans les roches.

Genista tinctoria L. – Reșița, Dealul Gol dans les prairies.

Genista tinctoria L. ssp. *elatior* (J. Koch) Nyman – Dealul Țerovei dans les prairies.

Vicia cracca L. – Reșița, Cuptoare village, dans Capu Baciului dans la forêt.

Fam. SANTALACEAE

Euonymus europaeus L. – Reșița, Doman Vallée, dans la forêt.

Thesium arvense Horvatowszky – Băile Herculane, dans Prolaz Gorges, sur la côte rocheuse.

Fam. EUPHORBIACEAE

Euphorbia carnatica Jacq. – Reșița, Doman Vallée de la rivière, la côte rocheuse dans la forêt.

Fam. ACERACEAE

Acer campestre L. – Reșița, , Cuptoare village, dans la prairies.

Fam. APIACEAE

Alyssum petraeum Ard. – Băile Herculane, les Haiducilor Grotte dans la forêt.

Arabis procurrens W. et K. – Băile Herculane, Cerna Valley falaises de calcaire.

Barbarea stricta Andrz. – Reșița, Cuptoare village dans la Ponor prairies et dans la forêt; Baciului Vallée le long de la route.

Barbarea vulgaris R. Br. – Reșița, Cuptoare village dans la prairies de montagne.

Bupleurum praecox L. – Reșița, dans la forêt, Doman Vallée de la rivière.

Cardaminopsis arenosa (L.) Hayek - dans la forêt de Vallée Baciului sur le calcaire.

Diplotaxis muralis (L.) DC. – Globu Craiovei dans le Globe Gorges bord de la route.

Seseli annuum L. – Reșița, Cuptoare village dans la Ponor prairies.

Sisymbrium altissimum L. – Reșița bord de la route; Caransebeș le rail road dépôt.

Sisymbrium orientale L. – Caransebeș Timiș rivière dans fauvette.

Fam. OLEACEAE

Fraxinus excelsior L. – Reșița dans la forêt Ranchina.

Fraxinus ornus L. - Reșița, Doman Vallée dans la forêt.

Fam. BORAGINACEAE

Pulmonaria montana Lej. – Bocșa, dans la forêt.

Pulmonaria officinalis L. – Reșița, Stârnic Vallée dans la forêt.

Fam. LAMIACEAE

Acinos alpinus (L.) Moench – Băile Herculane dans Prolaz Gorges, sur la côte rocheuse.

Acinos alpinus (L.) Moench ssp. *majoranifolius* (Miller) P.W.Ball – Băile Herculane.

Acinos arvensis (Lam.) Dandy – Reșița, Câlnic village dans les prairies.

Thymus dacicus Borbas – Băile Herculane Prolaz Gorges, sur la côte rocheuse.

Thymus pulegioides L. ssp. *chamaedrys* (Fries) Gușuleac – Reșița, Țerovei colline dans la prairies; Mont Semenic dans les marais.

Fam. CAMPANULACEAE

Campanula patula L. – Reșița, Țerovei colline.

Campanula rapunculoides L. – Fizeș village dans les prairies.

Fam. RUBIACEAE

Galium schultesii Vest – Reșița, dans la forêt Ranchina; Oravița dans la forêt.

Galium verum L. – Reșița, dans le foin colline Lupac.

Fam. DIPSACACEAE

Succisella inflexa (Kluk) G. Beck – Zervești, dans la prairie foin des marais.

Fam. ASTERACEAE

Anthemis ruthenica Bieb. – Reșița dans la colline Crucii.

Arctium minus (J.Hill) Bernh – Reșița, Țerovei colline bord de la route.

Aster novi-belgii L. – Reșița, bord de la route forestière dans la Râul Mare Vallée.

Bidens frondosa L. – Reșița, Lunca Bârzavei quartier, rivières Bârzava.

Bidens tripartita L. – Reșița, rivière Bârzava.

Centaurea stoebe L. – Globului Gorges sur la côte rocheuse.

Hieracium murorum L. – Reșița, dans la colline Ghica, dans la prairie.

Hieracium racemosum W. et K. – Globu Craiovei dans le Globe Gorges.

Hieracium umbellatum L. – Reșița, dans la rivière Stârnici.

Fam. LILIACEAE

Ornithogalum umbellatum L. – Reșița, dans la prairie et à travers les buissons dans la colline Dealul Gol.

Fam. ALLIACEAE

Allium vineale L. – Bocșa, dans la prairies bord de la route.

Fam. JUNCACEAE

Luzula campestris (L.) DC. – Mont Semenic dans les prairies.

Luzula luzuloides (Lam.) Dandy et Wilmont – Văliug, dans le forêt Crivaia.

Fam. CYPERACEAE

Carex divulsa Stokes – Băile herculane, dans Prolaz Gorges, sur la côte rocheuse.

Fam. POACEAE

Agrostis rupestris All. – Reșița dans la colline Ghica.

Phleum hirsutum Honck. – Reșița, dans la colline Ghica.

Melica ciliata L. – Reșița, Cuptoare village dans les prairies.

Melica nutans L. – Globu Craiovei dans la forêt.

Melica picta L. – Reșița dans la rocheuse de la forêt Ranchina.

BIBLIOGRAFIE

CIOCÂRLAN V., 2000 – *Flora ilustrată a României*. Ed. a II-a, Ed. Ceres, București.

NIMIS P. L., POLDINI L., MARTELLOS S., 2006 – *Flora Della Val Rosandra*. Edizioni Goliardiche.

IN MEMMORIAM, ION S. BĂCANU

January 1, 1931 – December 9, 2011

RADU GAVA

The Argeș County Museum, Armand Călinescu Street, no. 44, 110047, Pitești, Argeș, Romania,
e-mail: radugava@yahoo.com

The teacher ION S. BĂCANU was born on the 1st January, 1931, in the village Davidești, Argeș County. He was the 3rd of the four children of Băcanu family (the churchman Sebastian and Smaranda). After he finished the School from his natal village, between 1941 and 1949 he was a student of the High School Dinicu Golescu from Câmpulung-Muscel.



During the period 1949-1953 he was a student of the Faculty of Geology-Geography from the C. I. Parhon University of București. He graduated 1953.

After the graduation, he becomes a teacher at the Secondary School from Merișani, Argeș County until 1958. Here gets married with Sabina Diaconu, elementary teacher at the same school.

In 1958 he moves to Pitești, where he teaches the Geography and Geology until 1974 at the "Al. Odobescu" High School. Here, he was also a deputy manager of the school between 1972 and 1973.

Beginning with 1974 he continues his activity as a teacher of Geography at the Secondary Schools no. 4 and no. 2, from Pitești. He retires in 1996.

He was always focused on improving his skills as a teacher. In 1969, he published a valuable study methodic-scientific – "Aspecte morfologice asupra văii superioare a Argeșului, cu privire specială asupra originii cheilor Argeșului, Topologului și Vilsanului". This study represents the paper he presented in order to get the highest

graduation as a Secondary School teacher, which he successfully gained.

He permanently tried to get the newest scientific information as well as that regarding the teaching methodology. He studied scientific papers, took part at sessions of methodical commissions, pedagogical reunions, scientific briefings. He presents his scientific works at the Institutul de Perfecționare a Cadrelor Didactice and at the Societatea de Științe Geografice.

He loved his students, and in turn he was one of the most beloved and hardworking teachers. During the teaching years he organized various activities about the natural environment, as well as weather observations and the art of photography of the nature. Together with his students he was the author of various didactic materials (maps, charts, graphs, etc.) for the usage of the educational process. Both in the country and abroad (Russia, Hungary, Bulgaria, Czechoslovakia, Poland, Germany), he collected rocks, minerals and fossils and thus a valuable collection of geology was made. A part of this material was donated to the laboratory of palaeontology and historical geology of the Faculty of Biology from Pitești.

He was a well trained and talented teacher and pedagogue. In 1960 he became the Scientific Secretary of the Pitesti branch of S.S.N.G., a function he carried out until his retirement. As a Scientific Secretary he organized in Pitești two National Symposia in 1965 and 1972, and in 1969 he organized in the Câmpulung-Muscel the 2nd National Conference of Geography Teachers.

In 1969 he was a member of the editorial collective that made the book of geology for high school, which was edited and reprinted over the years by the Editura Didactică și Pedagogică.

Beside the teaching activities, Ion Băcanu had a rich scientific and methodological research activity. Thus he published in scientific magazines or in the local newspapers numerous studies of physics, geography and economy, as well as papers including geological and paleontological data of the Argeș area. He also published works of the geography teaching.

For his qualities as a teacher Ion S. Băcanu received the title of "Profesor Frunțaș" from the Ministry of Education.

All his friends, the former students or colleagues and the members of the S.S.N.G, Pitesti will always keep in their heart the image and the personality of Ion S. Băcanu.

He was buried in the cemetery of Merișani, Argeș.

IN MEMORIAM ION S. BĂCANU

1 ianuarie 1931 – 9 decembrie 2011

RADU GAVA

Argeș County Museum, Armand Călinescu Street, no. 44, 110 047, Pitești, Argeș, România,
e-mail: radugava@yahoo.com

Profesorul ION S. BĂCANU s-a născut, la data de 1 ianuarie 1931, în comuna Davidești, jud. Argeș, fiind cel de al treilea fiu, dintre cei patru copii, ai familiei preotului Sebastian și Smaranda Băcanu. După terminarea școlii primare în satul natal, urmează între anii 1941 și 1949, Liceul Dinicu Golescu din Câmpulung Muscel.



În perioada 1949-1953, frecventea cursurile Facultății de Geologie-Geografie de la Universitatea „C. I. Parhon” din București, iar, în anul 1953, susține examenul de stat și este declarat diplomat universitar.

La absolvirea facultății este repartizat în învățământ la Scoala Generală din Comuna Merișani, jud. Argeș, unde funcționează ca profesor până în anul 1958. Aici se căsătorește cu Sabina Diaconu, învățătoare la aceeași școală.

În anul 1958, se transferă la Pitești, la Liceul "Al. Odobescu", unde predă geografia și geologia până în anul 1974, când profilul liceului se schimbă, aici îndeplinind și funcția de director adjunct, în anul școlar 1972-1973.

Începând cu anul 1974, își continuă activitatea ca profesor titular de geografie la școlile generale nr. 4 și nr. 2, din Pitești, de

unde se pensionează, în anul 1996.

Permanent a fost preocupat de ridicarea pregătirii profesionale. În anul 1959, susține examenul de definitivat iar, în 1966, examenul pentru obținerea gradului II. Trei ani mai târziu, în 1969, realizează o valoroasă lucrare metodico-

științifică – *Aspecte morfologice asupra văii superioare a Argeșului, cu privire specială asupra originii cheilor Argeșului, Topologului și Vâlsanului*, cu care se prezintă la examenul pentru acordarea gradul I în învățământ, pe care îl promovează cu succes.

Se pregătea temeinic pentru lecții și căuta continuu să fie la curent cu ultimele noutăți științifice de specialitate și metodice, consulta lucrări de specialitate sau participa la schimburi de experiență în comisii metodice, cercuri pedagogice, atât pe plan local cât și național, sesiuni de comunicări și referate la Institutul de Perfectionare a Cadrelor Didactice sau la Societatea de Științe Geografice.

S-a distins prin muncă și dragoste față de elevi, fiind unul din cei mai iubiți și harnici profesori. De-a lungul anilor, a organizat cu elevii cercuri de studiu și a desfășurat activități practice pe teren, pentru cunoașterea mediului natural, pentru observații meteorologice sau pentru a învăța elevii să fotografieze natura înconjurătoare. Permanent, împreună cu elevii, a confectionat material didactic (hărți speciale, grafice, diagrame etc.) pentru a fi folosit în procesul de învățământ. De asemenea, cu ocazia diferitelor deplasări efectuate în țară sau în străinătate (Rusia, Ungaria, Bulgaria, Cehoslovacia, Polonia, Germania), a colectat roci, minerale și fosile, realizând pentru școală o valoroasă colecție de geologie. O parte din acest material a fost donat laboratorului de paleontologie și geologie istorică de la Facultatea de Biologie din Pitești.

Bine pregătit profesional și înzestrat cu harul de educator și talentul de pedagog, zestre care nu este la îndemâna oricui; remarcat pentru aceste calități, în anul 1960, este ales secretar științific al Filialei Pitești a S.S.N.G., funcție pe care o îndeplinește până la pensionare. În această calitate, a organizat la Pitești, pe lângă numeroase activități cu caracter local, și două Simpozioane Naționale, în anii 1965 și 1972, iar, în 1969, a organizat la Câmpulung Muscel a doua Conferință Națională a Profesorilor de geografie.

În anul 1969, este cooptat de Ministerul Învățământului în colectivul de redactare a manualului de geologie pentru liceu, manual editat și reeditat de-a lungul anilor de către Editura Didactică și Pedagogică.

În afara activităților didactice, profesorul Ion Băcanu a desfășurat și o bogată muncă de cercetare științifică și metodologică, publicând numeroase studii în revistele de specialitate sau în presa locală, privind unele aspecte fizico-geografice și economice din zona Argeșului sau date geologice și paleontologice. Lucrările metodice s-au referit la aspecte privind predarea geografiei în școală și folosirea materialului didactic la lecție.

Pentru calitățile și meritele dovedite de-a lungul anilor, profesorul Ion S. Băcanu a primit din partea Ministerului Educației și Învățământului titlul de „Profesor fruntaș”. Toți care l-au cunoscut, foștii elevi, colegii de catedră și membrii filialei Pitești a S.S.N.G., îi păstrează o amintire vie.

A fost înmormântat în cimitirul bisericii din comuna Merișani, Argeș.